



— SYMPOSIUM ON —  
**DATA FOR  
PUBLIC GOOD**  
— 2025 —  
**PROCEEDINGS**

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# Index

Message from the Organisers .....	03
Introduction .....	04
<b>Day 1</b>	
Welcome Address .....	07
Setting the Context .....	08
Keynote Address - Driving the Future: The Role of Government in Accelerating Data Science and AI Innovation .....	09
Keynote Address - Data Driven Governance: Harnessing Innovation for Citizen-Centric Public Services .....	11
Keynote Address - Why India's Data Economy Matters to the World .....	12
Keynote Address - Will AI Eat Geospatial? .....	14
Data as the Catalyst for Innovation: Unlocking the Power of Public-Private Partnerships .....	16
Panel Discussion: Unlocking the Power of Data Spaces – Enabling Digital Public Good through Global Interoperability .....	22
Panel Discussion: Connected Systems, Resilient Outcomes – Linking Mobility, Energy, and Climate Action through Shared Digital Infrastructures .....	23
Panel Discussion: Preserving Indian Knowledge Systems in the Age of AI .....	25
<b>Day 2</b>	
<b>Track 1 - Data Spaces and Digital Product Passport</b>	
Welcome Address .....	28
Talk: Data Spaces - Intro & Use Cases of Data Spaces (DPP, Travel/Tourism & Sovereign AI) .....	29
Talk: Data Spaces - Trust in Data Spaces .....	30
Talk: EU-Indo-Pacific Coordination for Trusted Data Exchange .....	31
Presentation: Data Spaces – Latest Advances in Context Information Sharing .....	32
Presentation: Digital Product Passports and Data Spaces: Building the Infrastructure for a Circular, Trusted Economy .....	33
Presentation: DPP & LEI – Open & Verifiable Ecosystem Globally .....	34
Dialogue: Data Spaces and Digital Product Passports: From Global Policy to Local Practice .....	35
Presentation: Sovereign AI using Data Spaces – Delivering Trustworthy, Open, and Interoperable Intelligence .....	36
<b>Track 2 - Mobility</b>	
Development of Sustainability Plans for Digital Public Infrastructure and Open Data .....	37
Panel Discussion: Governance, Stewardship, and Financial Models .....	38
From Data to Decisions – Interoperability in Practice: Case Studies from Cities and Startups .....	39
Panel Discussion: Open Data, Standards and the Future of Multimodal Mobility in India .....	42
Panel Discussion: Accelerating the E-Mobility Transition through Digital Ecosystems & Infrastructure .....	44
<b>Track 3 - WebSciX</b>	
Welcome Address: Setting the Vision for WebSciX .....	45
Talk: How the Post-Internet World Order Has Changed International Relationships .....	46
Talk: Open Data, Open Science: Building a Global Public Good .....	47
Talk - Data Exchange: The Third Leg of the Digital Public Infrastructure Stool .....	48
Talk: Knowledge Bases to Narrative Spaces .....	49
Talk: Computational Social Science, Web Data, and PRECOG .....	51
Talk: AI for Digital Public Infrastructure: Legal Issues & Responsible AI Adoption .....	52
<b>Track 4 - Privacy and Security for the Future of India</b>	
Opening Address: Setting the Stage for Privacy and Security Innovation in India .....	53
Talk: The State of Confidential Computing .....	54
Talk: Designing Trustworthy Data Ecosystems: DPI Opportunities alongside DPDPA Implementation .....	56
Talk: Towards Proactive Security in Critical Infrastructure .....	58
Talk: Broad Overview of Privacy/Security Issues in the ML Space .....	59
Presentations: Examples of Indigenous Innovation .....	61
Panel Discussion: Indigenous Innovation for Future .....	62
Panel Discussion: Impact of Privacy and Security as a Fundamental Right (DPDP) on Indian Innovation .....	63

## Message from the Organisers

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The *Symposium on Data for Public Good* was founded on a simple idea: that data, when responsibly harnessed, can transform public systems and improve quality of life at scale. Over the past three years, the symposium has emerged as a collaborative space where cross-sectoral stakeholders come together to learn, debate, co-create, and push the boundaries of what is possible in the world of public digital ecosystems.

This year's edition reflects the expanding scope of this mission. Whether through interoperable mobility systems, geospatial intelligence platforms, privacy-preserving technologies, or next-generation AI governance, the symposium highlights the remarkable progress India is making in designing digital infrastructure that is inclusive, open, and future-ready.

As organisers, we believe that a shared vocabulary and shared infrastructure are essential to addressing the complex challenges of a rapidly urbanising, digitising nation. The conversations held here—grounded in real deployments and informed by global best practices—reinforce our commitment to enabling responsible innovation that can be adopted and scaled across cities and sectors.

We invite all readers of this compendium to join this ongoing journey. Your ideas, collaborations, and contributions will continue to shape India's leadership in digital public goods and data-driven governance.



# Introduction

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The Symposium on Data for Public Good 2025 marks the third edition of an annual gathering that brings together policymakers, technologists, researchers, urban practitioners, industry leaders, and innovators committed to advancing data-driven public systems. Organised by the Centre of Data for Public Good (CDPG), Indian Institute of Science (IISc), the symposium has steadily evolved into a national platform that showcases cutting-edge work in geospatial technologies, AI/ML, privacy-preserving data systems, and digital public infrastructure for governance and public service delivery.

Held on 14–15 October 2025 at IISc Bengaluru, the symposium highlighted the transformative potential of data when shared responsibly and used collaboratively. This year's theme emphasised interoperability, openness, and scalability—the foundational principles required to unlock value for citizens, cities, and governments. Across two days, experts discussed how digital public goods, geospatial platforms, privacy-enhancing technologies, and mobility data ecosystems are reshaping public-sector innovation in India.

This compendium brings together session summaries, spotlight talks, panel discussions,

demonstrations, and insights presented during the symposium. It captures the breadth and depth of conversations that spanned next-generation MLOps, urban mobility platforms, healthcare knowledge graphs, secure data sharing infrastructures, and the future of geospatial intelligence. It also documents the real-world case studies—from Chennai to Bengaluru to Odisha—where interoperable systems are being deployed at scale to improve public services.

At its heart, the symposium reaffirms a shared conviction: data, when responsibly governed and widely accessible, can serve as a powerful enabler of public good. These proceedings are a testament to the collaborative spirit of the ecosystem—government bodies, academic institutions, industry, civil society, and startups—working together to create digital systems that are equitable, efficient, and citizen-centric.

We hope this compendium serves as a reference for practitioners, policymakers, researchers, and students, and as a catalyst for continued dialogue and action toward building a data-empowered, interoperable, and inclusive future for India.

— SYMPOSIUM ON —  
**DATA FOR**  
**PUBLIC GOOD**  
— 2025 —



**DAY 1**

# Day 1 Agenda

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Welcome Address

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Setting the Context

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Keynote Address - Driving the Future: The Role of Government in Accelerating Data Science and AI Innovation

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Keynote Address - Data Driven Governance: Harnessing Innovation for Citizen-Centric Public Services

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Keynote Address - Why India's Data Economy Matters to the World

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Keynote Address - Will AI Eat Geospatial?

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Data as the Catalyst for Innovation: Unlocking the Power of Public-Private Partnerships

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Panel Discussion: Unlocking the Power of Data Spaces – Enabling Digital Public Good through Global Interoperability

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Panel Discussion: Connected Systems, Resilient Outcomes – Linking Mobility, Energy, and Climate Action through Shared Digital Infrastructures

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Panel Discussion: Preserving Indian Knowledge Systems in the Age of AI

## Welcome Address

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**Prof. Govindan Rangarajan**  
Director, Indian Institute of Science, Bangalore

In his welcome address, Prof. Govindan Rangarajan set the tone for the third edition of the Symposium on Data for Public Good by emphasizing the critical role of data, research, and interdisciplinary collaboration in addressing complex societal challenges. Extending a warm welcome to all participants, he underscored IISc's long-standing commitment to excellence in science and technology, and its growing leadership in advancing data-driven approaches for public good.

Prof. Rangarajan highlighted that modern societal challenges – from urban mobility and environmental sustainability to healthcare and public service delivery – are inherently data-intensive. He noted that meaningful progress requires not only technological advancements, but also the thoughtful translation of research into real-world impact. In this context, he emphasized the importance of initiatives such as the CDPG, which serve as platforms for bridging cutting-edge research with public welfare.

A major theme of his address was the need for interdisciplinary collaboration. He stressed that no single discipline can solve the multifaceted problems facing society today. Instead, progress must emerge from active cooperation among fields such as data science, AI/ML, geospatial technologies, social sciences, public policy, and domain-specific expertise. The symposium, he noted, embodies this collaborative spirit by bringing together diverse stakeholders – researchers, students, industry leaders, government bodies, and practitioners.

Prof. Rangarajan also emphasized the growing importance of capacity building. As data becomes increasingly central to governance and societal development, he encouraged nurturing the next generation of researchers and practitioners who can work responsibly and effectively with data. He reiterated that educational initiatives, training programs, and platforms that cultivate talent and encourage responsible innovation are essential for a sustainable impact.

Crucially, he stressed that as we leverage data at scale, the principles of ethics, transparency, and accountability must remain at the forefront. Whether dealing with urban data, mobility systems, or digital platforms, responsible use of data is indispensable. He called for embedding governance and ethical considerations early in the design of data systems rather than treating them as afterthoughts.

In closing, Prof. Rangarajan affirmed IISc's commitment to supporting research that not only advances scientific understanding but also meaningfully contributes to societal welfare. He expressed confidence that the discussions, demonstrations, and collaborations emerging from the symposium would foster new ideas, strengthen partnerships, and help shape a future where data is harnessed thoughtfully and effectively for the public good.

## Setting the Context



**Prof. Inder Gopal**  
 Chairperson, CDPG, IISc Bengaluru

In his speech, Prof. Inder Gopal welcomed participants to the third edition of the Symposium on Data for Public Good, expressing gratitude for the overwhelming response that had led to more than 1,200 registrations.

He acknowledged the contributions of the symposium's four co-organisers – FIWARE Foundation, WRI India, GIZ, and IIIT Bangalore – each bringing deep expertise across open data ecosystems, sustainable urban development, multi-sectoral problem-solving, and web science. Their collaboration, he noted, had been instrumental in shaping both the conference agenda and the broader ecosystem of partnerships that CDPG continued to cultivate.

A major feature this year was the Hackathon built around BMTC's bus tracking data, made publicly accessible for the first time through the IUDX platform. With exceptionally high participation, the hackathon reflected growing public interest in data-driven mobility solutions. Prof. Gopal thanked BMTC, the Karnataka Department of Transportation, and Maruti Suzuki for enabling and supporting this initiative.

He also expressed gratitude to the media and community partners, as well as the numerous team members who worked behind the scenes. Their contributions, he emphasized, were essential to the success of the event and the growth of CDPG's mission.

Transitioning to the broader vision of the Centre, Prof. Gopal outlined the complex challenges inherent in using data for public good – from curation and quality, to analytics, model building, privacy, security, authenticity, and compliance with policy and legal frameworks. CDPG was established precisely to study and operationalise this entire value chain, ensuring that research does not remain confined to laboratories but extends to field deployment and real-world impact.

He described CDPG's partnerships with national and state agencies including MeitY, DST, the Ministry of Agriculture, and several state governments such as

Telangana and Maharashtra, as well as organisations like BMTC, BTP, ICMR, and CBR. These collaborations have enabled CDPG to build and test data-driven systems across four major domains: transportation, health, agriculture, and geospatial data – all of which form the thematic backbone of this year's symposium.

Prof. Gopal then provided a preview of the two-day program. Day 1 would feature a series of high-profile keynotes addressing critical dimensions of India's data ecosystem:

- MeitY's leadership in shaping national data policy and standards;
- the vital role of DARPG in strengthening citizen feedback and public grievance systems;
- a keynote by Sharad Sharma of iSPIRT on India's data economy and its global impact;
- and a talk by Peter Rabley, CEO of the OGC, on the future of AI and geospatial standards.

Panel discussions and talks throughout the day would explore data as a catalyst for innovation, the emergence of data spaces, mobility data ecosystems, and preservation of traditional knowledge in a digital world.

Day 2 would shift into a multi-track format led individually by CDPG, WRI-GIZ, IIITB, and FIWARE, covering privacy and security, mobility solutions, web sciences, and data spaces respectively – allowing participants to navigate between sessions based on their interests.

Prof. Gopal concluded by thanking the attendees for braving the city's traffic, and expressed hope that the symposium would spur deeper exploration, collaboration, and innovation. He emphasized that although CDPG's journey had only begun to "scratch the surface", the collective knowledge and engagement over the coming days would significantly advance the mission of using data responsibly and effectively for public good.

# Keynote Address - Driving the Future: The Role of Government in Accelerating Data Science and AI Innovation



**S. Krishnan**

Secretary, Ministry of Electronics and Information Technology (MeitY)

In his keynote address, Shri S. Krishnan reflected on the rapidly evolving role of data in modern governance and emphasized the Government of India's responsibility in shaping a secure, innovative, and citizen-centric data ecosystem. Speaking at the Third Symposium on Data for Public Good, he remarked on the growing national and global attention around data – how it is shared, how it is used, and how concerns around privacy and trust have become central to public discourse.

He highlighted that while conversations on data protection are crucial, the larger opportunity lies in harnessing data at scale for public good. As the primary custodian of vast volumes of both personal and non-personal data, the government today sits at the centre of India's digital transformation. With service delivery increasingly shifting to digital platforms, the volume, richness, and potential of government data have grown exponentially.

A key pillar of this transformation, he explained, is the Digital Personal Data Protection Act (DPDP Act). The Act establishes consent as the foundation of personal data use, defining a wide spectrum of personally identifiable information and placing control firmly in the hands of citizens. Data fiduciaries, he noted, are legally bound to use data only for purposes explicitly consented to. With final rules nearing notification, this framework is expected to bring stronger assurance of privacy, security, and accountability. Special safeguards, including verifiable parental consent for minors, further strengthen citizen protection in the digital ecosystem.

However, Shri Krishnan emphasized that the true purpose of data governance is not merely protection, but productive and ethical utilization of data for societal benefit. Until recently, government data existed largely in physical ledgers and decentralized records, making large-scale analysis difficult. Digitization has fundamentally changed this. Once data is centrally stored and structured, it becomes a powerful engine for evidence-based policymaking, predictive analytics, and targeted service delivery.

Yet, he cautioned that India's data landscape still remains fragmented. Large volumes of valuable administrative and transactional data remain distributed across ministries and institutions, often operating in silos. Unlocking the full value of this data requires interoperability, institutional collaboration, and the intelligent application of AI and analytics.

Drawing from his administrative experience, Shri Krishnan illustrated how non-personal data can generate transformative policy insights. He cited examples such as mapping commercial electricity connections and banking deposit data to identify economic activity clusters for administrative planning. These insights, while derived from non-personal data, can profoundly influence infrastructure placement, public investment, and institutional presence.

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He also reflected on collaborative work with research institutions such as J-PAL, where large-scale administrative datasets were analysed beyond their original intent. Health insurance data, for example, revealed disease burden patterns, treatment migration flows, hospital utilization trends, and regional disparities in healthcare access—offering powerful guidance for future public health infrastructure planning. Similarly, road accident databases provided insight into high-risk locations and systemic safety gaps.

Through these examples, Shri Krishnan made a compelling case that data-driven governance is not only about automation, but about intelligent decision-making rooted in real evidence. When combined with AI and advanced analytics, administrative data can evolve from passive digital records into active instruments of policy design, monitoring, and social transformation.

He concluded by reaffirming that the government's role in accelerating data science and AI innovation lies in three critical responsibilities:

- Building strong data protection and trust frameworks,
- Breaking data silos to enable responsible data sharing, and
- Creating platforms where innovation in AI and analytics directly serves citizens.

The keynote reinforced the symposium's central vision – that data, when governed responsibly and applied intelligently, can become one of the most powerful tools for inclusive development, responsive governance, and sustainable public good.



# Keynote Address – Data Driven Governance: Harnessing Innovation for Citizen-Centric Public Services



## V. Srinivas

Secretary, Department of Administrative Reforms and  
 Public Grievances (DARPG)

In his address on Data-Driven Governance: Harnessing Innovation for Citizen-Centric Public Services, Shri V. Srinivas highlighted how data, digital platforms, and mathematical models have become powerful instruments for transforming public institutions and improving citizens' lives. Drawing from over a decade of experience in building digital public institutions, he demonstrated how technology-backed governance can shift the paradigm toward what the Government of India describes as "maximum governance, minimum government".

Shri Srinivas reflected on his early experiences with large-scale digitization during his tenure at the All India Institute of Medical Sciences (AIIMS). The introduction of end-to-end digital systems fundamentally transformed hospital operations by reducing patient wait times, increasing transparency in appointments and surgical scheduling, and significantly improving service delivery. Through process re-engineering supported by strong mathematical models, patient handling capacity was nearly tripled – a striking example of how data-driven systems can directly enhance public welfare. This transformation found recognition in national literature, including references in *The Making of Aadhaar* and *Brigial Nation*.

Building on this success, he led the digitization of nearly 1,500 revenue courts in Rajasthan, addressing long-standing inefficiencies that left farmers uncertain about hearing dates, judgments, and legal outcomes. By transforming these opaque, paper-driven systems into transparent digital platforms, technology became a direct enabler of justice and citizen empowerment.

As Secretary of the DARPG, Shri Srinivas described the evolution of the Centralized Public Grievance Redress and Monitoring System (CPGRAMS) as a

cornerstone of smart governance in India. Conceived as a national, unified platform for grievance redressal, CPGRAMS today represents the world's largest 24x7 digital grievance interface, enabling citizens to directly engage with government institutions in a timely, accessible, and meaningful manner.

He noted that the platform gained particular significance during the COVID-19 pandemic, when over 20,000 grievances per day were being registered. Even under such unprecedented pressure, grievance redressal timelines were brought down to nearly three days, demonstrating the power of scalable digital governance. The success of CPGRAMS has attracted international attention, with presentations made to the Commonwealth Heads of Public Service, representatives of 56 countries, and the Government of the United States, many of whom expressed interest in replicating it as a global digital public good.

Shri Srinivas emphasized that grievance redressal systems are not merely administrative tools but powerful engines of citizen empowerment, policy feedback, and institutional accountability. By converting citizen voices into structured data, governments can not only resolve complaints efficiently but also identify systemic gaps, improve service delivery, and design more responsive public policies.

In conclusion, his address underscored that data-driven governance is no longer optional – it is foundational to building resilient, transparent, and citizen-centric public institutions. As digital platforms scale across governance domains, their true success lies in their ability to simplify access, amplify citizen voices, and translate data into meaningful public value.

# Keynote Address: Why India's Data Economy Matters to the World



**Sharad Sharma**  
 Co-founder, iSPIRT Foundation

In his keynote address, Shri Sharad Sharma presented a compelling global perspective on why India's data economy is poised to shape the future of AI, healthcare, and digital public infrastructure worldwide. Drawing on real-world deployments and emerging international collaborations, he demonstrated how privacy-preserving data systems can unlock extraordinary public value while protecting individual rights.

He began with a striking example from tuberculosis (TB) screening, where a newly approved AI-based solution allows users to simply cough into a mobile phone to detect TB. Already deployed in Madhya Pradesh, this innovation—developed by Wadhvani AI—illustrates how sensitive health data, when responsibly used, can directly power scalable AI solutions for public health. Despite a slightly elevated false-positive rate, the system has crossed regulatory thresholds for real-world deployment, marking a major milestone in applied AI for healthcare.

Turning to cancer diagnostics, Shri Sharma highlighted the scale of India's challenge: nearly 4,000 new cancer cases are detected daily, with over 75% diagnosed at Stage 3 or 4. He compared this with France, Brazil, and Japan—three nations now collaborating with India to create a shared, privacy-preserving cancer data ecosystem comprising nearly 10,000 new patient records per day. Access to such large-scale, diverse datasets can dramatically improve early-stage cancer detection, significantly increasing remission rates while reducing treatment costs and improving public health outcomes.

Crucially, Shri Sharma emphasized that traditional anonymisation is no longer sufficient for protecting sensitive training data. Instead, India is pioneering a model where "the data does not go to the model; the

model goes to the data". In this paradigm, AI models are trained inside secure computational environments, and only privacy-certified outputs are allowed to leave—using mathematically rigorous techniques such as differential privacy. This replaces slow, error-prone human inspection with automated, provable privacy guarantees.

He explained that this system relies on four fundamental digital building blocks:

- Onboarding of data providers,
- Standardised publication of metadata for discoverability,
- Registration of data consumers, and Secure, contract-governed access to data environments.

These same principles, he noted, already power India's data exchange architecture through platforms created by the CDPG—from non-personal data exchanges like IUDX to privacy-sensitive data collaboratives. Importantly, these systems are now being harmonised under national frameworks such as GDI and DEPA.

A central theme of the keynote was India's innovation in "techno-legal regulation"—the idea that market behaviour cannot be shaped by policy alone, but requires public digital infrastructure acting in tandem with law. Unlike many Western systems dominated by profit-driven data intermediaries, India's data exchanges are conceived as privately provisioned public digital utilities, similar in spirit to UPI. By compressing intermediary costs from as high as 80% to less than 1%, this model ensures that most of the economic value flows directly to data providers and innovators, dramatically accelerating innovation.

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Shri Sharma then traced the philosophical divergence between India's approach and global models such as GDPR in Europe and data broker ecosystems in the United States. While GDPR emerged from a pre-internet era that assumed data would disappear into opaque "black box" processors, India adopted a fundamentally different consent-based mental model—where personal data is shared directly with specific data consumers in exchange for clear, personalised benefits. This framework now operates at massive scale through India's Account Aggregator ecosystem, processing over 16 million digital consents per month, and is embedded within the DPDP Act.

Extending this logic to AI training data, Sharma introduced the Global Training Data Sharing Framework (GTDF)—a UN-backed initiative led by India with early alignment from France, Brazil, and Japan. The framework enables countries to share sensitive datasets such as cancer records with computational privacy guarantees, rather than relying on fragile contractual enforcement. This model is especially attractive to smaller nations that lack sufficient domestic training data to build competitive AI systems.

He concluded with a powerful assertion: India is poised to deliver the world's second major global digital standard—after digital identity—this time in AI training data governance. With health, mobility, and climate datasets increasingly flowing through privacy-preserving public infrastructure, India is positioned not merely as a data-rich nation, but as a global architect of trustworthy AI ecosystems.

Shri Sharma closed by urging participants to recognize the historic moment they are witnessing—where data, privacy, public infrastructure, and AI innovation are converging to redefine how societies build technology for the public good.



# Keynote Address - Will AI Eat Geospatial?



**Peter Rabley**

CEO, Open Geospatial Consortium

With the advent of Generative AI, a question that intrigues the mind of the Geospatial community across the globe is *"Will AI eat geospatial?"*

With rapid advances in this 'more than disruptive' technology that is artificial intelligence, many wonder whether traditional geospatial roles and processes will become obsolete.

The keynote, but Peter Rabley argues that the answer is far more nuanced: AI will not replace geospatial – it will fundamentally reshape it.

## The Shift from Map-Making to Spatial Reasoning

Historically, geospatial work has centred on painstaking manual processes: digitising features, annotating maps, cleaning unstructured spatial data, and stitching together diverse datasets. These tasks are increasingly being automated. Modern AI systems can extract features from imagery, classify land use, detect objects, and identify change patterns with unprecedented speed and accuracy.

But the real transformation lies beyond automation. Instead of static maps and layer-based GIS pipelines, AI enables spatial reasoning – the ability to interpret context, integrate diverse data modalities, analyse patterns, and generate dynamic insights. By bringing together satellite imagery, feeds from IoT devices, vector layers, and temporal data, AI systems can answer complex "why", "what if", and "what next" questions that were previously hard to answer.

## Democratisation Through Natural-Language Interfaces

One of the most significant shifts highlighted in the keynote is the emergence of natural-language and agent-based interfaces. These tools drastically reduce the barrier to entry for geospatial analytics. Instead of navigating complex GIS software, users – planners, administrators, researchers, citizens – can pose questions in plain language. AI interprets the query, retrieves the relevant geospatial data, performs the analysis, and presents clear insights.

This new trend promises to broaden the impact of geospatial data across sectors such as mobility, climate resilience, agriculture, and governance.

## Why Human Expertise Still Matters

Despite automation, the keynote emphasises that human expertise remains indispensable.

AI models are only as reliable as the data they are trained on, and geospatial data is often of poor quality. It is incomplete, noisy, lacks metadata or context-dependent. Experts are therefore needed to:

- curate and validate high-quality spatial datasets,
- interpret AI-generated patterns and anomalies,
- integrate domain knowledge into analyses, and
- ensure responsible and ethical use of spatial insights.

Complex tasks that require an understanding of the underlying policy guidelines, local context, socio-environmental understanding, or judgment cannot be delegated entirely to the AI models.

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## The Imperative of Governance and Trust

As AI systems generate more sophisticated geospatial outputs, the need for robust data governance, provenance, and transparency becomes even more pressing.

Questions of bias, accuracy, environmental impact, and privacy loom large. The keynote argues for embedding ethical principles and governance frameworks early in the AI-geospatial pipeline – rather than treating them as afterthoughts.

For public institutions, cities, and data-exchange platforms, this emphasis on trust and accountability aligns strongly with the growing need for transparent spatial decision-making.

## Implications for Public Good and Urban Systems

For initiatives that leverage geospatial data for societal impact – such as urban mobility planning, climate adaptation, land-use monitoring, or disaster management – AI certainly offers unprecedented opportunities like: faster, scalable spatial analysis; integration of multimodal datasets; real-time situational awareness; and broader access to geospatial intelligence.

However, these gains depend on sustained investment in skilled human oversight, data standards, and responsible governance.

## A Future Reimagined, Not Replaced

The keynote concludes with a balanced perspective: AI will not “eat” geospatial, but it will dramatically reshape the discipline.

The value chain will shift from manual digitisation to problem-framing, oversight, and interpretation. Data scientists, GIS professionals, domain experts, and policymakers must collaborate to ensure that AI-driven geospatial systems serve the public good – equitably, transparently, and sustainably.

As we enter this era of AI-augmented geospatial intelligence, the challenge is not to resist the technological shift, but to guide it thoughtfully. The future of geospatial belongs not to machines alone, but to the humans who know how to ask meaningful spatial questions – and ensure that the answers benefit society at large.

# Data as the Catalyst for Innovation: Unlocking the Power of Public–Private Partnerships

This session explored how data-driven Public–Private Partnerships (PPPs) are reshaping governance, service delivery, and innovation ecosystems in India. As digital transformation accelerates across sectors, the convergence of government scale, private-sector agility, and academic rigor is emerging as a powerful force for societal impact. The session examined how data acts as the binding infrastructure that fuels innovation, improves institutional performance, strengthens accountability, and enables evidence-based policymaking.

Through lived experiences from large-scale government collaborations, applied economic research, and institutional reforms, the session highlighted both the promise and the persistent challenges of translating India's data abundance into actionable intelligence. The discussions emphasized that beyond technology, capacity building, institutional redesign, regulatory foresight, and trust-based partnerships are essential for unlocking the full potential of data for public good.

## Institutionalising Data for Public Good: A State-Led Model of Public–Private Collaboration



### Talk by Urmila Chatterjee

Executive Director, Data Policy Innovation Centre

Dr. Urmila Chatterjee's talk offered a grounded and institutionally rich perspective on how data can be embedded into the everyday functioning of government through sustained public–private and academic partnerships. Speaking as both an economist and a practitioner, she highlighted how the real challenge today is not the absence of data, but the difficulty of translating data into government capability, efficiency, and decision-making power.

She began by introducing the Data Policy Innovation Centre (DPIC)—a unique partnership between the University of Chicago and the Government of Odisha. Unlike conventional academic collaborations, DPIC is fully funded by the state government and physically embedded in Bhubaneswar, with a resident team of economists and data scientists working directly with line departments. This on-ground institutional embedding, she noted, allows DPIC to operate not

merely as a research unit, but as a capacity-building and systems-reform platform within government.

The Centre's work spans three core functions:

- Curation and unlocking of high-quality government datasets,
- Applied analytics for system improvements and policy design, and
- Capacity building within government to create long-term demand for data-driven governance.

Dr. Chatterjee emphasized that India today is “data rich but information poor”. While massive volumes of administrative and transactional data exist at both national and state levels, their integration into governance workflows remains weak. As a result, public-sector decision-making often fails to fully leverage the strategic value of available data.

Situating her talk within the theme of innovation and PPPs, she highlighted how data-driven solutions are already transforming development outcomes globally—from poverty targeting using satellite imagery, to real-time disease surveillance during COVID-19 using digital trace data, to climate adaptation via precision agriculture and localized weather forecasting. India, she reminded the audience, has a long tradition of global leadership in data innovation, from:

- Indian Statistical Institute and P.C. Mahalanobis's pioneering work on sampling,
- To the Right to Information Act (2005), which became a blueprint for transparency legislation across South Asia.

These historical successes, she noted, were themselves products of strong public–academic and civil society partnerships.

However, shifting to present realities, Dr. Chatterjee offered a candid assessment of structural bottlenecks. She argued that 21st-century public infrastructure must include not just roads and power, but also data pipelines, cloud platforms, and AI systems. Yet state data centers today remain heavily dependent on:

- Legacy proprietary vendors,
- Weak in-house technical capacity, and
- Outsourced data functions—often exceeding 80% dependence on external consultants.

This imbalance, she warned, undermines institutional learning and long-term resilience. While PPPs are essential, excessive outsourcing of core data capabilities weakens the state's strategic control over its own digital infrastructure.

Drawing from DPIC's work in grievance redressal reform in Odisha, she demonstrated how AI and analytics can both improve service delivery and reduce administrative burden on government officials. Beyond resolving individual grievances, analytics can surface:

- Priority systemic issues,
- Geographic clusters of recurring failures, and
- Even “silent zones” where the absence of complaints itself signals governance gaps.

This shift—from reactive redressal to predictive and strategic governance—represents the next frontier of data use in the public sector.

A central warning in her talk was against extractive academic engagement with government. She cautioned that too often, researchers collect administrative data, publish high-impact research, and depart—leaving little institutional capability behind. True PPPs, she argued, must be reciprocal, where:

- Government gains lasting analytical capacity,
- Civil servants become confident data users, and
- Research directly strengthens governance systems.

Dr. Chatterjee concluded by asserting that technology alone cannot transform governance. What India needs is a synchronized reform of:

- Institutions,
- Procurement models,
- Human resources, and
- Regulatory frameworks,

so that data becomes a core production factor of the modern state, not merely a by-product of digitisation.

## ForestStack: A Digital Blueprint for Climate Innovation and Community Impact



### Talk by Rishikesh Kunte

Partner, Boston Consulting Group (BCG)

In his talk on 'India's Forest Act Blueprint', Shri Rishikesh Kunte presented ForestStack—a digital infrastructure designed to transform how India manages forests, climate action, and forest-dependent communities. Built through a collaboration between JICA, the Rajasthan Forest Department, and BCG, ForestStack is not just a technology product but the outcome of a two-and-a-half-year journey involving deep engagement with forest officers, communities, and ecosystem partners.

Shri Kunte began by reframing forests as living data systems, where each tree and ecological signal is a data point indicating stress, health, or resilience. Historically, forestry decisions in India and many other countries have relied heavily on experience and manual processes, with data being fragmented, outdated, and non-standardised. There were no common frameworks for forest and climate data comparable to standardisation in sectors like health. As a result, insights were delayed, forest fire responses were reactive, and innovation from startups and researchers remained limited.

ForestStack was conceived to address four core gaps:

1. Fragmented and non-standardised data across departments and sources,
2. Outdated, delayed insights for critical events such as forest fires and ecological stress,
3. Lack of a shared platform for government, researchers, NGOs, and startups, and
4. Limited innovation capacity in the forestry and climate space despite rising interest in green credits and carbon markets.

The solution took shape as a five-layer digital stack:

- Data layer aggregating over 40 datasets from forest records, satellite imagery (e.g., ISRO, NASA), weather systems, soil and water databases, and administrative boundaries;
- API gateway layer, built in collaboration with CDPG, to manage secure, governed access to data;
- Intelligence layer containing algorithms and analytics, especially geospatial models;
- Application layer with domain-specific tools; and
- Consumer layer for forest staff, policymakers, and external innovators.

Rajasthan was chosen as the lighthouse state due to its clear green-cover ambitions (from 8% to 20% over 20 years), its large-scale plantation programme under Hariyalo Rajasthan, strong leadership commitment, and prior digitisation efforts through the FMDSS portal. Using this foundation, ForestStack has already delivered two deployed solutions and two more under active testing:

- Forest Health Monitoring: Uses satellite imagery and multi-dimensional data (e.g., soil moisture, weather, vegetation indices) to track plantation survival and health. Foresters can monitor sites more frequently and objectively, shifting from ad hoc field inspections to data-backed surveillance.
- Forest Project Planning: Helps field officers and decision-makers select plantation sites based on environmental and operational parameters rather than solely experience. GPS and KML uploads from the field are analysed to provide detailed site characteristics, enabling more informed, transparent approvals and long-term tracking.

- **Green Credit and Carbon Program (in testing):** Supports faster and more transparent project design for carbon and green credit initiatives. Processes that earlier took four to six months offline can now be compressed to around a month, enabling India's net-zero ambitions with better governance of carbon assets.
- **Wildlife Habitat Monitoring (in testing):** Provides tools to analyse habitat conditions and biodiversity pressures, tailored to state-specific challenges—from big cats in Rajasthan to aquatic fauna in other regions.

Shri Kunte underscored that ForestStack is built largely on open-source frameworks, refined in close conversation with frontline forest staff through extensive field visits and workshops. This participatory approach has driven strong ownership: since its launch in March 2025, inaugurated by the Chief Minister of Rajasthan, around 80% of forest officers across the hierarchy use the platform regularly, and over 500 sites have already been processed through its workflows.

Beyond department-facing tools, the data exchange layer, developed with CDPG, is designed to unlock public–private innovation. By exposing curated

datasets and models via APIs, it enables startups, researchers, and other collaborators to build new applications in conservation, carbon markets, biodiversity monitoring, and community livelihoods—without each having to rebuild foundational infrastructure.

Looking ahead, Kunte outlined ForestStack's potential impact:

- Adding millions of hectares of green cover,
- Reducing human–wildlife conflicts,
- Increasing incomes for 10 million forest-dependent households, and
- Unlocking around a billion dollars of carbon value.

He closed with a call to action: whether as coders, foresters, policymakers, or researchers, everyone in the room has a role in co-creating solutions on top of this shared digital public infrastructure—from advanced applications to something as simple and powerful as ensuring that each planted sapling survives and thrives.

## Making Data Work: Trade-offs on the Supply Side of the Data Ecosystem



### Talk by Prof. R. Srinivasan

Professor of Strategy, IIM Bangalore &  
 Head, Centre for Digital Public Goods

Prof. R. Srinivasan's talk shifted the lens of the session to the supply side of data—the individuals, institutions, and firms that generate and release data into the ecosystem. Rather than focusing on use cases or platforms, he examined the strategic and ethical trade-offs embedded in how data is collected, profiled, aggregated, shared, and governed. His central argument: building a healthy data ecosystem is not only a technological exercise but also a continuous balancing act between personalization, privacy, transparency, competition, and public value.

He began with the everyday reality of digital profiling on platforms such as Instagram. Users provide basic “expressed preferences” at sign-up, but platforms quickly infer far richer “revealed preferences” by observing behaviour—what we watch, pause on, share, or revisit. Micro-experiments and behavioural cues enable highly personalized experiences that users often value. Yet, this same profiling feeds aggregated insights about communities and geographies. The first trade-off, he noted, is stark: we want personalization and convenience, but we may not want to permanently contribute to large-scale behavioural aggregation, nor fully understand how that data shapes broader decisions.

Building on this, he discussed how opt-in/opt-out design and behavioural nudges influence consent. Drawing parallels with organ donation experiments and other public policy applications, he pointed out that people rarely make fully conscious choices when confronted with defaults. Private players may legitimately want behavioural data to innovate and compete on customer experience—but the same mechanisms can also be used to profile or manipulate groups in ways that outstrip individuals' understanding of what they “consented” to. Regulation, he argued, must evolve beyond protecting only “hard” expressed data to also address use of behavioural and psychological insights.

Prof. Srinivasan then turned to the problem of misleading or low-resolution aggregate data. Using the example of a map showing the share of vegetarians across India, he noted that while such visualisations look attractive, they can be analytically weak: they mask frequency, intensity, and contextual nuance. Decisions like locating restaurants or supply chains based on such sparse indicators can be fundamentally flawed. This is a recurring risk in the data ecosystem: highly visible visuals built on thin, purpose-limited data that was never designed for the inferences people try to draw from it.

The talk also examined corporate data sharing and competitive strategy. Highlighting the example of PhonePe's publicly shared, district-level transaction data, Prof. Srinivasan noted how such openness—when combined with market share and competitor data—can reveal exactly where future competitive battles will be fought. While transparency is normatively appealing and useful for researchers or policymakers, it may inadvertently expose a firm's strategic priorities. Companies thus face another trade-off: being data-transparent without becoming strategy-transparent.

He stressed that high-quality public data is expensive and demanding to build and maintain. It requires not only initial investments in collection but also continuous updating to ensure freshness and relevance. For a commuter at a bus stop, ten million historical records are useless if the real-time feed says the next bus is arriving “on 14 October 2022”. This contrast between “stock data” for training and analysis and “flow data” for live service delivery must be explicitly recognized in design and funding decisions. Naïve solutions like “data collectives” among private players, he warned, can easily degenerate into either poor-quality pools (if contributions aren't enforced) or collusive clubs that define their own “truth” without accountability.

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In closing, Prof. Srinivasan argued that leveraging public data as a shared resource while enabling private differentiation is a delicate strategic problem. If all innovators work off identical public data rails, differentiation must come from superior analytical and inferential capabilities—not from privileged access. At the same time, neither government, nor private sector, nor civil society can independently resolve the many trade-offs around privacy, quality, incentives, and fairness. A robust data ecosystem therefore demands a three-way handshake:

- Government investing in high-quality, well-governed public data,
- Private players innovating responsibly on top of shared rails, and
- Civil society providing oversight, norms, and grounded feedback.

Only through such joint stewardship, he concluded, can the supply side of data be organized in a way that is innovative, competitive, and fundamentally aligned with the public good.

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# Panel Discussion: Unlocking the Power of Data Spaces – Enabling Digital Public Good through Global Interoperability

## Moderator



**Suna Akbayir**

CEO, Entrepreneur,  
 Innovation Strategist,  
 Beyond Barcode  
 & Artech



**Chandrashekar Reddy  
 Challagonda**

CEO, FIWARE  
 Foundation e.V.,  
 Board Member,  
 Gaia-X AISBL



**Franck Le Gall**

CEO EGM &  
 ETSI TC DATA Vice Chair



**Pierre Gronlier**

CIO, Gaia-X



**Lakshminrusimham  
 Vemuganti  
 Venkata Raghavendra**

Co-Founder &  
 CTO at Real Variable



**Vikas Panwar**

Country Business  
 Manager - India, GLEIF

## Panellists

This panel explored “data spaces” as a new way to share data across organisations and borders while preserving sovereignty, trust, and control. Chandra framed data spaces as governed ecosystems rather than just platforms: data owners decide who can access what, for which purpose, and can revoke access at any time. He illustrated the vision with examples such as cross-border sharing of medical records in emergencies and resilient global supply chains.

Pierre and Frank unpacked the trust and interoperability layers. Trust, they noted, is built by combining policies (how data may be used), claims (what participants declare about themselves), and evidence (certifications, audits). Interoperability must be addressed at multiple levels: technical formats, shared semantics, organisational arrangements, and legal compatibility (e.g., GDPR and DPDP). ETSI, FIWARE, Gaia-X, IDSA and the Data Space Support Centre each contribute parts of this stack, with a strong emphasis on implementation-led standards.

From an ecosystem angle, Vikas explained how the Legal Entity Identifier (LEI) provides a global, regulator-backed identifier for organisations—showing how common standards,

regulatory support and collaboration can make cross-border data use both trustworthy and practical. Elvi brought in the SME and India perspective, pointing to initiatives like ONDC, ULIP and sectoral platforms such as ForestStack. For SMEs, he stressed, the value of data spaces lies in turning scattered data into usable insights and new market opportunities, not in the technology itself.

Audience questions probed authorisation, inference, and incentives. The panellists underlined that authorisation is typically decentralised and policy-driven; data spaces do not replace laws like GDPR or DPDP, but provide verifiable trails to show compliance. On why non-government actors should care, the panel pointed to concrete benefits: better supply chain visibility, carbon accounting, innovation opportunities, and access to high-quality shared data without giving up control.

Overall, the discussion highlighted data spaces as the next layer atop digital public infrastructure: a way to connect platforms, sectors and countries through governed, standard-based data sharing that balances innovation, competition, and sovereignty.

# Panel Discussion: Connected Systems, Resilient Outcomes – Linking Mobility, Energy, and Climate Action through Shared Digital Infrastructures

## Moderator



**Narendra Verma**  
 Technical Advisor,  
 Sustainable Urban  
 Mobility, GIZ

## Panellists



**Abhay Sharma**  
 CTO, CDPG, IISc



**Prof. Vijay K**  
 Research Professor,  
 CiSTUP, IISc



**Deepak Krishnan**  
 Deputy Director,  
 Energy Program,  
 WRI India



**Cornelia S**  
 Head, EASE  
 (Enabling Accessible,  
 Sustainable and  
 Equitable Mobility), GIZ

This panel examined how shared digital infrastructures can help move Indian cities from fragmented, siloed mobility systems towards connected, resilient outcomes that span transport, energy, and climate goals.

Narendra opened by highlighting the institutional fragmentation in Indian urban mobility—multiple agencies (STUs, metro corporations, etc.) operating in silos—which leads to inefficiencies and poor user experience. Abhay detailed the technical side of this fragmentation: inconsistent data standards and quality (e.g., GTFS static vs real-time feeds), differing practices across cities, and the absence of standards on the operations side (fleet, crew, incidents). He argued that data exchanges like IUDX can address some of this by providing a common, standards-based core for discovery, authorisation, and data services, while allowing domain-specific innovation at higher layers.

Prof. Vijay drew on long experience with ITS projects to underline the political and organisational challenges behind standard adoption. Data exposes faults, so agencies are often reluctant to open it. While GTFS and related standards have been written into RFPs for years, enforcement and testing are weak. He nevertheless described the present as the “most exciting time” for mobility, with Aadhaar, UPI, ONDC and emerging protocols like Beckn creating a strong DPI foundation. He stressed the need for performance-linked funding (ridership, service quality) and neutral, trusted data custodians—often research institutions—to ensure data integrity and openness without giving control to monopolistic intermediaries.

From the energy perspective, Deepak framed electric mobility as the connective tissue between power systems and transport. With prosumers, rooftop solar, storage and EVs entering the grid, the electricity sector must manage distributed, variable resources while maintaining real-time balance. He emphasised that visibility, standardised data from diverse devices and vendors, and interoperable digital infrastructure are essential for applications like vehicle-to-grid (V2G), renewable-aligned charging, and grid-support services. This mirrors challenges in mobility: multiple OEMs, proprietary ecosystems, and the need for a unifying digital layer (e.g., a Unified Energy Interface) that can surface information and enable market-based participation without locking in consumers.

Representing the development cooperation perspective, Cornelia (GIZ) stressed the importance of governance, human capacity, and multilevel coordination. As a government-to-government agency, GIZ works with central ministries (MoHUA, MoHUA, line ministries), states, and cities, piloting approaches and supporting horizontal integration—getting standards, schemes and tools to actually be adopted locally. She emphasised multi-stakeholder structures (operators, officials, civil society, residents) with real mandates, combined with long-term capacity building, as critical for making digital public infrastructure sustainable beyond project lifecycles.

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Audience questions pushed the panel on open data incentives, timelines for “resilient” outcomes (like flood resilience and decarbonisation), and technical interoperability between standards. The panellists noted that silos benefit monopolies, not citizens, and argued that the real “killer apps” will be those that align citizen benefits, policy incentives, and market value—for example, shorter travel times, cleaner air, or opportunities for consumers to earn from providing flexibility to the grid. They cautioned that technology and DPI are enablers, not silver bullets: progress depends equally on policy choices, performance-linked incentives, long-term political will, and a negotiated political economy across sectors.

In sum, the panel framed connected digital systems—data exchanges, interoperable standards, and DPI—as the foundation on which cities can build resilient, low-carbon, people-centred mobility and energy systems, provided that governance, capacity, and incentives evolve alongside the technology.

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# Panel Discussion: Preserving Indian Knowledge Systems in the Age of AI

## Moderator



**Arpita**

Software Engineer,  
 Google



**Janvi Chhabra**

Software Engineer,  
 Microsoft



**Prof. Pratosh AP**

Assistant Professor,  
 IISc

## Panellists



**Sanket Patil**

Chief Data  
 Strategy Officer,  
 DataWeave



**Abhishek Upperwal**

CEO & Founder,  
 Soket AI Labs



**Srinivas Raghavan**

Professor, IITB

This panel discussion examined how artificial intelligence can engage with, preserve, and extend Indian Knowledge Systems (IKS) in an era increasingly shaped by large language models and data-driven technologies. Bringing together technologists, AI researchers, and academics, the session positioned IKS not as a static inheritance from the past, but as a living, evolving body of knowledge embedded in languages, communities, practices, and philosophical traditions.

The discussion began by framing Indian Knowledge Systems as inherently plural, contextual, and community-driven, spanning oral traditions, indigenous practices, philosophy, science, arts, and everyday lived knowledge. Panellists highlighted that much of this knowledge remains fragmented, under-documented, and poorly represented in digital ecosystems—particularly in the case of Indic languages and non-textual forms of knowledge.

A key focus was the misalignment between contemporary AI architectures and Indic knowledge structures. Modern large language models are largely built on assumptions derived from Western languages and prose-heavy corpora, whereas Indian languages—especially Sanskrit and its derivatives—are morphologically rich, free word-order, and predominantly poetic. The panellists argued that preserving IKS through AI may require rethinking current modelling paradigms, incorporating formal grammatical systems, and moving beyond purely data-intensive approaches towards more knowledge-informed AI.

The panel also explored the philosophical relevance of IKS in the age of AI. As AI systems increasingly rival or surpass human capabilities in analytical tasks, long-standing Indian philosophical inquiries into identity, purpose, consciousness, and suffering acquire renewed significance. Rather than viewing AI purely as an efficiency tool, the discussion framed it as a catalyst for revisiting fundamental questions about what it means to be human.

Ethics, inclusivity, and governance featured prominently in the conversation. The panellists cautioned against universal or one-size-fits-all definitions of fairness and ethics, emphasising that ethical norms are culturally grounded and context-specific. Responsible AI for Indian Knowledge Systems must therefore be participatory, consent-driven, and sensitive to community values, avoiding extractive data practices that strip knowledge of its social and cultural context.

The discussion concluded by underscoring that AI can serve as a powerful enabler for the preservation and evolution of Indian Knowledge Systems—provided it is guided by technical innovation, cultural sensitivity, and inclusive governance. Rather than replicating global AI models, the opportunity lies in developing approaches rooted in India's linguistic diversity, philosophical depth, and civilisational values, ensuring that AI development contributes meaningfully to the public good.

— SYMPOSIUM ON —  
**DATA FOR**  
**PUBLIC GOOD**  
— 2025 —

**DAY 2**

# Day 2 Agenda

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## Track 1 - Data Spaces and Digital Product Passport

Welcome Address

Talk: Data Spaces - Intro & Use Cases of Data Spaces (DPP, Travel/Tourism & Sovereign AI)

Talk: Data Spaces - Trust in Data Spaces

Talk: EU-Indo-Pacific Coordination for Trusted Data Exchange

Presentation: Data Spaces – Latest Advances in Context Information Sharing

Presentation: Digital Product Passports and Data Spaces: Building the Infrastructure for a Circular, Trusted Economy

Presentation: DPP & LEI – Open & Verifiable Ecosystem Globally

Dialogue: Data Spaces and Digital Product Passports: From Global Policy to Local Practice

Presentation: Sovereign AI using Data Spaces – Delivering Trustworthy, Open, and Interoperable Intelligence

## Track 2 - Mobility

Development of Sustainability Plans for Digital Public Infrastructure and Open Data

Panel Discussion: Governance, Stewardship, and Financial Models

From Data to Decisions – Interoperability in Practice: Case Studies from Cities and Startups

Panel Discussion: Open Data, Standards and the Future of Multimodal Mobility in India

Panel Discussion: Accelerating the E-Mobility Transition through Digital Ecosystems & Infrastructure

## Track 3 - WebSciX

Welcome Address: Setting the Vision for WebSciX

Talk: How the Post-Internet World Order Has Changed International Relationships

Talk: Open Data, Open Science: Building a Global Public Good

Talk - Data Exchange: The Third Leg of the Digital Public Infrastructure Stool

Talk: Knowledge Bases to Narrative Spaces

Talk: Computational Social Science, Web Data, and PRECOG

Talk: AI for Digital Public Infrastructure: Legal Issues & Responsible AI Adoption

## Track 4 - Privacy and Security for the Future of India

Opening Address: Setting the Stage for Privacy and Security Innovation in India

Talk: The State of Confidential Computing

Talk: Designing Trustworthy Data Ecosystems: DPI Opportunities alongside DPDPA Implementation

Talk: Towards Proactive Security in Critical Infrastructure

Talk: Broad Overview of Privacy/Security Issues in the ML Space

Presentations: Examples of Indigenous Innovation

Panel Discussion: Indigenous Innovation for Future

Panel Discussion: Impact of Privacy and Security as a Fundamental Right (DPDP) on Indian Innovation

## Welcome Address

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### Chandrashekar Reddy Challagonda

CEO, FIWARE Foundation e.V., Board Member, Gaia-X AISBL

In his welcome address, Chandrashekar Reddy Challagonda set the context for the day by outlining how the symposium would move deeper into the technical and institutional foundations introduced earlier. He clarified key concepts around data exchange, beginning with NGSI-LD, which he described as a combination of an API standard, data format, and smart data models that together enable seamless and interoperable data sharing. He highlighted its stewardship under ETSI, its growing international adoption, and its alignment with Indian standards through BIS and TSDSI, underscoring the importance of synchronising government- and industry-led standardisation efforts.

He then shifted focus to data spaces as the application layer of these standards, emphasising their relevance for cross-border and multi-sector use cases. One prominent example discussed was Digital Product Passports, which can support supply chain transparency, regulatory compliance, and data sovereignty—issues that have gained urgency in the current global geopolitical context. He also pointed to the broader vision of trusted digital identity and selective data sharing for individuals operating across jurisdictions.

Finally, Chandrashekar connected data spaces to the idea of sovereign and region-specific AI, noting that globally available AI models often perform unevenly across regions such as Africa and parts of the Global South. He argued for building AI systems grounded in local data and sectoral contexts to improve accuracy, fairness, and relevance. Inviting participants to engage actively, he framed the day as a collaborative exploration of standards, governance, and real-world implementations shaping the future of interoperable data ecosystems.

# Talk: Data Spaces - Intro & Use Cases of Data Spaces (DPP, Travel/Tourism & Sovereign AI)



## Lakshminrusimham Vemuganti Venkata Raghavendra (LV)

Co-Founder & CTO at Real Variable

In this session, Lakshminrusimham Vemuganti Venkata Raghavendra (LV), Co-founder and CTO of Real Variable, presented an implementation-focused perspective on how data spaces, trust frameworks, and semantic interoperability can address real-world challenges across global supply chains, sustainability, travel and tourism, and sovereign AI. Drawing on Real Variable's work with FIWARE and GAIA-X, he emphasised that data spaces are not about pooling or copying data, but about connecting data with trust, consent, and purpose.

Using Digital Product Passports (DPPs) as a central example, LV illustrated how cradle-to-grave traceability for batteries and textiles can significantly improve recycling rates, ESG compliance, and regulatory readiness—particularly for exports to the European Union. By enabling interoperable data flows across manufacturers, logistics providers, recyclers, and regulators, data spaces create a unified and verifiable view of a product's lifecycle while allowing each participant to retain data sovereignty. Similar principles were extended to textiles, where trusted data flows can substantiate claims of recycled content, increase material recovery, and support circular economy models.

The session also explored travel and tourism as a data-intensive domain, showing how anonymised and consent-based data sharing between transport providers, hotels, and city infrastructure can reduce congestion, emissions, and waste while improving visitor distribution and off-season revenues. These examples highlighted how contextual, real-time data—shared through trusted frameworks—can support better public planning and operational decision-making.

Finally, LV addressed sovereign AI, outlining how data spaces enable models to “travel to the data” rather than extracting data across borders. Through federated learning, countries and institutions can retain local control over sensitive datasets while sharing only model parameters or inferences. This approach, he argued, is critical for building AI systems that are regionally accurate, inclusive, and aligned with local contexts—particularly for the Global South.

Concluding the discussion, the session reinforced that trusted data spaces can deliver tangible benefits across business efficiency, regulatory compliance, government resilience, and societal sustainability, while offering a practical path to reconcile openness with data sovereignty in an increasingly interconnected world.

## Talk: Data Spaces - Trust in Data Spaces



**Pierre Gronlier**

Chief Innovation Officer, GAIA-X

In this session, Pierre Gronlier, Chief Innovation Officer at GAIA-X, provided a foundational and conceptual deep dive into how trusted data spaces are designed, governed, and operated. Framing data spaces as an evolution rather than a disruption, he emphasised that their core purpose is to enable secure, trustworthy data transactions between participants who agree on shared rules—without centralising or relinquishing control over data.

Pierre clarified that data does not exist in isolation: it is always coupled with the services and infrastructure that store, process, and transfer it. Trust, therefore, must extend not only to the data itself, but also to the underlying systems. In regulated domains such as health, energy, or finance, this means ensuring that both data providers and consumers operate on compliant infrastructures aligned with sector-specific requirements.

Walking through a typical data transaction, he described the full lifecycle—from discovery and onboarding, to identity verification, consent alignment, negotiation of usage terms, and execution. While these steps are not new in principle, the novelty of data spaces lies in embedding verifiable trust at each stage. Trust, he noted, is ultimately the outcome of a risk assessment: participants must have enough credible information to decide whether sharing data is safe, lawful, and aligned with agreed purposes.

A key conceptual shift highlighted in the talk was the preference for autonomy over sovereignty. Rather than treating sovereignty as an absolute or political construct, Pierre argued for assessing autonomy across multiple layers—legal, operational, technical,

and infrastructural—allowing organisations to retain meaningful control while still participating in cross-border data exchanges.

He further explained how technical enforcement can increasingly complement legal contracts, through mechanisms such as cryptographic identities, trusted execution environments, and privacy-preserving technologies like homomorphic encryption. These tools help ensure that data is used exactly as agreed, strengthening accountability and enabling automated compliance, which is particularly critical for SMEs facing growing regulatory burdens.

Pierre introduced GAIA-X as a non-profit standards and specification initiative, not an intermediary. GAIA-X provides blueprints, protocols, and reference implementations—the “ingredients”—that data space authorities can assemble according to their domain needs. He outlined four key layers of interoperability required for scalable data spaces: legal, organisational, semantic, and technical, noting that semantic alignment and shared data models are often the most enduring and challenging aspects.

Concluding, Pierre underscored two practical takeaways: the importance of clearly identifying a data space authority to define governance and trust anchors, and the need for organisations to separate internal data governance from secondary data usage strategies when exposing data externally. While questions around pricing, liability, and cross-regulatory alignment remain open, the session made clear that trusted data transactions—supported by interoperable trust frameworks—are central to the future of scalable, cross-domain data ecosystems.

# Talk: EU-Indo-Pacific Coordination for Trusted Data Exchange



**Franck Le Gall**

Vice Chair, ETSI TC DATA & CEO, EGM

In this session, Franck Le Gall situated the technical foundations of data exchange within a broader policy and geopolitical context, building on earlier discussions around trust. Once trust frameworks are in place, he noted, the next challenge is how data is actually exchanged—through which APIs, formats, and interoperable standards—and how this exchange can serve public good objectives at scale.

Drawing from his dual roles at ETSI TC DATA and EGM, a leading FIWARE ecosystem company, Franck highlighted the importance of aligning data standards and models such as NGSI-LD across regions. He emphasised that data for public good is not about indiscriminate openness, but about making data usable, governed, and impactful for improving public services, economic resilience, and sustainability. Examples ranged from urban mobility and healthcare to environmental monitoring and education, including cross-border use of satellite data and pandemic response systems.

A recurring theme was the distinction between *open data* and *shared data*. Franck cautioned against equating public good with unrestricted data release, pointing out that poorly curated open datasets often lack timeliness and value. Instead, he advocated for controlled data sharing, where data providers retain agency over usage while enabling innovation and public value creation.

He outlined key principles underpinning responsible data exchange: privacy protection, transparency of consent and usage, and fairness in participation. These principles, however, must be supported by strong governance to mitigate risks such as privacy breaches, misinformation, technological asymmetries, and fragmented infrastructures.

Avoiding unnecessary data replication was highlighted as both a sustainability and efficiency imperative.

Placing data exchange within the Indo-Pacific geopolitical landscape, Franck underscored the strategic importance of cooperation among regions such as India, the EU, Japan, South Korea, and Singapore. Shared approaches to data governance, cybersecurity, and interoperability were framed as contributors not only to innovation, but also to regional stability.

He then introduced digital partnerships and the EU–India Trade and Technology Council (TTC) as key institutional mechanisms for aligning priorities across borders. These frameworks span digital governance, AI, connectivity, semiconductors, clean energy, and skills exchange, translating high-level agreements into concrete collaborations.

Concluding with the INPACE project, Franck described its role as a facilitative platform rather than a technology builder—bringing experts, policymakers, and practitioners together through thematic working groups and practical initiatives. A notable example was the interoperability hackathon on digital identity and data exchange, which catalysed collaboration across Europe and India and demonstrated how small, focused interventions can generate meaningful momentum.

Overall, the session reinforced that standards-aligned, interoperable data exchange—anchored in trust and policy coordination—is essential to unlocking data for public good across regions, and that sustained dialogue and collaboration are as critical as technology itself.

# Presentation: Data Spaces – Latest Advances in Context Information Sharing



**Thomas Boussein**

Back - End Engineer, EGM



**Pierre Gronlier**

CIO, Gaia-X

This session translated earlier conceptual discussions on trust and data spaces into a practical, implementation-oriented perspective, focusing on how trusted data transactions are actually built and exchanged using open standards—most notably NGSI-LD.

Pierre Gronlier set the stage by distilling trusted data exchange into two core principles. First, linked data should be used to describe the world in a machine-readable and interoperable way. Using the Resource Description Framework (RDF), information is modelled as interconnected triples—*subject, predicate, object*—forming a flexible and extensible knowledge graph that can represent complex real-world relationships. Second, because data in public and cross-organisational settings is inherently decentralised, each claim within this knowledge graph must be cryptographically signed. By signing individual statements rather than entire datasets, multiple parties can contribute trustworthy information to the same graph while retaining accountability.

Pierre emphasised that this approach allows not only secure data exchange, but also governance insights. Analysing signed claims within a knowledge graph can reveal patterns of trust, concentration of issuers, and potential centralisation—providing visibility into how an ecosystem is functioning.

Building on this foundation, Thomas Boussein moved into the hands-on mechanics of NGSI-LD, the ETSI-standardised API and data model widely used in public-sector deployments. At its core, NGSI-LD is a REST-based interface for publishing and retrieving context data, designed to handle real-world

complexity such as temporal queries, geospatial filtering, and relationships between entities. Data is exchanged using JSON-LD, which combines the familiarity of JSON with the semantic richness of linked data.

Thomas illustrated how NGSI-LD represents information through entities (such as a car or parking spot), each identified by a global URI, enriched with properties and relationships. Crucially, NGSI-LD treats the property as the atomic unit of trust. This enables fine-grained provenance: different attributes of the same entity can be sourced, signed, and verified independently—reflecting real-world scenarios where multiple sensors or organisations contribute data.

To address trust explicitly, he introduced NGSI-LD data integrity proofs, aligned with W3C standards for verifiable credentials. These proofs allow each property to carry cryptographic evidence of its origin, enabling consumers to verify who asserted what, and under what authority—without centralising control.

Together, Pierre and Thomas demonstrated how trusted data exchange moves from abstract principles to operational systems. Their session showed that interoperability is not just about APIs, but about combining semantic models, cryptographic trust, and practical tooling in ways that remain usable for engineers while meeting governance and policy requirements. The takeaway was clear: standards like NGSI-LD make it possible to operationalise data spaces at scale—turning trust into something that can be implemented, verified, and reused across domains and borders.

# Presentation: Digital Product Passports and Data Spaces: Building the Infrastructure for a Circular, Trusted Economy



**Suna Akbayir**

CEO, Entrepreneur, Innovation Strategist, Beyond Barcode & Artech

In this session, Suna Akbayir positioned data spaces as the foundational digital infrastructure required for secure, fair, and regulation-compliant data exchange across global supply chains. Framing data spaces as rule-based ecosystems rather than isolated technologies, she highlighted their role in enabling trust, interoperability, and value creation across regions, sectors, and stakeholders.

Central to her talk was the concept of the Digital Product Passport (DPP)—a digital identity for physical products that captures verified information across the entire lifecycle, from design and manufacturing to use, repair, reuse, and end-of-life. Drawing an analogy with human passports, she explained how DPPs allow products to “travel” across borders while carrying trusted information about origin, materials, ESG compliance, and regulatory conformity.

Akbayir underscored that while DPPs are often perceived as a European initiative, they are rapidly becoming global. Parallel efforts are already underway in Australia, Japan, Singapore, China, and North America, driven by United Nations frameworks and sectoral alliances such as the Global Battery Alliance. What began with EU regulations—most notably the Eco-design and Sustainable Products Regulation—is now converging into a worldwide standard for international trade and sustainability compliance.

From a regulatory perspective, she noted that batteries and textiles will require mandatory DPPs from 2027, with additional sectors—including

electronics, tyres, construction materials, and critical minerals—phasing in by 2030 and beyond. These requirements place responsibility on OEMs and economic operators, while DPP systems themselves must be operated by independent, audited third parties, not by manufacturers alone.

Beyond compliance, Akbayir emphasised the economic transformation enabled by DPPs. By making lifecycle data visible and verifiable, DPPs support circular economy models such as repair, refurbishment, take-back schemes, and second-hand markets. This, she argued, opens new opportunities for data-driven services, startups, and SMEs—particularly in software, analytics, and supply-chain transparency—areas where India has strong capabilities.

She also highlighted the architectural principles behind DPP systems: multi-stakeholder governance, role-based access, interoperable identifiers, and standardised data formats (notably JSON-LD and linked data). Not all actors see all data; instead, access is finely controlled based on responsibility and trust—ensuring both transparency and sovereignty.

Concluding with a forward-looking message, Akbayir stressed that by 2030, Digital Product Passports will be the norm, not the exception. For India, early engagement with DPP infrastructure is not just about regulatory readiness for EU trade agreements, but about shaping new markets, influencing global standards, and securing a competitive position in the next phase of the data-driven, circular economy.

# Presentation: DPP & LEI – Open & Verifiable Ecosystem Globally



**Vikas Panwar**

Country Business Manager - India, GLEIF

Vikas Panwar's session highlighted the often-invisible but critical layer that underpins trusted global data exchange: verifiable organizational identity. Representing the Global Legal Entity Identifier Foundation (GLEIF), he explained how Legal Entity Identifiers (LEIs) and the newer verifiable LEI (vLEI) framework provide the trust infrastructure required for initiatives such as Digital Product Passports (DPPs), data spaces, and cross-border digital trade.

Panwar traced the origins of the LEI system to the 2008 global financial crisis, when regulators worldwide confronted a basic yet unresolved problem: *"Who is who, and who owns whom?"* Fragmented national identifiers made it impossible to aggregate risk across borders. In response, the G20 and the Financial Stability Board established the Global LEI System (GLEIS)—a globally governed, ISO-standardised framework (ISO 17442) that assigns a unique 20-character identifier to every non-individual legal entity engaged in economic activity.

He emphasised that LEI is not a replacement for national identifiers but a global interoperability layer. Each LEI is validated against local registries and maintained through a strict governance structure involving regulators worldwide, GLEIF as the central coordinator, and accredited Local Operating Units (LOUs) such as CCIL and NSDL in India. The resulting global registry is open, free to access, and publicly verifiable, aligning directly with the symposium's theme of *data for public good*.

A key strength of the LEI system, Panwar noted, is its ability to reveal corporate hierarchies. Beyond basic identity (Level 1 data), LEIs capture parent–subsidiary relationships (Level 2 data), enabling regulators, banks, and businesses to assess exposure, ownership, and systemic risk with far greater precision.

Moving beyond entity identity, Panwar introduced the vLEI framework (ISO 17442-3), which addresses a critical gap: verifying who is acting on behalf of an organization. Built on cryptographic protocols, vLEIs allow organizations to issue verifiable role credentials—for example, identifying a CEO, compliance officer, or authorised supplier representative. This enables digitally signed, tamper-evident interactions across systems, replacing fragile username–password models with cryptographically verifiable authority.

In the context of DPPs, Panwar argued that transparency alone is insufficient without trusted attribution. DPP ecosystems require certainty about which organization provided, verified, or updated data at each stage of a product's lifecycle. LEIs establish the identity of manufacturers, shippers, recyclers, and certifiers, while vLEIs ensure that data updates are made by authorised individuals or systems, with full auditability.

Drawing on India-specific examples, he showed that LEIs are already deeply embedded in national infrastructure—mandated for large-value payments, derivatives trading, and corporate credit reporting. This widespread adoption positions India well to align with emerging EU-led DPP requirements and global data space architectures.

Panwar concluded by positioning LEI and vLEI as foundational enablers rather than complete solutions. They do not replace sectoral standards or regulatory frameworks, but they provide the shared trust layer that prevents fragmentation across borders and systems. As data spaces, ESG reporting, and digital product passports scale globally, verifiable organizational identity, he argued, will be indispensable to making these ecosystems interoperable, auditable, and trustworthy at scale.

# Dialogue: Data Spaces and Digital Product Passports: From Global Policy to Local Practice



**Abdul Khalid**

Senior Program Associate, WRI India



**Suna Akbayir**

CEO, Entrepreneur, Innovation Strategist,  
Beyond Barcode & Artech

This discussion brought together two complementary perspectives on DPPs and data spaces—one rooted in sustainability and development practice, the other in global regulation, standards, and open-source infrastructure. Rather than a technical deep dive, the conversation focused on *why DPPs matter, how they are taking shape globally, and what adoption could look like in India.*

Suna Akbayir framed DPPs in simple terms: a passport for products. Just as people need passports to cross borders, products will increasingly need verifiable digital identities to move across markets. Origin, composition, sustainability claims, and lifecycle data will no longer be optional—they will be prerequisites for trade. DPPs operationalise this shift, especially under the EU's Ecodesign for Sustainable Products Regulation (ESPR), which consolidates sustainability, traceability, and producer responsibility requirements. Batteries and textiles are the first focus areas, with wider sectoral expansion underway.

The discussion positioned data spaces as the enabling layer beneath DPPs. These are shared digital environments where governments, industry, and regulators agree on rules for secure, sovereign, and interoperable data exchange. In this sense, DPPs are one of the first large-scale, real-world applications of data spaces—making abstract governance principles tangible.

Both speakers acknowledged that implementation challenges are universal: limited digital infrastructure among suppliers, skill gaps in supply chains, and low awareness of upcoming regulations. These are not just technical issues but economic and institutional ones, requiring coordinated public-private action.

From an Indian perspective, Abdul Khalid stressed that adoption cannot be a direct import of European models. Global frameworks must be adapted to local realities, especially in economies with fragmented, informal, and household-based production systems. Cultural context, incentives, and usability will determine success, much as India's digital public infrastructure has succeeded by localising global ideas.

On technology, the panel agreed that IoT, AI, and provenance mechanisms will play enabling roles—capturing supply-chain data, filling gaps, and optimising systems—but technology alone is insufficient without trust, governance, and inclusion.

The discussion concluded on an optimistic note. With its scale, digital foundations, and platforms like IUDX, India is not only well placed to adopt DPPs but also to influence how global standards evolve. Done right, DPPs can move beyond compliance to become tools for transparency, competitiveness, and public good.

# Presentation: Sovereign AI using Data Spaces – Delivering Trustworthy, Open, and Interoperable Intelligence



## Chandrashekar Reddy Challagonda

CEO, FIWARE Foundation e.V., Board Member, Gaia-X AISBL

In this concise presentation, Chandrashekar Reddy Challagonda reframed the conversation on sovereign AI by placing data—not algorithms—at its core. His central argument was simple but powerful: AI is only as good, inclusive, and reliable as the data it is trained on. Without trusted, contextual, and locally grounded data, claims of intelligent or sovereign AI remain hollow.

He argued that data spaces are the missing foundation. By enabling trusted, traceable, and sovereign data sharing, data spaces address growing global concerns around biased models, opaque data sources, and misuse of copyrighted or non-consensual data—concerns that have now moved from criticism to action, particularly through the EU AI Act and its growing international influence.

Using a vivid mobility example, he illustrated why one-size-fits-all AI does not work. Models trained on years of transportation data from Helsinki cannot be directly applied to Bengaluru, where traffic patterns, infrastructure, behaviour, and context are fundamentally different. Effective AI systems must therefore be trained on regional and sector-specific data—from traffic signals and public transport to environmental conditions and local events—while respecting privacy and provenance.

This leads to the core vision: sovereign AI as a layered system. Open foundation models provide a base, but they must be continuously retrained with locally sourced, well-governed data to produce sectoral, municipal, or regional AI models. These models are not static; they require constant retraining as cities, behaviours, and conditions evolve.

Crucially, Chandrashekar emphasised that this is not just a technical challenge. Governance, legal frameworks, trust, and public confidence are harder problems than algorithms. Sovereign AI must be built as public digital infrastructure, clearly oriented toward public good, with transparency about how data is collected, used, and protected.

He concluded by calling for a decentralised and participatory approach. Universities, research institutions, startups, SMEs, and governments must all contribute data, expertise, and oversight. Only through such collective ownership can AI systems become truly inclusive, locally relevant, and worthy of public trust.

In essence, the path to sovereign AI does not begin with models—it begins with shared, trusted, and locally rooted data ecosystems.

# Development of Sustainability Plans for Digital Public Infrastructure and Open Data



## Inaugural Talk

Ms. Pamli from WRI India delivered the inaugural talk, welcoming participants and set the context for the day's deliberations. In her address, she underscored the growing importance of *data as a public good* and the need for responsible, inclusive, and transparent data governance.

She identified sustainability, interoperability, and accessibility as the three guiding pillars of discussion for the day. While digital infrastructure offers transformative potential across sectors—healthcare, mobility, environment, and governance—its long-term value depends on sustained financing, institutional capacity, and adherence to open standards.

This session focused on the critical role of data as a public good and the necessity of building sustainable, interoperable, and accessible digital public infrastructures (DPIs). The discussion brought together experts from WRI India, Tech4Dev, and the Open Healthcare Network to showcase real-world applications of data platforms in the sectors of non-profit management, healthcare, and energy access.



## Spotlight Talk 1: Sustainability of Digital Public Infrastructure

Mr. Abhishek Nair, Senior Product Manager at *Project Tech4Dev*, presented Dalgo, an open-source data integration and analytics platform serving over 20 non-profit organizations. He explained that non-profits often face challenges in managing fragmented data and deriving insights for decision-making. Dalgo addresses these gaps by automating data ingestion, cleaning, and visualization processes, thereby enabling efficient monitoring and evaluation.

Highlighting the theme of sustainability, Mr. Nair noted that many digital platforms lose relevance over time due to a lack of ongoing funding and technical maintenance. Dalgo's model combines grant-based research funding with a SaaS-based operational framework, ensuring that non-profits can continue using the platform affordably while sustaining technical updates and community support.



## Spotlight Talk 2: Interoperability and Health Systems

In the second talk, Mr. Vignesh Hari from *Open Healthcare Network* introduced CARE, an open-source electronic medical records (EMR) and hospital management platform built on FHIR (Fast Healthcare Interoperability Resources) standards.

Developed initially as part of the *CoronaSafe* project during the COVID-19 pandemic, CARE has now evolved into a scalable health information platform with over 3 lakh registered patients and 7 lakh recorded encounters in Kerala. The system enables data sharing between hospitals and health departments, supporting transparent and timely decision-making.

Mr. Hari explained that the lack of interoperability in health data has long hindered healthcare delivery. CARE addresses this challenge by following open standards and maintaining modular plugin-based architecture. The platform allows partners—such as eGovernments Foundation and state health agencies—to develop and integrate custom components while preserving data security and interoperability.



## Spotlight Talk 3: Open Data for Energy Access and Planning

Dr. Shikha Anand, Senior Programme Associate at WRI India, presented the Energy Access Explorer (EAE)—an interactive geospatial data platform recognized globally as the first Digital Public Good (DPG) for achieving Sustainable Development Goal 7 (affordable and clean energy).

EAE combines spatial data on energy supply, demand, and socioeconomic indicators to support data-driven planning. The platform has been implemented across several geographies in Asia and Africa and is currently active in Jharkhand, Assam, Nagaland, and Mizoram.

Dr. Anand showcased examples where the platform helped governments prioritize solarization projects for schools, health centers, and flood shelters. She stressed the importance of multi-sectoral data partnerships, institutional capacity building, and community ownership to ensure the sustainability and inclusiveness of digital data systems.

## Panel Discussion: Governance, Stewardship, and Financial Models

This session featured a high-level panel discussion on governance, stewardship, and financial models for sustainable digital public infrastructure. The panel included:

### Moderator



**Abdul Khalid**  
Senior Program  
Associate,  
WRI India



**Ms. Suna Akbayir**  
CEO, Entrepreneur,  
Innovation  
Strategist, Beyond  
Barcode & Artech



**Mr. Ekant Tyagi**  
Country  
Engagement Partner,  
COSS



**Ms. Shelza Mayal**  
Senior Manager,  
Samagra  
Governance



**Mr. Vignesh Hari**  
Founding Member,  
Open Healthcare  
Network



**Dr. Shikha Anand**  
Senior Program  
Associate,  
WRI India



**Mr. Abhishek Nair**  
Senior Product  
Manager,  
DALGO

### Panellists

The discussion examined the institutional, technical, and financial dimensions of sustaining DPGs and DPIs.

Suna Akbayir shared insights from European experiences, especially around DPPs and how regulatory frameworks in the EU are promoting interoperability and circular economy practices. She noted that the involvement of private sector actors has accelerated adoption and standardization across industries.

Ekant Tyagi highlighted examples from India, such as *MOSIP* and *Sunbird*, illustrating how housing DPIs in neutral academic institutions like IIIT Bangalore can ensure long-term stewardship. He emphasized that sustained adoption and modular design are key to financial and operational longevity.

Shelza Mayal discussed the challenges of implementing DPGs within Indian state governments. She emphasized the need for policy awareness, capacity building, and standards-based procurement to encourage adoption. She cautioned that open-source principles must be better understood and integrated into state-level technology projects.

Hari and Dr. Anand both highlighted that interoperability and trust remain central to sustainable digital ecosystems, while Abhishek reiterated that sustainability must be viewed not only as financial stability but also as *continued utility, openness, and community engagement*.

The panel concluded that successful digital ecosystems depend on a multi-stakeholder model—combining government facilitation, community participation, academic involvement, and philanthropic or CSR-based funding.

In her closing remarks, Ms. Pamli thanked participants and noted that the day's discussions had collectively reinforced the importance of long-term planning in digital public infrastructure.

Key recommendations that emerged included:

- Integrating sustainability frameworks from the earliest stages of DPI development.
- Strengthening interoperability standards to allow seamless data exchange.
- Ensuring institutional stewardship through neutral anchors such as universities and non-profits.
- Promoting education and community participation, including student involvement in open-source development.
- Encouraging funding models that blend philanthropy, government support, and service-based revenue.

Participants also discussed the potential of aligning Indian initiatives with international data governance frameworks, particularly those emerging from the European Union.

# From Data to Decisions – Interoperability in Practice: Case Studies from Cities and Startups

As Indian cities race toward rapid urbanisation, their public transport ecosystems face an urgent need for smarter, interconnected digital infrastructure. The session “From Data to Decisions – Interoperability in Practice: Case Studies from Cities and Startups” brought together innovators, government leaders, and ecosystem builders who are at the forefront of this transformation. What emerged was a compelling narrative of how open data, standardization, and collaborative engineering are beginning to reshape mobility experiences for millions.

## Setting the Stage



The moderator, Rohan Rao, Program Lead, WRI India, opened with an unexpected metaphor: action films. Scenes from *The Bourne Ultimatum* and *Skyfall*, he noted, were choreographed using open GTFS real-time transit data—a reminder that the same data standards defining global mobility are also shaping the future of Indian public transport.

This playful icebreaker segued into a sobering reality: India's mobility ecosystem, despite enormous innovation, remains fragmented. Agencies build digital systems in silos, startups work with inconsistent formats, and valuable lessons often remain locked within individual pilots. The result is limited public benefit, missed opportunities, and an inability to scale impactful solutions.

The alternative, he argued, is clear—open, interoperable data systems that work for everyone. Grounding this vision, he walked the audience through the significance of GTFS, the global standard for transit data, now used from London to Accra to Delhi. In 2023, Bengaluru became the Indian pioneer when BMTC and BMRCL jointly released their static data in GTFS format, enabling multimodal trip planners, ticketing integrations, and innovative solutions through the OnRoute Mobility-

as-a-Service Challenge.

The entire session is divided into two part – Spotlight Talks, focussed on real-world deployments by startups and city agencies that are turning open-data theory into public benefit. and Panel Discussion on 'Open Data, Standards and the Future of Multimodal Mobility in India'.

## Spotlight Talks:

### Tummoc: Designing Seamless Multimodal Mobility

Representing Tummoc, Riya Mansukhani and Abha Mishra offered a candid account of working across diverse cities such as Delhi, Mumbai, and Bengaluru. Their biggest challenge, they said, was the absence of digitized, standardized data. STUs were hesitant to digitize ticketing, tracking data existed but was unusable, and merger across bus and metro systems was difficult due to inconsistent formats.

Tummoc responded by building a patented multimodal journey planner, a global-first all-in-one multimodal ticket, and a closed-loop wallet designed for low-connectivity contexts. Importantly, they became early adopters of the ONDC mobility network to integrate metro and bus ticketing.

Beyond the app experience, Tummoc developed backend AFCS and ITMS systems powering revenue reconciliation, crew management, and operational dashboards—for agencies such as BMTC, DTC, MTC, and BSRTC. Today, Tummoc handles 135 million monthly transactions on the agency side and serves five million users across 22 cities.

Their next ambition is to offer their multimodal ticketing as an API, open their datasets in GTFS formats, and contribute actively to the open-data mobility ecosystem.



### **CUMTA: Building Urban Mobility Infrastructure for Chennai**

If Tummoc represented the startup lens, Vignesh Tamilvanan, Data Architect from the Chennai Unified Metropolitan Transport Authority (CUMTA) presented the city-wide perspective. As Chennai's nodal transport authority, CUMTA's mandate spans buses, suburban rail, metro, roadworks, utilities, freight movement, and land use.

CUMTA is building Digital Chennai, an urban mobility twin integrating GIS, transport data, utility networks, excavation plans, and smart-city inputs. They recently launched the Chennai One App, India's first single-ticket platform integrating metro, bus, and suburban rail with a unified QR ticket. Within just 21 days, the app saw 4 lakh downloads, 2 lakh completed journeys, and 70% repeat users, signalling strong commuter interest in multimodal convenience.

Vignesh stressed the need for a national open mobility data policy, incentives for STUs to digitize operations, and more competition among mobility solutions to drive public benefit. CUMTA's work demonstrated that interoperability is not just a technical challenge but a governance priority.



### **Chalo: Scaling Public Transport Digitally, One City at a Time**

Priya Singh, Co-founder of Chalo, infused her talk with humour and realism. "Solving India's public transport is a mass problem, not a private problem," she said—and therefore demands collaboration rather than isolation.

Chalo operates in 100+ cities, with 30,000 buses on its platform and 400 crore rides monitored. Their landmark success came in Mumbai, where Chalo digitized the entire BEST bus fleet in 80 days, resulting in a 55% rise in ridership, 41% digital app adoption, and 15 crore savings from discontinuing paper roll tickets.

Chalo has implemented the National Common Mobility Card (NCMC) across seven states and has deep integrations with metro systems through ONDC. Their principle is simple: if data and ticketing systems are not digital, cities cannot become financially sustainable.

Priya concluded with a strong call for ecosystem unity: APIs should not be guarded by individual entities; mobility is a public good and must be treated as such.



### **Namma Yatri: Building Mobility on Openness and Local Empowerment**

For Kranti Tej, Product Manager, Namma Yatri, interoperability is not just technology—it is philosophy. Namma Yatri is built on open protocols, exposes all its operational data publicly, and has its entire codebase open-source.

Using GTFS real-time data from BMRCL, they developed Nama Transit, a seamless multimodal journey planner that brings together autos, metro, and walking routes—complete with second-by-second train arrival countdowns. Beyond Bengaluru, Namma Yatri powers live bus tracking in West Bengal, enables ambulance booking via public apps, integrates bus ticketing in Odisha, and even manages boat ticketing on the Odisha waterways.

Their story underscored a larger truth: when governments open their data, mobility innovation multiplies dramatically—and citizens win.



### CDPG: Toward a Bengaluru Transport Stack

Closing the spotlight series, Dr. Raghu Krishnapuram, Distinguished Scientist from CDPG, unveiled early insights from the upcoming Bengaluru Transport Stack, developed with BCG. Inspired by global successes like London, the stack aims to unify the city's transport datasets across modes and agencies while providing shared intelligence services.

The system includes:

- A transport data exchange ingesting static and real-time data from BMTC, metro, congestion sources, e-bikes, parking systems, and more.
- An intelligence layer offering ETA calculations, congestion maps, speed profiles, and demand-supply analytics.
- Tools for agencies—such as a multi-modal journey planner, feeder route gap analysis, revenue analytics, and route occupancy maps.
- Schedule optimization tools that have already identified opportunities to reduce bus requirements by up to 13 buses across select depots without reducing service quality.

Raghu emphasised that innovation should focus on commuter experience, but equal effort must support agency operations, route planning, crew optimisation, and financial sustainability.

### A New Era for Mobility in India

The session concluded with a shared realisation: India is on the cusp of a mobility revolution—one powered not by flashy technologies alone, but by interoperable data, open standards, and collaborative governance.

Across Bengaluru, Chennai, Mumbai, Kolkata, and Odisha, a new pattern is emerging:

- Agencies are digitizing and opening their data.
- Startups are building multimodal, scalable solutions.
- Citizens are embracing integrated ticketing and real-time travel information.
- Platforms like ONDC are stitching together disparate efforts into a national fabric.

The message was clear: open data works, and when governments, startups, and ecosystem partners collaborate, the transformation is not only possible—it is already underway.

## Panel Discussion: Open Data, Standards and the Future of Multimodal Mobility in India

### Moderator



**Srinivas Alavilli**  
Fellow, WRI India

### Panellists



**Janet Joseph**  
CSR Lead,  
Mercedes-Benz  
R&D India



**Prof. Abdul Pinjari**  
Professor, IISc



**Manjunath Shekhar**  
Director – Sustainable  
Urban Mobility, GIZ

This part of the session brought together experts from research, development, and industry to discuss the accelerating transformation of India's urban mobility ecosystem. Building on demonstrations from platforms like Tummoc and Namma Yatri earlier in the day, the panel underscored that India is in the midst of a genuine mobility revolution, driven by open data, multimodal integration, and growing civic-tech innovation.

### The Role of Open Standards

Prof. Abdul opened the discussion with a deep dive into the evolution of GTFS as the de-facto global transit data standard. While acknowledging the need for enhancements to reflect Indian realities—such as stage-based fares, diverse operators, and informal modes—he emphasised that GTFS remains a robust foundation. He highlighted that open data is not only a technological enabler but a catalyst for interoperability, innovation, and ecosystem-wide value creation. Students and developers were encouraged to contribute directly to improving open standards, noting that even a small contribution to an open repository becomes globally visible.

### Engaging with Public Agencies

Drawing on long engagement with government bodies, Manjunath Shekhar underlined that governance capacity and contractual

constraints—not unwillingness—often hinder data sharing. Organisations like GIZ, WRI, CDPG, and CiSTUP play a critical role in bridging these gaps through sustained engagement and capacity building. A national or state-level Urban Mobility Data Sharing Policy could provide the regulatory push needed for mandatory open transit data. He also pointed to hidden barriers within agencies themselves, where fragmented tenders and siloed ITMS systems impede even internal data use.

### Industry's Evolving Role

Representing Mercedes-Benz R&D India, Janet Joseph shared how the company has strategically positioned mobility and technology at the centre of its CSR efforts. MBRDI has supported open-data based multimodal pilots, including early-stage work with Tummoc and Namma Yatri—contributing funding, testing, and design inputs. She stressed that mobility is a universal public good, and open data can unlock solutions that benefit every segment of society. Encouraged by the pilot's success, MBRDI is now extending technology-enabled CSR to areas such as decarbonisation and disaster resilience.

## Audience Q&A: Key Themes

A rapid-fire Q&A brought forward concerns about digital ticketing fees, in-house government development, inclusivity, public finance interoperability, and digitising legacy transit systems. Key takeaways included:

- Digital channels already improve efficiency (e.g., Bengaluru Metro's discounts, BMTC's rapid UPI adoption).
- Government hiring limitations make external partnerships essential.
- Inclusivity extends beyond apps—open data supports physical displays, multimodal access points, and gender-focused initiatives like MobilizeHer.
- Small towns under the PM eBus SEWA mission present major new opportunities for youth-led digitisation and innovation.

## Closing Reflections

All three panellists emphasised that mobility is now an interdisciplinary domain with room for technologists, urban planners, policy analysts, economists, and designers. As India's cities grow and digitise, the demand for high-quality mobility solutions will multiply. The panel closed with a call to action for students and innovators to participate actively in the open mobility movement, contribute to national digital public goods, and help shape the next decade of urban transport in India.

# Panel Discussion: Accelerating the E-Mobility Transition through Digital Ecosystems & Infrastructure

## Moderator



**Neetu Anna Joseph**

Technical Advisor,  
Transport and  
Infrastructure, GIZ

## Panellists



**Akhil Jay Prakash**

Co-founder,  
Pulse Energy



**Anannya Das Banerjee**

Associate Director,  
Institute of Transport  
Studies (ITS), UC Davis



**Padmanabhan Naman**

Group CTO,  
BillionE Group



**Mohammad Imran Khan**

Vice President – EV  
Systems & Controls,  
Maruti Suzuki India  
Limited

The concluding session of the Mobility Track examined the critical digital foundations required to scale India's electric mobility transition. The panel emphasized that while vehicle electrification is progressing rapidly, the long-term success of EV adoption will be shaped equally by how transport, energy, data, and policy are integrated into a cohesive digital ecosystem.

The discussion opened with reflections on the importance of interoperable digital protocols in enabling EV charging, grid coordination, and energy system integration. Panelists highlighted India's progress through initiatives such as the India Energy Stack and the Unified Energy Interface, noting that shared standards are essential for enabling multi-party participation across chargers, discoms, OEMs, platforms, and consumers. Once the network layer is standardized, the panel noted, innovation at the platform and application layers can scale more effectively.

From an infrastructure perspective, the panel underscored the role of real-time data, system uptime, and predictive maintenance in ensuring reliable fast-charging networks, particularly along highways and in remote locations. Digitally connected charging stations and centralized monitoring were identified as critical enablers for customer trust, operational efficiency, and long-term viability of charging infrastructure.

The conversation then expanded to global and policy perspectives on digital mobility governance. Drawing from international research and regulatory experiences, the panel observed that while data availability has improved, meaningful use of mobility data remains constrained by fragmentation, limited standardization, and institutional capacity gaps. Challenges across

freight mobility, battery lifecycle management, and recycling ecosystems were highlighted as areas requiring coordinated data frameworks.

From an OEM standpoint, the panel discussed how connected vehicle data, when responsibly governed, can enhance user experience through improved journey planning, charger discovery, and seamless payment integration. The importance of transparency, user consent, anonymization, and compliance with emerging data protection frameworks was emphasized as essential to enabling innovation while maintaining public trust. Initiatives such as battery passports were cited as promising steps toward lifecycle traceability and circular economy objectives.

Across the discussion, panellists consistently emphasized that data sharing and interoperability are foundational to scaling electric mobility. At the same time, the panel acknowledged that no single stakeholder can address these challenges in isolation. Effective collaboration between startups, OEMs, discoms, regulators, and research institutions was identified as critical to aligning commercial sustainability with public value.

The session concluded with a shared recognition that digital infrastructure for electric mobility must be treated as a form of public digital infrastructure—open, reliable, and governed in a manner that supports innovation while safeguarding public interest. As India's electric mobility ecosystem continues to evolve, the panel highlighted the need for governance models to mature alongside technology to ensure scale, resilience, and long-term impact.

# Welcome Address: Setting the Vision for WebSciX



## Prof. Srinath Srinivasa

Professor and Dean (R&D), IIIT Bangalore

The WebSciX track of the Symposium on Data for Public Good opened with a compelling welcome address by Prof. Srinath Srinivasan, who introduced the vision, global relevance, and regional significance of the WebSciX initiative. Drawing from the interdisciplinary field of Web Science, he described it as the study of how the web, digital platforms, and now artificial intelligence shape human societies—going beyond technology to focus on responsible, human-centred innovation.

Prof. Srinivasan traced the intellectual roots of Web Science to Sir Tim Berners-Lee and the global Web Science Trust Network (WSTNet), of which India is now an active participant. He highlighted the “Four Internets” theory—European, American, and Chinese models of the internet—and pointed out that India, representing nearly one-fifth of humanity online, does not yet fit into any existing global pattern. This, he argued, positions India uniquely to define its own digital future and thought leadership.

Introducing WebSciX as India’s officially recognized satellite platform of the global Web Science community—similar in spirit to TEDx—he emphasized its goal of building a strong interdisciplinary ecosystem of researchers, practitioners, policymakers, technologists, and civil society actors. The initiative evolved from earlier Web Science for Development (WS4D) workshops

and now aims to create a sustained, India-centric research and practice network.

Key goals of WebSciX include:

- Advancing localized research on the societal impact of the web in India and the Global South
- Preserving and integrating Indian Knowledge Systems and Indian language content in the age of AI
- Enabling research collaborations and a shared knowledge repository
- Supporting policy-relevant interventions through think tanks and advisory networks
- Strengthening integration with the global Web Science community

Prof. Srinivasan concluded by inviting students, researchers, industry experts, policymakers, and civil society organizations to actively participate in shaping this emerging community through volunteering, program committees, sponsorship, and collaborative engagement. The address set a strong intellectual and participatory foundation for the WebSciX track, positioning it as a critical platform for shaping India’s digital social future.

# Talk: How the Post-Internet World Order Has Changed International Relationships



**S. Swaminathan**

Former Ambassador

In his keynote on *“How the Post-Internet World Order Has Changed International Relationships,”* Former Ambassador S. Swaminathan drew on over three decades in the Indian Foreign Service to trace how the internet and digital technologies have reshaped diplomacy—operationally, politically, and culturally. Rather than a grand abstract theory, he offered a grounded, almost narrative account: from driving through rainy Sri Lankan estates with only paper maps and diplomatic bags delayed by weeks, to today’s world of secure email, real-time data, video calls and app-based communication.

He argued that the internet has made diplomacy faster, more data-driven, and more public-facing, transforming both tools and expectations. Ministries now rely on secure digital channels, video conferencing and social media; the MEA has created dedicated divisions for e-governance, cyber diplomacy and emerging technologies. Public diplomacy has been fundamentally altered by platforms like X (Twitter), Facebook and Instagram, where foreign ministries and leaders communicate directly with foreign and domestic publics, bypassing traditional gatekeepers. India’s own official handles and the MEA app exemplify this shift, making policy, events and services far more visible and accessible.

Ambassador Swaminathan highlighted how AI and digital data have strengthened economic and trade diplomacy. Where trade analysis once relied on delayed, patchy statistics, today AI-assisted systems can integrate customs, port and manifest data for near real-time economic intelligence, supporting more sophisticated trade and investment strategies. He contrasted this with his early career

dependence on physical reports and slow statistical systems, underlining how much more responsive policymaking can now be.

A large part of his talk focused on soft power and cultural diplomacy in the digital age. Indian films, food, yoga, classical arts and cricket have long been tools of outreach; now, online platforms and streaming amplify that reach exponentially. He illustrated this with anecdotes from film festivals in Iceland and Brazil, yoga’s global adoption, and the explosion of Indian restaurants and cultural visibility abroad. Digital channels, he argued, make it much easier to promote tourism, education and cultural ties—whether it is Indian students accessing European universities or foreign learners accessing Indian languages and arts online.

In the Q&A, he acknowledged that the same technologies also complicate diplomacy: social media accelerates narratives and can constrain manoeuvring space; misinformation, fake accounts and deepfakes pose serious challenges. He suggested that one important area for technologists and web science researchers is building tools to detect and curb malicious content that distorts public debate. He also touched on science diplomacy (structured S&T collaborations with partner countries), India’s evolving trade posture in a more protectionist and fragmented global economy, and the enduring reality of borders and national interests despite utopian visions of a borderless digital world. Ultimately, he framed technology as a powerful amplifier of diplomacy—but not a substitute for the human judgment, cultural sensitivity and long-term relationship-building that still sit at the heart of international relations.

## Talk: Open Data, Open Science: Building a Global Public Good



**Prof. Shalini Urs**

Executive Director Emerita, ISiM

Speaking virtually from the US, Prof. Shalini Urs traced the evolution of open data and open science as a pathway to making knowledge a true global public good. Drawing on her decades-long work in digital scholarship and digital libraries (including Vidyanidhi and the ETD/open access movement in India), she situated open science in a longer history of thinking about science and society—from J.D. Bernal's "science in history" and Kuhn's paradigm shifts to Jim Gray's "fourth paradigm" of data-intensive scientific discovery. She highlighted how the combination of the web, digital libraries, and large-scale scientific data has shifted science from siloed labs and paywalled systems to an emerging vision of FAIR data—findable, accessible, interoperable and reusable—and open, networked research ecosystems.

Prof. Urs outlined key international developments: FAIR principles (2016), the Royal Society's call for science as an "open enterprise", and UNESCO's 2021 Recommendation on Open Science, along with growing mandates from major funders (EU, NIH, NSF, UKRI) that publicly funded research data be shared

under FAIR-compliant data management plans. She discussed knowledge infrastructures—repositories, persistent identifiers, ontologies, standards and stewardship—as the backbone of open science, illustrated through exemplars such as GenBank and the Open Source Malaria Project, which show how open data can accelerate discovery, enable global collaboration and lower costs (e.g., affordable drugs, faster vaccine development). Turning to India, she noted that, beyond DBT's policy for biological data, most agencies have yet to mandate open research data, and argued that this is a critical gap for any serious agenda on "data for public good". She closed by framing open science as a move toward an "epistemic commons", grounded in Merton's norms (communism, universalism, disinterestedness, organized skepticism), and called for cultural change, supportive policy, and sustainable funding to embed open data and open science as *digital public infrastructure*.

# Talk - Data Exchange: The Third Leg of the Digital Public Infrastructure Stool



**Prof. Inder Gopal**  
Chairperson, CDPG, IISc

In his WebSciX keynote, "Data Exchange: The Third Leg of the Digital Public Infrastructure Stool," Prof. Inder Gopal positioned data exchange alongside identity (Aadhaar) and payments (UPI) as the missing but essential leg of India's Digital Public Infrastructure (DPI). While identity and payments are now mature and widely adopted, data exchange is still fragmented, under-architected, and far more complex—both technically and institutionally.

Prof. Gopal distinguished data exchange from open data, arguing that the real challenge is sharing diverse, often sensitive data securely and at scale across domains such as urban systems, agriculture, health, geospatial services, and forests. Different data domains exhibit very different characteristics:

- Urban IoT streams: high-frequency, low-payload, real-time
- Video and CCTV feeds: massive volume, sparse signals of interest
- Geospatial and satellite data: huge but not real-time
- Agricultural and demographic data: distributed across multiple institutions

Because "one size does not fit all", he framed data exchange as a toolkit rather than a single platform: catalogues, standards, APIs, consent and policy frameworks, privacy-preserving technologies, and secure compute environments that can be composed for different use cases.

To make this concrete, he described a hierarchy of data and access models:

- Open data (e.g., government statistics, scientific data): accessed via portals with common formats and metadata
- High-value data (e.g., micro-weather, high-resolution maps): governed through policy-based access, APIs, and metering
- Personal and sensitive data (e.g., health, finance, security): requiring consent, anonymization, and often confidential compute so that algorithms can run on the data without exposing the raw data itself

He then outlined the architecture of a data exchange, using the Telangana Agricultural Data Exchange (ADeX) as an example:

- A catalogue and metadata layer that makes distributed datasets discoverable

- A consent and policy engine where data providers define who can access what, for how long, and under what conditions
- Resource services that standardize and transform heterogeneous data into common models as it flows
- Analytics, trust, and sandbox/AI-compute layers, including confidential clean rooms where multiple parties can securely combine data and algorithms, and only the computed results—not raw data—leave the enclave

Crucially, these exchanges are federated: data is not centrally stored but stays with the original providers and is accessed on demand via standard interfaces.

Prof. Gopal illustrated the impact of this approach through several live deployments:

- IUDX (urban data) across 52 smart cities, enabling applications such as real-time bus tracking in Bengaluru, traffic analytics using feeds from thousands of cameras, and optimized solid-waste routing in Varanasi that reduces fuel use, costs, and emissions
- ADeX (Telangana agriculture), where banks like HDFC use exchange-mediated access to crop, weather, soil, pest, and market data to underwrite smarter, lower-risk farmer credit—offering an alternative to informal moneylenders
- Health and research exchanges with the Indian Council of Medical Research and the Centre for Brain Research, where confidential compute allows researchers to analyse highly sensitive longitudinal health data without exposing individual records
- Emerging work in forests, geospatial data, and cross-border data systems with Smart Africa

He closed with a governance reflection: don't over-regulate too early. In his view, DPI for data should first prove value through real systems and real users; governance and regulation should follow practice rather than precede it, be domain-specific, and avoid stifling innovation before viable models have emerged. Data exchange, he argued, will only become a true third leg of India's DPI when it is judged not by architectures alone, but by the public-good applications it unlocks at scale.

## Talk: Knowledge Bases to Narrative Spaces



### Prof. Srinath Srinivasa

Professor and Dean (R&D), IIIT Bangalore

In his talk “Knowledge Bases to Narrative Spaces”, Prof. Srinath Srinivasa argued that as we build ever larger data and knowledge systems, we risk drowning out diverse worldviews—especially those rooted in oral traditions and local cultures. He began with a striking story of a tribal community in West Bengal that resisted borewell drilling, likening it to “drilling into your mother and sucking her blood”. Their worldview distinguished water under the earth (for the earth) from water on the surface (for humans), and they proposed rainwater harvesting instead. This, he suggested, is exactly the kind of indigenous, context-rich knowledge that rarely finds representation in formal knowledge bases or on the web.

He contrasted traditional storytelling—the primary way societies have preserved and transmitted knowledge for centuries—with today’s machine-centric knowledge management built on facts, ontologies, and triples. Stories work through metaphor, morals, and identification with protagonists; they shape our *hermeneutics*—our way of interpreting the world. By comparison, what he called “*machine hermeneutics*” focuses almost exclusively on structure and process (“how”), while sidelining intent, motivation, and lived experience (“why”). Using the example of asking why/how a friend cheated versus why/how a lunar eclipse occurs, he showed how modern science often collapses “why” into “how,” removing human meaning from the frame.

Prof. Srinivasa critiqued the pursuit of a single neutral narrative, for example through Wikipedia’s “neutral point of view.” Because what counts as “credible” must be backed by published literature, entire worlds of oral and local knowledge are filtered out. He cited work showing Eurocentric bias in

Wikipedia’s “history of country X” articles and invoked Chimamanda Ngozi Adichie’s warning about “the danger of a single story.” AI systems trained on such skewed corpora, he noted, only amplify this problem—turning an already dominant worldview into a global default.

As an alternative, he proposed “narrative spaces”: instead of one neutral point of view, systems should intentionally support *multiple* points of view (MPOV). The goal is not to remove subjectivity but to aggregate many coherent, subjective narratives around the same topic, and measure quality by *wholesomeness* (diversity of perspectives) rather than neutrality. His lab’s prior work models opinions as a combination of abstraction (idea) and expression (sentiment), and uses this to distinguish crowds, herds, mobs, and gangs, detect orchestrated online campaigns, and extract distinct narrative “camps” around controversies (such as Jallikattu or elections), along with their stances on key issues.

In the AI context, he showed how large language models can be *repurposed* to support plurality rather than homogenization using retrieval-augmented generation (RAG). His team built separate corpora—for example, mainstream news reports on COVID in Karnataka and oral narratives from a rural community near Tumkur—and then posed the same questions to both. Asked what changed due to COVID, news stories emphasized lockdowns, economic disruption, and policy measures, while community narratives highlighted unexpected positives: families reuniting, children spending more time with parents, migrants returning home. Neither perspective is “the truth” alone; the insight emerges from seeing them side by side.

He closed by emphasizing that knowledge management is fundamentally a human, interpretive activity. The real lever for change is not what we know, but how people internalize what they know—and that is shaped by stories, not just facts. Rather than letting AI collapse the world into a single flattened narrative, he argued, we can use the same technologies to surface and hold multiple narratives together, enabling more inclusive, empathetic, and locally grounded forms of knowledge.

Modelling Sources, Interventions, and Coordination in the Dynamics of Spread *Prof. Sakthi Balan, Shiv Nadar University Chennai*

Prof. Sakthi Balan's talk examined two critical contemporary phenomena through a common lens: infection spread (with COVID-19 as a case in point) and misinformation spread on social media. For epidemic modelling, he presented joint work with the AI Institute, University of South Carolina, extending the classic SIR (Susceptible–Infected–Recovered) model to an Exo-SIR framework that distinguishes between *endogenous* infections (within a population) and *exogenous* infections (introduced from outside, such as inter-state migration). Using COVID-19 case data from covid19india.org, combined with painstakingly compiled state-level data around the Tablighi Jamaat event, the team modelled exogenous inflows into states like Kerala and showed that Exo-SIR tracked real infection

curves more accurately than standard SIR. This underscored the importance of high-quality, well-integrated mobility and event data for planning interventions and sizing medical capacity during epidemics.

In the second part, Prof. Balan turned to misinformation spread, focusing on user-level engagement patterns as a window into coordinated activity. Using the COAID dataset on COVID-19 misinformation on Twitter (now X), his team constructed a coordination network based on semantic proximity (text similarity and hashtag overlap) and temporal proximity between posts. They defined a novel C-score metric to quantify the degree of coordination among users amplifying a misinformation theme, and demonstrated how higher coordination corresponds to stronger amplification. He argued that such coordination-aware analysis can inform future mitigation strategies—especially when combined with counter-misinformation campaigns—while also highlighting a structural challenge: critical engagement data on commercial platforms is increasingly inaccessible to researchers. He concluded by stressing the dual need for (i) carefully designed, privacy-aware data collection and integration mechanisms for public problems like pandemics and misinformation, and (ii) policy or institutional frameworks that enable academic access to platform data in the public interest.

## Talk: Computational Social Science, Web Data, and PRECOG

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### Prof. Ponnuram Kumaraguru (PK)

VP, ACM India and Professor, IIIT Hyderabad

In a lively, highly interactive session, Prof. Ponnuram Kumaraguru ("PK") introduced the audience to his research group PRECOG and its work at the intersection of web science, security, and society. He began by unpacking the name "PRECOG", inspired by Minority Report and the idea of "precognition" – anticipating harmful events before they occur – and connected this metaphor to his lab's long-standing interest in using web-scale data and social media traces to understand and mitigate online harms. Through anecdotes and humour, he highlighted how vast amounts of personal and behavioural data "hide in plain sight" on platforms such as X/Twitter, and how careful aggregation and analysis of such data can power both socially beneficial applications (early signals of crises, misinformation detection, public safety) and deeply problematic ones (profiling, misuse, targeted attacks).

Much of the session centred on misinformation, crisis response, and the dynamics of online narratives. Drawing on past events such as the Boston Marathon bombing and more recent Indian examples (e.g., viral but misattributed videos that trigger city-level blame games), PK discussed how false or misleading content can surge rapidly, while corrections or verified information often arrive late. In the Q&A, he emphasized the importance of building technical and institutional mechanisms that "pull the green line forward" – enabling faster, credible counter-narratives from platforms, newsrooms, governments, and civic actors – and noted the growing role of fact-checkers and "good citizens" on social media. The talk closed on a pragmatic note: web-scale data and AI offer powerful tools for data science for social good, but realizing that promise in India demands not only clever models, but also thoughtful governance, responsiveness, and public engagement.

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## Talk: AI for Digital Public Infrastructure: Legal Issues & Responsible AI Adoption



**Srijoni Sen**

Lawyer & DPI Advisor, IIIT Bangalore

Srijoni Sen discussed how governments are starting to use AI within digital public infrastructure, and stressed that when the state uses AI to make or support decisions, all existing constitutional and administrative law still applies. She distinguished three types of use: (1) *informational* tools like chatbots and portals; (2) *algorithmic decision-making* that scores, profiles, or recommends outcomes for people (e.g., welfare eligibility, tax scrutiny); and (3) *agentic systems* that directly act (e.g., auto-blocking accounts, auto-rejecting applications). The last two raise serious legal questions because they affect rights and entitlements. She referenced the EU AI Act and GDPR's ban on certain uses (like criminal prediction and social scoring), and contrasted this with India's current reality: AI/ML already being used in income tax case selection, voter-roll de-duplication, fraud detection in Ayushman Bharat, and Telangana's *Samagra Vedika* for beneficiary verification—where a court-ordered review later revealed significant errors.

She then connected these systems to Indian legal requirements: no discrimination, no improper delegation of state power to opaque systems, *reasonable* decisions, and fair process (reasons given, chance to be heard). Black-box AI that simply outputs “ineligible” or “high-risk” makes it impossible to test reasonableness or challenge bias, and can therefore be unconstitutional. Briefly touching on IP and liability, she noted that current practice often turns the nominal “human in the loop” into a “*moral crumple zone*” who carries blame for largely automated decisions. Her core argument: instead of treating AI as a special zone needing entirely new law, we should enforce existing constitutional and administrative standards on any AI used by the government—designing systems so their outputs can be explained, challenged, and corrected just as if a human official had made the decision.

## Opening Address: Setting the Stage for Privacy and Security Innovation in India



**Abhay Sharma**  
CTO, CDPG

The Privacy and Security track began with an energetic and forward-looking address by Abhay Sharma, CTO of CDPG, who framed the day's discussions around a central question: How can India enable data-driven innovation while handling sensitive data responsibly, securely, and at scale?

Abhay opened by acknowledging the rapid growth of the CDPG Symposium itself—now in its third edition—and the need to run four parallel tracks due to vibrant participation across domains. But he urged the audience, with characteristic humor, to remain rooted in this track, promising a day rich with insights from practitioners deeply immersed in the privacy and security landscape.

Drawing from CDPG's own evolution, he reflected on early experiences with the India Urban Data Exchange (IUDX). In the initial years, the team avoided sensitive data altogether—steering clear of names, phone numbers, or anything that might compromise privacy. Over time, however, CDPG began working across agriculture, geospatial, and even preliminary health data systems. This shift revealed an unmistakable reality: India must move from avoidance to active, responsible use of sensitive data. Avoiding such data stifles insight; using it carelessly erodes trust. The right path requires both *trust* and *technology*.

This is where Privacy-Enhancing Technologies (PETs) enter the picture. Abhay emphasized that PETs—whether in the form of Trusted Execution Environments (TEEs), Secure Multi-Party Computation, Differential Privacy, or Homomorphic Encryption—provide the mathematical and systems-level guarantees that allow institutions to work meaningfully with sensitive data while preserving confidentiality. Once viewed as niche research ideas, these technologies are now maturing into powerful components of real systems.

He described emerging architectures such as secure data collectives, where hospitals, pharmaceutical companies, or research institutions—sometimes competitors—can pool health data to enable improved disease prediction or drug discovery, all without

revealing raw data to one another. These systems enable “shared insights without shared data,” a paradigm that could transform how India approaches sectors like health, mobility, agriculture, and finance.

Yet Abhay was clear-eyed about the challenges ahead. PETs remain expensive to deploy, their maturity varies, and the ecosystem lacks standardised open-source libraries that startups and public-sector actors can easily depend on. Stronger communities, interoperable standards, and sustainable, open foundations are needed if India is to wield these technologies at population scale.

Looking ahead to the day's program, he highlighted three major segments:

1. Morning technical keynotes, led by researchers and practitioners pioneering advances in PETs and secure computation.
2. Post-lunch session on Indigenous Innovation, a topic he tied to India's global standing. He echoed a point from the previous day's keynotes: India is already a “pole position” leader in many digital public infrastructures, but sustained global leadership requires a strong domestic innovation ecosystem.
3. A critical panel discussion on the Digital Personal Data Protection Act (DPDPA)—its implications for startups, industry, and innovation; the readiness of the ecosystem; and what the newly notified rules mean in practice.

Abhay closed with optimism, invoking Ravi Shastri's famous words: “*It's going to be a cracker of a day.*” He encouraged participants to carry conversations beyond the room, build collaborations, and explore opportunities—punctuated by a gentle plug to students to visit CDPG's hiring booth for roles in cutting-edge privacy and security work.

With that, he welcomed the speakers, panelists, and audience to a day of deep engagement at the frontier of India's privacy and security ecosystem.

## Talk: The State of Confidential Computing



**Dr. Kapil Vaswani**

Head, SPARC FRO (FSID)

In an engaging and deeply technical session, Dr. Kapil Vaswani traced the evolution of confidential computing from its early academic roots to its current status as a critical pillar of modern cloud security. Drawing on over 18 years of experience as a security researcher at Microsoft Research, he offered both an insider's account and an industry-wide perspective on how hardware-backed trusted execution environments (TEEs) have transformed secure computation over the past decade.

Dr. Vaswani began with a simple observation: while many users unknowingly rely on confidential computing every day, only a fraction recognize its ubiquitous presence. He illustrated this with the example of Apple's Secure Enclave Processor (SEP)—a hardware-isolated coprocessor first introduced in the iPhone 5s. Designed to securely manage encryption keys, biometric data, passwords, and device secrets, SEP became the earliest large-scale consumer deployment of a TEE. Similar architectures now exist in nearly all modern smartphones.

Extending this paradigm to the cloud, Dr. Vaswani described the central challenge: *how do you ensure that sensitive workloads remain confidential and tamper-proof even from the cloud service provider?* The answer came in 2014 with Intel SGX, which enabled hardware-isolated logical enclaves on commodity CPUs. These enclaves protected both the confidentiality and integrity of application state, while enabling remote attestation—cryptographic verification that a workload is running in a genuine, trusted environment.

However, scaling SGX in production revealed several practical limitations: small memory capacity, developer complexity, performance overheads, and a new security boundary not aligned with cloud architectures. This led to the next major milestone: AMD SEV-SNP, which took a more pragmatic approach by isolating entire virtual machines rather than individual processes. This shift aligned TEEs with existing cloud security boundaries, making confidential computing significantly easier to adopt at scale. Soon, Intel transitioned from SGX to Intel TDX, and ARM introduced ARM CCA, marking a broad industry convergence toward VM-based TEEs.

Dr. Vaswani then highlighted one of the most significant recent advances—the extension of confidential computing to GPUs. In collaboration with NVIDIA, TEEs are now supported on Hopper GPUs, where a secure mode enforces memory isolation and encrypted I/O, enabling confidential AI workloads. He noted that performance overheads are now small and often negligible for large-scale models, as bottlenecks lie in I/O bandwidth rather than computation.

Beyond CPUs and GPUs, the field is now moving toward device-agnostic designs with emerging standards like T-DX and TDISP, which will enable secure assignment of NICs, SSDs, and other accelerators to TEEs with minimal overhead. These developments, he argued, will make it possible to support confidential computing across entire AI data centers.

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Dr. Vaswani emphasized that hardware alone is insufficient—developers need accessible platforms. He described the emergence of confidential VMs, confidential containers, and cross-cloud initiatives like Kata Confidential Containers that let developers run unmodified workloads with end-to-end attestation-based guarantees.

Real-world adoption is accelerating. Large-scale applications such as Signal, WhatsApp, Apple's Private Cloud Compute, and secure multi-party compute platforms such as Azure CleanRooms actively rely on confidential computing for protecting sensitive data in use. Closer to home, India's own DEPA Training framework is pioneering privacy-preserving collaborative model training using these technologies.

Dr. Vaswani closed with emerging challenges: side-channel attacks, physical attacks on memory encryption, secure supply chains, and the need for rapid vulnerability detection and recovery through mechanisms like code transparency and secure build pipelines. He also shared the vision of the newly established SPARC Focused Research Organization, which aims to define the future of *confidential AI data centers*—where all workloads, cloud control planes, and even foundational services operate within verifiable confidential computing environments.

Through an expansive and detailed narrative, the talk underscored how confidential computing is shifting from niche technique to foundational infrastructure, poised to safeguard the next generation of AI-driven systems.

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# Talk: Designing Trustworthy Data Ecosystems: DPI Opportunities alongside DPDPA Implementation



**Gaurav Mehta**

Co-Founder & Chief Innovation Officer, Concur

In a dynamic and high-energy session, Gaurav Mehta unpacked the real-world challenges and emerging opportunities surrounding the implementation of India's Digital Personal Data Protection Act (DPDPA). Drawing on his deep experience at the intersection of blockchain, compliance, and digital governance, he described how India can transition from legal mandates to a practical, scalable consent management ecosystem.

Gaurav began by situating the audience in the current implementation timeline of the DPDPA. With draft rules released in early 2025 and over 7,000 public comments collected, the government is now shaping a techno-legal framework robust enough to function in a high-velocity digital economy. As one of the six entities selected by MeitY to operationalize consent management, his team at Concur has spent three years building systems that anticipate the complexities of real compliance—not merely its legal intent.

He argued that global privacy regimes, from GDPR to emerging regional laws, have struggled with operationalization. Even after nearly a decade, Europe continues to see inconsistent and incomplete adoption. India, therefore, must not only build regulations but design infrastructure that makes compliance practical, affordable, and automated. This includes standardizing notices, enabling real-time consent revocation, enabling machine-readable interoperability, and reducing the compliance burden for both large enterprises and small processors.

Central to his thesis is the transition from data control to data ownership. India's digital public

infrastructure (DPI) vision—exemplified by Aadhaar, UPI, Account Aggregators, and new protocol-driven ecosystems—provides a fertile foundation for a consent-driven data future. But the scale is unprecedented: billions of consent artifacts, thousands of processors, multilingual interfaces, and dynamic notices across touchpoints ranging from mobile apps to connected TVs.

Gaurav walked through the intricacies of DPDPA-mandated consent flows: issuance of standardized notices, capture of granular purposes, multilingual accessibility, downstream propagation of consent updates to processors, and near-real-time revocation. He highlighted the currently fragmented practices within organizations—manual emails, delayed updates, inconsistent purpose definitions—and warned that without shared infrastructure, compliance gaps will be inevitable.

To address these gaps, Gaurav introduced the DPDPA DPI Ledger, a decentralized metadata infrastructure built using blockchain principles. This layer, developed by Concur and aligned with MeitY's NCBI (National Blockchain Infrastructure) vision, enables:

- Interoperability across consent managers
- Machine-verifiable consent provenance
- Real-time downstream updates for processors
- Auditable trails for regulators and data protection boards
- Standardized consent purposes and data elements across sectors

By aggregating over 80,000 consent purposes and 200 frequently used data elements—now translated into 22 languages—Concur's consent directory helps eliminate vague or misleading purpose statements. Gaurav emphasized that standardized, transparent notices are essential for meaningful user choice and effective auditing.

He also positioned the ledger as a multi-stakeholder asset: data fiduciaries reduce vendor lock-in; processors gain a single point of validation; regulators receive market-wide compliance telemetry; researchers gain anonymized insights into data practices; and policymakers can ground decisions in empirical patterns rather than assumptions.

Looking ahead, he projected a future in which:

- consent management becomes automated and ambient,
- data processing increasingly shifts to edge environments,

- secure multiparty computation and trusted execution environments enable cross-entity collaboration without data exchange,
- identity provenance becomes integral across devices,
- and India's DPDP infrastructure could serve as a global reference model, much like UPI.

Gaurav concluded with a call to collective innovation. With other consent managers and ecosystem partners, Concur is working toward a shared, federated model—an SRO-like structure that holds standards, fosters competition, and democratizes compliance technology. As he put it, the next decade of privacy in India will require "Jaan Ke Do"—a willingness to build, standardize, and reinforce a system where data rights are not just legally guaranteed but technologically sustained.

# Talk: Towards Proactive Security in Critical Infrastructure



## Bapu S. Bindhumadhava

Centre Head, Power Grid Centre of Excellence in Cybersecurity

In his opening talk for the Privacy and Security for the Future of India track, Bapu S. Bindhumadhava set the stage with a comprehensive and grounded perspective on the rapidly evolving security landscape of India's critical infrastructure. Drawing on over three decades of experience spanning real-time systems, smart grids, and cyber-physical system security, he articulated why proactive, resilient, and intelligence-driven security architectures are now indispensable for national infrastructure.

Focusing specifically on the power grid, Bindhumadhava walked the audience through the structural complexity of modern electrical networks—now deeply intertwined with digital communication systems, AI-enabled control functions, and data-driven operational layers. With India already transitioning from Industry 4.0 to early paradigms of Industry 5.0 and 6.0, he emphasized that the cyber layer has become inseparable from the physical grid, creating new vulnerabilities and magnifying operational risks.

He outlined the unique dual-risk environment of power systems, where physical faults and cyberattacks often appear indistinguishable, turning the fault-versus-attack classification problem into a critical first step for securing grid operations. With increasing integration of renewable energy, distributed assets, and smart metering, he noted that grid data—whether in transit, at rest, or used for experimental modeling—has become a prime target for misuse, theft, and real-time manipulation.

Bindhumadhava provided a clear architecture of today's "smart grid," highlighting the interconnected data clouds spanning consumers, markets, transmission, distribution, and generation. He underscored the massive computational and storage demands required to operate modern power systems, noting that real-time control of the grid at scale can demand petaflop-level compute and zettabyte-scale storage ecosystems, making cybersecurity inseparable from high-performance computing.

Moving from present challenges to future directions, he

distinguished between retrofitted cybersecurity—where aged operational technology (OT) devices are patched or externally secured—and next-generation cyber-resilient architectures, which are autonomous, self-healing, and designed for continuous threat adaptation. This progression demands innovations in intrusion detection, policy-driven monitoring, advanced vulnerability modeling, and risk-aware mitigation strategies, especially as state-sponsored and coordinated attacks become increasingly sophisticated.

He also discussed emerging technologies such as homomorphic intrusion detection, federated SOCs, differential privacy, secure multiparty computation, trusted execution environments, and the potential—but still limited—role of blockchain. While acknowledging their promise, he emphasized the performance limitations and real-time constraints that challenge their adoption within critical infrastructure.

The talk concluded with an overview of ongoing initiatives at the Power Grid Centre of Excellence in Cybersecurity (PGCOE), which is actively building applied research capabilities, creating reference architectures, generating real-world grid datasets, and collaborating with academia, national labs, and industry. Their work focuses on the transmission segment—the lifeline of the national grid—where ensuring operational continuity and system resilience is paramount.

Through this talk, Bindhumadhava delivered a decisive message: future-ready security for India's critical infrastructure must move beyond protection toward resilience, grounded in intelligent monitoring, robust control systems, and collaborative research-driven innovation.

Below is a polished, proceedings-ready **talk summary** for Dr. Nishanth Chandran, written in the same tone and structure as your earlier Privacy & Security track articles. Once you share the **Bapu Bindhumadhava** transcript, I will produce the final summary and compile the entire track cohesively.

# Talk: Broad Overview of Privacy/Security Issues in the ML Space



## Dr. Nishanth Chandran

Senior Principal Researcher, Microsoft Research India

In a wide-ranging and thought-provoking session, Dr. Nishanth Chandran offered a panoramic overview of the rapidly evolving security and privacy challenges in modern machine learning. Framing his talk as “a session with more questions than answers,” he emphasized that while machine learning continues to reshape sectors from healthcare to finance, the privacy expectations, adversarial risks, and mitigation technologies are not yet fully understood at scale.

He began by underscoring a universal truth: everyone wants security and privacy, yet few can precisely articulate what these guarantees should mean in an ML context. Classical cryptography has thrived by rigorously defining what an attacker can and cannot do. ML systems, by contrast, handle massive, sensitive datasets across training and inference, involve multiple stakeholders, and behave in ways that often defy simple formalisation. As a result, both definitions and protections require new thinking.

Dr. Chandran outlined two broad categories of adversarial behaviour in ML systems:

### 1. Attacks on the Model and Training Data

These include:

- Data poisoning, where malicious parties introduce corrupted training data—sometimes subtly, such as imperceptible pixel modifications that cause a stop sign to be misclassified.
- Jailbreaks and prompt injection, where crafted prompts override model safeguards, enabling harmful or policy-violating outputs.
- Model extraction, where an attacker queries a model repeatedly to reconstruct a replica, effectively stealing the model's intellectual property.

Such attacks raise concerns not only about confidentiality but also integrity: a compromised model cascades risks across downstream systems.

### 2. Attacks on the Query

Here the threat is reversed: the model provider may seek to learn sensitive information from user queries or repurpose them for fine-tuning. For inference-as-a-service systems, this raises critical questions—does the service provider see your data? Can your queries be used to retrain the model? Should they?

To address these diverse challenges, Dr. Chandran discussed four major classes of privacy-enhancing technologies (PETs), stressing that no single PET offers complete protection; robust ML systems require carefully composed combinations.

#### 1. Differential Privacy (DP)

DP helps ensure that a model cannot reveal whether any particular individual's data was used in training, by injecting mathematically calibrated noise during learning. While foundational, DP introduces a well-known privacy–utility trade-off: more noise strengthens privacy but reduces accuracy. Dr. Chandran noted that achieving the right balance is both mathematically grounded and empirically driven, depending on the task.

## 2. Confidential Computing & Cryptographic Techniques

He described two broad approaches to secure computation:

- Hardware-based protections (e.g., confidential computing TEEs)—covered in detail in Kapil Vaswani's talk—that isolate computation in secure enclaves.
- Cryptography-based approaches, such as secure multiparty computation and homomorphic encryption, which allow computation on encrypted data without revealing inputs.

These tools enable powerful use cases:

- secure medical inference where hospitals keep patient data encrypted at all times,
- private model evaluation (“benchmarking without revealing datasets”),
- cross-organizational ML training where competitors contribute data without seeing each other's records.

Dr. Chandran highlighted *Easy Secure MPC*, a library from his group that makes such techniques more accessible, demonstrating real deployments in radiotherapy planning and medical model evaluation.

## 3. Access Control Across the ML Pipeline

He emphasized that access control must apply not just to data owners but to all participants in the ML lifecycle. For example, when replying to an email using an AI agent, the agent must not leak information that the sender is not authorised to receive—even unintentionally through prompt injection. This principle is central to enterprise-grade systems like Microsoft's Copilot Tuning.

## 4. Federated Learning (FL)

While often mischaracterised as a PET, Dr. Chandran clarified that FL does not inherently provide privacy. It merely reduces the amount of information exchanged. Real guarantees emerge only when FL is combined with DP, secure computation, or confidential computing. Still, FL's efficiency and distributed design make it a powerful building block for multi-entity training.

Toward the end, he pointed to emerging areas not covered in detail:

- synthetic data, which may offer privacy-preserving alternatives to real data;
- the interplay between emerging regulation and technology, where formal guarantees may eventually be mandated for deployment.

In closing, Dr. Chandran reminded the audience that while the space is rich with opportunity, it is equally filled with unanswered questions—both scientific and practical. Creating secure, privacy-preserving AI systems will require deep interdisciplinary work, careful composition of technologies, and policy frameworks aligned with technical realities.

## Presentations: Examples of Indigenous Innovation

This session highlighted diverse examples of indigenous innovation emerging from India's public health, agriculture, and governance sectors—each reflecting how local ingenuity and context-driven design can deliver global impact.



Dr. Sharan Murali, *Scientist C, ICMR–National Institute of Epidemiology*, presented the *Aadhaar Portal (Advanced Data Analytics for Public Health Action and Research Venture)*—an initiative developed in collaboration with the CDPG. The platform seeks to transform fragmented public health data into actionable “epidemic intelligence.” Dr. Murali demonstrated how integrating datasets from India's disease surveillance programs, viral research networks, and outbreak records can enable predictive modeling for disease prevention. Through standardized ontologies (SNOMED CT and FHIR) and no-code AI analytics, Aadhaar offers an interoperable data exchange that simplifies analysis for field epidemiologists. The system also incorporates automated report generation, anonymization, and chatbot-assisted query features, empowering health workers with accessible, privacy-compliant data tools for rapid response.



Vikas Kanungo, *Global AI Strategist, World Bank*, discussed national and state-level initiatives fostering indigenous digital innovation, especially in agriculture. He highlighted the Maharashtra State AI Policy for Agriculture—India's first domain-specific AI policy with a ₹500 crore budget—aimed at creating a statewide *Agri Data Exchange*, AI labs in agricultural universities, and digital public goods for the farming ecosystem. Kanungo showcased “Mahavistar”, a Marathi–English AI chatbot providing hyper-local agricultural advice based on soil, weather, and land data curated by universities. He also introduced the concept of “Agri-Verse”—a digital ecosystem

(beyond platforms) enabling startups, researchers, and public agencies to collaboratively build AI applications using shared data, GIS engines, and visualization tools. These initiatives, supported by the World Bank and partners such as NVIDIA and Microsoft, exemplify India's shift from technology adopters to innovation contributors in the global AI landscape.



D. Chakrapani (IAS, Retd.), *Former Director General, AP HRDI and Advisor, S2Tech*, drew from his work with the Centre for Innovations in Public Systems (CIPS) to illustrate grassroots models of social and technological innovation. He shared documented cases such as:

- The Aravind Eye Care System, which localized lens manufacturing, reduced cataract surgery costs from 10,000 to 100, and pioneered tele-ophthalmology networks serving rural India;
- The Mahatma Gandhi Institute of Medical Sciences (Wardha) model integrating *medical education with community health practice*;
- The development of plastic roads by *Vasudevan Rajagopalan* (“Plastic Man of India”); and
- Adoption of eco-san toilets and biodigesters for waste management and sanitation. Chakrapani emphasized how data-driven governance and informal data-sharing networks during COVID-19 further exemplified indigenous innovation in crisis response, underscoring the importance of institutionalizing data collaboration across sectors.

Collectively, the session demonstrated India's capacity to design *contextually relevant, scalable, and inclusive innovations*—grounded in public value, interdisciplinary collaboration, and the creative use of indigenous knowledge.

## Panel Discussion: Indigenous Innovation for Future

### Moderator



**Dr. Kapil Vaswani**  
Head,  
SPARC-FRO, FSID

### Panellists



**Dr. Amit Sharma**  
Microsoft  
Research India



**Prof. Gurumurthy**  
Head, Foundation for  
Science, Innovation and  
Development, IISc



**Dr. Nishant Chadha**  
Director of Policy  
Research, Indian School  
of Business, Hyderabad



**Srinivas Kadaba**  
Center for Brain  
Research, IISc

The panel “*Indigenous Innovation for the Future*” brought together researchers, policymakers, and industry leaders to explore pathways for fostering innovation rooted in India’s unique socio-economic and scientific context. Dr. Amit Sharma opened by reflecting on conducting research with limited resources and lower talent density compared to global hubs. Drawing from his experiences in causal inference and mental health applications, he emphasized focusing on “*peripheral problems*”—areas overlooked by global research centers but of high local impact—such as developing standardized verification platforms and culturally attuned mental health technologies.

Prof. Gurumurthy outlined the IISc’s initiatives under the Foundation for Science, Innovation, and Development (FSID), which engages industry, supports deep-science startups, incubates SMEs, and drives translational research. His examples—from quantum technology to gallium nitride fabrication and rural livelihood programs—demonstrated how academia-industry collaborations can enable indigenous technological capacity and inclusive innovation.

Dr. Nishant Chadha offered a critical economic perspective on defining “indigenous innovation.” He questioned whether innovation should be measured by ownership, capacity building, or economic

retention within India. Presenting patent data, he noted India’s growing but uneven innovation geography, stressing that commercialization, not just discovery, defines innovation. He argued for greater private-sector participation, competition, and investment in higher education to enhance innovation density and sustainability.

Srinivas Kadaba shared insights from the Center for Brain Research, highlighting how philanthropy and interdisciplinary collaboration—such as Kris Gopalakrishnan’s funding of neurodegenerative research—demonstrate indigenous models of innovation driven by altruism rather than profit. He underscored the importance of integrating traditional and indigenous knowledge systems into modern science, and of scaling India’s “jugaad” mindset into sustainable scientific innovation.

In closing, the panelists agreed that India’s innovation ecosystem must balance *discovery*, *commercialization*, and *social relevance*. Key enablers include patient capital, risk tolerance, private research institutions, and mission-driven national programs. True indigenous innovation, they concluded, will emerge not by imitating global models but by solving India’s problems at India’s scale.

# Panel Discussion: Impact of Privacy and Security as a Fundamental Right (DPDP) on Indian Innovation

## Moderator



**Shalabh Jain**

Head - Security & Privacy, CDPG

## Panellists



**Fasihullah Askiri**

Principal Architect, Swiggy



**Dipanjan Dey**

Assistant Professor, School of Earth, Ocean and Climate Sciences



**Utkarsh Srivastava**

CEO, Securelytix



**Yashu Bansal**

Assistant Professor, Manipal Law School

The panel discussion explored the implications of India's Digital Personal Data Protection (DPDP) Act, 2023, on privacy, innovation, and business practices within the country's growing digital ecosystem. Framed as India's response to global data protection frameworks such as the EU's GDPR, the DPDP Act establishes privacy as a constitutional and fundamental right, while introducing new obligations for data fiduciaries regarding consent, data minimization, and grievance redressal.

Panelists represented diverse sectors—finance, technology, academia, and industry—including HDB Financial Services, Manipal University, Securelytix, and Swiggy. Discussions highlighted that although enforcement of the DPDP Act is pending, organizations are proactively preparing through data discovery, privacy impact assessments (DPIAs), and the creation of data governance structures. Emphasis was placed on the need for “privacy by design,” pragmatic engineering solutions, and internal awareness programs to cultivate responsible data handling practices.

A recurring theme was the balance between protecting individual rights and sustaining innovation. Speakers cautioned that stringent data compliance could pose short-term burdens for startups and small enterprises, though most agreed that structured privacy measures ultimately enhance trust and long-term competitiveness. The conversation also addressed challenges in informed consent, dark patterns in digital interfaces, anonymization standards, healthcare data exemptions, and the unique realities of India's digital literacy and socio-economic diversity.

Panelists concluded that the DPDP framework, while evolving, marks a transformative shift toward responsible data governance in India. Its successful implementation will depend on awareness, capacity-building, and regulatory clarity that supports both citizen rights and technological innovation.

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