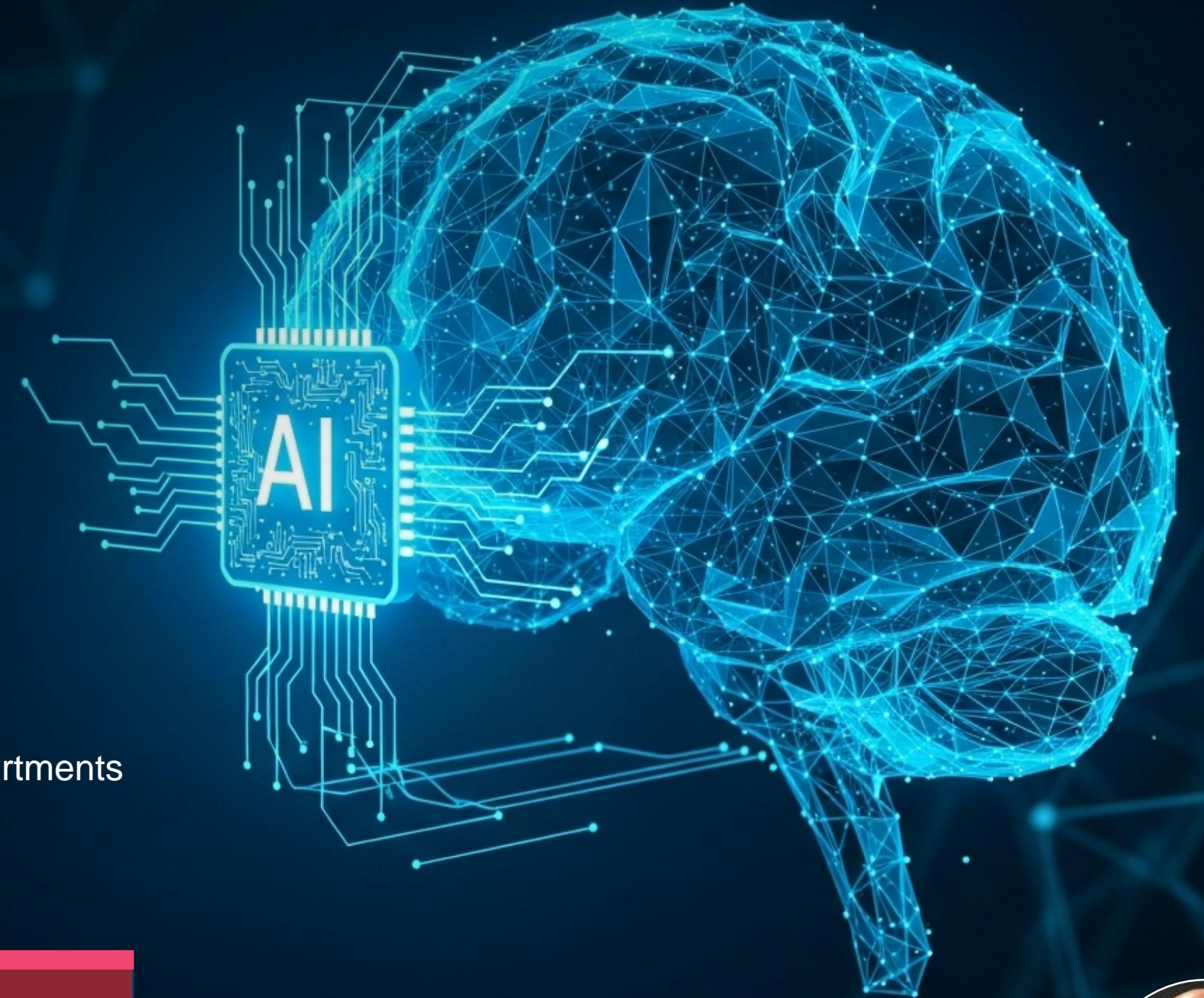


AI & Frontier Technologies in Public Administration

From Understanding to Impact —
A Framework for Group-I Officer Trainees



Government of Telangana · Foundation Course 2024 · 215 Officer Trainees · 12 Departments

Part 1

What Is AI?

Part 2

AI in Your Department

Part 3

Opportunities &
Responsibilities

Dr. B.V.R. Mohan Reddy,
Founder-Chairman, Cyient Ltd
Chairman, BoG, IIT Hyderabad



PART 1

What Is AI & Frontier Technology?

The journey from abacus to intelligence — explained simply

AI Did Not Appear Overnight — Four Rivers Merged

Computing Power

Computers shrank from room-sized machines to smartphones in your pocket. Today's smartphones are a million times more powerful than the computers that sent Apollo to the moon.

Communication

The internet connected 5 billion people. Data that once took weeks to travel across the world now crosses in milliseconds. This gave AI a nervous system.

Sensors & Data

Satellites, phones, CCTV, health devices, weather stations. Every day, 2.5 quintillion bytes of data are generated. This gave AI eyes, ears, and memory. AI learns from Data as humans learn from experience.

Algorithms

Mathematics + statistics + pattern recognition. Researchers found ways to teach machines to learn from examples — not rules. This gave AI the ability to think.

From Rule Books to Learning Machines (where AI came from)

Rule-Based AI

Programmers wrote every rule manually. Computers could play chess — but only what they were told.

1950s–70s

Expert Systems

AI mimicked human experts in narrow fields — medical diagnosis, oil exploration. Useful, but brittle.

1980s–90s

Machine Learning

Instead of rules, machines learned from data. Email spam filters, Netflix recommendations, fraud detection.

2000s–10s

Foundation Models

ChatGPT, Gemini, Copilot. AI that writes, codes, diagnoses, translates — and keeps getting better.

2020s→

You are joining the civil service at the most consequential inflection point in the history of technology.

How Does AI Actually Work? A Simple Stack

Your Question or Task

You type, speak, or upload data. The AI receives your input.

Large Language / Foundation Model

Vast data — books, web pages, images, code, with billions of connections, used for training. It finds patterns and generates a response.

Training Data

Millions of examples the model learned from. Quality of training data determines quality of AI.

Computing Infrastructure

Thousands of specialized chips (GPUs/TPUs) running simultaneously. India is building this.

Mathematics & Statistics

Linear algebra, probability, calculus. The same maths taught in engineering colleges — amplified.

Like a pyramid — every upper layer depends on the strength of what's below it.

AI Is One Piece. Here Is the Wider Picture.

AI & Machine Learning

Machines that learn from data, recognise patterns, make decisions. The engine of the modern technology revolution.

Internet of Things (IoT)

Billions of sensors — in fields, roads, hospitals, homes — sending real-time data. The eyes and ears of governance.

Blockchain

Tamper-proof digital records. Land registrations, certificates, welfare payments that cannot be falsified or disputed.

Geospatial & Remote Sensing

Satellites and drones mapping every inch of Telangana. Crop health, encroachment, flood risk — seen from space.

Cloud & Edge Computing

Storing and processing data wherever it's needed — in a data centre or directly at a village-level device.

Cybersecurity

Protecting government systems, citizen data, and critical infrastructure from digital threats and attacks.

What Is Coming in the Next 5 Years

01 Autonomous AI Agents

AI that doesn't just answer questions — it takes actions. Booking appointments, filing compliance reports, flagging anomalies — without being asked every time.

02 AI in Every Device

Intelligence at the edge — in a panchayat kiosk, a PHC tablet, a field officer's phone. No internet required. Decisions in real time, anywhere.

03 Generative AI for Government

Documents drafted, policies summarised, budgets analysed, citizen queries answered — in Telugu, Hindi, English — by AI working alongside officers.

04 Digital Twins of Cities

A complete virtual model of a district — every road, pipe, building, population movement. Simulate policy impact before implementing it.

PART 2

AI in Your Department

What these technologies mean for the work you will do every day — across all 12 departments

Meet Lakshmi — and the System That Failed Her

Lakshmi · Nalgonda · 2023

Her crop failed. She was entitled to insurance compensation.

- 11 months of waiting
- 4 trips to the district office — 12 km each way
- Needed an NGO just to navigate the system
- Lost an entire sowing season

She was not asking for a favour.

She was asking for what the government had already promised.

VS

Lakshmi · Nalgonda · 2027

Same crop failure. But the system is redesigned.

- Satellite AI flags crop stress 3 weeks before harvest
- MPDO's dashboard shows her village at risk
- Pre-approved claim auto-triggered on field assessment
- Compensation in Jan Dhan account within 72 hours

She never visits a single office.

The system came to her — in Telugu, on a basic phone.

Every Department. One Transformation.

PR & RD

MGNREGS smart verification ·
Satellite asset mapping

Audit

Continuous AI audit · Anomaly
detection in real time

Treasury

Real-time fraud surveillance · Auto-
reconciliation

Health

Disease surveillance · PHC stock
prediction

Employment

Skill-gap matching · Predictive
placement

Tribal Welfare

Integrated entitlement dashboard ·
Dropout alerts

Social Welfare

Scholarship fraud detection ·
Pension de-duplication

Labour

Risk-based inspection · Wage
surveillance

Registration

Document fraud AI · Smart
encumbrance check

Panchayat

Works completion verification ·
Fund tracking

Revenue

Land record automation · Disaster
crop assessment

Finance

Budget utilisation modelling · Spend
analytics

Panchayat & Rural Dev · Audit · Treasury



MPDO — Panchayat & Rural Dev

Mandal Parishad Development Officer

▶ Smart MGNREGS attendance

Facial recognition on tablets ends proxy muster rolls. Wage credit tied to verified presence — saving crores.

▶ Satellite asset verification

Drone & satellite imagery confirms pond, road, check dam completion without physical site visits.

▶ Wage delay dashboard

Predictive alerts flag panchayats at risk of payment delays before the cycle closes — officers intervene early.

▶ Telugu crop advisory bots

PM-KISAN registered farmers receive personalised soil, weather, and crop advisories in Telugu on basic phones.



Audit Department

Assistant Audit Officer

▶ Continuous real-time audit

Every transaction monitored as it flows — not 18 months later. Duplicates, round-tripping, timing spikes caught instantly.

▶ AI anomaly detection

ML models flag unusual payments — same vendor, same amount, same day — before money leaves the system.

▶ Risk-scored auditee list

High-risk drawing officers, departments, and geographies ranked automatically — prioritise field time where it matters.

▶ Auto-draft audit observations

NLP generates draft observations from flagged transaction data — officer reviews and signs, not writes from scratch.



Treasury

Assistant Treasury Officer

▶ Pre-disbursement fraud screen

Every payment instruction evaluated against a live fraud model before funds leave. Unusual patterns blocked for review.

▶ Automatic D&D reconciliation

Drawing and disbursement registers reconciled daily by AI — zero manual ledger matching, exceptions surfaced instantly.

▶ Cash flow prediction

Predict which departments will exhaust budget allocations months ahead. Reappropriations planned, not scrambled for.

▶ Dormant account alerts

AI identifies dormant welfare accounts and unclaimed amounts for follow-up — reducing fiscal leakage across schemes.

Medical & Health · Employment · Tribal Welfare



Medical & Health

Administrative Officer (M&H)

▶ Disease surveillance AI

HMIS data analysed for dengue, malaria, and TB clusters in Telangana mandals — weeks before formal outbreak declaration.

▶ PHC stock prediction

Drug consumption patterns predict shortfalls at primary health centres — ORS, iron tablets, vaccines restocked before depletion.

▶ Neonatal risk scoring

ASHA workers receive weekly ranked lists of high-risk pregnancies in their caseload — based on weight, visit history, and outcomes.

▶ Teleconsult routing

Sub-centre patients triaged by AI symptom checker and routed to appropriate specialist level — reducing unnecessary transfers.



District Employment

District Employment Officer

▶ Skill-gap analytics

Registered job seekers' profiles matched against real-time industry demand across Telangana's industrial corridors and IT parks.

▶ Personalised placement paths

AI recommends specific ITI course and institution for each candidate based on actual placement records of previous cohorts.

▶ Employer alert integration

Registered employers auto-notified when matching candidates become available — reducing time-to-hire for MSMEs.

▶ Ghost registration detection

Aadhaar-linked de-duplication across employment scheme databases — identifying fraudulent registrations and fake beneficiaries.



Tribal Welfare

District Tribal Welfare Officer

▶ Integrated entitlement view

Single dashboard: every tribal beneficiary, every scheme — hostels, scholarships, forest rights — one screen across 9 tribal districts.

▶ School dropout prediction

Attendance patterns and family stress indicators predict dropout risk 4–6 weeks before a child actually leaves school.

▶ Hostel nutrition monitoring

Automated alerts when hostel attendance, meal records, or weight data indicate irregularities — early welfare intervention.

▶ Forest land rights tracker

ML models map encroachment patterns on tribal land — evidence for legal action before disputes escalate to courts.

Social Welfare · Labour · District Registration



Social Welfare

Social Welfare Officer

▶ Scholarship fraud detection

Cross-references enrolment, attendance, and bank data — flags students simultaneously enrolled in multiple colleges.

▶ Pension leakage prevention

Detects accounts where pension is disbursed but no other banking, ration, or healthcare activity exists — flags deceased beneficiaries.

▶ Scheme entitlement chatbot

Telugu-language chatbot answers citizen queries on SC/BC scheme eligibility — available 24x7 without officer intervention.

▶ 12-scheme de-duplication

Aadhaar-linked de-duplication scans across all social welfare schemes simultaneously — one click, zero manual cross-checking.



Labour Department

Assistant Commissioner of Labour

▶ Establishment risk profiling

ML ranks factories, construction sites, and mills by violation probability — inspectors deployed to highest-risk units first.

▶ Cluster exploitation detection

Complaint pattern analysis identifies systemic wage theft across industrial clusters — enabling structural action, not just case-by-case.

▶ Wage payment surveillance

PF and ESI data monitored for delayed or underpaid wages — alerts generated before the payment window closes.

▶ Worker grievance portal

Telugu and Hindi chatbot for unorganised sector workers to log complaints via voice — without a written complaint.



District Registration

District Registrar

▶ Document fraud detection

AI compares submitted property documents against originals in IGRS database — forged stamps, altered signatures caught at the counter.

▶ Instant encumbrance certificate

EC generation in minutes rather than days — AI searches all registered transactions on a property and consolidates automatically.

▶ Market value benchmarking

Circle rate validation using actual IGRS transaction data — reducing under-valuation disputes and stamp duty evasion.

▶ Disputed property alert

AI flags properties with pending court orders, mutation disputes, or active litigations before registration is processed.

Panchayat Officers · Revenue & Land · Finance & Budget



District Panchayat

District Panchayat Officer

▶ Works completion photo AI

Field officer submits geotagged photo — AI compares against approved design and previous site images. No false completion certificates.

▶ Satellite asset monitoring

Roads, drains, community halls verified by satellite imagery — deterioration alerts triggered within months of construction.

▶ Fund utilisation dashboard

Real-time GP-wise budget tracking with automatic deviation alerts — underspend and misallocation visible before year-end panic.

▶ Tax defaulter recovery

AI identifies property tax defaulters, auto-generates notices, and tracks recovery — replacing manual registers across 12,769 GPs.



Revenue & Land Records

Revenue / Dharani / Land Administration

▶ Dharani mutation automation

Aadhaar-linked record updates — pattadar passbooks, mutations, and encumbrance linkages processed in real time, not months.

▶ Satellite crop loss assessment

Pre/post-disaster satellite comparison replaces manual crop surveys — faster, objective, and tamper-resistant compensation triggers.

▶ Land dispute prediction

ML models flag plots with elevated litigation risk based on historical dispute, ownership complexity, and survey inconsistency.

▶ Instant certificate issuance

Income, caste, and residence certificates auto-issued from verified Aadhaar and revenue data — no manual verification queue.



Finance & Budget / GAD

Finance Officer / General Administration

▶ Budget utilisation prediction

Identify which departments will underspend or overshoot months before year-end — reappropriations planned, not scrambled.

▶ Expenditure anomaly alerts

AI flags unusual departmental claims, round-number contingency withdrawals, and late-year spending spikes for officer review.

▶ Policy file intelligence

Relevant precedents surfaced, technical annexures summarised, financial implications flagged — better notings in less time.

▶ Real-time district dashboards

District collectors access live expenditure analytics across all departments — enabling evidence-based resource reallocation.

Your Role Does Not Disappear — It Transforms

AI does the counting. You do the judging. AI surfaces the information. You make the decision. AI handles the routine. You handle what matters most.

— The Officer's New Compact with Technology

BEFORE

Manual data entry & form processing



AFTER

Exception management & quality oversight

BEFORE

Reactive complaint handling



AFTER

Predictive citizen service before complaints arise

BEFORE

Annual inspections & periodic audits



AFTER

Real-time risk monitoring & continuous assurance

BEFORE

Physical verification of every record



AFTER

AI-assisted verification with human sign-off

The only test that matters:

Does it reach Lakshmi?

01 Works in Telugu

Every citizen-facing AI system must function in Telugu as its primary language — not as a translation afterthought.

02 Works offline

Mandal-level connectivity is unreliable. Edge-capable systems are the architecture for rural Telangana.

03 Built with users

ASHA workers, MPDOs, gram sachivs — build systems with them, not for them. Their context determines adoption.

PART 3

Opportunities, Responsibilities & The Road Ahead

What this means for Telangana — and for you as an officer

India's Digital Foundation Is Already Built

Intelligence Layer — AI/ML/Analytics

What we build now on top of everything below

ABDM · ONDC · Account Aggregator

Domain-specific digital rails for health, commerce, finance

UPI · DigiLocker · CoWIN · UMANG

Transaction, identity, and service infrastructure

Aadhaar — Universal Digital Identity

1.4 billion citizens on one verifiable identity stack

17B+

UPI transactions
per month

1.4B

Aadhaar enrolled
citizens

550M+

Ayushman Bharat
enrolments

100M+

DigiLocker
documents stored

The Four Transformations AI Makes Possible



Service Delivery 24x7

Citizens access government in their language, on a basic phone, at any hour. Permits, certificates, entitlements — without queuing, without intermediaries.



Predictive Governance

AI sees crop stress, flood risk, disease clusters weeks before a crisis emerges. Governance shifts from response to anticipation.



Policy Intelligence

Policy proposals analysed for fiscal impact, beneficiary reach, and unintended consequences — before they are notified.



Amplifying Frontline Workers

Every ASHA worker, village officer, and MPDO with a real-time decision-support tool — not a dashboard they ignore, but a nudge in their hand.

Power Comes with Responsibility — Four Rules



Watch for Algorithmic Bias

An AI trained on old data will reproduce old inequalities. Always ask: who does this system underserve? Test outcomes across gender, caste, geography.



Ensure Explainability

Every AI-driven government decision must be explainable to the citizen in plain language. 'The algorithm decided' is not an acceptable answer.



Protect Privacy

The DPDP Act 2023 is law. Citizen data you access for one purpose cannot be used for another without consent. Data protection is an officer's duty — not IT's.



AI Advises — You Decide

In every high-stakes decision — welfare eligibility, inspection outcomes, land disputes — a human officer makes the final call and carries accountability.

The Real Test: Can It Reach the Last Mile?

If our technology works in Hyderabad but not in Hanamkonda, in English but not in Telugu, online but not offline — we have not solved the problem.

— The Last-Mile Standard

01 Telugu First

Every citizen-facing AI system must work in Telugu — not as a translation, as the primary design language.

02 Voice & Low-Literacy

Many citizens cannot read. Voice interfaces and visual prompts are not optional features — they are the interface.

03 Offline Capability

Mandal-level connectivity is unreliable. AI systems must function with intermittent internet through edge computing.

04 Co-designed with Users

Build systems with ASHA workers, MPDOs, and frontline staff — not just for them. They know what actually works.

What You Can Do — Starting in Your First Posting

Ask the AI question

For every process in your department, ask: which part of this is repetitive, rule-based, or data-intensive? That is where AI can help.

Demand explainability

When AI-generated outputs are presented to you, ask how the system reached that conclusion. You are accountable — so you must understand.

Protect citizen data

Know what data you have access to, why you have it, and what you are permitted to do with it. The DPDP Act makes this a legal obligation.

Champion the last mile

Push back on technology designs that only work for English-literate urban citizens. Your mandate is the entire population of your district.

Keep learning

The tools will change faster than any training programme can track. Curiosity and critical thinking are your most durable professional assets.

Stay the human in the loop

Technology amplifies your capacity. It does not replace your judgement, your empathy, or your accountability to the citizen.

Lakshmi - 2030 - What You Will Have Built

01 Crop stress flagged 3 weeks early

A satellite-AI system, deployed by the Agriculture department, alerts her MPDO. She is notified by a voice message in Telugu.

02 Assessment is automated on-site

Her Panchayat Officer uses a mobile app for geo-tagged field verification. No manual survey. No travel to a district office.

03 Compensation triggers automatically

Pre-approved by the Treasury Officer's AI-monitored system. Jan Dhan disbursement within 72 hours of assessment.

04 The system came to her

She made zero trips to any office. It happened in Telugu. On a basic phone. Built by officers like you, for citizens like her.

You are not just learning about AI.

**You are the generation of officers
who will deploy it.**

215 officer trainees. 12 departments. Across every district of Telangana.
You are the last mile — and the first line of the AI era in public service.

Build with integrity. Serve with technology. Decide with humanity.

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THANK YOU