

**A
Project Report**

For

Nebula9.ai

Position: Business Analyst Internship

Scenario 2: AI in Healthcare Patient Support

Candidate: Anant Upadhiyay

Date-20 July 2025

Email:anant.upadhiyay.22cse@bmu.edu.in

contact: 8750447547

Prepared

For



**Nebula9.ai Recruitment Team
July 2025**

Project Overview

In today's digital era, leading healthcare organizations strive to provide efficient, accessible, and patient-centric services. The healthcare provider does not have an expandable, smart and never-losing patient-connection solution. Being a Business Analyst of a healthcare organization that plans to introduce an AI-driven virtual assistant, my major task will be to serve as a liaison between the clinical, operational and technical departments and make sure that the planned solution will meet the demands of patients and the organizational priorities. Patients today expect fast, personal, and round-the-clock support—an expectation shaped by rapid digital advancements in almost every other aspect of their lives. For healthcare providers, delivering on this promise is challenging, especially when administrative staff are over-stretched and workflows are fragmented. At the same time, manual data entry and outdated systems expose providers to risks of human error and inconsistencies in medical documentation, often leading to further delays or miscommunication.

My responsibilities include:

Gathering and analysing input from doctors, nurses, administrators, IT leaders, and—critically—patients themselves.

Translating those needs into actionable features (such as 24/7 appointment scheduling, health FAQs, and medication reminders), while ensuring strict integration with the hospital's electronic medical records (EMR) and compliance with privacy standards.

Acting as a liaison throughout the project, clarifying priorities, resolving conflicts, and ensuring constant communication between stakeholders to facilitate adoption and value realization.

Leading change management efforts by documenting challenges, mapping workflows, providing training, and collecting ongoing feedback after implementation.

AI-driven virtual assistants in healthcare are not just about “answering questions”—they are rapidly becoming indispensable tools for streamlining triage, improving medication adherence, reducing no-shows, simplifying billing, and providing real-time, personalized patient guidance. By bringing together patients, providers, and technology, these solutions enable a smarter, more scalable approach to healthcare delivery, ensuring the organization can meet—and exceed—the rising expectations of the digital age.

Project Objective

This project is aimed at the design, implementation, and creation of a strong AI-based virtual assistant that allows patients and their care providers to converse continuously, intelligently, and extremely personalized through the given virtual assistant. As an answer to the growing needs of equitable, responsive, and patient-centred care, the assistant will be a digital bridge that is available 24-hours, 365 days a year and will give the existing experience of the care journey a seamless and responsive approach.

Available in numerous forms such as web portals, mobile apps, and voice-based devices, the virtual assistant is designed to make sure that patients can reach out to their healthcare provider at any location at any time and refute the constraints in the traditional working hours, diminishing their dependency on face-to-face or telephonic consultation. This 24-hour access becomes very fundamental towards ensuring that more patients become active in the way they manage their health and on the same hand reduce the administrative load on hospital employees.

Its main characteristics are that it is completely autonomous in the management of the appointment strictly: patients can make or cancel their appointment or change it at any moment in real-time without making a call or any kind of intervention. Automation of such processes will not only maximize convenience of the patients but also will free up administrative resources to work on other, more valuable tasks. Moreover, it will provide the assistant with near-infinite and near-instant responses to most frequently asked health-related and administrative questions driven by AI to provide quick, precise and contextually appropriate assistance at all hours of the day.

Other than simplification in administration, the system has one-on-one medication reminders based on the profile therapy plan and care history of each specific patient and counter one of the most prevalent issues in the healthcare industry: the lack of adherence to cited medication. By offering such reminders using the communication channel that a patient prefers and considering his or her daily habits, the assistant helps them achieve higher adherence and develop better long-term health outcomes. One of the most fundamental basic elements of this solution is its context-aware secure interaction model. The assistant will utilize the application of advanced role-based access controls, which would only allow the most critical information to be accessed by authorized individuals. Any communication and transfer of data will be end-to-end encrypted, with an audit trail in place that allows monitoring of system usage which in turn allows transparency and compliance. The integration to the Electronic Medical Records (EMR) system of the hospital will be built to perform to or above the industry-leading standards of data protection, such as HIPAA and GDPR, to ensure confidentiality, integrity, and security of the information about all other patients. With the help of this project, the healthcare organization wishes to make a radical breakthrough in terms of the digital engagement with patients, the efficiency of operations, and the quality of delivery. The virtual assistant will lead to a drastic decrease in manual work as well as streamline patient-provider communication, and, by the benefits of AI-enhanced automation and personalization (guided by the secure and standards-compliant integration of technology), become the foundation of a new paradigm of smart and patient-centric care delivery in the new, digital healthcare age

Historical Data

- The global AI virtual assistant market in healthcare amounted to 677.93 million in 2023 and is expected to reach 9295.63 million by 2030 at a CAGR of 33.77% in the mentioned time frame, Verified Market Research reported.
- Precedence Research confirms that AI in healthcare exceeded \$26.69 billion in 2024 and projects the figure to be higher by 2034 at \$613.81 billion.

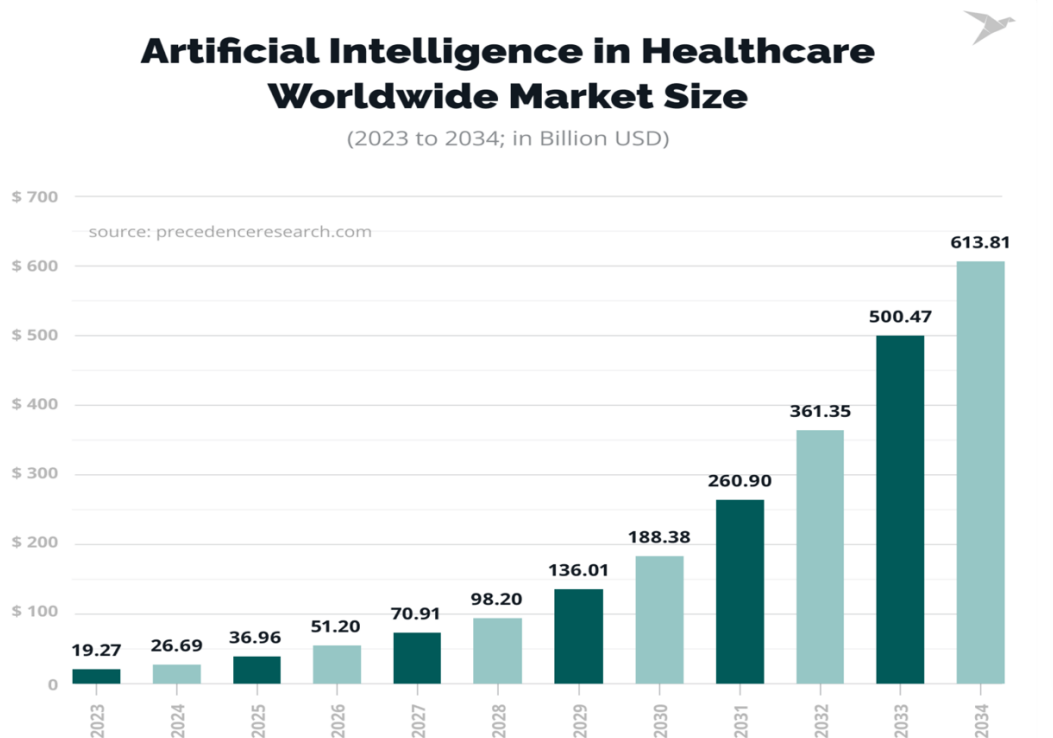


Fig 1: worldwide market size of Artificial Intelligence (AI) in healthcare from 2023 to 2034

- According to Forbes, 72 percent of patients were fine with voice assistants to serve them with several other functions, such as refills or scheduling appointments. Almost 50 percent of healthcare institutions use voice tech, and 39 percent of them intend to deploy it.
- The AI virtual assistants have the capacity to lessen the administrative workload of healthcare providers since it can automate up to 30 percent patient interactions, including appointment setting and reminder processes.
- More than 70 percent of patients were satisfied with patients' consultations due to the utilization of AI virtual assistants to make inquiries on their health condition and appointment management.
- Hospitals that have implemented AI virtual assistants have witnessed a decrease of up to 40 percent on the calls and responses that the call centres received regarding the normal questions that patients ask.

Market Opportunities

TAM (Total Addressable Market): The healthcare virtual assistant market is estimated to grow to be \$4.68 billion by 2034 (Precedence Research) and \$9.29 billion by 2030 (Tech Magic/Verified Market Research) globally with the major buyer segment being hospitals, large clinics, and health systems. Automation requirements, digital transformation, and cost reduction, and chronic disease management are the drivers of growth

SAM (Serviceable Available Market): Targets sales/support explicitly to hospitals and health systems (the segment commonly referred to as the providers), which should comprise at least a third to half of the TAM (so far, nearly all existing virtual assistant deployments are in hospitals and clinics, not in insurers or payers). The vendor market (including hospitals) in the world is estimated to be at least 1.52.0 billion by 2025.

SOM (Serviceable Obtainable Market): Depicts the part that your company can reasonably achieve. This is usually 1-5 percent of the SAM within first few years in case of a new entrant or regional roll out. Example: In the burgeoning health tech space of India, the available market in the AI assistant in the hospital space may be in the range of 20-50 million in 2025-2028 with the forecast rising as adoption levels gather pace.

	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)

Table 1: TAM vs SAM vs SOM Market size estimates

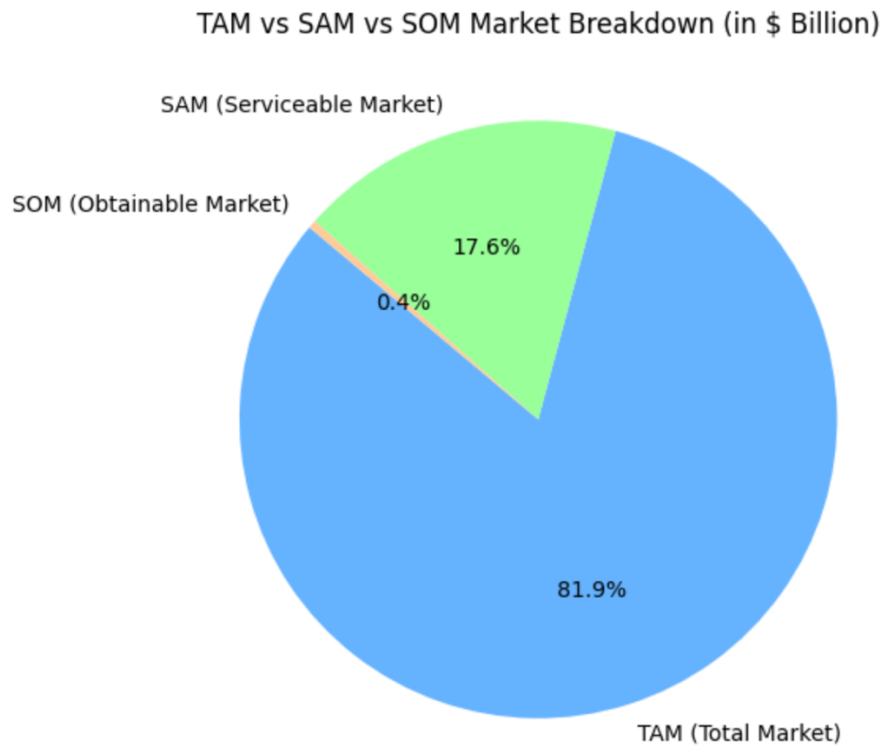


Fig 2: TAM vs SAM vs SOM Market Breakdown

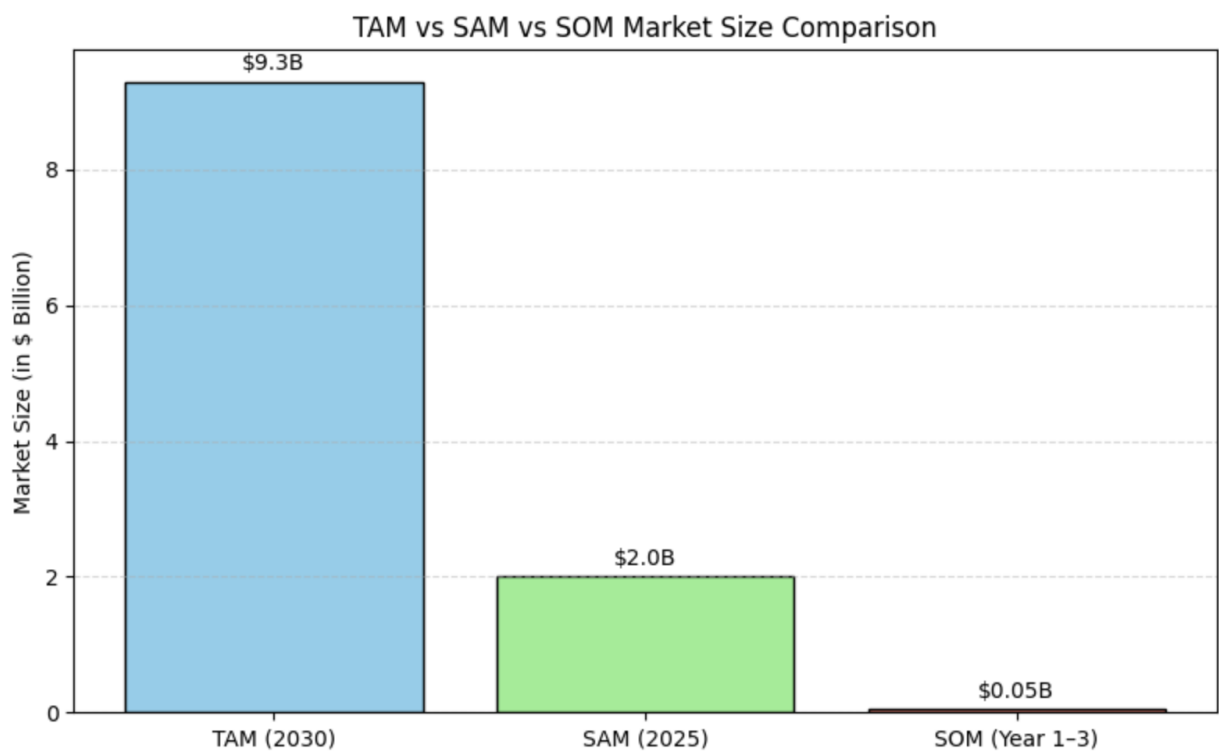


Fig 3: Market Size Estimate

Competitor Analysis

Name	Offering	Strengths	Weaknesses
Nuance (Microsoft)	AI virtual assistants for clinical documentation and patient engagement; strong EMR integration	<ul style="list-style-type: none"> - Deep EHR/EMR integration - Speech & natural language recognition - High adoption in clinical settings 	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - Comprehensive virtual care (AI triage + live doctor access) - Global scalability - Integration with health systems 	<ul style="list-style-type: none"> - Data privacy concerns in some markets - Limited language support in certain regions
Ada Health	AI-powered symptom checker and patient guidance	<ul style="list-style-type: none"> - Accurate symptom analysis - User-friendly interface - Broad medical database 	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - Strong telehealth infrastructure - Integration with providers - Robust compliance and security 	<ul style="list-style-type: none"> - Higher costs for advanced features - Primary focus on telemedicine, less on AI automation
Amazon (Alexa Health)	Voice-based patient engagement, appointment scheduling, medication reminders	<ul style="list-style-type: none"> - HIPAA-compliant AI voice assistant - Scalable, home and hospital integration 	<ul style="list-style-type: none"> - Requires patient comfort with voice tech - Less personalization for complex medical needs
Verint	Conversational AI interfaces for healthcare call centres and patient portals	<ul style="list-style-type: none"> - Improves call centre efficiency - Advanced conversational AI 	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - Extensive health information - On-demand virtual consults 	<ul style="list-style-type: none"> - Limited EMR integration - Reliance on quality and availability of expert network

Key Growth Drivers of AI-Powered Virtual Assistant

1. Stakeholder Identification and Analysis- Stakeholder identification not as a one-time task, but as a living process. New ones will emerge as your idea evolves.

1.1 Stakeholder Salience Venn Diagram-

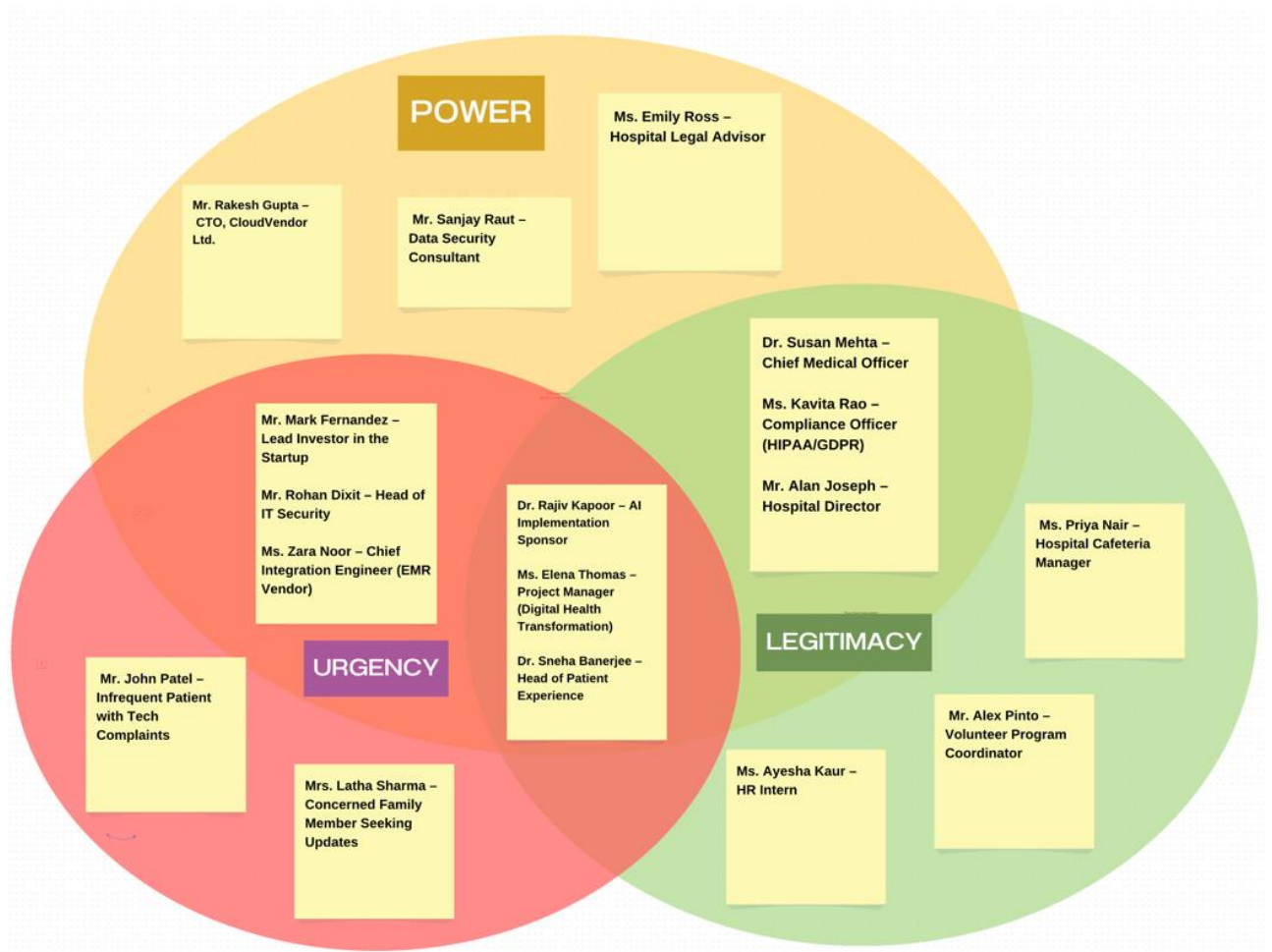


Fig 4: Venn diagram-based Stakeholder Salience Model that maps various stakeholders involved in the development and implementation of an AI-powered virtual assistant for 24/7 patient support in a hospital setting

The **Stakeholder Salience Venn Diagram** is a strategic tool used to visually categorize and prioritize stakeholders based on their level of influence, involvement, and immediacy of concern in a project. In the context of implementing an **AI-powered virtual assistant in a healthcare setting**, this diagram helps identify who must be engaged, monitored, consulted, or informed throughout the project lifecycle. The three core attributes used in this model are

Power, Urgency, and Legitimacy, and stakeholders are plotted in overlapping circles to reflect their combination of these traits.

Power is the first attribute, and it means influence in a decision or resources or the enforcement of rules by a stakeholder. **The stakeholders include such people as the Hospital Legal Advisor (Ms. Emily Ross), the CTO in the cloud/vendor team (Mr. Rakesh Gupta), Data Security Consultant (Mr. Sanjay Raut) will fit under this category.** These people themselves do not participate in the practical process of intensive care of patients but perform an important role in assessing the possibility, safety, and legal aspect of the implementation of AI tools in the medical organization.

Urgency brings an emphasis on the stakeholders with time-constrained needs or those whose interests need urgent solutions. These can be those that will be directly affected by any such delays or malfunctions, i.e., **patients with numerous tech complaints (Mr. John Patel), relatives requesting information (Ms. Latha Sharma), investors who want quick ROI (Mr. Mark Fernandez.)** Their suggestions usually act as a springboard of the project by either exhibiting the realistic deficiencies or holding the implementation team to their feet.

Legitimacy refers to the people with formal authority or has a moral claim associated with the project. This is composed of **top-level hospital officials and officials such as the Chief Medical Officer (Dr. Susan Mehta), Compliance Officer (Ms. Kavita Rao), and Hospital Director (Mr. Alan Joseph).** Their opinion can be crucial to the alignment of the virtual assistant with the best clinical practice, ethical values, regulations, i.e., HIPAA or GDPR.

At the point of intersection of these circles, the diagram determines categories of compound stakeholders. Take an example of those contained in the **Power + Urgency quadrant- the Lead Investor (Mr. Fernandez), EMR Vendor Head (Ms. Zara Noor) among others, are very influential and demand swift action**, thus are instrumental in the short-term interest. **The Power + Legitimacy group has some stakeholders such as legal advisor of the hospital and IT lead who have a more strategic and governance role. Individuals in the Urgency + Legitimacy are the ones in the leadership of an organization by the need to implement AI** (sponsors of implementation in the case of AI) (Dr. Rajiv Kapoor) or leads of the digital transformation (Ms. Elena Thomas) because of their formal position and daily interaction with patients and systems.

The most salient stakeholders are right in the heart of the Venn diagram where Power, Urgency and Legitimacy are joined. They are important partners in bringing success to the project including the senior's clinical officers and program sponsors. **The decisions made by them are used in all way decisions in the direction of strategy as well as the on-ground implementation and they have been keenly involved in the development as well as deployment stages.** Through such a systematic representation of stakeholders, the business analyst securities tangential communication, allots priority to engagement activities, and builds a higher level of alignment into the clinical, administrative, and technical areas.

1.2 Primary, Secondary, and Tertiary Stakeholders

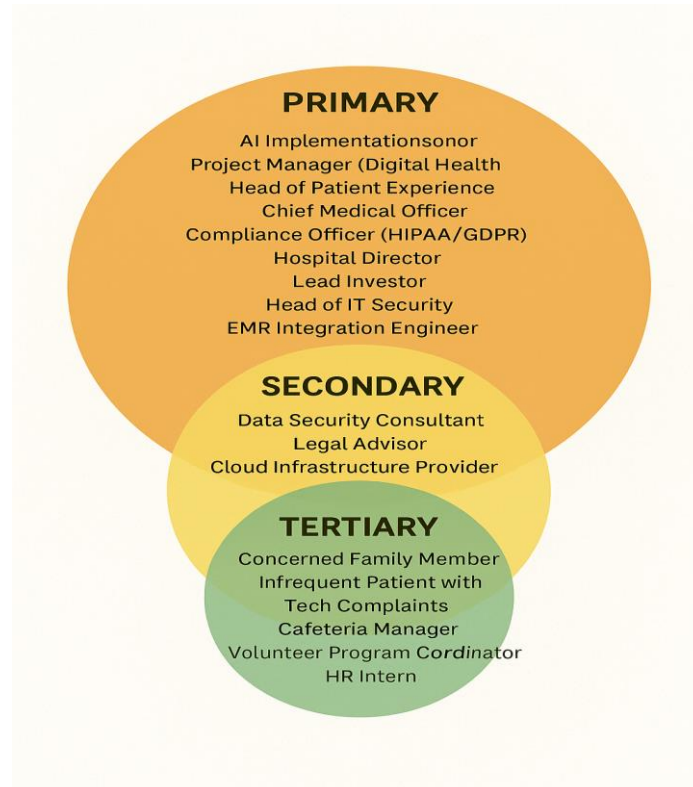


Fig 5: Three-tiered classification of stakeholders

Primary Stakeholders - These are the **most critical stakeholders** who have **direct influence, high involvement**, and a **strong stake** in the success of the AI healthcare project. 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 and can affect the project's security, legal framework, and infrastructure. Their involvement ensures the project is technically sound and legally compliant.

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. Their opinions are important for ensuring the system is patient-friendly, inclusive, and aligned with user needs.

Role Name	Role Title	Key Needs & Priorities
Dr. Rajiv Kapoor	AI Implementation Sponsor	Project leadership, timely implementation, alignment with strategic goals.
Ms. Elena Thomas	Project Manager (Digital Health Transformation)	Agile delivery, cross-team coordination, system performance tracking.
Dr. Susan Mehta	Chief Medical Officer	Clinical accuracy, patient safety, integration with care workflows.
Ms. Kavita Rao	Compliance Officer (HIPAA/GDPR)	Legal compliance, data privacy, secure handling of patient information.
Mr. Alan Joseph	Hospital Director	Organizational efficiency, improved service quality, return on investment.
Mr. Mark Fernandez	Lead Investor	Financial returns, milestone achievement, product scalability.
Mr. Rohan Dixit	Head of IT Security	Strong cybersecurity, threat prevention, secure data flow.
Ms. Zara Noor	Chief Integration Engineer (EMR Vendor)	Seamless system integration, minimal disruption, technical compatibility.
Dr. Sneha Banerjee	Head of Patient Experience	Enhanced user experience, reduced wait times, intuitive digital interactions.

Table 2: Key stakeholders in the implementation of an AI-powered virtual assistant

2) Requirement Gathering

2.1 Understanding Empathy Mapping

Empathy mapping is an important tactical technique that business analysts apply when they want to know more about the stakeholders on a project; mainly the users and decision-makers. This is meant to walk in their shoes and understand their motivations, fears, needs and behaviour. It goes deeper than demographic variables and looks at the emotional and cognitive influences, which in most cases are pivotal when it comes to the development of efficient systems, such as in the case of healthcare AI.

The empathy maps include a description of various important personas in one of the healthcare AI implementation projects: the AI Implementation Sponsor, the Chief Medical Officer, and the Head of IT Security. All the maps are subdivided into major quadrants:

- **What they SEE:** What they observe and can see in the surrounding.
- **What they SAY:** Actions and verbal declaration of priorities or concerns.
- **What they hear:** Information provided by their colleagues, trends in the industry, media and the management.
- **What they THINK and FEEL:** Inner fears, dreams and inspirations.
- **What they DO:** Expressed actions and behaviour patterns.
- **Other Actions and Inspirations:** Dissimilar at first sight but motivators that are comprehensive.

Each persona is a descriptive characterization of a group of stakeholders who have distinctive needs that will have to be addressed in the requirement-gathering process of design system.

The AI Sponsor will be focused on ROI, a perception of reputational risk, and low-hanging fruit. They work to manage the project exposure and ensure leadership acquisition.

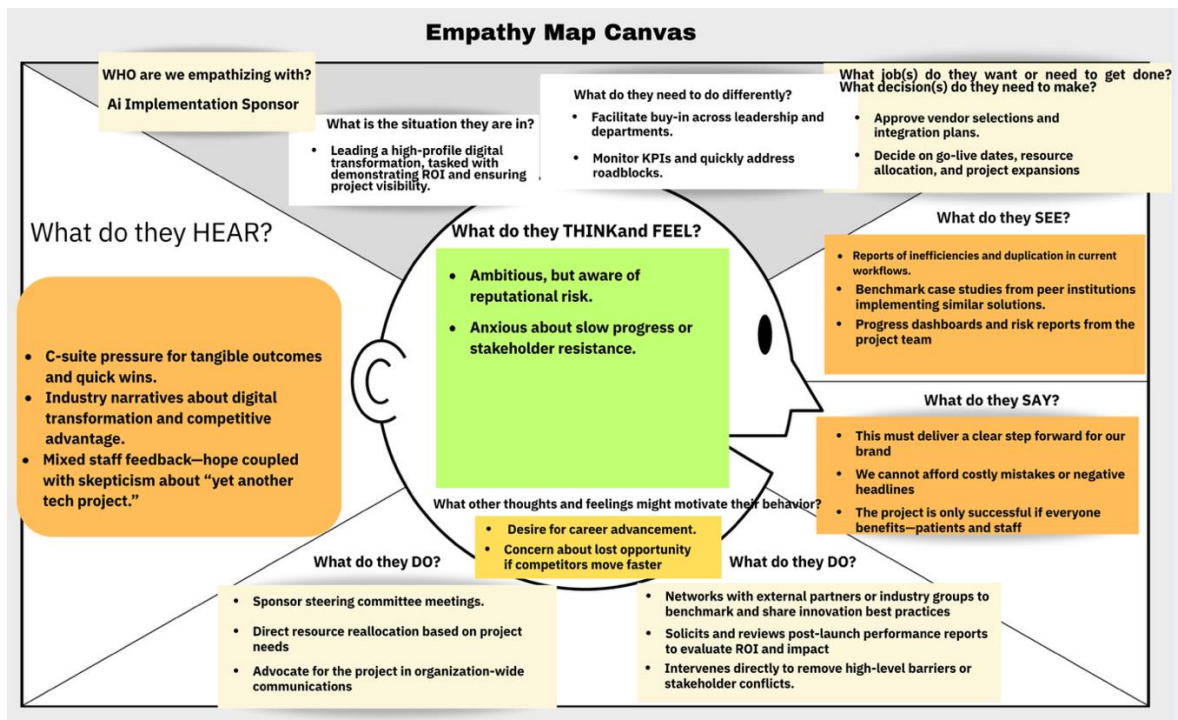


Fig 6: Empathy Map Canvas for AI Implementation Sponsor

The Chief Medical Officer is concerned with clinical security, employee education, and the alignment of the AI tools with the clinical guidelines.

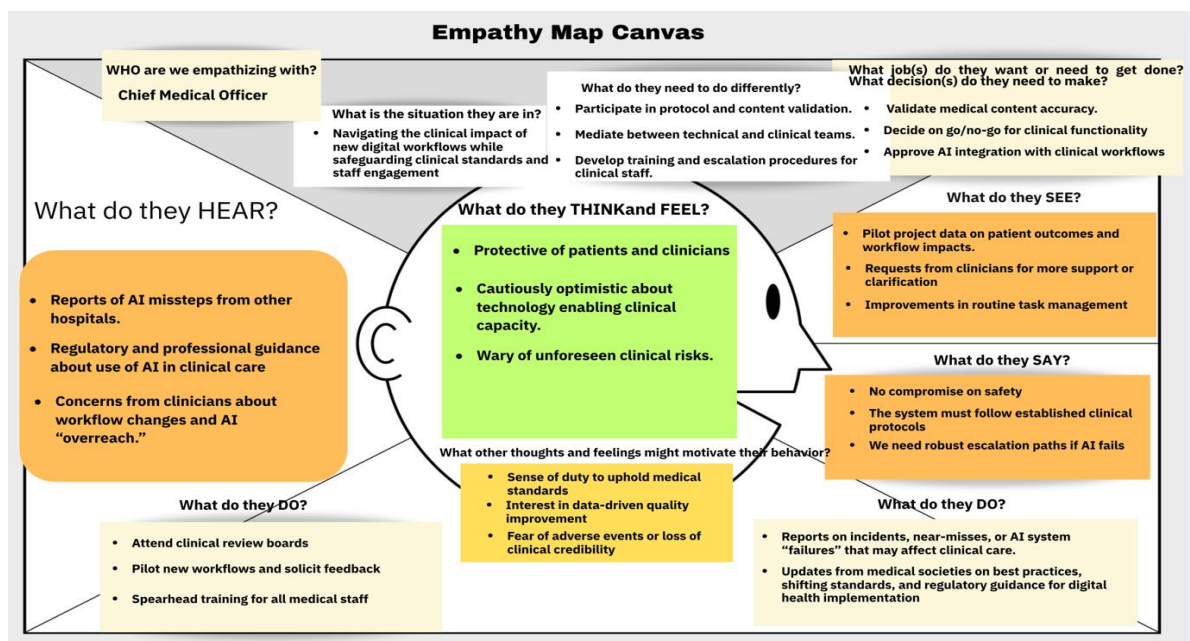


Fig 7: Empathy Map Canvas for Chief Medical Officer

The concern of the Head of IT Security includes data protection, the threat of breach and compliance, which is the basis of secure integration.

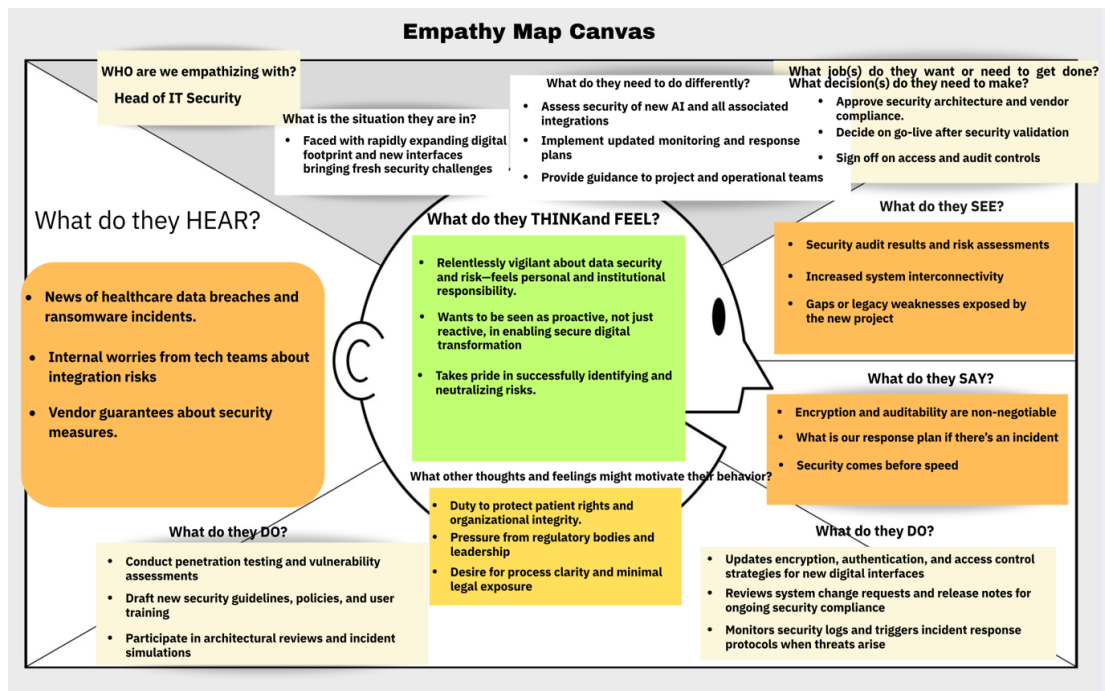


Fig 8: Empathy Map Canvas for Head of IT security

Note- Such empathy maps assist analysts to predict the resistance that stakeholders may have and find out their unmet needs and match the features to the real-life incentives.

2.2 Customer's Persona Analysis

When working as a Business Analyst to a healthcare assistant that incorporates the use of AI, it becomes critical to understand the needs of the end users, their behaviour and issues in details. The customer personas help in ranking the functional and nonfunctional requirements.


Customer personas shift requirements gathering of abstract wish lists to evidence based scenario driven design. To make another example, chronic patients, i.e., those that deal with diabetes, hypertension, or long-term treatment, need consistent, smooth interactions, automated reminders, and patient-positive dialogs which inspire medication take and repeated health checkups. Such characteristics as individual arrangements of medicine intake, automatic reminders about follow-ups, and sympathetic dialog scripts reach the top of the list of needs of this population.

Conversely, occasional users those using healthcare services intermittently when experiencing acute care needs or annually wanting to be checked up have other concerns altogether. To them, getting easy access to reliable information, booking appointment quickly and no frustrating outdated user interface are the most important. They might not require long term tracking but like effective fast service and clear communication when needed.

For Example:

1) Patient with Chronic Conditions – Maria Desai

USERPROFILE
Maria Desai



Age: 58
Location: Bangalore, 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:

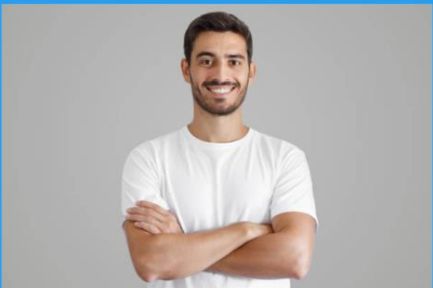
1. Struggles to keep track of medication schedules.
2. Experiences long phone wait times or limited access outside business hours.
3. Feels overwhelmed by fragmented care and the need to communicate information repeatedly between different providers.

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.

2) New/Occasional Patient – Sachin Dubey

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.

2.3 Solution Design

2.3.1 Value Proposition Model

Value proposition model is a tool that helps to systematically spell out and match the distinct advantages that a solution delivers to its intended customers or users both physical and emotional. Owing to this model, as a business analyst, you utilize it in mediating between organizational goals and user needs via mapping:

- The burning (Jobs) needs and desires of the customers
- What hurts them (Pains)
- The wanted results (Gains)
- How the solution of strong presence would solve those (Products & Services, Pain Relievers, Gain Creators)

2.3.2 Value Proposition Model Structure

1. Value Map

- **Products & Services:** Features and functions that you really covered with your solution (e.g. chatbots, automatic FAQ, EMR integration).
- **Pain Relievers:** The way in which the solution removes or minimized the pains of the users (ex: instant booking versus the phone queue, privacy options to build trust).
- **Gain Creators:** The unique value your solution brings that can be used to address pains (e.g. real-time personalized responses, notifications based on user requirements).

2. Customer Profile

- **Customer Jobs:** The fundamental activity, issue, or requirement that the customers seek to fulfil (e.g. appointments, medicine alerts, or 24-hour help).
- **Pains:** Difficulties, impediments, or unpleasant experiences which cause jobs to be hard (e.g. long lines, unable to get an appointment, privacy issues).
- **Gains:** The desired positive effects that are anticipated by the customers of a product or service (e.g., fast answers, safe access, better compliance).

Why It Matters?

The value proposition model ensures solutions are not just “built to spec,” but designed to deliver clear, validated benefits that matter most to real users. As a business analyst, you use this as a blueprint to align design, development, and rollout—maximizing both adoption and measurable ROI.

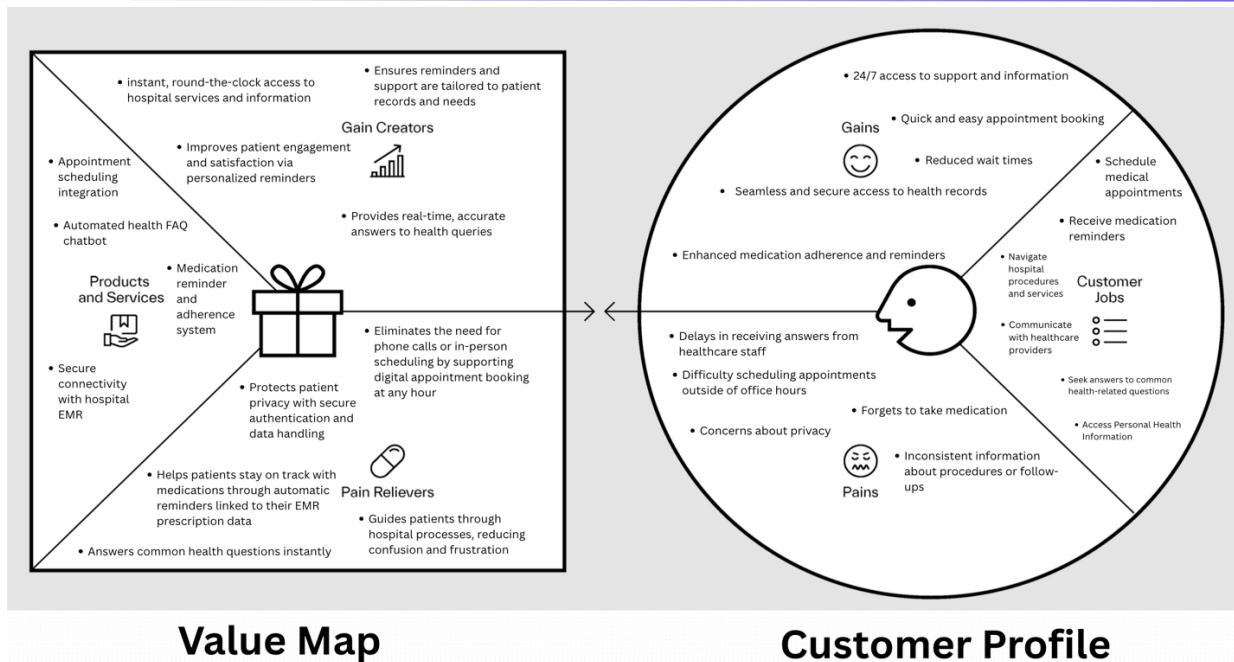


Fig 9: The Value Proposition Canvas helps align the **solution's offerings** (Value Map) with the **needs and expectations of the customer** (Customer Profile), aiming to improve the healthcare experience

2.3.2 Business Model Canvas

Business Model Canvas (BMC) is a strategic and entrepreneurial tool that is created to describe, analyse and design the business models in a single page in a visual way. It gives us a clear and simplified paradigm to learn how a business makes, delivers, and captures value, and therefore it is one of the most valuable guides that an entrepreneur should learn so that they could have a map of a company of how it creates, captures, and delivers value.

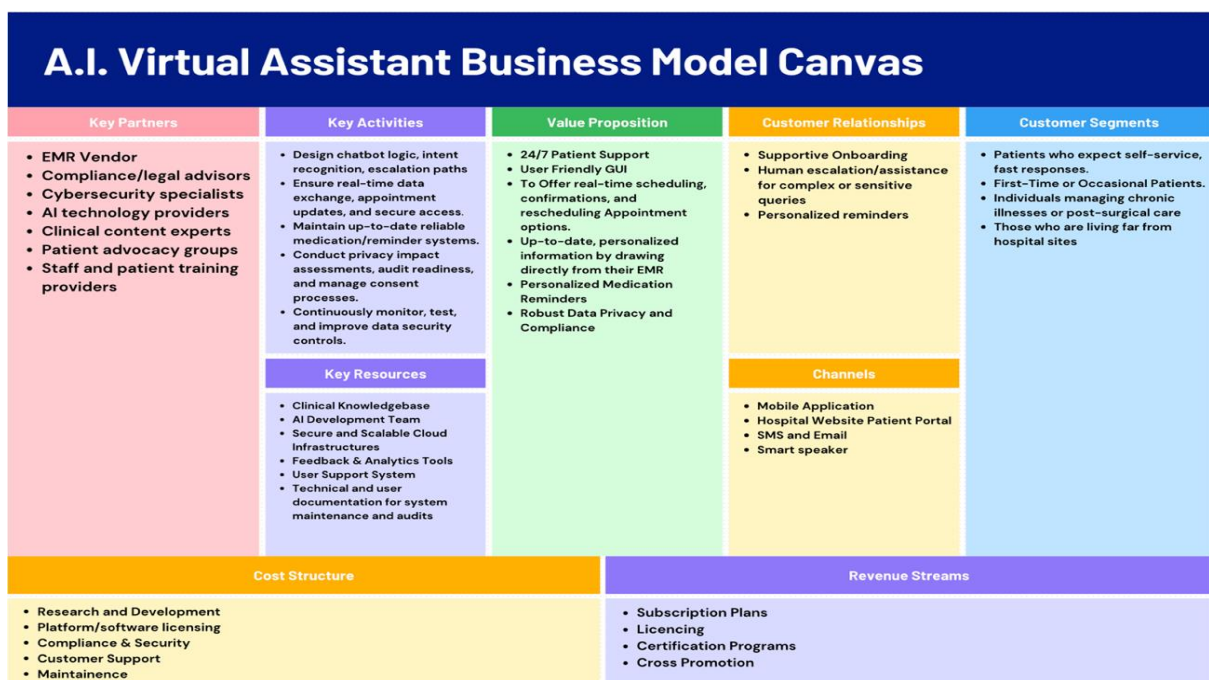


Fig 10:Business Model Canvas

The BMC's one-page format simplifies complex business models, making it easy to onboard teams, communicate with stakeholders, and iterate quickly. It is useful across various contexts such as launching new products, entering new markets, or pivoting business strategies. For example, companies like Netflix have successfully used BMC principles to evolve their business model in response to market shifts

3. Project Management Technique

Agile methodology is the most effective technique in a case of a project that is building an AI-powered virtual assistant to assist patients around the clock. Agile divides a project into small, manageable increments referred to as a sprint (2-4 weeks per sprint) where each sprint aims at delivering an increment to the product, a working and testable product. Agile does not engage into hard long-term planning but instead, it accepts change, even after the project has started, based on things moving along, and based on novel ideas. Open communications, regular performance reviews and testing are the heart of the process.

3.1 Functional and Non-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.

Table 3: 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.

Table 4: Non-Functional Requirements

3.2 Project Timeline (Example for a 6-month Agile Implementation)

Month	Phase / Sprint	Key Activities and Deliverables
1	Planning / Discovery	Stakeholder interviews, requirement gathering, empathy mapping, and MVP planning
	Sprint 0	Plan system architecture, EMR integration roadmap, and security evaluation
2	Sprint 1	Build basic assistant infrastructure and prototype appointment scheduling
3	Sprint 2	Integrate EMR (read capability), implement basic medication reminder logic
	Sprint 3	Add health FAQ module, simple administrative functions, and gather initial user feedback
4	Sprint 4	Improve system security (encryption, RBAC), and begin implementing audit logging
	Sprint 5	Enable multi-channel support (mobile, voice), and add accessibility features
5	Sprint 6	Collect user feedback, fix bugs, and finalize billing query automation module
	UAT / Beta	Conduct User Acceptance Testing (UAT), run pilot with staff and patients, and provide training
6	Go-Live & Support	Launch to production, onboard customers, gather real-world feedback, transition to support and maintenance phase

Table 5: Project Timeline

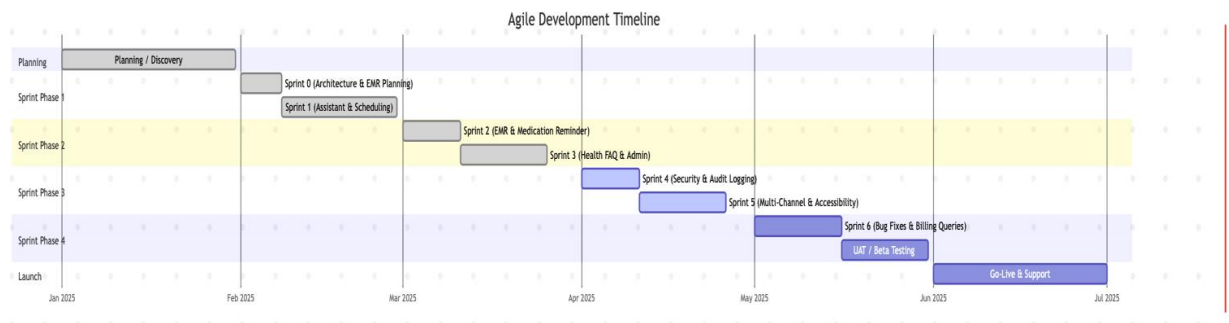


Fig 11: Gantt-Chart for the Project Timeline

4. Risk Management Framework

For healthcare AI deployments, Strong risk management is a major responsibility for a Business Analyst.

4.1 Risk Assessment

Sno.	Risk	Description	Consequences / Effects
1	Security Breach	Unauthorized access to patient data or EMR due to hacking, phishing, or poor access control.	Loss of patient trust, legal penalties, regulatory fines, and reputational damage.
2	Compliance Failure	Non-compliance with healthcare regulations like HIPAA, GDPR due to missing technical/process controls.	Heavy fines, market exclusion, potential shutdown.
3	Integration Failure	Inability to properly connect to EMRs or third-party systems due to technical incompatibility or errors.	Disrupted operations, user frustration, increased operational cost.
4	Intelligence Bias/Mistake	Errors or biased recommendations caused by poor data or algorithm flaws.	Patient harm, credibility loss, legal action, and regulatory scrutiny.
5	User Resistance	Staff or patient reluctance to use the assistant due to usability concerns or distrust in technology.	Low adoption, wasted investment, unmet business goals.
6	Performance Bottlenecks	System lags, crashes, or slows down during peak usage times.	Poor user experience, increased support cost, loss of reputation.
7	Change Management Gaps	Insufficient training, communication, or documentation leading to confusion or improper use.	Errors, user dissatisfaction, decreased productivity.
8	Scope Creep	Uncontrolled addition of features or demands beyond original project scope without proper evaluation.	Time delays, budget overruns, reduced quality, team burnout.
9	Vendor/Technology Risk	Over-reliance on third-party vendors or outdated technology that may fail or become unsupported.	Service downtime, forced migration, unexpected expenses, and data loss.

Table 6: Possible risks that might affect the project

4.2 Risk Analysis

1. Severity- An impact that the negative effects of risk may have on the safety of the patients, the functioning of the hospital, economics, or legal position of a hospital in case the risk materializes.

2. Likelihood- Likelihood of risk occurrence bearing in mind existing controls and situations.

3. Priority Runs severity and probability to prioritise risks to actions.

Risk	Severity	Likelihood	Priority (H/M/L)
Security Breach	High	Medium	High
Compliance Failure	High	Low	Medium
Integration Failure	Medium	Medium	Medium
AI Bias/Error	High	Medium	High
User Resistance	Medium	High	High
Performance Bottleneck	Medium	Medium	Medium
Change Management Gap	Medium	Medium	Medium
Project Scope Creep	Medium	High	High
Vendor Risk	Medium	Low	Low/Medium

Table 7: Risk Analysis of the identified Risk

4.3 Risk Control Strategies-

1. Security & Compliance

- Implement high-grade encryption (in transit and at rest) on all information relating to patients and communication.
- Conduct periodic and confidential security reviews and hacking.
- Make compliance with regulations (HIPAA, GDPR) with the system part of the system at inception. Enforce stringent role-based access controls and all-time monitoring of unauthorized access activities.

2. Thorough Testing

1) Unit Testing: Detect that individual features are functioning well when they are occurring alone.

2) System Integration Testing: Perform checks on the ability of interoperability with the EMR, billing, and other third-party systems.

3) User Acceptance Testing (UAT): Put major workflows through the test with real users. Get peak loads and stress-test to leak performance. Fairness and Bias testing of AI elements; have quality training data that is representative, and audit ready.

4) Training and Interaction with Users: Round the clock education of both staff and patients. Use several ways (emails, workshops, quickies, assistance of helpdesk). Find and empower change champions amid the staff members to encourage engagement and tackle concerns.

5) Modular Architecture: Components of build systems need to be built as microservices or exposed through a clear API to ensure that failure can be isolated and replaced easily. This will permit modification of one bad module (e.g. billing query handler) without having to modify the others.

6) Fallback Mechanisms: Construct an automatic transition of the AI to human agents in complicated, unclear, or critical situations. Make sure that it is possible to degrade the system gracefully and continue to provide partial service when one feature fails.

7) Legal Reviews: The formalization of a compliance and legal review schedule should be at all stages, not only pre-launch. Keep records of the project decisions to be subjected to regulation checks and audit trail.

8) Scope Control: Implement open-access change requesting. Any request of new features/functionalities needs to be considered in terms of business influence, schedule, and availability of resources prior to being approved.

9) Vendor SLAs: Perform extensive supplier due diligence (financial health, record, support). Negotiate Service-Level Agreements (SLAs) which are legally binding and which protect against outages, response times, data ownership and an exit plan.

3. Continuous Monitoring and review

1. Risk Reviews Periodic Risk Reviews

Make risk review meetings official and invite people at the close of each sprint or major project milestone.

- Keep the risk register up to date
- Evaluate new risks/changes in expectation/severity
- Schedule and delegate mitigation controls

2. Early warning systems and Dashboards

- Install dashboards that would track the system health and usage patterns, and the error logs.
- Configure settings that raise automated alerts on strange activity (security breaches, anomalous access to data) and performance unusual behaviour through the use of AI/ML-based cyber threat or system misbehaviour detection.

3. Stakeholder Engagement

- Conduct frequent stakeholder reviews led by clinical, operational, IT, and compliance leaders to share risk status, receive new knowledge, and make joint decisions within a short amount of time.

4. Incident and Feedback Tracking

- Incorporate user complaints and incident reports in the risk management itself.
- Investigate and solve any incidents as quickly as possible, and record lessons learned, and changes to practice.

5. Integration Method

5.1 Standards-Based APIs:

The integration considers **FHIR (Fast Healthcare Interoperability Resources)** standards to guarantee organized and regular access to wellbeing information (e.g., patient data, clinical records, laboratory outcomes). **RESTful APIs and GraphQL are to be used to support low-latency data fetching and communication** through a scalable system.

a) Module Architecture-Microservices are used to abstract APIs to achieve maintainability and scalability. All its core functions (e.g. appointment booking, retrieving medical records, medication reminder) are implemented as a service and can later be updated or swapped without disrupting the whole system.

b) Data Sync in Real-Time: -The synchronization of data between the assistant system and the EMR system is done in real time, and webhooks and the event-driven architecture are provided.

5.2 Compliance and security architecture

Being so sensitive in nature, the system design conforms closely to international data privacy and security standards.

5.2.1 U.S. users: HIPAA Compliance:

- Data at rest is encrypted by using AES-256 encryption, and data in transit by using TLS 1.3.
- Role-based access control (RBAC) to limit the data access and refer to the role of the user (e.g., patient, physician, or admin). Audit and logging of their access of data regularly to facilitate incident response.

5.2.2 GDPR compliances (EU and India):

- Clear authorization of gathering and processing of data.
- Right-to-be-forgotten mechanisms to enable patients to put forward requests to destroy personal data.

5.2.3 Authorization and Authentication:

- **AUTH 2.0 and OpenID Connect** to support safe user authentication and implementations of third-party applications.
- The clinical staff and admins are provided with Two factor authentication (2FA).

6. Business Plan: 3-Year Revenue Model

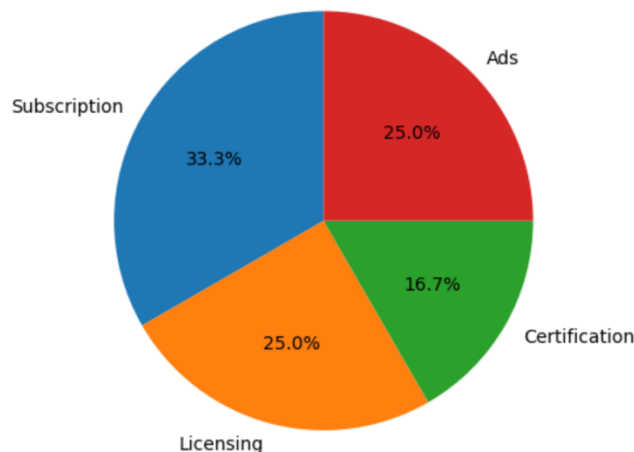
Year 1: Establishment and Pilot Revenue

- **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

Revenue Composition - Year 1



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**

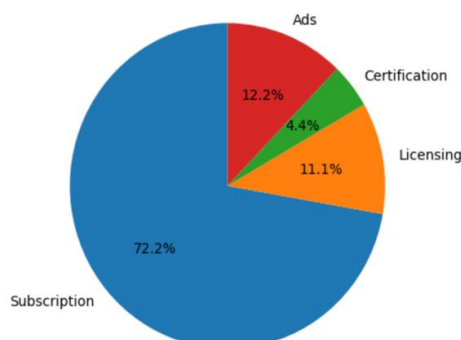
• **Licensing:** Enter more institutional contracts and partnerships (public/private hospitals, clinics). **Estimated Revenue: ₹3 Lakhs–₹5 Lakhs**

• **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 (free + paid). **Estimated Revenue: ₹4 Lakhs–₹5.5 Lakhs**

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

Revenue Composition - Year 2



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

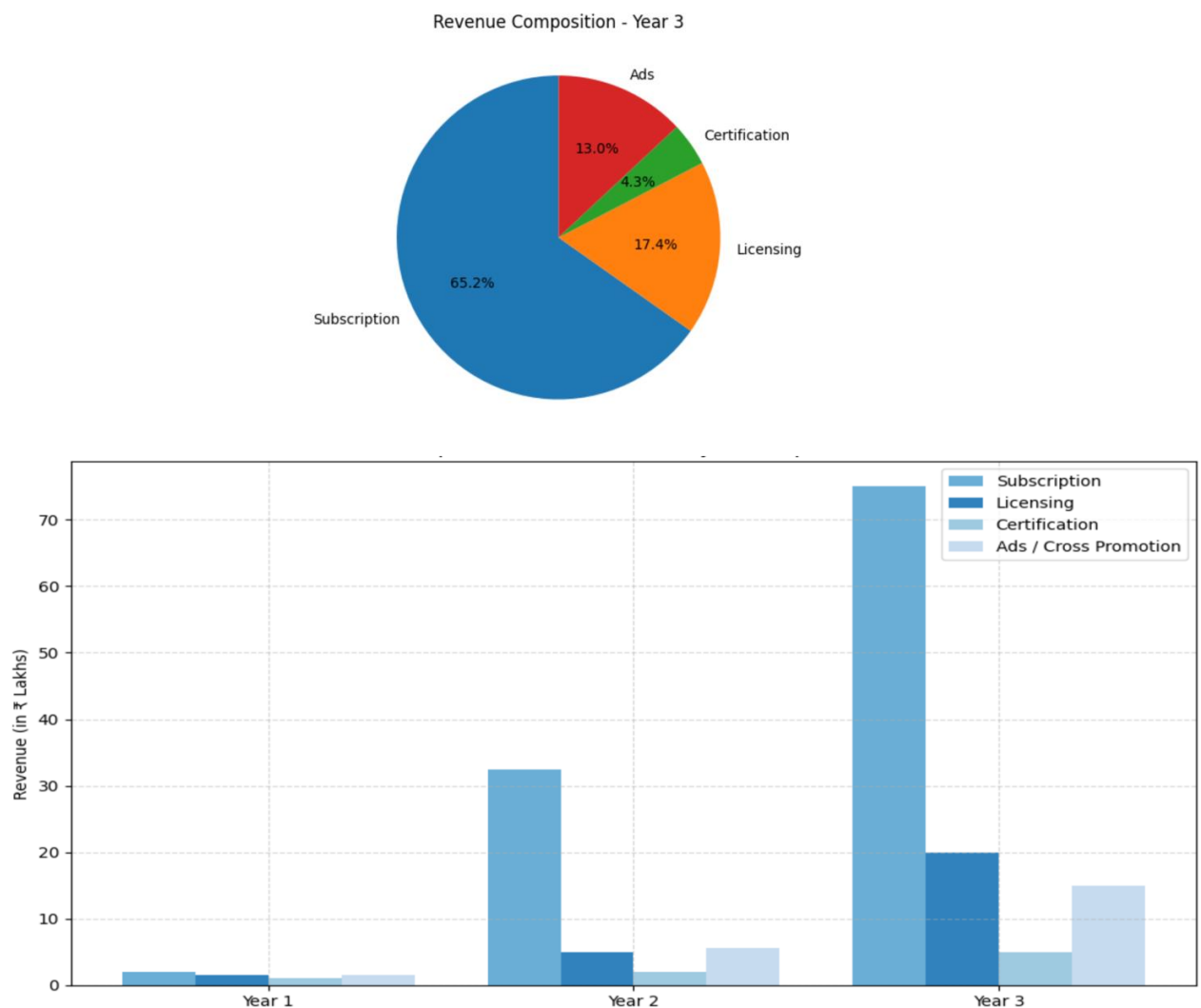


Fig12: Side-by-Side comparisons of revenue streams across three years. It indicates **strong growth in Subscription and Licensing revenues**, especially in Year 3.

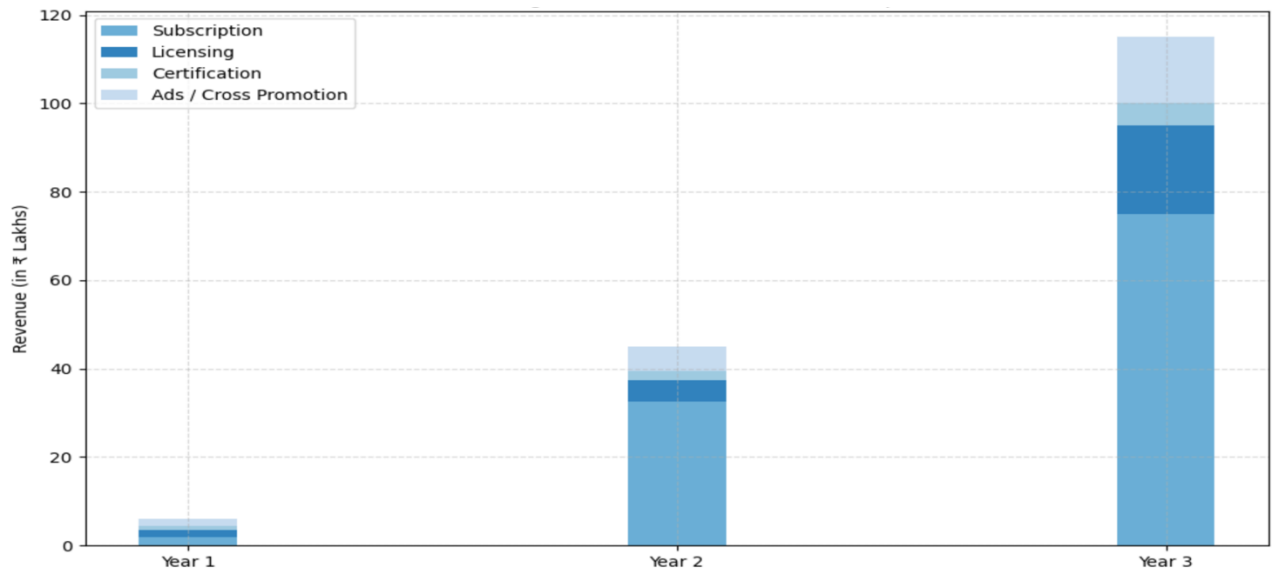


Fig 13: Emphasizes **Cumulative revenue growth** which show that year-over-year total revenue increases dramatically, mainly driven by **subscription services**, followed by **licensing and ads**

7. 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

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

Year 3: Expansion Phase

Fixed Costs (FC): ₹20 Lakhs (global scaling, new facilities, hiring)

Variable Costs (VC): ₹250 per user

Revenue per User:

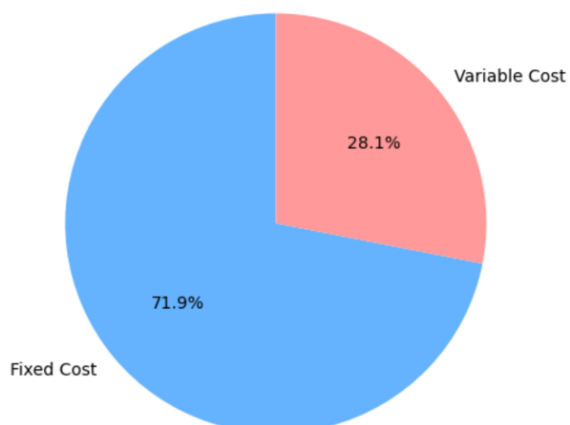
- Premium Subscription: ₹650/year
 - Ad Revenue: ₹240/year
- Total Revenue per User: ₹890/year**

Break-even Point (Units):

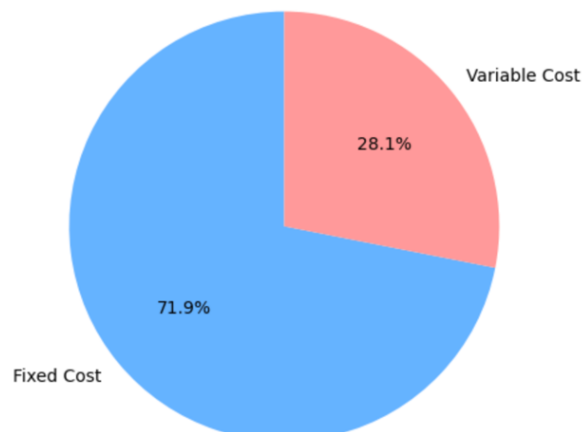
$$\text{BEP} = \frac{20,00,000}{890 - 250} = \frac{20,00,000}{640} \approx 3,125 \text{ users}$$

Required Users for BEP: 3,125 users

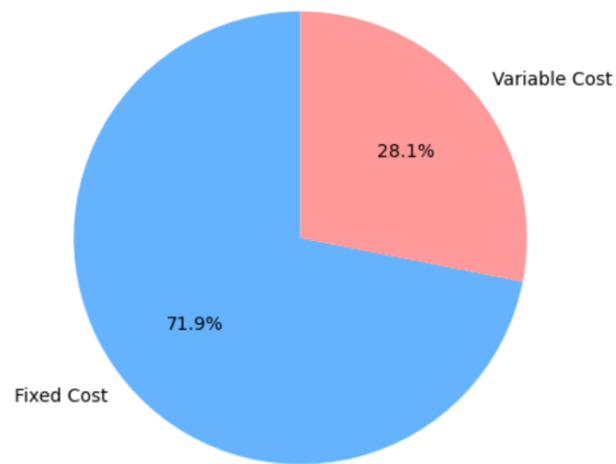
Cost Structure at BEP (Year 1)



Cost Structure at BEP (Year 2)



Cost Structure at BEP (Year 3)



Break-even Point (Users) Over 3 Years

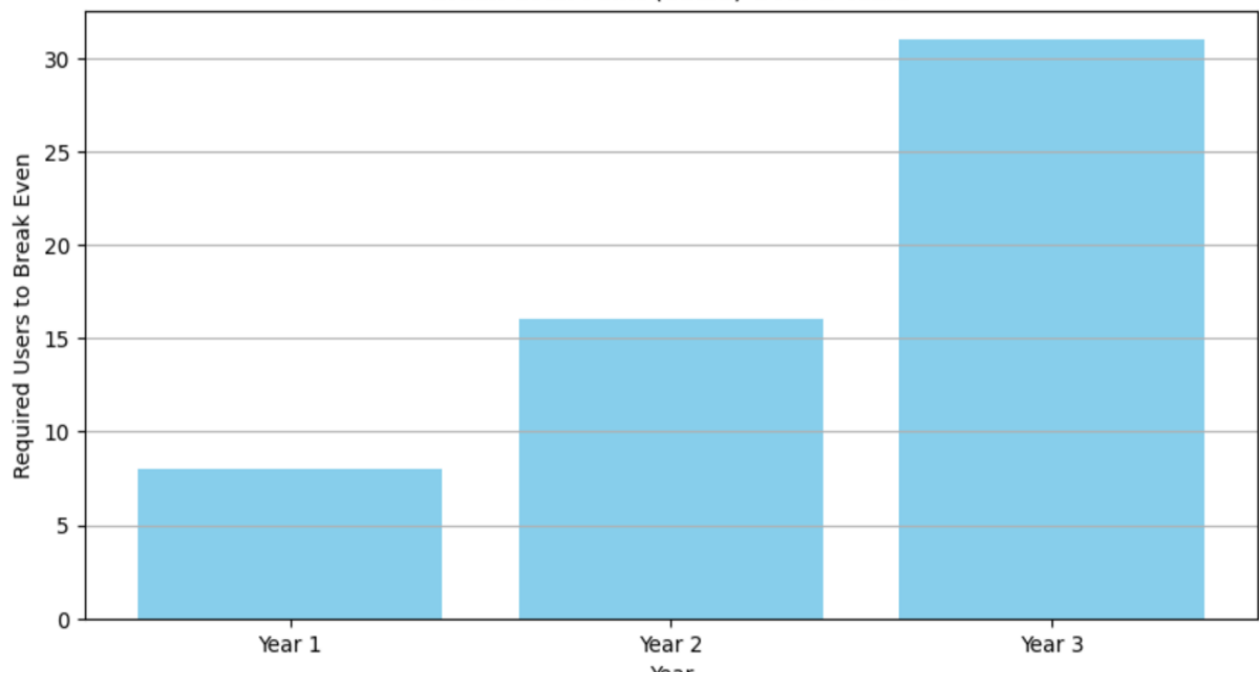


Fig 14: Scale and costs grow, the number of users required to cover costs increases. This reflects higher fixed/variable expenses or greater investment in Year 3

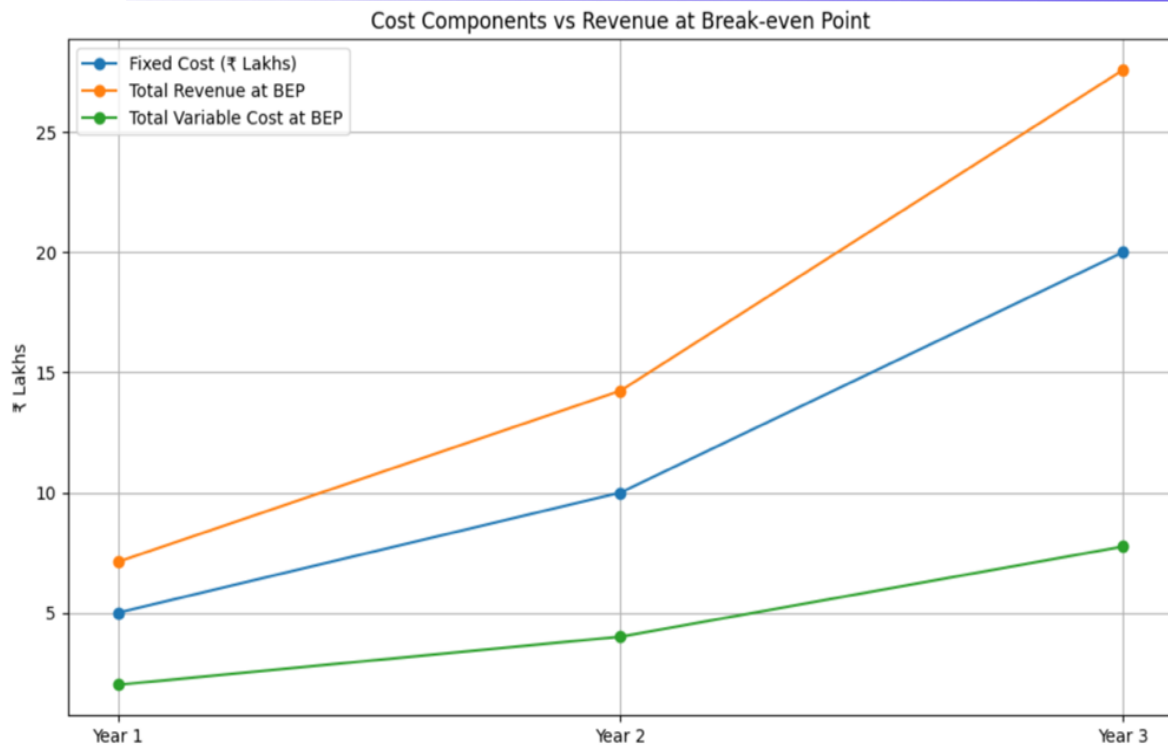


Fig 15: Revenue must grow proportionally with both fixed and variable costs to maintain viability

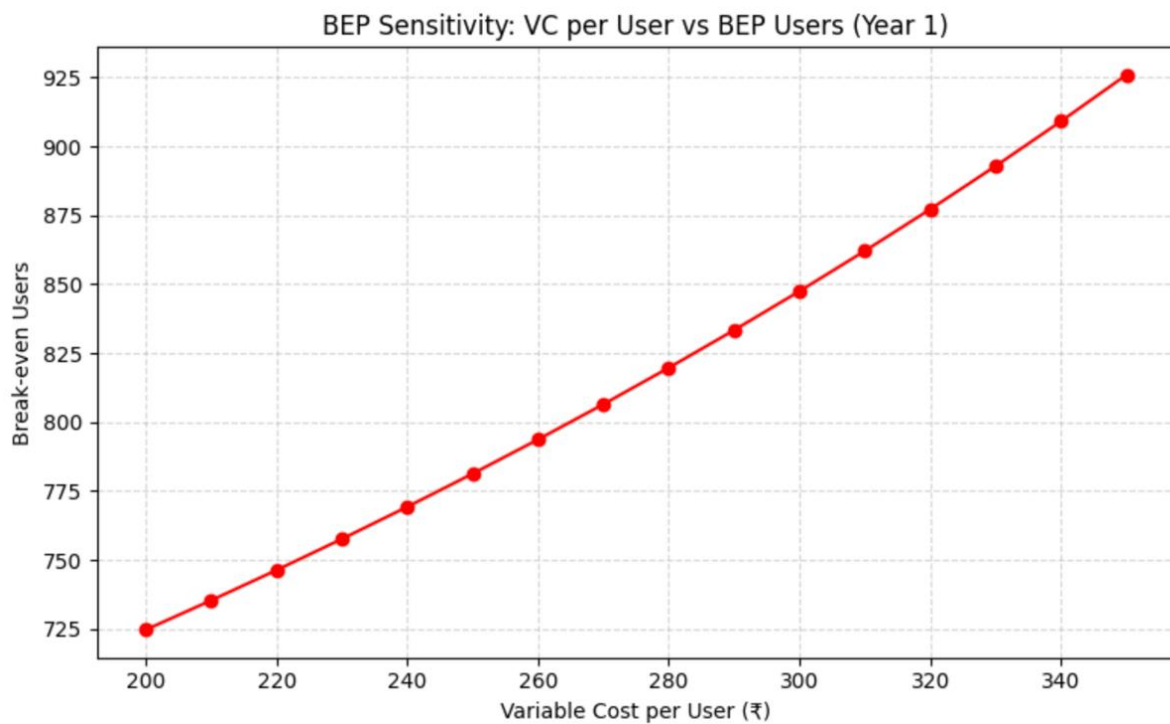


Fig 16: Shows how sensitive break-even point is to changes in per-user cost. Even a ₹50 increase in variable cost per user raises the break-even user count by ~100

8. Conclusion

The Global Healthcare Patient Engagement platform by Nebula9.ai leads to a well-aligned, economically viable, and technologically empowering solution that would alter healthcare operations and patient engagement levels in the sector. By providing virtually 24/7 intelligent assistance, smooth EMR integration, and a fully customized and multi-channel user experience, the assistant directly copes with the most burning issues, i.e., delayed appointment scheduling, poor medication compliance rates, excessive administrative burden, and scattered communication. The solution is highly commercially viable as it has been backed by one of the fastest-growing global markets, which is expected to achieve growth of about 36.95 percent to reach \$9.29 by 2030, and, the estimated Serviceable Obtainable Market in India, in the next few years, is projected to be 20-50 crore. The revenue model, which is expected to decrease as well as grow over the estimated future years with the subscription model, institutional licensing, certification programs, and cross-promotion will be the major supporters, will be scalable and is envisioned to rise to 3.5-6 lakhs in Year-1 to 83-115 lakhs in Year-3. Break-even analysis affiliates a low entry barrier, as well as profitability at only 831 users per year, and healthy margin of 890 revenue per user, compared to 250 variable costs. Moreover, the project implements the wormhole-based risk management model, and it has a remarkably profound risk management policy considering HIPAA/GDPR compliance, data protection, system strength, which has fallbacks and guarantees patient trust and safety and does not break the service. Empathy-guided requirement collection and stakeholder salience mapping have been exercised to guarantee considerable adoption and satisfaction by clinicians, administrators, IT employees, and patients as well. Application of Agile methodology leads to the provision of incremental value with continuous feedback integration. Taken as a whole, the assistant would not only fulfil the existing needs in the field of healthcare but would be future-proof, providing a safe, expandable, and patient-centric tool, making Nebula9.ai a competitive entity in the realm of AI-healthcare.

This was not just a business analysis project because it met the deadlines, it was the symbol to the type of impact-driven work, purpose-led work as a business analyst that I am aiming towards leading. I have experienced the power of deep market research, empathy with the stakeholders combined with the approach to the whole system and as a result have understood how with a smart approach to integrating AI into healthcare, it can become more than just automation and can provide tangible and quantifiable results, to both patients and providers. It confirmed my belief that the future of digital health includes not only the further technological movement but the establishment of trust, access, and equity in every point of care.

At Nebula9.ai I apply the sensitivity of a user advocate, the optimism of a strategist, and methods of a data-driven specialist to every choice. I am excited to use the chance to create solutions that are not only scalable but relevant solutions that minimize the burden within a system without compromising human care and providing a significant change to underserved communities. We are developing the tools to inform policy, empower patients, and change lives, and through all that innovation, I will continue to focus on building with purpose, collaborating with humility, and never losing sight of a true human need in the face of innovation.

Thank you for reviewing this assessment. I look forward to discussing my approach and ideas with the Nebula9.ai team.

Anant Upadhiyay
Business Analyst Applicant
anant.upadhiyay.22cse@bmu.edu.in | +91 8750447547