AI in Healthcare Patient Support

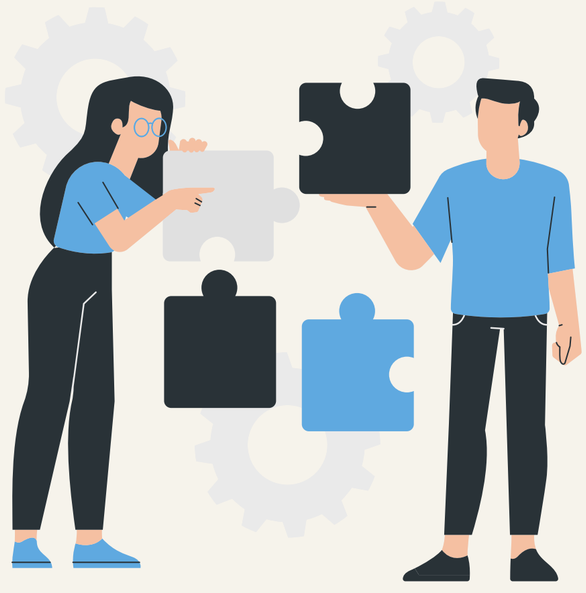
Nebula9.ai

Internship | Assessment-2 | July 2025

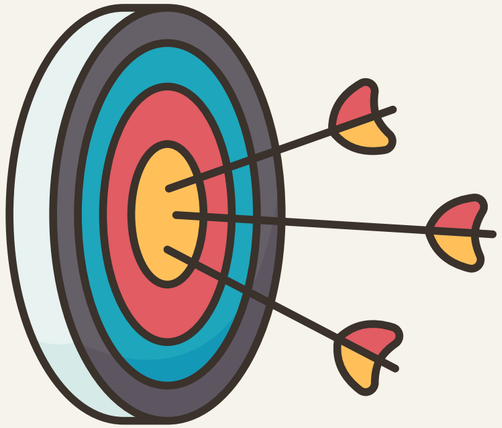
By Anant Upadhiyay

Our Problem

The healthcare industry inefficiencient in patient support due to fragmented workflows, overburdened administrative staff, and reliance on outdated systems. Manual data entry leads to errors and delays, while limited 24/7 accessibility forces patients to depend on traditional methods like phone calls or in-person visits, resulting in long wait times and frustration. Additionally, the lack of personalized engagement contributes to poor medication adherence and inconsistent follow-ups.



Objective



The primary objective of this project is to design and implement an AI-driven virtual assistant that revolutionizes patient support in healthcare. This solution will provide 24/7 accessibility through multiple channels (web, mobile, and voice), enabling patients to book appointments, receive medication reminders, and access instant health-related information

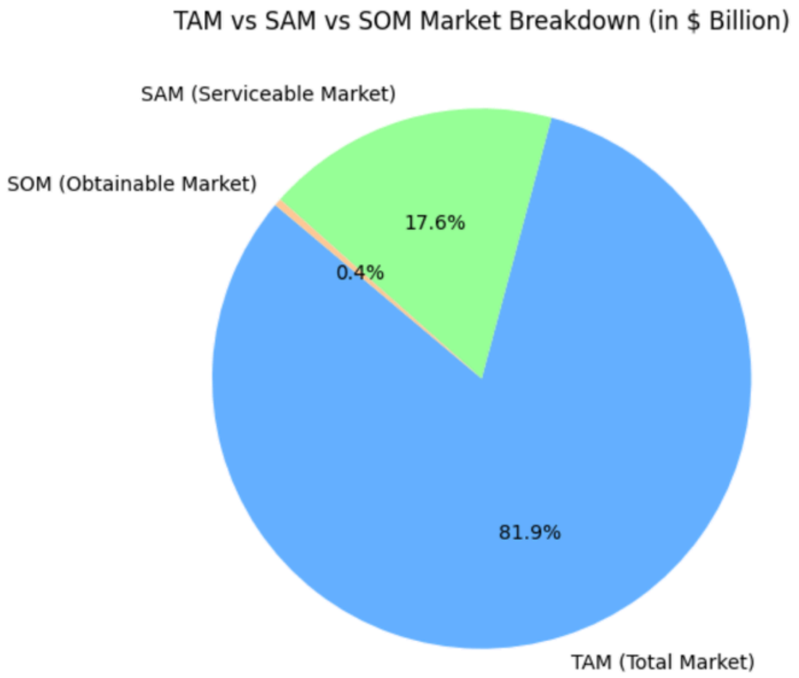
Our goal is to Transform patient care into a scalable, efficient, and personalized experience.

What we are offering

- 24/7 Multi-Channel Patient Support
- Personalized Medication Adherence
- Automated Appointment Management
- Secure EMR Integration
- Preliminary symptom analysis using verified medical databases.
- Real-Time Analytics & Feedback

Market Opportunities

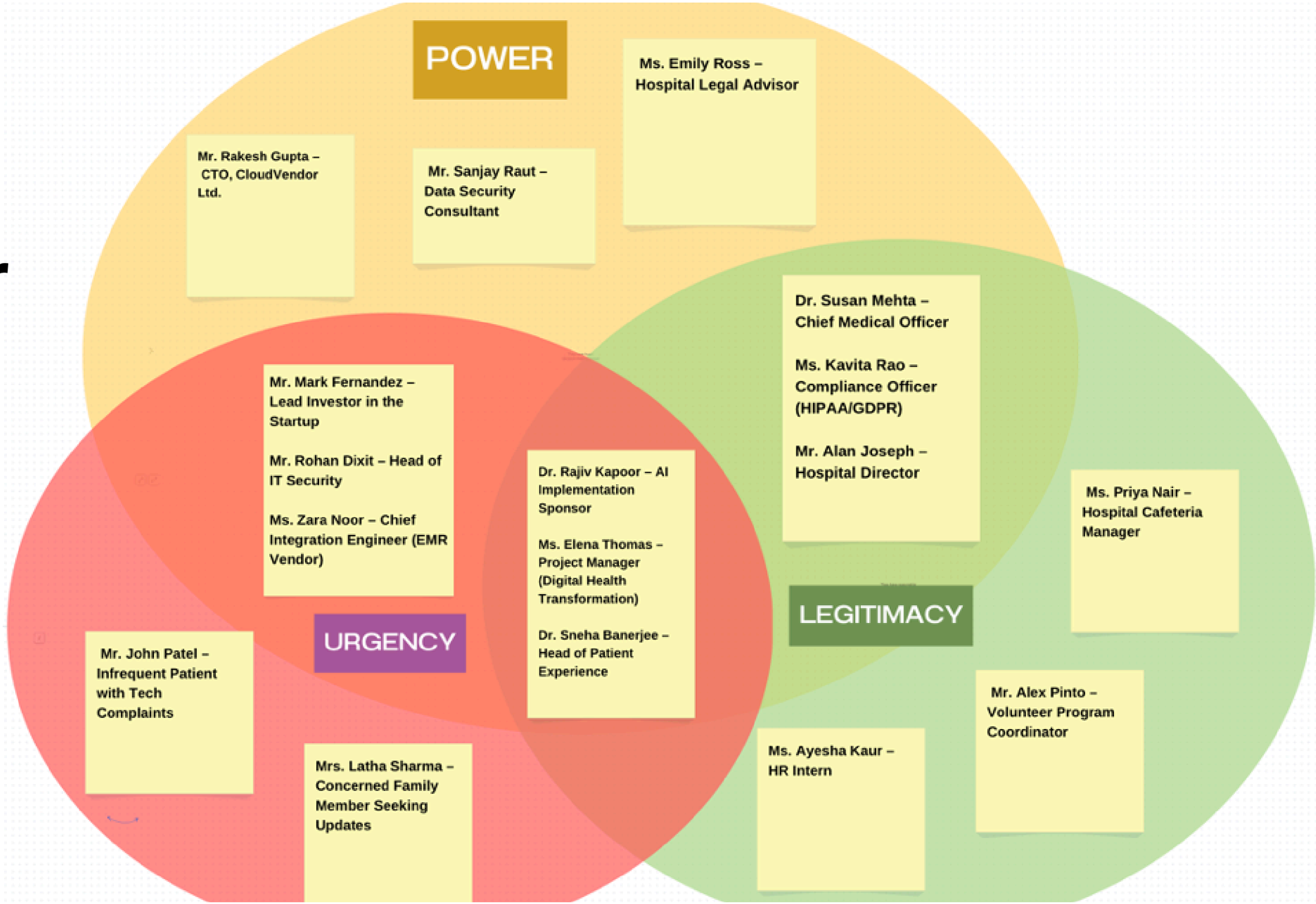
	Description	Market Size Estimate
TAM	Total Addressable Market Global market for all healthcare virtual assistants across all settings (hospitals, clinics, home care, etc.)	$4.7 billion globally by 2034 (CAGR 24.7%) or $9.3 billion by 2030 (CAGR 33.7%) (varies by source; providers are key buyer segment)
SAM	Serviceable Available Market Market for healthcare-focused virtual assistants in hospitals and similar large facilities worldwide	~$1.5–2.0 billion (2025) estimated for providers segment (hospitals are the largest buyer vertical)
SOM	Serviceable Obtainable Market Hospital/health system market in your region/country or initial rollout scope (<5% of SAM in year 1–3)	Example: $20–50 million in India, or $50–100 million in select EU/US metro regions (Year 1–3 realistic share, depending on go-to-market efforts and partnerships)

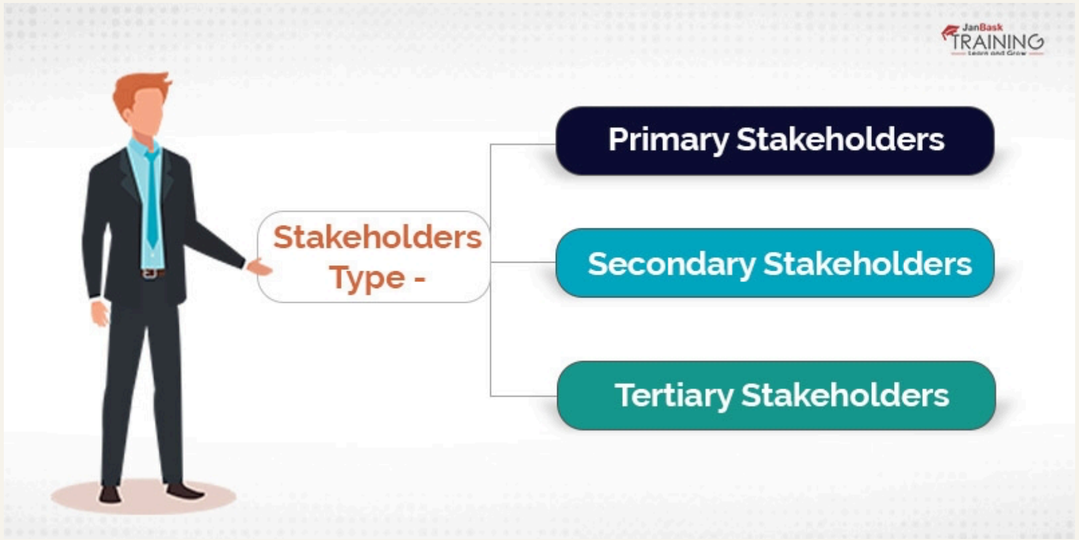


COMPETITOR ANALYSIS

Name	Offering	Strengths	Weakness
Nuance (Microsoft)	AI virtual assistants for clinical documentation and patient engagement; strong EMR integration	- Deep EHR/EMR integration - Speech & natural language recognition - High adoption in clinical settings	- Costly for smaller settings - Focused more on clinician workflows than direct patient-facing features
Babylon Health (eMed)	24/7 AI healthcare platform with chatbot, symptom checker, virtual doctor consultation	- Comprehensive virtual care (AI triage + live doctor access) - Global scalability - Integration with health systems	- Data privacy concerns in some markets - Limited language support in certain regions
Ada Health	AI-powered symptom checker and patient guidance	- Accurate symptom analysis - User-friendly interface - Broad medical database	- Not always integrated with hospital EMRs - Limited scope beyond triage and self-management guidance
Amwell	Virtual assistant with appointment scheduling, online therapy, and patient triage	- Strong telehealth infrastructure - Integration with providers - Robust compliance and security	- Higher costs for advanced features - Primary focus on telemedicine, less on AI automation
Amazon (Alexa Health)	Voice-based patient engagement, appointment scheduling, medication reminders	- HIPAA-compliant AI voice assistant - Scalable, home and hospital integration	- Requires patient comfort with voice tech - Less personalization for complex medical needs
Verint	Conversational AI interfaces for healthcare call centres and patient portals	- Improves call centre efficiency - Advanced conversational AI	- Focus is more on enterprise/call-centre use, less on direct patient therapeutic support
HealthTap	AI chatbot with medical Q&A, access to doctors, health library	- Extensive health information - On-demand virtual consults	- Limited EMR integration - Reliance on quality and availability of expert network

Stakeholder Salience Venn Diagram-

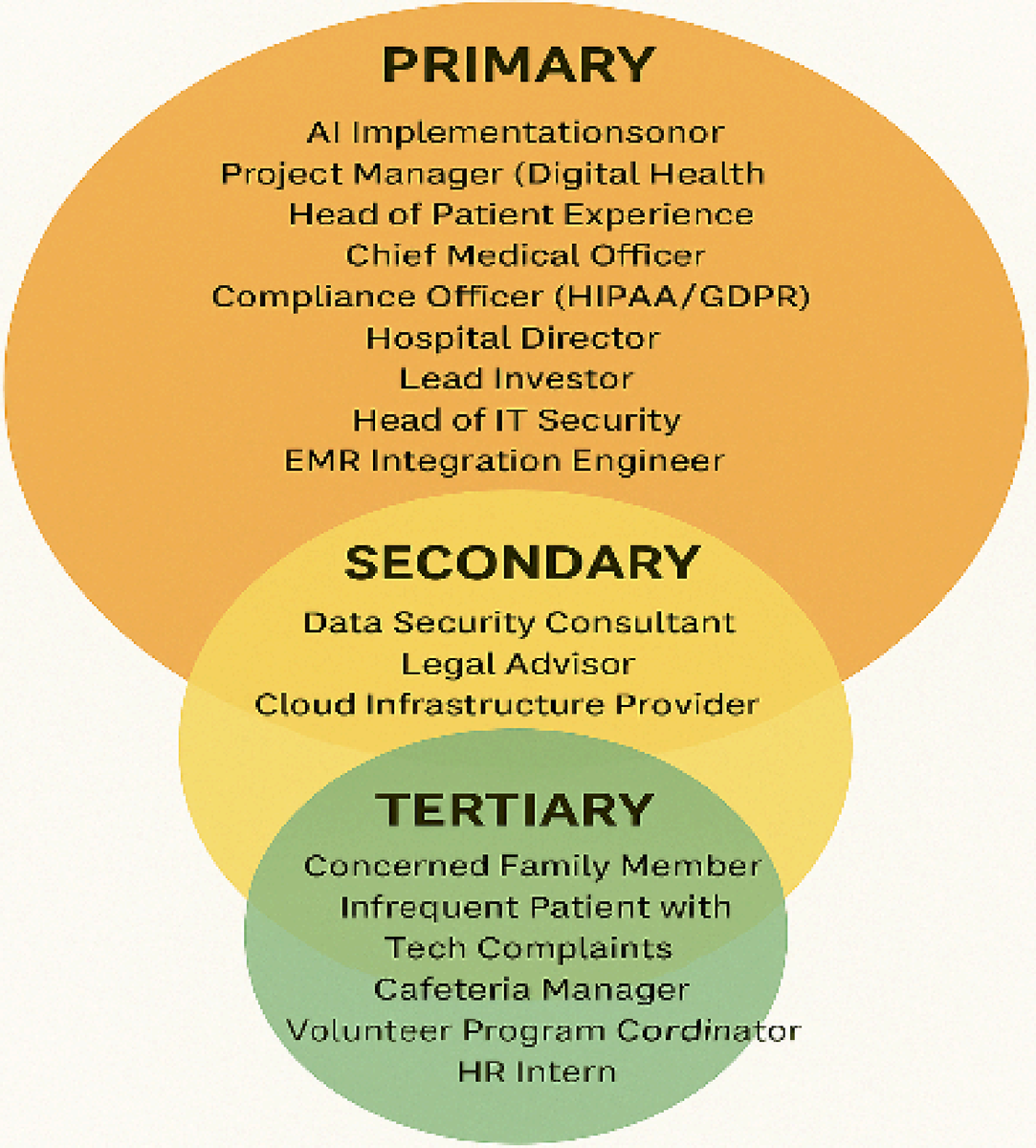




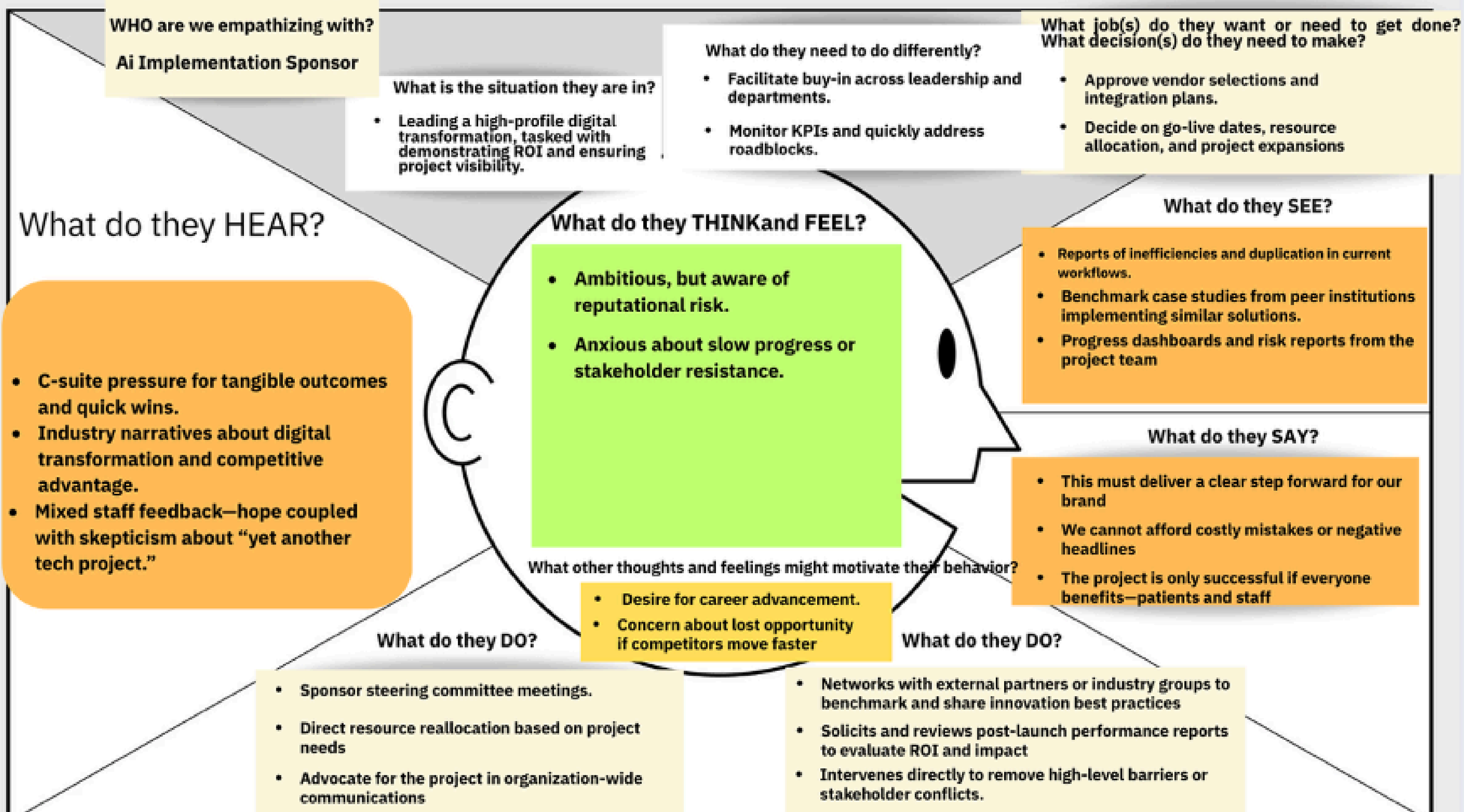
Primary Stakeholders - They are typically involved in decision-making, regulatory compliance, system integration, and leadership. Their feedback and approval are crucial for project direction, milestones, and deployment.

Secondary Stakeholders- These stakeholders have moderate influence and expertise but are not directly involved in day-to-day decisions or operations. They play supportive or advisory roles.

Tertiary Stakeholders- These are stakeholders with lower influence or formal authority, but they may interact with the system and provide valuable insights into usability, acceptance, and public engagement.



Empathy Map Canvas



Empathy Map Canvas

WHO are we empathizing with?

Chief Medical Officer

What is the situation they are in?

- Navigating the clinical impact of new digital workflows while safeguarding clinical standards and staff engagement

What do they need to do differently?

- Participate in protocol and content validation.
- Mediate between technical and clinical teams.
- Develop training and escalation procedures for clinical staff.

What job(s) do they want or need to get do
What decision(s) do they need to make?

- Validate medical content accuracy.
- Decide on go/no-go for clinical functionality
- Approve AI integration with clinical workflows

What do they HEAR?

- Reports of AI missteps from other hospitals.
- Regulatory and professional guidance about use of AI in clinical care
- Concerns from clinicians about workflow changes and AI "overreach."

What do they THINKand FEEL?

- Protective of patients and clinicians
- Cautiously optimistic about technology enabling clinical capacity.
- Wary of unforeseen clinical risks.

What do they SEE?

- Pilot project data on patient outcomes and workflow impacts.
- Requests from clinicians for more support or clarification
- Improvements in routine task management

What do they SAY?

- No compromise on safety
- The system must follow established clinical protocols
- We need robust escalation paths if AI fails

What other thoughts and feelings might motivate their behavior?

- Sense of duty to uphold medical standards
- Interest in data-driven quality improvement
- Fear of adverse events or loss of clinical credibility

What do they DO?

- Attend clinical review boards
- Pilot new workflows and solicit feedback
- Spearhead training for all medical staff

What do they DO?

- Reports on incidents, near-misses, or AI system "failures" that may affect clinical care.
- Updates from medical societies on best practices, shifting standards, and regulatory guidance for digital health implementation

USERPROFILE

Maria Desai

Age: 58
Location: Banglore,India
Occupation: Retired School Teacher

Bio: Maria is a 58-year-old retired schoolteacher living with her spouse. She manages type 2 diabetes and hypertension and visits her specialists regularly. While she uses her smartphone and tablet for messaging and video calls, she sometimes finds it overwhelming to track her various doctor visits and medication routines.

Pain Points:

1. Struggles to keep track of medication schedules.
2. Experiences long phone wait times or limited access outside business hours.
3. Feels overwhelmed by fragmented care and the need to communicate information repeatedly between different providers.

Needs and Goals:

1. Personalized, regular medication reminders.
2. Seamless scheduling of specialist appointments.
3. Ability to review medical history and appointments in one place.

Sachin Dubey

Age: 25
Location: Gurgaon, India
Occupation: Business owner

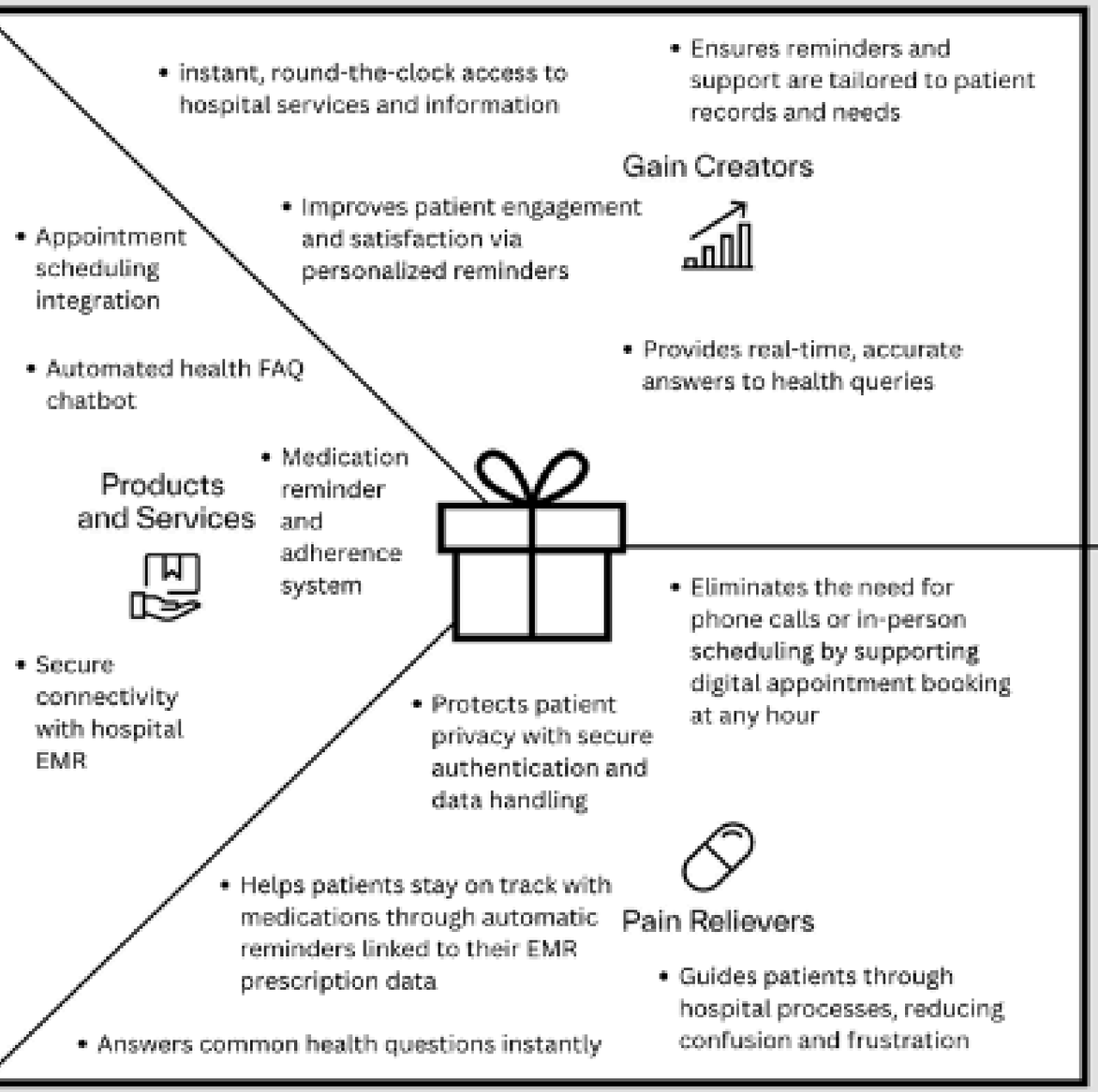
Bio: Sachin is a 25-year-old small business owner and a pragmatic, proactive individual. Although he has not needed frequent care, he values efficient service and resents unnecessary friction. For acute issues or checkups, Sachin looks for a service that offers quick onboarding,clear information, and transparent appointment booking.

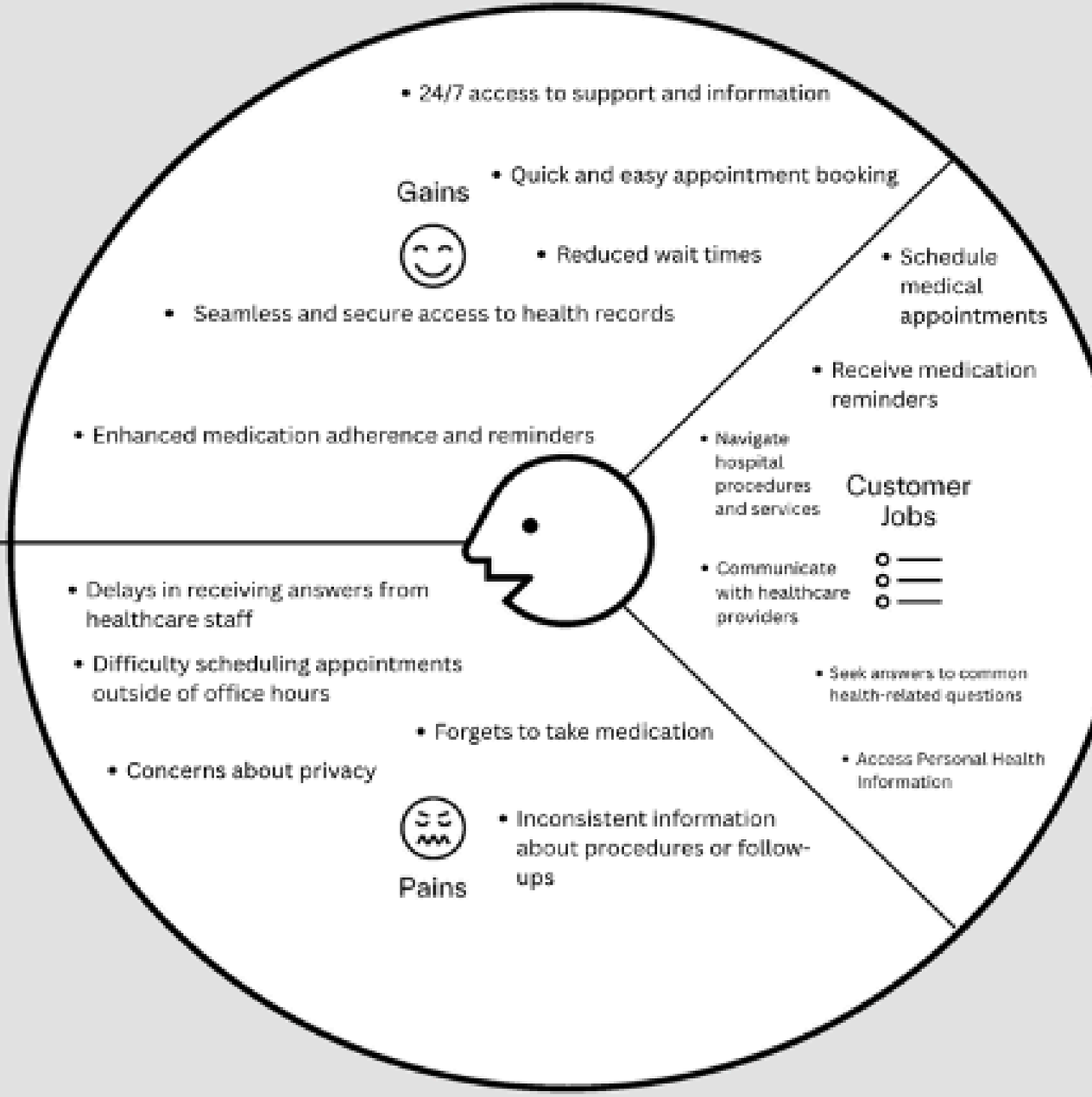
Pain Points:

1. Struggles with onboarding or finding basic information about services, accepted insurances.
2. Hesitant to call clinics—prefers if all basic FAQs can be addressed instantly and transparently through digital means
3. Frustrated by lack of real-time support or uncertainty around what to expect at the clinic.

Needs and Goals:

1. Rapid, guided onboarding for new or occasional patients.
2. Quick access to practical information (location, insurance, procedures).
3. Efficient appointment search and booking.
4. Clear instructions before and after visits.





Value Map

Customer Profile

BUSINESS CANVAS MODEL

Key Partners

- EMR Vendor
- Compliance/legal advisors
- Cybersecurity specialists
- AI technology providers
- Clinical content experts
- Patient advocacy groups
- Staff and patient training providers

Key Activities

- Design chatbot logic, intent recognition, escalation paths
- Ensure real-time data exchange, appointment updates, and secure access.
- Maintain up-to-date reliable medication/reminder systems.
- Conduct privacy impact assessments, audit readiness, and manage consent processes.
- Continuously monitor, test, and improve data security controls.

Key Resources

- Clinical Knowledgebase
- AI Development Team
- Secure and Scalable Cloud Infrastructures
- Feedback & Analytics Tools
- User Support System
- Technical and user documentation for system maintenance and audits

Value Proposition

- 24/7 Patient Support
- User Friendly GUI
- To Offer real-time scheduling, confirmations, and rescheduling Appointment options.
- Up-to-date, personalized information by drawing directly from their EMR
- Personalized Medication Reminders
- Robust Data Privacy and Compliance

Customer Relationships

- Supportive Onboarding
- Human escalation/assistance for complex or sensitive queries
- Personalized reminders

Channels

- Mobile Application
- Hospital Website Patient Portal
- SMS and Email
- Smart speaker

Customer Segments

- Patients who expect self-service, fast responses.
- First-Time or Occasional Patients.
- Individuals managing chronic illnesses or post-surgical care
- Those who are living far from hospital sites

Cost Structure

- Research and Development
- Platform/software licensing
- Compliance & Security
- Customer Support
- Maintainence

Revenue Streams

- Subscription Plans
- Licencing
- Certification Programs
- Cross Promotion

NON FUNCTIONAL REQUIREMENTS

S.no	Non-Functional Requirement	Description
1	Security & Privacy	Implements end-to-end encryption, secure login/authentication, and is compliant with HIPAA and GDPR regulations.
2	Performance	System responds to 95% of user requests in under 2 seconds and supports 1000+ concurrent sessions.
3	Reliability/Uptime	Guarantees 99.9% system uptime with robust failover mechanisms and disaster recovery protocols.
4	Scalability	Designed to scale seamlessly to accommodate more users, hospitals, and third-party integrations (labs, pharmacies, etc.).
5	Usability	Intuitive and user-friendly interface; compliant with accessibility standards (e.g., WCAG 2.1).
6	Maintainability	Modular, well-documented codebase with automated testing to simplify bug tracking, updates, and long-term support.
7	Interoperability	Supports integration with major EMR standards and vendors (e.g., HL7, FHIR).
8	Auditability	Maintains tamper-proof, end-to-end logs to ensure full traceability and compliance.
9	Localization	Supports easy adaptation to different regions, languages, and cultural norms without requiring a full system overhaul.

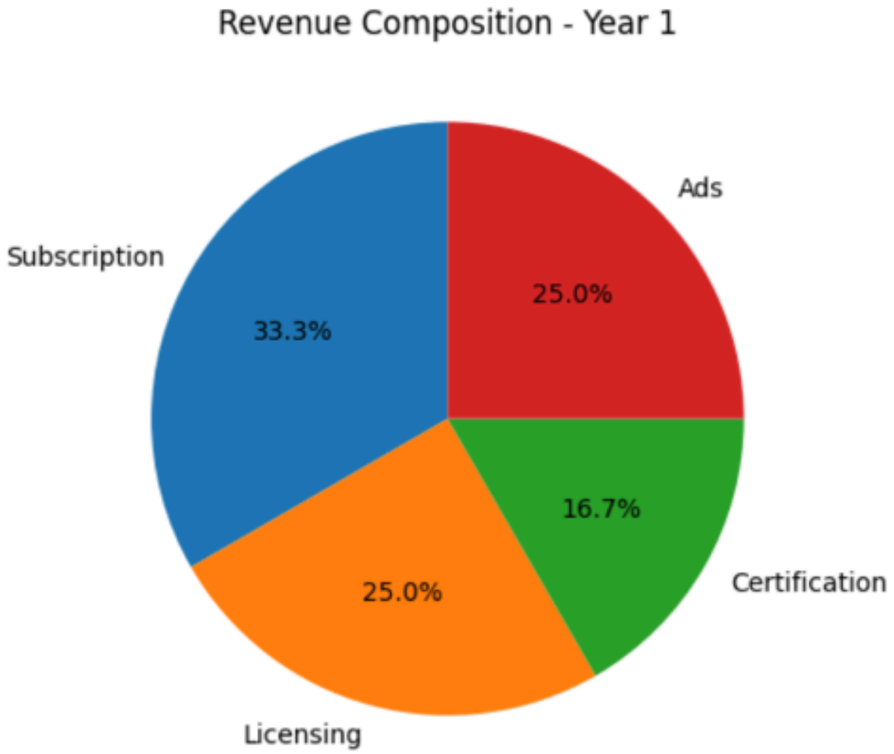
FUNCTIONAL REQUIREMENTS

S.no.	Functional Requirement	Description
1	24/7 Appointment Booking	Patients can book, change, or cancel appointments anytime via chat, voice, or portal.
2	Medication Reminders	Sends personalized notifications based on EMR data, therapy plans, and user preferences.
3	Symptom Checker	AI-powered assistant provides accurate responses to common health queries and basic triage.
4	EMR Compatibility	Capable of reading and writing to in-hospital Electronic Medical Record (EMR) systems.
5	Multi-Channel Access	Accessible through website, mobile application, and voice-enabled devices.
6	Automated Billing Queries	Automatically interprets and explains bills, insurance claims, and payment plans to patients.
7	Role-Based Access Control	Access to data is restricted based on the role (doctor, nurse, admin, etc.) of the user.
8	Audit Trails	Logs all user/system activity to maintain transparency and support compliance.
9	Multi-Language Support	Provides assistance in multiple languages, supporting accessibility for visually/hearing-impaired users.
10	Feedback & Escalation	Collects user feedback and offers escalation to a human agent when necessary.

3-YEAR REVENUE MODEL

Year 1: Establishment and Pilot Revenue

- **Subscription Plans: Launch freemium access for individual users and offer premium subscriptions (₹650/year for advanced features). Estimated Revenue: ₹1 Lakh–₹2 Lakhs**
- **Licensing: Conduct paid pilot programs with healthcare institutions, hospitals, and clinics. Estimated Revenue: ₹1 Lakh–₹1.5 Lakhs**
- **Certification Programs: Provide training and certification for staff and clinicians using the assistant. Estimated Revenue: ₹0.5 Lakh–₹1 Lakh**
- **Cross Promotion: Earn ad revenue through cross-promotion partnerships; calculated at ₹240/year per user from 1,500 users (free + paid). Estimated Revenue: ₹1 Lakh–₹1.5 Lakhs**



Year 1 Total Revenue Estimate: ₹3.5 Lakhs–₹6 Lakhs

3-YEAR REVENUE MODEL

Year 2: Growth and Scaling

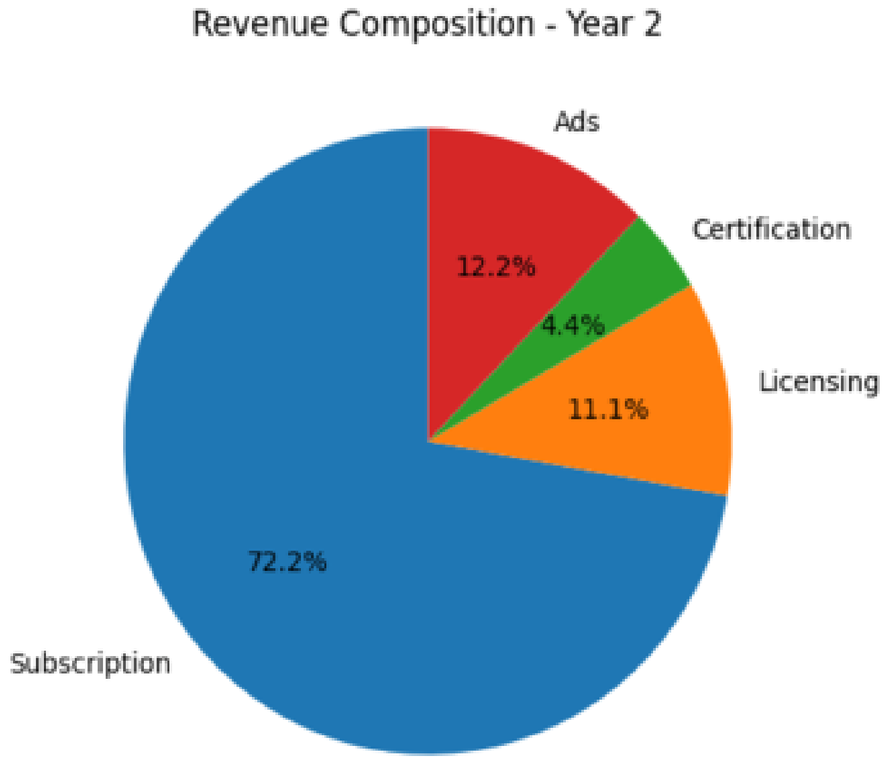
- **Subscription Plans: Expand to 3,000–5,000 paid users at ₹650/year. Estimated Revenue: ₹19.5 Lakhs–₹32.5 Lakhs**

- **Licensing: Enter more institutional contracts and partnerships (public/private hospitals, clinics). Estimated Revenue: ₹3 Lakhs–₹5 Lakhs**

- **Certification Programs: Scale-up certification and training programs for health professionals. Estimated Revenue: ₹1.5 Lakh–₹2 Lakhs**

- **Cross Promotion: Earn ad revenue from 8,000 users at ₹240/year each Estimated Revenue: ₹4 Lakhs–₹5.5 Lakhs**

Year 2 Total Revenue Estimate: ₹28 Lakhs–₹45 Lakhs



3-YEAR REVENUE MODEL

Year 3: Regional and National Expansion

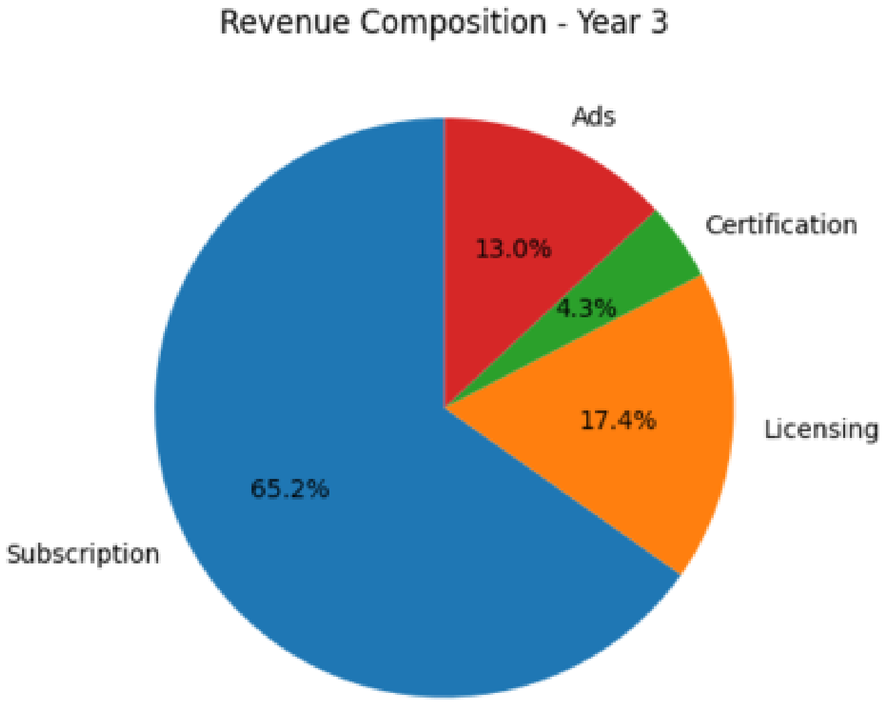
- **Subscription Plans: Grow to 10,000+ paid users at ₹650/year, plus introduce enterprise subscription tiers. Estimated Revenue: ₹60 Lakhs–₹75 Lakhs**

- **Licensing: Widespread deployment via state and national healthcare collaborations. Estimated Revenue: ₹10 Lakhs–₹20 Lakhs**

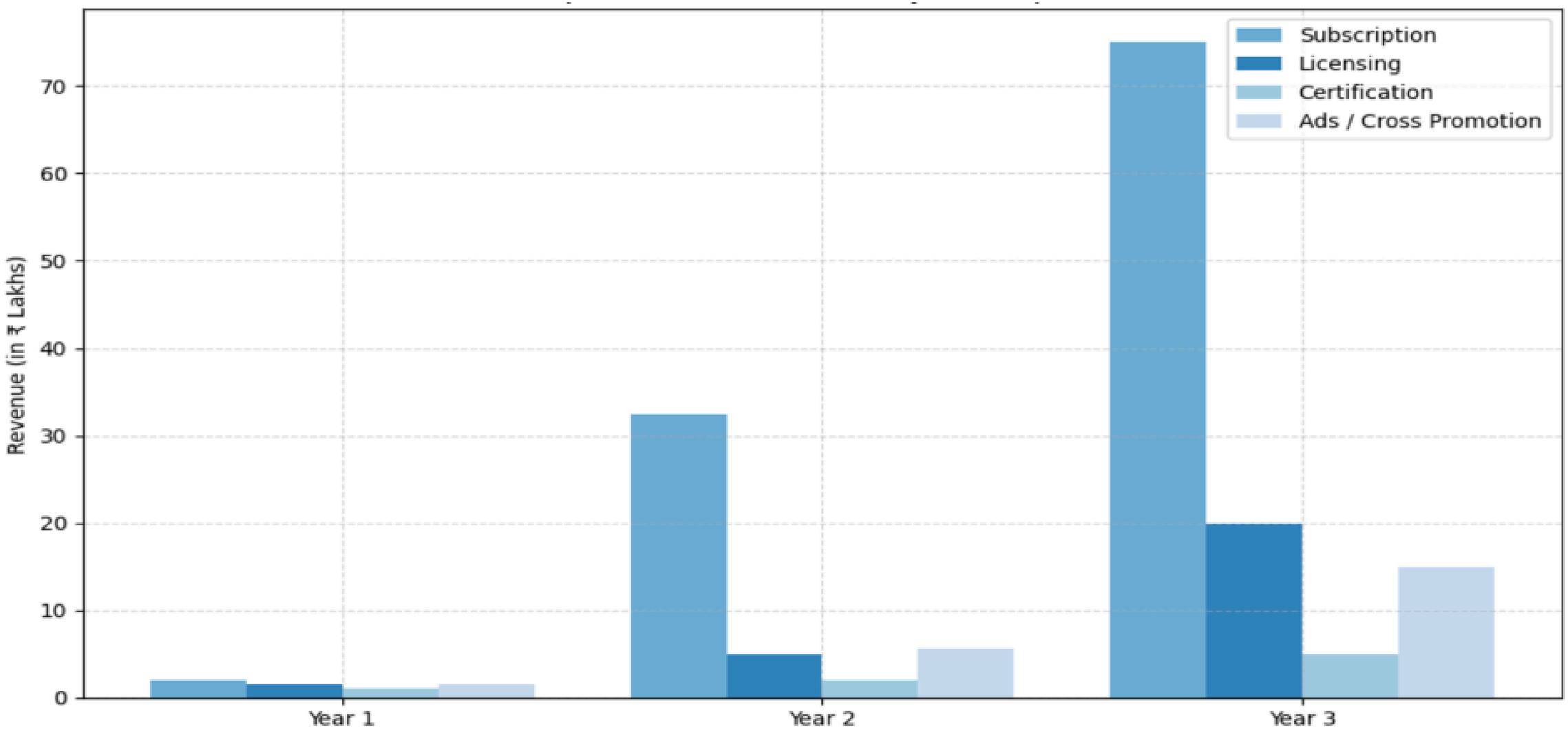
- **Certification Programs: Certify hundreds of professionals and conduct large-scale training partnerships. Estimated Revenue: ₹3 Lakhs–₹5 Lakhs**

- **Cross Promotion: Boost ad and cross-promotion revenue via national campaigns and telehealth partners. Estimated Revenue: ₹10 Lakhs–₹15 Lakhs**

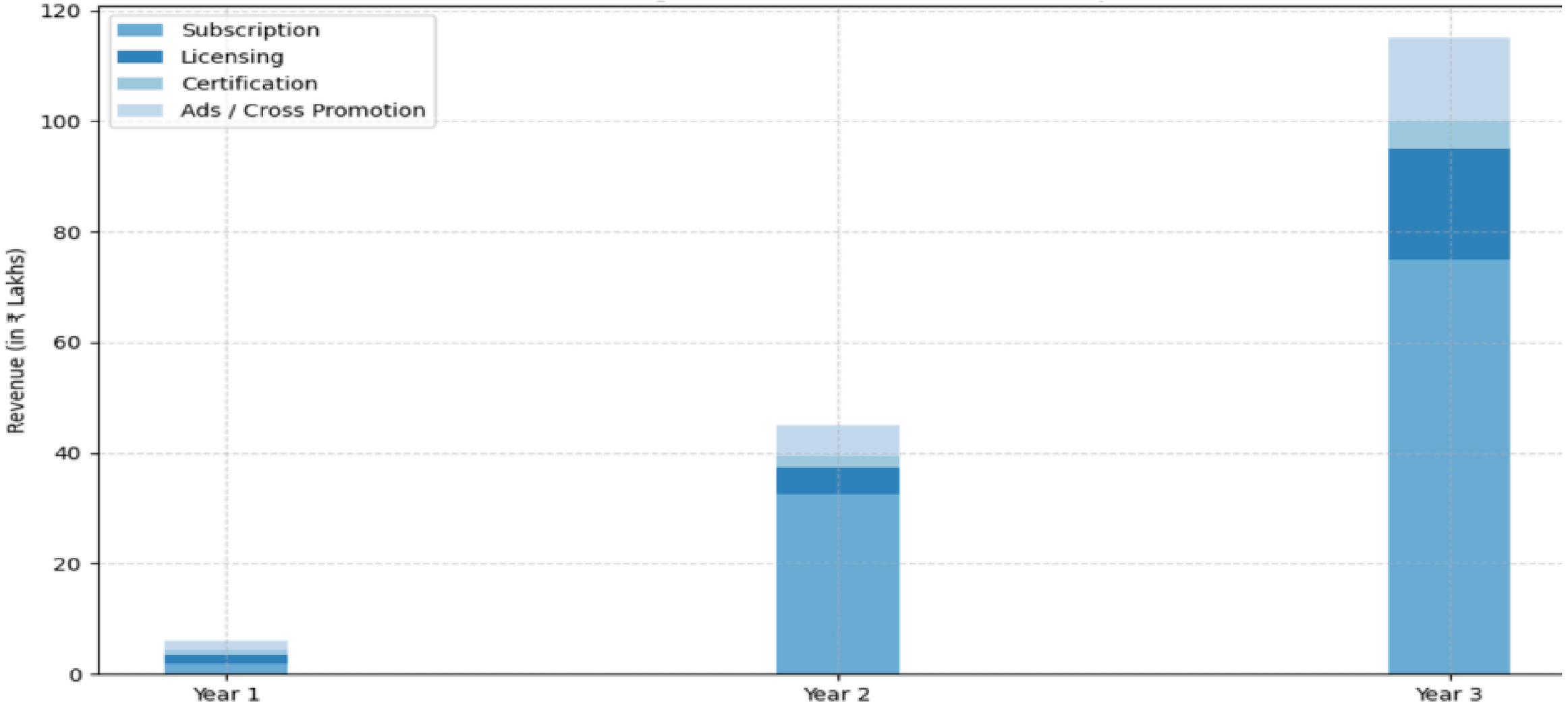
Year 3 Total Revenue Estimate: ₹83 Lakhs–₹115 Lakhs



Side-by-Side comparisons of revenue streams across three years. It indicates strong growth in Subscription and Licensing revenues, especially in Year 3.

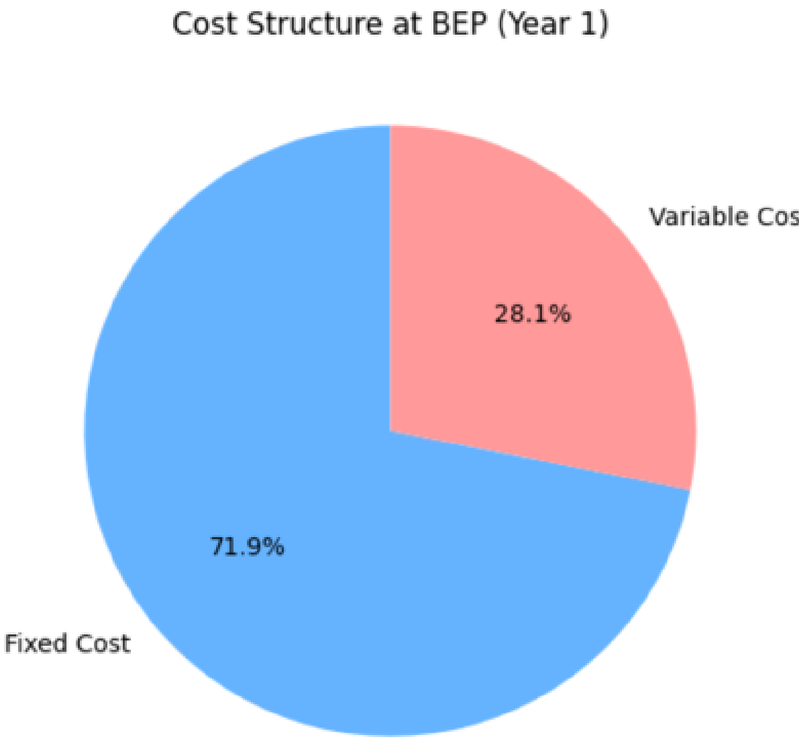


Emphasizes Cumulative revenue growth which show that year-over-year total revenue increases dramatically, mainly driven by subscription services, followed by licensing and ads



BREAK EVEN ANALYSIS

Year-wise Estimates for Break-even Analysis:



Year 1: Establishment Phase

- **Fixed Costs (FC): ₹5 Lakhs (initial setup, team, infrastructure)**
- **Variable Costs (VC): ₹250 per user (server, support, operations)**
- **Revenue per User:**

Premium Subscription: ₹650/year
Ad Revenue: ₹240/year
Total Revenue per User: ₹890/year

Break-even Point (Units):

$$\text{BEP} = \frac{\text{FC}}{\text{Revenue per User} - \text{VC per User}} = \frac{5,00,000}{890 - 250} = \frac{5,00,000}{640} \approx 781 \text{ users}$$

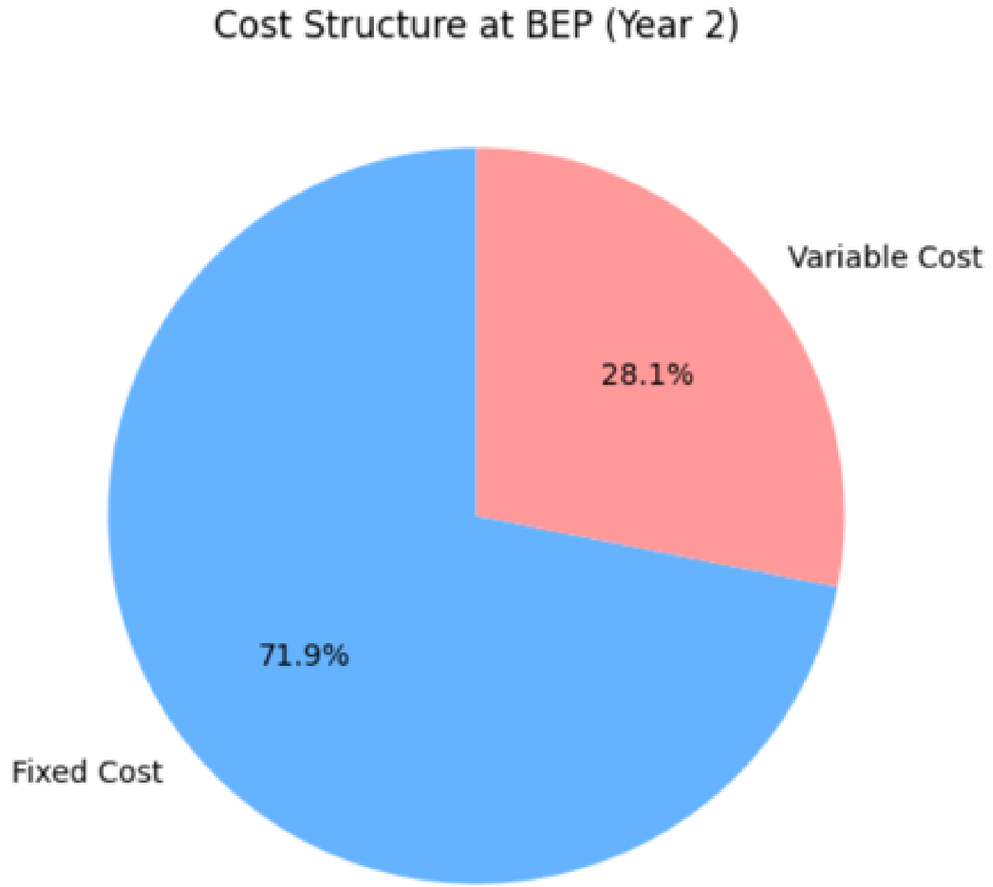
Required Users for BEP: 781 users

BREAK EVEN ANALYSIS

Year 2: Growth Phase

- **Fixed Costs (FC): ₹10 Lakhs (scaling infrastructure, expanded team)**
- **Variable Costs (VC): ₹250 per user**
- **Revenue per User:**

Premium Subscription: ₹650/year
Ad Revenue: ₹240/year
Total Revenue per User: ₹890/year



Break-even Point (Units):

$$\text{BEP} = \frac{10,00,000}{890 - 250} = \frac{10,00,000}{640} \approx 1,563 \text{ users}$$

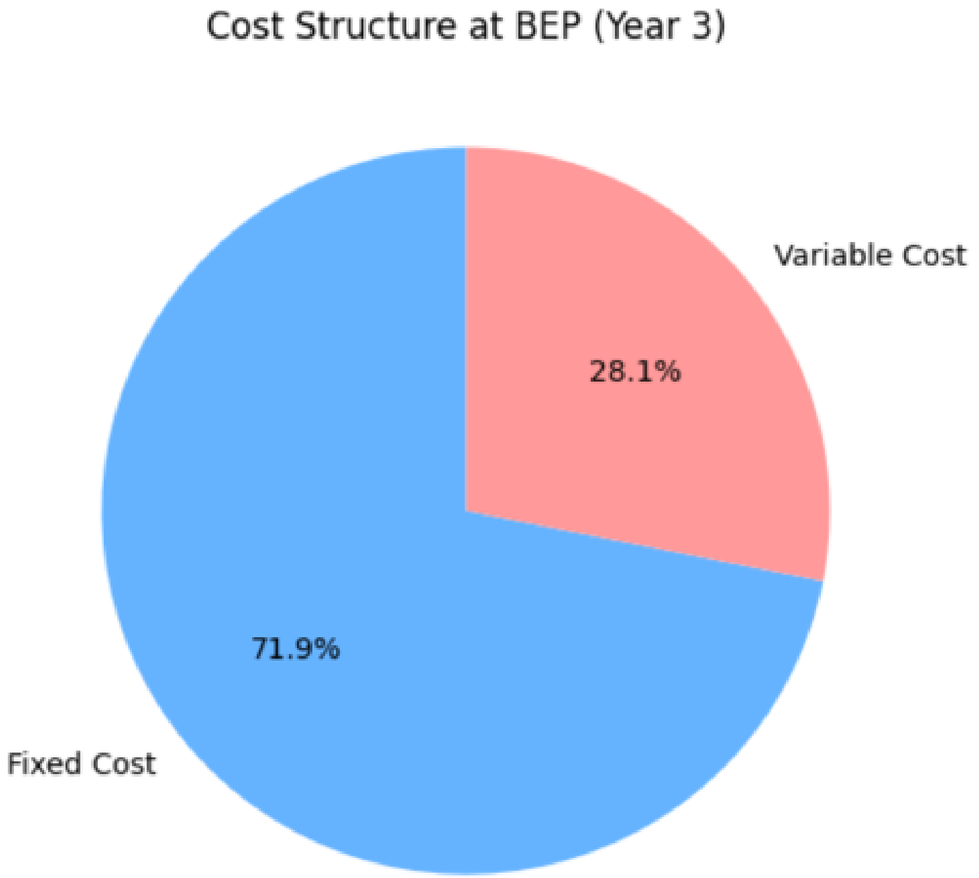
Required Users for BEP: 1,563 users

BREAK EVEN ANALYSIS

Year 3: Expansion Phase

- **Fixed Costs (FC): ₹20 Lakhs (global scaling, new facilities, hiring)**
- **Variable Costs (VC): ₹250 per user**
- **Revenue per User:**

Premium Subscription: ₹650/year
Ad Revenue: ₹240/year
Total Revenue per User: ₹890/year

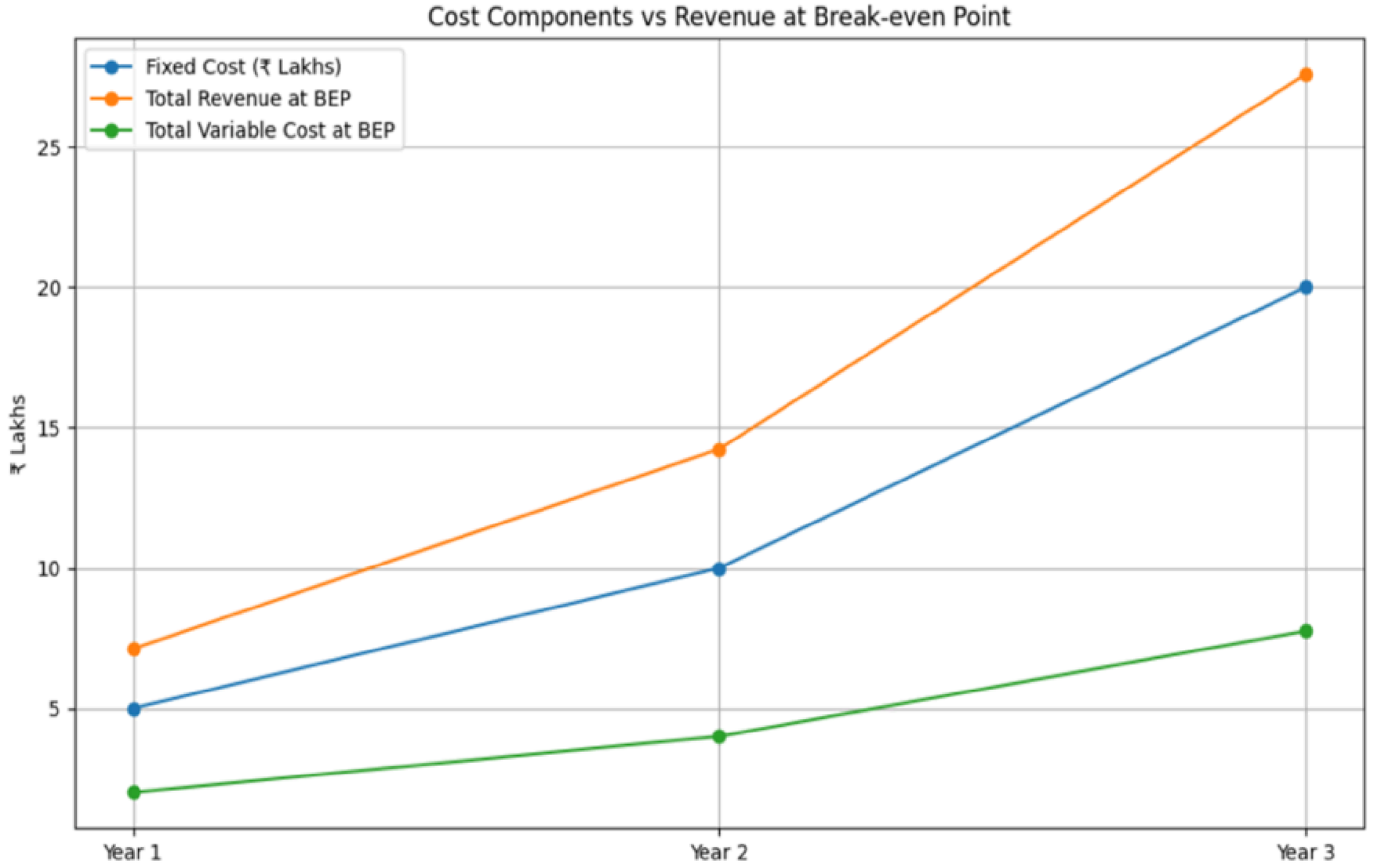


Break-even Point (Units):

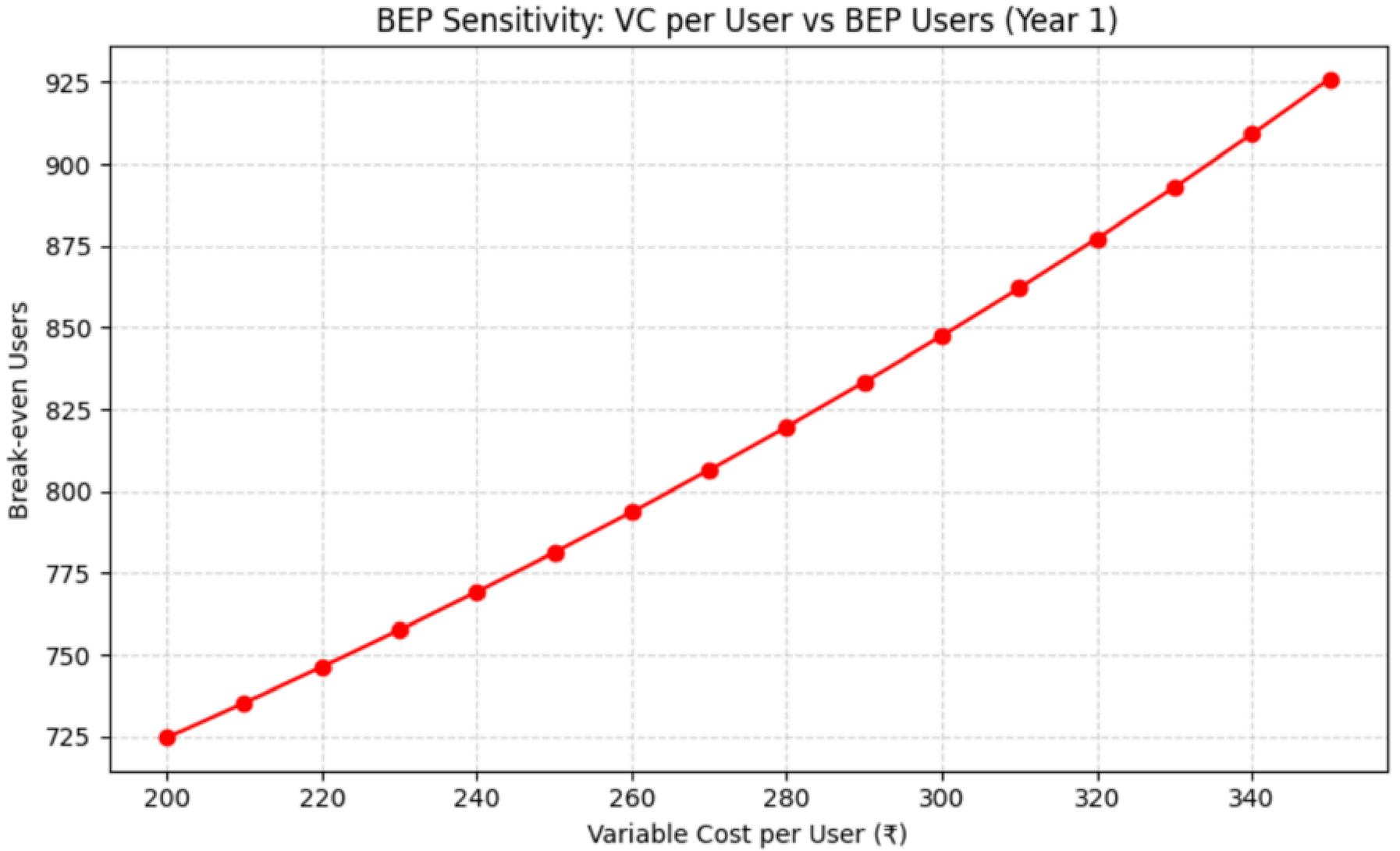
$$\text{BEP} = \frac{20,00,000}{890 - 250} = \frac{20,00,000}{640} \approx 3,125 \text{ users}$$

Required Users for BEP: 3,125 users

Revenue must grow proportionally with both fixed and variable costs to maintain viability



Shows how sensitive break-even point is to changes in per-user cost. Even a ₹50 increase in variable cost per user raises the break-even user count by ~100



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