Software Requirements Document

For

TeleVitality

“Empowering Health Beyond Boundaries”

Prepared By:

Group 1

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1. Introduction

1.1 Abstract

TeleVitality is a pioneering telemedicine initiative poised to redefine healthcare accessibility, transcending geographical barriers to deliver essential medical services. With a focus on holistic well-being, our platform seamlessly connects patients and healthcare providers through cutting-edge technology. Offering intuitive virtual consultations, diagnostics, and remote monitoring, TeleVitality prioritizes privacy and data integrity while integrating seamlessly with existing healthcare systems. Going beyond traditional telemedicine, our platform features real-time monitoring, personalized wellness plans, and comprehensive user education. Scalable and adaptable, TeleVitality anticipates future healthcare needs, continuously improving to provide cost-effective, sustainable solutions. Join us in shaping a healthier, more connected world where quality healthcare knows no bounds.

1.2 Problem Statement

The existing telemedicine relies on a combination of technologies, infrastructure, and operational processes to facilitate remote healthcare services. The biggest issues in healthcare today like

- Preventable Medical Errors
- Poor Amenable Mortality Rates
- Lack of Transparency
- Difficulty Finding a Good Doctor
- Inequitable Access

1.3 Objectives

The objectives for TeleVitality telemedicine software can be framed around improving accessibility, quality of care, patient outcomes, and overall healthcare efficiency. Here are some suggested objectives:

1. Enhance Accessibility:

Objective:
Increase access to healthcare services by providing a user-friendly and widely accessible telemedicine platform.
Key Results:
Expand the reach of TeleVitality to underserved populations and remote areas, ensuring that patients can connect with healthcare professionals from anywhere.

2. Improve Patient Engagement:
Objective:
Foster active patient participation in their healthcare journey through interactive features and educational tools.
Key Results:
Increase patient engagement metrics, such as secure messaging usage, appointment adherence, and utilization of educational resources within the TeleVitality platform.

3. Ensure Data Security and Privacy:
Objective:
Uphold the highest standards of data security and patient privacy in compliance with healthcare regulations.
Key Results:
Implement and maintain robust encryption protocols, secure authentication mechanisms, and regular security audits to safeguard patient information.

4. Optimize Remote Diagnostics:
Objective:
Facilitate accurate and effective remote diagnostics for a wide range of medical conditions.
Key Results:
Integrate advanced diagnostic features into TeleVitality, enabling healthcare providers to remotely assess and diagnose medical conditions through real-time data sharing.

5. Promote Continuity of Care:
Objective: Support a seamless transition between virtual and in-person care to ensure continuity of patient care.
Key Results:
Develop features that facilitate smooth transitions between telemedicine and traditional healthcare settings, promoting a holistic approach to patient care.

6. Increase Provider Adoption:
Objective:

Encourage healthcare professionals to adopt TeleVitality as a primary tool for delivering remote healthcare services.

Key Results:

Provide training and support programs for healthcare providers, highlight the benefits of the platform, and gather feedback to continuously improve the user experience.

7. Expand Telehealth Services:

Objective:

Broaden the range of telehealth services offered through TeleVitality to cover various medical specialties**.**

Key Results:

Work towards customizable telehealth solutions that cater to the unique requirements of different medical disciplines, encouraging a diverse range of healthcare providers to utilize the platform.

8. Facilitate Remote Monitoring:

Objective:

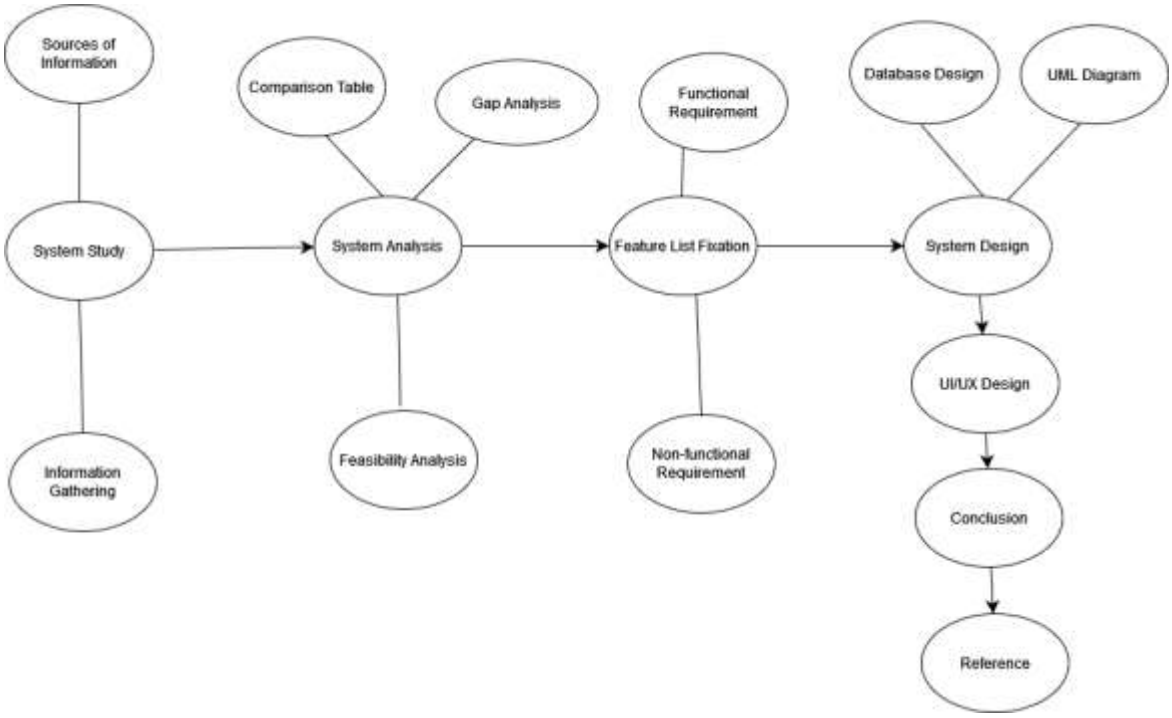
Enable healthcare providers to remotely monitor patients with chronic conditions and ensure timely interventions.

Key Results:

Integrate remote monitoring devices and features into TeleVitality, allowing continuous tracking of vital signs and health parameters.

These objectives can serve as a framework for TeleVitality to contribute to the advancement of telemedicine, providing a comprehensive and patient-centred approach to remote healthcare delivery.

1.4 Methodology Fixation



2. System Analysis

2.1. Information Gathering

Source of information refers to the channels through which data is gathered for the telemedicine project. These channels can be categorized into two types:

- Internal
- External

2.1.1. Sources

2.1.1.1. Internal Source

Internal sources encompass official documents, personnel, and feedback from users or customers within the telemedicine project team.

2.1.1.2. External Source

External sources include benchmark products, online reports, research papers, articles, insights from related authorities or experts in the field of telemedicine, and other external references.

Benchmark Products:
Visiting different benchmark websites to know about the features and how the system works there. There are many benchmark products of our project "TeleVitality"

- DocTime
- Hospitalin
- HealthX

Online Sources:
Articles & Blogs:

1. https://www.researchgate.net/publication/371806919_Telemedicine_A_New_Way_to_Provide_Healthcare

2. https://www.researchgate.net/publication/277924225_Telemedicine_A_brief_analysis

3. https://ldi.upenn.edu/our-work/research-updates/how-health-systems-can-help-address-language-barriers-to-achieve-digital-health-equity/

User:

- Insurance Providers
- Patients
- Administrative Staff
- Doctors

2.1.2. Tools

2.1.2.1. Survey

Appropriate tools to collect information:

- Interviewing the user
- Surveying
- Document Analysis

2.1.2.2. Interview

Interview:
Date: 11 March 2024
Time: 12:30 PM
Place: Room No.:(505), UIU Campus
Subject: Lab Support Room

Time Allocated	Interviewer Subject Or Objective	Interview Response
1 to 2 Min	Objective: Introduce ourselves	
5 to 10 Min	Question 1: What do you like most about using telemedicine?	
5 to 7 Min	Question 2: What challenges have you faced while using telemedicine?	
3 to 5 Min	Question 3: How do you think telemedicine could be improved to better meet your needs?	

2.2. Feasibility Analysis

A feasibility analysis assesses the viability of a project, considering various factors including technical, operational, economic, legal, and scheduling considerations. Let's perform a feasibility analysis for TeleVitality:

1. **Technical Feasibility**:
   Assessment:
   - Evaluate technical capabilities and requirements for TeleVitality.
   Considerations:
   - Ensure availability of skilled developers in healthcare and telemedicine.
   - Assess platform compatibility with devices, browsers, and operating systems.
   - Verify scalability for future user base and data volume.

2. **Operational Feasibility**:
   Assessment:
   - Examine how TeleVitality integrates into current organizational operations.
   Considerations:
   - Assess impact on workflows and processes.
   - Ensure healthcare providers can adapt to virtual consultations.
   - Evaluate training and support needs for effective platform use.

3. **Economic Feasibility**:
   Assessment:
   - Analyse economic viability of TeleVitality.
   Considerations:
   - Estimate development, operational, and maintenance costs.
   - Identify potential revenue streams like subscriptions or partnerships.
   - Analyse ROI and time to break even.

4. **Legal Feasibility**:
   Assessment:
   - Evaluate legal and compliance requirements.
   Considerations:
   - Ensure compliance with healthcare regulations such as HIPAA.
   - Address legal and ethical considerations for telemedicine.
   - Review intellectual property and secure necessary patents.

5. **Scheduling Feasibility**:
   Assessment:
   - Evaluate project completion within a reasonable timeframe.
   Considerations:
   - Develop realistic project schedule with development phases.
   - Identify potential bottlenecks or challenges.
   - Consider external factors like regulatory approvals.

6. **Market Feasibility**:
   Assessment:
   - Analyse market demand and potential for TeleVitality.
   Considerations:
   - Conduct market research to understand telemedicine demand.
   - Identify target demographics and user preferences.
   - Analyse competitor landscape and unique selling points.

7. **Cultural and Social Feasibility**:
   Assessment:
   - Evaluate alignment with cultural and social norms.
   Considerations:
   - Consider cultural attitudes towards telemedicine.
   - Assess social acceptance and willingness to adopt virtual healthcare.
   - Identify privacy concerns and resistance to change.

2.2.1. Economic Feasibility

2.2.1.1. Cash Flow

Equipment	**$2,00,000**
Project life	**5 years**
Salvage Value	**-**
Depreciation expense	**$40,000 per year**
Cash Operating Expenses	**-$5,000 per year**
Revenues	**$240,000 per year**
Growth rate for revenues	**0%**
Cost of goods sold/Revenues	**60%**
Investment in Net operating working capital	**-$78,000**
Required rate of return	**20%**
Tax rate	**30%**

Since there is no change in revenues or other sources of cash flows from year to year, the total operating cash flows will be the same every year.

	Year 1-5
Project Revenues (growth rate =0%)	$240,000
- Cost of goods sold (60% of revenues)	-144,000
= Gross Profit	$96,000
- Cash operating expense	-$5,000
- Depreciation	-$40,000
= Net operating income	$51,000
- Taxes (30%)	-$15,300
=Net Operating Profit after Taxes (NOPAT)	$35,700
+ Depreciation	$40,000
= Operating Cash Flows	$75,700

	Year 0	Year 1-4	Year 5
Operating Cash flow	-	$75,700	$75,700
Less: Capital expenditure	-$200,000	-	-
Less: additional net working capital	-$78,000	-	$78,000
Free Cash Flow	-$278,000	$75,700	$153,700

2.2.2. Technical Feasibility

To perform a technical analysis for the TeleVitality telemedicine project, we'll assess its technical feasibility by evaluating key aspects such as required technologies, infrastructure, compatibility, scalability, and potential challenges.

1. **Required Technologies**:

- TeleVitality will be using technologies for real-time video conferencing, secure data transmission, electronic health record (EHR) integration, and remote monitoring.

- Development will involve programming languages such as JavaScript, along with framework NextJs to make full stack site.

- Integration with existing healthcare systems may necessitate knowledge of HL7, FHIR, or other interoperability standards.

2. **Infrastructure**:

- TeleVitality will be using robust server infrastructure to handle high-quality video streaming, secure data storage, and real-time communication.

- Cloud-based solutions such as AWS or Azure may be utilized for scalability, reliability, and cost-effectiveness.

- Consideration of backup and disaster recovery measures to ensure data integrity and system availability.

3. **Compatibility**:

- The platform is going to be compatible with a wide range of devices, including smartphones, tablets, laptops, and desktop computers.

- Compatibility with various operating systems (iOS, Android, Windows, macOS) and web browsers (Chrome, Safari, Firefox) would allow for a seamless user experience.

4. **Scalability**:

- TeleVitality is going to be designed to accommodate a growing user base and increasing data volume over time.

- Scalability measures such as load balancing, auto-scaling, and database sharding may be implemented to ensure optimal performance under increasing demand.

5. **Potential Challenges**:

- Ensuring HIPAA compliance and data security to protect patient confidentiality.

- Addressing network latency and bandwidth limitations to maintain high-quality video streaming and real-time communication.

- Integrating TeleVitality with diverse EHR systems and healthcare workflows while minimizing disruption to existing processes.

- User interface design considerations to ensure usability and accessibility for both healthcare providers and patients.

6. **Mitigation Strategies**:

- Conduct thorough testing, including stress testing and penetration testing, to identify and address potential vulnerabilities.

- Collaborate with healthcare IT specialists and legal experts to ensure compliance with regulatory requirements and industry standards.

- Implement user feedback mechanisms and iterative development processes to continuously improve platform performance and user experience.

7. **Conclusion**:

- Based on the technical analysis, TeleVitality appears feasible with the proper allocation of resources, expertise, and attention to technical considerations.

- Continued monitoring and adaptation will be necessary to address evolving technological trends and healthcare needs.

This analysis provides a foundational understanding of the technical aspects of TeleVitality and highlights areas requiring further attention and refinement during development and implementation.

2.2.3. Behavioural Feasibility

To conduct a behavioural analysis for the TeleVitality telemedicine project, we will assess how users, including healthcare providers and patients, are likely to behave when interacting with the platform.

1. **User Adoption**:

- Evaluate healthcare providers' willingness to adopt telemedicine for consultations and patient care.

- Assess patients' attitudes toward virtual healthcare visits and their likelihood of using TeleVitality for medical consultations.

2. **Usability and User Experience**:

- Analyse the platform's user interface and ease of navigation to determine its intuitiveness and accessibility.

- Gather feedback from potential users through surveys or focus groups to identify any usability issues or areas for improvement.

3. **Trust and Confidentiality**:

- Assess users' perceptions of the platform's security measures and their confidence in the confidentiality of their medical information.

- Highlight security features such as end-to-end encryption and secure data storage to build trust among users.

4. **Communication and Engagement**:

- Examine how effectively TeleVitality facilitates communication between healthcare providers and patients, including features for real-time messaging and video consultations.

- Consider strategies to encourage patient engagement, such as appointment reminders, health education materials, and personalized wellness plans.

5. **Adaptation and Learning Curve**:

- Determine the learning curve for both healthcare providers and patients in using TeleVitality for virtual consultations.

- Provide training resources, tutorials, and support services to help users adapt to the platform and maximize its benefits.

6. **Cultural Sensitivity and Inclusivity**:

- Consider cultural factors that may influence users' attitudes and behaviours toward telemedicine, including language preferences and cultural norms surrounding healthcare.

- Ensure that TeleVitality accommodates diverse user needs and preferences to promote inclusivity and accessibility.

7. **Feedback and Continuous Improvement**:

- Establish mechanisms for gathering user feedback and monitoring user behaviour to identify areas for enhancement.

- Use iterative development processes to incorporate user feedback and improve the platform's usability, functionality, and overall user experience over time.

8. **Conclusion**:

- Based on the behavioural analysis, TeleVitality appears promising for adoption by healthcare providers and patients, with attention to usability, trust, engagement, adaptation, cultural sensitivity, and ongoing improvement being key factors in ensuring its success.

By conducting a comprehensive behavioural analysis, we can better understand user needs, preferences, and behaviours, ultimately enhancing the platform's effectiveness and user satisfaction.

2.3. Comparison Analysis

Benchmark Study

A benchmark study and analysis involve comparing and evaluating the performance, processes, or outcomes of a particular system, product, or process against established standards or competitors. The purpose is to identify strengths, weaknesses, and areas for improvement. Benchmarks serve as reference points for assessing performance and making informed decisions. The analysis includes gathering data, measuring performance metrics, and drawing conclusions to inform decision-making and enhance overall effectiveness.

Benchmark

Features	DocTime	Hospitalin	HealthX	Televitality
Virtual consultations	✓	✓	✓	✓
Secure Messaging	✓	✓	✓	✓
Digital Health Records	✓	✗	✗	✓
Remote Monitoring	✗	✗	✗	✓
Appointment Scheduling	✓	✓	✓	✓
E-Prescriptions	✓	✓	✓	✓
Teletherapy Services	✗	✗	✗	✓
Multilingual Support	✓	✗	✗	✓
Insurance Integration	✗	✗	✗	✓
Customizable platform	✗	✗	✗	✓

2.4 Survey Attendee Statistics

https://forms.gle/G8QKb2tUPesheDz58

1. What is your gender?
    - Male
    - Female
2. What is your age group?
    - 18-25
    - 26-33
    - 34-41

- 42-49
- 50 and above

3. **Familiarity with Telemedicine**: How familiar are you with telemedicine services?
    - Very familiar
    - Somewhat familiar
    - Heard of it, but do not know much
    - Never heard of it
4. **Usage of Telemedicine**: Have you ever used telemedicine services before?
    - Yes, regularly
    - Yes, a few times
    - No, but I am open to trying
    - No, and I am not interested
5. **Preferred Features**: What features would you find most useful in a telemedicine service? (Multiple answers allowed)
    - Video consultations
    - Prescription delivery
    - Booking appointments online
    - Access to medical records
    - Other (please specify)
6. **Concerns about Telemedicine**: What are your biggest concerns about using telemedicine services?
    - Privacy of my medical data
    - Quality of care
    - Difficulty in using technology
    - Lack of personal interaction
    - Other (please specify)
7. **Trust in Telemedicine**: Would you trust the diagnosis provided by a doctor via a telemedicine service?
    - Yes, completely
    - Yes, but I would prefer a face-to-face consultation as well
    - No, I would prefer a face-to-face consultation only
    - Unsure

8. On a scale of 1-5, how would you rate the importance of ease of use in a telemedicine service?

    - 1 - Not at all important
    - 2 - Slightly important
    - 3 - Neutral
    - 4 - Quite important
    - 5 - Extremely important

9. Service Accessibility: How important is it for the telemedicine service to be accessible on various devices (e.g., mobile, tablet, desktop)?

- Very important
- Somewhat important
- Neutral
- Not important

10. Integration with Health Trackers: Would you find it useful if the telemedicine service could integrate with your personal health tracking devices (e.g., smartwatches, fitness trackers)?

- Yes, very useful
- Yes, somewhat useful
- Neutral
- No, not useful

11. Communication Preferences: What is your preferred method of communication with healthcare professionals through a telemedicine service (e.g., text, audio, video)?

- Text
- Audio
- Video
- No preference

12. Appointment Scheduling: How important is an online appointment scheduling feature to you in a telemedicine service?

- Very important
- Somewhat important
- Neutral
- Not important

13. Prescription Services: Would you find a feature for online prescription refills and delivery useful?

- Yes, very useful
- Yes, somewhat useful
- Neutral
- No, not useful

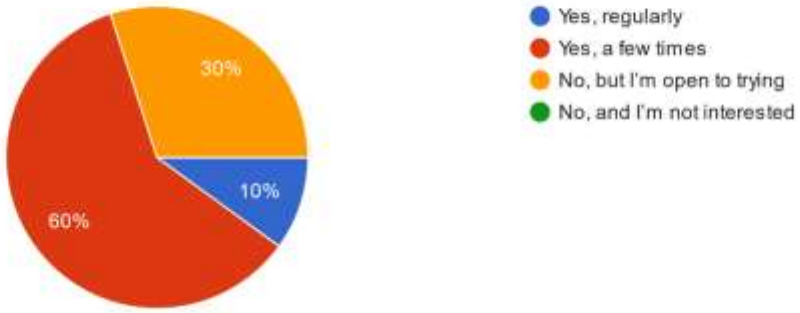
14. Insurance Coverage: How important is it for the telemedicine service to accept your health insurance?

- Very important
- Somewhat important
- Neutral

- Not important

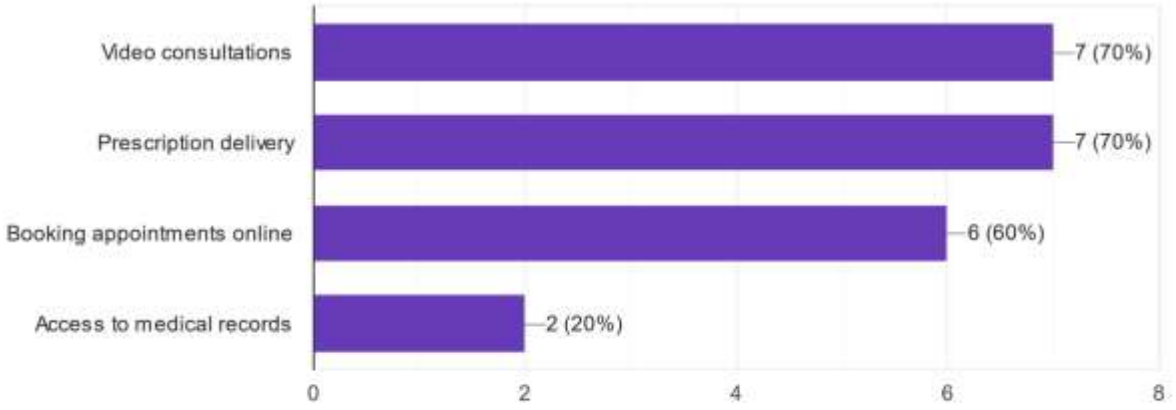
4. Have you ever used telemedicine services before?

10 responses



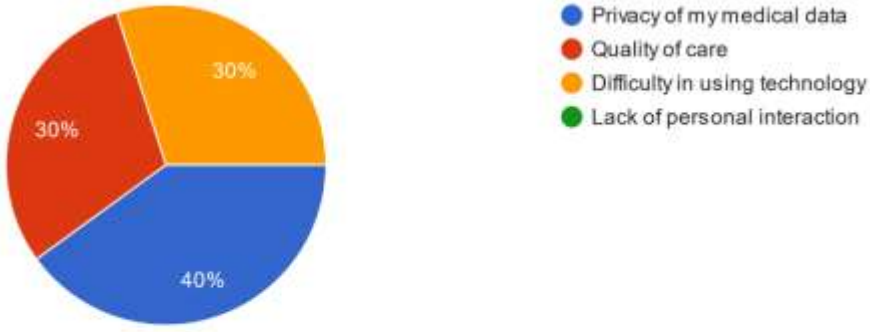
5. What features would you find most useful in a telemedicine service? (Multiple answers allowed)

10 responses



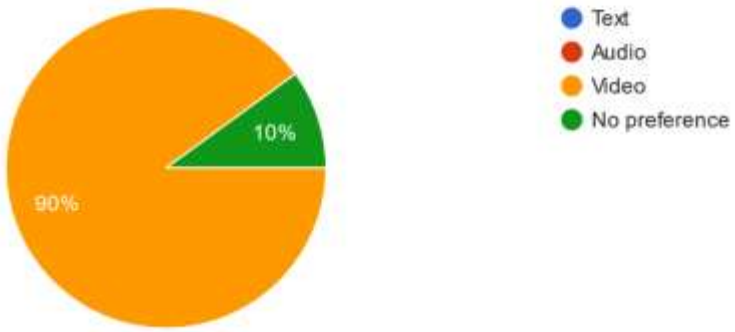
6. What is your biggest concern about using telemedicine services?

10 responses



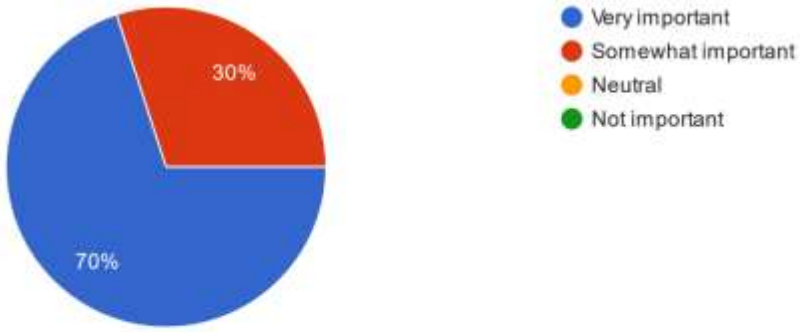
10. What is your preferred method of communication with healthcare professionals through a telemedicine service (e.g., text, audio, video)?

10 responses



11. How important is an online appointment scheduling feature to you in a telemedicine service?

10 responses



2.5. Research Paper Findings

Paper Name & Author	Findings
Telemedicine: A New Way to Provide Healthcare A. Shaji George A.s Hovan George	Proposed: • Teleconsultation • Prescription Delivery • Remote Patient Monitoring • Success Metrics Tracking
Telemedicine: A brief analysis Rajani Gupta R. S. Gamad Prashant Bansod	Proposed: • Wireless Technologies Integration • Storage and Security • Transmission Optimization • Biomedical Equipment Management • Clinical Booking and Scheduling
How Health Systems Can Help Address Language Barriers to Achieve Digital Health Equity Sansanee Craig, MD, Angela Shen	Proposed: • Equity and Access • Regulatory Compliance • Training and Education

2.6 SWOT Analysis

SWOT analysis is a strategic planning tool used by organizations and individuals to evaluate their current situation and make informed decisions about their future. The acronym SWOT stands for

Strengths:

1. Virtual Consultations:
   - Functional: Real-time communication supports prompt interactions.
   - Non-functional: Low response time (3 seconds) ensures efficient consultations.

2. Secure Messaging:
   - Functional: End-to-end encryption ensures secure communication.
   - Non-functional: Messages are delivered within 1 second, promoting real-time communication.

3. Digital Health Records:
   - Functional: Rapid data retrieval (within 2 seconds) enhances user experience.
   - Non-functional: Strict data integrity measures (0.1% error rate) ensure reliable health records.

4. Remote Monitoring:
   - Functional: Real-time data transmission enables timely healthcare interventions.
   - Non-functional: Compatibility with various monitoring devices supports diverse patient needs.

5. Appointment Scheduling:
   - Functional: Quick booking confirmation (within 1 minute) enhances user satisfaction.
   - Non-functional: Integration with digital calendars ensures seamless appointment management.

Weaknesses:
1. E-Prescriptions:
   - Functional: Requires high accuracy in e-prescriptions (99%), potential for errors.
   - Non-functional: Integration with pharmacy systems may pose challenges.

2. Teletherapy Services:
   - Functional: Video quality is essential for effective therapy, potential for technical issues.
   - Non-functional: Therapist availability within 24 hours may be a constraint.

Opportunities:

1. Multilingual Support:

- Functional: Multilingual support for diverse user bases.
- Non-functional: Real-time translation services during consultations enhance accessibility.

2. Insurance Integration:

- Functional: Real-time verification of insurance coverage during appointment scheduling.
- Non-functional: Streamlined insurance claim processing within 48 hours (about 2 days).

Threats:

1. Customizable Platforms:

- Functional: Adaptability across different devices is crucial for user satisfaction.
- Non-functional: Ensuring consistent user preferences across platforms may pose challenges.

2. General Threats:

- Non-functional: Potential threats to system security may arise if encryption standards are not rigorously maintained.
- Non-functional: The challenge of maintaining high availability (99.9%) under unforeseen circumstances.

Summary:

This SWOT analysis provides a snapshot of TeleVitality's current state, leveraging both the functional and non-functional requirements to identify areas of strength and areas that may need improvement or further strategic attention.

2.7. GAP Analysis

Gap analysis evaluates the differences between the features, performance, and capabilities of an organization's product and a recognized benchmark or industry-leading product. This analysis is conducted to identify areas where the organization's product falls short or differs from the benchmark and to determine how these gaps can be addressed to enhance the organization's product and competitiveness.

- Technical Infrastructure
- Security Assessment
- Stakeholder Feedback

2.8. Feature List Fixation

2.8.1 Functional Requirements

Functional requirements include Technical Details, Data/Reports Processing Expectations etc. of the software.

1. Virtual Consultations:
   - Response Time:
     Requirement: Virtual consultations should have a response time of less than 3 seconds to ensure prompt communication.
   - Concurrent Users:
     Requirement: The system should support at least 100 simultaneous virtual consultations to accommodate peak usage.

2. Secure Messaging:
   - Encryption Standards:
     Requirement: All messages exchanged within the secure messaging feature should be end-to-end encrypted using industry-standard protocols.
   - Delivery Time:
     Requirement: Messages should be delivered within 1 second of being sent.

3. Digital Health Records:
   - Data Retrieval Time:
     Requirement: Retrieval of patient health records should take no more than 2 seconds for optimal user experience.
   - Data Integrity:
     Requirement: The system should ensure data integrity, with a maximum error rate of 0.1% in health record entries.

4. Remote Monitoring:
   - Real-time Data Transmission:
     Requirement: Remote monitoring devices should transmit data to the platform in real-time to enable timely healthcare interventions.
   - Compatibility:
     Requirement: The platform should be compatible with a wide range of remote monitoring devices to support diverse patient needs.

5. Appointment Scheduling:
   - Booking Confirmation:

Requirement: Users should receive a booking confirmation within 1 minute of scheduling an appointment.

- Calendar Integration:

  Requirement: The system should integrate with users' digital calendars for seamless appointment management.

6. E-Prescriptions:
   - Accuracy:

     Requirement: E-prescriptions should have an accuracy rate of 99%, minimizing errors in medication information.
   - Pharmacy Integration:

     Requirement: Ensure seamless integration with pharmacy systems for efficient prescription fulfilment.

7. Teletherapy Services:
   - Video Quality:

     Requirement: Teletherapy video sessions should support high-definition quality for clear and effective communication.
   - Therapist Availability:

     Requirement: Ensure that therapists are available for virtual sessions within 24 hours of appointment requests.

8. Multilingual Support:
   - Language Options:

     Requirement: Provide support for at least five languages within the platform's interface and content.
   - Translation Services:

     Requirement: Implement real-time translation services during virtual consultations for effective communication.

9. Insurance Integration:
   - Real-time Verification:

     Requirement: Insurance integration should provide real-time verification of coverage and eligibility during the appointment scheduling process.
   - Claim Processing Time:

     Requirement: The system should process insurance claims within 48 hours of submission.

2.8.2 Non-Functional Requirements

Non-functional requirements are essential aspects that define how a system performs its functions. They focus on qualities such as performance, reliability, security, and user experience. Here are potential non-functional requirements for the functional units of your product:

1. Performance:
   - Response Time:
     Requirement: Virtual consultations should have a response time of less than 2 seconds.
   - Throughput:
     Requirement: The system should support a minimum of 500 simultaneous virtual consultations without degradation.

2. Reliability:
   - Availability:
     Requirement: The system should have an uptime of at least 99.9%.
   - Fault Tolerance:
     Requirement: In case of a server failure, the system should automatically switch to a backup server within 5 seconds.

3. Security:
   - Data Encryption:
     Requirement: All communication, including messaging and health record access, should be encrypted using industry-standard protocols.
   - Access Control:
     Requirement: Implement role-based access control to ensure that only authorized users can access specific functionalities.

4. User Experience:
   - Usability:
     Requirement: The system should follow UX best practices, ensuring a user-friendly interface for all functionalities.
   - Accessibility:
     Requirement: The platform should adhere to accessibility standards (e.g., WCAG) to accommodate users with disabilities.
5. Scalability:
   - User Growth:
     Requirement: The system should be able to handle a 20% increase in user base within a month without performance degradation.
   - Data Storage:

Requirement: Ensure the system can scale its data storage to accommodate an increasing volume of health records.

6. Interoperability:
   - Integration with Third-Party Systems:
   - Requirement: The platform should be able to integrate seamlessly with external systems such as insurance providers and pharmacy databases.

7. Compliance:
   - Regulatory Compliance:
     Requirement: The system should adhere to relevant healthcare and telemedicine regulations, ensuring compliance with privacy laws (e.g., HIPAA).

8. Technical Compatibility:
   - Cross-Platform Compatibility:
     Requirement: The platform should be compatible with major operating systems (iOS, Android, Windows) and browsers (Chrome, Firefox, Safari).

9. Backup and Recovery:
   - Data Backup:
     Requirement: Implement daily automated backups of all health records and system configurations.
   - Disaster Recovery:
     Requirement: Define and test a disaster recovery plan to ensure system restoration within 24 hours in case of a catastrophic event.

3. System Design

3.1. Introduction

The unified modeling language (UML) is a general-purpose visual modeling language that is intended to provide a standard way to visualize the design of a system.UML provides a standard notation for many types of diagrams which can be roughly divided into three main groups:

1. Behavior diagrams,
2. Interaction diagrams, and
3. Structure diagrams.

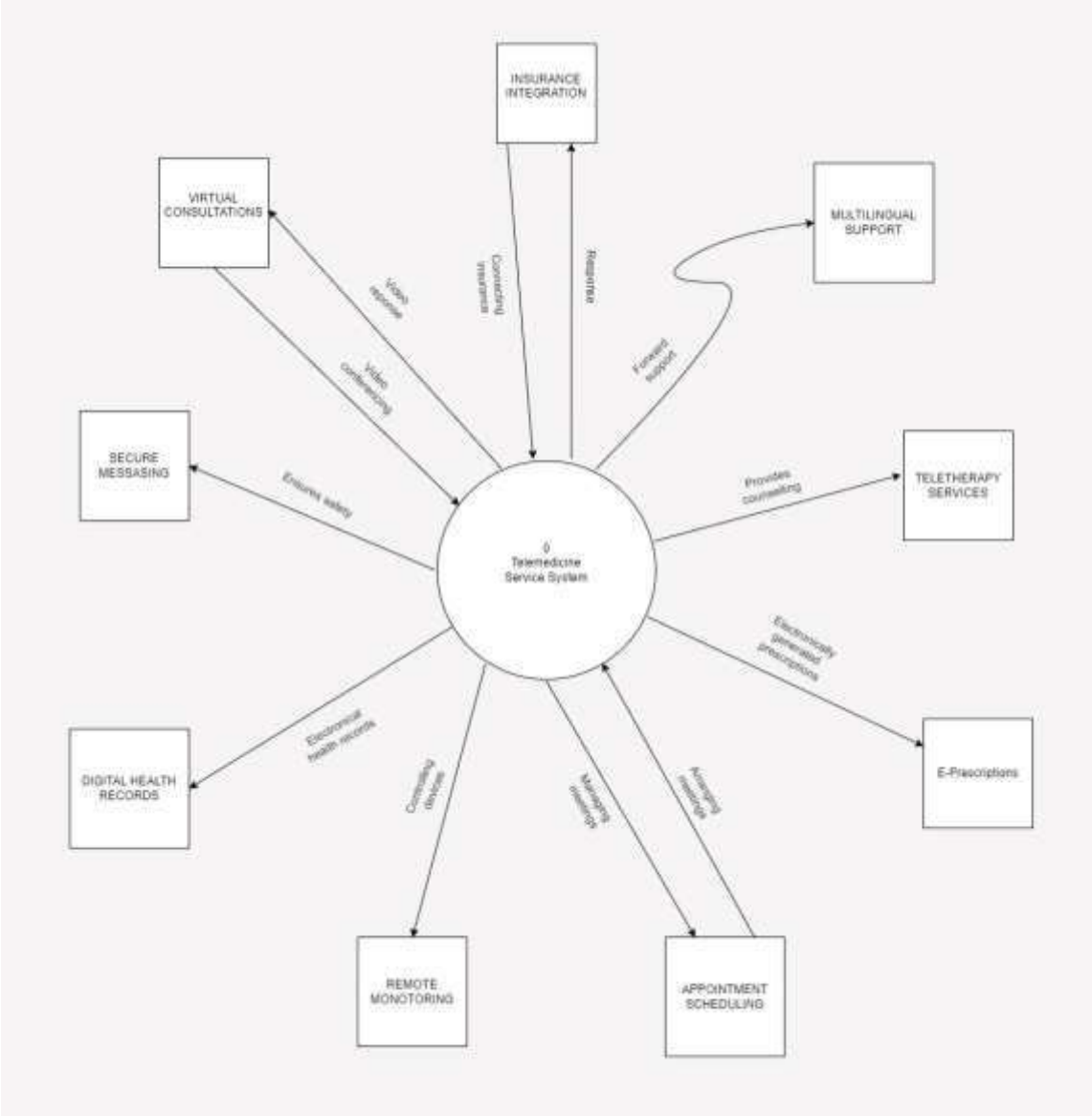
Proposed Diagrams:

i. Class Diagram
ii. Use Case Diagram
iii. State Diagram
iv. Sequence Diagram

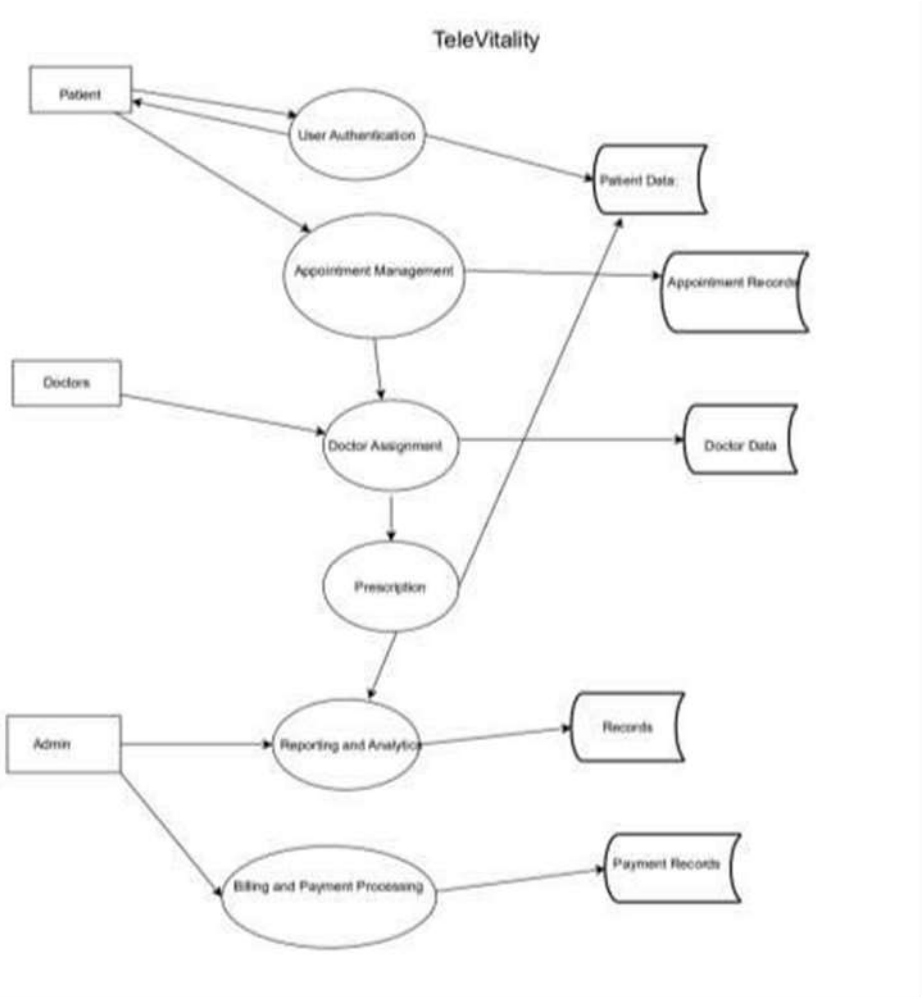
v. CRC Diagram
vi. Deployment Diagram
vii. E-R Diagram
viii. UI Design

3.2. UML Design

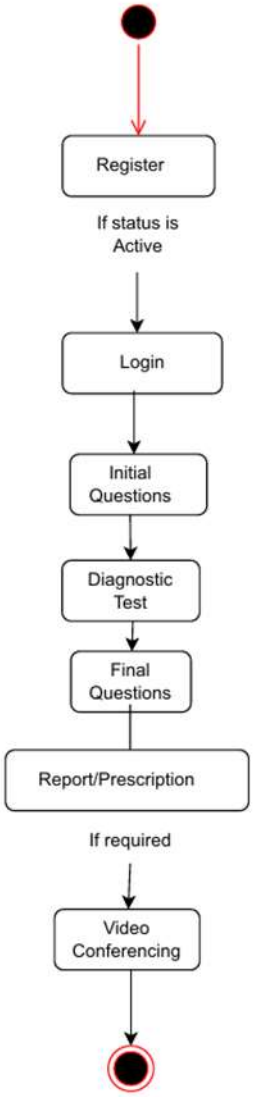
3.2.1. Context Diagram



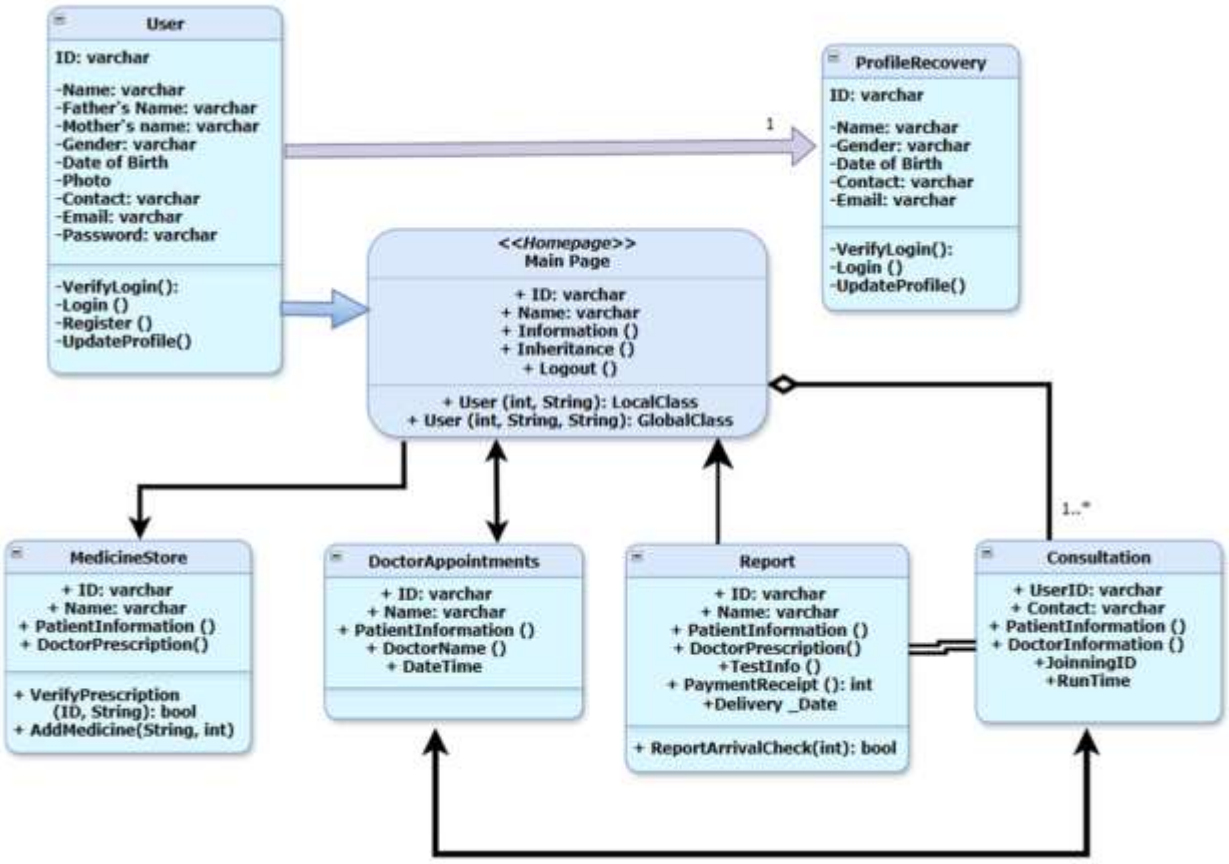
3.2.2 Data Flow Diagram



3.2.3. State Diagram



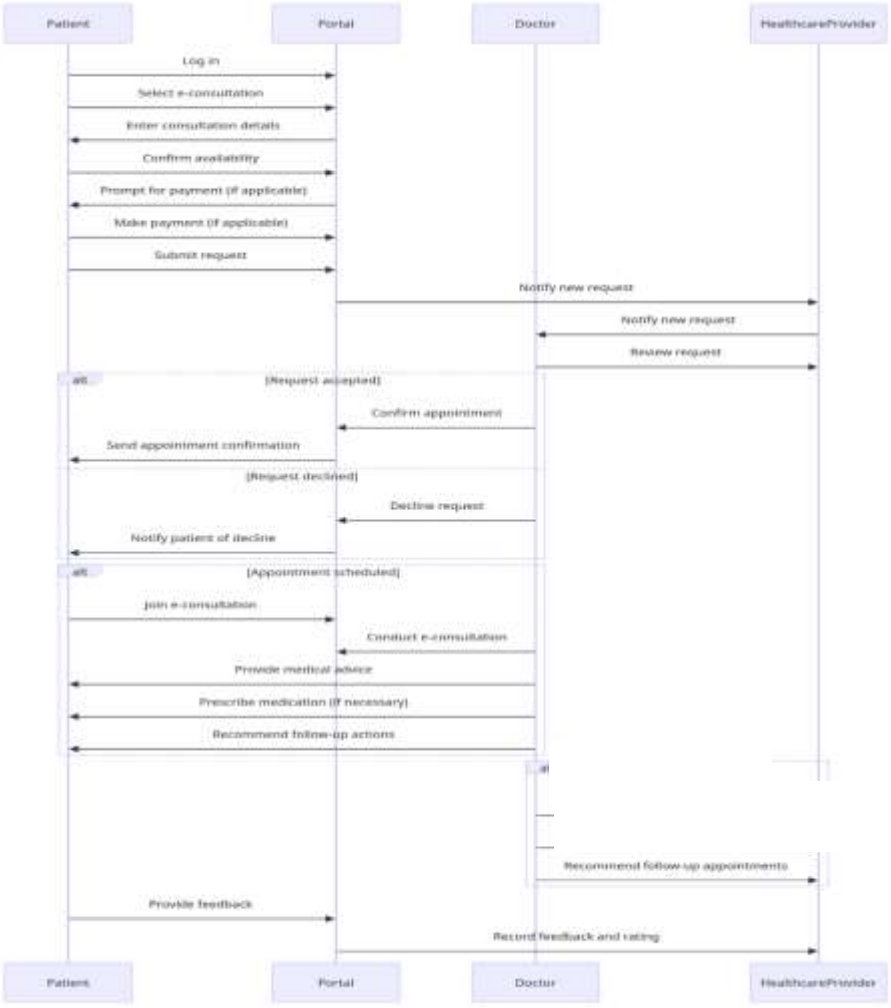
3.2.4. Class Diagram



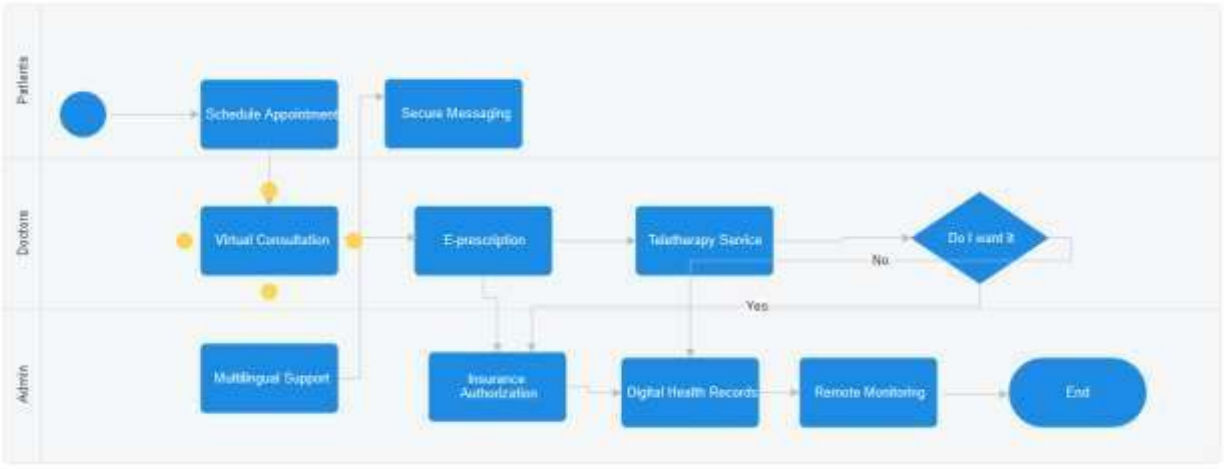
3.2.5. Activity Diagram

3.2.6. Sequence Diagram

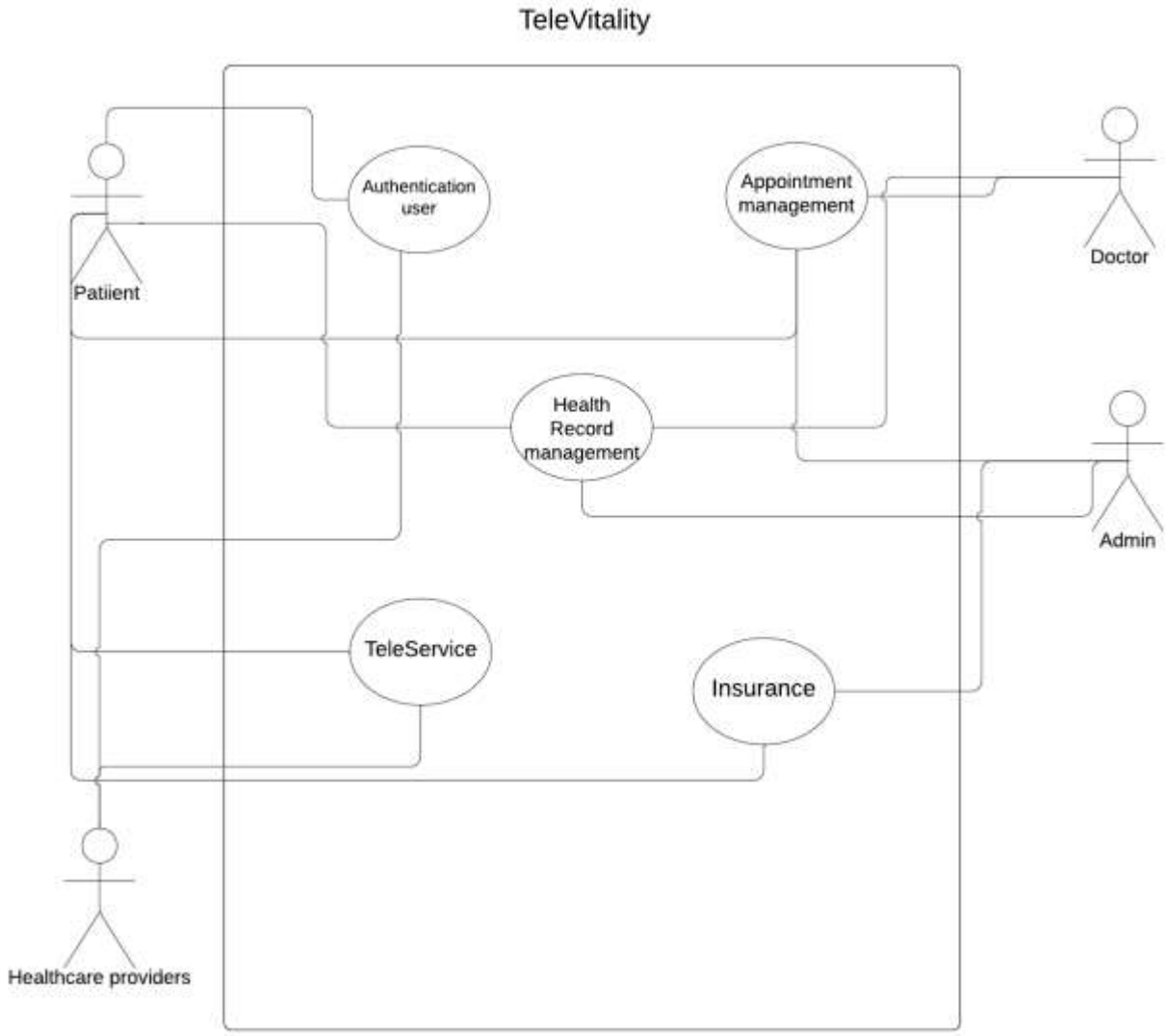
SEQUENCE DIAGRAM OF COMMUNICATION BETWEEN DOCTOR AND PATIENT DURING E-CONSULTATION



3.2.7. Swimlane Diagram



3.2.8.Use Case Diagram



3.2.9. Use Case Descriptive Form

1.UC 01: TeleService – Descriptive Form
2. Description: People can consult with a doctor online and can receive e-prescriptions with lots of facilities.

3.Stakeholders and Interests:

Patients: can consult with a doctor online and have access to lots of facilities.

Doctor: can remote monitoring of a patient.

Healthcare Providers: Can provide medical help.

Admin: can supervise everything.

4. Primary Actor:

Patients

5. Preconditions:

The patient is logged in with an authentication.

6. Success Scenario:

- Patient logged in.
- Booked an appointment with a doctor.
- Talked to the doctor on video.
- Received e-prescription.
- Can see digital health records on profile.
- Health insurance has been added.
- Is able to customize and use the website at his convenience.
- Log out

7. Alternative Scenario:

a) Unable to log-in

- resend the OTP

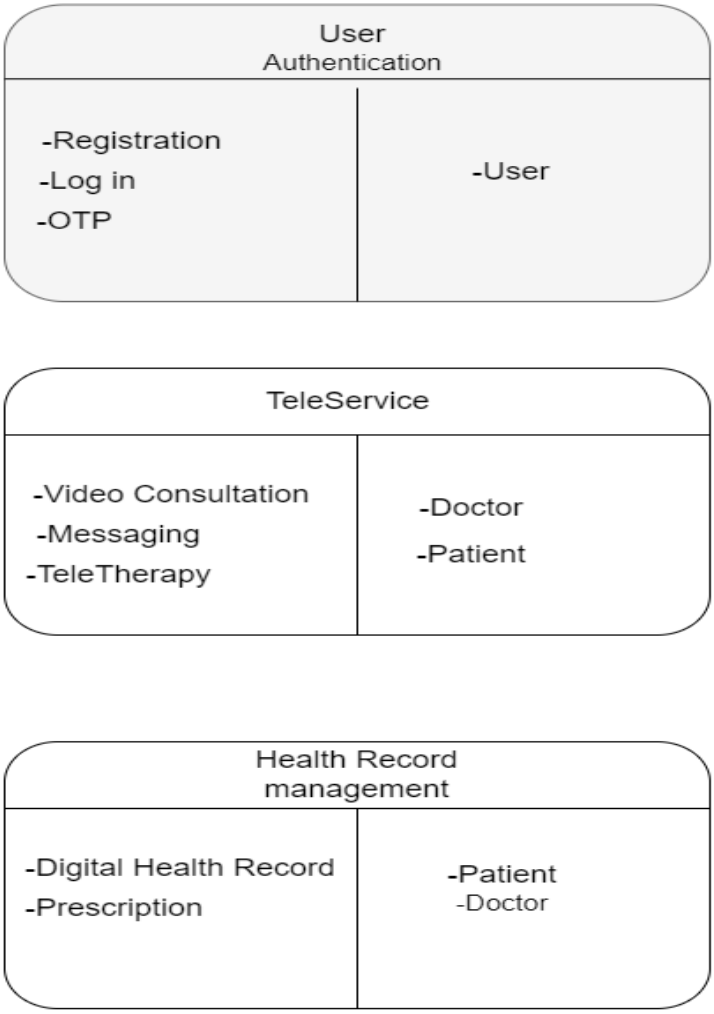
b) Unable to sign up for insurance

- show an error message.

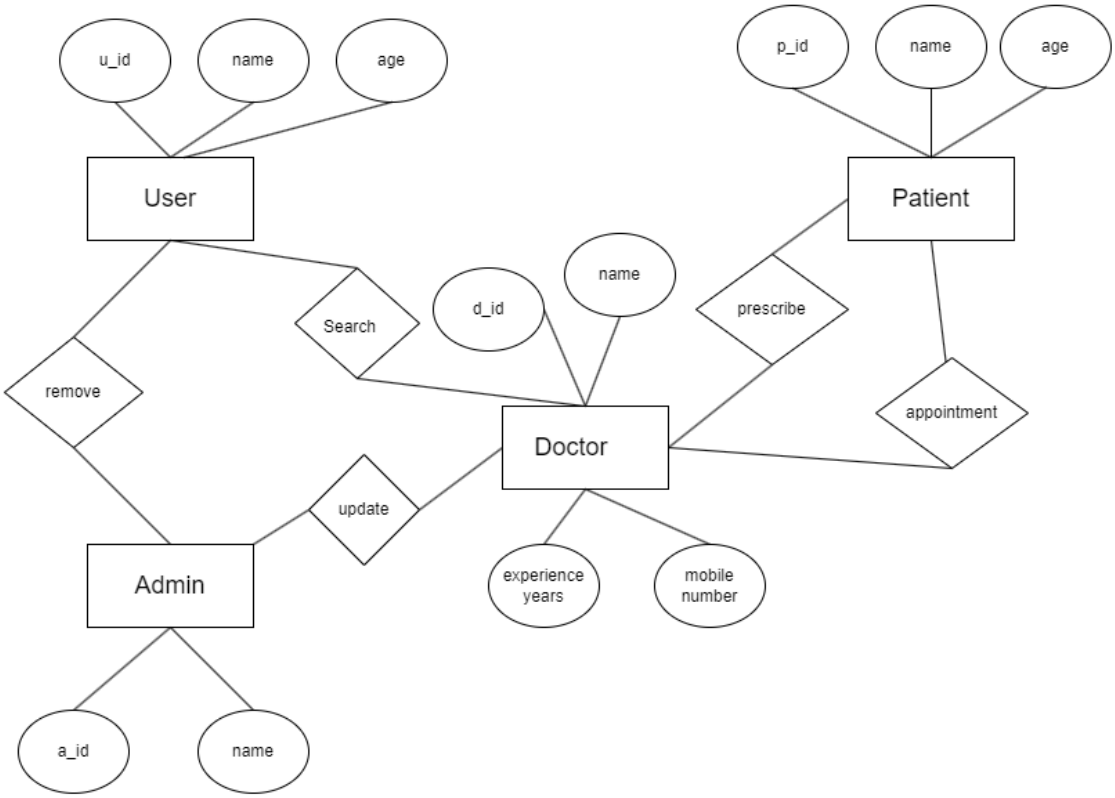
8. Post Conditions:

Patients are satisfied with the service. The doctor monitored the patients remotely.

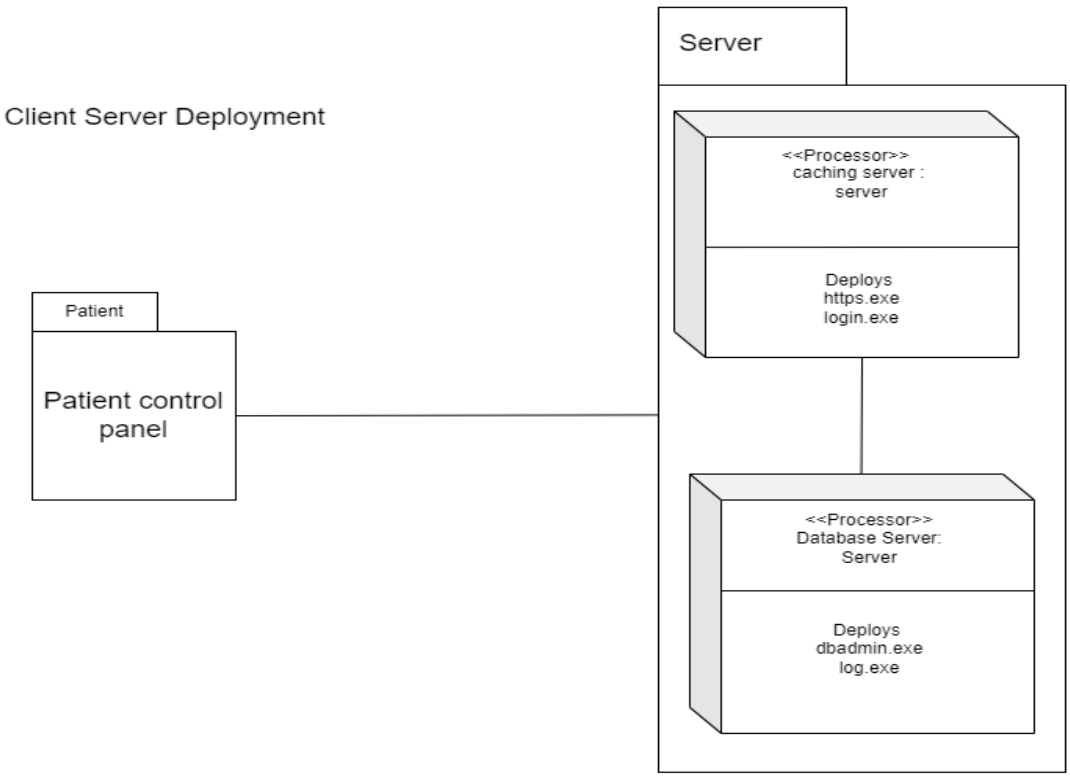
3.2.10. CRC Diagram



3.2.11. ER Diagram



3.2.12. Deployment Diagram



3.3. UI Design

3.3.1. Major Rules

The field of User Interface (UI) design encompasses a wide range of principles and guidelines aimed at creating interfaces that are intuitive, user-friendly, and effective. Here are some major rules and principles of UI design:

1. 3 Golden Rules
2. Shneiderman's 8 Golden Rules
3. Norman's Design Principles
   We will be using these rules for our Figma implementation.

3.3.1.1. 3 Golden Rules

1. Place Users in Control
i. Modeless
ii. Flexibility
iii. Interruptible
iv. Helpful
v. Forgiving
vi. Navigable
vii. Accessible
viii. Facilitative
ix. Preferences
x. Interactive

2. Reduce Users' Memory Load
i. Relieve short-term memory:
ii. Rely on recognition, not recall
iii. Provide visual cues:
iv. Forgiving:
v. Frequency:
vi. Promote an object-action syntax:
vii. Use real-world metaphors
viii. User progressive disclosure
ix. Organize

3. Make the Interface Consistent
i. Continuity:
ii. Maintain consistency within and across products
iii. Keep interaction results the same
iv. Provide aesthetic appeal and integrity
v. Encourage exploration

3.3.1.2. Shneiderman's 8 Golden Rules

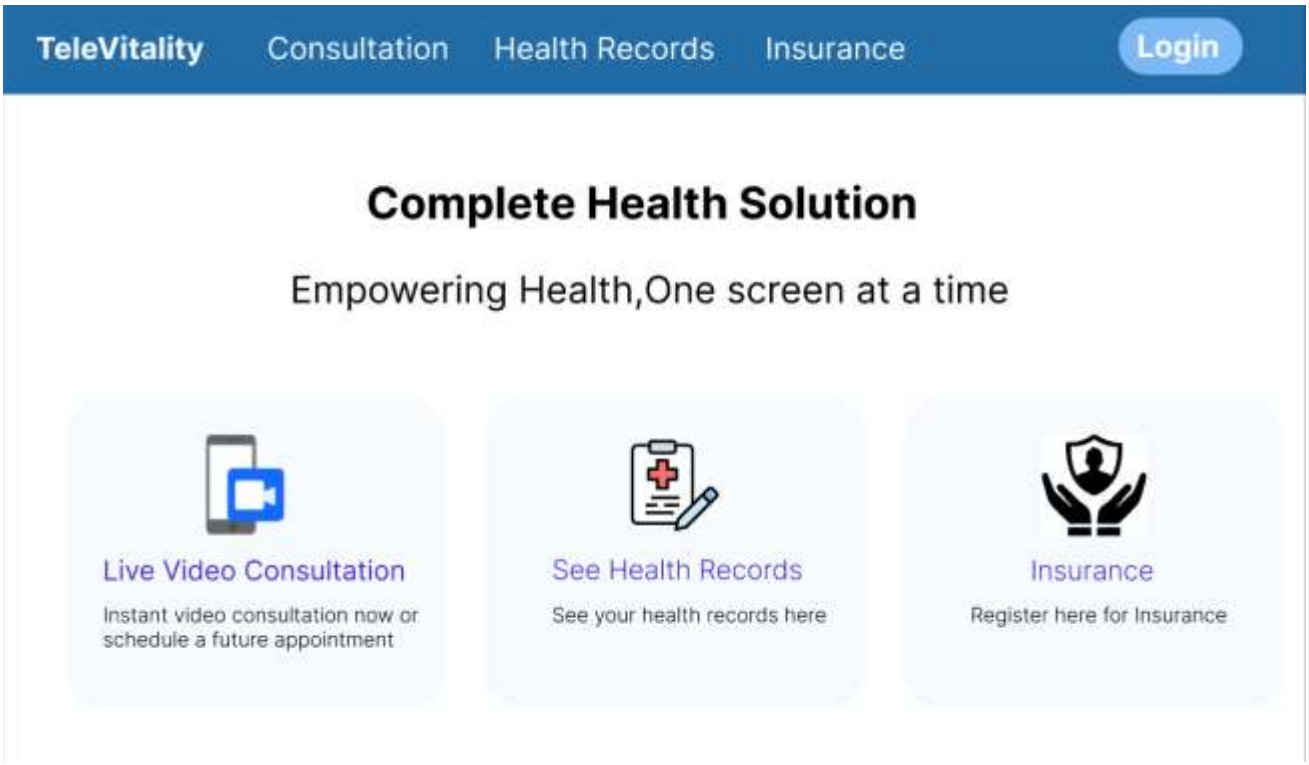
1. Strive for Consistency.
2. Seek universal usability.
3. Offer informative feedback.
4. Design dialogs to yield closure.
5. Prevent errors.
6. Permit easy reversal of actions.
7. Keep users in control.
8. Reduce short-term memory load

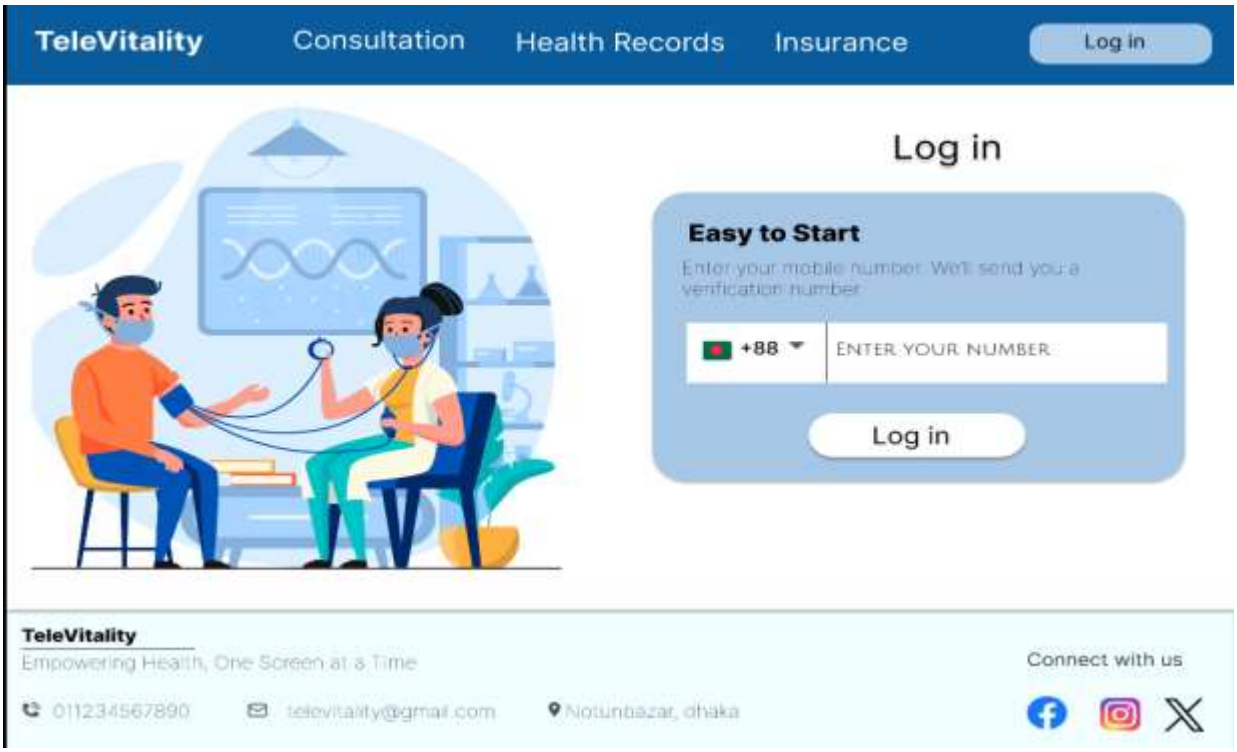
3.3.1.2. Norman's Design Principles

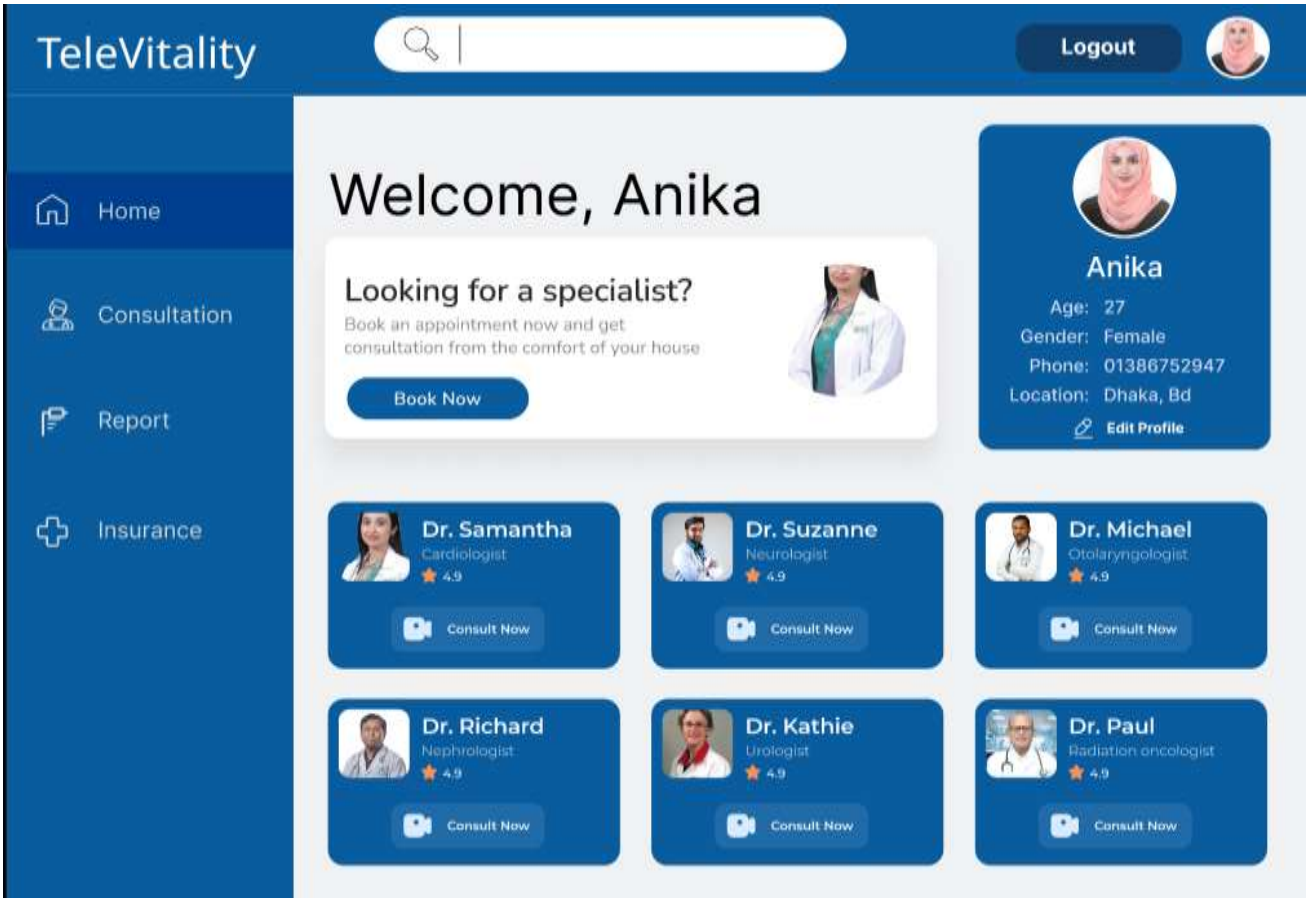
1. Visibility: Can I see it?
2. Feedback: what is it doing?
3. Affordance: Is it self-descriptive?
4. Mapping: where am I and where can I go?
5. Constraints: why can't I do that?
6. Consistency: Have I seen this before?

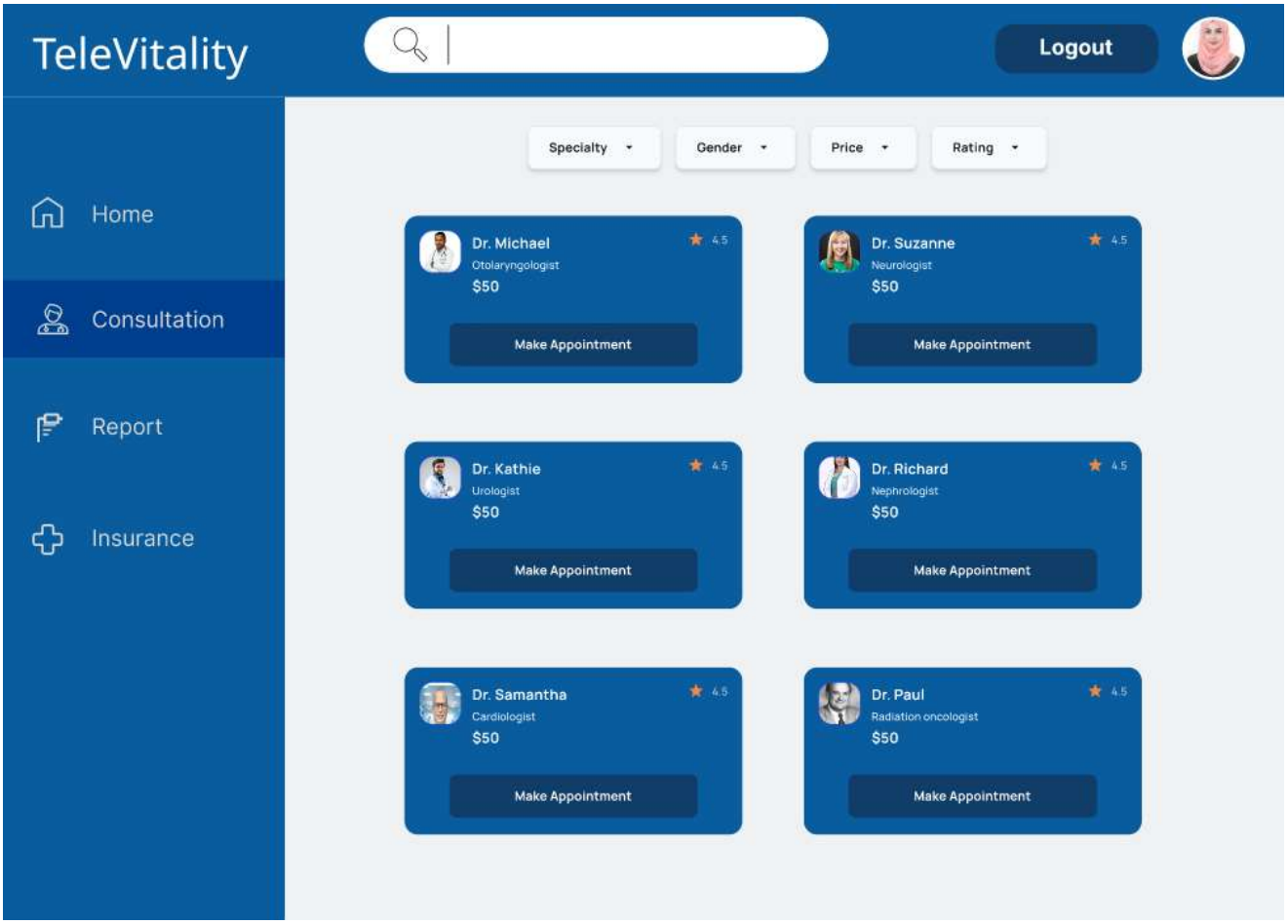
3.3.2. Figma Implementation

https://www.figma.com/file/Hn4UH9sctX308WHB5w9d0O/TeleVitality?type=design&node-id=0%3A1&mode=design&t=jwfXgcdlECXVicNg-1




TeleVitality
Consultation
Health Records
Insurance
Log in
Log in
Easy to Start
Enter your mobile number. We'll send you a verification number
+88
ENTER YOUR NUMBER
Log in
TeleVitality
Empowering Health, One Screen at a Time
01234567890
televitality@gmail.com
Notunbazar, dhaka
Connect with us


TeleVitality
Logout
Home
Consultation
Report
Insurance
Welcome, Anika
Looking for a specialist?
Book an appointment now and get consultation from the comfort of your house
Book Now
Anika
Age: 27
Gender: Female
Phone: 01386752947
Location: Dhaka, Bd
Edit Profile
Dr. Samantha
Cardiologist
4.9
Consult Now
Dr. Suzanne
Neurologist
4.9
Consult Now
Dr. Michael
Otolaryngologist
4.9
Consult Now
Dr. Richard
Nephrologist
4.9
Consult Now
Dr. Kathie
Urologist
4.9
Consult Now
Dr. Paul
Radiation oncologist
4.9
Consult Now


TeleVitality
Logout
Home
Consultation
Report
Insurance
Specialty
Gender
Price
Rating
Dr. Michael
Otolaryngologist
$50
4.5
Make Appointment
Dr. Suzanne
Neurologist
$50
4.5
Make Appointment
Dr. Kathie
Urologist
$50
4.5
Make Appointment
Dr. Richard
Nephrologist
$50
4.5
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Cardiologist
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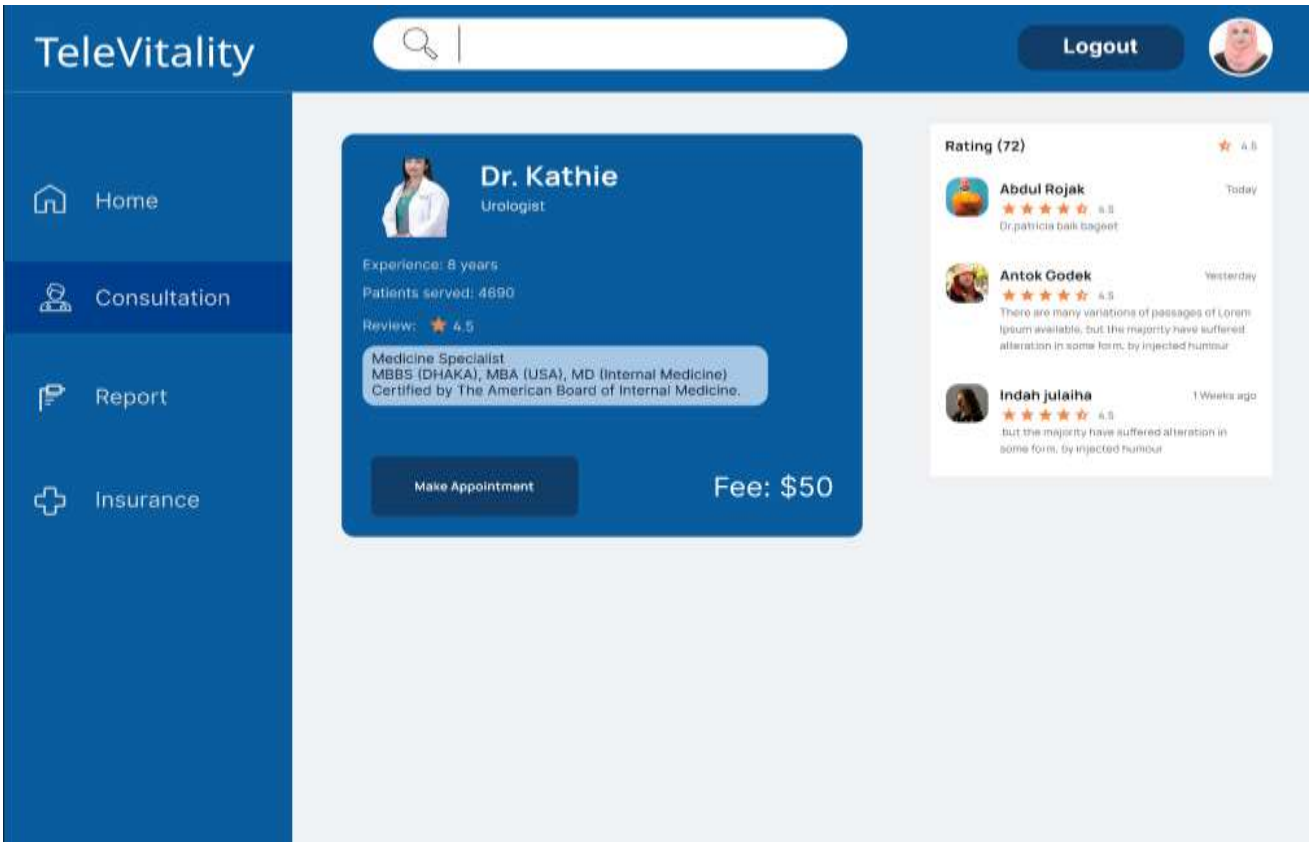
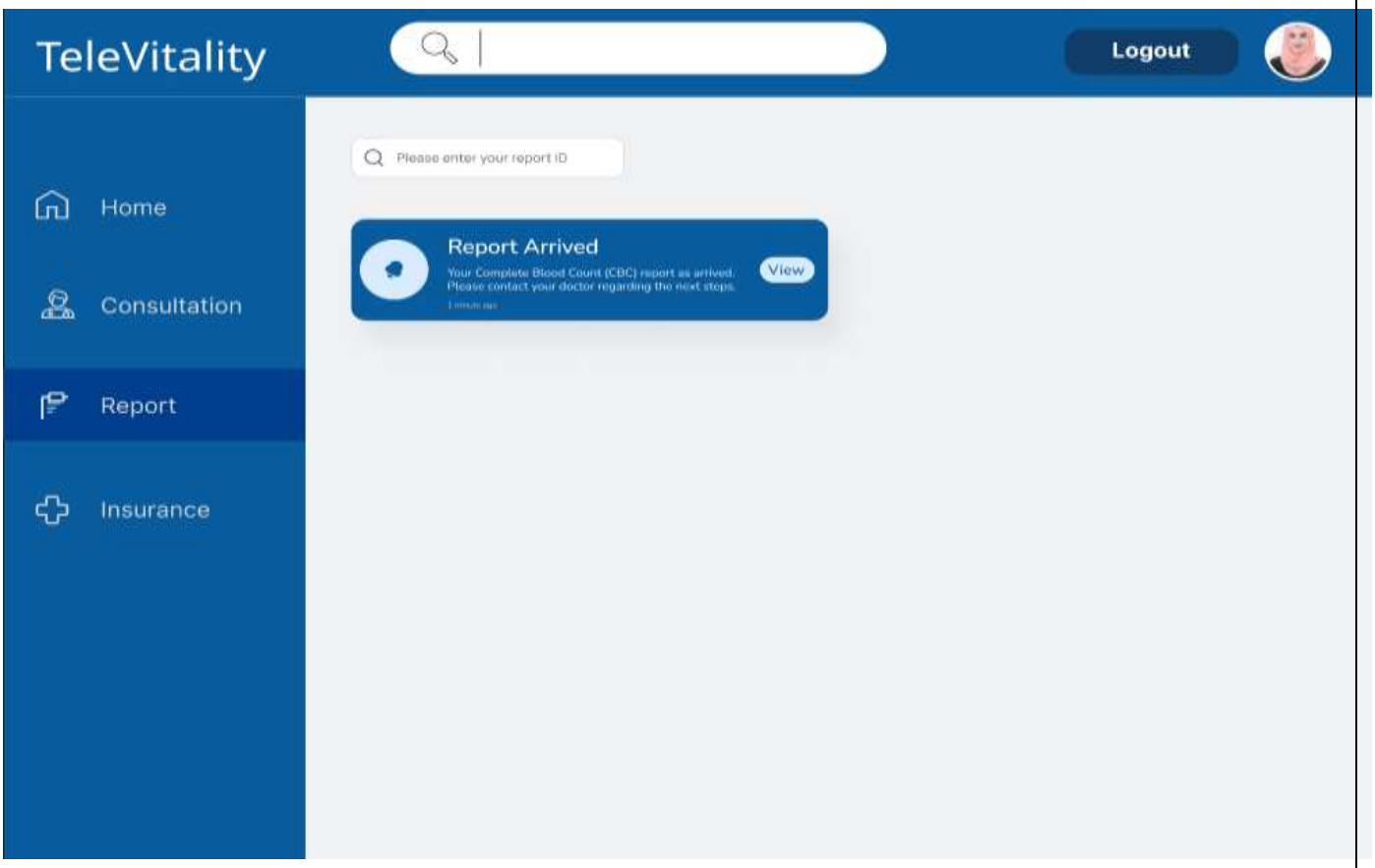
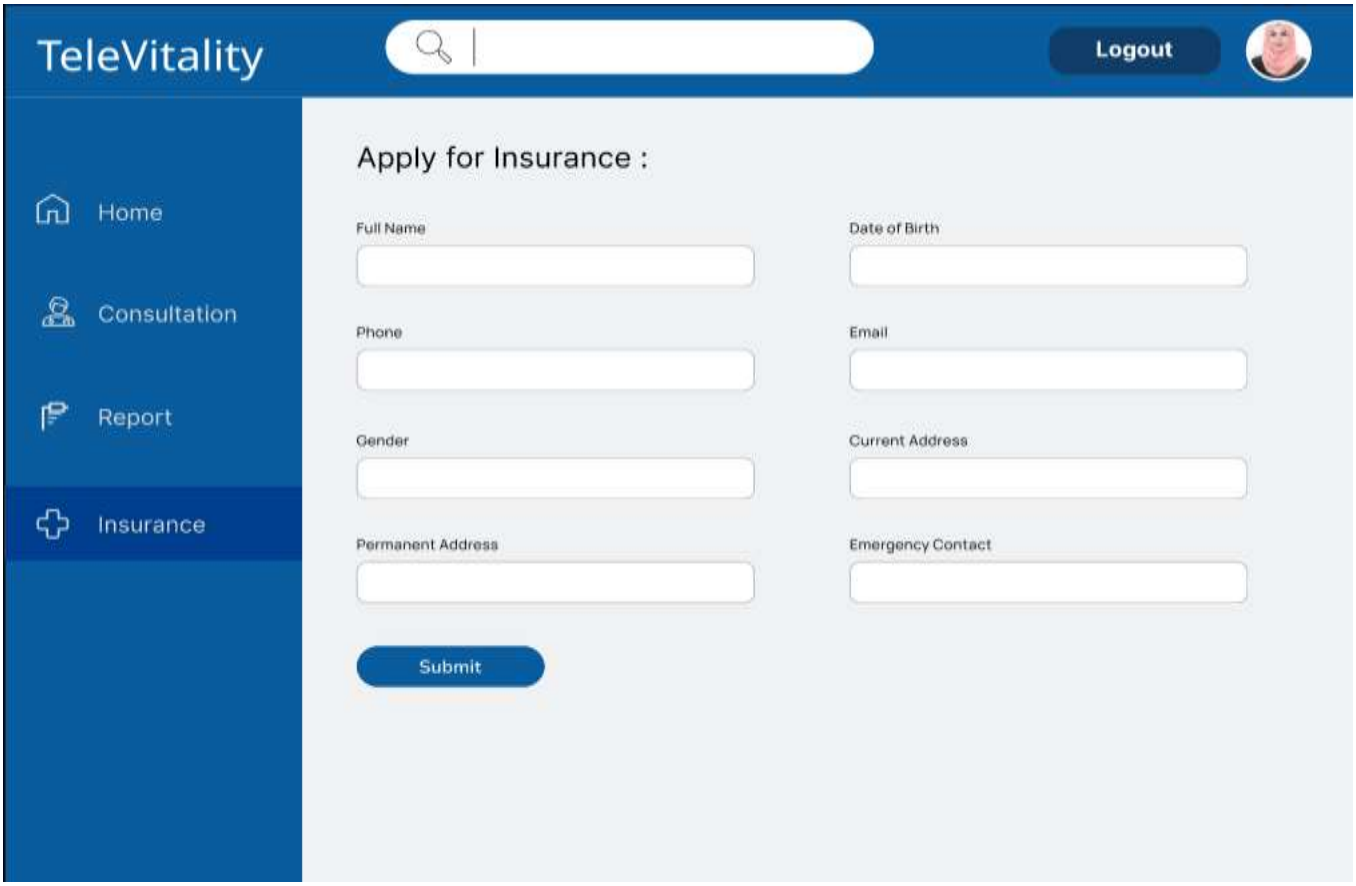
Radiation oncologist
$50
4.5
Make Appointment


TeleVitality
Logout
Home
Consultation
Report
Insurance
Dr. Kathie
Urologist
Experience: 8 years
Patients served: 4690
Review: 4.5
Medicine Specialist
MBBS (DHAKA), MBA (USA), MD (Internal Medicine)
Certified by The American Board of Internal Medicine.
Make Appointment
Fee: $50
Rating (72)
Abdul Rojak
Today
Antok Godek
Yesterday
There are many variations of passages of Lorem Ipsum available, but the majority have suffered alteration in some form, by injected humour
Indah julaiha
1 Weeks ago
but the majority have suffered alteration in some form, by injected humour


TeleVitality
Logout
Please enter your report ID
Home
Consultation
Report
Insurance
Report Arrived
Your Complete Blood Count (CBC) report as arrived.
Please contact your doctor regarding the next steps.
View

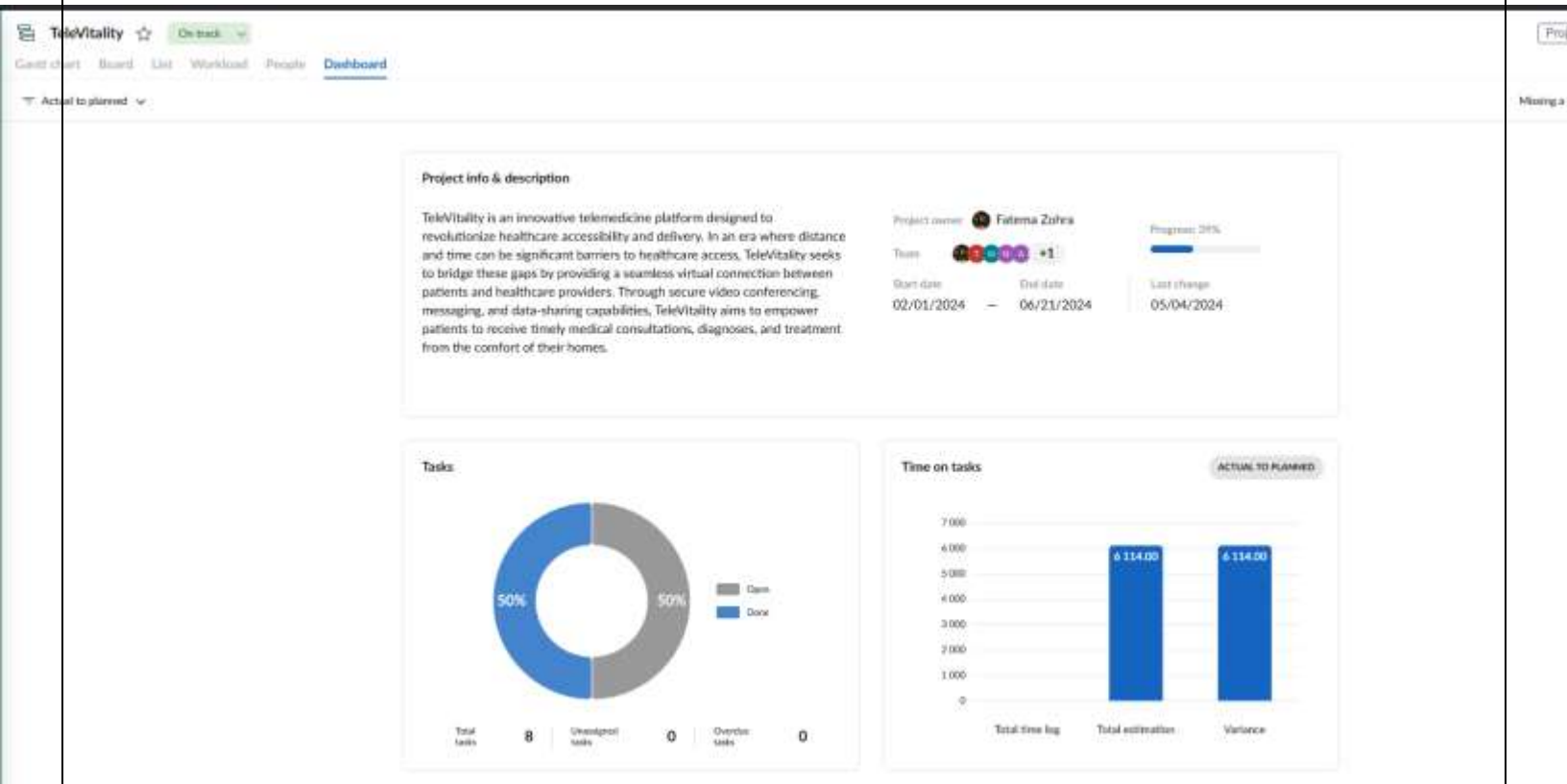

TeleVitality
Logout
Home
Consultation
Report
Insurance
Apply for Insurance :
Full Name
Date of Birth
Phone
Email
Gender
Current Address
Permanent Address
Emergency Contact
Submit

4. Implementation Plan

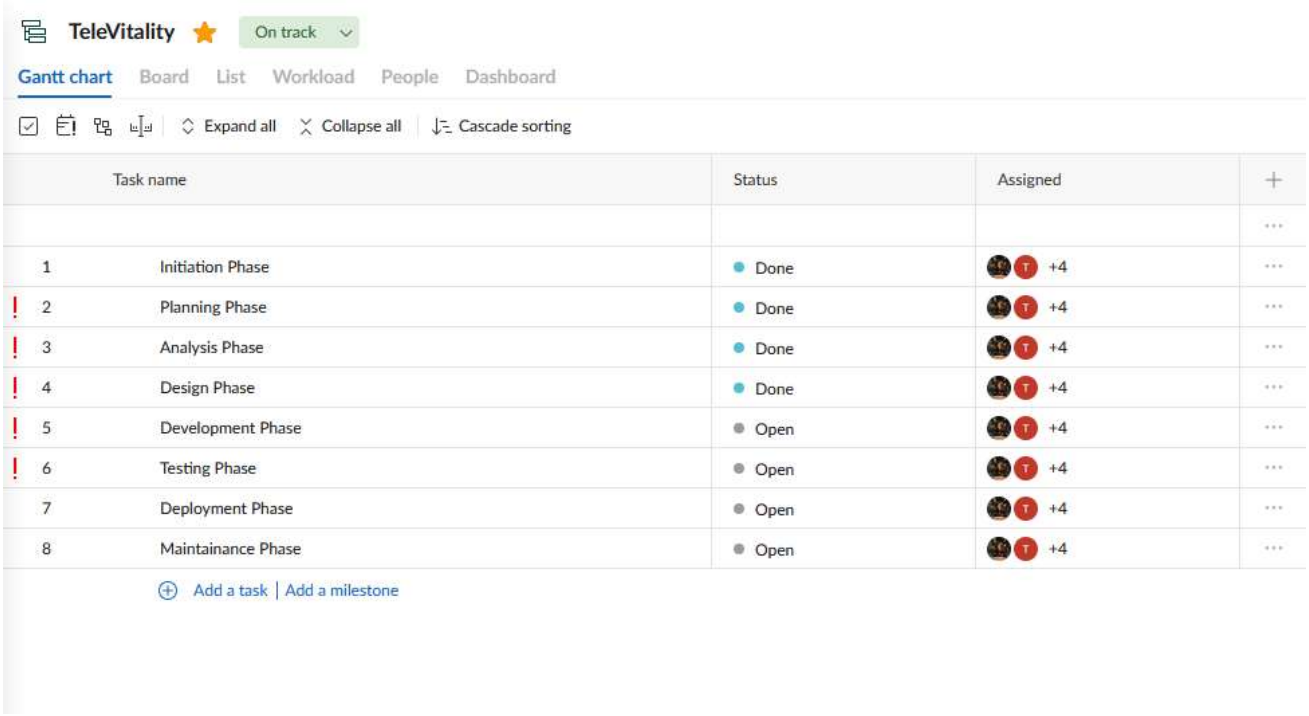
4.1. Gantt Chart

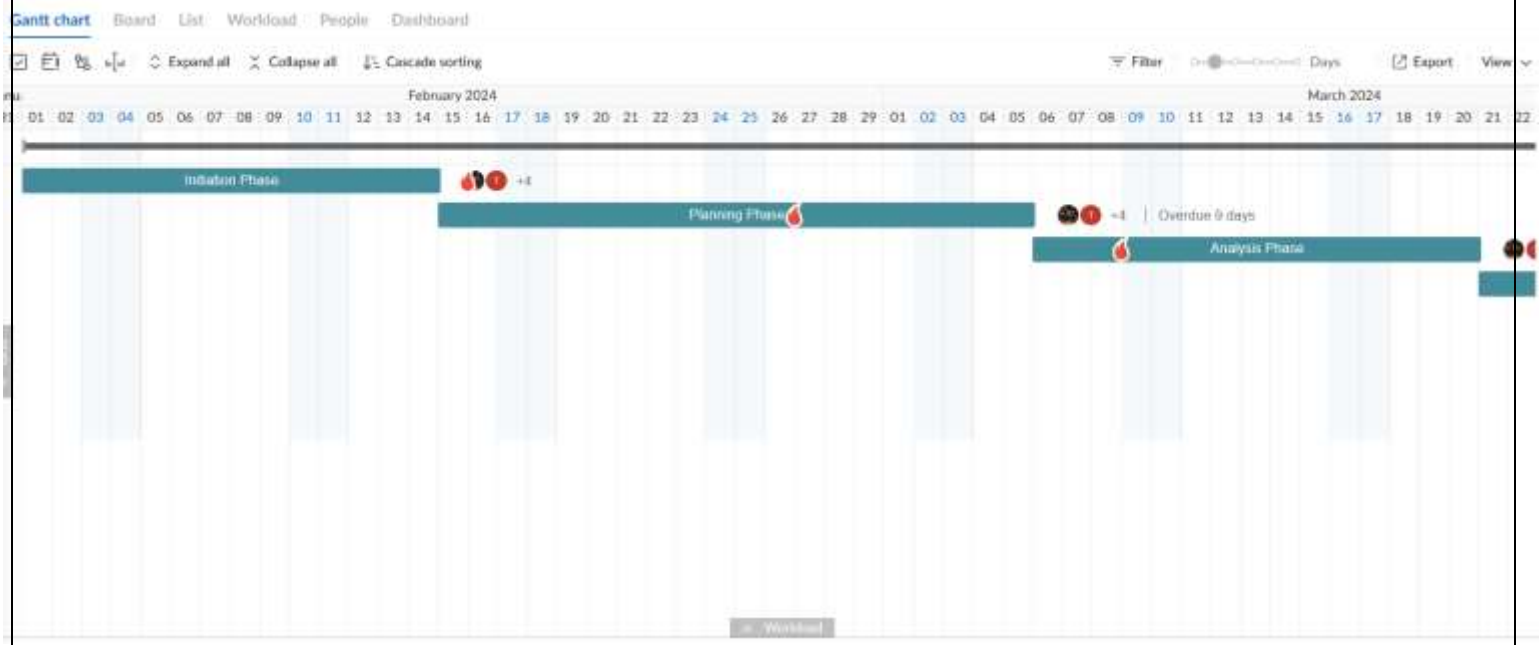
https://app.ganttpro.com/shared/token/94ef6e4c0e712696077e3ed40f25763e0acc3645cc847ebb1a580e5ca843762d/1430582

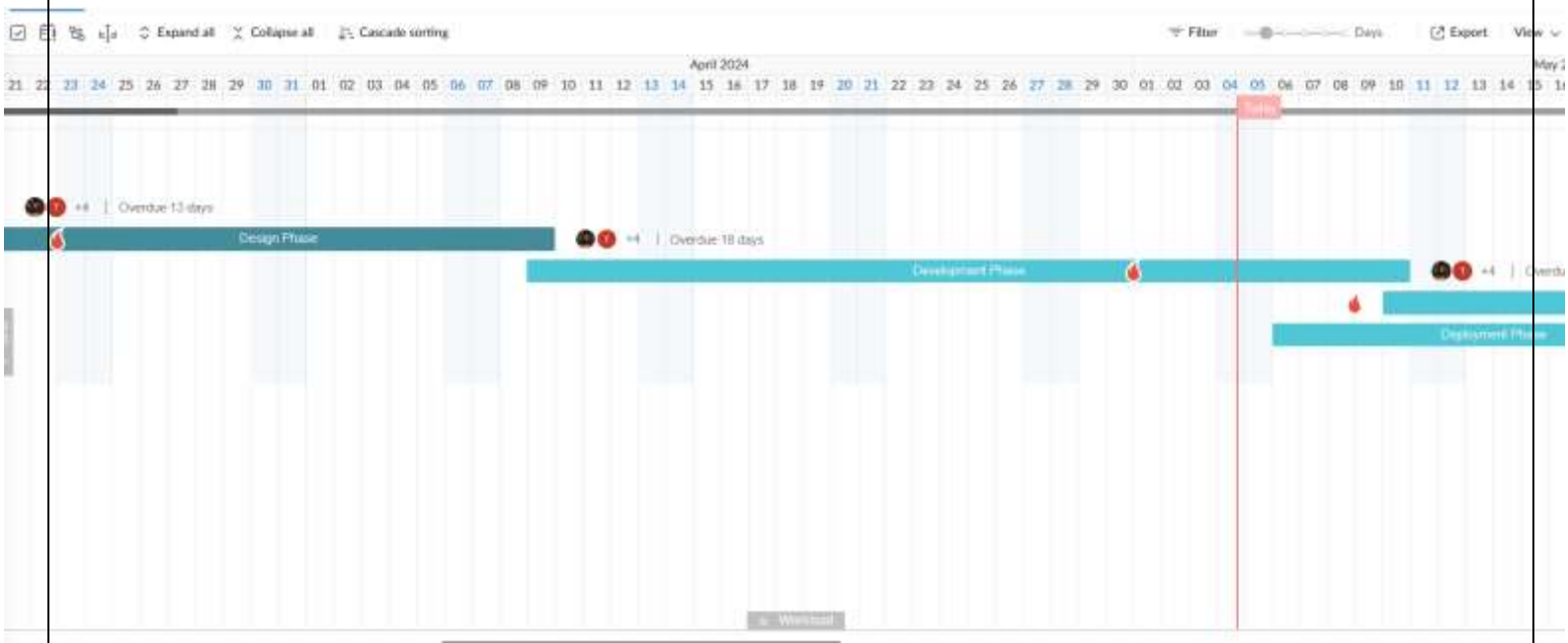
Dashboard

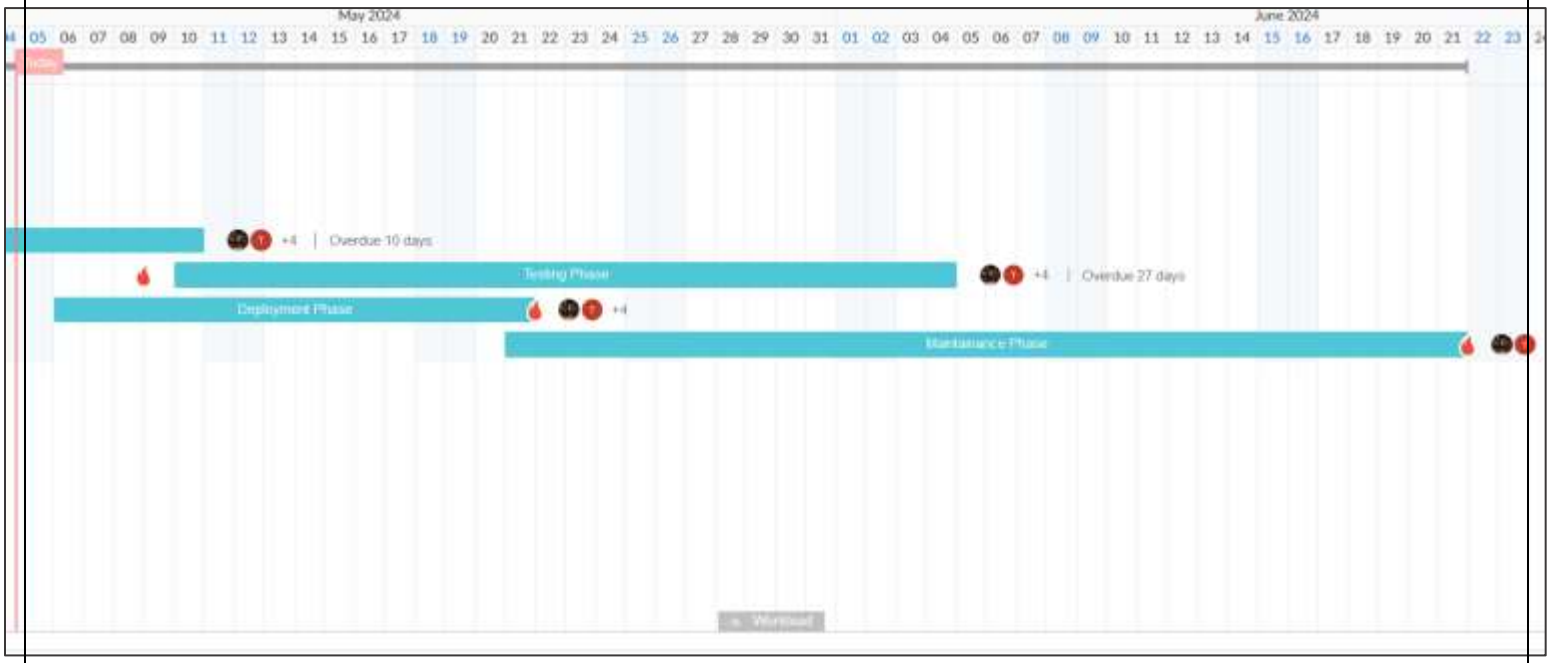


Tasks


TeleVitality
On track
Gantt chart
Board
List
Workload
People
Dashboard
Expand all
Collapse all
Cascade sorting
Task name
Status
Assigned
1 Initiation Phase Done +4
2 Planning Phase Done +4
3 Analysis Phase Done +4
4 Design Phase Done +4
5 Development Phase Open +4
6 Testing Phase Open +4
7 Deployment Phase Open +4
8 Maintainance Phase Open +4
Add a task | Add a milestone


Gantt chart
Board
List
Workload
People
Dashboard
Expand all
Collapse all
Cascade sorting
Filter
Days
Export
View
February 2024
March 2024
Initiation Phase
Planning Phase
Overdue 9 days
Analysis Phase


Expand all
Collapse all
Cascade sorting
Filter
Days
Export
View
April 2024
Overdue 13 days
Design Phase
Overdue 18 days
Development Phase
Deployment Phase



4.2. Technology/Tools Used

Frontend:

1. React.js:

- We will use React.js for building the user interface of our web application.

- We will leverage React's component-based architecture for modularity and reusability.

- We will be implementing features such as user authentication, appointment booking, and prescription ordering using React components.

2. React Router:

- We will use React Router for client-side routing to navigate between different pages and components based on the URL.

3. Redux:

- If our application's state management complexity increases, we may consider using Redux for centralized state management.

- Redux can help manage application-wide state such as user authentication status, appointment details, and prescription data.

4. Axios:

- We will utilize Axios for making HTTP requests to our backend API endpoints.

- Axios provides a simple and efficient way to handle asynchronous data fetching and sending requests.

5. Bootstrap:

- We will choose a UI framework like Bootstrap to speed up the development process and ensure consistency in design.

- This framework offers pre-designed components and styles that can be easily customized to match our application's branding.

Backend:

1. Node.js:

- We will utilize Node.js as the backend runtime environment for building server-side logic and handling incoming requests.

- Node.js offers non-blocking I/O, making it suitable for building scalable and performant web applications.

2. Express.js:

- We will use Express.js as the web application framework for Node.js.

- Express provides a robust set of features for building RESTful APIs and handling middleware functions.

3. MongoDB:

- We will use MongoDB as the database to store user data, health records, appointments, prescriptions, and doctor reviews.

- MongoDB's flexible schema design and scalability make it suitable for handling diverse types of data in a healthcare application.

4. Mongoose:

- We will use Mongoose as an ODM (Object Data Modelling) library for MongoDB in Node.js.

- Mongoose simplifies interactions with the MongoDB database by providing a schema-based solution and validation features.

5. JWT (JSON Web Tokens):

- We will implement JWT-based authentication for users to securely log in using their phone numbers.

- JWT tokens can be issued upon successful authentication and used to authorize access to protected routes and resources.

Database:

1. MongoDB Atlas:

- We will host our MongoDB database on MongoDB Atlas, a fully managed cloud database service.

- MongoDB Atlas provides scalability, high availability, and security features, allowing us to focus on building your application without worrying about database management tasks.

2. Mongoose Schema:

- We will define Mongoose schemas to represent various entities such as users, doctors, appointments, prescriptions, and reviews.

-We will utilize Mongoose schema validation to enforce data integrity and ensure consistency in our database.

With these tools, we can efficiently develop our telemedicine web application, providing users with features such as appointment booking, e-consultation, access to health records, prescription ordering, and viewing doctor reviews, while ensuring security, scalability, and usability.

4.3. Deployment

Deploying TeleVitality will require the following steps:

Step 1: Project Setup and Planning

- Duration: 2-3 weeks

1. Define project requirements and features.

2. Create wireframes and design mock-ups for the user interface.

3. Set up version control using Git and create a repository for the project.

4. Define the project structure and architecture.

Step 2: Frontend Development

- Duration: 2-4 weeks

1. Set up the React.js project and install necessary dependencies.

2. Implement user authentication using phone numbers.

3. Develop UI components for appointment booking, health record viewing, prescription ordering, and doctor reviews.

4. Integrate with backend API endpoints using Axios for data fetching and sending requests.

5. Test frontend components for functionality and responsiveness.

Step 3: Backend Development

- Duration: 3-5 weeks

1. Set up Node.js with Express.js and install required packages.

2. Implement RESTful API endpoints for user authentication, appointment management, health record retrieval, prescription ordering, and doctor reviews.

3. Connect to MongoDB database using Mongoose and define data models for users, appointments, prescriptions, and reviews.

4. Implement JWT-based authentication and authorization middleware.

5. Write unit tests for backend routes and controllers.

Step 4: Database Setup

- Duration: 1-2 weeks

1. Set up MongoDB Atlas or deploy MongoDB on a cloud platform.

2. Create MongoDB collections for storing user data, appointments, prescriptions, and reviews.

3. Configure database security settings and access controls.

Step 5: Integration and Testing

- Duration: 1-2 weeks

1. Integrate frontend and backend components together.

2. Test end-to-end functionality including user registration, appointment booking, health record retrieval, prescription ordering, and doctor reviews.

3. Perform usability testing to ensure a smooth user experience.

4. Fix any bugs or issues identified during testing.

Step 6: Deployment

- Duration: 1-2 weeks

1. Set up a production environment for hosting the web application.

2. Deploy backend API server to a cloud platform like AWS, Azure, or Heroku.

3. Deploy frontend React application to a static hosting service like Netlify or Vercel.

4. Configure domain settings and SSL certificates for HTTPS security.

5. Set up continuous integration and continuous deployment (CI/CD) pipelines for automated deployment.

Step 7: Post-Deployment Tasks

- Duration: Ongoing

1. Monitor application performance and user feedback.

2. Implement updates and new features based on user feedback and changing requirements.

3. Perform regular maintenance tasks such as database backups, security updates, and performance optimizations.

Total Estimated Duration: 10-20 weeks

6. Conclusion

In conclusion, while our telemedicine web app marks a significant achievement, there's room for improvement. Leveraging AI for personalized healthcare and integrating with pharmacies can enhance user experience. Looking forward, the project holds potential for expansion, with opportunities to introduce new features like remote monitoring. Embracing innovation ensures our platform remains at the forefront of telemedicine, empowering users to access healthcare conveniently and effectively.

7. References

https://healthxbd.com/
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https://www.researchgate.net/publication/277924225_Telemedicine_A_brief_analysis