

Aanchal AI: Holistic Maternal & Child Health Intelligence Ecosystem

Hybrid RAG Intelligence • Multi-Modal Interfaces • Predictive Clinical Engine • Longitudinal Care

1. Problem Statement & Motivation

Problem: India's healthcare system fragments patient data. Mothers, children, doctors, and ASHA workers operate in silos. Critical risk factors (Preeclampsia, Anemia) are missed due to paper records. Post-delivery, the mother's health often overshadows the newborn's needs due to a lack of continuous digital tracking.

Motivation: Aanchal AI is not just a chatbot; it is a **comprehensive digital health ecosystem**. We bridge the gap between policy (SUMAN/RBSK) and practice by unifying patients, providers, and data. Our goal is a seamless **Care Continuum** where AI-driven insights empower every stakeholder.

2. Solution: Multi-Stakeholder Intelligence Ecosystem

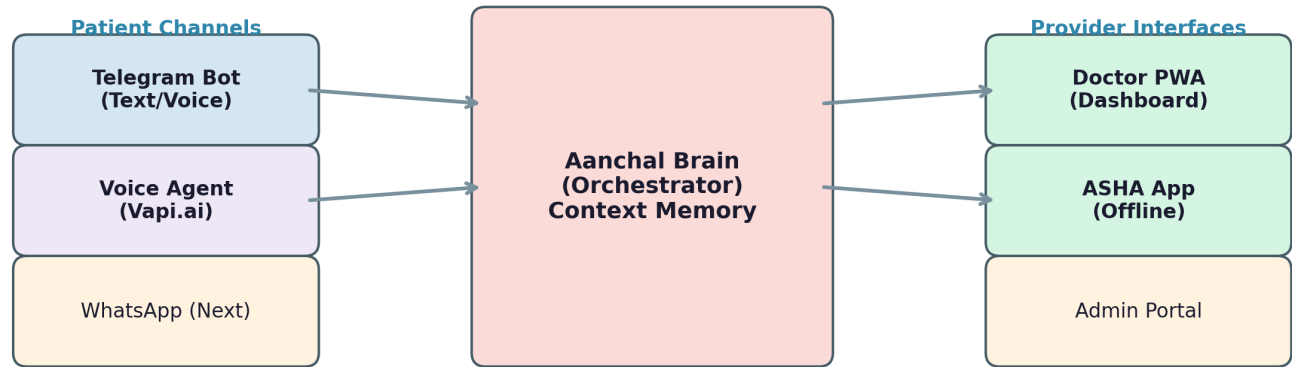


Fig 1: The Aanchal AI Ecosystem – Unifying Patients (Chat/Voice) & Providers (Web/App) via AI Core

Aanchal AI serves multiple users simultaneously: **(1) For Mothers:** A zero-install Telegram/Voice interface for vernacular support. **(2) For Doctors:** A React-based PWA Dashboard visualizing patient risk trends. **(3) For ASHA Workers:** An Offline-First App for field data collection. **(4) The Core:** An intelligent orchestrator that routes data and insights across these channels in real-time.

3. Technical Approach: The AI Engine

At the core is a **Hybrid RAG Engine** (`rag_service.py`) merging semantic search (pgvector) with clinical precision (BM25). **10 Specialized Agents** (Risk, Nutrition, Vaccine, etc.) analyze incoming data. A **Response Validator** acts as a safety layer against hallucinations. Data integrity is maintained via a **Longitudinal Record System** that evolves with the patient from pregnancy through childhood.

Holistic System Architecture & Intelligence Engine

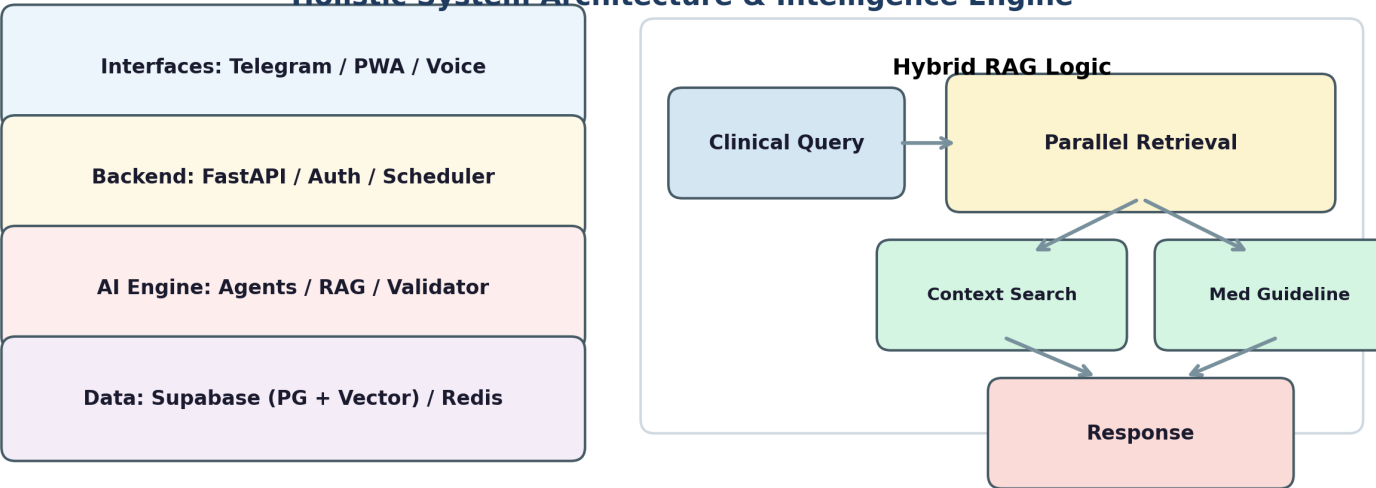


Fig 2: 5-Layer Technical Architecture (Left) & Clinical RAG Pipeline (Right)

4. The Care Continuum (Novelty)

Our unique value proposition is the **Seamless Transition**. Unlike isolated apps, Aanchal AI triggers an context-aware **Auto-Switch** (``delivery.py``) at birth. The mother's history informs the child's care plan, activating pediatric agents and vaccination schedules (IAP 2023) immediately without data silos.

This ensures that critical prenatal history (e.g., gestational diabetes) is not lost but proactively informs neonatal risk assessments, creating a true longitudinal health record.

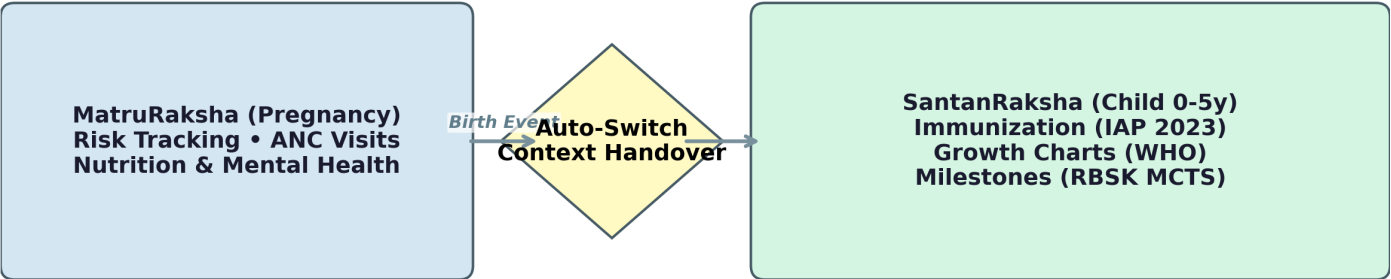


Fig 3: Automated Longitudinal Care Transition: MatruRaksha → SantanRaksha

5. Data & Evaluation

Source	Usage	Integration
UCI Maternal	Knowledge	RAG Index
IAP 2023	Vaccines	Logic Rules
RBSK 4Ds	Devel.	Milestones
Supabase	Live Data	Patient History

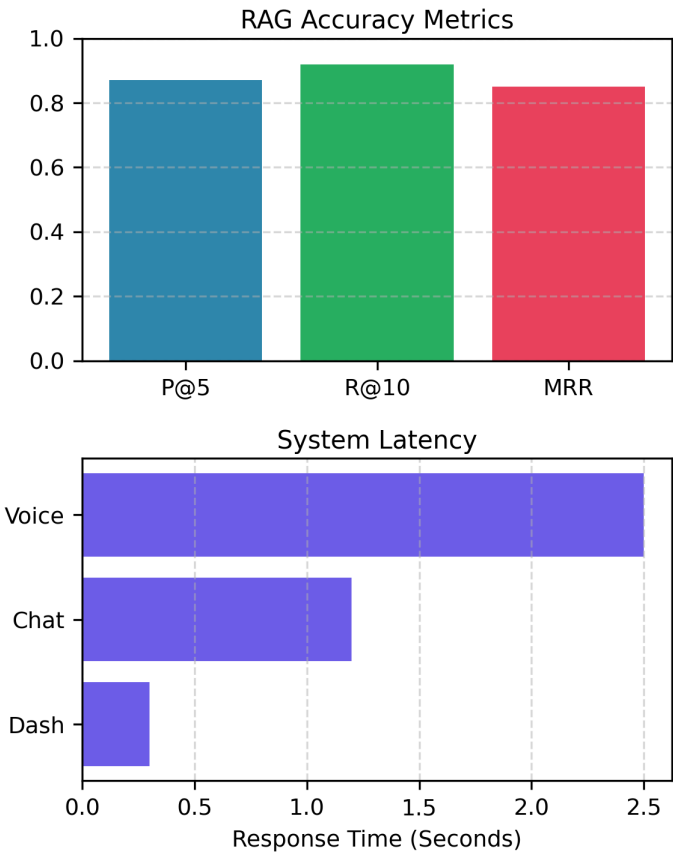


Table 1: Clinical Data Sources (Left) | Fig 4: AI Accuracy & Latency (Right)

6. Scalability & Impact

Phase	Timeline	Scope	Strategic Goal
1	Now	1 District	Pilot Ecosystem (Chat + PWA)

2	6 Mo	10 Dist	Federated Learning + IoT Integration
3	1 Yr	State	ABDM Integration (Govt Stack)

Impact: By unifying fragmented care into a single intelligent thread, Aanchal AI empowers 10,000+ ASHA workers and protects 500,000+ lives. It transforms healthcare from reactive capability to proactive, continuous intelligence. This ecosystem effectively addresses the 'last mile' problem in digital health delivery, ensuring no mother or child is left behind.