

Requirements Management for E-Prescription System

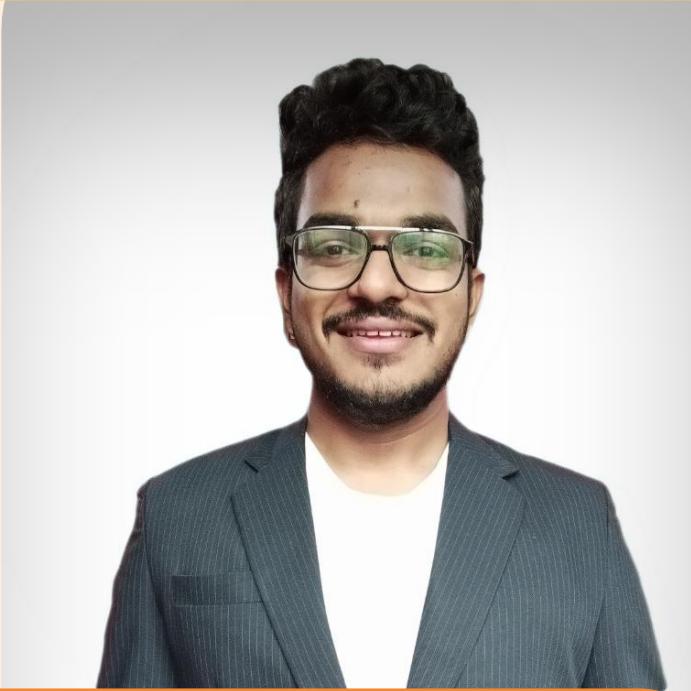
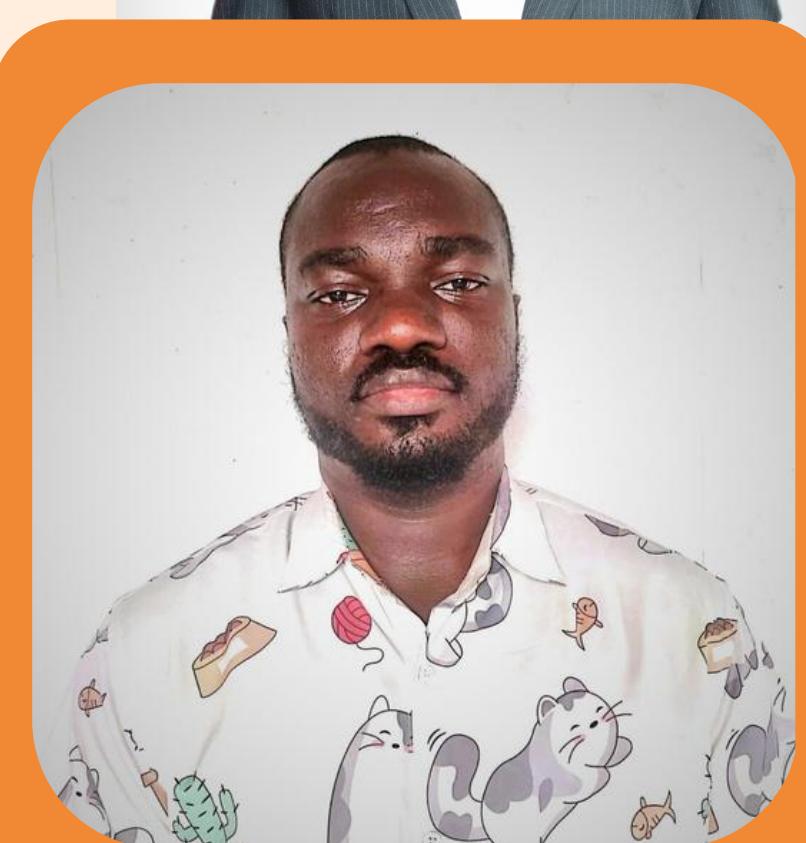
Master in Digital Health and Data Science

by
Suyog Waghore, Ifeanyi Benjamin Eneje, Vivek Joshi,
Mahmoud Elmadany





Team



Introduction

Purpose of the Document

- Comprehensive guide for stakeholders
- Design, implementation, and management of the system



Aim and Target Group



Clear understanding of functional and non-functional requirements

Target audience: developers, healthcare professionals, regulatory bodies

Objective and Core Functionality



Collaboration

Facilitate electronic prescription processes

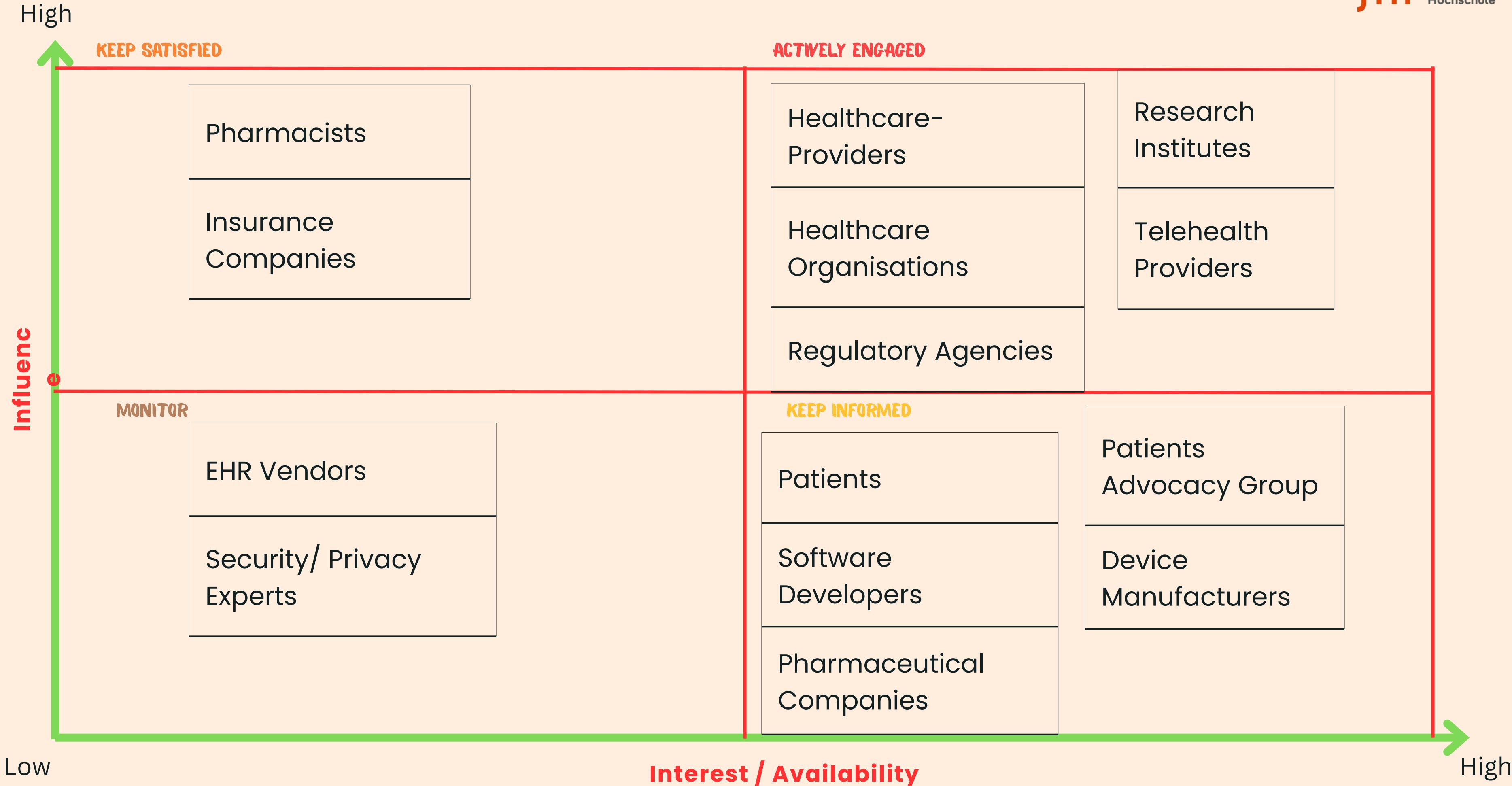


Process

Prescription generation, transmission, and dispensing

Stakeholders in E-Prescription System





Involvement of Key Stakeholders

Key Stakeholders in Decision-Making



Healthcare Providers

Determine system functionality aligning with clinical processes.

Focus on system implementation, resource allocation, and alignment with organizational goals

Healthcare Organizations

Regulatory Agencies

Stay engaged to understand and comply with evolving healthcare and tech regulations

Collaborate on input for training programs for healthcare professionals and students

Educational Institutions

Telehealth Providers

Engage to align e-prescription functionalities with broader telehealth services

Involvement of Key Stakeholders

Key Stakeholders in Decision-Making



Address workflow needs, integrate with pharmacy systems, and ensure prescription verification

Pharmacists

Insurance Companies

Collaborate for alignment with billing and reimbursement requirements

Involvement of Key Stakeholders

Key Stakeholders in Decision-Making



Patients

UI design, accessibility, and user-centric features

Active participation in software architecture, development methodologies, and ongoing maintenance

Software Developers

Pharmaceutical Companies

Engage in decisions on medication databases, formulary integration, and system support

Involve in decisions on patient-centric features, privacy, and meeting patient needs

Patients' Advocacy Groups

Device Manufacturers

Include in decisions about platform compatibility, app development, and hardware requirements

Involvement of Key Stakeholders

Key Stakeholders in Decision-Making



Involve in decisions regarding integration, data exchange, and interoperability.

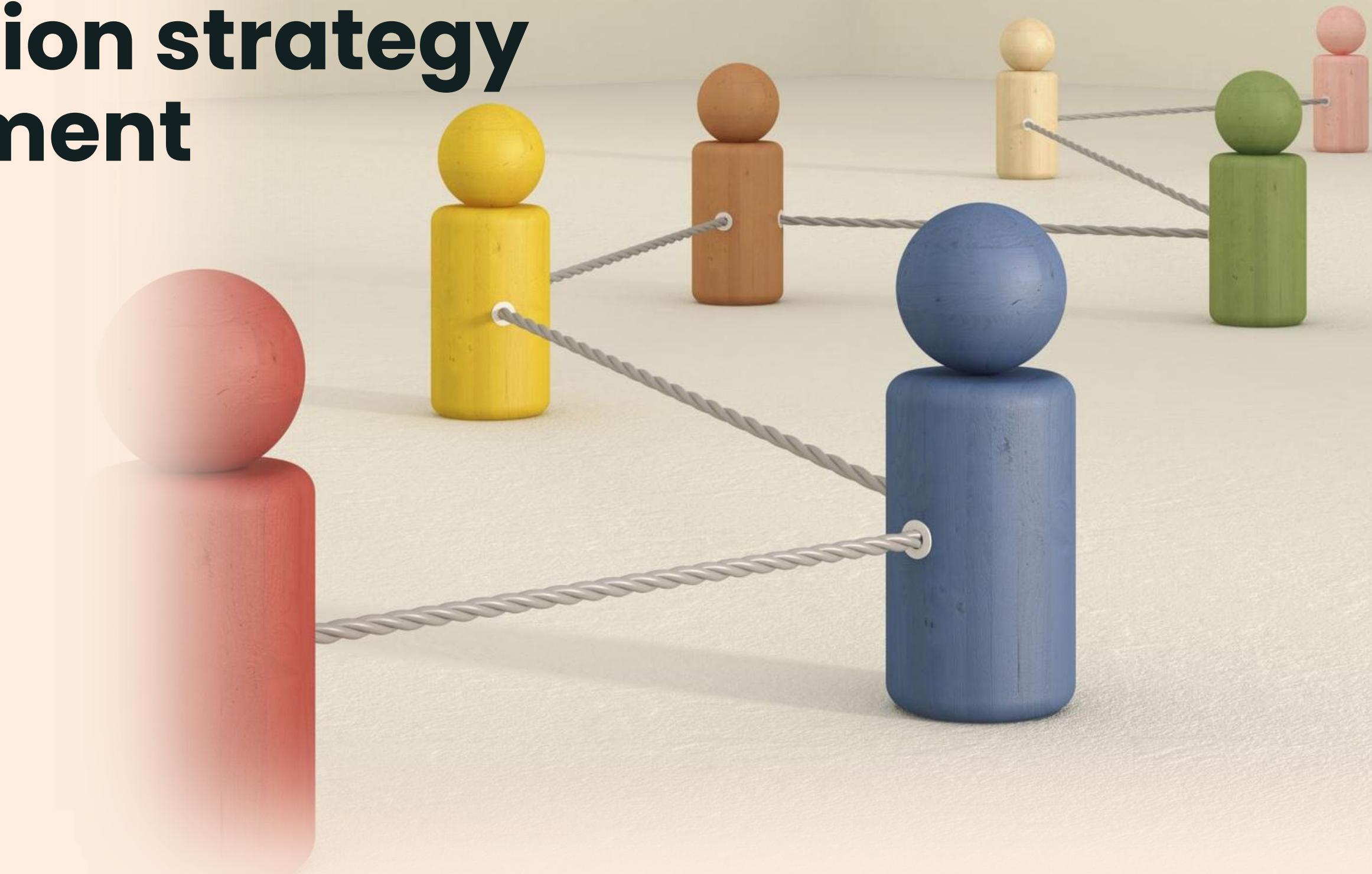
EHR Vendors

**Security and Privacy
Experts**

Guide decisions on data security, privacy policies, and compliance with healthcare information protection standards

Stakeholders expectations, communication strategy and Requirement Elicitation

Ifeanyi Eneje



Communication strategies

Message:

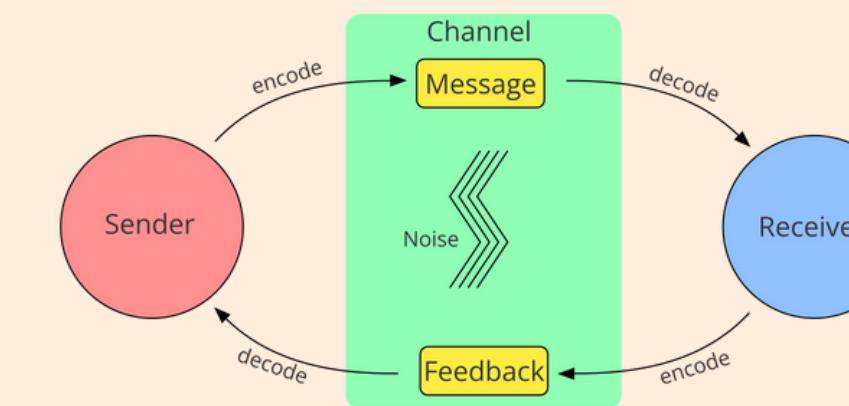
- **Clear**
- **Concise**
- **Understandable**
- **Credible**



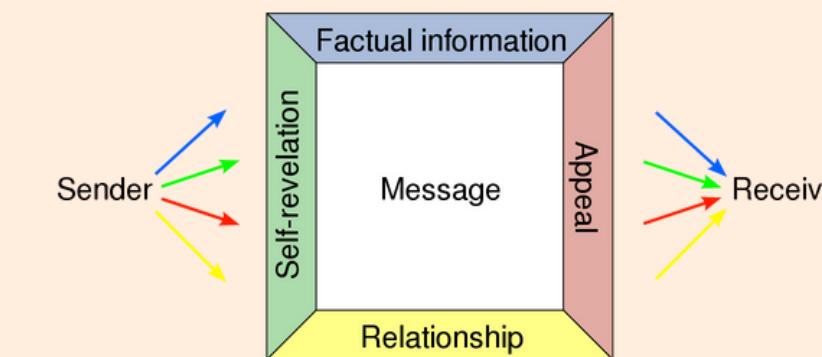


Communication theories

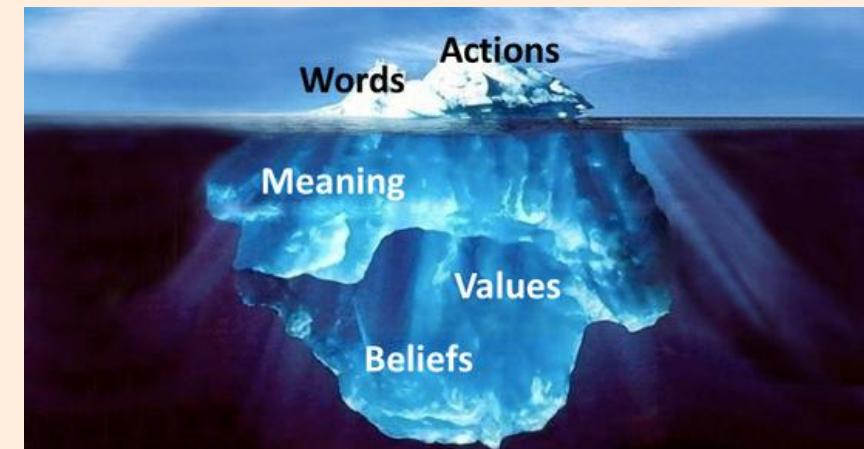
Sender-receiver model (Shannon and Weaver): Sender—Encoder—channel—Noise—Decoder—Receiver



The four-sides model for improving communication (Shulz von Thun): "Traffic light is green", "Green light is on", "I want to get going", "You need my help", "Go".



The Iceberg model(S. Freud): factual level – clear statements(20%), relationship level(80%) – emotions and experiences



Constructivism(Jean Piaget): constructing the understanding of the world around one based on the interactions with informations and events around one.



Expectations of Key stakeholders

Physicians:

- Streamlined prescription workflows,
- quick access to patient medication history,
- and integration with electronic health records (EHR).

Nurses:

- Efficient medication administration,
- accurate patient information,
- and improved communication with pharmacists.

Pharmacists:

- Accurate and legible prescriptions,
- real-time access to patient medication history,
- and improved communication with physicians.



Patients:

- Convenient and error-free prescription processes,
- easy access to medication information,
- and improved communication with healthcare providers.

Healthcare Organizations:

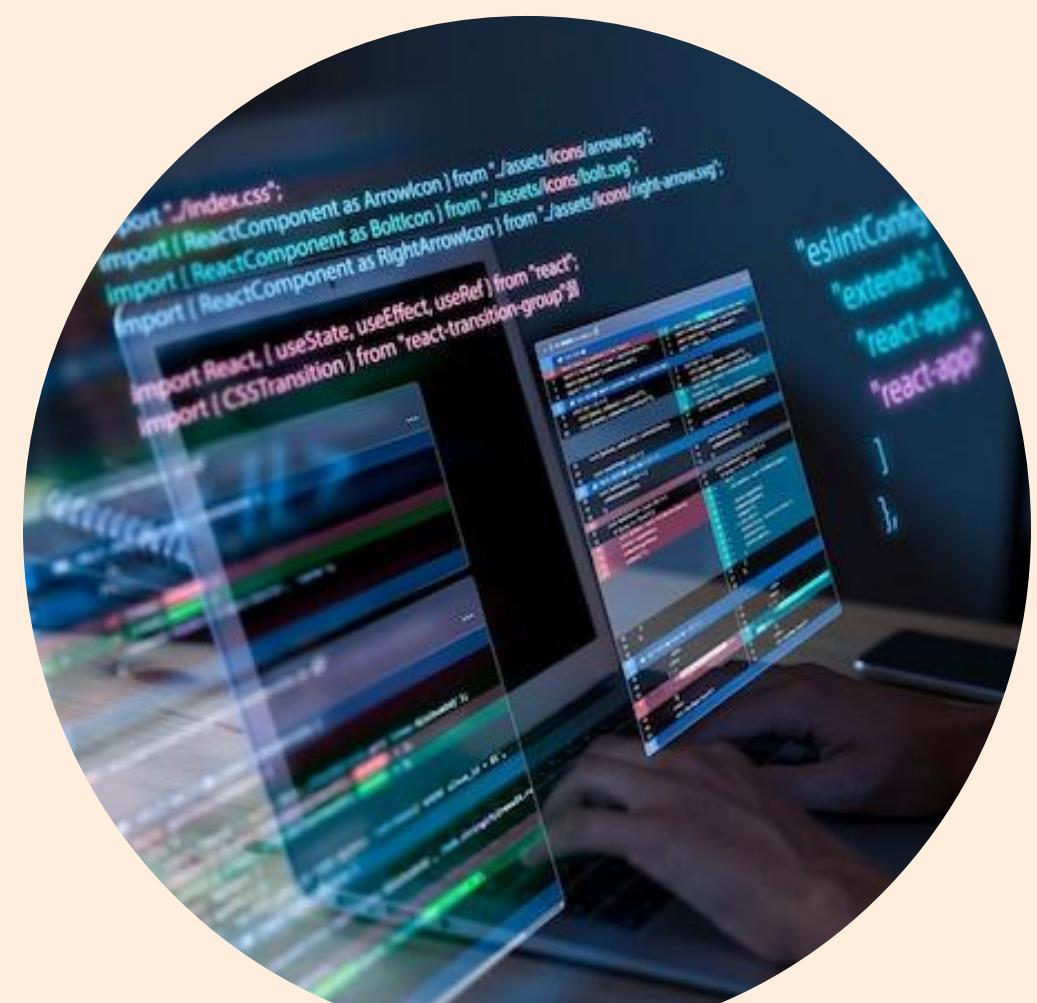
- Improved prescription accuracy,
- enhanced patient safety,
- and streamlined medication management.

Software Developers:

- Development of a secure,
- scalable,
- and interoperable e-prescription system.

Insurance Companies:

- Streamlined claims processing,
- reduced medication errors, and improved patient outcomes.



Regulatory Agencies:

- Compliance with prescription-related regulations,
- patient safety, and data security.

Electronic Health Record Vendors:

- Interoperability with EHR systems, seamless data exchange, and improved medication history accuracy.

Security and Privacy Experts:

- Robust protection of patient prescription data, compliance with privacy regulation.

Telehealth Providers:

- Integration with telehealth platforms, seamless remote prescription capabilities, and secure communication channels.



REGULATORY COMPLIANCE



Planning Stakeholders communication strategy

- **Identifying Stakeholders:**
Conduct analysis to identify and categorise stakeholders.
Open register with contacts ,roles
- **Setting Communication Objectives:** define purpose and goal of communication for each stakeholder group for instance informing physicians of system capabilities or updating patients on prescription status.
- **Determining Communication Channels:**
Select appropriate communication channels based on the nature of info and stakeholders preferences e.g. e-mails, regular face to face meetings, webinars.
- **Defining Frequency and Timing**
- **Content Tailoring for Stakeholders**

- **Content Tailoring for Stakeholders:**

For instance, highlighting the benefits of e-prescription system to Physicians, nurses, pharmacists ,others

- **Two-way Communication:**

Establish forums for questions, suggestions, and concerns through regular meetings, surveys, and dedicated communication channels.

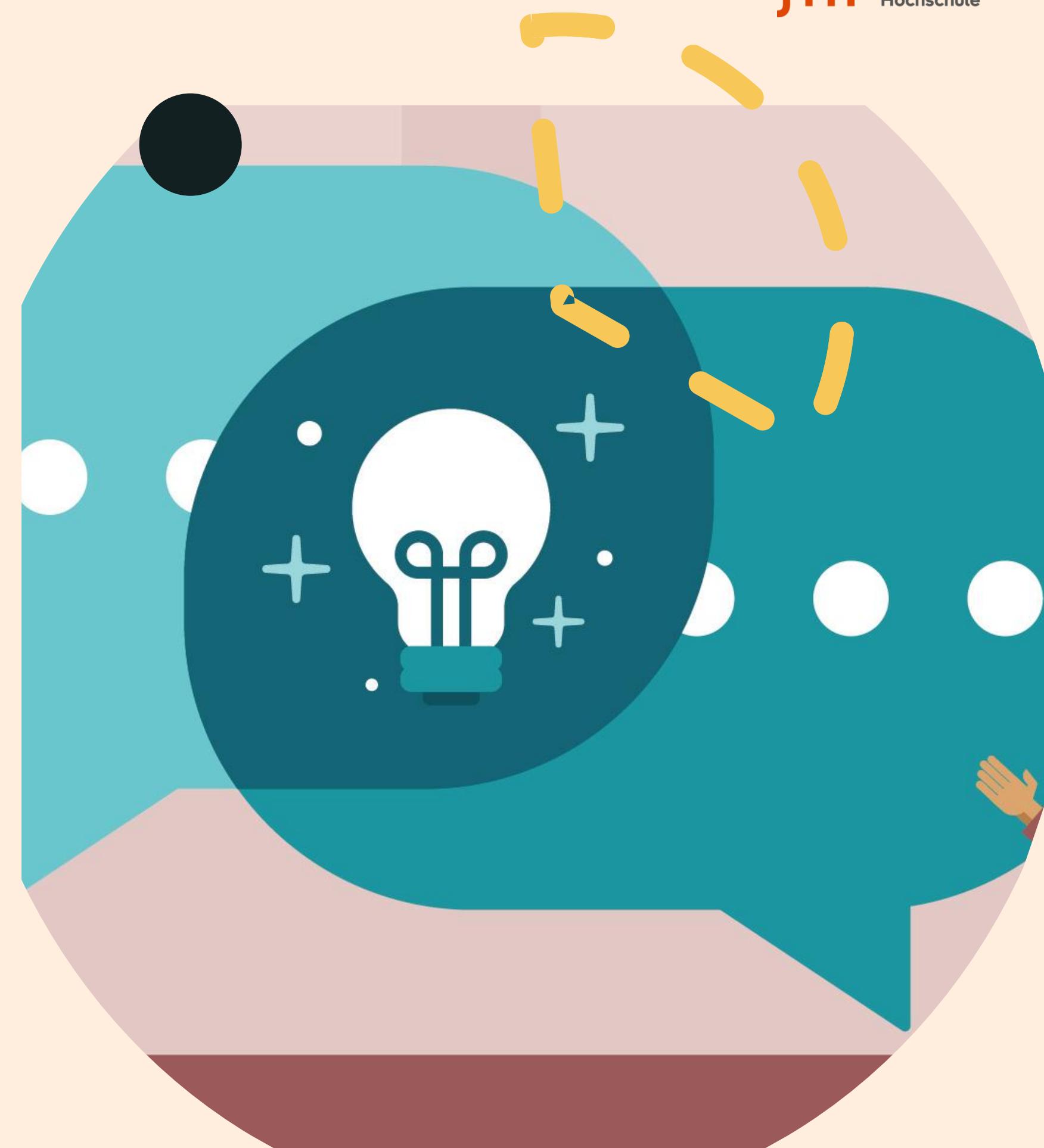
Implement a feedback mechanism within the e-prescription system for users to report issues or provide suggestion

- **Training and Education:**

Handling Conflict and Issues:

Address conflicts and issues promptly to maintain a positive project environment.

Establish a protocol for reporting and resolving conflicts.



- **Documentation and Record-keeping:**

Archive meeting minutes, communication logs, and feedback received for future reference.

- **Continuous Improvement:**

Conduct periodic reviews of the communication strategy to identify areas for improvement.

Our Strategies

Physicians:

- **Strategy:**

- Conduct orientation sessions to introduce physicians to the e-prescription system.
- Provide regular updates on system enhancements and improvements.
- Establish a dedicated helpdesk or support team for immediate issue resolution.
- Offer training sessions to ensure physicians are proficient in using the system.

Pharmacists:

- **Strategy:**

- Collaborate with pharmacy associations to disseminate information about the e-prescription system.
- Conduct training sessions for pharmacists on using the system for prescription processing.
- Establish a real-time communication channel for pharmacists to clarify prescription details.

- **Share updates on medication recalls or changes that may impact pharmacists.**



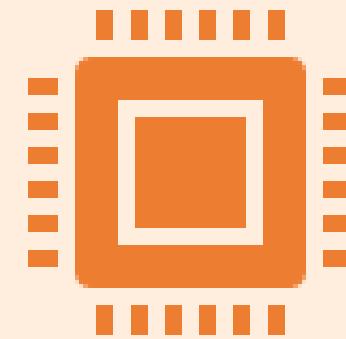
Insurance Companies:

- **Strategy:**

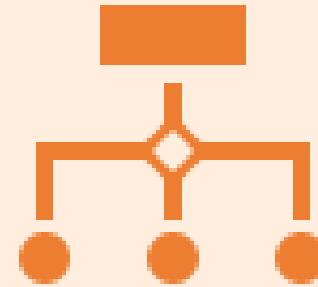
- Collaborate on integration points between the e-prescription system and insurance platforms.
- Share regular updates on prescription trends and data relevant to claims processing.
- Address concerns related to billing and reimbursement through transparent communication.
- Establish a dedicated support channel for insurance-related inquiries.



Requirement Elicitation



Definition : Process of gathering information about the required and existing systems and distilling the user and system requirements



Scope: working with stakeholders to find out about the application domain, the services that the system should provide and the systems operational constraints



Sources : stakeholders, documents and other existing systems.

Activities for a single elicitation session

Prepare for elicitation:

- **Decide on elicitation scope and agenda**
- **Prepare resources**
- **Prepare questions**

Perform elicitation activities:

- **Perform elicitation session**

Follow up after elicitation:

- **Organize and share notes**
- **Document open issues**

Requirement elicitation for selected stakeholder groups

Physicians

- **Objective:** Understand physician requirements for seamless integration of e-prescription into their workflows.
- **Strategy:** Conduct interactive workshops, surveys, and one-on-one interviews.
- **Technique:** Use process mapping to identify current prescription workflows and gather feedback on potential improvements.
- **Schedule:** **Workshop – 2 days, Surveys – 2 weeks, Interviews – 1 month.**
- **Resource Estimates:** Facilitator, Analyst, Survey Tool, Interviewers.
- **Risks:**
 - Lack of participation due to busy schedules.
 - Resistance to change in established workflows.



Insurance Companies

- **Objective:** Determine insurance companies' requirements for streamlined claims processing with e-prescriptions.
- **Strategy:** Engage in collaborative meetings, document analysis, and interviews.
- **Technique:** Analyze current claims processing workflows and gather feedback on integration points.
- **Schedule:** Collaborative Meetings – 1 month, Document Analysis – 2 weeks, Interviews – 1 month.
- **Resource Estimates:** Facilitator, Analyst, Meeting Coordinator, Interviewers.
- **Risks:**
 - Limited availability of key decision-makers for collaborative meetings.
 - Sensitivity to data security concerns in claims processing.



This Photo by Unknown author is licensed under
CC BY-SA.



Pharmacists

- **Objective:** Gather insights on pharmacists' expectations and concerns regarding e-prescriptions.
- **Strategy:** Organize focus group discussions, interviews, and site visits.
- **Technique:** Scenario-based discussions to understand real-world challenges and opportunities.
- **Schedule:** Focus Groups – 2 sessions, Interviews – 1 month, Site Visits – 2 weeks.
- **Resource Estimates:** Facilitator, Analyst, Site Visit Coordinator, Interviewers.
- **Risks:**
 - Limited availability of pharmacists for focus group sessions.
 - Potential resistance to technology adoption.



	Interviews	Workshops	Focus Groups	Observations	Questionnaires	System interface Analysis	User Interface Analysis	Document Analysis
Patients	x				x			
Healthcare Providers	x	x	x	x	x	x	x	
Pharmacists	x	x	x	x	x	x	x	
Healthcare Organizers	x	x	x	x	x	x	x	
Software Developers	x	x		x	x	x	x	
Regulatory Agencies	x	x		x	x	x	x	x
EHR Vendors	x	x		x	x	x	x	x
Insurance Companies	x	x		x	x	x	x	x
Device Manufacturers	x	x		x	x	x	x	x
Educational/ Research Institutions	x	x		x	x	x	x	x
Patient Advocacy Group	x			x	x	x	x	
Telehealth Providers	x	x		x	x	x	x	
Security/ Technology	x	x		x	x	x	x	x

Overall Risks:

- **Stakeholder unavailability or limited participation due to busy schedules.**
- **Resistance to technology adoption among stakeholders.**
- **Security and privacy concerns may hinder open discussions.**
- **Incomplete or inaccurate information provided during elicitation sessions.**



Mitigation Strategies:

- Ensure flexibility in scheduling to accommodate stakeholders' availability.
- Provide clear communication on the benefits of the e-prescription system to address resistance.
- Implement robust confidentiality measures to address security concerns.
- Conduct follow-up sessions to clarify and validate information gathered during elicitation.



Elicitation technique: Questionnaire

Determined beforehand:

- **What do we want to find out?**
- **How should the survey be conducted?**
- **Is there enough prior knowledge to ask specific questions and provide sufficiently clear answers**
- **Or should the interviewee point of view be taken into account and their perceptions and experience recorded?**

Brainstorm



Ensured:

- Used simple, unambiguous terms
- Avoided long and complex questions
- Avoided double stimuli and negatives
- Avoided insinuations and suggestive questions
- Used answer categories that are exhaustive and disjunctive (non-overlapping)
- Ensured content of a question do not have effect on answer
- Defined unclear terms





Questionnaire Form

<https://docs.google.com/forms/d/e/1FAIpQLSczWZSnbp6nhvUWivbM-1u9MhMIB8VlaTveJEoQScrU2CNyyQ/formResponse>

E-Prescription Patient Experience Survey

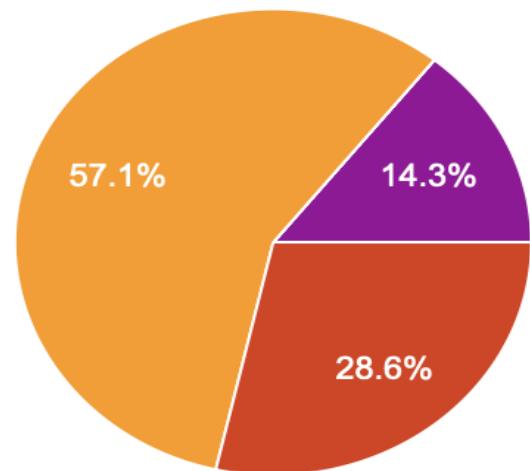
7 responses

[Publish analytics](#)

Section 1: Basic Information

Age Group

7 responses

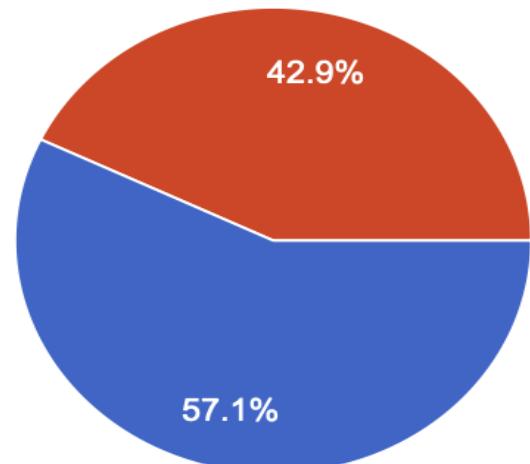


- Under 18
- 18-24
- 25-34
- 35-44
- 45-54
- 55-64
- 65 or older

[Copy](#)

Gender

7 responses

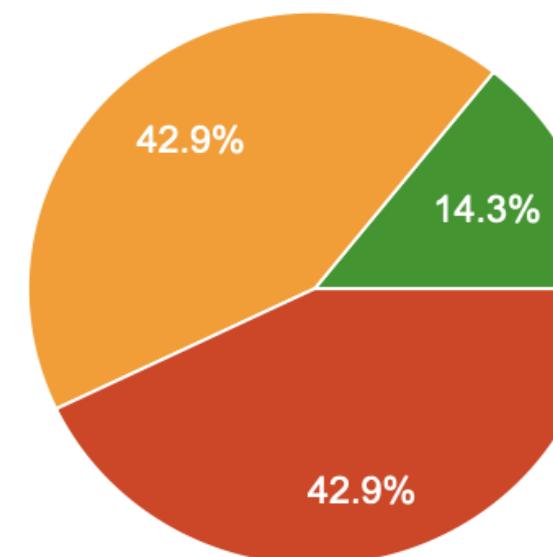


- Female
- Male
- Non-binary/Third gender
- Prefer not to say

[Copy](#)

How often do you visit a healthcare provider?

7 responses

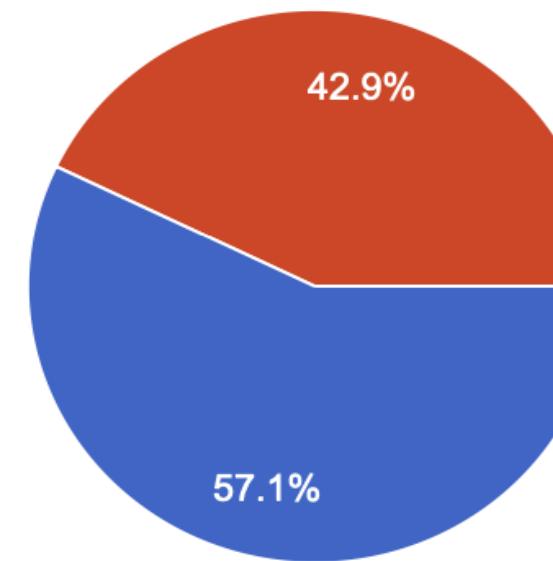


- Regularly (monthly or more often)
- Occasionally (every few months)
- Rarely (once a year or less)
- Never

Awareness and Understanding of E-Prescriptions

Prior to this survey, were you aware of E-prescriptions?

7 responses



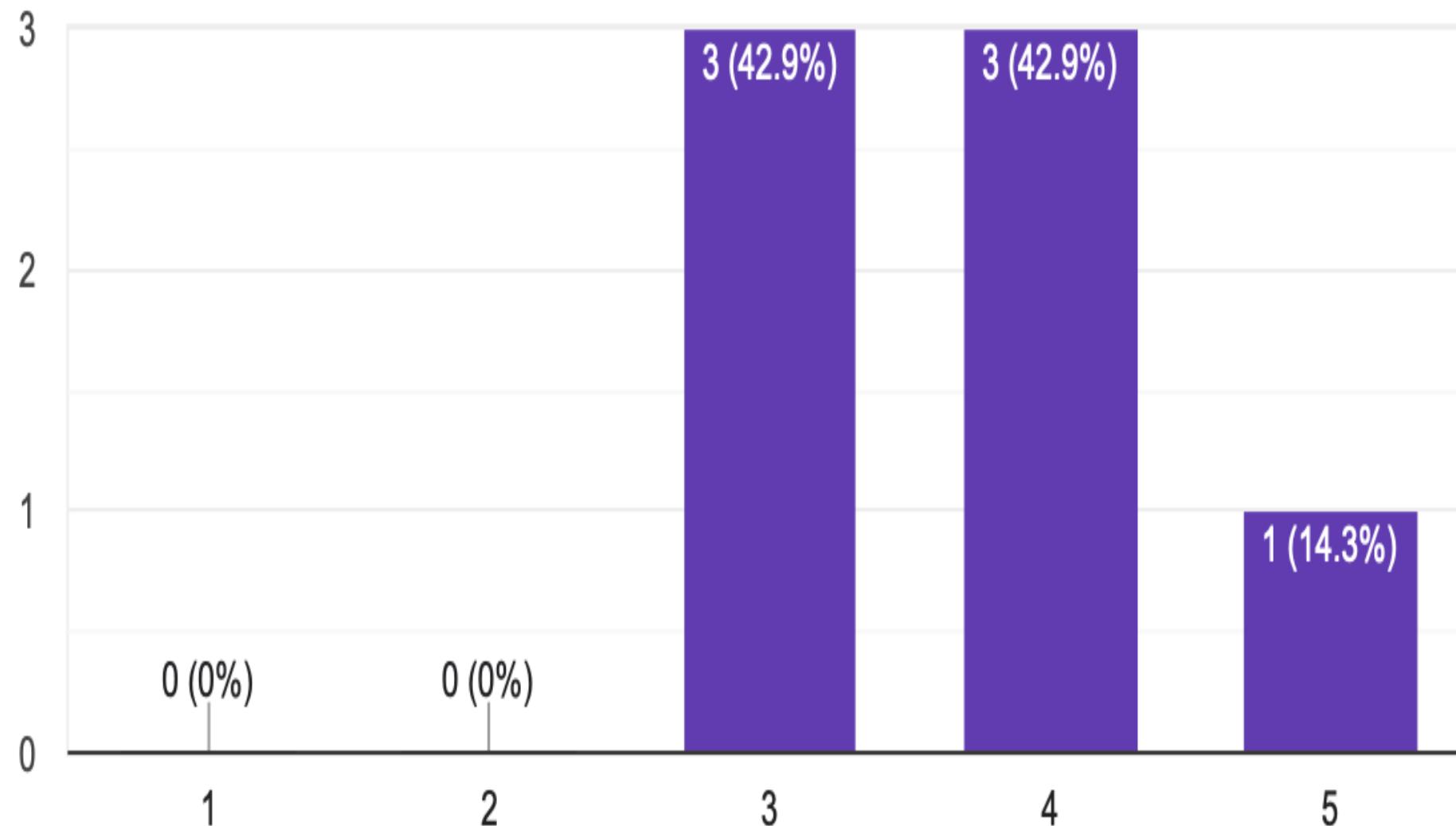
- yes
- No



How would you rate your understanding of what E-prescriptions are?

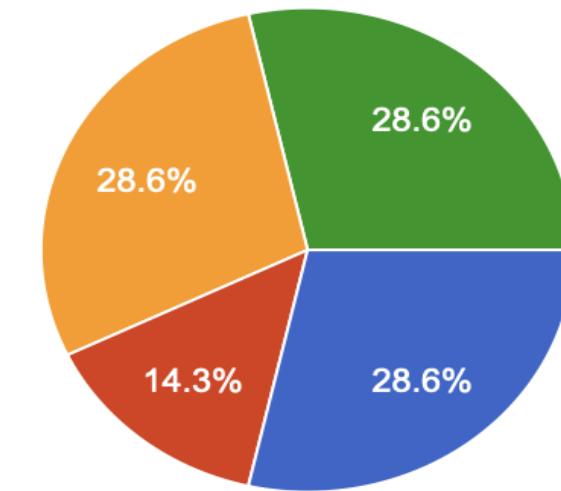


7 responses



How did you first learn about E-prescriptions?

7 responses

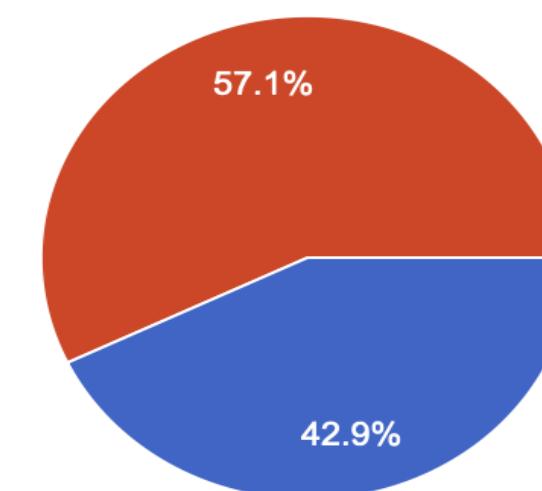


- Healthcare provider
- Pharmacy
- Friends or family
- Internet
- Social media
- Other: _____

Section 3: Usage of E-Prescriptions

Have you ever received an E-prescription?

7 responses

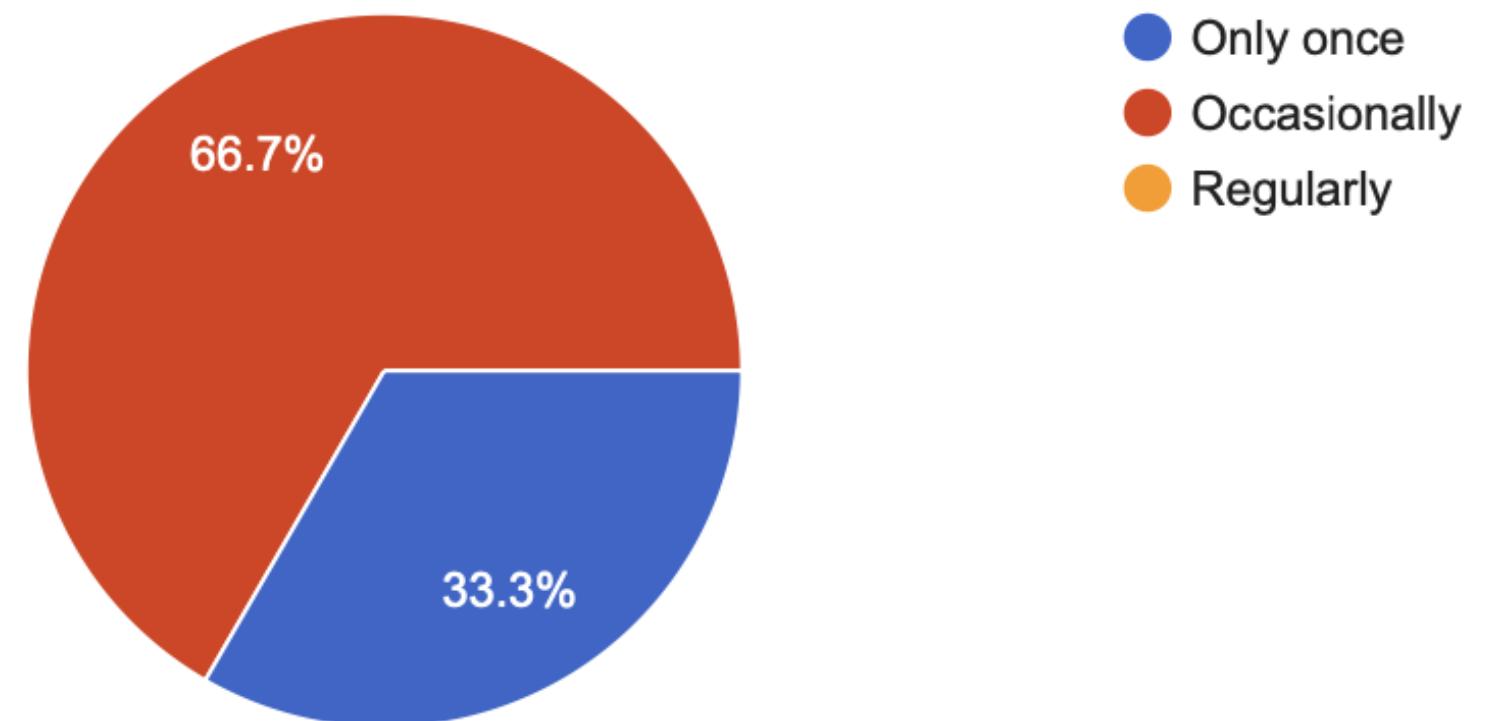


- Yes
- No

feedback

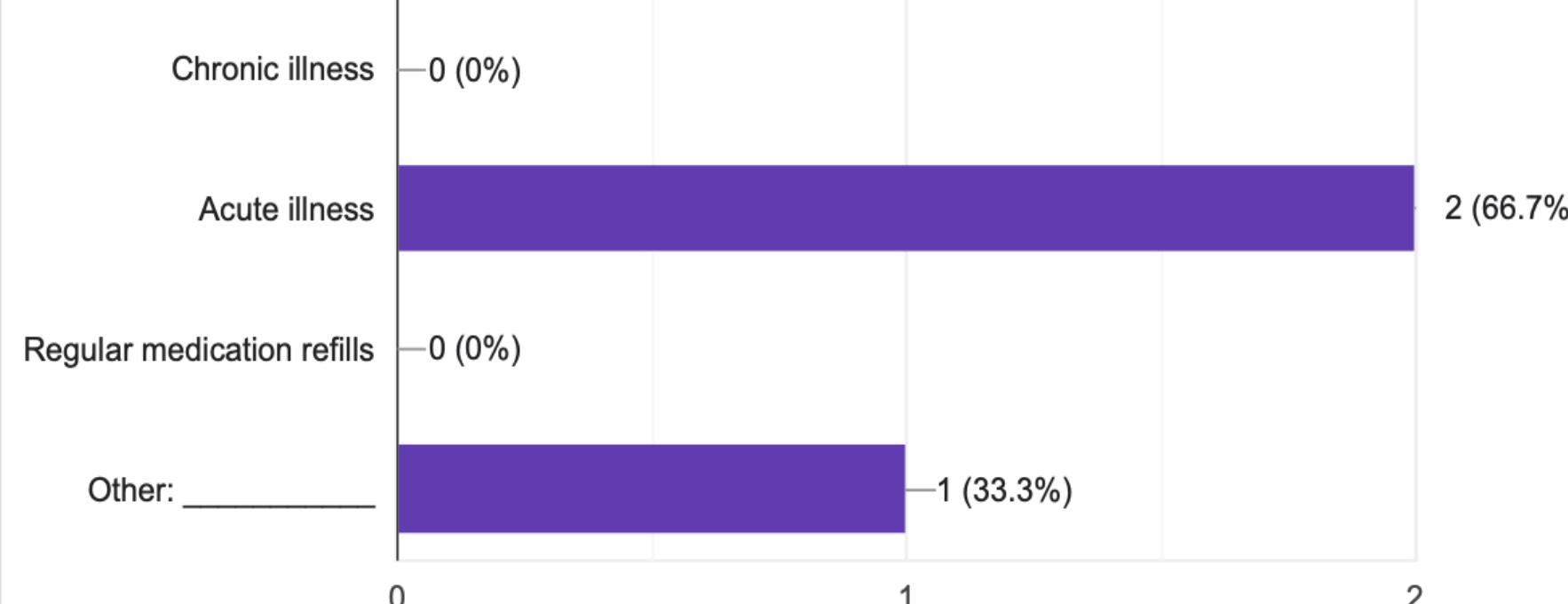
How often have you received E-prescriptions?

3 responses



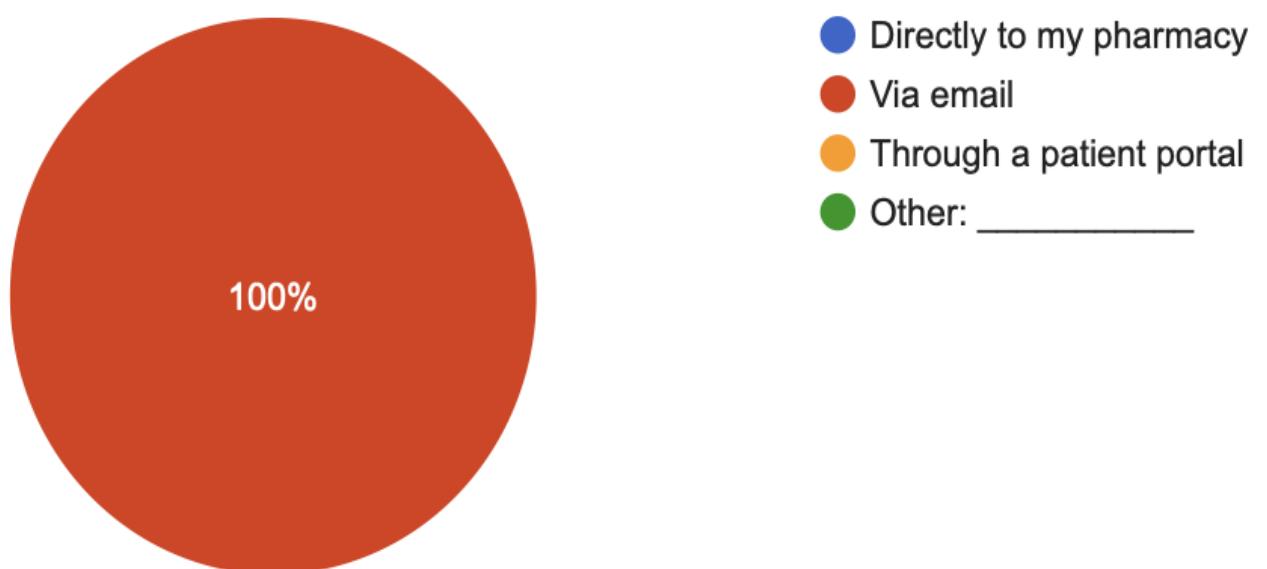
For what type of medical needs have you received E-prescriptions?

3 responses



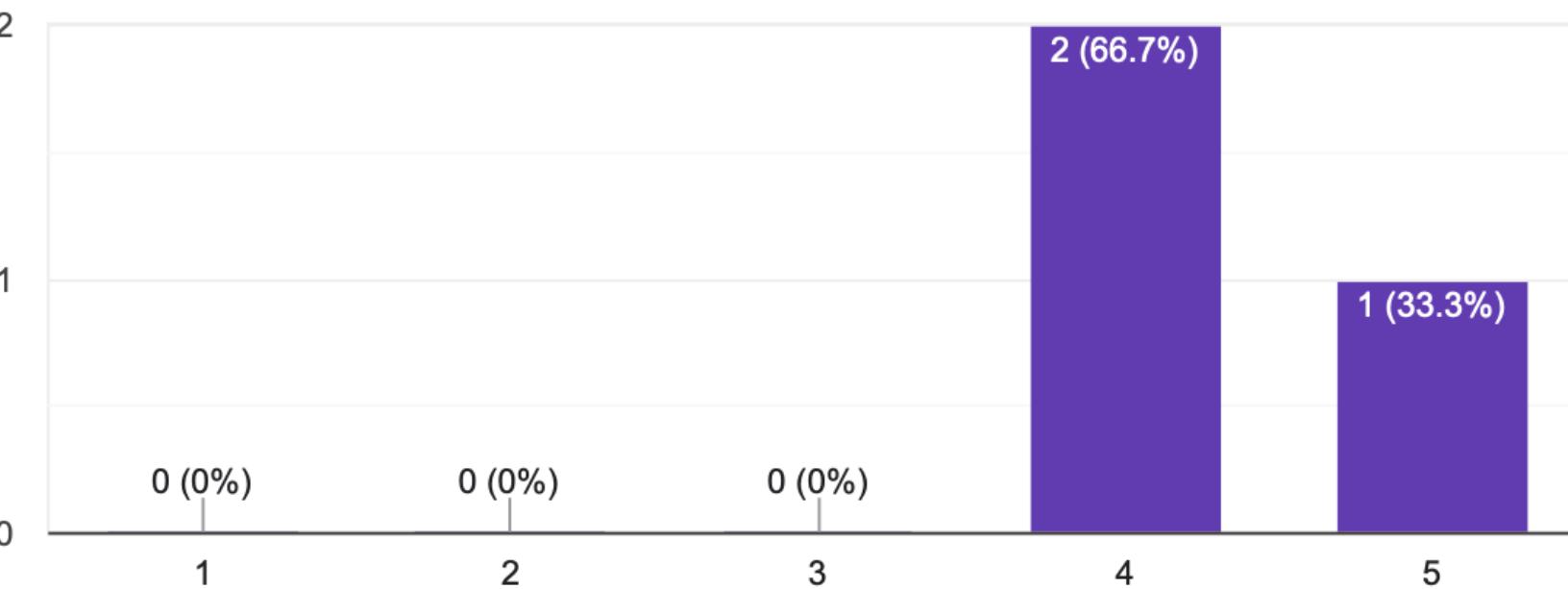
Which of the following options best describes how you received your E-prescription?

3 responses



How satisfied are you with the E-prescription process? Copy

3 responses

**What do you like most about E-prescriptions?**

2 responses

In any corner of world you can receive it from your family doctor. It's paperless and takes less time

It is stored in system and we dont have to take care of papers.

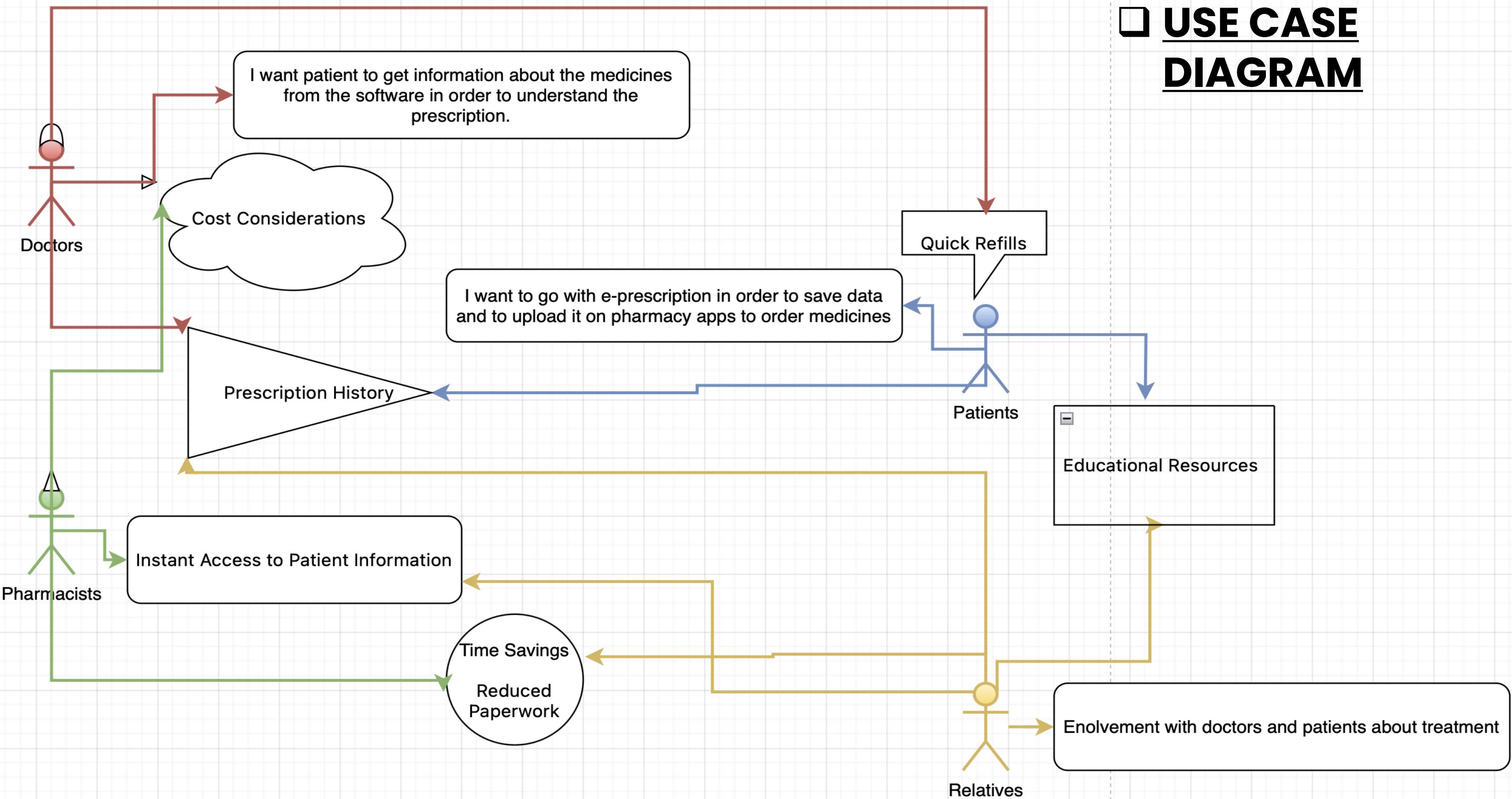
What challenges, if any, have you faced using E-prescriptions?

2 responses

.

Currently no challenges

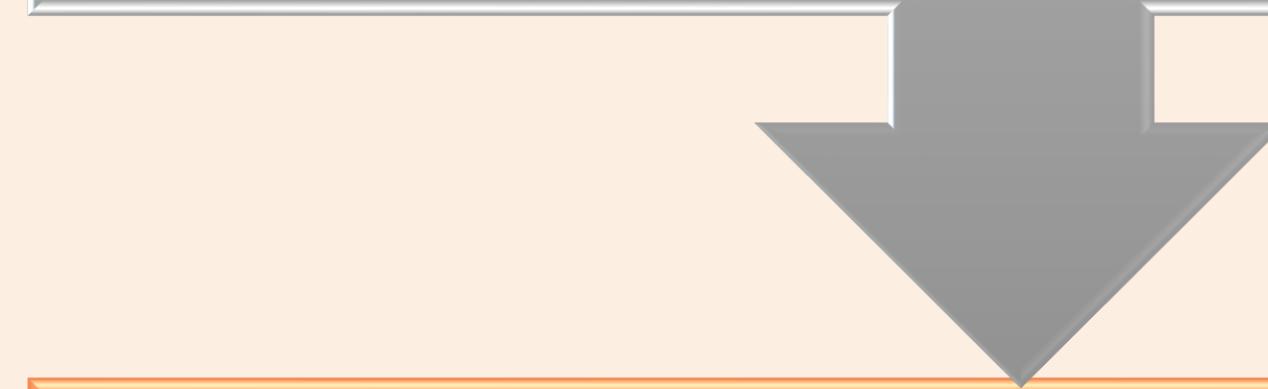
USE CASE DIAGRAM



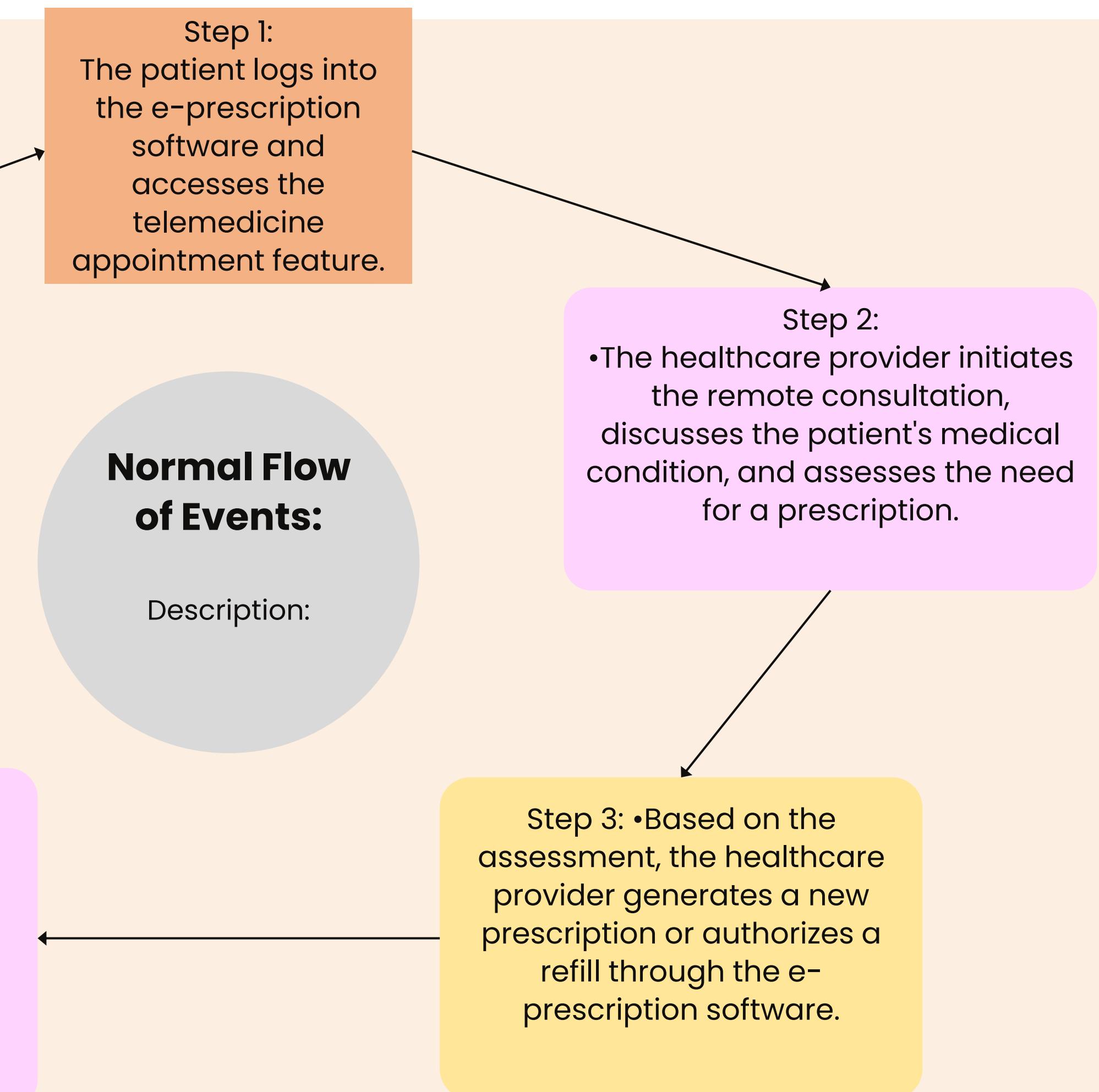
USE CASE

"Remote
Prescription
for
Telemedicin
e in E-
prescription
Software"

**Description: Remote Prescription
for Telemedicine in E-
prescription Software"**



A patient schedules a telemedicine appointment with a healthcare provider. The patient needs a prescription for a new medication or a refill and opts for a remote consultation via the e-prescription software.



What Can Go Wrong or Differently

Highlighting potential challenges and deviations:

Technical issues.

Miscommunication during the consultation.

Patient difficulties in accessing the prescription.

Connectivity issues with the pharmacy system.

Other Concurrent Activities



Additional activities happening concurrently:



Patient accessing educational resources.

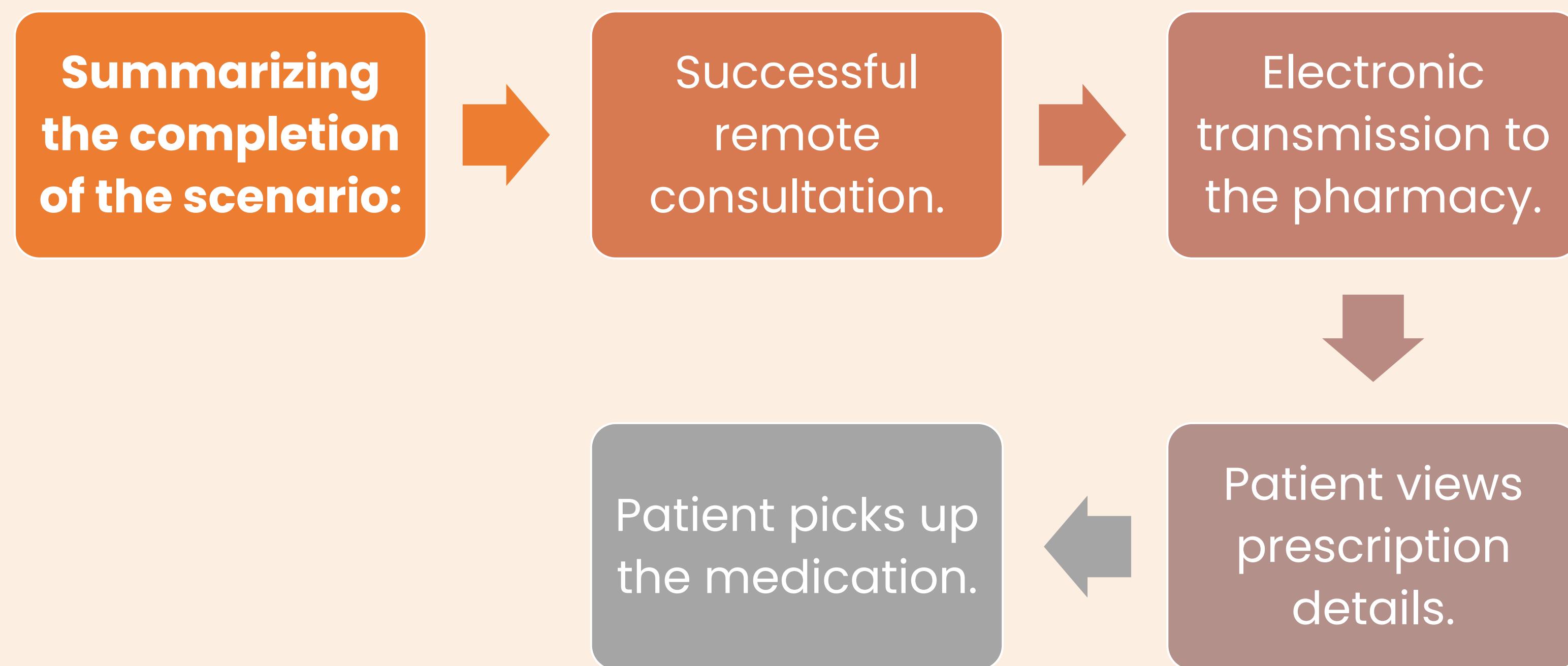


Healthcare provider managing other telemedicine appointments.

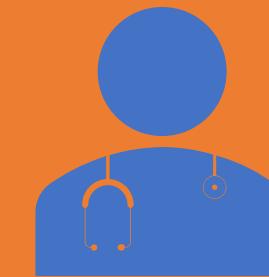


Use icons or images to represent concurrent activities.

Scenario Finish



Specifying use cases with scenarios



Goal:

Patients seek a new prescription or refill during a telemedicine appointment through the e-prescription software.

Precondition:

Healthcare provider and patient are connected for a telemedicine appointment.

Post-condition:

Prescription details are transmitted electronically to the patient's chosen pharmacy.

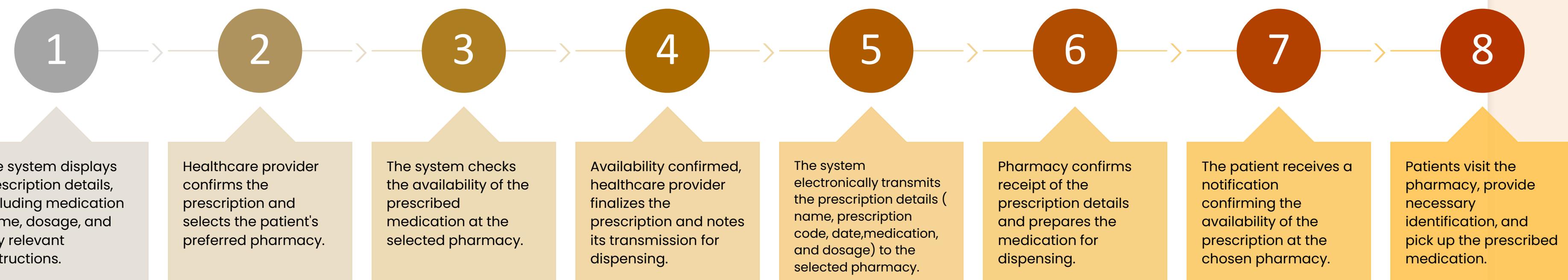
Main Scenario:

Healthcare providers initiate telemedicine consultation through e-prescription software.

Patient discusses medical condition with the healthcare provider, and a prescription is deemed necessary.

Healthcare provider accesses the e-prescription functionality and generates a new prescription or authorizes a refill.

Main Scenario



Exception Scenario A:
No Prescription Issued (after step 2 positive scenario)

A1. Healthcare provider determines no prescription is necessary and concludes the telemedicine appointment.

A2. System issues a message confirming no prescription is available.

END

Exception Scenario B:
Medication Unavailable (after step 6 positive scenario)

B1. The system reports that the selected medication is currently out of stock at the pharmacy.

B2. The system prompts the healthcare provider to consider alternative medications or whether the medicine should be ordered.

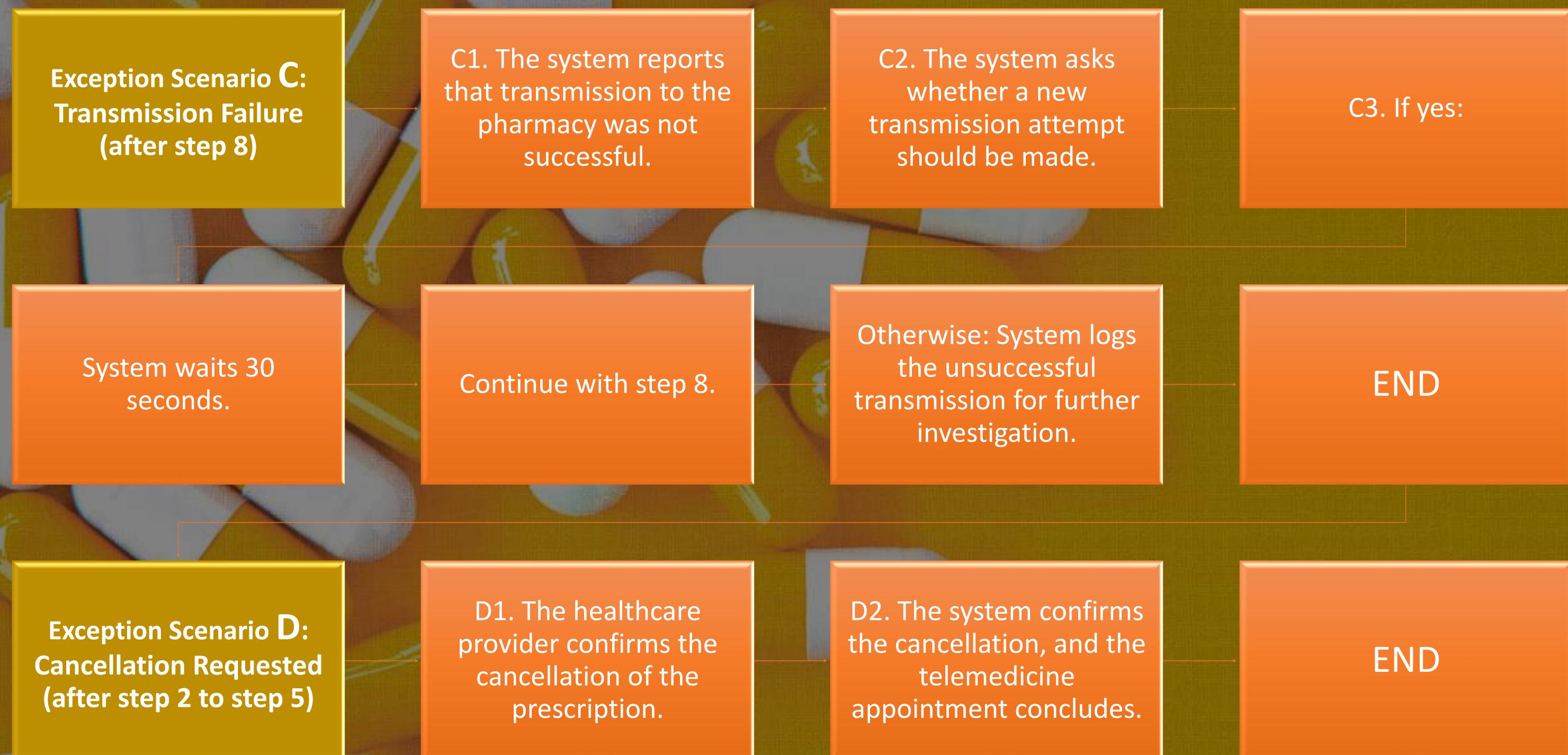
B3. If the healthcare provider confirms an order: Extension point "Order required."

Otherwise: System confirms the unavailability of the medication.

END

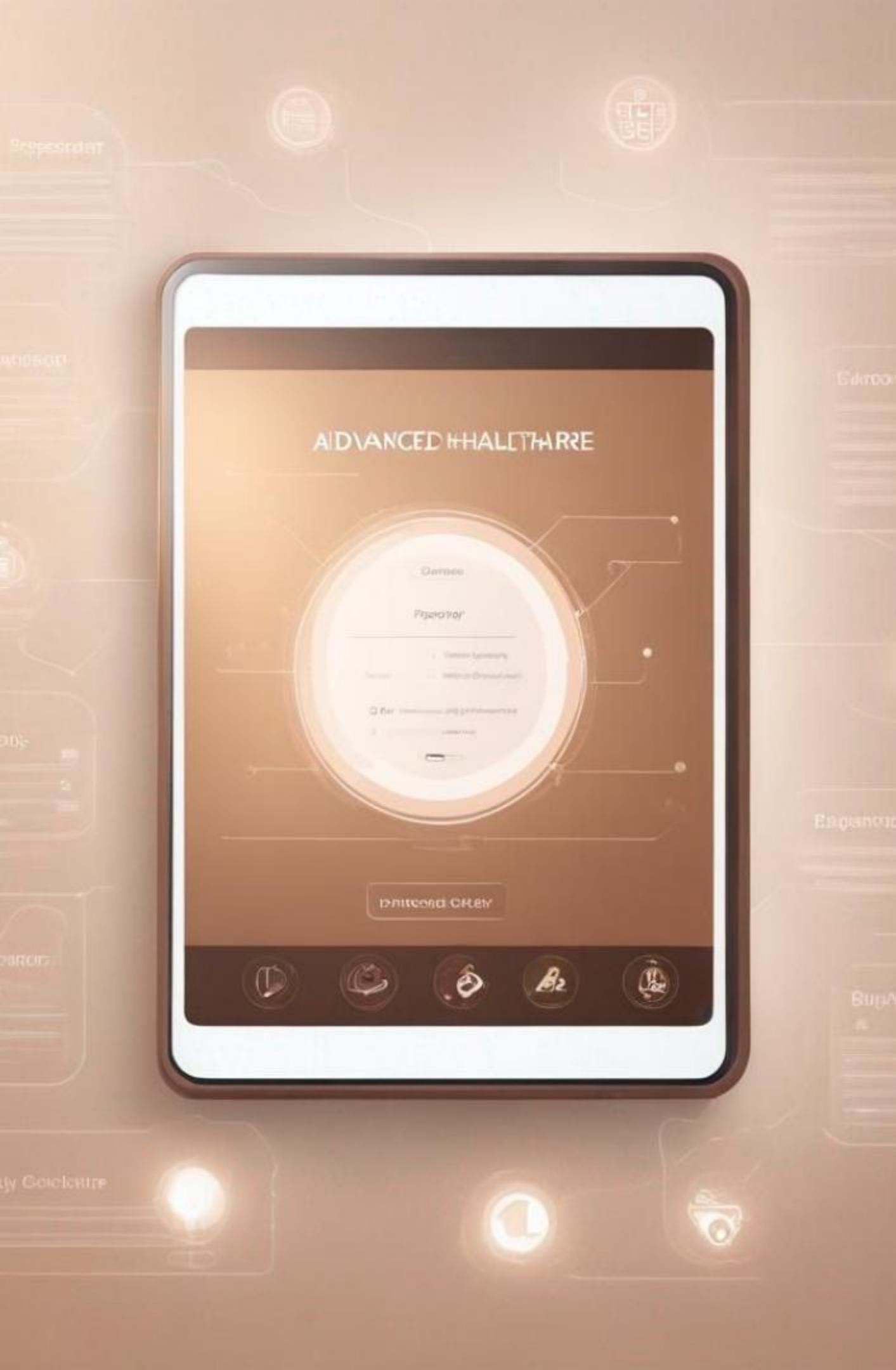
Scenario A & B

Scenario C & D



E-Prescription System: Ensuring Scalability and Interoperability

In the fast-changing world of healthcare technology, it's very important to handle things like scalability and interoperability well. These factors are key for setting up and running an e-prescription system successfully. Making sure the system can deal with different amounts of users and work well with other healthcare systems is crucial for offering ongoing, high-quality care to patients.



Scalability and Interoperability: Key Elements for Electronic Prescription Systems



Scalable Architecture

Ensuring that the e-prescription system can adapt to increasing demands without compromising on performance.



Seamless Exchange

Facilitating the secure and standardized exchange of data across the healthcare network.

Scalability: Future-Proofing the System

1

Concurrent Users

Designed to support an expanding number of users without performance degradation.

2

Storage Needs

Adaptable storage solutions to meet the growing volume of data.

Scalability: Adapting to User Load

Dynamic Healthcare Demands

The healthcare environment is dynamic, with electronic prescription demands fluctuating, especially during peak hours or when patient visits increase. A scalable e-prescription system is vital to handle these changes without performance compromise.

User Load Handling

The system must support a scalable number of concurrent users, particularly during peak clinic hours or patient surges. It should uphold acceptable response times and performance, considering database, server, and network capacities.

Scalability: Data Storage Considerations

1

Seamless Data Scaling

The e-prescription system should effortlessly scale in data storage as electronic prescriptions and patient records grow, adapting its storage infrastructure for the increasing data load.

2

Database Architecture

Scalability extends to database architecture, including considerations for data partitioning and strategies for efficient data storage and retrieval.

Scalability: Performance Under Pressure



Peak Usage Times

The e-prescription system should be designed to accommodate peak usage times, ensuring that performance metrics are maintained even under high user loads.

Server and Network

Scalability considerations should extend to server capacity and network bandwidth, ensuring that the system remains responsive and reliable.

Interoperability: Integration with Healthcare Ecosystem

1

Healthcare Providers and Systems

Healthcare providers use various information systems for patient data management. The e-prescription system must integrate seamlessly to exchange information and provide a holistic patient medical history view.

2

Effective Collaboration

Interoperability allows for effective collaboration between different healthcare entities, ensuring a comprehensive approach to patient care through the integration with EHR systems, pharmacy management systems, and more.

Interoperability: Ensuring Standard Compliance

Standardized Data Exchange

The e-prescription system should facilitate the exchange of patient information and prescription data in a standardized, secure manner, enhancing collaboration within the healthcare ecosystem.

Regulatory Adherence

Compliance with industry standards and regulations, such as HL7 for healthcare information exchange and NCPDP for pharmacy transactions, is essential for effective communication with other systems.

Interoperability: Connecting Diverse Systems

Healthcare Ecosystem

The e-prescription system's integration with the healthcare ecosystem is crucial for exchanging information with various healthcare platforms.

Standard Compliance

Adherence to standards like HL7 and NCPDP is essential for the e-prescription system to communicate effectively and foster interoperability.

Interoperability: Facilitating Secure Exchanges

Integration with EHR Systems

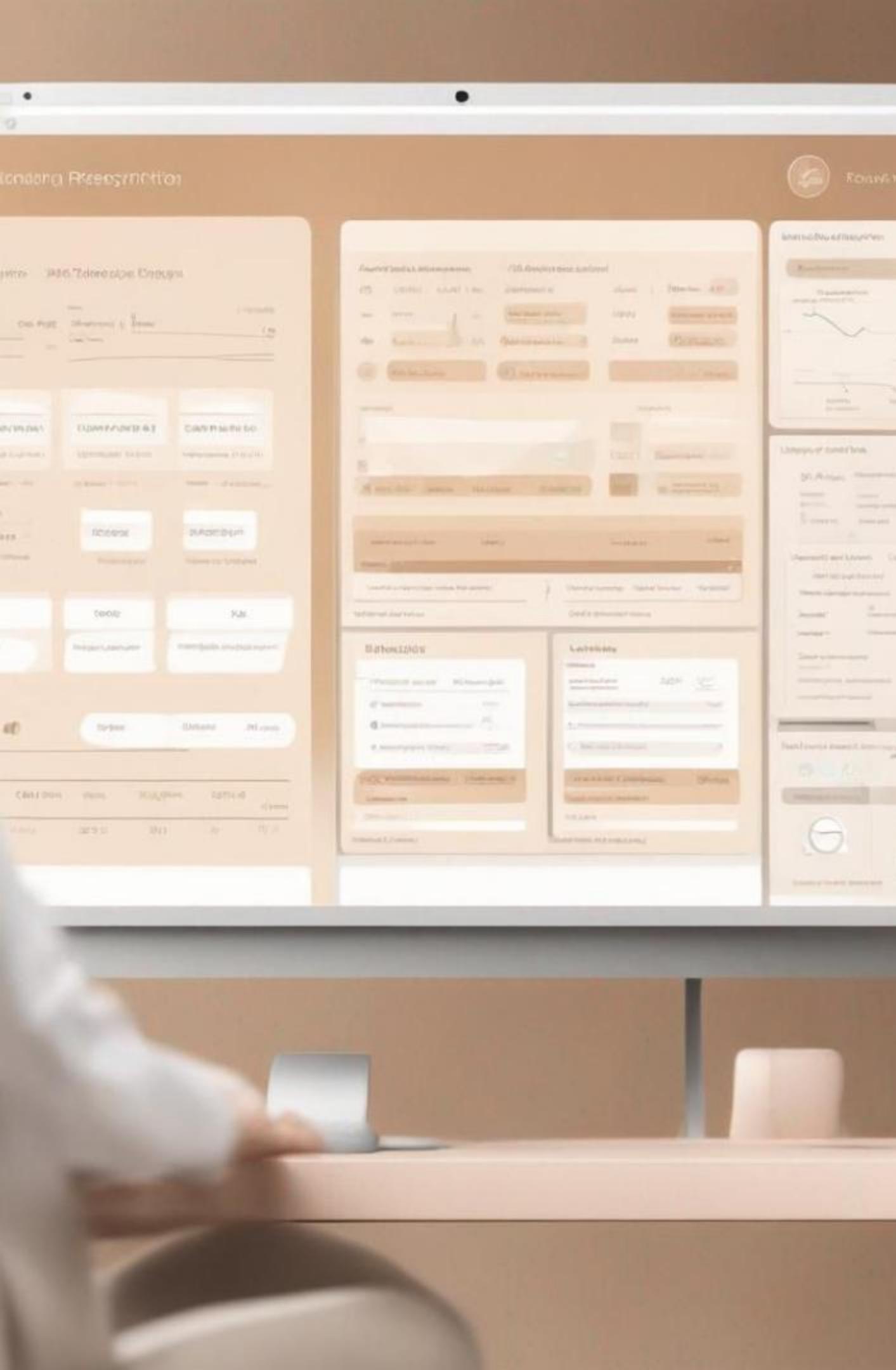
Seamless patient data exchange

Pharmacy Management Systems

Efficient prescription processing

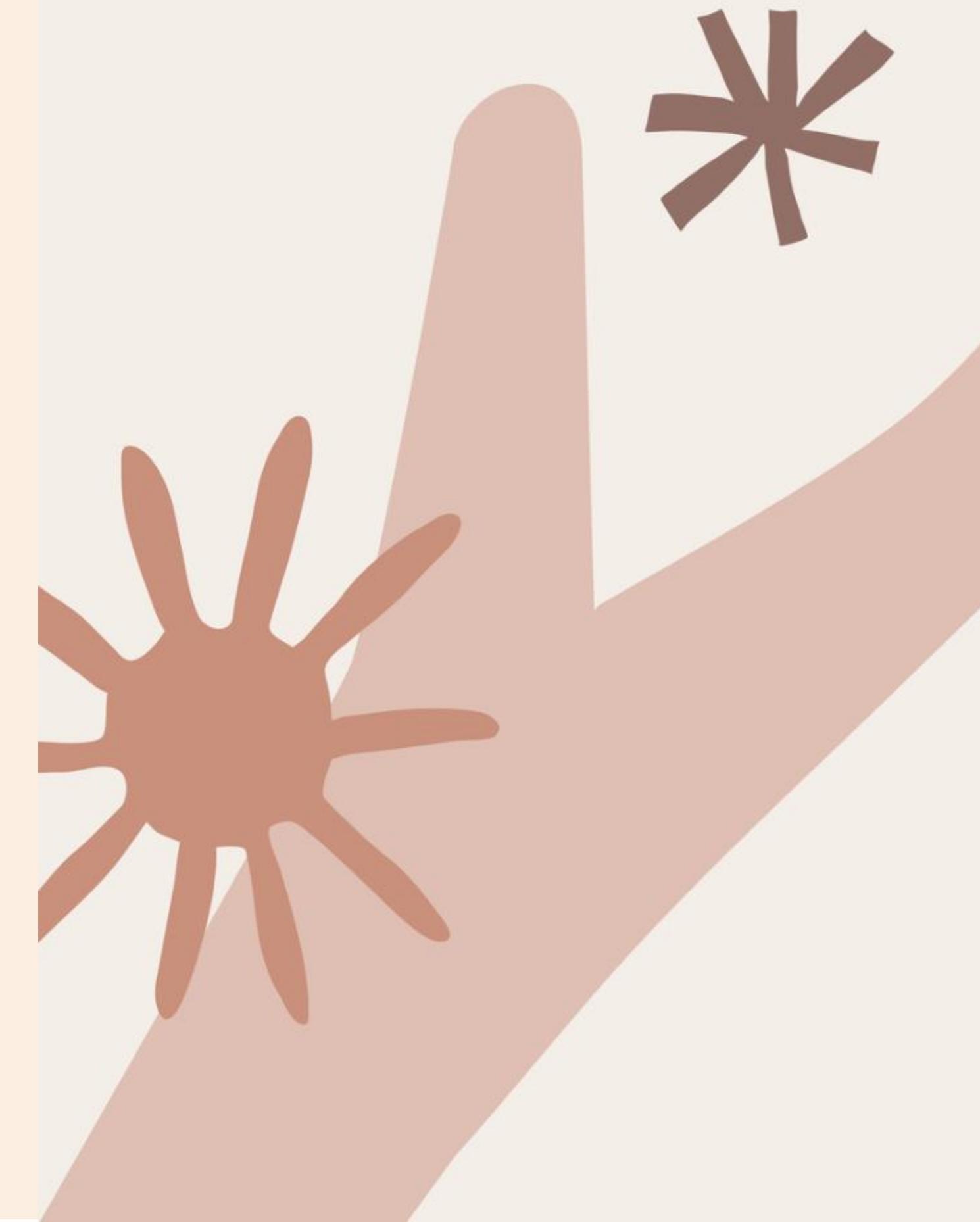
Healthcare Information Systems

Comprehensive patient care approach



Techniques for Choosing What's Most Important in E-Prescription Software:

Looking into how to decide what's most important in managing what e-prescription software needs to do is crucial for creating healthcare solutions that work well and help effectively. Knowing the benefits, difficulties, and examples of using various approaches helps those involved make smart choices to improve how clinics operate and keep patients safe.



1 Pairwise Comparison

2 \$100 Method

Pairwise Comparison: Advantages

1 Feature Prioritization

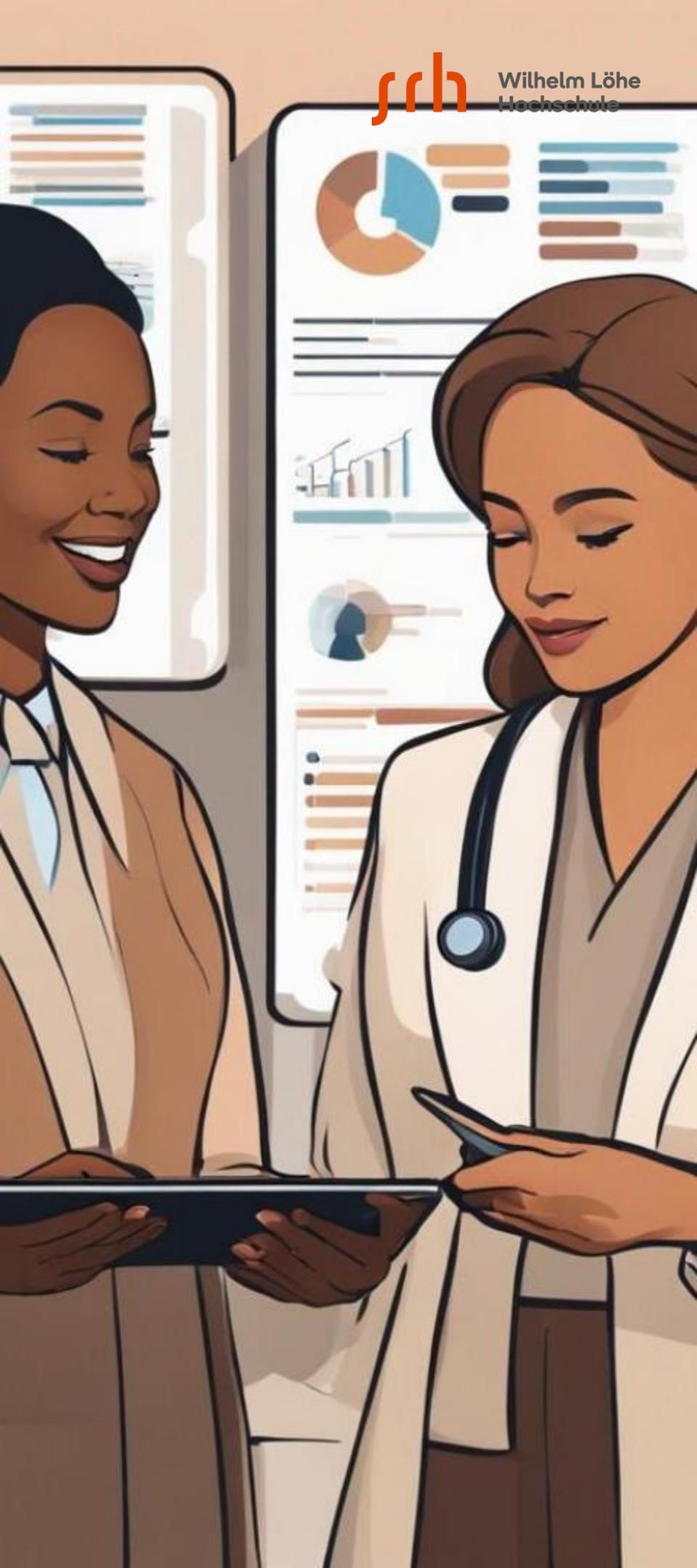
Enables the team to prioritize features and functionalities in the e-prescription software by directly comparing their importance, ensuring the most critical aspects are addressed first.

2 Stakeholder Alignment

Facilitates discussions among stakeholders to align on the relative importance of various software requirements.

3 Simplicity for Teams

Simple enough for a cross-functional team with diverse expertise to collaboratively prioritize requirements.



Pairwise Comparison: Challenges

Subjectivity in Context

The clinical context may introduce subjectivity, as healthcare professionals may have varying opinions on the criticality of certain features.

Scalability Issues

As the software evolves with additional features, the number of pairwise comparisons may become time-consuming and challenging to manage.

Intransitivity in Decisions

In clinical scenarios, intransitivity in decision-making (e.g., conflicting patient safety concerns) may pose challenges.

A background image showing a network of numerous small, white, spherical nodes connected by a complex web of thin, light-colored lines, representing a system of interconnected components.

Pairwise Comparison: Difficult Cases

1

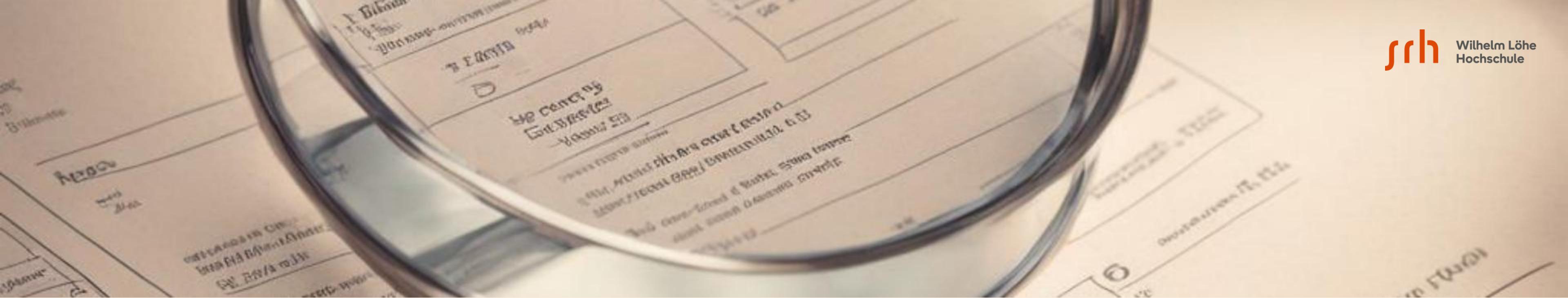
Equal Clinical Significance

When two requirements are perceived as equally critical for patient safety or regulatory compliance, making a clear pairwise choice may be challenging.

2

Complex Interdependencies

If certain requirements have intricate interdependencies within the healthcare workflow, capturing these nuances in pairwise comparisons can be difficult.



Pairwise Comparison: Limitations

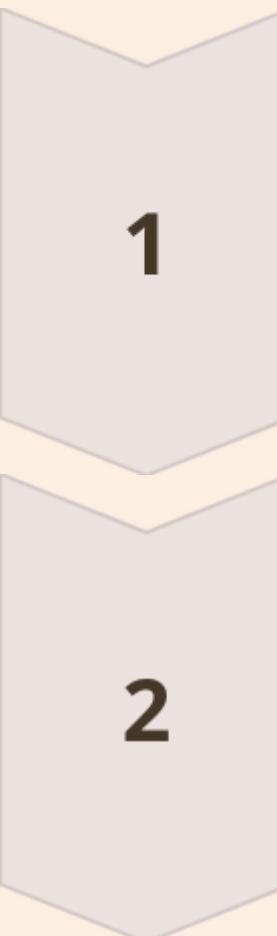
Limited Granularity

The method may not capture fine-grained clinical nuances, potentially overlooking subtle but critical requirements.

No Absolute Measures

Pairwise comparison may not provide an absolute scale for the clinical importance of each requirement.

Pairwise Comparison: Use Cases

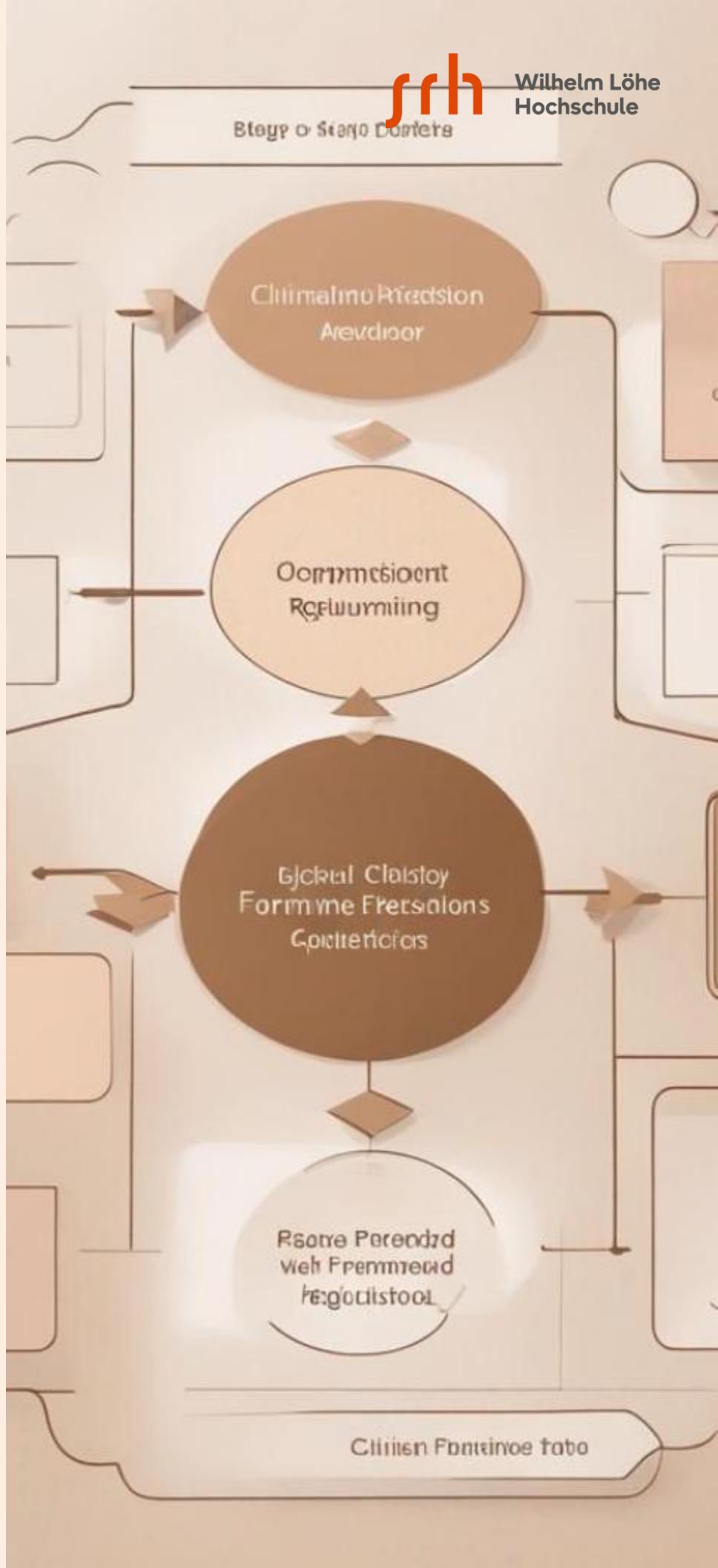


Clinical Workflow

Useful for determining the priority of features that enhance the efficiency and safety of the clinical workflow.

Regulatory Compliance

Effective for prioritizing requirements that are crucial for meeting regulatory standards in the e-prescription software.



\$100 Method: Advantages

Resource Allocation

Ensures that a limited budget is allocated to the most critical features, aligning with the healthcare organization's priorities.

Budget Planning

Provides a straightforward approach for healthcare IT managers to plan the budget for e-prescription software development.

Decision Constraints

Establishes a clear constraint (monetary budget) to prevent overcommitment of resources in the development process.



\$100 Method: Challenges

1

Fixed Budget Issues

In the rapidly changing healthcare landscape, a fixed budget may be challenging to adapt to evolving standards and requirements.

2

Distribution Dilemma

Deciding whether to distribute the budget equally across clinical needs or allocate more to critical patient safety features may pose challenges.

3

Monetary Bias

The monetary value assigned may introduce bias, potentially overlooking non-monetary but crucial clinical requirements.

\$100 Method: Difficult Cases

Inadequate Safety Budget

If the assigned budget is insufficient to address critical patient safety needs, tough decisions about which features to prioritize may arise.

Regulatory Non-Monetary Needs

When compliance with healthcare regulations requires non-monetary investments, the \$100 constraint may not fully capture the complexities.

\$100 Method: Use Cases

1

Regulatory Focus

Useful for prioritizing features that contribute to regulatory compliance within the allocated budget.

2

Patient Safety

Applicable when allocating a fixed budget to prioritize features that enhance patient safety in the e-prescription software.

THANK YOU