AGI
ASSOCIATION OF GEOSPATIAL INDUSTRIES

NEWSLETTER

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Theme: Geospatial DPI: Foundations for a Data-Driven India

Editors' Note

For much of its history, geospatial technology has been understood through its outputs: maps, surveys, satellite imagery, coordinates, and complex visualisations. But one interesting transformation taking place today is weaving geospatial into the larger digital architecture of a country.

The idea of Geospatial Digital Public Infrastructure (DPI) brings this shift into focus.

At its heart is a simple proposition: location is a common thread running through almost every aspect of development. Land, roads, buildings, farms, water, utilities, forests, logistics networks and public services all exist somewhere. When this spatial context can be created, connected, updated, and responsibly shared through interoperable digital systems, it becomes the foundation on which other services and decisions can be built.

Think of Geospatial DPI as the fulcrum between technology and public infrastructure. Information created for one purpose can, within appropriate frameworks, support many others. A foundational dataset can inform complex planning, a positioning network can be used for multiple applications, and a common spatial reference can allow seemingly disconnected systems to work together.

The implications extend well beyond government. For businesses, reliable spatial infrastructure can reduce duplication, improve decision-making and create new opportunities to build applications and services. For citizens, the promise is more meaningful: better planning, more responsive services, and a clearer understanding of the places in which they live and work.

And what stands out is that Geospatial DPI is no longer an abstract idea. The foundations are being built, the applications are expanding, and the conversation today is about how we make these systems useful, accessible, and impactful.

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Message from the President's Desk

Sreeramam GV
President, AGI

India's Geospatial ecosystem is entering an important phase of its evolution. From being viewed as a specialised mapping and surveying capability, it has come to be recognised as an enabler of infrastructure, governance, economic activity, and public service delivery.

The emergence of Geospatial Digital Public Infrastructure is a natural progression of this journey.

A robust Geospatial DPI ecosystem requires much more than dataset creation. Foundational data, standards, interoperable platforms, high-accuracy positioning infrastructure, efficient access and update mechanisms, and resource-application interlinking are all key ingredients. The Geospatial DPI is like the foundation that various stakeholders can use to build upon the same spatial ecosystem rather than working in siloes, in repetition.

We are already seeing important building blocks emerge. Think of national positioning infrastructure like the CORS network, and foundational data initiatives under the National Geospatial Policy 2022. Or consider platforms for infrastructure planning like PM GatiShakti and land administration like SVAMITVA and NAKSHA.

The next challenge is to connect these efforts more effectively and translate them into scalable, outcome-oriented applications.

For the Geospatial industry, this presents an opportunity as well as a responsibility. The geospatial sector must continue to invest in indigenous technologies, skilled manpower, platforms, analytics, and emerging capabilities like GeoAI, digital twins, and multi-sensor integration. Close collaboration between industry and government will ensure that standards, specifications, procurement frameworks, and data ecosystems reflect real-world implementation requirements.

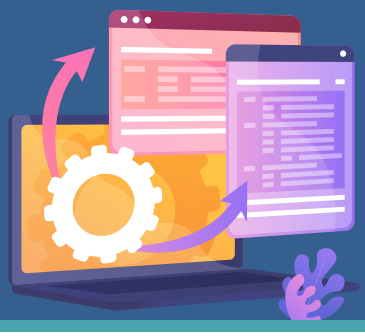
Equally important is the need to think beyond individual projects. Geospatial DPI can create an ecosystem in which government becomes a stronger creator and consumer of foundational spatial infrastructure, while Indian companies build applications, services and technologies on top of it for diverse sectors and markets.

If we build the right foundations today, location can become one of the most powerful connective layers of India's digital economy tomorrow. At the Association of Geospatial Industries (AGI), our focus remains on strengthening this ecosystem through discourse and dialogue. This edition of our newsletter, ***"Geospatial DPI: Foundations for a Data-Driven India",*** brings together insights from across the value chain on these lines.

Enjoy Reading!

Sreeramam GV
President, AGI

Updates from AGI



AGI Elections to the Governing Council and Office Bearers 2026-28

AGI recently conducted its elections for the Governing Council and Office Bearers for the 2026–28 term, marking the beginning of a new leadership cycle for the Association. The newly constituted leadership will continue to strengthen AGI's role as a platform for industry representation, policy dialogue, knowledge sharing and collaboration with government and other stakeholders.

2nd Meeting of the Geospatial Industrial Development Board (GIDB)

The 2nd meeting of the GIDB was held with **Logistics** as its thematic focus, bringing together stakeholders from government, industry and logistics infrastructure to examine the role of Geospatial technologies in strengthening India's logistics ecosystem.

AGI presented an overview of the current status, growth outlook and emerging opportunities for the Indian geospatial industry, with particular emphasis on how location intelligence, mapping, positioning, spatial analytics and emerging technologies can support logistics planning, infrastructure and operations.

The meeting also featured perspectives from key stakeholders including the **Department of Posts, DPIIT, CONCOR, Central Warehousing Corporation (CWC), MapmyIndia** and **Delhivery**, enabling discussion across policy, infrastructure, technology and end-user perspectives. The dialogue highlighted the growing convergence between geospatial technologies and logistics and the opportunities for deeper industry adoption.

Meeting with the Surveyor General

AGI continued its engagement with the Survey of India (SOI) through a strategic meeting with the Surveyor General of India, Shri Shailesh Kumar Sinha, focusing on opportunities to strengthen **Government–industry collaboration** and creating structured avenues for industry participation. Key areas discussed included AGI's participation in upcoming GDPDC ministerial meetings, co-organising an Industry Dialogue series, joint engagement with foreign National Mapping Agencies (NMAs) in coordination with SOI, MEA and relevant organisations, and other shared interests.

Meeting with Joint Secretary (Mech), Ministry of Agriculture

An AGI delegation, led by Secretary-General Shri Prashant Joshi met with officials from the Ministry of Agriculture & Farmers Welfare (MoA&FW), including Joint Secretary and Assistant Commissioner, Shri A.N. Meshram and Joint Secretary (Mech), Smt S. Rukmani. The discussions focused on **AGI's draft white paper,** "Role of Geospatial Technologies in Addressing Gaps in India's Agriculture Sector," with a proposal for joint release and endorsement. The meeting also explored the geospatial industry's key concerns, and strengthening collaboration for deeper adoption of geospatial technologies in the agriculture sector.

Meetings with Joint Secretaries, Department of Land Resources

An AGI delegation, led by Senior Vice President, Shri Deepak Awari, Secretary-General, Shri Prashant Joshi, and Secretary, Shri Vinod Mishra met with the Joint Secretary and Directors of NAKSHA, Mr. Shyam Kumar, and DILRMP, Shri D N Joshi of DoLR. Both sides agreed on continued coordination, mutual participation in departmental initiatives, and timely exchange of industry inputs and requirements.

Meeting with Joint Secretary and Head, NEST Division, Ministry of External Affairs

An AGI delegation, led by Senior Vice President, Shri Deepak Awari met with Joint Secretary and Head, NEST Division, Mr. Binod Kumar of the Ministry of External Affairs. Both sides agreed to work closely in facilitating international collaborations, promoting the global presence of India's geospatial industry, and strengthening industry–MEA engagement.

Meetings with Nodal Officers and State Representatives

The AGI team met with and apprised several departmental and state officers of the Indian Geospatial industry roadmap, AGI's vision, and potential areas of collaboration, including:

- **Shri Shyam Kumar,** Director, NAKSHA, Department of Land Resources
- **Shri Ch. Tata Babu**, Director, APSAC, Govt of Andhra Pradesh
- **Shri. Bhaskar Katamneni,** IAS, Secretary, Department of IT&C, Govt of Andhra Pradesh
- **Shri. Surya Teja**, IAS, Managing Director, AP Technology Services, Govt of Andhra Pradesh
- **Shri. Dr. N. Yuvaraj**, IAS, Secretary, Department of Industries, Govt of Andhra Pradesh
- **Shri. Shubham Bansal**, IAS, Commissioner, AP Industrial Infrastructure Corporation Ltd., Govt of Andhra Pradesh
- **Shri Budithi Rajasekhar,** IAS, Special Chief Secretary, Department of Agriculture
- **Shri. S. Suresh Kumar,** IAS, Principal Secretary, Department of Municipal Administration and Urban Affairs, Govt of Andhra Pradesh
- **Shri Shashi Bhushan Kumar (IAS),** Special Chief Secretary, Department of Water Resources, Govt of Andhra Pradesh
- **Shri. B. Mohd. Diwan Mydeen**, IAS, Principal Secretary, Department of Forests, Govt of Andhra Pradesh
- **Dr. Harish Puppala, Coordinator,** Centre for Geospatial Technology, SRM University
- **Dr. Roshan Srivastav,** Project Director, IIT Tirupati Navavishkar I-Hub Foundation

Interview – Octave

"As India's DPI ecosystem continues to evolve, geospatial intelligence has the potential to become a foundational layer," notes Chanpreet Singh Sahni, Vice President, Octave

Octave has just completed one of the most significant corporate transformations in the global geospatial industry, becoming an independent pure-play software and SaaS company. For your Indian clients and partners, what does this mean in terms of product roadmap, investment, and commitment to the market?

"Our transformation into an independent, software-first and SaaS-focused company reinforces our long-term commitment to innovation and customer success. For our customers and partners in India, it means a sharper focus on delivering an integrated portfolio that spans the entire asset lifecycle—from Design to Build, Operate, and Protect. By bringing together these capabilities, we are helping organizations create a connected digital foundation that enables better planning, faster execution, smarter operations, and more resilient infrastructure. At the same time, we are advancing our geospatial intelligence platforms, accelerating cloud-native capabilities, and delivering solutions that address rapidly evolving business and government requirements.

India is one of the world's most dynamic geospatial markets, driven by digital transformation initiatives, smart infrastructure, and data-led governance. We see tremendous opportunities to collaborate with customers across government, utilities, telecommunications, transportation, defense, agriculture, and urban development. Our investment strategy remains centered on expanding platform capabilities, strengthening our partner ecosystem, supporting local innovation, and ensuring that customers can deploy scalable, secure, and interoperable geospatial solutions aligned with India's digital ambitions."

Octave's geospatial intelligence suite represents decades of deep platform investment. As the geospatial sector accelerates under the National Geospatial Policy 2022, how are these platforms positioned for India-specific use cases?

"India's National Geospatial Policy has created an enabling environment where location intelligence is becoming integral to decision-making across sectors. Our geospatial intelligence platforms are designed to help organizations transform complex spatial data into operational insights that improve planning, monitoring, and execution.

For India, this translates into applications across urban planning, infrastructure development, utilities modernization, disaster preparedness, environmental monitoring, agriculture, mining, public safety, and national security. Equally important is our ability to integrate data from satellites, drones, aerial imagery, IoT sensors, enterprise systems, and AI models into a unified operational picture.

Our long-term commitment to India is reflected not only in the solutions we build but also in our strong local presence. With a large and growing employee base and dedicated R&D centers in Hyderabad and Pune, India plays a pivotal role in the evolution of our geospatial intelligence platforms. This local expertise enables us to develop capabilities that address India's unique requirements while contributing to global innovation. Beyond mapping assets, our platforms empower organizations to build digital twins, automate workflows, leverage AI-driven analytics, and make data-driven decisions at scale, all while ensuring seamless interoperability with existing enterprise systems."

India's Geospatial DPI vision calls for geospatial data to be woven into the country's foundational digital infrastructure: interoperable, accessible,

and actionable across sectors. What does "intelligence at scale" specifically mean for a country like India, and how do you see Octave's platforms contributing?

"For a country as diverse and fast-growing as India, intelligence at scale means enabling millions of decisions—large and small—to be informed by trusted location intelligence. Whether planning transportation networks, monitoring critical infrastructure, managing utilities, responding to natural disasters, or delivering citizen services, geospatial data becomes significantly more valuable when it is accessible, interoperable, and connected to operational workflows.

Our role is to provide a platform that transforms data into actionable intelligence. By combining imagery, GIS, AI, analytics, and cloud technologies, organizations can move beyond visualization to predictive insights and automated decision support.

As India's Digital Public Infrastructure ecosystem continues to evolve, geospatial intelligence has the potential to become a foundational layer that connects physical assets with digital services. We believe open standards, secure data sharing, scalable cloud platforms, and AI-enabled analytics will be essential to realizing this vision, and our platforms are designed to support these principles."

The transition from desktop GIS to cloud-native, SaaS-delivered geospatial platforms is reshaping how government and enterprise users in India consume spatial intelligence. What does this shift look like on the ground in India, and what are the key barriers that still need to be resolved?

"The shift is already underway. Organizations increasingly want geospatial capabilities that are collaborative, accessible from anywhere, and capable of integrating with enterprise applications rather than remaining confined to specialized desktop environments. Cloud-native platforms make it possible for users across departments to access consistent, up-to-date geospatial information while reducing deployment complexity and accelerating innovation.

That said, the pace of adoption varies across sectors. Factors such as legacy infrastructure, data governance requirements, procurement models, cybersecurity considerations, and workforce skills continue to influence adoption decisions. Many organizations are also navigating hybrid environments where on-premises and cloud deployments coexist.

Addressing these challenges requires more than technology. It calls for investment in standards-based interoperability, workforce development, trusted cloud infrastructure, robust security frameworks, and strong collaboration between government, industry, academia, and technology providers. As these foundations mature, cloud-delivered geospatial intelligence will become increasingly mainstream across India."

As Octave enters a new chapter, what message would you share with the next generation of Indian geospatial professionals, researchers, and entrepreneurs about the opportunities ahead?

"India is entering an exciting phase where geospatial intelligence is moving from a niche capability to a strategic enabler of national development. Advances in AI, cloud computing, Earth observation, drones, digital twins, IoT, and real-time analytics are creating entirely new opportunities to solve complex challenges at unprecedented scale.

For students, researchers, and entrepreneurs, this is the time to think beyond traditional GIS. The future belongs to professionals who can combine geospatial expertise with data science, artificial intelligence, software engineering, automation, and domain knowledge. Innovation will happen at the intersection of these disciplines.

At Octave, we believe the next wave of geospatial innovation will be driven by collaboration between academia, startups, government, and industry. Our focus is on building open, scalable platforms that break down information silos, enabling data and insights to flow seamlessly from one phase of an asset or project lifecycle to the next. By ensuring continuity of information across planning, design, construction, operations, and maintenance, we empower organizations to make better decisions, improve efficiency, and unlock greater value. We look forward to supporting this ecosystem by equipping innovators with the technologies they need to develop solutions that deliver meaningful impact for businesses, communities, and society."

In the Spotlight

Survey of India's Empanelment Initiative: Strengthening Quality, Standards and Credibility Across India's Geospatial Industry

Building a Capability-Driven Procurement Ecosystem

India's geospatial ecosystem is expanding rapidly. The implementation of the National Geospatial Policy 2022 has accelerated demand for reliable geospatial data, surveying, mapping, remote sensing, GIS, photogrammetry, LiDAR and related technologies across sectors. Government programmes in infrastructure, urban development, agriculture, disaster management, defence, logistics, environment and public service delivery increasingly require capable implementation partners.

As the scale and complexity of these projects grow, a robust and quality-focused procurement ecosystem becomes essential. The technical competence, professional systems and delivery capabilities of geospatial service providers directly influence the accuracy, reliability and effectiveness of project outcomes. In this context, the Survey of India's Empanelment of Bidders initiative marks a significant shift towards a more structured, capability-driven and quality-conscious approach to identifying eligible industry players.

Understanding the SOI Empanelment Framework

The empanelment initiative focuses on the technical prequalification of firms. Financial bidding or quotation is not required at the empanelment stage. Instead, organisations are assessed on their technical capabilities, experience, resources, infrastructure and suitability for undertaking specialised geospatial assignments.

The process aims to create a pool of technically qualified firms that can subsequently participate in project-specific financial bidding, subject to the requirements of individual assignments. This separates technical assessment from financial competition and ensures that project opportunities are opened to organisations that have already demonstrated the required capabilities.

The framework covers different specialised service categories, enabling firms to be assessed according to their areas of expertise. It also provides capability-based classifications, namely Class C, Class B, Class A and Class A+. These classifications create a structured basis for understanding the scale, experience, resources and technical capacity of participating organisations.

Empanelment is valid for three years, subject to the applicable provisions. The framework also includes a six-monthly performance review, emphasising that empanelment is not merely a one-time qualification. Firms are expected to maintain professional standards, deliver quality outcomes and remain compliant with the prescribed requirements throughout the period.

The provisions also recognise Joint Ventures and Consortiums, where permitted under the Request for Empanelment. This can enable organisations with complementary strengths to collaborate and address assignments requiring a combination of technical expertise, field capacity, equipment, software and domain knowledge.

Why This Represents a Positive Shift

The initiative places greater emphasis on capability rather than cost alone. By establishing technical eligibility before project-specific financial bidding, it can help ensure that price competition takes place among firms capable of meeting the technical requirements of the assignment.

A capability-based approach can also encourage standardisation across the industry. Organisations will have greater incentive to strengthen their quality systems, maintain appropriate technical manpower, invest in equipment and software, document previous project experience and demonstrate their institutional readiness. Over time, this can support greater consistency in the delivery of geospatial services.

The framework may contribute to better quality outcomes by encouraging project owners to work with firms whose technical credentials and capabilities have been assessed. It can also support faster procurement by creating a recognised pool of eligible firms for future requirements, reducing the need to repeatedly establish basic technical suitability from the beginning.

Another important benefit is the potential creation of a more transparent and level playing field. Startups, MSMEs, specialised survey firms, technology providers and established enterprises can present their capabilities within a defined framework. This can improve visibility for organisations that may possess strong technical expertise but have previously had limited access to government opportunities.

The performance review mechanism further strengthens accountability. It encourages firms to view empanelment as a continuing responsibility rather than a one-time achievement. Sustained quality, timely delivery, compliance and professional conduct become important elements of continued credibility.

What This Means for the Industry

The initiative provides a clear signal to industry players that technical preparedness and professional systems will remain central to participation in government geospatial projects. Companies should therefore review and strengthen their quality management systems, technical manpower, certifications, equipment, software infrastructure, project documentation and capability demonstrations.

Firms should also ensure that their statutory, financial and organisational records are properly maintained and that their past assignments are documented in a clear and verifiable manner. Demonstrating experience through project reports, client credentials, technical case studies and evidence of successful delivery can support a stronger empanelment application.

The opportunities may differ across categories of industry participants. Startups can use the framework to gain recognition through specialised capabilities and innovative solutions. MSMEs can showcase their domain expertise and technical specialisation. Established companies may gain access to a wider project pipeline. Technology firms can explore participation across multiple service categories, while survey and mapping companies can benefit from greater visibility within a recognised pool of technically qualified providers.

Joint Ventures and Consortiums may also create opportunities for collaboration, particularly where assignments require integrated capabilities that may not be available within a single organisation.

AGI's Perspective

The Association of Geospatial Industries (AGI) welcomes the Survey of India's Empanelment Initiative as a progressive step towards strengthening quality, standards, professionalism, technical excellence and transparency in the procurement of geospatial services. As India's geospatial ecosystem continues to expand under the National Geospatial Policy 2022, frameworks that recognise technical capability and promote structured, quality-driven procurement will play an important role in enhancing the credibility and maturity of the sector.

AGI encourages geospatial organisations across the ecosystem, including startups, MSMEs, survey firms, technology providers and established enterprises, to carefully review the empanelment framework, assess their eligibility and actively participate in the initiative. Beyond creating access to future opportunities, organisations should view the framework as an opportunity to strengthen quality systems, build technical capabilities, invest in skilled professionals and align with evolving industry standards. Collective commitment to capability building and professional excellence will be instrumental in supporting a robust, globally competitive and future-ready geospatial industry for India.

Resources

- https://surveyofindia.gov.in/UserFiles/files/Empanelment%20of%20Firms-02-03-2026.pdf
- https://surveyofindia.gov.in/UserFiles/files/Emp_Bidders%281%29.pdf
- https://surveyofindia.gov.in/UserFiles/files/Empanelment%20of%20Firms-Geospatial%20Services-07-01-2026.pdf

Article – Amnex Infotechnologies

From Satellites to Sarpanch: How Amnex Turns Remote Sensing into Agricultural Intelligence

Intelligence is natural. And for over a decade, Amnex has been making it work at national scale -turning satellite pixels into the decisions that shape how India farms, procures, insures, and pays its farmers.

Indian agriculture runs on questions that are deceptively simple and notoriously hard to answer at scale. What is growing on this parcel of land right now? How healthy is it? How much will it yield? Which farmer owns it, and are their claims true? Answering these questions across 1.2 lakh villages and tens of millions of hectares - reliably, cheaply, and in near real time - is not a survey problem. It is a geospatial intelligence problem.

That is the problem Amnex Infotechnologies has spent the last decade solving.

A foundation built on remote sensing, at scale

Amnex's agriculture practice did not begin with dashboards or mobile apps. It began with the hard science of earth observation - processing high-resolution optical and SAR satellite imagery, building AI/ML models to classify crops, and validating those models against ground truth collected in the field.

The numbers describe a capability that is difficult to replicate:

- **70 million+ hectares** of crop area classified across **16 states, 180+ districts, 1,880+ talukas**, and **1.2 lakh+ villages**
- **40+ TB of satellite imagery** processed and **33+ crop types** mapped in a time-series crop library
- **1.2 million+ ground truth points** collected to train and calibrate models
- **10 million+ cadastral records** analysed at the parcel level
- **200+ TB of data** correlated across **400+ districts** through a real-time analytics engine

This is the backbone. Everything Amnex does downstream - every advisory sent to a farmer, every fraud flagged before a payout, every insurance claim settled in days instead of weeks - is derived from this remote-sensing and AI foundation.

The product engine: Agrogate and Croptrack

Amnex delivers this intelligence through two flagship products that sit at opposite ends of the value chain.

Agrogate is the geospatial decision-support platform for governments and institutions. It is a single, unified web platform that monitors the entire crop lifecycle - from sowing to harvest and post-harvest- and converts authenticated data into actionable layers: crop acreage and yield estimation, crop health indices, disaster and loss assessment, demand management for inputs, and downstream services for agriculture finance and crop insurance. Agrogate is where a Director of Agriculture sees the state's cropping picture, and where a bank verifies a loan applicant's land and crop before disbursing.

Croptrack is the farmer-facing mobile companion. It brings the same satellite-derived intelligence down to the individual land parcel - real-time crop health, personalised advisories, weather-based alerts, fertiliser and irrigation recommendations, market prices, and a crop calendar driven by a growing-degree-days model. Where Agrogate informs the decision-maker, Croptrack empowers the cultivator.

Together, the two products form a genuine farm-to-fork stack: the same remote-sensing engine, surfaced for two very different users.

The Capability

The capability can underpin any Agri Digital Public Infrastructure (DPI):

- **Digital Crop Survey:** Amnex's geo-referenced, mobile-based enumeration and GIS-layer generation that contributes to accurate mapping across pilot states, feeding verified crop acreage and damage data to government and insurers.
- **Farmer Registry:** Amnex's work supports millions of farmers digitised, with integrated identity,

farmer-to-plot mapping against land records, and interoperability across multiple platforms

- **The Decision Support System:** Amnex operates as the geospatial intelligence hub - fusing the Farmer Registry, geo-tagged crop survey, IMD/AWS weather feeds, soil health layers, and land parcel maps with high-resolution satellite imagery and AI/ML to power cadastral-level monitoring and policy planning.

The through-line is unmistakable: the DPI is the ambition, but Amnex's remote-sensing expertise is what makes the ambition executable on the ground.

A state-level implementation - the flagship, built on top of the foundation

One of India's leading agricultural states is leveraging this DPI capability, with Amnex serving as the technology partner. On top of that integrated foundation, the state now runs a portfolio of use cases that were simply not possible before:

- **A Digital Farmer Card -** links KYC identity, land holding, crop registration, and scheme benefits into a single QR-scannable card.
- **Parcel-level crop life-cycle monitoring** tracks every stage from sowing detection through crop-type classification, vegetative health, stress identification, and harvest - all at the individual plot.
- **A dedicated farmer advisory app -** the first of its kind launched by the state - reaches millions of farmers via app and SMS/WhatsApp, integrating ground survey, satellite, AI, weather, soil, and the farmer registry into one evidence-based advisory system.
- **Rapid crop-loss assessment** cut insurance field verification time by around 80%, enabling claim settlement within roughly 14 days after heavy or unseasonal rain.

All of this is orchestrated from the Agriculture Command & Control Centre, where the state's cropping picture is monitored in real time. And the operational outcomes are measurable: 25–30% yield gains in adoption zones, 20%+ improvement in procurement efficiency, and insurance claim cycles compressed from 8–10 weeks to under three.

The intelligence underneath

None of the above is a black box. Amnex's crop yield prediction approach fuses multi-source, multi-temporal satellite data with vegetation and biophysical indices, weather parameters, and field-collected ground truth - trained through machine-learning models and validated against crop cutting experiments to produce yield maps down to the gram panchayat level.

The same time-series engine drives crop growth monitoring on a 15-day cadence, index-based health and water-stress assessment, drought and mid-season adversity mapping, and near-real-time flood and cyclone loss assessment - the last of which was proven when drone-based post-flood assessment covered 50,000+ hectares across 45 villages in just eight days. Increasingly, Generative and applied AI extend this further — into crop identification, classification, and cross-region comparison for subsidy validation and insurance.

A track record that the country has recognised

Amnex's contribution has been formally acknowledged where it matters. The Government of India profiled the company's work in its **"Doubling Farmers' Income" report (Volume XII)** on science for smart agriculture. The portfolio has earned the **Bill & Melinda Gates Foundation Award (2017)** for innovation in big data, the **Vibrant Gujarat GESIA Award (2018)** for best AI product, the **Digital India Award (2018)** for emerging technology in agriculture, the **SKOCH Governance Award (2019)**, and the **FICCI National Geospatial Award (2021)** for geospatial technology innovation.

Beyond India, the same remote-sensing playbook now travels - from KCC land and crop verification for a leading bank in India, to coffee and banana farm monitoring for a financial institution in Guatemala, to precision agriculture in Australia.

The road ahead

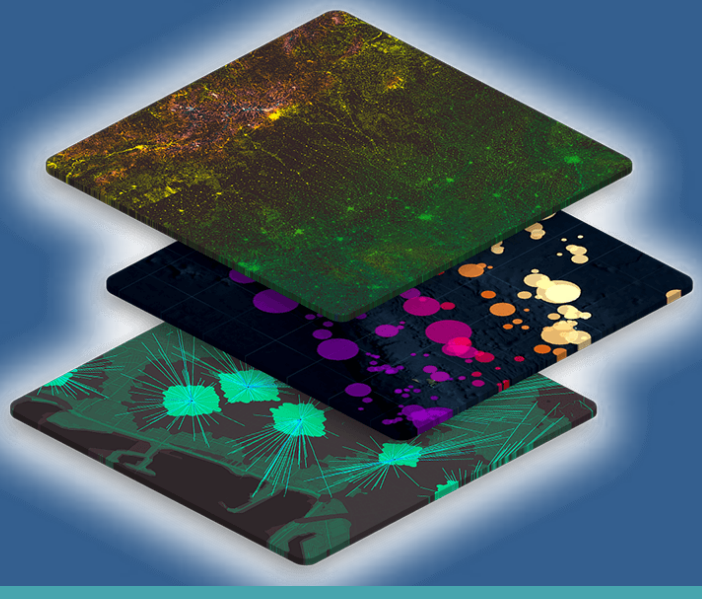
The pattern across every engagement is consistent. Amnex starts with remote sensing and geospatial AI as the source of truth, hardens it against millions of ground-truth points, productises it through Agrogate and Croptrack, and then builds the citizen-facing and policy-facing applications on top of that foundation.

That is why, as India layers ambitious digital public infrastructure over its agricultural economy, it keeps coming back to the same question - who can actually make the pixels mean something? For the country and the states, the answer has been Amnex.

Intelligence that makes global technologies come to life.

Article – Esri India

Building A Data-Driven Nation with Geo-DPI



The Indian Government is largely focusing on building a data-driven economy, because, by securely sharing and using data, governments and businesses can improve productivity, personalize services, develop new digital products, support economic growth, and make evidence-based policy decisions while empowering individuals with greater control over their data.

However, experts understand that achieving a data-driven economy requires more than just digitizing services. It needs a strong digital foundation that can be shared across sectors.

What makes a strong foundation?

Outcomes such as trusted digital identity, interoperable digital payments, secure and consent-based data sharing, and robust governance frameworks for privacy and security, have been identified as key pillars. These foundational elements have evolved into **Digital Public Infrastructure (DPI)**, providing common digital building blocks that enable governments, businesses, and citizens to interact seamlessly.

These common digital building blocks have aided in breaking down data silos and improving service delivery. By making high-quality digital data accessible in a secure and interoperable manner, DPI has fostered innovation, evidence-based policymaking, financial inclusion, and the development of new digital services, establishing the infrastructure needed for a data-driven economy.

Going Beyond with Geo-DPI

Now, DPI focused on 'who' and 'what', and achieved considerable success in its objectives, but the **'where'** dimension remained unaddressed. Integrating geospatial intelligence adds this critical 'where' dimension to digital data, providing context for smarter decision-making, more efficient service delivery, and greater national resilience. From identifying underserved communities for targeted welfare programs to optimizing last-mile connectivity for digital transactions, geospatial integration with DPI is no longer optional, it is a strategic necessity for building a truly data-driven economy.

The need for Geo-DPI is becoming even more urgent in the age of Artificial Intelligence. AI systems depend on high-quality, interoperable, and contextualized datasets. Geospatial information provides a crucial layer for applications such as urban digital twins, climate resilience planning, precision agriculture, transportation optimization, and smart infrastructure management. Experts increasingly recognize that strong DPI ecosystems provide the trusted data foundations upon which advanced AI systems can be built.

Indo ArcGIS Living Atlas and More

Esri India's Indo ArcGIS Living Atlas is one of the most comprehensive collections of authoritative geospatial content assembled for India. The platform hosts about 800 layers of geospatial data, including demographic datasets, transportation networks, administrative boundaries, population data, environmental information, and more. The content is updated regularly to maintain accuracy and relevance.

By providing a standardized and continuously updated source of geographic information, it enables organizations to reduce the time spent on sourcing, validating, and maintaining data while supporting the broader objectives of Geo-DPI, including interoperability, discoverability, and trusted data sharing at scale.

As geospatial adoption expands across government and enterprise, there is also a growing need to deploy trusted geospatial content within secure on-premises environments. The **Indo ArcGIS Raster and Vector Basemaps Data Packs** address this requirement by providing localized raster and vector basemaps. Additionally, **Indo ArcGIS StreetMap** provides offline, enriched street data to deliver high-quality and multiscale cartographic map display;

accurate geocoding; and optimized routing, driving directions, and network analysis. This eliminates the need to process, update, or format raw street data by the users themselves. They can have access to authoritative datasets that are optimized for performance and out-of-the-box analysis.

Collectively, platforms such as Indo ArcGIS Living Atlas, the Indo ArcGIS Raster and Vector Basemaps Data Pack, and ArcGIS StreetMap illustrate how curated, authoritative geospatial content can strengthen the foundational data layer of India's evolving Geo-DPI ecosystem.

Conclusion

India's success with DPI has shown that shared digital infrastructure can unlock innovation, improve service delivery, and accelerate economic growth. Geo-DPI represents the next phase of that journey. By creating a national geospatial foundation and leveraging platforms such as Indo ArcGIS Living Atlas, India can transform fragmented datasets into actionable intelligence. The result will be a more connected, efficient, and data-driven nation, one where decisions are not only digital but geographically intelligent.

Article – Hexagon

FROM CHAOS TO CLARITY Transforming Land Administration Through Digital Reality: Building a Smarter Future with Enterprise Geospatial Solutions

By Pankaj Gupta, Director - Sales & Services
Hexagon Infrastructure & Geospatial

"Fragmented land records, outdated survey practices, and lack of data transparency continue to challenge modern governance. A digital transformation powered by geospatial intelligence is redefining how land is understood, managed, and governed."

Land administration has evolved from routine record-keeping into a strategic foundation for national development. Accurate land information now underpins infrastructure planning, urban expansion, environmental sustainability, investment, taxation, disaster resilience, and citizen services. Governments accelerating digital transformation require transparent, continuously updated land records more than ever. The focus has shifted from maintaining cadastral maps to creating trusted geospatial intelligence that supports better governance and informed decisions.

Many organizations still struggle with fragmented databases, paper-based records, legacy survey practices, and disconnected workflows. These issues create inconsistencies between spatial and textual data, prolong disputes, delay transactions, and weaken inter-departmental coordination. Investments in Smart Cities, digital public infrastructure, and climate-resilient development make an integrated geospatial foundation essential.

Advances in surveying, enterprise GIS, cloud computing, and Digital Reality are reshaping how land data is captured, managed, and shared. Connecting field operations to enterprise platforms enables a unified digital ecosystem covering the full lifecycle—from acquisition and validation to long-term management and citizen services—delivering higher efficiency, transparency, interoperability, and confidence in land governance.

Hexagon's integrated geospatial solutions support this shift by uniting precision surveying, enterprise GIS, and intelligent data management in a scalable framework. Governments can build accurate, future-ready digital land records while maximizing existing technology investments.

A Turning Point: When Technology Meets Governance

Imagine a city where every parcel is represented digitally with centimeter-level accuracy, surveyors, planners, revenue officials, and administrators share a single source of truth, and citizens access reliable, transparent land information. This reduces disputes, accelerates services, and enables evidence-based planning.

This is now practical through Hexagon's Land Record Management Solution, which integrates geospatial intelligence, field mobility, and enterprise platforms into a connected digital ecosystem.

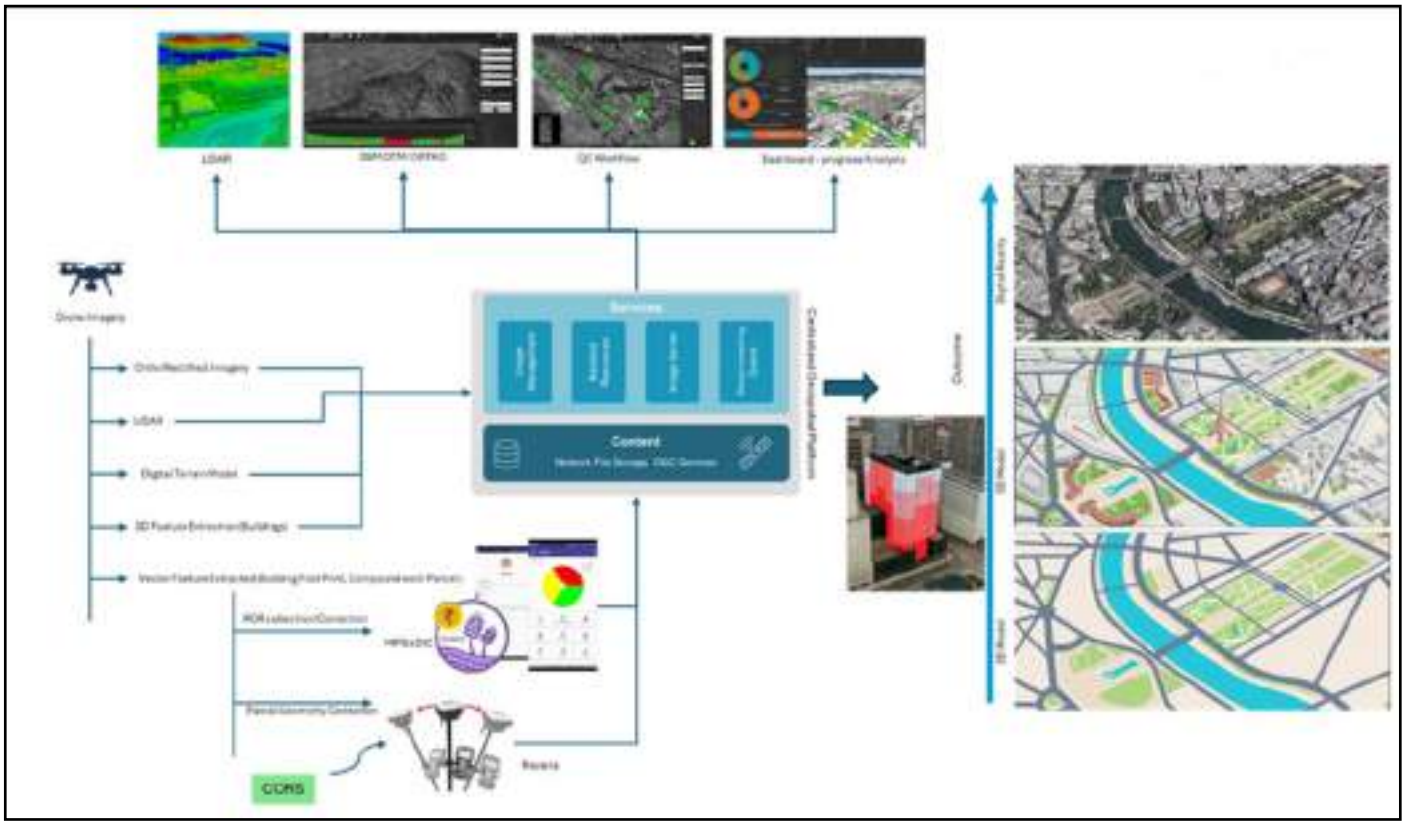
At its heart is a simple yet transformative idea: ***"Bring every dimension of land—physical, legal, and spatial—into one digital reality."***

Integrated Digital Land Administration Workflow (Drone Survey → GNSS Survey → GIS Processing → Quality Assurance → Enterprise GIS → Citizen Services).

High-resolution spatial data is first captured using drone imagery, aerial photography, satellite imagery, and LiDAR. High-precision GNSS RTK receivers and robotic total stations then establish parcel boundaries, validate features, and record centimetre-level coordinates.

Field observations synchronise directly with enterprise GIS. Survey data, geometries, and attributes reside in a central geospatial database, ensuring consistency and eliminating manual reconciliation. Enterprise GIS serves as the common platform for managing, validating, visualising, and securely sharing authoritative land information.

Built on Open Geospatial Consortium (OGC) standards, the platform integrates with cadastral databases, registration systems, revenue applications, utilities, and planning solutions. WebGIS portals, dashboards, and automated quality assurance deliver timely insights, while field teams operate effectively even with limited connectivity.



Hexagon Enterprise Geospatial Ecosystem –

Connecting Survey, GIS, Analytics and Digital Land Governance

Accurate digital cadastral information supports property taxation, infrastructure planning, Smart City development, utility management, environmental monitoring, disaster preparedness, and Digital Twin initiatives. Citizens gain faster verification, transparent ownership data, and better digital services. Agencies achieve higher efficiency, fewer disputes, and stronger evidence-based decision-making.

Powering India's Next Generation of Land Record Modernization

India's land administration is undergoing historic change. Initiatives such as SVAMITVA and NAKSHA demonstrate the Government of India's commitment to accurate, geospatially enabled land records through advanced surveying, CORS infrastructure, drone mapping, GIS, and digital workflows. These programmes set new benchmarks for transparency, efficiency, and citizen-centric governance and rank among the world's largest geospatial modernisation efforts.

Hexagon's Digital Reality portfolio aligns with these goals by covering the complete lifecycle. It integrates high-accuracy GNSS, enterprise CORS, reality capture, survey automation, enterprise GIS, and digital land information management into a unified platform for scalable, future-ready programmes.

For large-scale surveys, Leica FLX100 Plus enables rapid GIS and asset data collection. Leica GS18 T delivers high-precision RTK without pole levelling, boosting productivity in challenging conditions. Leica TS20 Robotic Total Stations provide precise boundary surveys where satellite visibility is limited. Together they form an efficient hybrid workflow meeting modern accuracy and productivity needs.

Robust positioning infrastructure is critical. Leica GR50 reference stations with Leica Spider GNSS network software deliver reliable survey-grade

positioning across large areas, forming the geodetic foundation for statewide operations.

Kerala shows the practical value of this approach. The state deployed a comprehensive Hexagon ecosystem combining Leica GS18 T, Leica TS16, rugged field tablets, M.App Enterprise, and GeoMedia. Field observations synchronize directly with enterprise GIS, where automated quality assurance, topology validation, workflow management, and WebGIS publishing make authoritative cadastral data available to multiple departments from a single source of truth. It is one of India's earliest end-to-end enterprise land administration solutions on a unified Digital Reality platform.

Unlike multi-vendor setups that rely on disconnected systems, Hexagon provides an integrated ecosystem uniting surveying, positioning infrastructure, enterprise GIS, workflow automation, analytics, and citizen services in one interoperable architecture. This reduces complexity, accelerates delivery, simplifies maintenance, and offers a scalable foundation for Smart City, Digital Twin, infrastructure, and geospatial initiatives.

"Hexagon has emerged as a technology leader in India's digital land administration journey by delivering an integrated Digital Reality ecosystem that spans high-precision surveying, CORS infrastructure, enterprise GIS, and citizen-centric land information systems. Unlike conventional point solutions, Hexagon provides a complete end-to-end platform—from geospatial data acquisition to enterprise data management, quality assurance, analytics, and WebGIS—enabling governments to accelerate digital land transformation through a single, interoperable technology stack"

As India advances digital governance, land administration remains central to sustainable development, infrastructure growth, and economic progress. SVAMITVA, NAKSHA, and progressive state programmes are turning land information into a trusted digital asset that strengthens governance and citizen services.

With a proven portfolio spanning precision surveying, CORS infrastructure, enterprise GIS, and Digital Reality technologies, Hexagon is well positioned to help governments build resilient, interoperable, and future-ready land administration systems. Connecting field operations with enterprise platforms delivers greater transparency, operational efficiency, and smarter public services while establishing the geospatial foundation for India's next generation of digital governance.

"Digital land intelligence is the foundation of next-generation governance."

Discover how Hexagon's integrated Digital Reality portfolio is enabling next-generation land administration and geospatial transformation by visiting the Hexagon website:-

GIS and Assets Management - https://leica-geosystems.com/products/gis-collectors

Survey Grade GNSS - https://leica-geosystems.com/products/gnss-systems

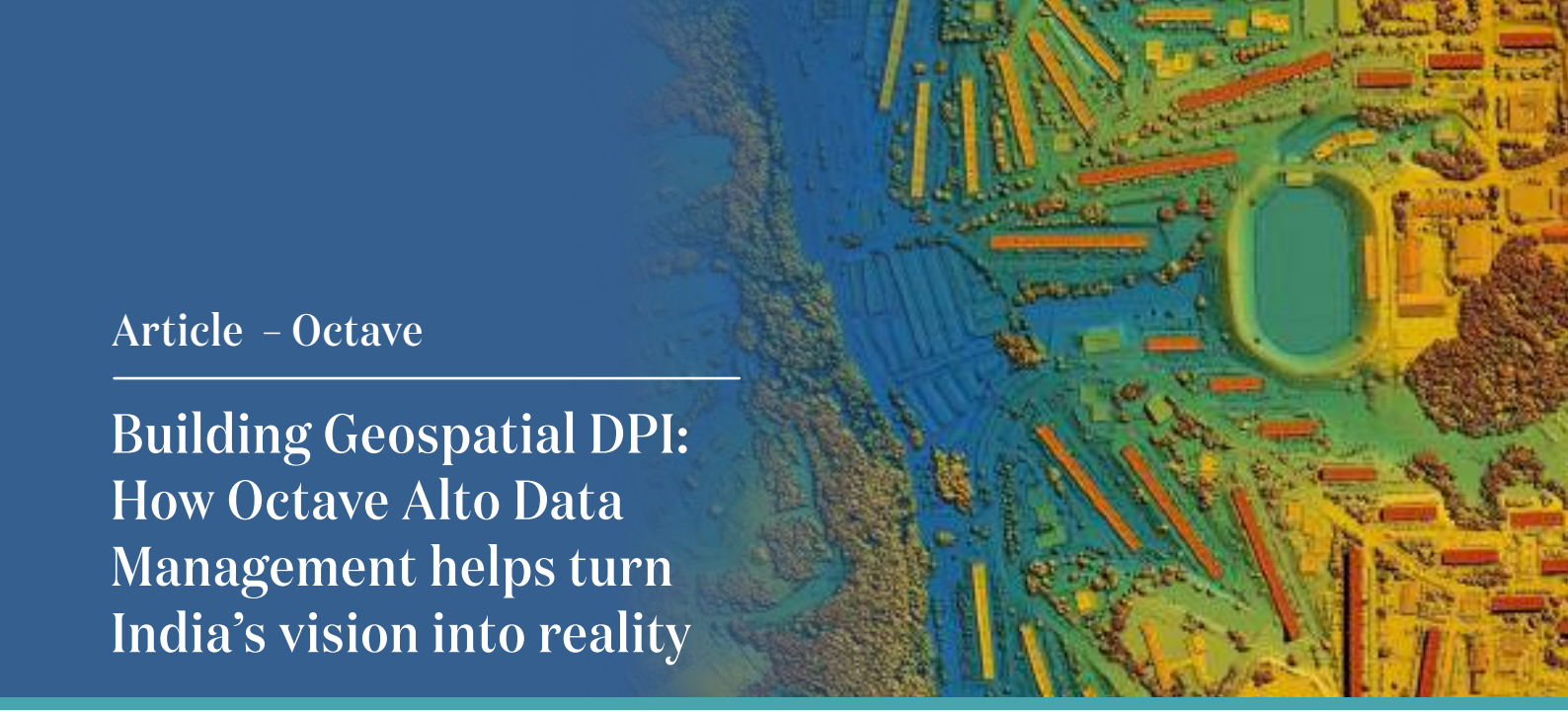
Electronic Total Stations - https://leica-geosystems.com/products/total-stations

Airborne Sensors - https://leica-geosystems.com/products/airborne-systems

Mobile Mapping Systems - https://leica-geosystems.com/products/mobile-mapping-systems?redir=38

Detection Systems - https://leica-geosystems.com/products/detection-systems

Machine Control Systems- https://leica-geosystems.com/products/machine-control-systems



Article – Octave

Building Geospatial DPI: How Octave Alto Data Management helps turn India's vision into reality

India's Digital Public Infrastructure (DPI) initiative has transformed how citizens access essential services. Two of its best-known examples are Aadhaar, the national digital identity system, and UPI, the digital payments network. Together, they demonstrate how shared digital infrastructure can operate at national scale and serve the public good.

The next frontier is geospatial data.

India's National Geospatial Policy (NGP) 2022 recognizes that location data is becoming as important to public services as identity and payments. From disaster response and land records to urban planning and infrastructure management, reliable geospatial data can help governments make faster, better decisions.

But data alone is not enough. To realize the vision of a national geospatial ecosystem, organizations need a way to organize, manage, discover and share that data at scale.

Turning geospatial data into public infrastructure

NGP 2022 aims to make geospatial data more accessible, standardized and usable across government and industry. The policy replaced many legacy approval processes with a more open framework and established ambitious goals, including:

- A national digital elevation model by 2030
- A national digital twin
- A unified digital interface for accessing publicly funded geospatial data

Taken together, these initiatives lay the groundwork for what many describe as Geospatial DPI: a shared geospatial foundation that supports a wide range of public services and applications.

However, building that foundation requires more than policy. It requires infrastructure that can manage and deliver vast amounts of spatial data efficiently.

The missing piece: Geospatial data management

Many government agencies already manage large collections of geospatial information, including LiDAR surveys, drone imagery, historical maps, elevation models and utility and infrastructure records.

These datasets often reside in different systems, departments and formats. Without a common way to organize and access them, the benefits of open data remain limited.

Octave Alto Data Management addresses this challenge by providing a centralized platform for managing geospatial assets.

The platform:

Organizes data automatically

Alto Data Management discovers and catalogs geospatial data across departments and storage locations, creating a centralized view without duplicating data. Users can easily find and access the information they need.

Supports open standards

Built on OGC and ISO standards, the platform integrates with existing GIS and business applications. Agencies retain flexibility and avoid being locked into a single vendor ecosystem.

Scales for enterprise use

The platform supports large datasets and high user volumes while providing built-in geoprocessing capabilities. Teams can perform spatial analysis directly on the server without requiring specialized GIS expertise at every workstation.

Protects sensitive information

Granular access controls allow agencies to share public-facing datasets while maintaining appropriate security and governance for restricted information.

Where policy meets execution

NGP 2022 establishes the vision. Alto Data Management helps make that vision operational.

The connection is straightforward:

NGP 2022 goal	Alto Data Management capability
Expand access to publicly funded geospatial data	Creates a searchable, shared geospatial data library
Provide a unified access experience	Delivers centralized discovery and access across departments
Strengthen geospatial infrastructure	Supports scalable management of distributed datasets
Improve interoperability	Uses open standards compatible with a broad ecosystem of applications
Reduce technology dependency	Prevents vendor and format lock-in

This is what transforms policy into functioning infrastructure.

A national digital elevation model delivers value only when planners, engineers and decision-makers can easily find and use the data. A national digital twin is only effective when imagery, elevation, utility and planning data are maintained in a connected and up-to-date system.

Why it matters

State agencies, municipalities and public organizations are not asking whether they should collect geospatial data. That requirement already exists.

The real challenge is how to manage and share that information efficiently across multiple programs and stakeholders without building a new data infrastructure for every project.

Whether the goal is flood-risk assessment, utility management, land administration or emergency response, success depends on having a reliable geospatial data foundation in place.

Looking ahead

India's vision for geospatial infrastructure is ambitious. As the country advances toward national digital twins and a comprehensive digital elevation model, the differentiator will not be who has geospatial data. Nearly every agency already does.

The differentiator will be who can manage, standardize and deliver that data effectively.

That is the promise of Geospatial DPI: a shared, long-term foundation that enables the next generation of location-enabled public services.

Octave Alto Data Management provides a practical way to build that foundation today.

Article – Ceinsys

Geospatial DPI: Putting the Citizen at the Centre of a Data-Driven India

India's Digital Public Infrastructure story is often told through the lens of Aadhaar, UPI, and DigiLocker — the identity, payment, and credential rails that have quietly transformed how a billion people interact with government and commerce. But there is a fourth layer that is only now coming into focus: the spatial layer. When location intelligence is embedded into shared digital infrastructure — with open standards, interoperable APIs, and real-time data — it changes not just how government plans, but how ordinary citizens experience the services that are meant to serve them.

That is what Geospatial DPI means in practice. It is not about roads or bridges. It is about a farmer who can check the irrigation status of his field on a phone. A family in a remote village who receives clean water because a sensor flagged a pressure drop at 2am before anyone woke up to a dry tap. A homeowner whose property boundary is no longer a matter of dispute because it is recorded, geo-tagged, and accessible on a shared platform. A district collector who knows exactly which habitations are flood-prone — before the monsoon arrives, not after.

At CS Tech Ai (Ceinsys Tech Ltd), we have spent over two decades building the systems that make this kind of intelligence operational. What follows are three areas where we believe Geospatial DPI is already changing lives — and where the work is still very much in progress.

When Water Reaches Every Tap: JJM and the IoT Layer

The Jal Jeevan Mission set an ambitious goal: functional tap water connections to every rural household in India. The infrastructure side of that promise — pipes, tanks, pumps — is largely a solved problem. The harder challenge is keeping it working. A pump that fails silently. A pipeline that loses pressure overnight. A storage tank that runs dry because nobody noticed the inflow had dropped three days ago.

CS Tech Ai addressed this in a large-scale rural water supply programme by designing and deploying an IoT-based smart water management system for a state-level water supply department. The solution placed sensors across the network — at intake points, pumping stations, distribution nodes, and household connections — continuously monitoring pressure, flow, and consumption. Automated dashboards tracked KPIs in real time. Pumps and valves that were previously operated manually could now be monitored centrally, with anomalies triggering alerts before they became failures.

What made this Geospatial DPI — rather than simply IoT — was the spatial layer underneath. Every asset was mapped ,field data collection, grounding the entire network in accurate, queryable location data. A pressure drop did not just generate a number; it generated a location, a network segment, an affected population. The result: faster fault response, better preventive maintenance planning, and — most importantly — more reliable water at the tap for villages that had lived with inconsistency for years.

Land Records, Property Rights, and the Geospatial Foundation of Trust

Few things matter more to a household than knowing their land is theirs. In India, unclear land records have historically been a source of dispute, exclusion from credit, and vulnerability to encroachment. Digitising land and property data is one of the most consequential applications of Geospatial DPI — because it touches ownership, livelihood, and legal identity all at once.

CS Tech Ai has worked with state government departments to build Web-GIS based land asset management systems that bring spatial intelligence to public land governance. For one client — a state agency managing land parcels across educational institutions, administrative buildings, and civic facilities — we developed a platform that geo-tagged and mapped thousands of parcels, overlaid cadastral data for ownership validation, and created a unified Web-GIS dashboard accessible across revenue, planning, and audit departments. Encroachment incidents fell. Inter-departmental coordination improved. Land records that had existed only in paper registers became live, queryable, and defensible.

In the urban context, CS Tech Ai has also delivered Web-GIS enabled property survey and digitisation for Urban Local Bodies — enabling accurate, spatially referenced property records that feed directly into fair tax assessment and citizen-facing services. When a resident can verify their property boundary online rather than waiting months for a manual survey, that is Geospatial DPI working as it should: reducing friction, building trust, and putting accurate information in the hands of the people who need it.

Disaster Management: Knowing Before It Happens

India loses billions every year to floods — in lives, livelihoods, and infrastructure. The gap between a flood that destroys and a flood that is managed is almost always a question of time and information. How early did authorities know which areas would be inundated? How quickly could resources be mobilised? How accurately could risk be communicated to communities that needed to act?

CS Tech Ai built a predictive flood modeling framework for a national disaster management agency to close exactly that gap. The system combined high-resolution optical satellite imagery, digital elevation models, and hydrological data to map flood-prone zones and simulate inundation scenarios across multiple return periods — a 1-in-10-year event, a 1-in-25-year event, and beyond. GIS-based dashboards gave response teams spatial visibility of impact zones and alert dissemination channels to reach vulnerable populations ahead of the event, not during it.

This is the promise of Geospatial DPI in disaster management: not reacting to what happened, but preparing for what is likely to happen. Spatial data, shared standards, and open platforms mean that the same flood model can inform a district collector's evacuation plan, a state government's resource pre-positioning, and a national agency's policy framework — all from the same underlying data layer.

Industrial Land and the MIDC Model

The same spatial intelligence that protects citizens from floods and clarifies their land rights also underpins industrial development done well. Maharashtra's industrial estates, administered by MIDC, house thousands of businesses and the livelihoods of millions of workers. Managing those estates — land parcels, utility networks, infrastructure assets, encroachments — at scale requires exactly the kind of shared, standards-based spatial platform that defines Geospatial DPI.

CS Tech Ai's Web-GIS based asset mapping and monitoring work for government facilities — including applications directly relevant to industrial estate management — delivers geo-tagged visibility of physical assets, utility networks, and land parcels across multiple zones. Role-based access means that revenue departments, planning teams, and audit functions all work from the same spatial truth, rather than maintaining separate, often contradictory, records. The result is better resource allocation, reduced disputes, and a more transparent environment for the businesses operating within these estates.

The Opportunity Ahead

India has built remarkable digital public infrastructure at the identity, payment, and credential layers. The geospatial layer is the next frontier — and it is already being built. PM GatiShakti has demonstrated what shared spatial data can do at the national planning level. The JJM programme has shown how location intelligence changes last-mile service delivery. Land digitisation is slowly transferring power from paper registers to citizens with smartphones.

What is needed now is for geospatial intelligence to be treated as infrastructure in the same way that Aadhaar and UPI are — open, interoperable, citizen-facing, and built on shared standards. The companies and agencies doing this work are not just building software. They are building the spatial foundation on which a data-driven India will stand.

At CS Tech Ai, with 27 years of geospatial and engineering experience behind us, that is the work we show up for. The map of India's future is being drawn — and it belongs to every citizen on it.

Article – Marvel Geospatial

Geospatial DPI: Foundations for a Data-Driven India

India is undergoing a rapid digital transformation, powered by large-scale Digital Public Infrastructure (DPI) initiatives that are reshaping governance, service delivery, and economic development. While platforms such as Aadhaar, UPI, and DigiLocker have demonstrated the transformative potential of digital infrastructure, the next frontier lies in geospatially enabled DPI. By integrating location intelligence into national development frameworks, India can create a comprehensive, data-driven ecosystem that supports planning, monitoring, and decision-making at every level.

Geospatial DPI refers to the foundational framework that combines geographic information systems (GIS), remote sensing, drone technologies, LiDAR, digital twins, and real-time data platforms to create spatially aware digital infrastructure. Such systems provide a common operating picture for governments, utilities, infrastructure agencies, and citizens, enabling informed decisions based on accurate and timely location data.

One of the most significant examples of geospatial DPI in India is PM GatiShakti. Designed as a national master plan for multimodal connectivity, PM GatiShakti integrates infrastructure data from multiple ministries and departments onto a unified geospatial platform. This approach helps identify infrastructure gaps, reduce project delays, optimize logistics, and improve coordination among stakeholders. By leveraging geospatial intelligence, planners can evaluate transportation networks, industrial corridors, utility infrastructure, and environmental constraints within a single framework.

The success of such initiatives depends heavily on the availability of accurate and up-to-date geospatial data. Advances in drone-based surveys, mobile mapping systems, high-resolution satellite imagery, and LiDAR technologies have significantly improved the quality and accessibility of spatial information. These technologies enable rapid mapping of urban and rural environments, generating precise datasets that can be integrated into enterprise GIS platforms and digital twins.

Geo-tagged infrastructure mapping has emerged as a critical component of this ecosystem. Roads, water supply networks, sewerage systems, power distribution assets, telecom infrastructure, public buildings, and transportation facilities can all be geo-referenced and monitored through GIS-enabled platforms. The resulting spatial databases provide a reliable foundation for asset management, maintenance planning, and service delivery optimization.

For urban local bodies and utility agencies, geo-tagged infrastructure data offers unprecedented visibility into asset conditions and operational performance. Infrastructure inventories that once existed in fragmented spreadsheets and paper records can now be consolidated into centralized geospatial repositories. Decision-makers gain access to accurate asset locations, condition assessments, connectivity information, and historical maintenance records, enabling more efficient planning and resource allocation.

Traffic and mobility management represent another area where geospatial DPI delivers significant value. Rapid urbanization has increased the complexity of transportation networks, requiring data-driven approaches to congestion management and mobility planning. GIS platforms integrated with traffic sensors, GPS-enabled vehicles, and real-time monitoring systems help authorities analyze traffic patterns, identify bottlenecks, and optimize transportation infrastructure. Such insights support safer roads, reduced travel times, and improved commuter experiences.

Environmental and climate applications are equally important in a data-driven India. Geospatial technologies enable continuous monitoring of land use, vegetation cover, water resources, flood-prone areas, air quality, and climate-related risks. By integrating satellite observations, drone surveys, and field-based data collection, governments and organizations can develop proactive strategies for environmental conservation and disaster management. Spatial analytics also support sustainable development by balancing infrastructure growth with ecological considerations.

Weather intelligence further strengthens geospatial DPI by providing actionable insights for agriculture, transportation, disaster response, and public safety. Real-time weather information integrated into GIS platforms enables predictive modeling and risk assessment, helping stakeholders prepare for extreme weather events and minimize disruptions. When combined with geospatial infrastructure data, weather analytics can significantly improve resilience and operational preparedness.

Another emerging dimension of Geospatial DPI is its role in public service delivery and citizen engagement. By integrating geospatial databases with government service platforms, authorities can monitor project progress, verify asset creation, track scheme implementation, and ensure transparency in public spending. Geo-tagged assets under rural development, urban infrastructure, water supply, sanitation, and smart city programs provide real-time visibility into ground conditions. This location-based intelligence enables evidence-driven governance, reduces duplication of efforts, and enhances accountability. Furthermore, citizen-facing geospatial applications empower communities to access location-specific information, report issues, and actively participate in local development initiatives, strengthening the connection between governance and public outcomes.

At Marvel Geospatial Solutions Pvt. Ltd., we recognize that reliable geospatial information is the cornerstone of digital transformation. Our experience in GIS mapping, drone surveys, LiDAR data acquisition, mobile mapping, photogrammetry, BIM, and digital twin development has demonstrated the value of location intelligence across multiple sectors. By transforming raw spatial data into actionable insights, geospatial

technologies enable organizations to improve efficiency, transparency, and service delivery.

The future of geospatial DPI lies in interoperability, scalability, and accessibility. Open standards, integrated data platforms, and cloud-based architectures will facilitate seamless data sharing across departments and organizations. Emerging technologies such as artificial intelligence, machine learning, and digital twins will further enhance the analytical capabilities of geospatial systems, enabling predictive and prescriptive decision-making.

As India progresses toward becoming a globally competitive digital economy, geospatial DPI will play an increasingly strategic role in national development. Accurate location data, integrated infrastructure inventories, real-time monitoring systems, and advanced analytics will empower governments and enterprises to make better decisions, deliver smarter services, and build resilient communities.

The vision of a data-driven India cannot be realized through digital systems alone; it requires an understanding of where people, assets, resources, and opportunities are located. Geospatial technologies provide that essential spatial context. By strengthening geospatial DPI and expanding the adoption of location intelligence across sectors, India can unlock new levels of efficiency, sustainability, and inclusive growth, creating a stronger foundation for future generations.

Article – Matrix Geo Solutions

Geo-DPI: Building India's Spatial Intelligence Backbone for Viksit Bharat

India's digital transformation has become a global benchmark, with platforms such as Aadhaar, UPI and DigiLocker showing how Digital Public Infrastructure (DPI) can transform governance and citizen services. The next frontier is Geospatial DPI (Geo-DPI) — a unified spatial ecosystem embedding location intelligence into governance and infrastructure planning.

The National Geospatial Policy 2022 envisioned geospatial information as a foundational digital asset enabling evidence-based decision-making across government and industry. Geo-DPI operationalises this by making trusted, standardised geospatial information available as a national public resource — a paradigm shift for a country as diverse and infrastructure-intensive as India.

Why Geo-DPI Matters

Every government scheme or infrastructure project shares one common denominator — location. Historically, ministries and agencies have worked with fragmented datasets and isolated GIS platforms, resulting in duplicated effort and slower decisions.

Geo-DPI addresses this by creating a common spatial reference framework where authoritative geospatial data can be securely shared and reused across departments — much like UPI standardised digital payments. This is supported by the Policy's push for liberalisation of geospatial data, interoperability, open standards and greater private participation.

In practice, this shows up as duplicated effort: two departments surveying the same road or utility corridor in the same year, unaware the other's data already exists, simply because no shared registry exists. A common spatial backbone removes that blind spot.

From Maps to National Intelligence

Geo-DPI is more than digital maps. Its vision is a living spatial intelligence platform integrating data from satellites, drones, aerial LiDAR, ground surveys and IoT sensors into one authoritative national framework.

The emerging architecture includes several foundational elements:

- One Nation, One Map (ONOM) providing a common authoritative spatial reference.
- Standardised base maps covering administrative boundaries, transportation, utilities, hydrography and land use.
- National geospatial registries for authoritative datasets.
- Cloud-native GIS infrastructure enabling scalable access.
- Secure APIs that allow government departments and private developers to build innovative applications.
- AI-driven validation and quality assurance for continuously updated spatial information.

Together, these capabilities create a trusted foundation on which thousands of applications can be built.

The Foundation of India's Digital Twin Economy

One of Geo-DPI's most transformative outcomes will be Digital Twins — virtual representations of physical assets that continuously integrate real-world data for monitoring and prediction.

The Policy identifies Digital Twins of major cities as a long-term objective. Geo-DPI provides the spatial framework for these twins to function across agencies — imagine planning a metro corridor while visualising underground utilities, traffic, land ownership and flood risk within a single platform.

Accelerating Infrastructure Development

India is investing unprecedented resources in highways, railways, logistics corridors and smart cities. Such programmes require precise geospatial intelligence throughout the project lifecycle, from planning to execution and asset management.

Drone surveys, aerial LiDAR and digital engineering have already shown their ability to reduce timelines and cut cost overruns. Geo-DPI will multiply these benefits by ensuring every project begins with trusted spatial information, complementing initiatives such as PM GatiShakti, Digital India and the vision of Viksit Bharat 2047.

Transforming Governance Through Spatial Intelligence

Geo-DPI can redefine public administration, moving governments from reactive to predictive governance. Applications span urban planning, disaster preparedness, climate resilience, precision farming, land administration, utility management, water planning and homeland security.

When location becomes a shared digital asset, departments no longer work in silos — they collaborate on one trusted foundation.

The Role of Industry

The Policy recognises that achieving India's geospatial ambitions requires active participation from the private sector — technology companies, survey firms, drone providers, AI developers and GIS solution providers building national spatial capacity. Drone mapping, aerial LiDAR, satellite imagery, mobile mapping, AI-powered analytics and Digital Twin platforms must become interconnected components of Geo-DPI, not standalone solutions.

Across sectors, the constraint is rarely willingness — most departments recognise the value of shared data. More often, it is procurement models that still treat each survey as a one-off deliverable. Contracts specifying data standards, licensing terms and reuse rights up front would make interoperable data a practical reality.

Lessons From the Ground: What Industry Experience Is Teaching Us

Beyond policy and architecture, Geo-DPI's success will be decided on the ground — in how consistently spatial data is captured, validated and reused. A few lessons are emerging from field implementation across transportation, water, power and mining.

First, accuracy standards must be a shared discipline, not a project-by-project choice. Programmes such as SVAMITVA, which has mapped rural land parcels nationwide, and the newer NAKSHA programme for urban land records show what's possible when accuracy is paired with a common data framework, both drawing on the Survey of India's CORS network for high-precision positioning — a reminder Geo-DPI depends on ground infrastructure as much as software.

Second, interoperability is harder in practice than in policy. Coordinate systems and data formats still vary between departments and contractors on the same corridor. On one rail corridor survey, a datum mismatch between the executing agency and a utility department meant overlaying cable data with the rail alignment required weeks of reconciliation — a delay upfront standardisation would have avoided. Standardising early saves rework, especially on multi-agency projects like railway electrification.

Third, no single sensor — drone, LiDAR, satellite or mobile mapping — captures everything a project needs. The best projects integrate multiple data sources into one validated dataset.

Finally, capacity building must keep pace with technology adoption. As programmes scale up drone-based surveys, trained surveyors and GIS analysts are becoming a genuine constraint. Public-private collaboration on training, alongside the incubation centres envisaged under the Policy, will be essential to sustaining Geo-DPI at national scale.

As Geo-DPI moves from policy to implementation, industry's role is to feed these insights back — helping refine standards and build the shared spatial foundation Viksit Bharat 2047 will depend on.

About the author: This article is authored on behalf of Matrix Geo Solutions Ltd., a New Delhi-based geospatial and drone survey company delivering large-scale mapping, aerial LiDAR and GIS solutions across India's railways, roads, water, power and mining sectors since 2008.

Article – QuantaSIP

Geospatial DPI for a Data-Driven India: From Space-Based Decision Intelligence to Land Intelligence

India is rapidly building a Digital Public Infrastructure (DPI) ecosystem that extends beyond identity, payments, and governance into the realm of geospatial intelligence. Accurate location-based information is increasingly becoming the foundation for infrastructure planning, utility management, agriculture, environmental monitoring, and public service delivery.

At the intersection of geospatial technology, land intelligence, and decision support systems is **QuantaSIP GIS,** a geospatial technology company specializing in cadastral intelligence, land records, GIS solutions, satellite analytics, and enterprise spatial decision-support platforms.

Recently, **QuantaSIP GIS** received national recognition through its selection under the prestigious **IN-SPACe Seed Fund Scheme** for the development of a Decision Support System (DSS) for Power Sector Installations and Right of Way (ROW) Management. The project was selected under the IN-SPACe Announcement Opportunity (AO) for Downstream Applications – Proof of Concept (PoC). Out of 92 proposals submitted by 87 organizations across India, only 15 projects from 12 organizations were selected, making this a significant milestone for the company and a validation of the growing role of geospatial intelligence in solving real-world challenges.

Leveraging Space Technology for Critical Infrastructure:

India's power transmission network spans thousands of kilometers across diverse terrain. Managing transmission corridors and Right of Way (ROW) areas remains a complex challenge involving encroachments, vegetation growth, land ownership disputes, environmental risks, and regulatory compliance.

The proposed DSS aims to transform this process by integrating satellite imagery and Earth Observation data, GIS and spatial analytics, Artificial Intelligence and Machine Learning, cadastral and ownership intelligence, real-time monitoring dashboards, and automated reporting systems.

One of the key differentiators of the system is the integration of ownership-linked parcel intelligence. By combining satellite observations with cadastral and land ownership information, the DSS will enable users to identify not only where a risk exists, but also which land parcel is affected and who owns it. This capability is expected to significantly improve issue resolution, planning efficiency, and regulatory compliance.

Building the Land Intelligence Layer:

As the DSS project evolved, one insight became increasingly evident: effective infrastructure governance requires more than satellite imagery alone. It requires a reliable land intelligence framework.

Every infrastructure project eventually intersects with land parcels, ownership records, administrative boundaries, and legal rights. Whether the objective is route planning, Right of Way management, asset monitoring, compensation assessment, renewable energy site selection, agricultural intelligence, insurance verification, or infrastructure development, cadastral information becomes a critical decision-making component.

Cadastral data represents the most granular layer of land information available. It defines parcel boundaries and links them with land records, ownership details, survey numbers, khasra information, and administrative hierarchies. When combined with GIS and Earth Observation datasets, cadastral intelligence transforms static maps into actionable decision-support systems.

Cadastral Data as a Foundation for Geospatial DPI:

Today, cadastral and land intelligence datasets are being used for infrastructure planning and corridor analysis, Right of Way verification and monitoring, renewable energy site identification, telecom and utility network planning, agricultural intelligence and farmer outreach, BFSI risk assessment and insurance verification, property validation, government planning, and spatial analytics applications.

Expanding Access to Land Intelligence Across India:

To support this growing demand, QuantaSIP GIS has developed cadastral and land records datasets across 19 Indian states including Maharashtra, Madhya Pradesh, Rajasthan, Uttar Pradesh, Karnataka, Andhra Pradesh, Telangana, Uttarakhand, Haryana, Goa, Jharkhand, Chhattisgarh, West Bengal, Punjab, Kerala, Tamil Nadu, Tripura, Bihar, and Odisha.

These datasets are being utilized across sectors including utilities, telecom, agriculture, infrastructure, financial services, insurance, renewable energy, and governance.

The Road Ahead:

India's geospatial ecosystem is entering a transformative phase where satellite technology, artificial intelligence, GIS, and land intelligence are converging to solve complex operational challenges.

Government to back 15 space projects to solve issues like crop failure, flooding

India is shifting its space ambitions from satellite launches to using satellites for disasters preparation, infrastructure and water security. Here's how.

To help bridge that gap, the Indian National Space Promotion and Authorisation Centre (IN-SPACe) has announced the winners of five space technology use-cases under its Seed Fund Scheme.

The announcement of the winners followed a technical evaluation of 92 proposals by a panel comprising experts, representatives from various agencies, and experts from isro and IN-SPACe. In the end, 15 organisations have been selected to carry out pilot demonstrations.

Meanwhile, Bluesky Space Innovations, Quantasip Geomatic Informative Solutions and Vassar Labs IT Solutions will develop decision-support systems for power sector installations and Right of Way management.

The IN-SPACe-supported Decision Support System for Power Sector Installations and Right of Way Management represents an important step toward this future. More importantly, it demonstrates how geospatial DPI can create measurable impact by connecting space-based observations with actionable land and infrastructure intelligence.

Being a pioneer in rural land records, QuantaSIP is now expanding its capabilities into Urban Land Records services, marking an important step toward extending land intelligence solutions across India's rapidly evolving urban landscape.

As organizations increasingly adopt data-driven decision-making, the integration of Earth Observation data, cadastral intelligence, and GIS platforms will become a cornerstone of India's digital transformation journey—enabling smarter infrastructure, better governance, and more resilient development.

Article – SATPALDA

Supporting Geospatial Digital Public Infrastructure Through Satellite Imagery and GIS-Based Analysis

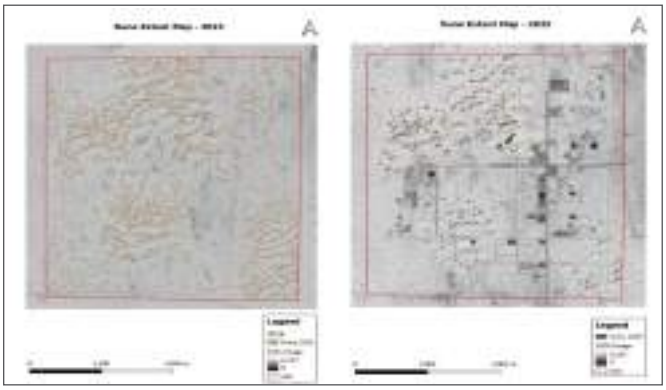
Reliable geospatial information forms the backbone of Digital Public Infrastructure (DPI), enabling planners and decision-makers to understand ground realities and respond to changing conditions with confidence. Although geospatial technologies are widely used for infrastructure planning, their role in monitoring environmental change is equally important for protecting long-term investments and critical assets. By combining satellite imagery with GIS analysis, organizations can continuously monitor landscape changes, identify emerging environmental risks, and plan mitigation measures before those risks become operational challenges. This study presents a geospatial workflow developed to monitor sand dune migration and forecast future movement patterns that may affect industrial infrastructure.

Sand dune migration is a continuous natural process in arid regions that can gradually impact industrial facilities, transportation corridors, utility networks, and other critical infrastructure. Measuring how dunes migrate over time helps organizations understand where future encroachment may occur and supports more informed planning decisions.

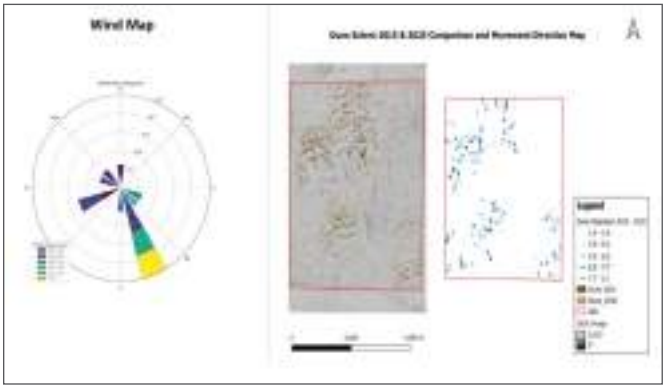
To address this challenge, SATPALDA conducted a geospatial study covering approximately 100 sq. km of desert terrain with active dune systems. The primary objective was to quantify historical dune movement, determine the dominant migration trend, and predict future dune positions to identify areas potentially vulnerable to dune encroachment.

Sentinel-2 satellite imagery acquired between 2015 and 2025 was used as the primary dataset for the analysis. A GIS workflow was developed in QGIS to extract dune extents from multi-temporal imagery.

A threshold-based classification approach was used to separate dune surfaces from the surrounding terrain before further spatial analysis was carried out. The classified raster outputs were converted into vector polygons, enabling dune boundaries from different years to be compared within a GIS environment.

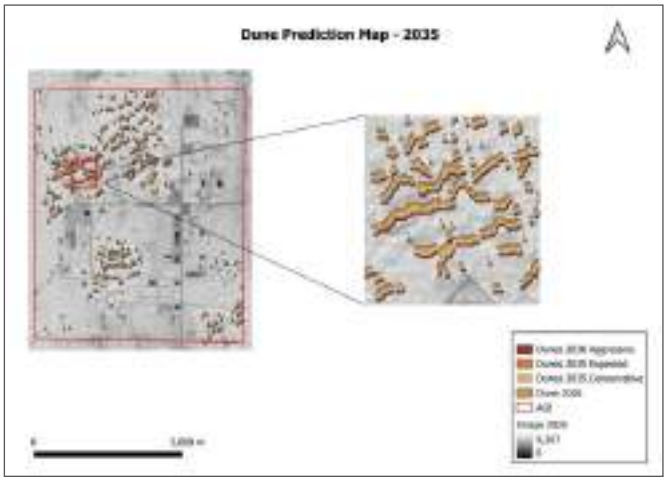


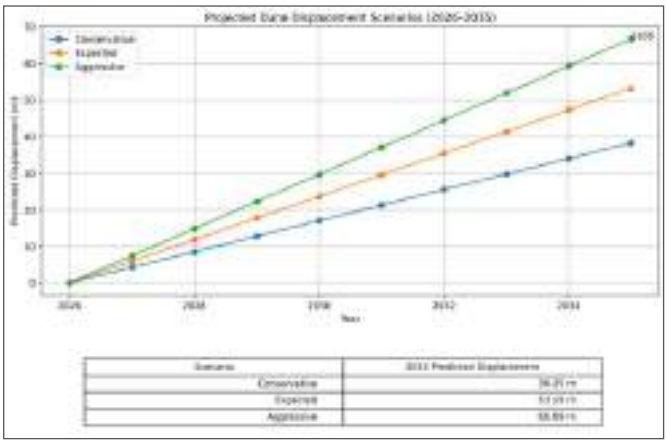
To understand dune movement, centroid locations were generated for corresponding dune polygons, and migration vectors were created to calculate displacement and movement direction. Vector and wind flow analysis identified a dominant migration azimuth of approximately 165°, indicating a south-southeast (SSE) migration trend.



Based on the observed average migration rate of approximately 6 m/year, future dune positions were projected for 2035 using a linear trend extrapolation approach. To represent uncertainty in future landscape dynamics, three prediction scenarios Conservative, Expected, and Aggressive were developed, providing a range of possible

dune migration outcomes. Developing multiple prediction scenarios allowed stakeholders to evaluate different levels of potential risk rather than relying on a single deterministic forecast

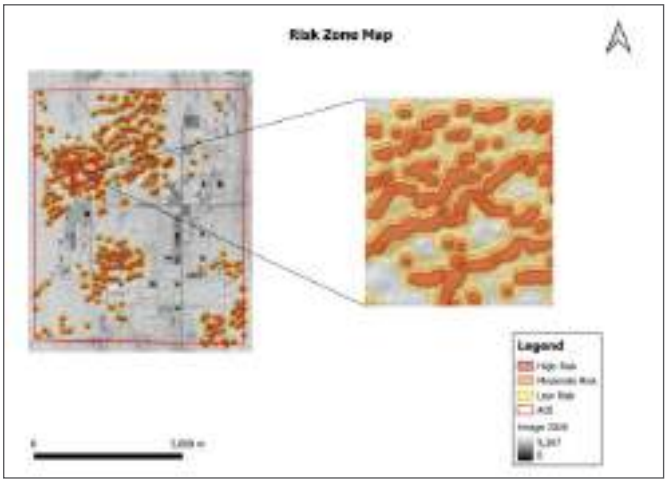




The analysis identified a cumulative dune displacement of approximately 59 meters between 2015 and 2025, corresponding to an average migration rate of approximately 6 meters per year.

The historical analysis established consistent migration trends, while the prediction model illustrated how dune positions could change under conservative, expected, and aggressive future scenarios. The predicted dune extents also identified locations where continued migration may pose a greater risk to nearby industrial infrastructure and operational corridors.

Rather than relying solely on field observations, stakeholders were able to evaluate historical trends, compare alternative future scenarios, and identify potential exposure zones using a consistent geospatial framework. These outputs supported evidence-based risk assessment, long-term planning, and infrastructure protection.



The project shows that satellite imagery can be used for much more than visual interpretation. When combined with GIS analysis, it becomes a practical source of spatial intelligence that helps organizations understand future environmental changes and plan mitigation measures before problems arise.

As Geospatial DPI continues to expand in India, projects like this demonstrate how Earth Observation and GIS can contribute to environmental monitoring and infrastructure planning. Converting satellite data into practical information allows decision-makers to evaluate future risks, prioritize mitigation efforts, and support more resilient development.

This case study reflects SATPALDA's application of Earth Observation and GIS technologies to support predictive environmental analysis and infrastructure resilience.

Article – OGC

Geospatially Enabling DPI through Open Standards

By Harsha Vardhan Madiraju
Associate Director, Open Geospatial Consortium (OGC)

India's Digital Public Infrastructure (DPI) journey has become a global reference point for how technology can be deployed at population scale. Platforms such as Aadhaar, UPI, DigiLocker, and the Open Network for Digital Commerce (ONDC) have shown how interoperable digital infrastructure can create public value, stimulate innovation, and enable new services across sectors.

At its core, DPI refers to shared digital systems that provide secure, interoperable, and reusable building blocks on which governments, businesses, researchers, and citizens can build applications and services. Identity, payments, health, and commerce are now widely recognized pillars of India's DPI ecosystem. Another layer is becoming just as important: geospatial infrastructure.

As India pursues goals around smart infrastructure, climate resilience, disaster preparedness, logistics efficiency, precision agriculture, and evidence-based governance, location is becoming central to decision-making. The question is no longer whether geospatial information matters, but whether the country has the digital infrastructure needed to discover, exchange, integrate, and operationalize location-based information at scale.

Many of the building blocks are already in place.

Viewed together, initiatives such as NRSC-ISRO Bhuvan, the Integrated Geospatial Data Exchange Interface (GDI), and India's participation in the World Meteorological Organization's WMO Information System 2.0 (WIS 2.0) points to the foundations of a Geospatial DPI for India—one built on open standards, interoperability, and public benefit.

Bhuvan: Shared Geospatial Services at National Scale

One of India's most successful geospatial platforms is Bhuvan, developed by the National Remote Sensing Centre (NRSC), a major center of the Indian Space Research Organization (ISRO).

Since its launch in 2009, Bhuvan has evolved into a national geospatial services platform supporting governance, planning, environmental management, and disaster response. As reported earlier by OGC, the platform serves approximately 150,000 unique users daily and records nearly 20 million hits every day. Supported by OGC Standards, NRSC Bhuvan supports more than 100 use cases and provides over 150 customized solutions across government programs.

Its impact can be seen across flagship initiatives such as the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), Pradhan Mantri Awas Yojana (PMAY), and Pradhan Mantri Gram Sadak Yojana (PMGSY). Bhuvan has helped monitor rural infrastructure assets, improve transparency in program implementation, support disaster response during cyclones and floods, and provide geospatial intelligence during the COVID-19 pandemic.

What makes Bhuvan particularly relevant in the DPI context is that it functions as shared infrastructure. Rather than individual agencies building isolated systems, Bhuvan provides common geospatial services that can be used and adapted across sectors and programs.

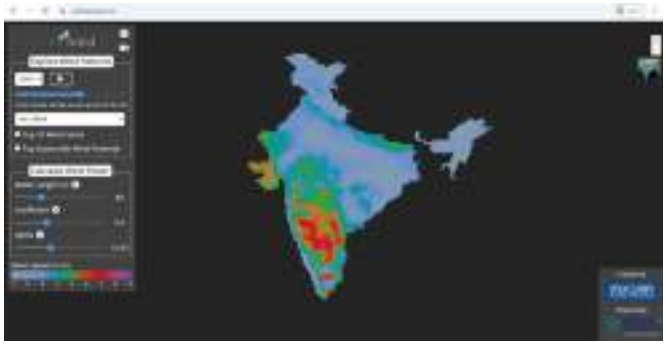
Its implementation of OGC standards such as Web Map Service (WMS), Web Feature Service (WFS), Web Coverage Service (WCS), Catalogue Service for the Web (CSW), and Web Map Tile Service (WMTS) enables interoperability between systems, allowing geospatial information to be accessed and used through a wide variety of applications and platforms.

GDI: Breaking Down Geospatial Data Silos

If platforms like Bhuvan make geospatial services widely available, the next challenge is making geospatial data easier to discover, access, and use across organizations.

The Integrated Geospatial Data Exchange Interface (GDI), piloted by the Centre of Data for Public Good (CDPG) at the Indian Institute of Science (IISc) with funding from the Department of Science and Technology (DST), was created to address a long-standing problem: valuable geospatial datasets often remain fragmented across government departments, research institutions, and private organizations.

GDI demonstrated the success by providing access to more than 1,300 datasets contributed by 31 organizations including the Survey of India, National Remote Sensing Centre, National Informatics Centre, academic institutions, and industry participants.



Built using OGC API standards, GDI enables metadata-rich, interoperable, and consent-based data sharing. Importantly, data providers retain control over access and usage while making their datasets discoverable and reusable across a broader ecosystem.

Early pilot implementations have already demonstrated the value of this approach. Logistics company Delhivery improved geocoding accuracy and operational efficiency using datasets accessed through the platform. Other applications support renewable energy assessment, coastal monitoring, startup innovation, and research initiatives.

At its core, GDI treats geospatial data as a shared resource rather than something locked within organizational silos. Much like UPI simplified digital payments by providing common infrastructure, GDI demonstrates how standards-based geospatial data exchange can reduce friction and create new opportunities for collaboration and innovation.

Connecting India to Global Climate & Weather Data Networks

Geospatially enabled DPI is not limited to national systems. Many of today's challenges—including cyclones, floods, heatwaves, climate variability, and environmental monitoring—require information to move seamlessly across national boundaries.

India's participation in the World Meteorological Organization's WMO Information System 2.0 (WIS 2.0), which implements OGC APIs, demonstrates this broader dimension.

Through the India Meteorological Department (IMD), India contributes operational weather and climate information through a modern standards-based infrastructure enabled by WMO WIS 2.0 and OGC API Standards.

The IMD WIS 2.0 node currently provides access to a range of operational datasets, including synoptic observations from fixed land stations, upper-air temperature, humidity and wind reports, drifting buoy observations, satellite products, Common Alerting Protocol (CAP) alerts, and forecast model products such as GFS and GEFS.

India's participation highlights an important aspect of geospatial DPI: the ability to connect national infrastructure with global information networks. Open standards make it possible for data produced in India to be shared, discovered, and used as part of international efforts to better understand weather, climate, and environmental risks.

The Opportunity Ahead

Taken together, Bhuvan, GDI, and IMD's participation in WIS 2.0 show that many of the building blocks of a geospatial DPI ecosystem are already in place.

The next opportunity lies in strengthening the connections between these systems through common standards, improved discovery, real-time data exchange, and emerging technologies such as GeoAI and digital twins.

As India continues to expand its broader DPI ecosystem, geospatial information is becoming an increasingly important foundation for decision-making across sectors. Open standards developed through organizations such as OGC provide a pathway for ensuring that this infrastructure remains interoperable, scalable, and accessible.

The success of India's DPI journey has already demonstrated how shared digital infrastructure can unlock innovation and public value at scale. Geospatial DPI represents the next frontier—one where location-based information becomes a trusted, reusable public asset powering a more resilient, efficient, and data-driven India.

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