

# Project Deliverable 1

## Group 13

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### Overview statement & planning:

#### 1. Context and Motivation

The motivation for developing this healthcare application stems from a critical examination of the current U.S. healthcare system, which is burdened by high operational costs and inefficiencies that affect patient access to care. Emergency and urgent care centers, while essential, often come with prohibitively high costs, even for minor medical issues. This is compounded by long wait times and an overburdened system that can lead to delayed treatments and increased severity of medical conditions.

Our proposed solution, a comprehensive healthcare app, seeks to revolutionize the way individuals seek and receive medical care. By harnessing technology to facilitate an initial diagnosis and direct treatment path, we aim to alleviate the strain on traditional medical facilities while offering a cost-effective alternative to users. This app will not only cater to immediate medical inquiries but also integrate a seamless delivery system for necessary medications, drastically reducing the need to physically visit healthcare providers for non-critical care.

### Problem Statement

This application directly addresses several key issues within the healthcare sector:

1. **High Costs of Care:** Many individuals defer visiting medical facilities due to cost concerns, potentially worsening their conditions.
2. **Inaccessibility of Timely Medical Advice:** Geographic and socio-economic factors often limit access to quality healthcare.
3. **Overutilization of Emergency Services:** Non-critical issues often lead to unnecessary emergency room visits, straining resources, and increasing wait times for critical care patients.

By providing an alternative through our app, we target these issues, offering diagnosis, treatment recommendations, and medication delivery for acute medical conditions, and directing more severe cases to appropriate healthcare services.

## **2. Value Propositions**

### **2.1 Tangible Value:**

- **Cost Reduction:** By minimizing unnecessary clinical visits, we reduce medical expenses for users.
- **Efficiency in Treatment:** Fast-tracking diagnosis and medication delivery shortens recovery times and improves user health outcomes.
- **Reduced ER Congestion:** Non-critical patients who use the application instead of ER services free up critical resources, decreasing system-wide wait times and costs.

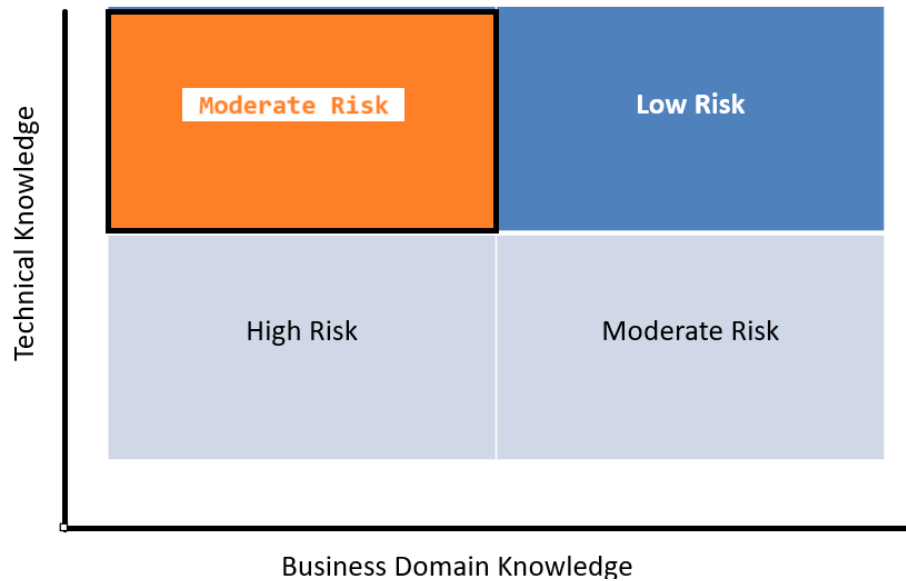
### **2.2 Intangible Value:**

- **Accessibility and Convenience:** Users can access healthcare services from the comfort of their homes.
- **Peace of Mind:** Quick, reliable medical consultation reduces anxiety over health issues and potential medical bills.
- **User Empowerment:** Provides users with knowledge and control over their health management.

## **3. Feasibility Analysis**

### **3.1 Technical Feasibility:**

- The development involves creating a user-friendly interface with backend support capable of handling sensitive medical data securely.
- Integration with existing healthcare IT systems is crucial for accessing real-time data and facilitating smooth operational transitions.
- **Risk Matrix:** We have the required Technical knowledge but lack on the Domain Knowledge, so this projects falls into a Moderate Risk category (Quadrant 1).



- **Project Size:** The project is moderate to large in scope, requiring AI-driven diagnostics, multi-platform support, real-time data updates, and robust security.
- **Compatibility:** Seamless integration with **Electronic Health Records (EHRs)** and pharmacy databases is paramount, necessitating standardized APIs and compliance with healthcare data exchange protocols. Also, the system will be compatible with Windows OS as well as Mac. For mobile devices, Android as well as iOS will be supported.
- To conclude, the project is technically feasible with technical knowledge on Application Development, and Healthcare domain knowledge, which can be sourced from on campus facilities as well as experienced professionals.

### 3.2 Economic Feasibility:

- Funding will initially be sourced from venture capital interested in healthcare innovations.
- Revenue models include subscription fees, a pay-per-consultation system, and possible affiliations with insurance entities.
- Identifying Costs:
  - Software Development: Building a minimum viable product (MVP) can range from \$100K to \$300K (Clutch, 2022; GoodFirms, 2021).
  - AI and Security: Integration of AI/ML capabilities and HIPAA-compliant security measures add further expenses.
  - Partnership & Marketing: Onboarding pharmacies and healthcare providers, plus marketing campaigns for user adoption.

| Development Costs   | Operational Costs  | Tangible Benefits  | Intangible Benefits   |
|---|--|--|---|
| <b>Software Development &amp; Integration</b> <ul style="list-style-type: none"> <li>Salaries for developers</li> <li>Consultant fees (medical advisors, domain experts)</li> <li>AI/ML integration costs</li> <li>Platform licensing fees (if using third-party APIs)</li> </ul> | <b>Cloud Hosting &amp; Maintenance</b> <ul style="list-style-type: none"> <li>Ongoing hosting fees</li> <li>System updates and patches</li> <li>Software license renewals</li> </ul> | <b>Reduced Healthcare Expenses</b> <ul style="list-style-type: none"> <li>Decreased ER visits for non-critical issues</li> <li>Lower overhead for in-person consultations</li> </ul> | <b>Enhanced Reputation</b> <ul style="list-style-type: none"> <li>Elevated brand recognition in healthcare/tech sectors</li> <li>Competitive advantage as an innovator</li> </ul>   |
| <b>Hardware &amp; Software Setup</b> <ul style="list-style-type: none"> <li>Equipment (servers, networking, etc.)</li> <li>Vendor installations</li> <li>Development environment tools</li> </ul>   | <b>Support &amp; Training</b> <ul style="list-style-type: none"> <li>User support staff salaries</li> <li>Training materials/sessions</li> <li>Communication expenses</li> </ul>     | <b>Potential Revenue Streams</b> <ul style="list-style-type: none"> <li>Subscription fees</li> <li>Pay-per-consultation charges</li> <li>Insurance partnerships</li> </ul>           | <b>Improved Customer Satisfaction</b> <ul style="list-style-type: none"> <li>Faster diagnosis and convenient medication delivery</li> <li>Greater user trust and loyalty</li> </ul> |
| <b>Security &amp; Compliance</b> <ul style="list-style-type: none"> <li>HIPAA audit fees</li> <li>Data encryption solutions</li> <li>Legal consultations</li> </ul>   | <b>Operational Team Salaries</b> <ul style="list-style-type: none"> <li>Ongoing monitoring</li> <li>Customer service, pharmacy liaison, etc.</li> </ul>                              | <b>Decreased Operational Delays</b> <ul style="list-style-type: none"> <li>Faster prescription processing</li> <li>Better resource allocation in clinics</li> </ul>                  | <b>Increased Market Share</b> <ul style="list-style-type: none"> <li>Stronger position in the telehealth market</li> <li>Positive word-of-mouth referrals</li> </ul>                |
| <b>Pilot Program &amp; Testing</b> <ul style="list-style-type: none"> <li>Beta testing costs</li> <li>Test environment setup and user acceptance testing</li> <li>Bug fixes and enhancements</li> </ul>   | <b>Periodic Upgrades</b> <ul style="list-style-type: none"> <li>Hardware repairs/upgrades</li> <li>License expansions for new features or modules</li> </ul>                         | <b>Reduced IT &amp; Staff Costs</b> <ul style="list-style-type: none"> <li>Streamlined admin tasks through automation</li> <li>Lower overhead for manual processes</li> </ul>        | <b>Higher Quality of Service</b> <ul style="list-style-type: none"> <li>Real-time updates and user-friendly interfaces</li> <li>Greater provider-patient transparency</li> </ul>    |

Assigning Value: (Estimated)

| Benefits   | Amount (USD)     | Notes   |
|--|------------------|---|
| <b>1. Reduced ER Visits / Cost Savings</b>       | \$300,000        | Based on reduced non-critical ER admissions, aligning with telehealth savings [1] (Clutch, 2022; GoodFirms, 2021) |
| <b>2. Potential Subscription Revenue</b>         | \$100,000        | Estimated pay-per-consultation or membership model.   |
| <b>3. Improved Customer Service (Intangible)</b> | \$50,000*        | Approx. value reflecting higher patient satisfaction and repeat usage [4] (Rock Health, 2022).                    |
| <b>Total Benefits</b>                            | <b>\$450,000</b> |   |
| <b>Development Costs</b>                         |                  |   |
| <b>1. Cloud Environment Setup</b>                | \$50,000         | Servers, databases, and related infrastructure [3] (Grand View Research, 2021).                                   |
| <b>2. AI Integration &amp; Development Labor</b> | \$350,000        | Salaries for developers, AI specialists, and consultants [1] (Clutch, 2022).                                      |
| <b>3. Software Licenses</b>                      | \$30,000         | Annual fees for APIs, machine learning libraries, etc.  |
| <b>4. Hardware</b>                               | \$70,000         | Testing devices, backup servers, networking equipment.  |
| <b>5. Implementation &amp; Training</b>          | \$20,000         | Internal onboarding, pilot user training, documentation.  |
| <b>Total Development Costs</b>                   | <b>\$520,000</b> |   |
| <b>Operational Costs (Year 1)</b>                |                  |   |
| <b>1. Cloud Hosting &amp; Maintenance</b>        | \$60,000/year    | Ongoing SaaS and infrastructure costs for reliability [2] (GoodFirms, 2021).                                      |

|  |                    |  |
|--|--------------------|--|
| <b>2. Support Staff</b>                    | \$80,000/year      | Customer service, pharmacy liaison, and IT support.  |
| <b>3. Software Upgrades &amp; Renewals</b> | \$20,000/year      | Version updates, security patches, license renewals. |
| <b>Total Operational Costs (Year 1)</b>    | <b>\$160,000</b>   |  |
| <b>Total Costs (Year 1)</b>                | <b>\$680,000</b>   | \$520K (development) + \$160K (operational)          |
| <b>Net Benefit (Year 1)</b>                | <b>(\$230,000)</b> | \$450K benefits - \$680K total costs                 |

Estimated project cash flow and Net Present Value:

| <b>Year</b> | <b>Projected Costs</b> | <b>Projected Benefits</b> | <b>Net Cash Flow (Benefits - Costs)</b> |
|-------------|------------------------|---------------------------|---|
| 1           | \$680,000              | \$450,000                 | <b>(\$230,000)</b>                      |
| 2           | \$300,000              | \$550,000                 | <b>\$250,000</b>                        |
| 3           | \$300,000              | \$700,000                 | <b>\$400,000</b>                        |
| 4           | \$350,000              | \$800,000                 | <b>\$450,000</b>                        |

Assuming a discount rate of 10%, NPV for the project over 4 years will be \$665,942.90 And the payback period (ROI) is approximately 1 Year 11 months.

### 3.3 Organizational Feasibility:

- The app will serve a broad demographic, focusing on individuals looking for quick, reliable medical advice.
- Partnerships with healthcare providers and pharmacies will be essential for integrating services like real-time diagnosis and home delivery of medicines.
- **Primary Patients:** Individuals seeking quick, cost-effective medical advice for non-life-threatening conditions.
- **Healthcare Providers:** Physicians, nurses, and allied health professionals who benefit from streamlined electronic records and easier appointment scheduling.
- **Pharmacy Representatives:** Professionals responsible for processing prescriptions and managing medication deliveries.
- **Integration with Healthcare Organizations:** Collaboration with existing clinics, health networks, and pharmacies is essential. Early pilot programs can demonstrate the platform's value, encouraging widespread adoption.
- If we build it, will they come? Yes, we have technical expertise and healthcare partnerships to build it, and it directly addresses rising costs and limited access. Our provider and pharmacy collaborations ensure user adoption and the current surge in

telehealth demand makes this the ideal time to launch.

### 3.4 Scheduled Feasibility:

- The development timeline is estimated at 18 months from concept to launch, with phased rollouts to manage risks and incorporate user feedback effectively.
- Estimated Timeline: 18 Months
- Planning & Requirement Analysis (3 months)
- Prototype & Iteration (6 months)
- Beta Testing & Regulatory Approvals (4 months)
- Deployment & Stabilization (5 months)
- **Phased Rollouts:** By releasing features in stages, the project team can incorporate real-time user feedback and mitigate risks before full deployment.
- Timing seems to be feasible for the project as we don't see any major changes taking place in the coming years.

### 3.5 Risk Assessment

- **Technological Risks:** Data breaches and system failures pose significant risks. Mitigation includes robust security protocols and regular system audits.
- **Regulatory Compliance:** Ensuring compliance with health regulations such as HIPAA is essential; non-compliance could lead to legal issues and fines.
- **Market Acceptance Risks:** User skepticism could affect adoption rates. Engaging marketing strategies and transparent communication will be key.

## 4. System Development Methodology

The Agile methodology is chosen for its flexibility and responsiveness. This approach supports iterative testing and modification based on real-time feedback, ensuring the app remains adaptable to user needs and industry standards. Agile facilitates a collaborative environment, essential for integrating diverse inputs from healthcare professionals, developers, and end-users, which is critical for the multifaceted nature of healthcare applications.

**Iterative Approach:** Agile facilitates continuous improvement via sprints, allowing teams to release features for immediate feedback.

**Flexibility in Healthcare:** Regulatory standards can shift rapidly; an iterative method helps incorporate new rules or best practices on the go.

**Stakeholder Involvement:** Frequent stakeholder demos ensure alignment with patient needs, provider workflows, and pharmacy integration.

# Business Requirements Definition

## **Non Functional Requirements:**

1. Operational Requirements
  - 1.1.The app must support different system access (IOS, Android, or other).
  - 1.2.The app must connect with pharmacy and healthcare provider systems in real-time data update.
  - 1.3.The system must operate 24/7 to ensure users can access healthcare services at any time.
2. Performance Requirements
  - 2.1.The app must perform user inputs (symptoms, Healthrecord, etc.) provide professional diagnostic recommendations within 5 minutes.
  - 2.2.The app must allow users to make appointments with providers in simple way
  - 2.3.The app must support the user to connect with healthcare providers in chat, live videos, etc.
  - 2.4.The online AI diagnosis must achieve a 95% accuracy rate and recommend to the user which doctor to visit.
3. Security Requirements
  - 3.1.To avoid unwanted access, the app must use two-factor authentication (2FA) for our accounts.
  - 3.2.All user information must be encrypted at any time.
  - 3.3.To protect the user privacy of medical information, the app must adhere to the Health Insurance Portability and Accountability Act.
4. Cultural and Political Requirements
  - 4.1 The app must provide multi-languages to diverse user base.
  - 4.2 The application needs to comply with local healthcare laws in each state in which it is used.
  - 4.3 The app must avoid biases in diagnosis, inclusivity the diversity of user base.

## **Functional Requirements: (Users)**

### **1. Patient**

- 1.1 Symptom Diagnosis and Solution Recommendation
  - 1.1.1 The application should allow users to input symptoms or queries with images or text (e.g., burns, rashes).
  - 1.1.2 The application should allow professional solutions and diagnoses on inputs.
  - 1.1.3 The system should filter and determine if the condition requires immediate professional solution.



## 1.2 Medication Delivery Integration

1.2.1 The application should allow users to order prescribed medication through the platform.

1.2.2 The system must provide real-time monitoring of medication delivery.

1.2.3 The delivery status and estimated arrival time must be notified to the users.

## 1.3 Specialist Referral System

1.3.1 The app must indicate close-by specialists, hospitals, or emergency services (redirect user to 911) in case of emergencies.

1.3.2 The system must allow users to schedule appointments directly from the app.

1.3.3 Reminders of appointments should be sent to users.

## **2. Healthcare Provider**

### 2.1 Patient Data Access

2.1.1 Providers must be able to access patient medical history and diagnostic reports.

2.1.2 The system should allow providers to update patient records by adding new diagnoses or treatment plans.

### 2.2 Consultation Scheduling

2.2.1 Providers must be able to schedule and book consultations via the app.

2.2.2 The system should automatically remind providers of scheduled consultations.

### 2.3 Integration with Pharmacy System

2.3.1 Providers must be able to write prescriptions directly from the app.

2.3.2 The system should transmit prescriptions to connected pharmacies.

2.3.3 The system should notify providers when prescriptions are filled and shipped.

# Requirement Gathering Strategy

## **Technique 1: Interviews**

Interviews allowed us to capture in-depth, qualitative insights from key stakeholders who would be using or interacting with the healthcare application. We targeted three primary groups: patients, healthcare providers, and pharmacy representatives. This method not only provided us with personal experiences and expectations but also revealed specific challenges and potential improvements that could be addressed by the system.

Before conducting the interviews, we developed an interview guide tailored for each stakeholder group. This guide included a set of core questions to ensure consistency while allowing room for follow-up questions based on individual responses.

- **Patients:**
  1. “What challenges do you face when trying to access timely healthcare services?”
  2. “Can you describe an instance when delays in receiving treatment affected your well-being?”
  3. “What features in a healthcare app would increase your trust and willingness to use it?”
- **Healthcare Providers:**
  1. “What are the main difficulties you encounter when managing patient records or scheduling consultations?”
  2. “How could an integrated system improve your day-to-day operations and patient care?”
  3. “What security measures do you consider critical when handling sensitive patient information?”
- **Pharmacy Representatives:**
  1. “What inefficiencies currently exist in the prescription processing and medication delivery process?”
  2. “How would real-time integration with a digital platform streamline your operations?”
  3. “What specific features would help reduce errors in prescription fulfillment?”

## **Technique 2: Observation**

This technique was crucial for understanding the real-world context in which the application would be used, and for identifying practical challenges that users might not fully articulate during interviews.

Key points of observation:

- We noted how patients describe their symptoms, including the language they use, and any difficulties encountered when communicating their conditions.
- We watched how providers manage patient records, from manual entry to digital updates, noting any delays or errors in the process.
- How patients enter symptoms and navigate current digital tools or kiosks.
- Actual wait times from symptom reporting to diagnosis or treatment.

## References:

- 1) Clutch. (2022). *How Much Does App Development Cost?* <https://clutch.co/app-developers/resources/how-much-does-app-development-cost>
- 2) GoodFirms. (2021). *App Development Cost and Time Survey*.  
<https://www.goodfirms.co/resources/app-development-research>
- 3) Grand View Research. (2021). *Healthcare IT Market Size & Share Report*.  
<https://www.grandviewresearch.com/industry-analysis/healthcare-it-market>
- 4) Rock Health. (2022). *Digital Health Funding Report*. <https://rockhealth.com/reports/>