FINAL REPORT

TEAM 3: Carl Klutzke, Emamezi Evi Odioko, Phani Teja Nallam

EXECUTIVE
SUMMARY

Healthcare portals have the potential to substantially improve communications between healthcare providers and their patients.
- They are available 24 hours a day, 7 days a week
- They can streamline common patient interactions, such as:
- Updating prescriptions
- Requesting lab results
- Scheduling appointments
- Billing

They overcome many of the problems with voicemail:
- Poor sound quality
- Difficulty understanding patient speech
- Failure of patients to provide important information

- No record of contact

However, much of that potential remains to be realized. Existing portals tend to focus on features rather than usability, making it hard for patients to set up their accounts, and failing to provide clear and useful information. Regulatory and liability restriction impose additional burdens. And portals lack the sense of personal contact that some patients find reassuring.

For this project we designed a prescription management subsystem for Health-Connect, a hypothetical healthcare portal. The interactions we designed allow a patient to manage her prescriptions via a smartphone app, with physician and pharmacist interactions assumed behind the scenes. We selected this subsystem because we hadn't seen anything like it in the existing portals we studied, and because it involved multiple care providers operating in a workflow.

We designed our prototype using Adobe XD. We performed three rounds of evaluations, updating the prototype from our findings between each round:

1.   Internal cognitive walkthrough and heuristic analysis
2.   Evaluation by a subject matter expert
3.   Evaluation by HCI experts

Much work would remain to complete the design of this prescription management subsystem. But we're off to a good start, and have a clear direction of what we would do next.

SUMMARY

Healthcare portals have the potential to greatly improve communication between patients and their healthcare providers. Most patient communication currently takes place in person or by phone. Providers are busy seeing patients, so most of the phone communication is via voicemail, which can be difficult to understand and inconvenient to respond to. An effective portal system could streamline the communication process and provide self-service operations (scheduling, billing, checking the status of prescriptions and test results) that otherwise require assistance from healthcare staff.

KEY FINDINGS

1. Many patients, especially older patients, do not see the need for communicating with their providers through a healthcare portal. They enjoy the personal relationship they have with their established providers and do not want to lose that connection.
2. Conversely, providers see a lot of potential value in increased use of healthcare portals. They overcome many of the limitations and failures of communicating with patients over the phone. But confusing registration processes and poor user experiences can prevent this value from being realized.
3. Healthcare portals face significant liability and regulatory concerns. Patients must be warned to call 911 for emergency assistance rather than using the portal. Patient information must be protected under HIPAA, which requires text and email notifications from the system to be virtually devoid of content, and prevents caretakers from having access to information about family members in their care.
4. Both portals we studied provide a means to sync the patient's appointments with their own electronic calendars by downloading an iCal or ICS file. However, they don't provide the patient with guidance on how to use the file. We doubt that most users know how to update their calendars this way, and they probably resort instead to entering the information manually.

SUGGESTIONS FOR FURTHER STUDY

A healthcare portal should not be launched without thorough understanding of regulatory and liability concerns. These are outside the scope of our expertise, but we will comply with them to the best of our ability. An interview with a legal professional who specializes in healthcare would be helpful.

In the time available, we mostly interviewed care providers. Further interviews with with more pharmacists and a wider variety of patients would give us more insight on how to make a well-rounded and usable system.

The myriad rules of the wide variety of insurance providers complicate the healthcare process. We note that neither of the studied portals managed any insurance information other than identification of the provider. Adding insurance information to our healthcare portal would greatly increase its complexity, but could be of tremendous assistance if it helped patients and providers navigate the insurance benefits and restrictions for each patient.

CHAPTER ONE

DOMAIN SPACE AND REQUIREMENTS GATHERING

SUGGESTIONS FOR DESIGN EXPLORATION

Any healthcare portal is potentially a large and complex system. We will focus our initial design efforts on the following features:

1. Scheduling appointments. This is a high-use feature and fundamental to patient care.
2. Filling prescriptions. This is another high-use feature, requiring workflow coordination between the patient and multiple providers (a physician and a pharmacist).
3. Private messages. A simple electronic messaging system would provide a fallback mechanism for other features, and an alternative to phone and voicemail.

PROCESS

We conducted comparative research observations of the following systems:
•   Follow My Health, a healthcare portal from Allscripts
•   My IU Health, a healthcare portal from Cerner

We interviewed the following healthcare providers:
•   A physician assistant
•   Two dentists
•   A d octor
•   A pharmacist

We also interviewed an elderly healthcare patient about her experiences managing approximately 20 maintenance prescriptions for herself and her spouse.

We constructed an affinity diagram and a concept map to synthesize our findings.

COMPARATIVE
RESEARCH

FOLLOW MY HEALTH

The Follow My Health portal from Allscripts is patient-focused, with a design that is intended to integrate communication with multiple providers. However, its design appears to be focused more upon providing lots of features than upon ease of use and understanding. The interface is cluttered with dubious features and redundant labels. The website doesn't use responsive design techniques, and some visual modules are not appropriately sized. The PA we interviewed indicated that this is the portal provided by her practice, but it is hard to use and she does not refer patients to it.

Much of the provided clinical information on medical history and past procedures seems unclear or just wrong, though it's unclear if that is the fault of the system or due to improper provider use. For example, the following list is the Surgical History for a dermatology patient.
•   *SKIN BIOPSY TANGENTIAL (11100)***
•   Surgical Trays
•   *EXCISION MALIG LESION ARMS/LEGS/TRUNK 2.1CM-3.0CM (11603)*
•   REPAIR COMPLEX WOUND, SCALP/ARM/LEG 2.6-7.5 CM (13121)
•   ***SKIN BIOPSY TANGENTIAL (11100)
•   Karen Prince, M.A.
•   Brittany LaFree, PA-C - Scribe
•   ***SKIN BIOPSY PUNCH EA ADD (11101)
•   ***SKIN BIOPSY PUNCH (11100)
•   Surgical Trays
•   Brittany LaFree, PA-C
•   Dennae Noblitt, PA-C - Scribe
•   Andrea Schroeder, PA-C
•   No History of Past Surgical History

In short, Follow My Health provides many potentially useful features for patients to communicate with providers, schedule appointments, view their medical history, and pay their healthcare bills. However, execution of all features is generally poor.

MY IU HEALTH

The My IU Health portal is the IU Health implementation of Cerner's healthcare portal product. It is provider-focused: it is strictly for communication between IU Health and the patient, and provides no integration of communication with other healthcare providers.

My IU Health has a clear focus on usability. The interface is simple and uncluttered. It responds to resizing of the browser window. It provides clear instructions on how to get started and how to get help, including an introductory video. It allows patients to schedule a first appointment before they create an account. It allows payment of patient bills without signing in to the system, which is useful for paying bills for other family members. Medical history information, such as recent test results, is clearly presented: a patient with no medical background may not understand the significance of the information, but they can see it and ask questions about it.

Scheduling an appointment is generally straightforward and easy. The process uses a wizard interface and demonstrates a progress bar. The display of the selected information could be emphasized. One step in the process incurred a very delayed system response, but eventually completed. The conclusion of the process was confirmed by display and the opportunity to send an email to the patient.

INTERVIEW - PHYSICIAN ASSISTANT

Karen Klutzke is a physician assistant at Indiana Neuroscience Associates, a private neurology practice. We interviewed her about communication with patients and pharmacies.

When not meeting in person, patients primarily communicate with healthcare providers by telephone. But the healthcare providers are too busy seeing patients to actually take the phone calls, so the patients frequently must leave voicemail messages. Such messages frequently have the following challenges:

- The quality of the audio can be poor.
- Patients don't always speak clearly or slowly enough to be understood.
- The patient is not clearly identified, because:
  - The patient forgot to provide their name.
  - The provider doesn't know how to spell the name.
  - The provider has multiple patients with the same name.
- There is no lasting record of the conversation for future reference. Generally providers are supposed to provide written notes in the patient's EHR, however:
  - Such notes are only the provider's impression of the conversation, which may omit or alter important details.
  - Providers are busy. Some minimal contacts, such as providing test results or refilling a prescription, aren't considered worth taking time to note.
- Returning phone calls to patients is inconvenient.
  - Requires access to the patient's contact information, which can be in a different system.
  - Provider can't catch up on messages outside of working hours because patients aren't likely to accept the calls at those times.
  - Patients may not have voicemail to receive messages.

Maintenance prescriptions for schedule 2 narcotics present further challenges. Because these are controlled substances, providers cannot simply call the prescription in to the pharmacy. The patient must obtain a physical paper prescription slip from the provider and take it in person to the pharmacy. The provider may send the prescription slip to the patient by mail, but they must have a reminder to do so, and early enough in advance to allow the slip to travel through the mail and the patient to get to the pharmacy before their current medication supply runs out.

INTERVIEW - DENTISTS

Sowjanya Edumudi and Krishna Priya are dentists and are now pursuing masters. We interviewed them on the functions that must be incorporated in an app or website that bridges the gap between doctors and patients, and helps in better tracking the patient's history. The following information is taken from their suggestions on what to incorporate in the design.

They suggested that apart from detail history of previous records, it is best to use a con

cise format by which a medical practitioner can track understand the patient's history in a minute or two. In order to facilitate a standard method for providing patient information, medical practitioners use the SOAP(an acronym for subjective, objective, assessment, and plan) format for both writing notes and presenting patients on rounds. The purpose of a SOAP note is to have a standard format for organizing patient information. If everyone used a different format, it can get confusing when reviewing a patient's chart.

In previous data the reason for visit, result and data must be arranged in chronological order. This can be linked to in depth data on a particular visit where hospital records, prescriptions and lab results can be attached. Very basic symptoms can be the root cause of many harmful diseases, these primary diseases/symptoms when identified can help in providing better treatment. Provisional diagnosis with cough and common cold can lead to chronic obstructive pulmonary diseases ; hypertension and diabetes may lead to congestive heart failure. So, even if the disease/symptom seems small and the patient has used self medication, it's better to keep a record of that also.

To collect the information regarding on past data and present data all health care providers maintain the patient's data by CCR(continuity of care record) and CCD(continuity of care document) which can be accessible by the patient.

The patients dashboard must contain a patient id, name, in-time, out-time, hospital id.

INTERVIEW - DOCTOR

Sonali Patel is a doctor with more than 10 years of experience and is now doing her masters. She suggested some similar designs to look for like:
•   Blue button
•   Patient Web portal
•   No more Clipboard
•   Cloud based m-health system
•   IU-Health

She gave the information on what must be included in the basic information (similar to SOAP note) which is must so patient can be treated just by looking at this information (without past data) in emergency situations. According to her the basic data must include:
•   Family history
•   Chronic conditions
•   Allergies
•   Drug Allergies
•   Addictions
•   Past history(just brief)
•   Current medication (for drug-drug interaction checking)
•   Insurance Provider

The HIPAA regulation for accessing patient data include various rules such as: previous doctor must allow access for a new doctor to access the data; patient data cannot be giv

en to anyone other that medical providers, emergency contacts. So, it's better to design accordingly.

INTERVIEW - PATIENT

Mary Klutzke is an octogenarian with multiple health conditions that require maintenance medications. Her spouse, Robert, is a nonagenarian who also requires multiple maintenance medications and is incapable of providing his own care. Between the two of them they require approximately 20 prescriptions. They are assisted by their daughter and a personal healthcare assistant.

Mary doesn't use any healthcare portals. All communication with her healthcare providers is in person or by phone. Every Monday she calls the pharmacy at her grocery store to request refills, and she picks them up on Wednesday with her groceries. She enjoys the personal connection she has with her pharmacists, and the remember her and seem interested in her care. She rarely has difficulties getting her prescriptions filled, and when incidents occur they are usually resolved by a phone call from the pharmacist to the doctor.

Mary has experimented with mail order prescriptions several years ago but didn't like it. They didn't always seem to send the right amount. She's heard things are better now but she's not interested.

TARGET USERS

Our target users for the healthcare portal are healthcare providers and their patients. Healthcare providers include:

- Doctors and physician assistants
- Nurses
- Hospitals
- Medical Laboratories
- Dentists
- Pharmacies

Our goal is to design a portal that makes it easy for patients of those providers to do the following:
- Communicate with providers
- See their medical history
- Check the status of their prescriptions
- Request updates and refills to prescriptions
- Schedule appointments
- Pay medical bills

We performed the following interviews to gather information.

PROBLEM
SYNTHESIS

Understanding the various functions that will be incorporated

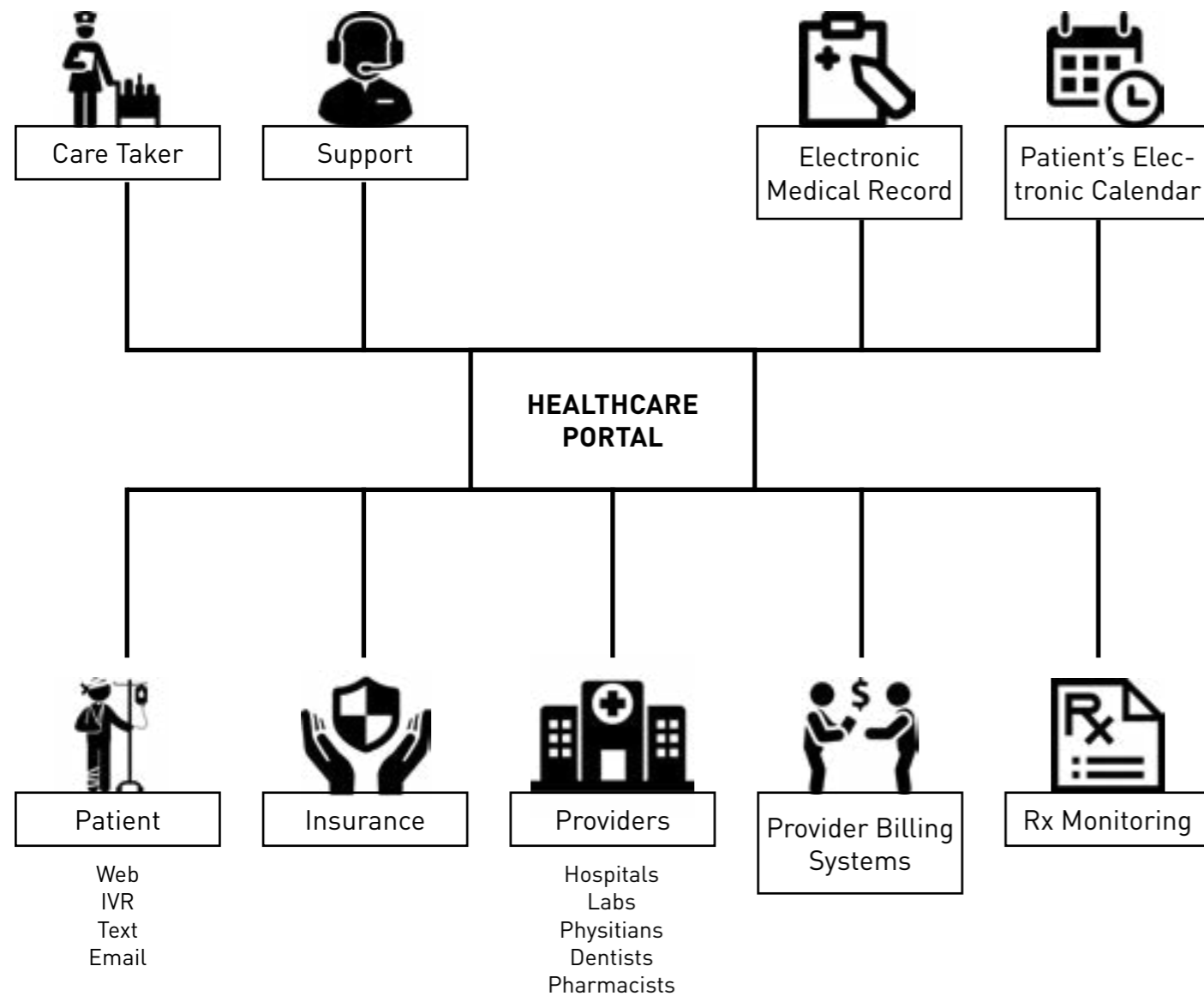| Basic Data	SOAP format	Past Records	Current Record	Tracker
The data needed for identification. This information is not private and can be accessed without patient or doctors authorization.	In order to facilitate a standard method for providing patient information, clinicians use the SOAP format for both writing notes and presenting patients on rounds.	Detailed information on the past visits. This contains chronological history of CCR(continuity of care record) and CCD(continuity of care document)	Detailed information on the current or recent visit. This contains CCR(continuity of care record) and CCD(continuity of care document)	Keep track of prescriptions and appointments. Provide virtual communication between patient and health-care provider.
AIM: For maintaining records and tracking individuals.	**AIM:** To understand past history in 2min.	**AIM:** The photographs or documents of past history.	**AIM:** Add new records to the system.	**AIM:** Track appointments and medications.
Sub Divisions: Patient id Name Age Sex Consulting Doctor Insurance Provider	**Sub Divisions:** Famiy History Allergies Drug Allergies Addictions Cronic Diseases Past History(outline)	**Sub Divisions:** Medical records Lab Records Prescriptions	**Sub Divisions:** Medical records Lab Records Prescriptions	**Sub Divisions:** Reminders Chat
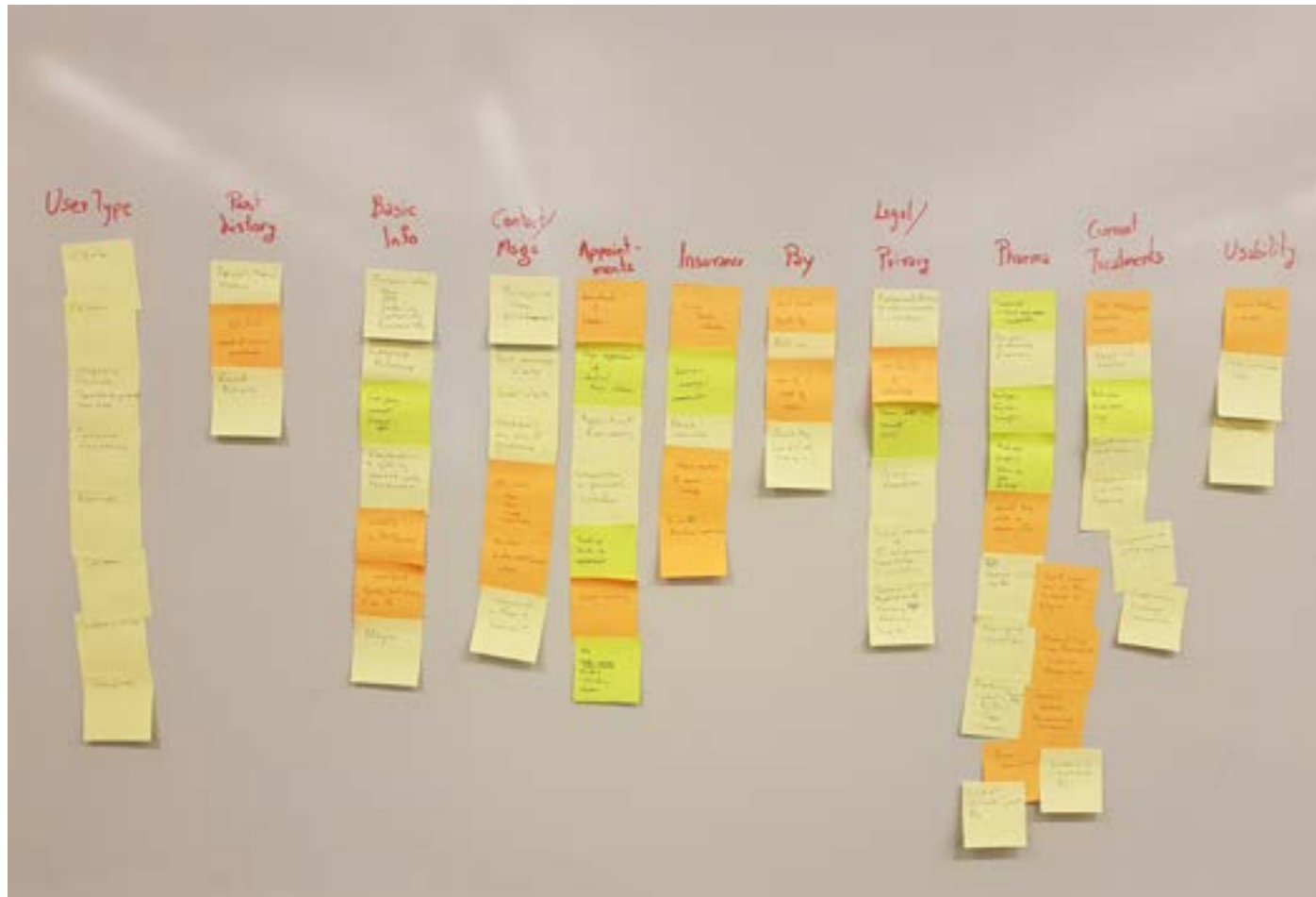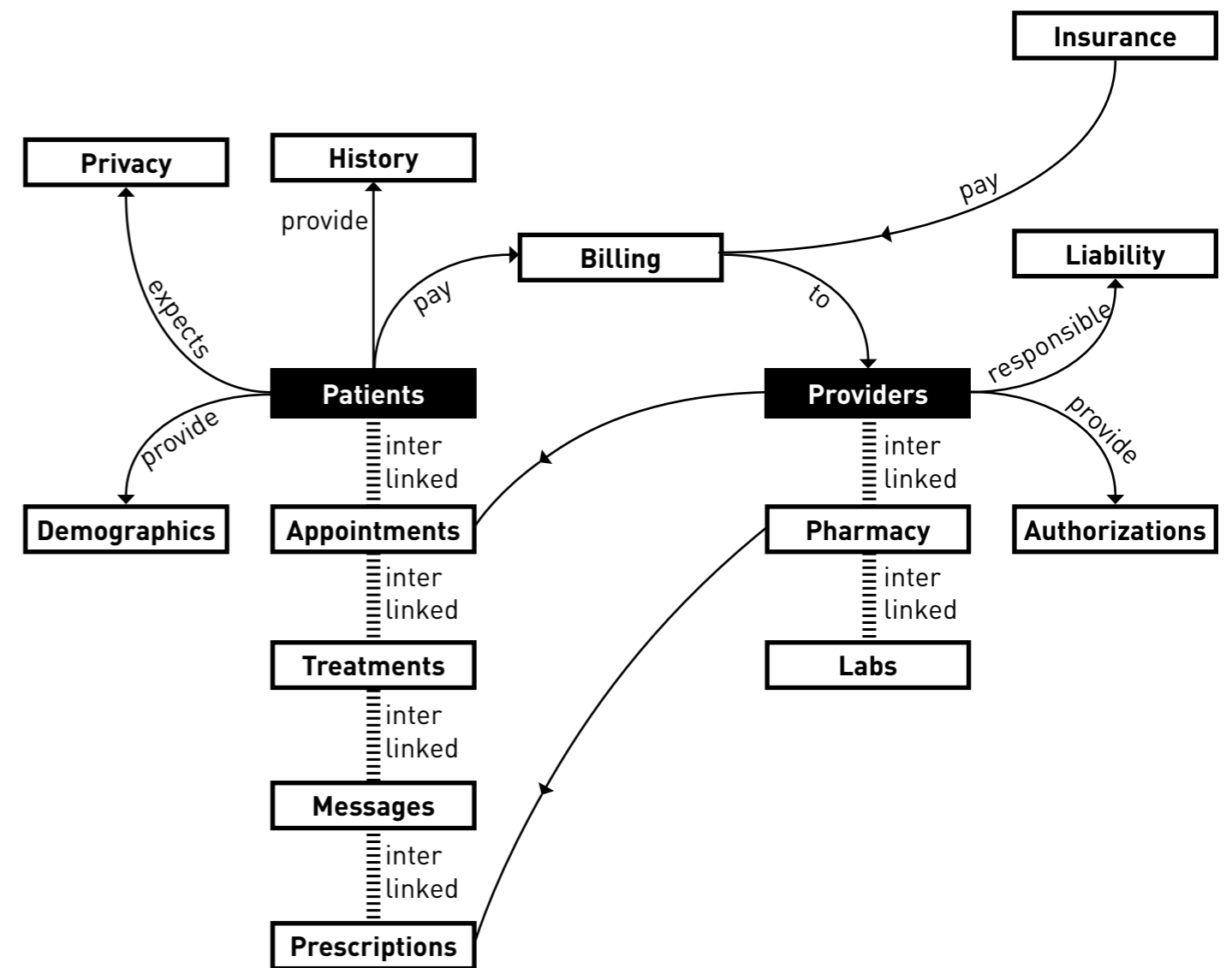
EXPLORATIVE DESIGN

REQUIREMENTS

CONNECTIONS

The healthcare portal will connect to the following users and systems.

Note that this healthcare portal provides the patient to multiple healthcare providers.

| Care Taker | Support | | Electronic Medical Record | Patient's Electronic Calendar |

HEALTHCARE PORTAL

| Patient | Insurance | Providers | Provider Billing Systems | Rx Monitoring |

Patient:
Web
IVR
Text
Email

Providers:
Hospitals
Labs
Physitians
Dentists
Pharmacists

BENEFITS

The healthcare port will provide the following primary benefits.

Benefit	To Whom	Supporting Features
Appointment Management	Patients Providers	Scheduling, Reminders, Calendar Integration, Provider Availability, Waiting List
Prescription Management	Patients Prescribers Insurance	Availability (stock), Eligibility based on time, Allergies, Interactions, Prescription Monitoring Integration, Insurance Integration, Prescription History, Reminders, Workflow/Status, Refill Request, Current Treatment(s), EHR Integration
Messaging/Communication	Patients Providers	Secure Email, Text Messaging, IVR, Emergency Disclaimer, Recent Activity/History, Automated Transcription, Automated Translation
Bill Payment	Patients Providers Insurance	Quick pay, Statements, Cost Calculations/Estimates
Patient History	Patients Providers	Allergies, Family History, Recent Activity, Appointment History, Lab Results, Prescription History, Emergency History, Message History, Current Treatments, EHR Integration
Patient Info	Patients Providers	Demographics, Provider list, Insurance Information, Contact Information, Emergency Contacts, Allergies, EHR Integration

SYSTEM INTERFACE REQUIREMENTS

The design is for a smartphone app for iOS or Android. More patients have smartphones than PCs.

The following interfaces should also be implemented:
- Tablet or desktop computer access via a web browser. This is the primary interface for healthcare providers and system administrators.
- Interactive voice response (IVR), to support patients who are used to contacting their healthcare providers by telephone.

ENVIRONMENTAL REQUIREMENTS

The patient-facing portal will be used in typical consumer environments which do not incur any additional specific requirements.

The healthcare provider interfaces will be used in clinical environments. Users may be wearing examination gloves.

ASSUMPTIONS AND DEPENDENCIES

We assume that most users of the system can read and write in US English at the 7th grade level.

We assume that the system is being developed for use in the USA.

We assume that our design is close enough to US regulatory compliance to be practical.

OTHER
REQUIREMENTS

APPLICABLE STANDARDS

Because we are designing a system for use in the USA, the system must be compliant with Health Insurance Portability and Accountability Act (HIPAA), Title II privacy laws. Compliance with Section 508 of the Rehabilitation Act is not required unless the system is employed by a US federal agency. However, Section 508 compliance is encouraged as a useful accessibility benchmark, especially since many users of a healthcare system are likely to have temporary or long-term disability issues.

PERFORMANCE REQUIREMENTS

This is not a patient-care critical system and it is not to be used for emergencies. It does not have specific uptime requirements.

DOCUMENTATION REQUIREMENTS

The system should provide online help for patients in the following formats:
- Intro video
- Getting Started guide
- FAQ

The system should also provide documentation for administrators and healthcare providers to configure the system to their needs.

SYSTEM
EXPLORATION

A fully-implemented healthcare portal is a massive undertaking. Our project will focus on the design of a single patient-facing subsystem. In this section we explore scenarios for the following subsystems, to determine which one we will design.
• Appointment Management System
• Prescription Management System

APPOINTMENT MANAGEMENT SYSTEM

Scenario 1 – Rescheduling an Appointment

Mary needs to reschedule an appointment with her cardiologist. She isn't comfortable using smartphones and doesn't have one of her own. Her daughter, Chris, makes the change for Mary as her authorized caretaker. The scenario begins with Chris looking at the appointment on her personal calendar (Google Calendar).
1. Chris taps a hyperlink on the calendar entry.
2. The phone launches the healthcare portal app and displays the details of the appointment. Chris requests to reschedule.
3. The system displays the next available appointment times. It grays out times that conflict with Mary or Chris's personal calendars.
4. Chris selects an appointment time. The appointments are further in the future than they would like, so she also requests to be added to the cardiologist's waiting list.
5. The system displays the selected appointment information and updates the appointment on Mary and Chris's personal calendars.
6. The day before the appointment, the system sends a text message, reminding Mary and Chris of the appointment. Chris confirms the reminder.
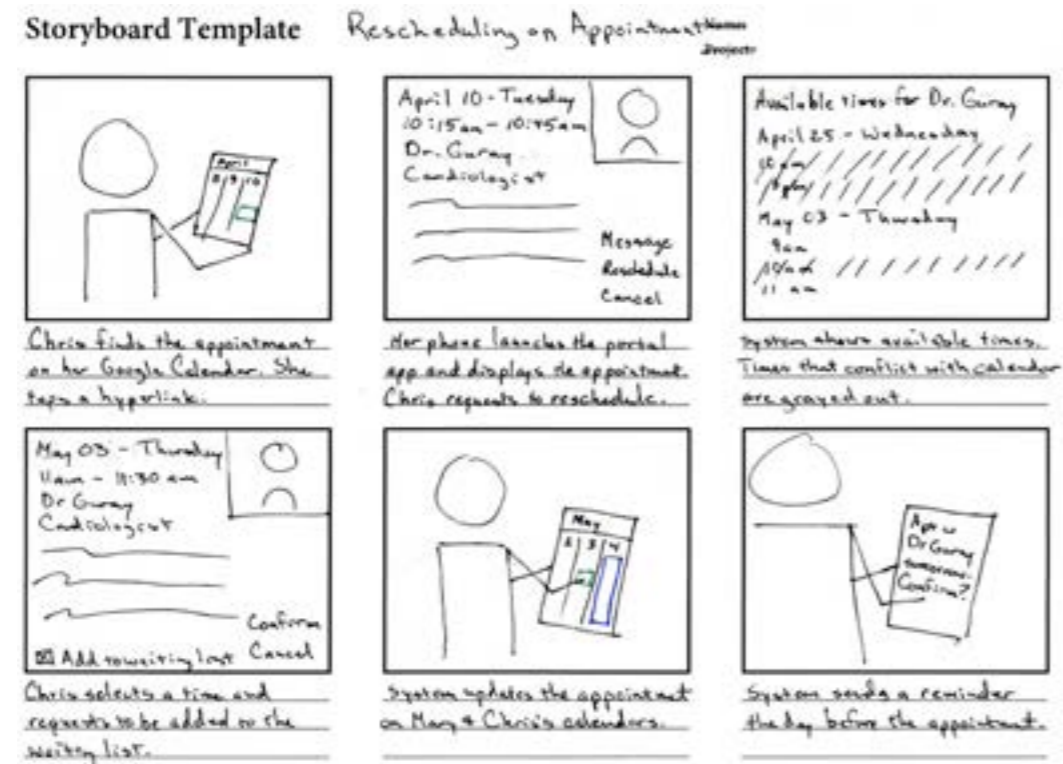
Scenario 2 – 'Back Up Doctor'

A patient has a monthly appointment set up with his doctor, however he wants to see if he can meet with him prior to his routine appointment to discuss a health issue. He checks to see if he can schedule an appointment with him but his doctor's calendar is pretty full.
1. The patient clicks on the 'Make Appointment' button.
2. The system asks for the date he'll like for the appointment.
3. The system asks for the doctor he'll like to see. His usual doctor is already on the list. He taps on his doctors name.
4. The system informs him that his doctor isn't available and recommends another doctor similar to his that is free either on the date he wants or the closest available date.
5. The patient taps accept on the 'back up doctor' and makes the appointment.
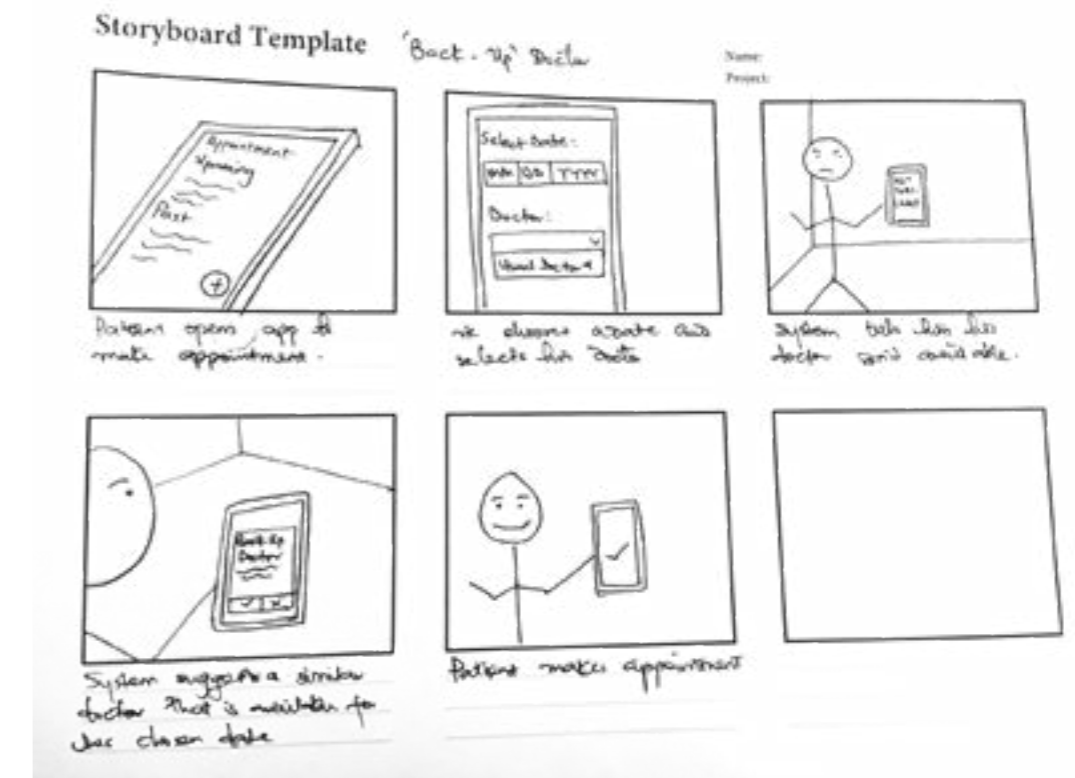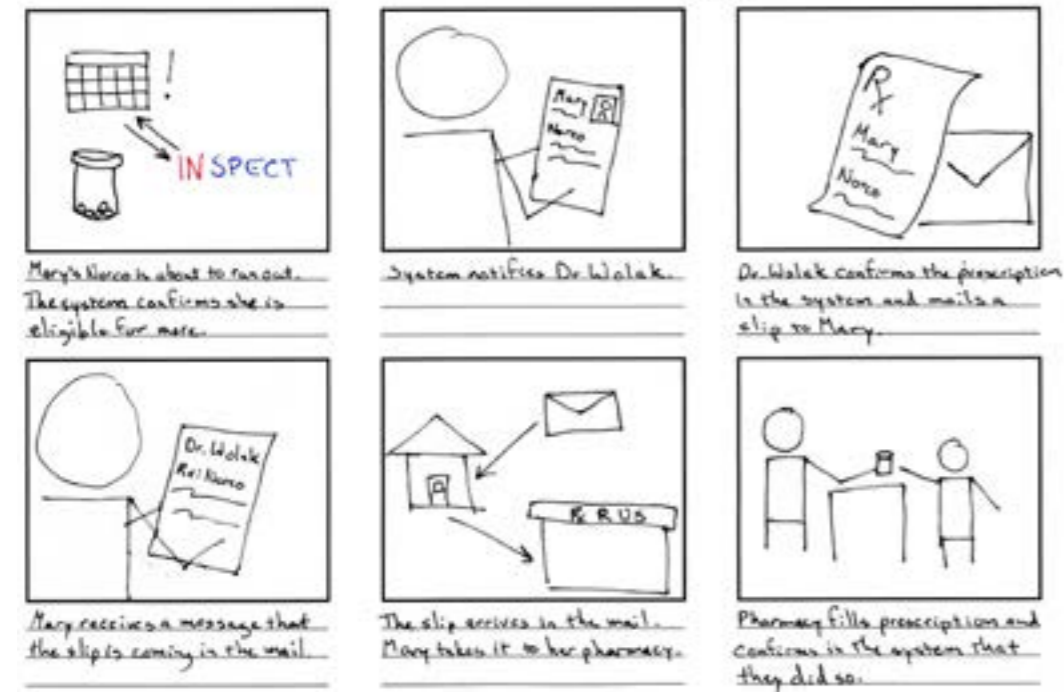
PRESCRIPTION MANAGEMENT SYSTEM

Scenario 1 - Refill for Controlled Prescription

Schedule II narcotics require a new printed prescription slip be presented to the pharmacist each month. A patient who is on such a drug for chronic pain must receive the slip in time to take it to the pharmacist and get it refilled before their supply runs out. Ideally the slip would be physically mailed from the prescriber to the patient.
1. The system determines that Mary's Norco supply will run out in five days. It checks the Indiana prescription monitoring system to ensure she is eligible for a new prescription.
2. The system sends a message to Dr. Wolak with the prescription request and the monitoring system findings.
3. After ensuring that the prescription is still warranted, Dr. Wolak confirms the prescription request in the system. She fills out a prescription slip and mails it to Mary.
4. Mary receives a message that the prescription slip is on the way.
5. Mary receives the slip in the mail and takes it to her pharmacist.
6. The pharmacist fills the prescription according to regulations, then confirms in the system that the prescription request has been filled.

Scenario 2 - Checking Prescription Availability

A patient needs to purchase his new medication based on the prescription he just got from the hospital. He heads out to his usual pharmacy but they've run out of stock.
1. The patient clicks on the prescription icon
2. The system displays Charles' prescription activity.
3. The patient clicks on the most recent prescription and the system displays dosage instructions and other important notes from the hospital.
4. The patient taps on 'Find Available Stores' and the system displays all nearby pharmacies that currently have his medication in stock.
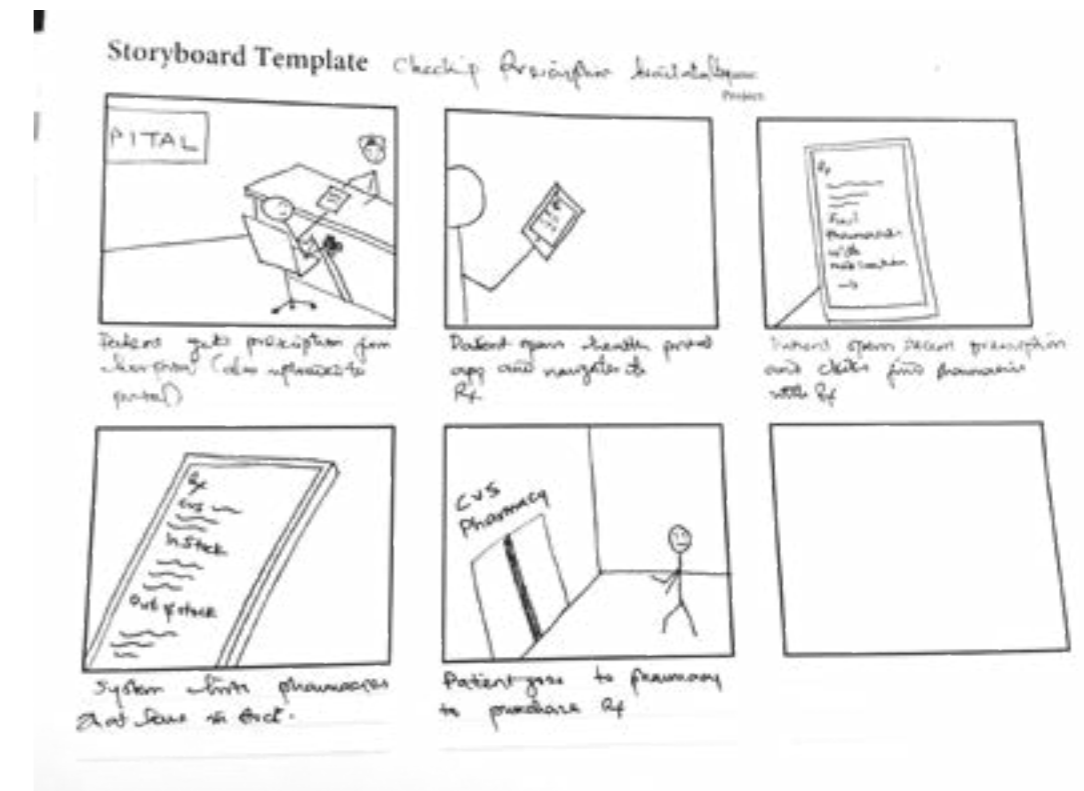
NEXT
STEPS

Next system for devolepment:

We selected the prescription management subsystem to design further. Some providers do follow-up on appointment scheduling and send confirmation messages but we didn't find any centralized system for follow-up on prescriptions and their availability. So this seemed like a new area to investigate.

Functions to Detail:

The following features are what we will be concentrating more in order to devolep a high fidelity prototype:
• Schedule of narcotics.
• Availability of prescription drugs
• Supply of prescription drugs
• Intake reminder.
• Purchase reminder.
• Nearby Pharmacy

Having decided to design the prescription management system of the healthcare portal, we identified a starting scenario: request a prescription refill.

Then we sketched a few phone app screens for the scenario:
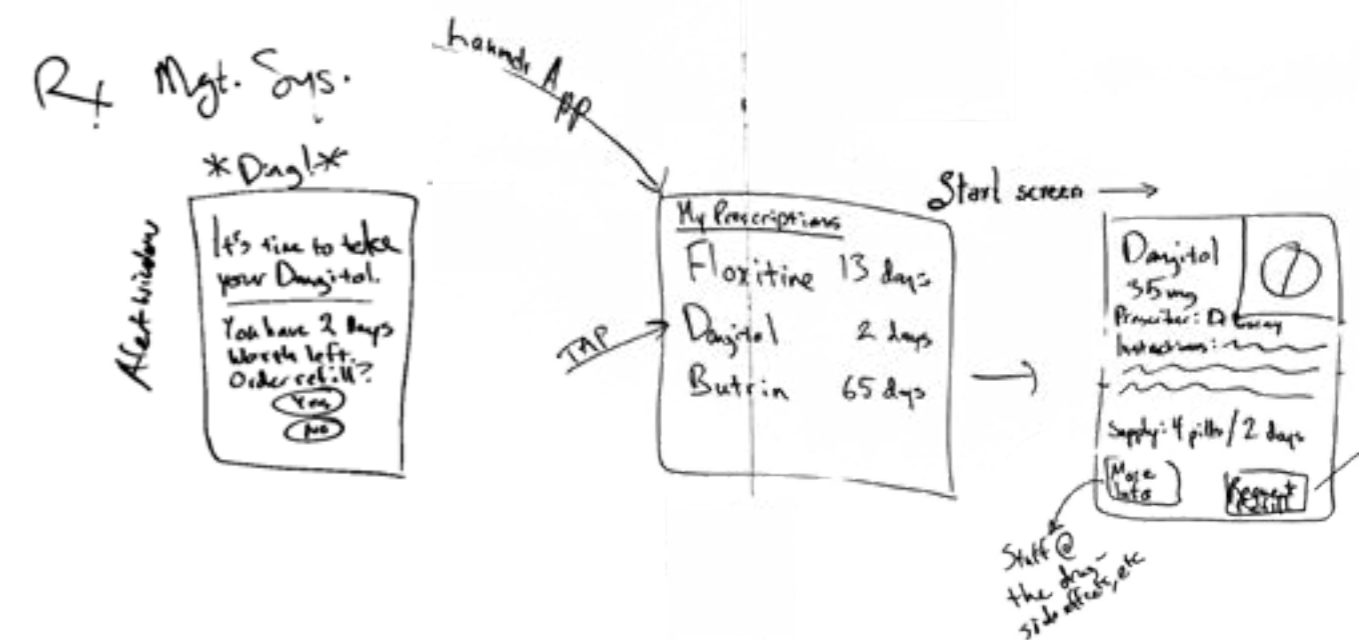
CHAPTER THREE

SKETCHING, PROTOTYPING, AND INTERNAL WALKTHROUGH

PAPER
PROTOTYPE

Based on those initial sketches, we identified the following tasks to implement in a paper prototype:
- Request a refill of a prescription.
- Request refills of multiple prescriptions, including one for your spouse.
- Check the status of a prescription refill request.
- Respond to a pharmacy message, which stated that one of your requested prescriptions was out of stock.

We wrote use cases for each of the tasks, to describe the screens to be implemented. We designed these screens in Adobe XD, to be printed for testing.

System shows order details and default pharmacy.

Details of prescription including Prescriber, Side Effects and users.
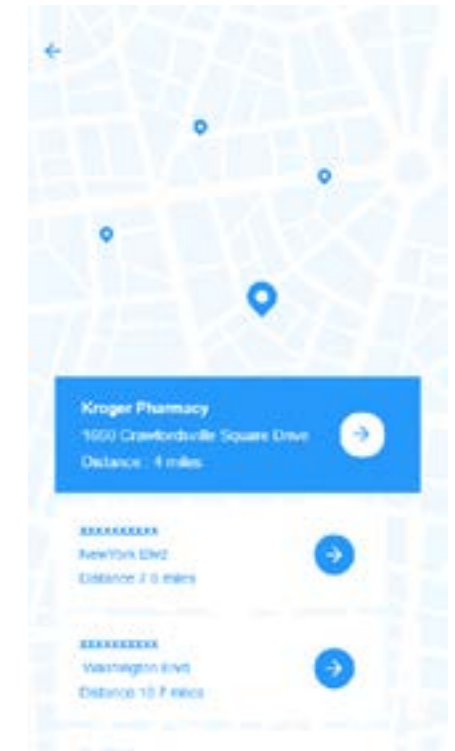
Suggested pharmacy closest to the user and other pharmacies.

Alert from Health-Connect reminds user to take medicadtionand refill prescription.
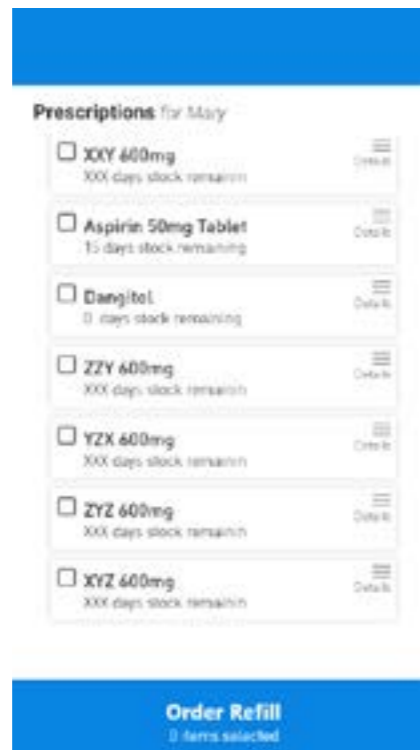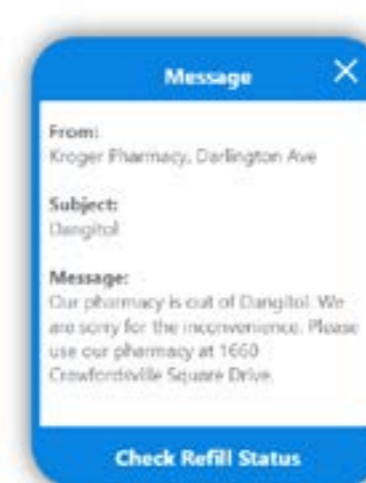

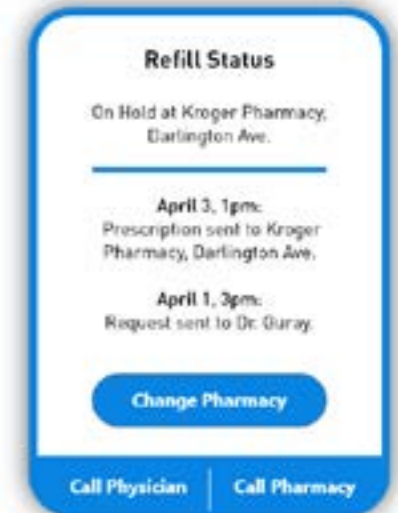User's prescription list.

Details of Dangitol prescription.

Status of Refill request

Update from Kroger Pharmacy saying they're out of Dangitol.

Status of Refill request with option to change pharmacy after update from Kroger.

INTERNAL WALKTHROUGH RESULTS

Our internal walkthroughs revealed the following issues:
- We should allow the user to choose some options besides the "happy path".
- We should provide working Back and Home buttons.
- We should redesign the prescription list page due to reduce confusion and improve convenience.
- We should add some authentication measure for switching between patient accounts.

NEXT STEPS
- Update the Adobe XD prototype from the results of our tests.
- Add hot spots to make it interactive.
- Test t he prototype with a subject matter expert.

DYNAMIC PROTOTYPE DESCRIPTION
We developed our final prototype as a smartphone app using Adobe XD. Each prototype screen included a number of hotspot links to other screens. Here are some screens from our most recent prototype.
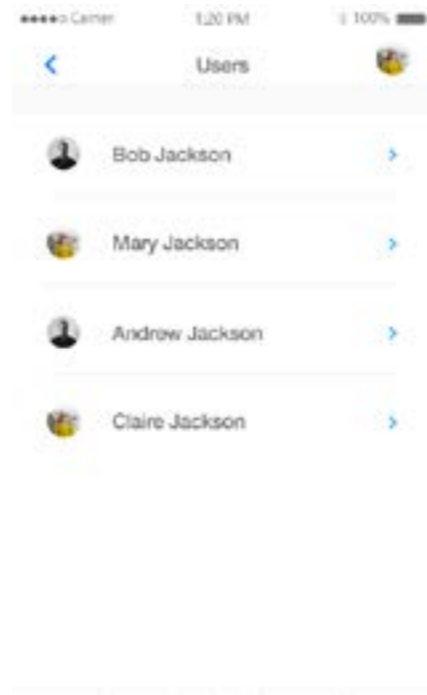
CHAPTER FOUR

DYNAMIC PROTOTYPE AND DEVELOPMENT
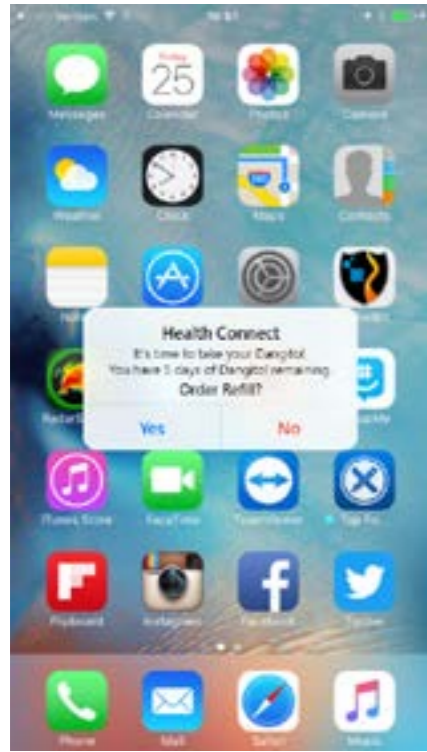
Health-Connect alerts Mary that it's time to take her medication. It also notifies her that this prescription is running low.
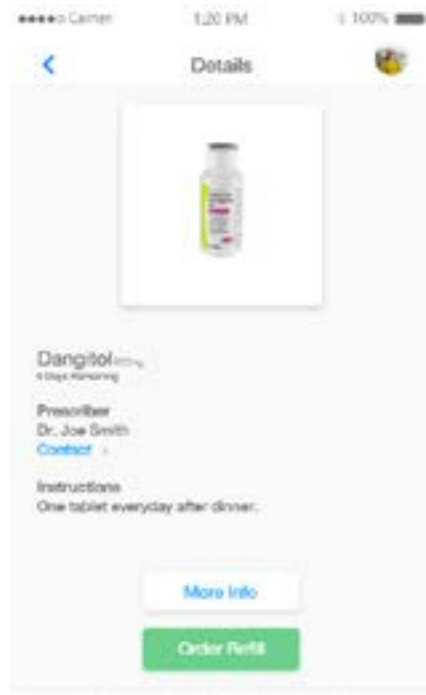
Health-Connect shows Mary her information about this prescription. Additional information (side effects, uses) not specific to Mary is available from the More Info button.
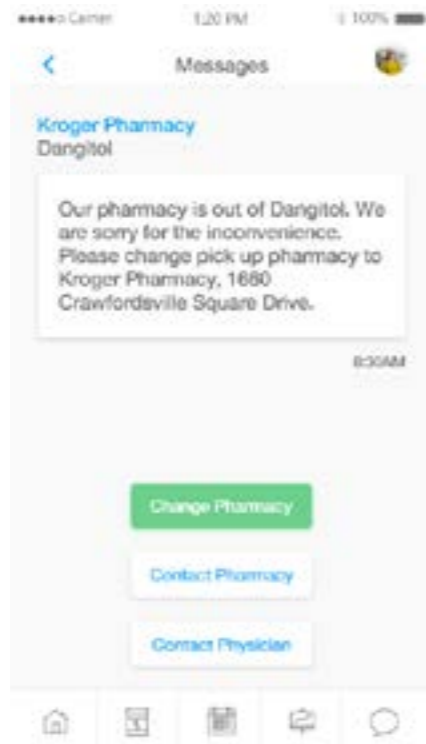

With authorization from their accounts and the proper security authentication, Mary can also manage prescriptions for her spouse and children.
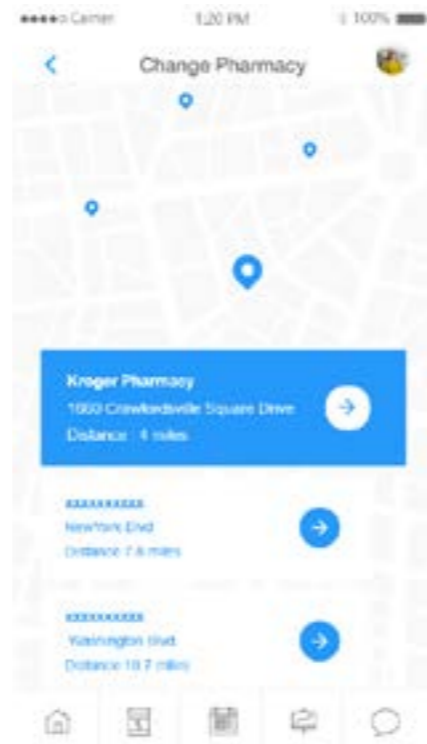

Mary receives a notice from the pharmacy about the status of her order.

Mary orders prescription refills for herself and her spouse.

Mary checks the status of her refill order.

Mary transfers the order to a different pharmacy.

ADOBE XD PROTOTYPE:

https://xd.adobe.com/view/57e4c9aa-adf9-4538-5941-afb6c1efd-fee-21d5/?fullscreen

SUBJECT MATTER EXPERT EVALUATION

We recruited Karen Klutzke—a physician assistant—as a subject matter expert to evaluate the first version of our dynamic prototype. We updated the prototype based on these findings before the next round of evaluations.

FINDINGS	MODIFICATIONS
Some of the hotspots were not properly linked, making task 2 impossible to complete, and making it difficult to find the right page to start task 3.	Correct the flaws in the prototype. Combine tasks 1 and 2.
Shopping cart metaphor is not appropriate for prescriptions.	Change terminology to "orders" instead.
Prescription detail page is too cluttered.	Separate the patient's personal information about the prescription (dosage, prescriber) from general information (side effects, usage).
"Add Request" button on order page is unclear.	Change to "Add Prescription".
It is unrealistic to estimate when the physician will respond to an updated prescription request.	Changed order message to indicate that Health-Connect would notify the patient when their order status changed.

Overall she liked the design, especially the timeline on the Order Status page. She suggested the following enhancements, which remain to be implemented.
- Add a test task that includes waiting for insurance approval.
- Add cost estimates to the order page, taking the patient's insurance into consideration, and providing alternative pricing (via GoodRx service) for out-of-pocket costs.

HCI EXPERT EVALUATIONS

We recruited the following HCI experts to evaluate our final dynamic prototype.
- Travis Faas, HCI PhD student at IUPUI
- Swati Mishra, second year HCI MS student at IUPUI
- Swapnil Chandra, second year HCI MS student at IUPUI
- Early Attoh, Product Designer at CCHub

Most of the evaluations were performed in person while we observed: Mr. Attoh performed his evaluation remotely. The evaluators used a think-aloud protocol while performing the following prescription management tasks:
1. Order a prescription refill in response to a system reminder.
2. Check the status of the prescription order.
3. Respond to a message from the pharmacy.

Our HCI experts provided the following observations:
- All agreed that the text is too small, especially for elderly patients. Perhaps there should be an option to set the size.
- They agreed that the cost of the medicine should be provided.
- The alert from the pharmacy should provide more information and emphasis up-front instead of requiring a click on the Show button.
- Placing a combined order of prescriptions for both Mary and Bob was difficult.
- Button arrangements could be improved.

Mr. Attoh felt the order timeline should be flipped so it proceeded from top to bottom in chronological order. We feel the current design is the right choice because it puts the most relevant information at the top, where it is most easily seen. If future testing provides support for Mr. Attoh's argument, we should test both version to see which our users prefer.

Overall our evaluators felt the design was off to a good start.

NEXT STEPS

Much work remains just to finish designing the prescription management subsystem of our Health-Connect portal. If we continued on to another round of evaluations, we would do the following:
1. Increase the text size.
2. Reconsider placement of buttons.
3. Refine the process of combining refills for multiple patients in a single order.
4. Add cost estimates to prescription orders.
5. Ensure compliance with applicable regulations (e.g. HIPAA).

Our future test tasks would include the following scenarios:
1. Renew a prescription from the physician.
2. A prescription is on hold until insurance authorization can be obtained.

WHAT WE LEARNED

A healthcare portal is a big and complex system. It was important that we pick a focus area and start there. Even the prescription management subsystem we selected would take much more work to finish designing.

Our first prototype was supposed to be paper. We mocked it up in Adobe XD as a convenient drawing tool. We planned to print them, but then testing would have required a "Wizard of Oz" to manipulate the pages and remember the links between them. It was actually simpler to link hot spots on the pages together. Maybe we could have completed that prototype faster with quick pen sketches, but with the graphics expertise on our team, a drawing tool seemed like the right choice.

Our task sheets from our midterm project were too detailed. They provided our testers with step-by-step instructions to complete the tasks. As a result, we didn't get a good assessment of how users would explore and learn our design. For this project we simply described a situation and a desired outcome, and we learned more about the design as a result.