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Astraios Software

A White Paper by Astraios Health Intelligence

A STRATEGIC CASE FOR AI-DRIVEN DIAGNOSTIC UNIFICATION IN INDIAN HEALTHCARE

From Fragmentation to Intelligence

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Executive Summary

Indian healthcare's most consequential failure is not clinical — it is architectural. Diagnostic data generated at scale across radiology and pathology is neither retained longitudinally nor synthesised across modalities, rendering the system structurally incapable of early-signal detection at population scale. This paper argues that AI's primary value in this context is not workflow acceleration but information unification — and that the economic and clinical case for building this infrastructure layer is both urgent and commercially viable. Astraios is building that layer, entering at the most defensible point in the system: clinical diagnostics.

1. Introduction: The Structural Failure at the Core of Indian Diagnostics

Indian healthcare produces clinical data at significant and growing scale. India's diagnostic imaging market was valued at approximately USD 1.7 billion in 2023, expanding at a compound annual growth rate above 13%. Yet the output of this activity — scans, reports, pathology slides, lab results — is systematically fragmented across institutions, inaccessible across time, and delivered to patients in a form that forecloses informed decision-making.

The consequence is a system that consistently intervenes late. Roughly 70 to 80 percent of aggregate healthcare expenditure concentrates at crisis-point events: late-stage oncology, acute cardiac intervention, sepsis management, and ICU admissions. This is not primarily a treatment capability deficit. It is a detection-timing failure — one that existing infrastructure was never designed to solve, and which AI, applied correctly, is now positioned to address.

The best achievable outcome is a shift in the system's intervention point: from crisis management toward early-signal detection, enabled by longitudinal, multi-modal diagnostic intelligence accessible to clinicians, patients, and insurers simultaneously.

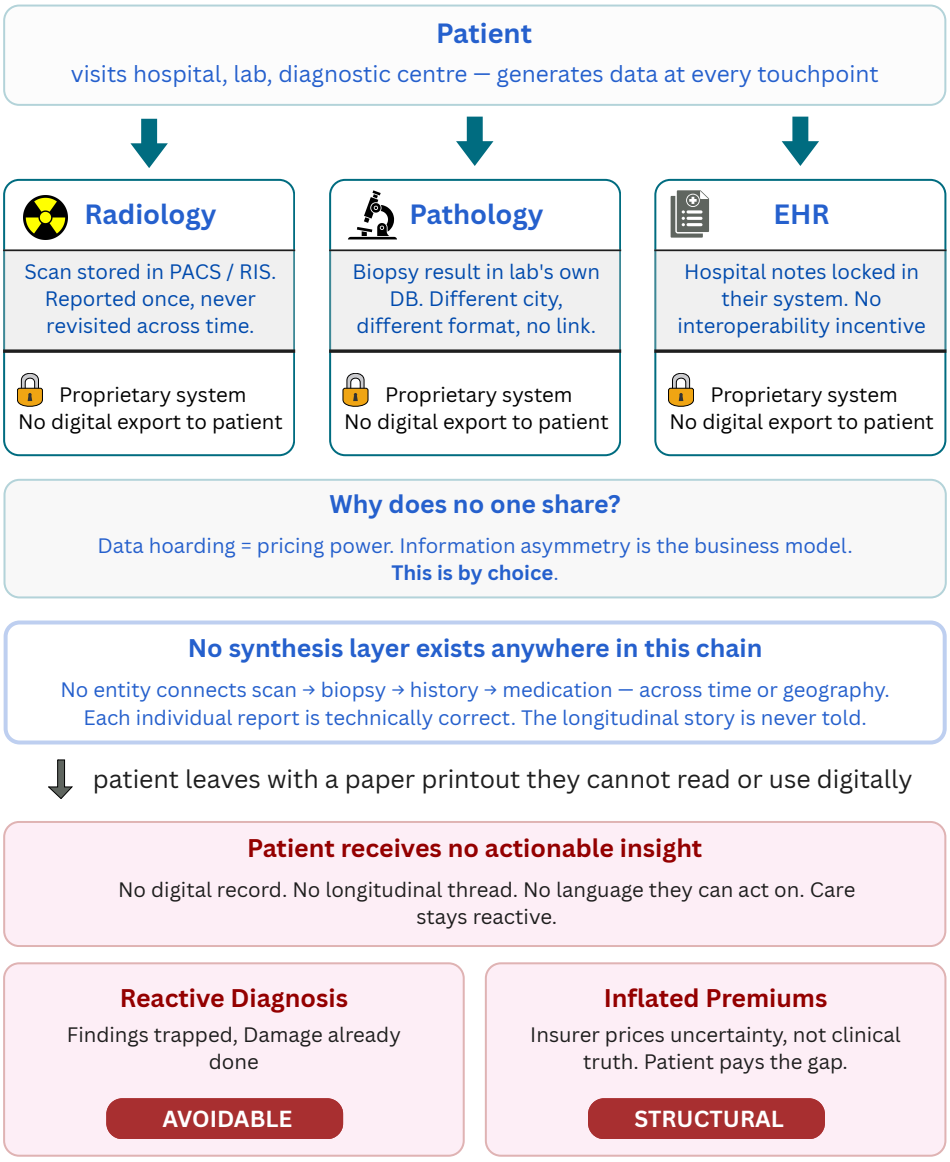
2. Backdrop: A Market Defined by Structural Tension

The supply constraint is acute. India has approximately 20,000 practising radiologists serving a population of 1.4 billion — a ratio of roughly 1 per 70,000 against a WHO-recommended benchmark of 1 per 10,000. Diagnostic volume is growing faster than specialist supply can correct, and no credible workforce expansion scenario closes this gap within a decade. Healthcare AI implementation has crossed 50% of organisations globally — the technology is no longer being evaluated, it is being operationalised." (McKinsey, Q4 2025)

The patient population is structurally unprotected. Over 500 million Indians lack meaningful health insurance coverage. Within this group, three distinct vulnerability layers exist: the urban uninsured, who bear full out-of-pocket costs for standard care; the semi-urban and rural population, who face compounded disadvantage through provider scarcity and information opacity; and the elderly population above 70, for whom private health insurance is either unavailable or priced beyond access. For these segments, the cost of the same clinical procedure varies significantly depending not on clinical complexity but on the patient's negotiating position — a function entirely of information access and institutional backing.

The insurer-hospital dynamic is adversarial and structurally unresolved. Group health insurance premiums have risen sharply, driven by claims inflation that insurers attribute partly to hospital over-servicing and unnecessary repeat diagnostics. Hospitals counter that insurance networks undervalue clinical services. Neither party currently has access to longitudinal, multi-modal clinical data sufficient to resolve the dispute on evidentiary grounds. The result is a pricing environment characterised by friction, opacity, and persistent inefficiency. Neither party currently has access to the longitudinal data needed to resolve this on evidentiary grounds — a gap that AI-driven diagnostic unification is now structurally positioned to close.

The diagnostic support layer — radiology and pathology — is commoditizing. Priced as a transactional fixed cost within the broader care episode, both disciplines generate the richest raw clinical signal in the system while capturing minimal strategic value from it. AI presents these disciplines not as a threat but as a structural opportunity to move from commodity transaction to intelligence function.



The data exists. It is trapped — not missing. Fragmentation is not a failure of technology. It is a feature of the incumbent model.

3. The Solution: An Intelligence Layer, Not a Faster Workflow

The dominant positioning of AI in clinical diagnostics — as a tool for accelerating report generation — addresses a real operational constraint but misidentifies the structural opportunity. Workflow speed is a productivity argument. The more significant business proposition is information architecture. Healthcare organisations implementing AI with defined use-case architecture achieve $3.20 return per $1 invested within 14 months — the infrastructure bet has an established return profile." (2025)

The core hypothesis is this: if radiology and pathology data were retained longitudinally, synthesised across modalities, and made accessible in structured form to clinicians, patients, and risk analytics platforms simultaneously, the system's behaviour would change at three levels. Clinical decisions would benefit from assembled ground truth rather than isolated snapshots. Patients would gain the informational capacity to navigate care and associated financing decisions with agency. Insurers would gain the evidentiary infrastructure to engage hospitals on clinical grounds.

This is not a technology pitch. It is a market structure argument. The financial services analogy is instructive: the transition from bank-controlled financial information to consumer-accessible data did not happen because banks innovated willingly. It happened because consumer-facing platforms built the intelligence layer that made fragmentation untenable. The healthcare parallel is structurally identical — and the entry point is diagnostics.

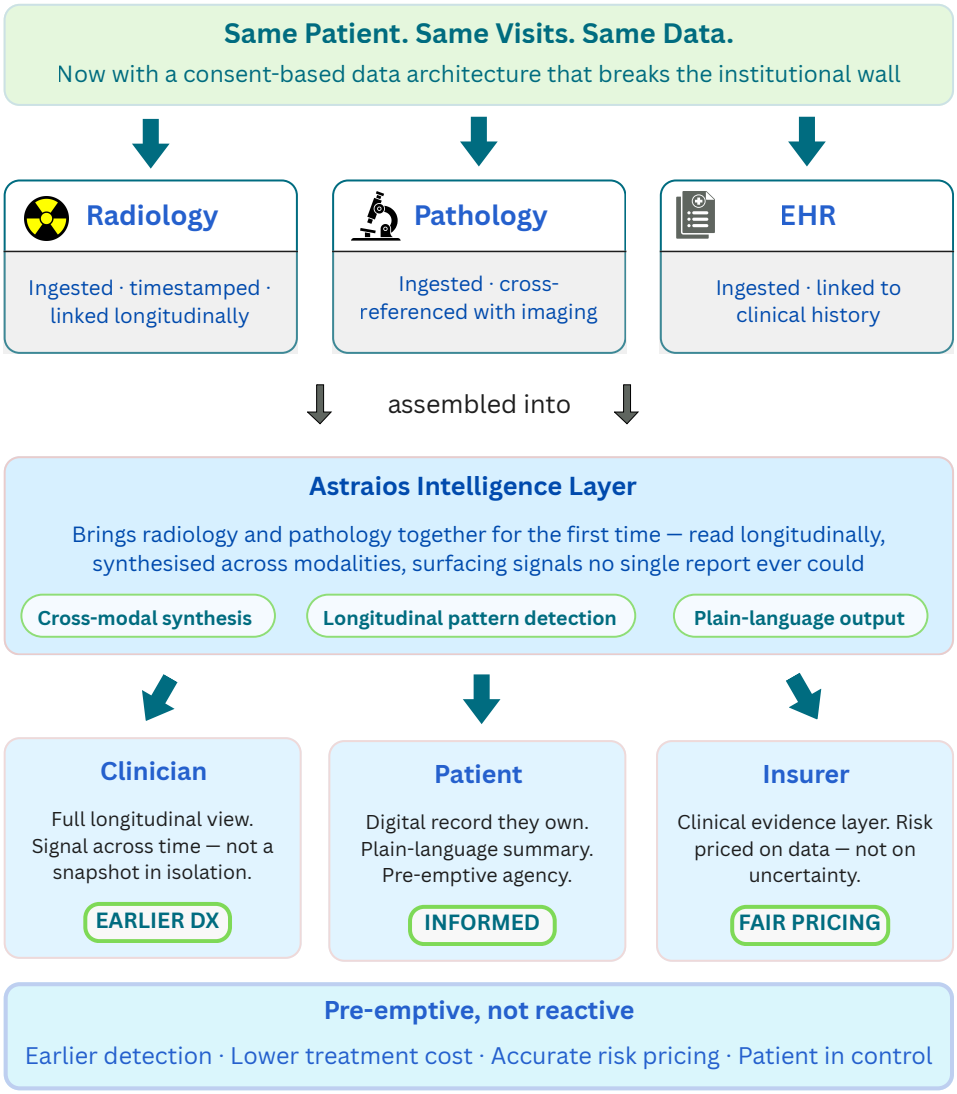
4. The Astraios Platform: Architecture for Unification

Astraios is building the AI intelligence layer that unifies fragmented diagnostic data into longitudinal, multi-modal patient records — with structured outputs flowing to three beneficiary groups simultaneously.

For clinicians: A combined radiology-pathology reporting layer that synthesises imaging findings and histopathological data for the same patient within a single structured output — enabling diagnostic convergence that neither discipline produces in isolation.

For patients: A plain-language summary of diagnostic findings, generated from the same inference pipeline, delivered in English and regional Indian languages. This output includes likely clinical implications, recommended follow-up pathways, and approximate cost ranges — enabling patients to navigate health and financial decisions with informed agency for the first time.

For insurers: A longitudinal claims-intelligence layer that surfaces cross-modal clinical patterns within consented, de-identified patient populations — providing the evidentiary basis for actuarially sound, clinically grounded negotiations with provider networks. India's healthcare AI market is projected to reach $18.6B by 2035, with diagnostics as the largest segment — the commercial case for building the intelligence layer now is not speculative." (Market Research Future, 2025)



The platform enters the market through independent diagnostic labs — not hospital-owned departments — because independent labs serve cross-institutional patient populations, are not defended by hospital procurement dynamics, and represent the fastest route to the cross-institutional longitudinal data that the intelligence layer requires.

5. The AI signal is already clear

The **diagnostic intelligence layer** deploys two purpose-differentiated AI models: MedGemma 1.5 4B, a domain-specific small language model optimised for full-study structural analysis across complete PACS image sets; and Gemini for targeted fast reporting on key uploaded images where turnaround time is the primary constraint. The architecture is DICOM-native and cloud-deployed on Indian Azure infrastructure, ensuring data residency compliance.

The dominant narrative around AI in diagnostics has been workflow acceleration — faster reports, shorter turnaround. The evidence has moved past that. A 2025 Lancet-published scoping review across 8,013 studies found AI-assisted radiology raising clinician detection sensitivity by 6–8 percentage points with no loss of specificity — a clinical gain that workflow speed alone cannot produce. The more consequential finding is structural: when AI operates across modalities rather than within them, it surfaces signals that no single report ever could. That is the architectural bet Astraios is positioned to win.

50 %

OF HEALTHCARE ORGANISATIONS HAVE NOW IMPLEMENTED GEN AI

Up from 25% in 2023. For the first time, zero respondents reported no AI plans — the wait-and-see era in healthcare is over.

McKinsey US Gen AI Healthcare Survey, Q4 2025

6-8 PP

IMPROVEMENT IN CLINICIAN DETECTION SENSITIVITY WITH AI ASSISTANCE

Across fracture and oncology imaging, AI-assisted reading raised sensitivity with no loss of specificity — the critical clinical tradeoff, resolved.

Systematic review across 8,013 studies, The Lancet, 2025

$57 B

GLOBAL HEALTHCARE AI MARKET BY 2029, FROM $11.9B TODAY

A 37% CAGR — with diagnostics, clinical decision support, and claims intelligence as the three primary growth engines. The infrastructure bet is now a mainstream market.

GlobalData Strategic Intelligence, 2025

6. Platform Architecture

The technical foundation comprises three integrated layers.

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The **synthesis and routing layer** manages multi-modal data assembly — connecting imaging outputs with pathology results and, progressively, structured EHR inputs via HL7 FHIR-compliant interfaces. Human-in-the-loop sign-off is a hard architectural requirement: no diagnostic output is released without credentialed clinician review.

The **patient intelligence layer** converts structured clinical outputs into accessible formats — plain-language summaries, follow-up guidance, and financial navigation inputs — with consent management and audit trail baked into the pipeline from deployment.

7. Key Assumptions and Risks

Four assumptions underpin this thesis, each carrying identifiable risk.

Data consent at scale. The longitudinal intelligence layer requires patient consent architecture that is granular, portable, and regulatorily durable. India's Digital Personal Data Protection Act 2023 provides the legal framework; implementation at ground level across diverse lab partners is an execution risk that requires sustained investment.

Hospital channel resistance. Phase 1 deliberately avoids hospital procurement dependencies. The risk materialises in Phase 2 if insurer and patient-side adoption does not generate sufficient pull pressure on hospitals within a commercially viable timeframe.

Regulatory progression. Current operations are teleradiology-compliant. Progression toward Software as a Medical Device classification under CDSCO is in process. The platform architecture is designed to avoid rebuilding at transition, but regulatory timeline uncertainty is a real variable.

Consumer trust velocity. The patient knowledge product depends on adoption by a population with limited prior exposure to AI-mediated health information. Trust development is a function of outcome quality and community-level communication — both slower to compound than technology deployment.

8. Reality Check: Is the Market Ready?

Early indicators suggest the structural conditions are aligning. Smartphone penetration in semi-urban India has exceeded 60 percent. Younger patients increasingly arrive at diagnostic centres expecting digital delivery of results. Three comparable markets offer a directional evidence base.

South Korea has moved furthest on AI-native radiology deployment. Companies including Lunit and JLK have achieved regulatory clearance for AI-assisted reading across multiple modalities, with adoption at major hospital networks and export to over 50 countries. The South Korean case demonstrates that radiologist-AI collaboration — not replacement — is a clinically and commercially viable model.

China's Ping An Good Doctor platform reached over 400 million registered users by integrating clinical navigation with insurance intelligence. The model demonstrates consumer appetite for health information access when delivered accessibly — a direct parallel to the patient knowledge layer thesis.

Singapore's national AI health strategy has formalised the integration of AI diagnostic tools into public health infrastructure, including AI chest X-ray screening at the population level. This represents the Phase 3 endpoint — government as intelligence infrastructure buyer — that the Astraios roadmap targets at sufficient scale.

9. Conclusion

The diagnostic fragmentation problem in Indian healthcare is not an unsolvable technical challenge. It is a coordination failure sustained by commercial incentives that AI is now positioned to structurally reorder. The window to build the foundational intelligence layer — before incumbents recognise what the actual strategic asset is — is open and time-bounded.

Astraios enters at the ground truth layer of the clinical system, accumulating the longitudinal, multi-modal diagnostic data that makes everything downstream — early detection, patient navigation, insurer intelligence, population-scale signal detection — architecturally possible. The investment thesis is not a faster workflow product. It is the infrastructure bet on a system that is ready, for the first time, to assemble the whole picture.

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Software

ABOUT ASTRAIOS

Astraios Software is an AI-driven healthcare technology company building the diagnostic intelligence layer for Indian healthcare — unifying fragmented radiology and pathology data into longitudinal, multi-modal patient records accessible to clinicians, patients, and insurers simultaneously.

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Deb brings nearly 30 years in enterprise software and 15 years focused on healthcare technology. As founder and lead strategist at Astraios, he is responsible for the company's product direction, market architecture, and go-to-market positioning across clinical, insurer, and government channels.

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