

LABORATORY INTELLIGENCE PLATFORM

Building an Agentic AI Laboratory Intelligence Platform for a Leading Indian Tertiary Care Hospital

How a major multi-specialty hospital unified fragmented enterprise systems through an AI layer, and enabled executives and clinicians to interact with laboratory data in natural language.

ASK "Show laboratory revenue by specialty."

AGENTIC
AI layer

UNDERSTANDS · QUERIES · ANSWERS

InterSystems TrakCare

Oracle Fusion

Microsoft Power BI



CLIENT

Leading tertiary-care teaching and multi-specialty hospital, North India

TECHNOLOGY

TrakCare · Oracle Fusion · Power BI · PostgreSQL · Python · Google LLMs

FIRST USE CASE

Laboratory analytics: revenue, cost, service and turnaround time

OUTCOME

A validated, cost-controlled conversational AI layer across enterprise systems

01 · EXECUTIVE SUMMARY

Data exists everywhere, but insights are difficult to access.

A leading tertiary-care teaching hospital in North India had a robust enterprise ecosystem generating operational, financial and clinical data every day. Yet answering management-level questions remained cumbersome.

THE ENTERPRISE ECOSYSTEM ALREADY IN PLACE

CLINICAL

InterSystems TrakCare

Clinical and hospital operations

ENTERPRISE

Oracle Fusion

Enterprise and financial management

ANALYTICS

Microsoft Power BI

Analytics and reporting

To answer one question, users had to...

THE FRICTION

- 1 Navigate multiple dashboards
- 2 Access different reports
- 3 Apply filters
- 4 Request support from analytics teams
- 5 Perform additional manual analysis

LEADERSHIP WAS CAUTIOUS

Concerns shaping the AI roadmap

Rising LLM token costs

Cost scalability

Governance concerns

AI misuse risks

Information was abundant. Intelligence remained fragmented.

THE OUTCOME IN BRIEF

The resulting platform bridged enterprise applications and surfaced unseen correlations across lab performance, revenue and operations through an Agentic AI-powered healthcare intelligence platform, giving executives natural-language self-service over daily-refreshed data.

02 · BACKGROUND

The challenge is data accessibility, not availability.

Every patient interaction, laboratory test, admission and financial transaction expands a hospital's analytical footprint. Hospital systems capture this information effectively, but struggle to democratize access to it.

EXECUTIVES

Do not want another dashboard.

CLINICIANS

Do not want another report.

DEPARTMENT HEADS

Do not want to learn complex BI tools.

Instead, they want answers.

Which department generated the highest laboratory revenue this month?

How are turnaround times trending?

What is driving increasing laboratory costs?

How does OPD utilization compare with IPD utilization?

Which specialties are contributing most to laboratory growth?

THE FUNDAMENTAL QUESTION

What if the organization could simply talk to its data?

03 · DEFINING THE VISION

Not a laboratory analytics project. A strategic exploration of enterprise AI.

The laboratory domain was simply the starting point. The broader goal was to test whether an AI-driven intelligence layer could sit above fragmented hospital systems and provide one unified way to access organizational knowledge. Phase 1 was designed around two strategic objectives.

OBJECTIVE 01

Validate AI integration across fragmented systems

Clinical, financial and operational data often reside in different systems built by different vendors.

KEY QUESTION

Can AI provide a unified view of information drawn from multiple enterprise systems?

OBJECTIVE 02

Enable conversational analytics

Could executives and clinicians interact with enterprise data using ordinary English? Instead of navigating reports, users would simply ask, for example:

What are the highest-cost laboratory services?

If successful, this approach could dramatically simplify access to information across the organization.

04 · WHY LABORATORY ANALYTICS

The ideal proving ground for enterprise AI

Laboratories generate a unique blend of data. Few hospital departments provide such a rich combination of operational and business intelligence, which made the laboratory the perfect environment to evaluate an Agentic AI layer.



Financial data

Revenue

Costs

Margins

Utilization

Operational data

Volumes

Productivity

Capacity utilization

Service data

Turnaround times

Service-level performance

Patient responsiveness

Clinical consumption data

Specialty utilization

Departmental demand

Testing trends

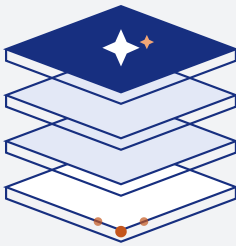
05 · EXISTING TECHNOLOGY LANDSCAPE

The mature digital infrastructure was already in place. The challenge was not replacing it, but creating a unified intelligence experience across it.

06 · DESIGNING THE SOLUTION

A hybrid architecture that uses AI selectively

A common misconception in enterprise AI is that every analytical process should be delegated to a Large Language Model. The team deliberately avoided this, to achieve both performance and cost efficiency.



USE TRADITIONAL ANALYTICS FOR
Calculations

USE AI FOR
Understanding and interpretation

LAYER 1

Data layer

Centralized PostgreSQL repository, refreshed daily

Service-line data consolidated into one analytical structure instead of querying production systems for every interaction: the single source of truth.

Consistent information

Faster responses

Less production dependency

Better governance

Scalability

LAYER 2

Analytics layer

Python

Structured analytics, including all KPI calculations, run outside the LLM environment, significantly reducing AI processing costs.

Fixed-format KPIs

Standard reporting

LAYER 3

AI layer

Google Large Language Models

Introduced only where reasoning and interpretation are required.

Question understanding

Context interpretation

Natural language processing

Insight generation

LAYER 4

Agent layer

Conversational interface

Users interact not with dashboards but with an intelligent analytical assistant: the gateway into laboratory intelligence.

Ask in plain English

Self-service insight

07 · FOCUS AREAS OF ANALYSIS

Four lenses on laboratory performance

Revenue analytics

The most frequently explored area: Revenue trends across specialties, helping reduce revenue leakage through healthcare financial intelligence.

- Oncology
- Nephrology
- Orthopedics
- Cardiology
- Pulmonology
- Spine
- Other departments

EXAMPLE QUESTION

How are revenue trends changing over time?

Cost analytics

- Cost trends
- Department-level cost patterns
- Service-level economics
- Cost behavior across operations

Service analytics

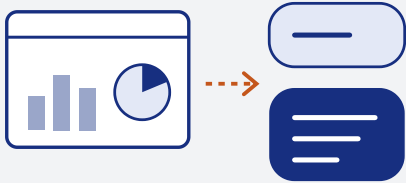
- Utilization patterns
- Volume trends
- Service-load distribution
- Operational productivity

Turnaround time

- Laboratory categories
- Diagnostic functions
- IPD operations
- OPD operations

08 · MOVING BEYOND DASHBOARDS

From anticipating questions to answering any question



TRADITIONAL BI

Reports are built in advance

Questions are anticipated

Dashboards are designed accordingly

New questions go unanswered

CONVERSATIONAL ANALYTICS

Business questions change continuously

Users ask what was never anticipated

Teams interact naturally with data

Instead of searching, they simply ask

09 · ADOPTION ACROSS BUSINESS AND CLINICAL TEAMS

Different stakeholders, one conversational interface

STAKEHOLDER

Executives

- Revenue
- Costs
- Service performance
- Operational trends

STAKEHOLDER

Department leaders

- Utilization
- Productivity
- Turnaround times

STAKEHOLDER

Clinicians

- Departmental performance
- Service delivery
- Operational efficiency

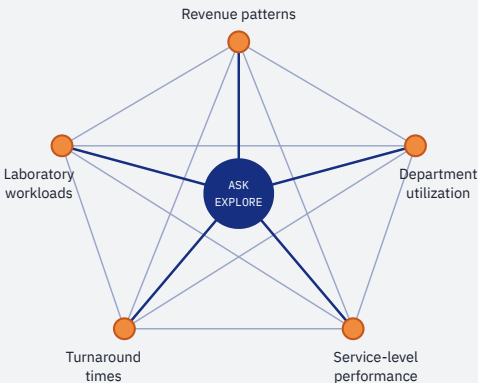
The conversational model proved valuable across all groups because it reduced reliance on technical reporting expertise.

10 · UNEXPECTED VALUE

Discovering hidden relationships

Because users were free to keep asking new questions, they uncovered patterns and correlations that had not been previously considered.

The platform became a discovery engine, not merely a reporting tool.



11 · WHY TURNAROUND TIME MATTERS MORE THAN EVER

TAT has moved from operational metric to patient experience metric

HISTORICALLY

Operational metric

→

TODAY

Strategic objective

Patient expectations continue rising, and social media, online reviews and healthcare rating platforms can make service issues publicly visible almost immediately. Delays in laboratory processing can impact:

Patient satisfaction

Physician experience

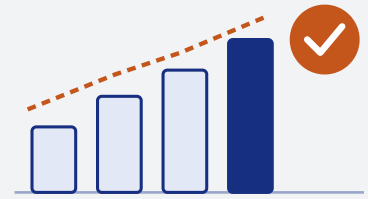
Hospital reputation

Clinical decision-making

13 • RESULTS

What Phase 1 delivered

The project delivered five meaningful outcomes.



01

Successful multi-system integration

An AI layer operated above multiple enterprise applications while providing a unified analytical experience.

02

Democratized, accessible information

Users obtained insights in ordinary English instead of navigating multiple reports and dashboards. Analytical friction fell, letting them focus on questions rather than tools.

03

Cost-controlled AI deployment

Separating analytical processing (Python) from language reasoning (LLMs) kept AI operating costs under control and made the architecture economically sustainable at scale.

04

Discovery of new insights

Management gained visibility into patterns and relationships previously hidden in siloed reporting environments.

05

Strategic validation

Most importantly, the project confirmed the viability of an enterprise AI layer within a complex hospital ecosystem, adding value on top of existing technology investments rather than replacing them.

12 · CREATING A FOUNDATION FOR FUTURE TRANSFORMATION

Phase 1 was foundational, by design

THE AGENT WAS NOT INTENDED TO

✗ Replace hospital applications

✗ Automate laboratory operations

✗ Recommend actions

✗ Make decisions

Those objectives belong to future phases. Phase 1 focused solely on proving the intelligence layer itself.

14 · CONCLUSION

For many healthcare organizations, the AI conversation begins with automation. For this hospital, it began with intelligence.

THE PHASE 1 QUESTION

Can an AI layer unify information scattered across multiple hospital systems and make it accessible through natural human conversations?

ANSWER

Yes, and without uncontrolled costs.

THE MOST SIGNIFICANT OUTCOME WAS CULTURAL

~~"Where is the report?"~~ → "What can we learn from the data?"

THE TAKEAWAY

The future of healthcare analytics may not be more dashboards. It may be a conversation.

Phase 1 is the first step toward a unified Agentic AI intelligence layer for decision-making across the entire hospital enterprise.

