Interaction Design Degree Project Stage I

Organizer for Chronic Patients

By :
Hemruchi Shah
(07633803)

Guide:
Prof. Anirudha Joshi

Submitted in partial fulfillment of the requirement for the degree of
Master of Design in Interaction Design

Industrial Design Centre
Indian Institute of Technology
Powai, Mumbai
2008

Approval Sheet

The Interaction design project 2 entitled
"Organizer for Chronic Patients" by Hemruchi Shah (07633803) is approved, in partial fulfillment of the requirements for
Master of Design degree in Interaction design.

Guide :

Chairman :

Internal Examiner :

External Examiner :

Acknowledgements

I would like to thank the following people for their support:

Prof. Anirudha Joshi for his support and guidance during the course of this project.

Atul, Shreyasi, Rutuja, Vinay and Prajakta for participating in the brainstorming sessions.

All the stakeholders of my project who took part in the user studies and feedback sessions.

All faculty and students of IDC for their feedback.

Hemruchi Shah
November 2008

Content

1. Overview ... 1
    1.1 Abstract ... 2
    1.2 Introduction ... 3
    1.3 Methodology ... 4
    1.4 Project Timeline ... 5

2. Background Study ... 6
    2.1 Chronic Disease ... 7
    2.2 User Studies & Mappings ... 9
    2.3 Existing Technologies ... 15
    2.4 Secondary Research ... 17
    2.5 Goals ... 26

3. Ideation ... 31
    3.1 Concept Domains ... 32
    3.2 Design Ideas ... 33

4. Final Concept ... 46
    4.1 Project Focus ... 47
    4.2 Concept Map ... 48
    4.3 Concept Detailing ... 50
    4.4 Prototyping & User Feedback ... 59

5. References ... 61

1. Overview

1.1 Abstract ... 2
1.2 Introduction ... 3
1.3 Methodology ... 4
1.4 Project Timeline ... 5

1.1 Abstract

The projects aims to facilitate healthcare amongst chronic patients. User studies of patients, caretakers and healthcare providers gave many insights and ideas. After analyzing these I decided to focus on helping chronic patients to organize their time and lifestyle keeping in view the ease in attending to their ailment.

Hence the outcome, a mobile application, will facilitate the patient in various management activities like:

- Medication Reminders.
- Reminders on Health Schedule.
- Organizing Medical Reports.
- Handy Case History in case of emergency.

The application is developed to store, update and manage the medical and clinical records of chronic patients to assist the healthcare providers in their clinical analysis.

1.2 Introduction

Chronic conditions will not go away; they are the healthcare challenge of this century. *(WHO Report)*

The dramatic increase in chronic conditions has led to the demand of a creative action that facilitates the stakeholders of the healthcare sector. The market is flooded with a choice of products and services along with resources to acquire them. Innovative treatments and high value drugs, equipment and gadgets occupy considerable shelf space at the retailers and prove as probable drivers of sales.

Factors like infrastructural improvements, growing literacy rate and resultant increase in the standard of living and higher purchasing power have opened the route to a healthcare access at one's door step. New trends like medical tourism and technology based segment penetration continue to boost the healthcare sector making room for a change in the existing communication methods. The patient has now become the focal point. Innovative methods are incorporated by healthcare providers to assist the patient in making his life more comfortable.

My project focuses on facilitating healthcare to the 'probables' of the chronic patients. I have tried to build an interface that helps a chronic patient to meet up to his health schedule with ease and organize himself so that he can lead a stress free and meaningful life despite his chronic health condition by keeping his worries at a distance.

> *"Chronic conditions will not go away; they are the health care challenge of this century."*
>
> WHO Global Report
> CARE FOR CHRONIC CONDITIONS

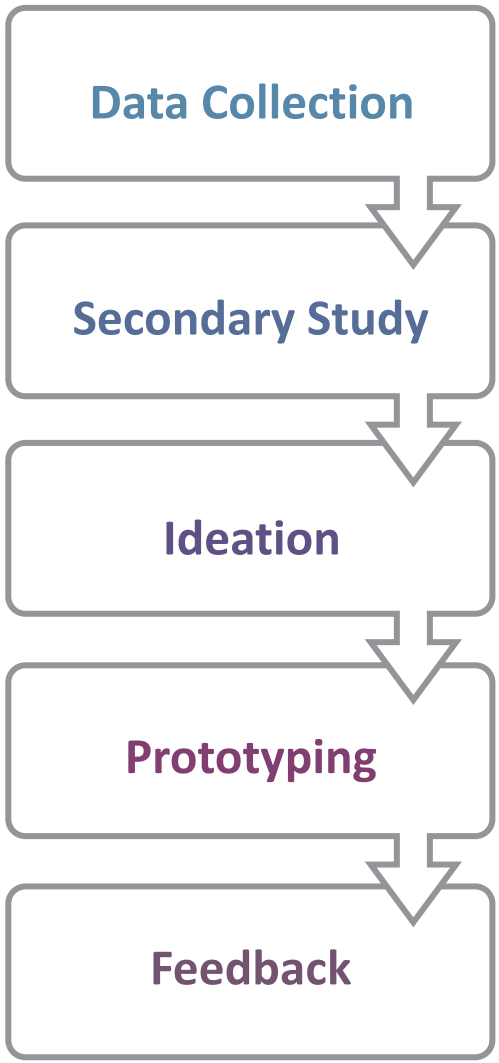


Fig 1.3.1: Design Process Followed

1.3 Methodology

I used the following method while working on my project:

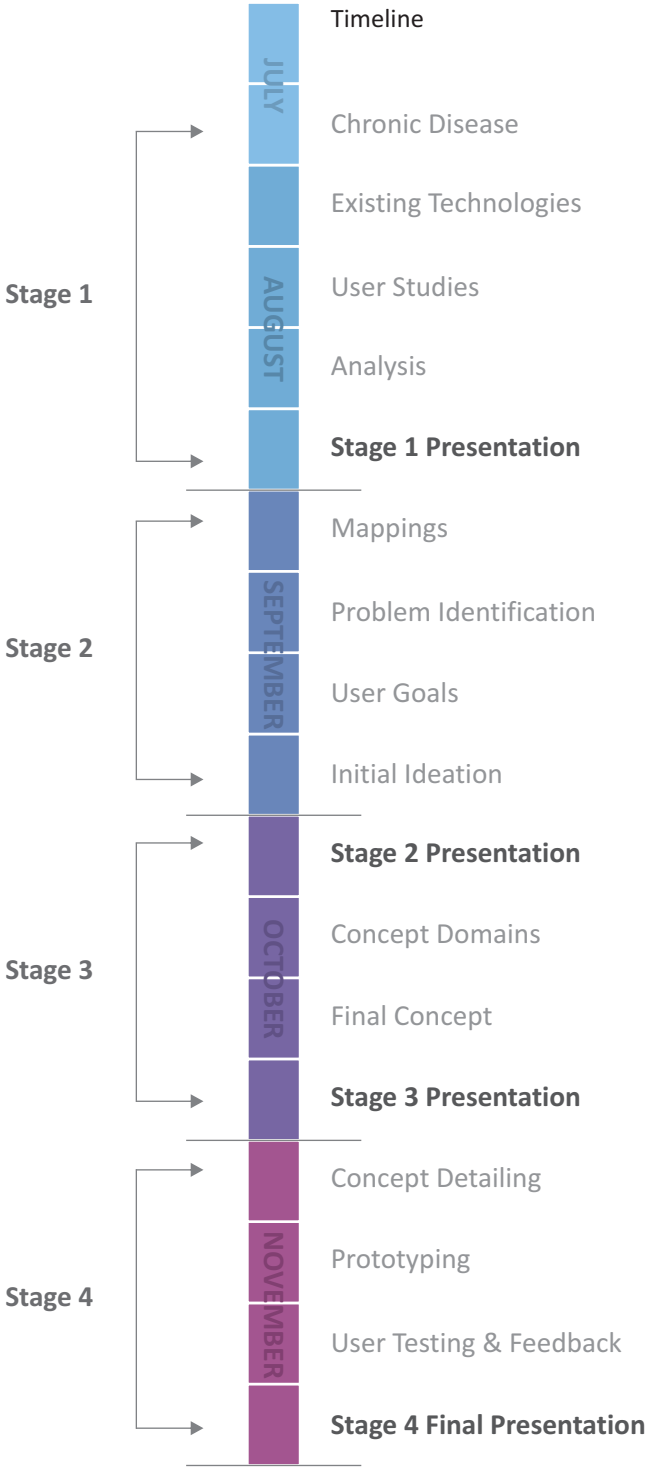
Data Collection:
I did a background study wherein I collected information on different kinds of Chronic disease. I spoke to a few doctors and understood about the maintenance level in each disease. Next I conducted user studies with few chronic patients. The aim was to understand how they organize themselves. Thereafter I did analysis and found breakdowns. The next step was to understand existing technologies and work done for chronic patients.

Secondary Study:
I conducted a second user study to find out how people remember things and why do people forget things. Then I did a brainstorming session and made mind maps to jot down all the data in a consolidated manner. Next I did analysis of the user studies and made a list of goals, problems and possible solutions. Then I identified the different domains in which I would develop my ideas.

Ideation:
After my research was done, I developed a few concepts that I thought would be probable solutions to the problems. I explored various domains and came up with multiple concepts. After looking at the various concepts, I finalized one idea and started to detail it.

Prototyping:
I am currently working on the prototype of my product.

Feedback:
User feed back will be taken based on the prototype.



1.4 Project Timeline

The Project was divided into 4 stages.

Stage 1:
Here we started with the initial Background study. I studied different chronic disease and existing work done to facilitate chronic patients. I also did user studies with chronic patients to understand the real world scenario and know their problems.
Stage 1 ended with a presentation on 22 August 2008.

Stage 2:
I did a brainstorming session and made mind maps to facilitate my thinking and understanding of chronic patients. I identified major problems faced by patients and defined user problems, goals and possible solutions.
Stage 2 ended with a presentation on 3 October 2008.

Stage 3:
I defined different concept domains and started with ideation.
Then I decided on my final concept and started to detail it.
Stage 3 ended on 24 October 2008.

Stage 4:
This included prototyping, user studies and making the final product after user feedback.

Fig 1.4.1: Project Time Line

2. Background Study

2.1 Chronic Disease ... 7
2.2 User Studies & Mappings ... 9
2.3 Existing Technologies ... 15
2.4 Secondary Research ... 17
2.5 Goals ... 26

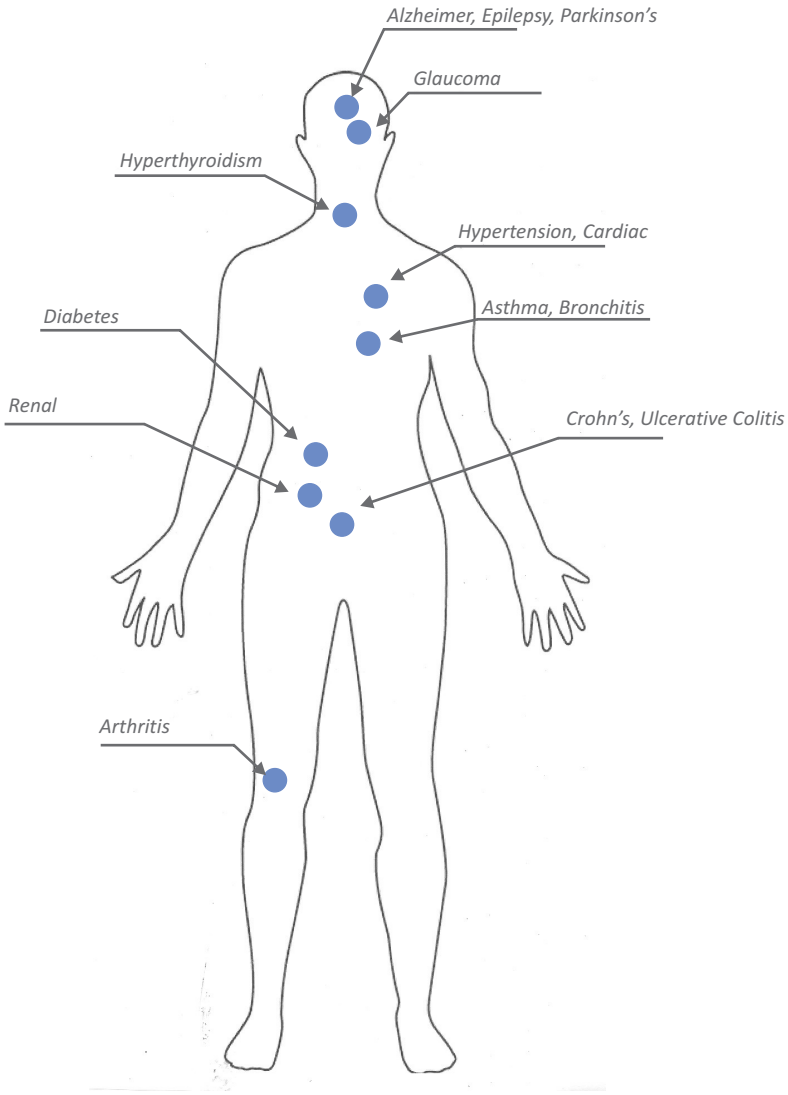


Fig 2.1.1: A few chronic disease

2.1 Chronic Disease

Disease is an abnormal condition that impairs bodily functions associated with specific visible symptoms. It refers to any condition that causes extreme pain, dysfunction, distress, social problems and/or death to the person affected. [R1]

A **chronic disease** is a disease that is long-lasting or recurrent condition. Any condition lasting more than three months can be termed as "Chronic". The most common chronic conditions are high blood pressure, arthritis, respiratory diseases like emphysema, and high cholesterol.

In this broader sense, it includes injuries, disabilities, disorders, syndromes, infections, isolated symptoms, deviant behaviors etc. Any of these conditions can become chronic. These became keywords to my initial background research.

I have illustrated a few well known chronic disease in Fig. 2.1.1.

2.1 Chronic Disease

Any disease has a different kind of maintenance level. It can range from short term, to mid term and long term. With the onset of a chronic disease the maintenance level of the disease becomes longer. (as illustrated in Fig 2.1.2)

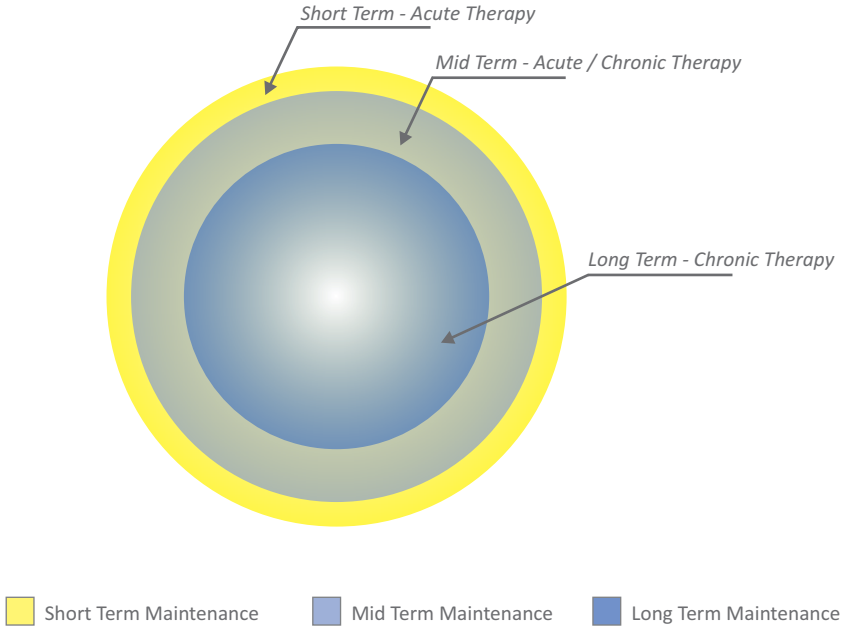


Fig 2.1.2: Maintenance Level in Acute & Chronic Disease

This lead me to first analyze the difference between a chronic therapy patient and acute therapy patient.

Chronic therapy Patient	Acute therapy Patient
Long term medication	Short term medication
Change in lifestyle Diet- exercise- health awareness	Temporary change in lifestyle till body returns to normal condition
Constantly in touch with doctor	In touch with doctor till medication is on
Update doctor on every stage and of every symptom	Updating the doctor only during the course of the medication
Regular checkups to keep tab on condition	
Manage reports for any kind of reference in diagnosis	
Keep in touch with health awareness groups or labs or retailers for latest developments	
Stick to a daily routine of medication so it does not lead to any complication	
Has to inform about his chronic condition and show all reports to doctor who prescribes medication other than his consultant, surgeon	Needs to only inform doctor of prior acute conditions
Never be short of medication and never to skip a dose	Complete only a given medication course

2.2 User Studies & Mappings

Before going to the users to understand their lifestyles and problem areas, I made a stakeholder map to convey my understanding of the health segment. Thereafter I tried to identify the communication flow between each of the stakeholders. (Fig. 2.2.1) Next I conducted user studies to identify problem areas and breakdowns in the communication between the stakeholders.

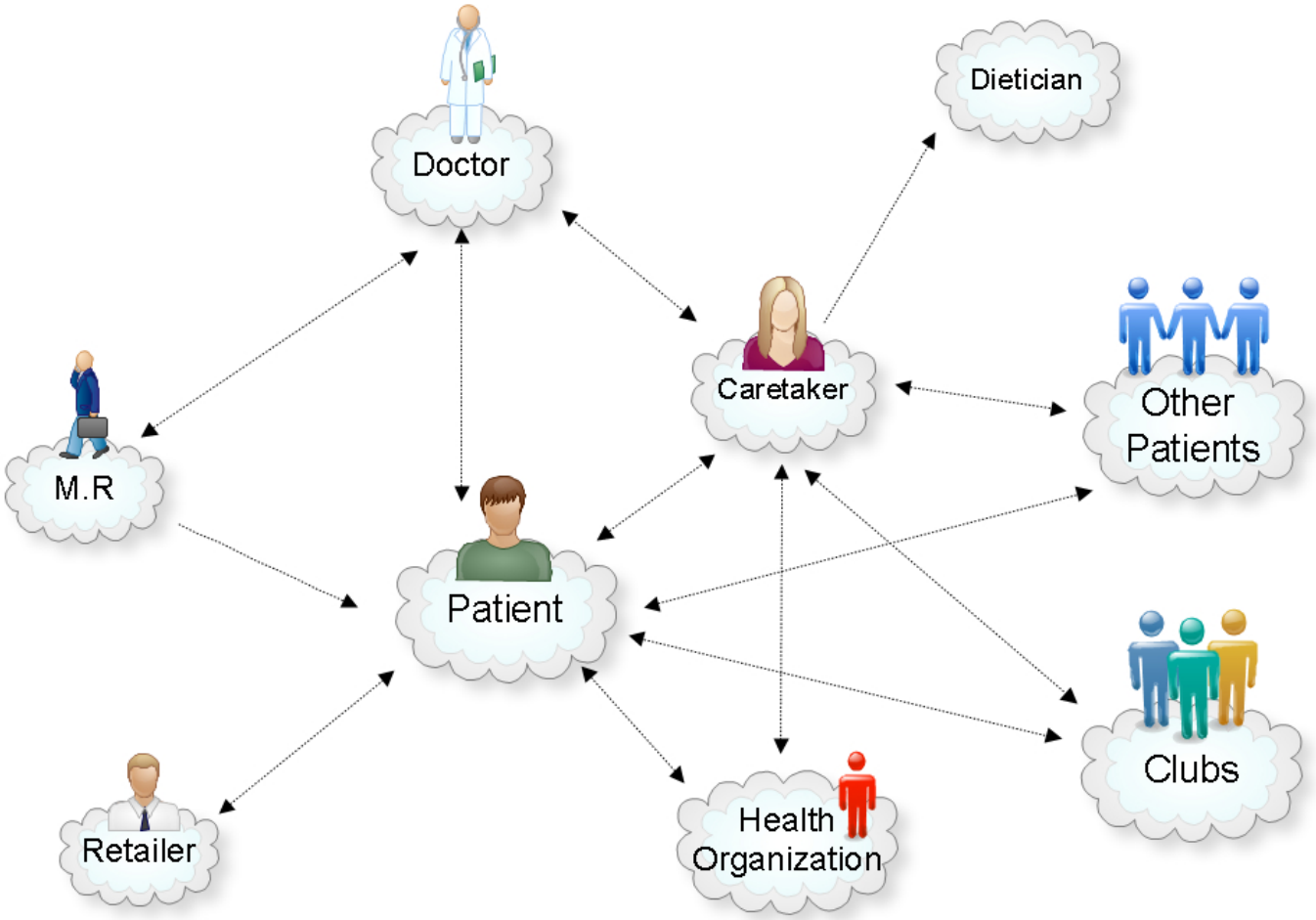


Fig 2.2.1: Stakeholders in the health segment

2.2 User Studies & Mappings



Relation to Patient: Wife and mother
Age: 62 years
Profession: Housewife

User 1: Observations and Insights:

- She lives with her husband and twin sons.
- Her elder twin son has renal problems since birth.
- She and her husband, both have diabetes.
- She makes pouches of medicines for her husband and son.
- She tends to forget medicines but her husband is punctual.
- There is no reminder system. “I just try to remember it all”
- She and her husband go for walks regularly. Want to stay fit.
- “The doctor tells us what to do. We follow his instructions.”

As shown in Fig. 2.2.2:

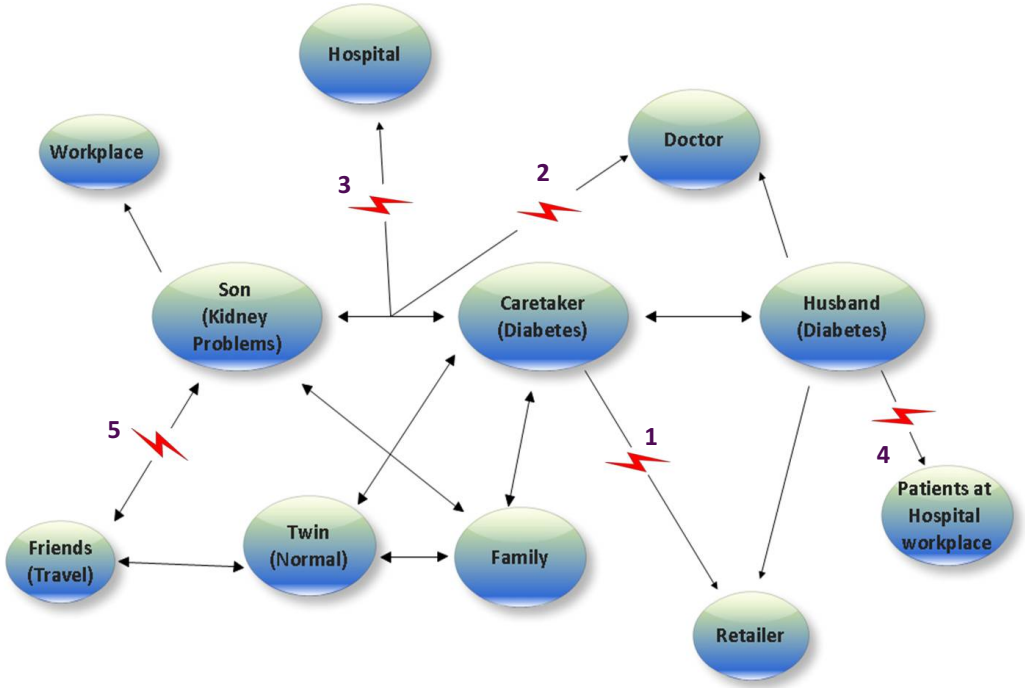


Fig 2.2.2: Mapping Breakdowns for User 1

<u>Breakdown 1</u>
Medicines are too expensive. She has to find out rates at different places and buy in bulk.

<u>Breakdown 2</u>
Browses through med. records on and off for appointments. She does not follow any reminder system. May become late for appointments.

<u>Breakdown 3</u>
Son relies on mother for reminder of appointments.

<u>Breakdown 4</u>
Husband works at a hospital but still never contacted another patient with kidney problems or attended any lectures for patients and family.

<u>Breakdown 5</u>
Son cannot be away from home for many days. He is scared of sudden emergencies that may not be handled properly by unknown people.

2.2 User Studies & Mappings



Chronic Disease: Ulcerative Colitis (Since 1994)
Age: 53 years
Profession: Businessman

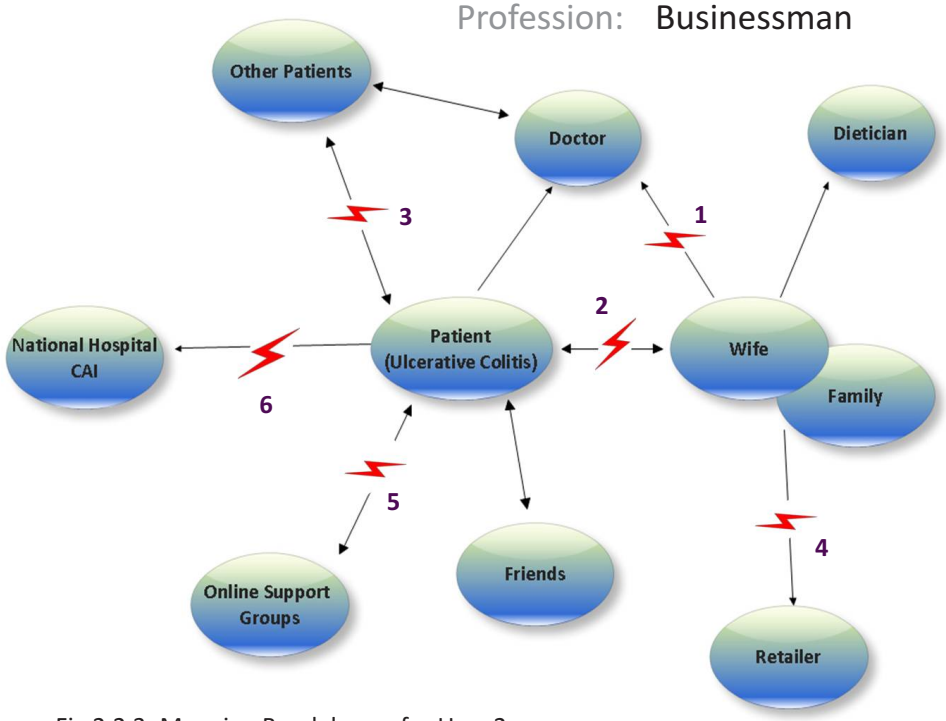


Fig 2.2.3: Mapping Breakdowns for User 2

User 2: Observations and Insights:

- Ulcerative Colitis Patient, diagnosed in 1994
- Daily maintenance, Daily care of illeostomy bag + medication
- Came across online support groups. Informed is doctor of the same.
- There are no support groups in India that help Indian patients.
- Many times forgets appointments.

As shown in Fig. 2.2.3:

Breakdown 1
Many times he and his wife forget appointments.

Breakdown 2
Even if medicines are ready on table, patient forgets to take them.
Wife sometimes calls up to remind him to take medicines after lunch.

Breakdown 3
Patients feel embarrassed to talk of their condition.

Breakdown 4
Medicines are too expensive. He finds them at wholesale price.
Places order of equipments when second last flange from box.
Wife plans in such a way that there is ample time to substitute stock.

Breakdown 5
Embarrassing to share problems with people.

Breakdown 6
Invited by a patient to speak on his lifestyle pre and post operation.
They are not well organized.

2.2 User Studies & Mappings



Chronic Disease: Renal Problems
Age: 26 years
Profession: Working

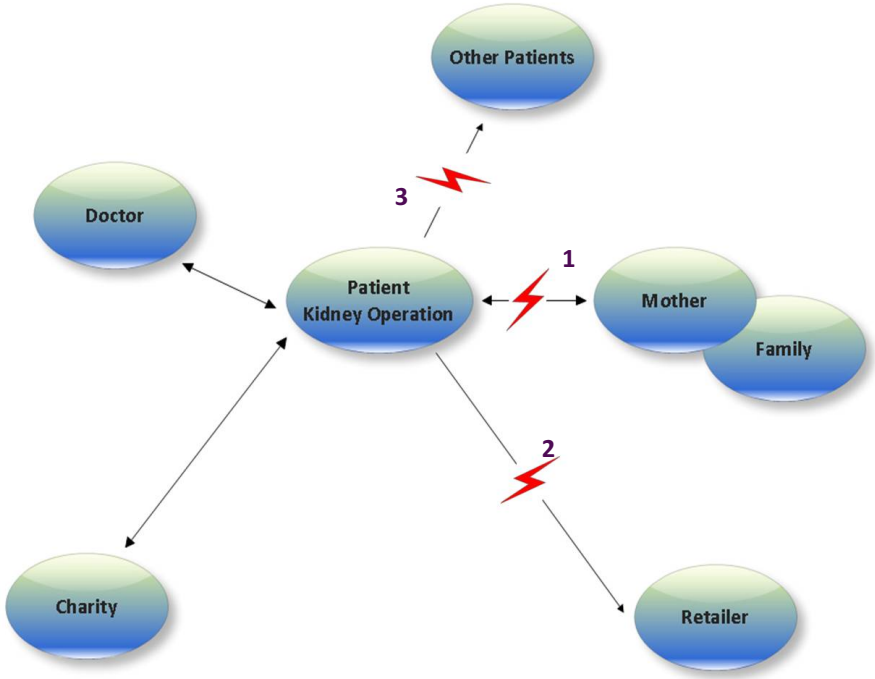


Fig 2.2.4: Mapping Breakdowns for User 3

User 3: Observations and Insights:

- Recently had a kidney operation done. Mother donated a kidney.
- Cannot afford treatment.
- Doctor had her sponsored through charity.
- Medication costs her Rs. 50,000 a month (both mother and herself)
- Emotional roller coaster ride everyday.
- She has no emotional support.
- She cannot talk of her problem to anyone. (A girl, 26 yrs etc.)
- The patient manages everything herself.
- Goes through a lot of depression.
- Cannot afford medication.
- Looks out for wholesale. Buys weekly medicines.
- Cannot talk about her problems to anyone.

As shown in Fig. 2.2.4:

<u>Breakdown 1</u>
No emotional and financial support.
The patient manages everything herself.
Goes through a lot of depression.

<u>Breakdown 2</u>
Cannot afford medication.
Looks out for wholesale.
Buys weekly medicines.

<u>Breakdown 3</u>
Cannot talk about her problems to anyone.
Embarrassed of her condition.
Not aware of any support group.

2.2 User Studies & Mappings

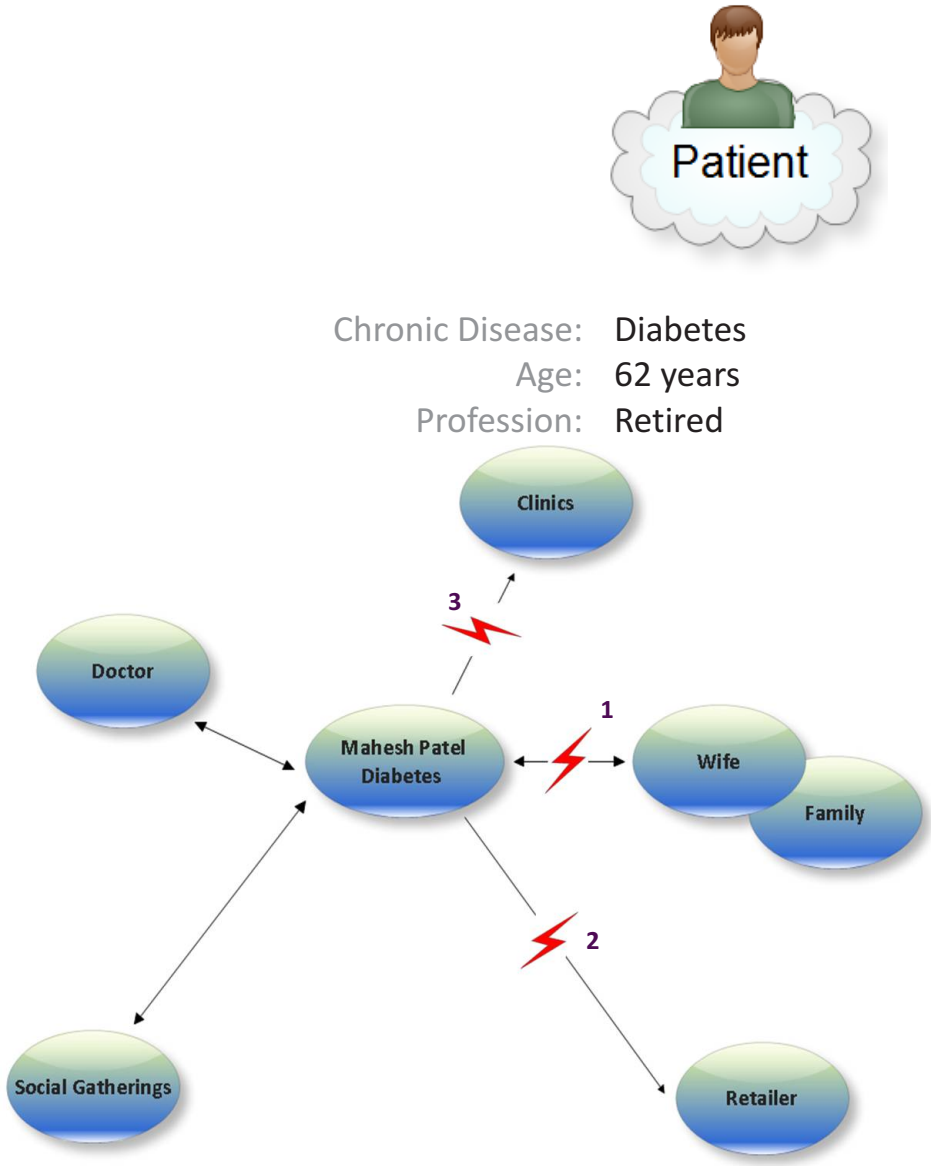


Fig 2.2.5: Mapping Breakdowns for User 4

User 4: Observations and Insights:

- Buys his medicine stock of 100 days.
- Keeps 10 days medicines in a box on the dining table.
- "My 10 days medicine should get over on an afternoon only."
- But then if he has skipped he cant do anything about it.
- He forgets to have his medicine many times.
- He is not aware of any support groups.
- He loves to read articles, especially health related.
- Does a weekly home check of diabetes.
- Does not write down the result. Remembers for next check.
- Every six months has a medical checkup done of entire family.
- He calls up the clinic and books appointments.
- He goes for regular walks.
- Follows a diet. Does not consult dietician but through magazines.

As shown in Fig. 2.2.5:

Breakdown 1

Forgets to have medicines even when they are put in front of him.
Its all a mental process in remembering.

Breakdown 2

Medicines are too expensive.
Used to buy from the chemist earlier. Now he buys from a wholesaler and that has reduced his cost around 15%

Breakdown 3

Many times he forgets his half yearly checkups.
He follows up as soon as he remembers.

2.2 User Studies & Mappings

After conducting my user studies and analyzing them, I consolidated all my thoughts into a mind map (Fig 2.3.6)

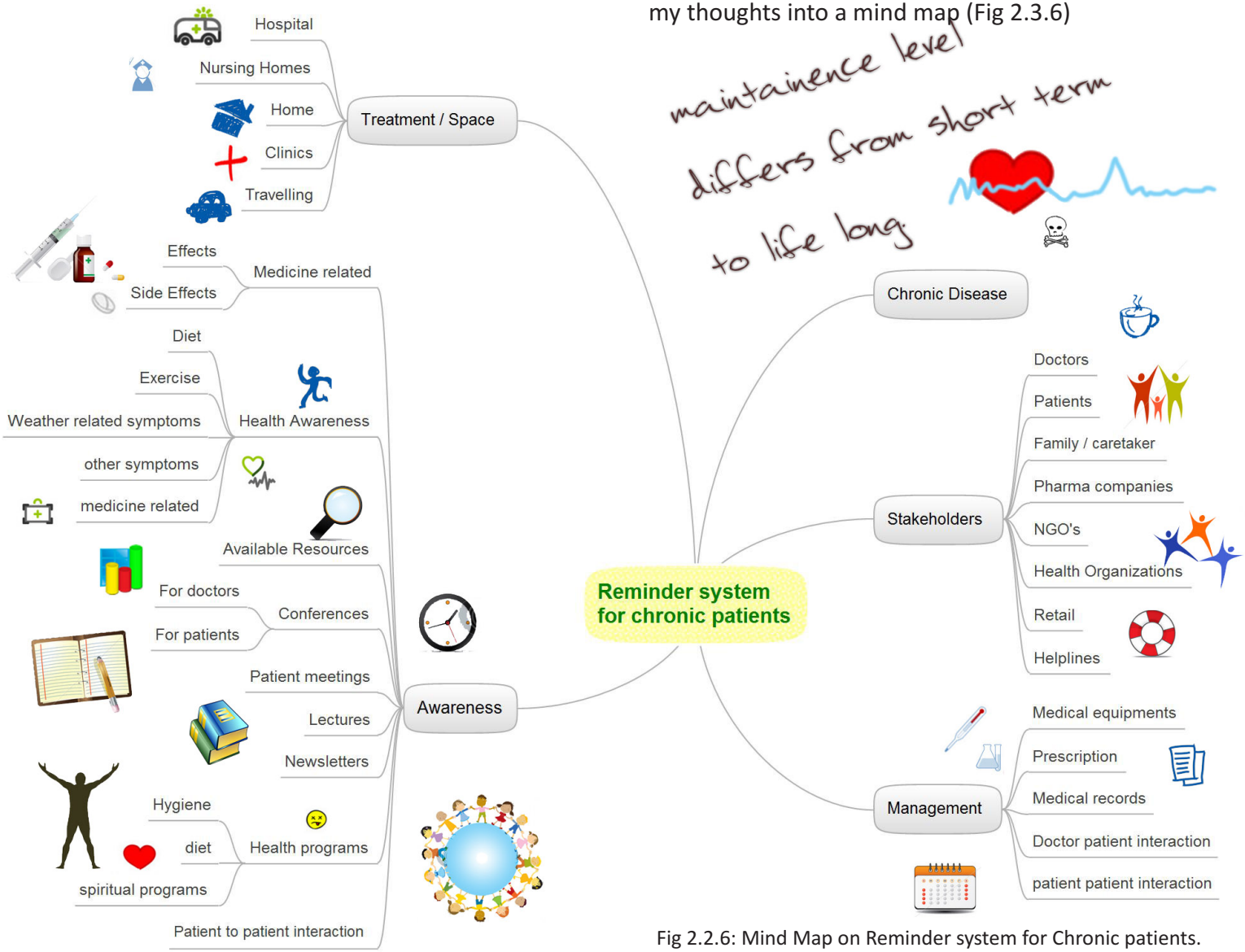


Fig 2.2.6: Mind Map on Reminder system for Chronic patients.

2.3 Existing Technologies

This step in my project included a study of various existing technologies and work done.



Fig 2.3.1: [R2] *http://www.hompath.com/*

1. Patient monitoring Softwares:

Many softwares are available the facilitate remote patient monitoring. These websites allow the doctor and patient to interact with each other and allowing the doctor to treat the patient.

Eg: Hompath



Fig 2.3.2: [R3] *http://www.medhelp.org/*

2. Online Forums and Support Groups:

There are a few web sites dedicated to a specific disease where in the patient logs in to discuss his problems with other patients or caretakers. Unfortunately there is no Indian patient interaction support website that helps Indian patients. The sites help establish large communities and offering tools for patients to compare symptoms, effective drug dosages and side effects or connect patients to physicians and let them moderate many of the forums. Doctors and patients work together to create "wikis," or documents that can be edited by any user.

Eg: www.patientslikeme.com | www.medhelp.org | www.j-pouch.org

2.3 Existing Technologies

Fig 2.3.3: *National Kidney Foundation India Logo* [R4]

3. Patient Clubs:

Many such clubs are formed as an initiative of pharmaceutical companies and patients. These clubs organize meets and lectures on educating the patients and caretakers or informing them on the latest developments.

Eg: Colitis Association of India, National Kidney foundation



Fig 2.3.4: *IDC Project 2006, Saikat Mandal* [R5]

4. Work done in IDC

Device to help diabetic and obese people lead a healthy life style.
by Saikat Mandal, VC 2006

This project was done in IDC to help diabetic people lead healthy lifestyles. The interface allowed the patient to interact with other patients, doctor, caretaker and dietician freely. It helped him monitor his disease and update the doctor.

2.4 Secondary Research

A secondary research was done on how people remember things and organize themselves. Through this user study I found out various articles and objects that people make use of in the day to day life to assist them into being organized. These also became an inspiration for a few concepts. Shown below are the different means by which people remember things. (Fig. 2.4.1)

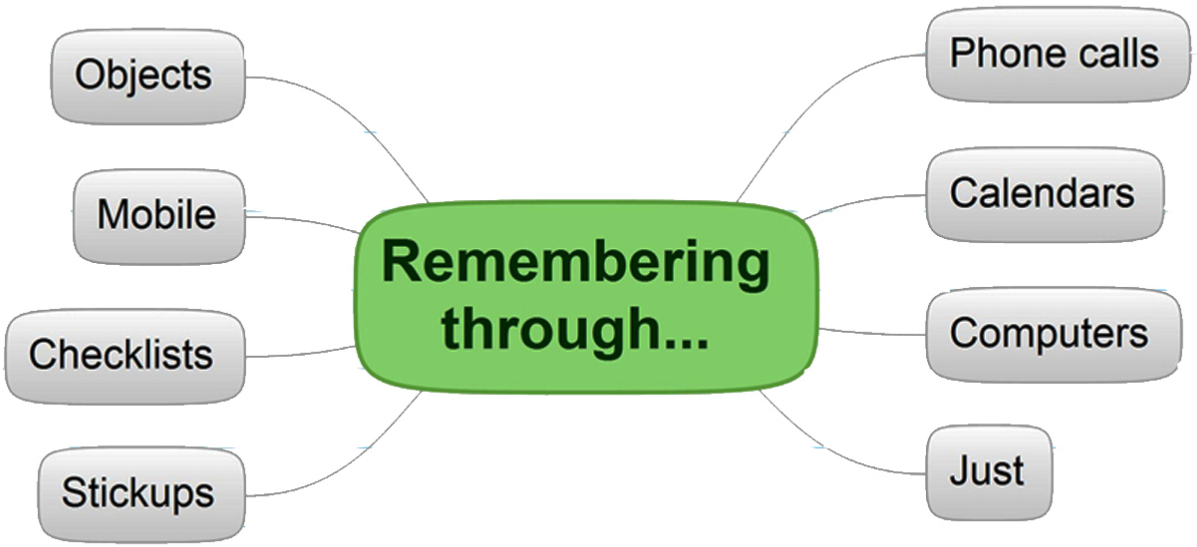
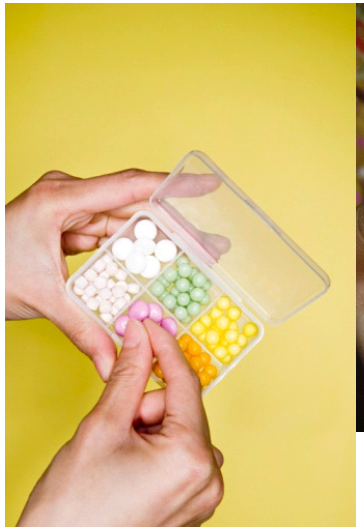


Fig 2.4.1: Mapping How people remember things.

2.4 Secondary Research

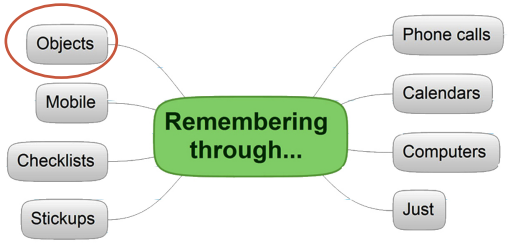
Fig 2.4.2: Mapping remembering things through objects



Seeing the object itself to remember task



Tying knots to remember that a task is pending.



Remembering through Objects:

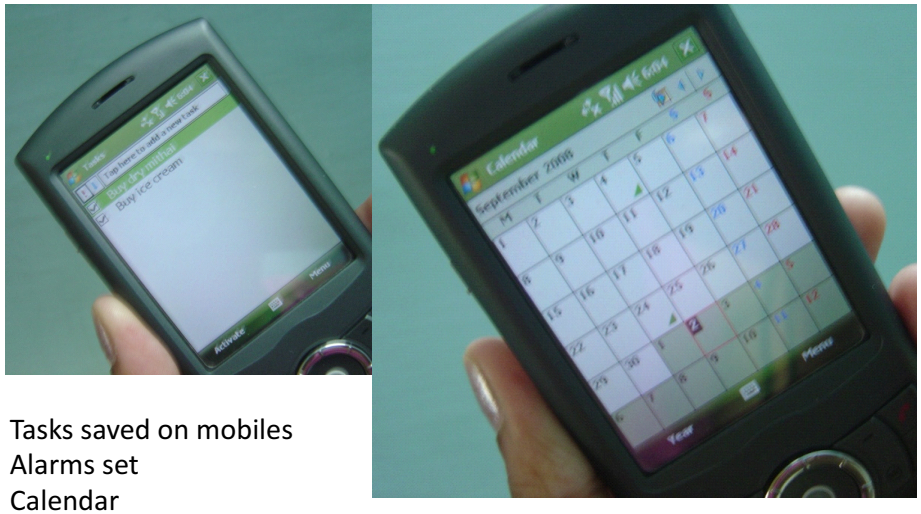
Many people remember doing tasks by associating the task with certain objects. These objects maybe everyday things. (Fig 2.4.2)

Eg:
Many housewives remember tasks by tying knots on their saree pallus to remind them that a task is pending.

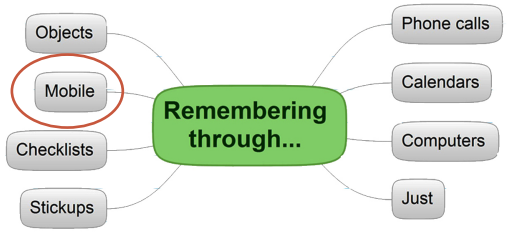
Many people keep their medicine boxes on the dining table so that its in front of them and they are constantly reminded about it and do not get up from the table without eating the dose.

2.4 Secondary Research

Fig 2.4.3: Mapping remembering things through Mobiles



Tasks saved on mobiles
Alarms set
Calendar



Remembering through Mobile Phone:

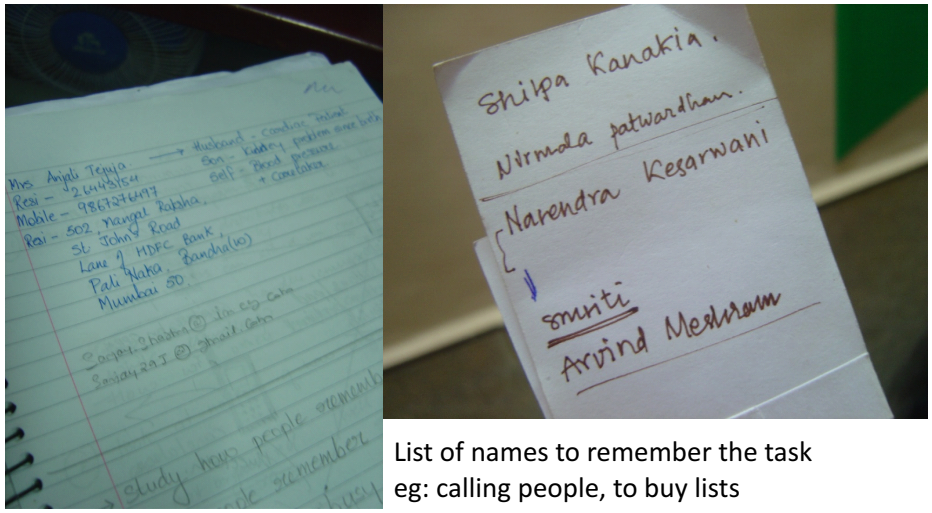
Some people who are a it tech savvy, often make use of the mobile calendars to synchronize their outlook with the phone.

Many people set alarms or to-do lists on their mobile phones to remind them of tasks.

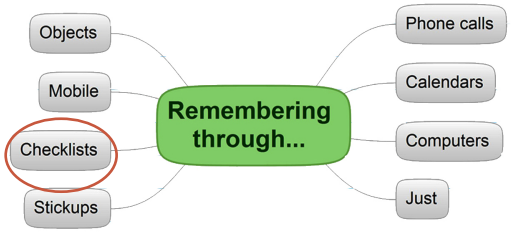
(Fig. 2.4.3)

2.4 Secondary Research

Fig 2.4.4: Mapping remembering things through Checklists



List of names to remember the task
eg: calling people, to buy lists



Remembering through Checklists:

Eg:
Women make a shopping list before buying groceries.

Checklist of to-do tasks in a personal diary that u see everyday.

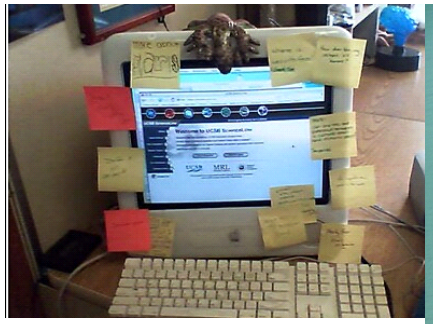
Many people have a habit to write down tasks on a daily diary.

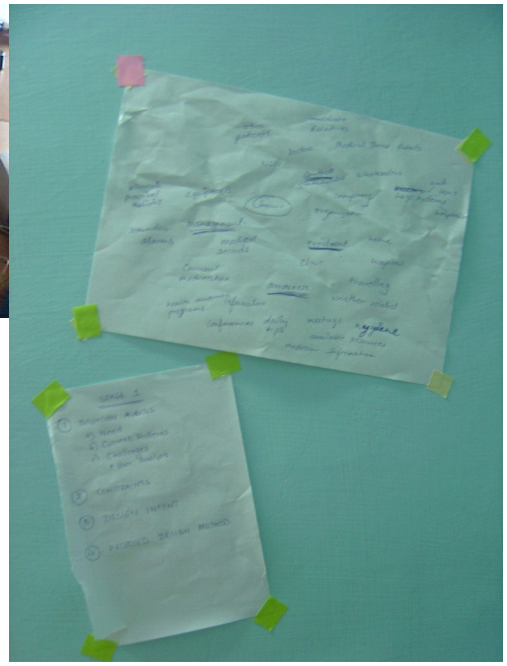
People also write things in important books they know they will refer again.

Some people write things to remember on any paper available.
(Fig 2.4.4)

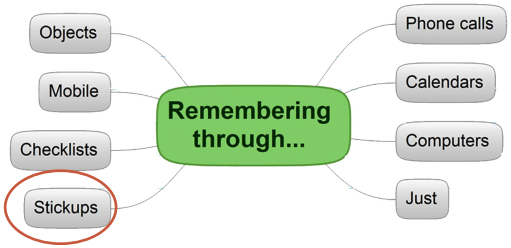
2.4 Secondary Research

Fig 2.4.5: Mapping remembering things through Stick ups





Post its
Pin important notes on wall



Remembering through Stick-ups:

Many people stick up charts on which they write all important things.

Post its are put up on walls, books or computer screens where they are easily visible.
(Fig 2.4.5)

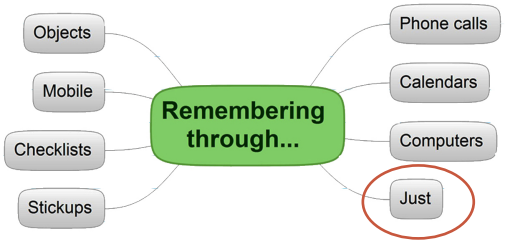
2.4 Secondary Research

“I simply remember.”

“I don’t need to write it down. Its all in my mind.”

“I don’t forget.”

“Its all inside my head.”

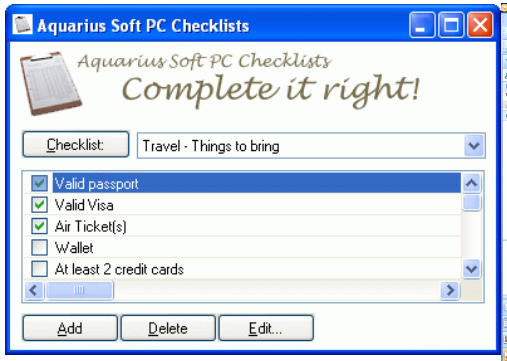


Memorizing tasks:

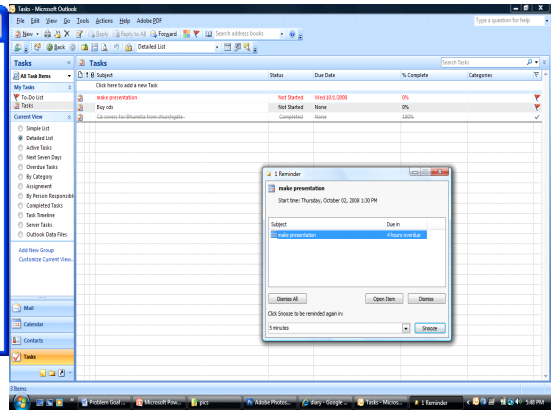
Many people are good at remembering tasks and that to complete the tasks accurately. Such people are the most organized kind of people.

2.4 Secondary Research

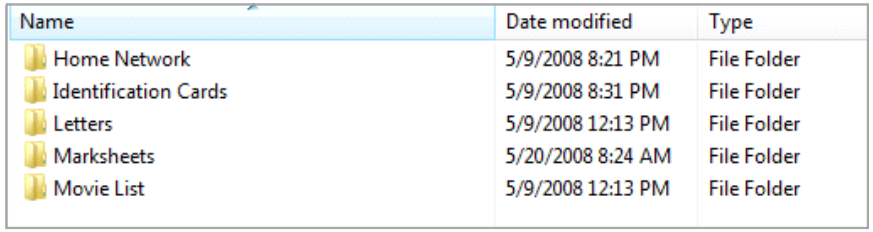
Fig 2.4.6: Mapping remembering things through computers



Checklist software

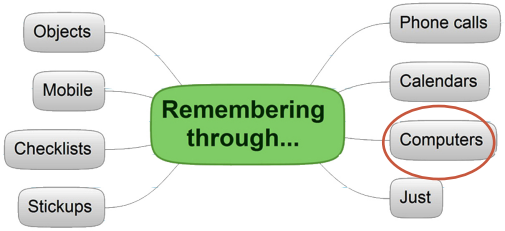


Microsoft Outlook alarms



Name	Date modified	Type
Home Network	5/9/2008 8:21 PM	File Folder
Identification Cards	5/9/2008 8:31 PM	File Folder
Letters	5/9/2008 12:13 PM	File Folder
Marksheets	5/20/2008 8:24 AM	File Folder
Movie List	5/9/2008 12:13 PM	File Folder

Copy of important documents for easy retrieval



Remembering through Computers:

People make use of Outlook to sync their mailbox, tasks and appointments to phones. They efficiently make use this kind of reminder system to finish the tasks.

Many software are also available that help people to set reminders and pop up on the computer screen when activated.

Organizing document copies is also a nice way of being disciplined and helps in easy retrieval.
(Fig 2.4.6)

2.4 Secondary Research

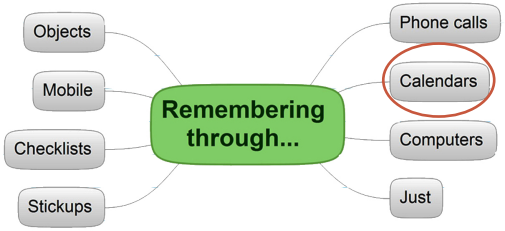


Fig 2.4.7: Mapping remembering things through calendars



Writing on calendars to remember

Remembering through Calendars:

Many people write important notes or appointments on the monthly calendar so that it is visible to them the whole month. This allows them to efficiently prepare for the engagement.

Many housewives write certain monthly expenditures on the calendars so that at the end of the month they can calculate efficiently on month end.

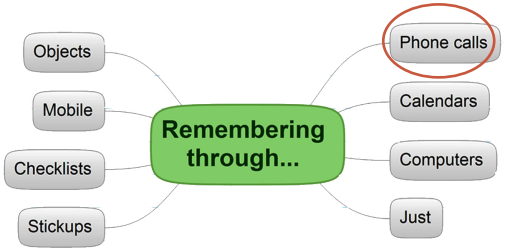
Using electronic calendars and setting reminders for them is also an efficient way to remember things.
(Fig 2.4.7)

2.4 Secondary Research



Asking others to call you
and remind you some tasks

Fig 2.4.8: Mapping remembering things through phone calls



Why do people forget to do things?
Following are a few user statements:

"Something more important came up."

"Busy routine all day."

"Something more interesting was happening."

"I was lost in watching a tv serial."

"I was busy in office."

"I was too tired to hunt for the medicine."

"I was stressed out."

2.5 Goals

From the user studies and mappings, I derived a list of goals that my user could have in using my product. These goals I divided according to the domain the fell under. The four domains are: (Fig 2.5.1)

- Schedule
- Treatment
- Organization and
- Awareness

I also sorted these according to the type of user who would use my product.



Fig 2.5.1: Domains of user goals

2.5 Goals



Patient Goals

Schedule:

- Not waste doctors time if he is late for appointment.
- Not to waste own time even though late.
- Reach every appointment and update doctor
- To be able to finish other tasks while waiting.
- Able to do every test and store reports for doctors use
- Follow up regularly.

Treatment:

- Procure medication at better price.
- Be regular in taking medicines.
- Be regular and try to remember through a medium.
- Not to skip any dose due to unavailability of medicine.
- Emotional support and talk freely of problems.
- The patient should be able to contact the doctor at every stage.
- Get prompt medication in emergency situation.
- Be able to inform unknown people of his condition.

Awareness:

- Disease economics.
- Know dos and don'ts that help handle emergencies.
- Known contacts in unknown places to help in emergencies.
- Interaction with other patients of similar diagnosis.
- Know effects and side effects of drugs taken.

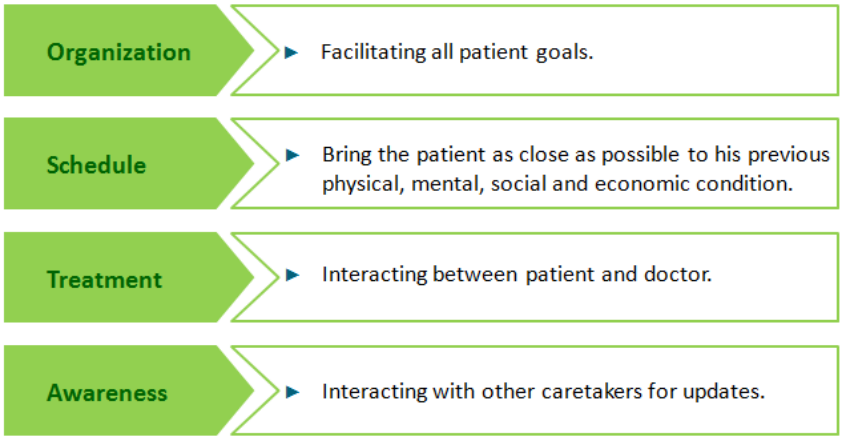
Organization:

- To have access to documents in case of emergencies

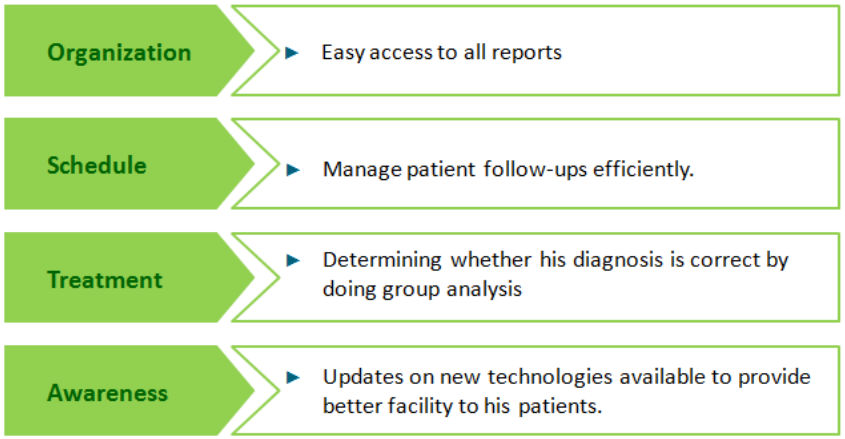
2.5 Goals

Caretaker Goals

- Facilitating all patient goals.
- Interacting between patient and doctor.
- Bring the patient closer to pre disease condition.
- Interacting with other caretakers.



2.5 Goals



Doctor Goals

Schedule:

- Able to receive updates on tests done by patient.
- Managing follow ups

Treatment:

- Provide medication to patient at better price.
- In case of emergency the doctor can give prompt treatment.
- Able to prescribe alternate medication due to unavailability of drug.
- Group analysis of patients with similar diagnosis to make conclusions regarding effectiveness of certain diagnosis or drug.
- Be reachable for emergency situations
- Can retrieve unknown patient's case history easily in case of emergencies.

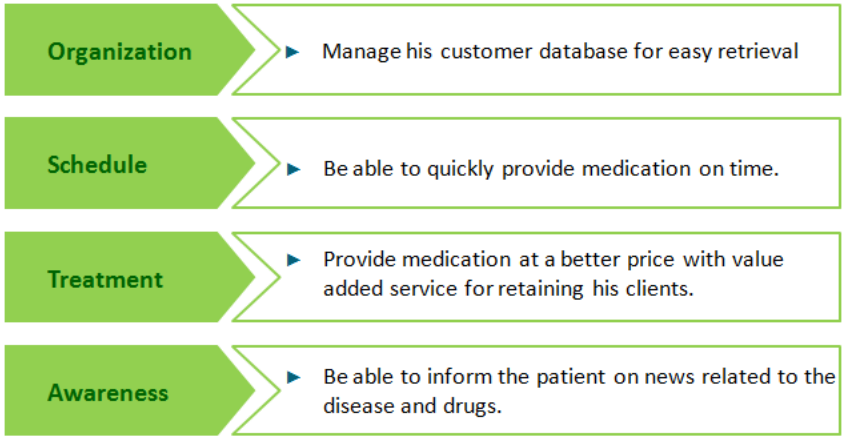
Awareness:

- Be aware of the process in diagnosis and all steps taken by patient.

Organization:

- To have access to documents in case of emergencies.

2.5 Goals



Retailer Goals

Schedule:

- Be able to inform the patient on dose completion.
- Manage prescriptions of patients.
- Be able to quickly provide medication on time.
- To offer other value added services.

Treatment:

- Provide medication at better price.
- Regular in updates to patient on stock completion.
- Prompt delivery of decided stock of medication.
- Consult the doctor in case of unavailability of drug.

Awareness:

- Inform the patient on news related to the disease and drugs.

Organization:

- Manage patient data base for easy prescription retrieval & reminders.

3. Ideation

3.1 Concept Domains ... 32
3.2 Design Ideas ... 33

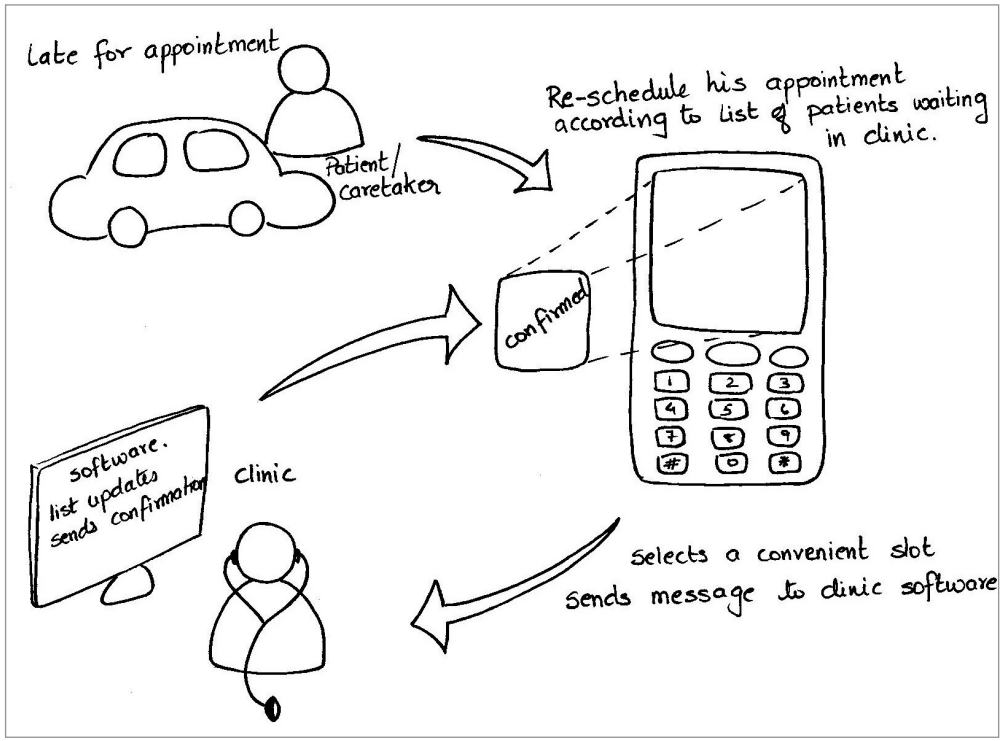
3.1 Concept Domains

Based on the problem and goal domains that were identified in the analysis, I sketched the initial design ideas (Fig 3.1.1) which will be explained in this chapter.



Fig 3.1.1: Concept Map

3.2 Concepts



Concept 1

The patient is many times late for appointments.

This causes him to wait for longer time in the clinic.

It ends up in wasting a lot of valuable time where in other tasks can be achieved.

The aim was to design a mobile application that would enable the patient to reschedule his appointment.

The patient logs on to the system through his mobile phone.

He can retrieve a list of patients with appointments who are waiting in the clinic.

After looking at the list, the patient can select a free slot.

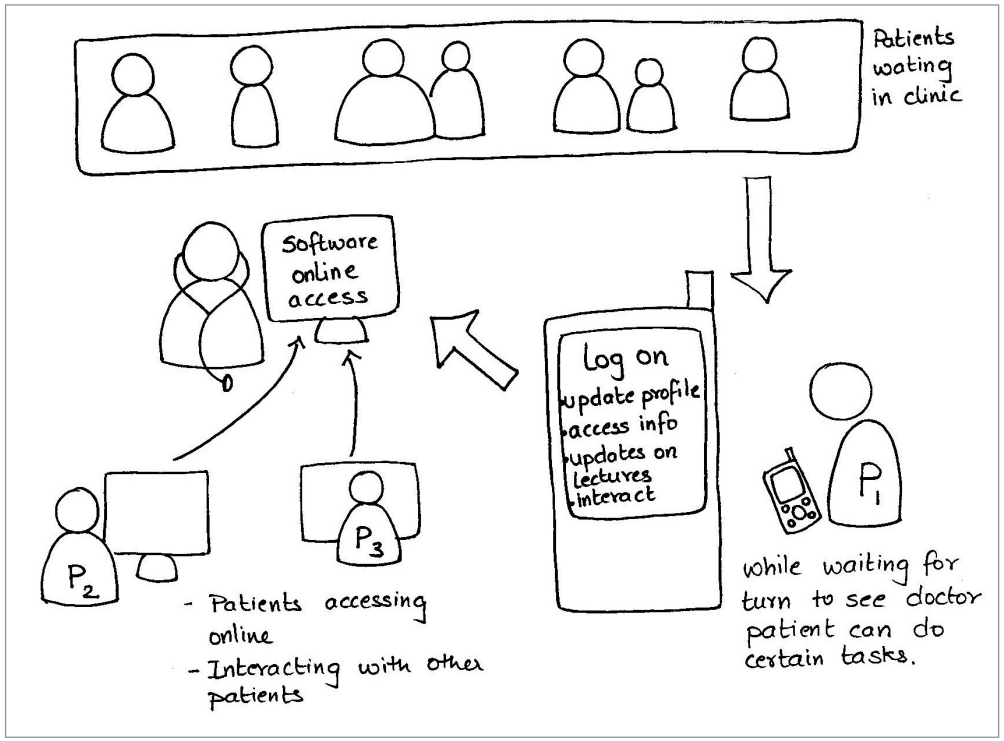
He reschedules his appointment if allowed by the clinic.

After submitting his slot, the software at the clinic confirms.

Similarly a patient can also make an appointment with the doctor.

He browses through the list of appointment and picks his slot.

3.2 Concepts



Concept 2

Patients wait in the clinic for hours many a times.

During this time, they do nothing but either read magazines or look around.

The aim was to design a medium that would enable the patient to do pending tasks during this time.

The patient uses his mobile phone to log into the system.

He can browse through his profile that has an access code.

He can update his profile and browse through his records.

He can search for updates, discussions and connect to other patients.

Other patients can access the system online. They can join discussion groups and interact with other patients and caretakers.

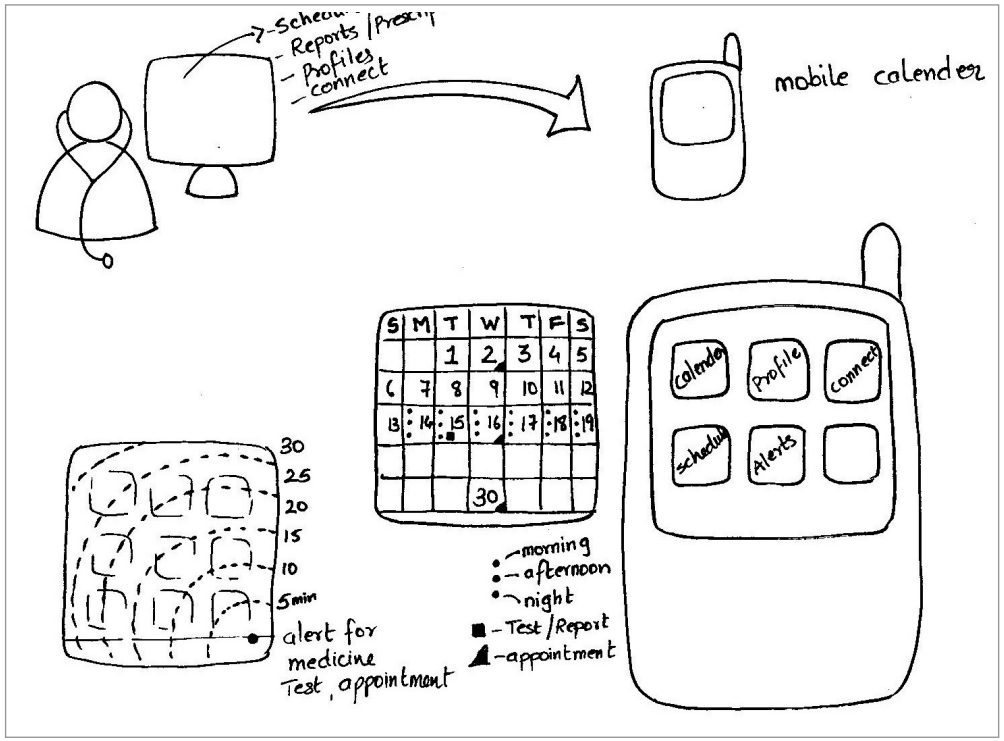
The doctor can supervise his patients from his terminal.

He has access to all patient reports.

He can do group analysis of his patients with similar diagnosis.

He can also supervise the discussion boards.

3.2 Concepts



Concept 3

Finding reports and keeping up to date with the health schedule is a tedious task.

Hence this lead to ideation on a medium that would enable the patient to be organized with his prescription and reports.

The system has a unique profile of the patient that contains his entire medical history.

This medical history can be sorted out as his profile, contacts, prescriptions, reports and diagnosis.

The patient can carry all of this on his mobile phone via an application.

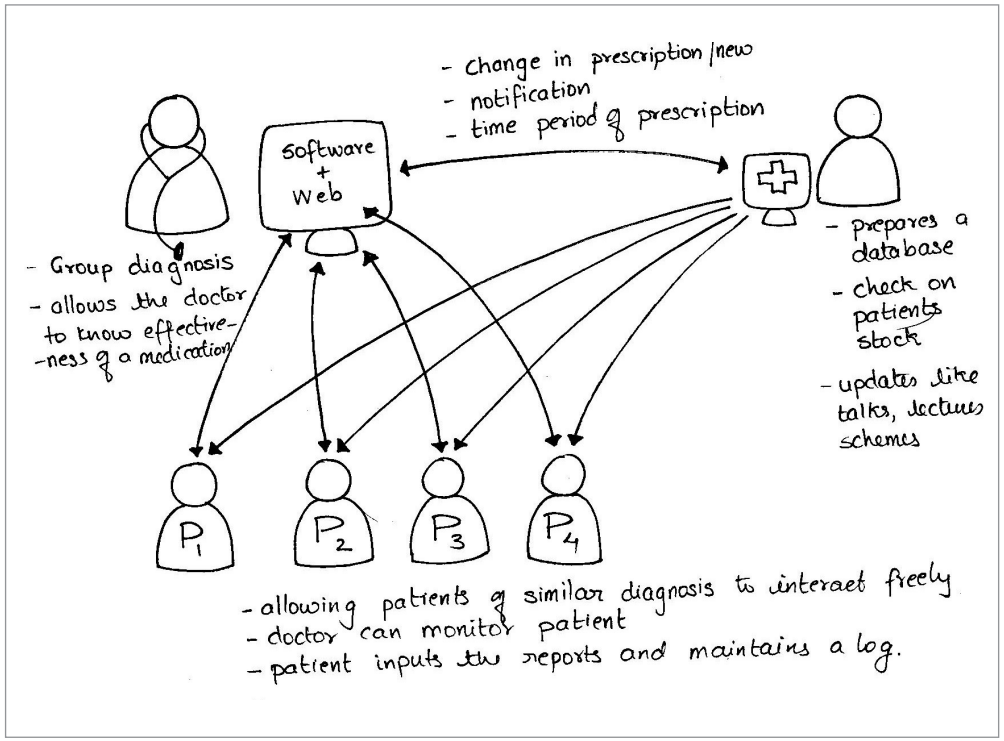
The system at the doctors end can transfer the data in the phone. The system also syncs the mobile calendar with the prescription.

The calendar then sounds alarms when the patient is supposed to take his medicine.

The reports that are carried by the patient on the cell phone is a very handy tool.

In case of emergencies, unknown people can know of the medical history of the patient and other doctors can diagnose correctly.

3.2 Concepts



Concept 4

The idea was to connect the doctor, patient and the retailer via a software and internet.

The Patients have unique profiles on the system.

The Doctor logs into the system and can view the patients history.

The patients can interact amongst each other.

The doctor can do group analysis of patients with similar diagnosis.

He can prescribe also over the software.

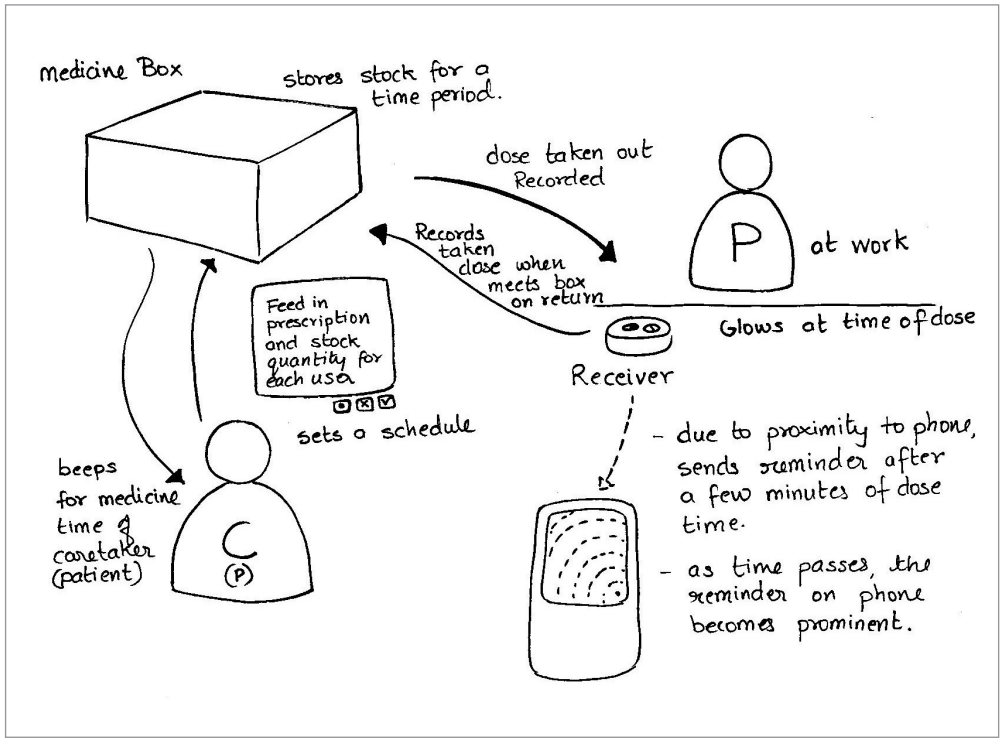
A change in prescription, or a new proscription goes as a notification to the retailer.

The retailer has a database of existing patients.

He delivers a stock of medication to the patient. He also keeps a tab on the reminders that need to be given to the patient. Hence he can inform the patient in advance of the completion of stock of medication.

The retailer also partly assumes the role of the caretaker. He takes up the responsibility of informing the patients about regular checkups and delivers to him some important updates.

3.2 Concepts



Concept 5 - Medicine Box

The idea was to make the patient have his daily dose of medication.

The caretaker inputs the medication into the box. (box has a screen n few buttons.)

He enters the timings of the medication.

There are small cases in the box that one can use while traveling.

Dose taken out is recorded.

At the time when the patient is supposed to take the medicine, the case starts to vibrate and glow.

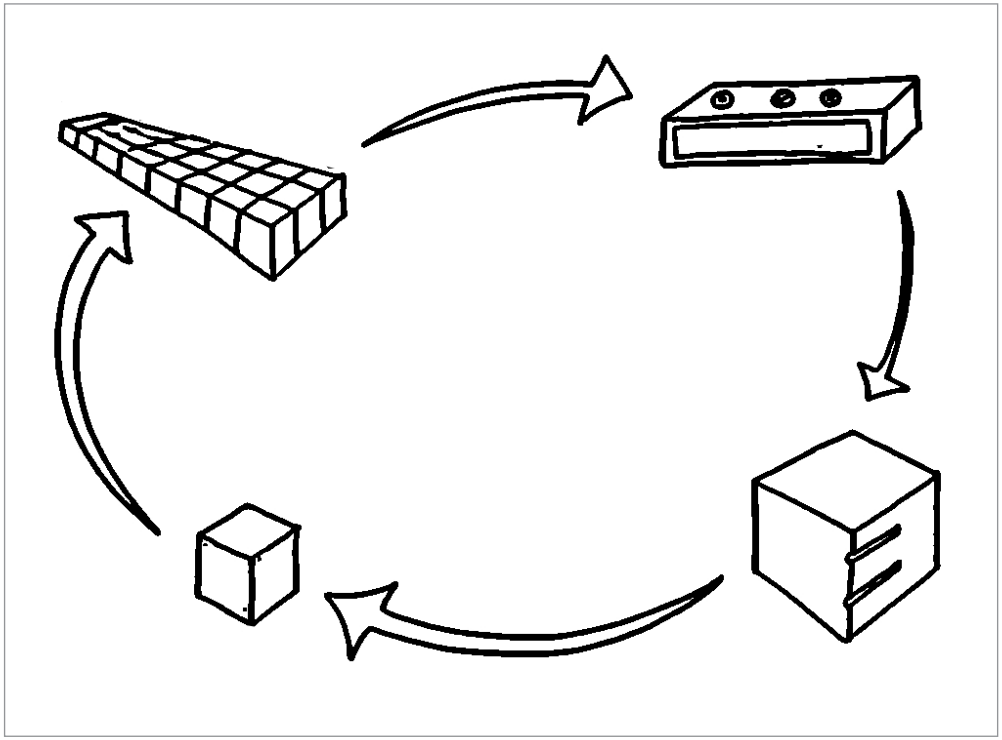
If the medicine is taken then the alarm stops. (sensors in the case)

If the medicine is not taken then the receiver will send out signals to a synced devices like mobile phone via blue-tooth.

Upon activation of the device, it starts ringing and reminds the patient to take the medicine.

If the medicine is taken at home, then the box itself will sound the alarm.

3.2 Concepts



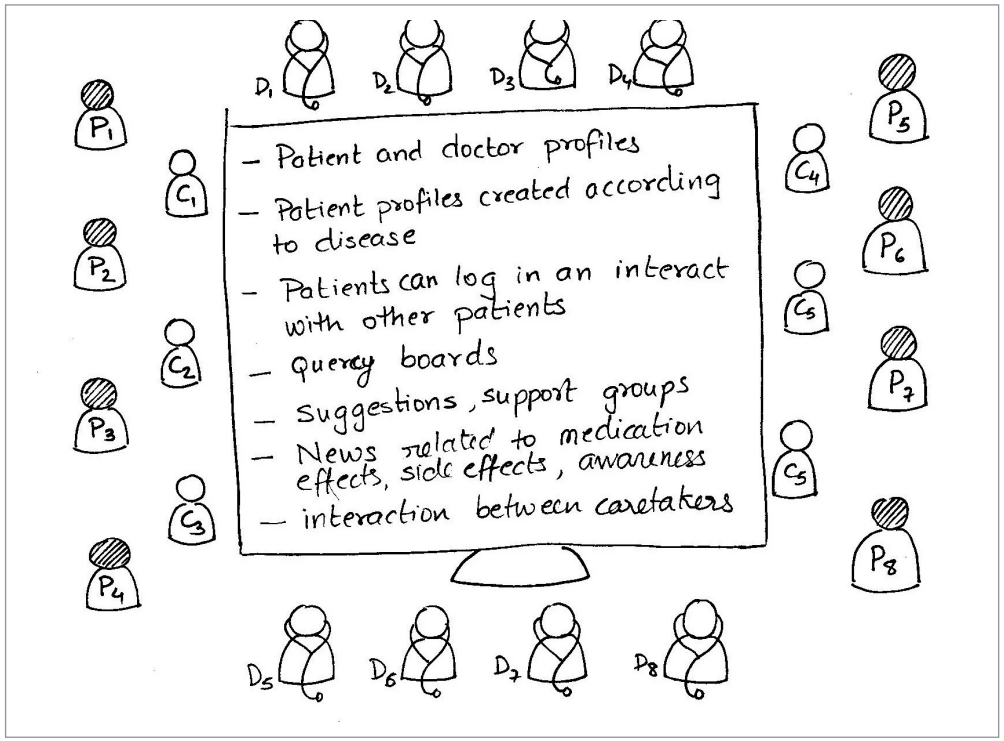
Concept 6 - MediCase

This is a pill case that can be programmed to beep and glow at the time desired.

It has an input unit attached to one end. The unit stores the prescription of the patient and the timings the medicine needs to be taken.

At the desired time the box particular box that has to be opened, will light up, indicating to the patient which medicine case has to be opened.

3.2 Concepts



Concept 7 - Chronic Mates

The idea was to build a website that would allow free flow of interaction between all the stakeholders of the healthcare industry.

Here every one who logs on has to create an account.

Then patients need to fill in medical details and other histories.

The caretakers can also log in and interact with other patients and other care takers.

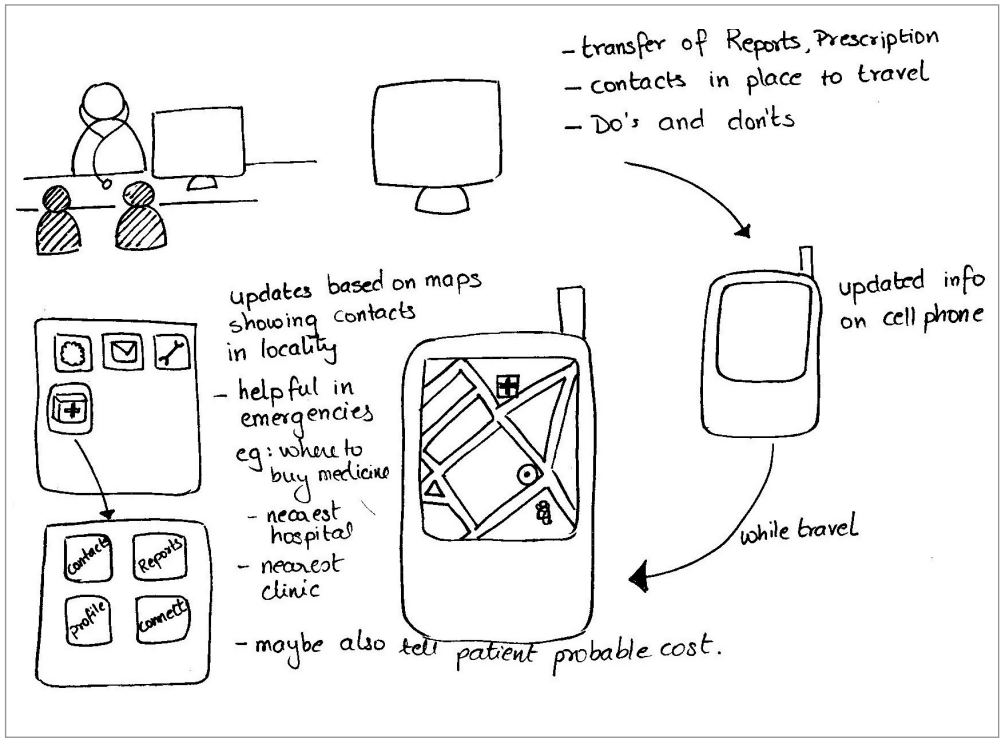
The site allows patients and caretakers to discuss and debate upon their needs.

The doctors play a supervising role where the patients can put up queries related to the problems faced.

The need was that there is at the moment no Indian website where in Indian patients look up to for assistance.

Building an interface like this would mean that patients can freely interact and ask questions that they may not be able to ask openly to doctors or other people face to face.

3.2 Concepts



Concept 8

Chronic patients are scared to travel to far of places away from immediate help. They fear that in case of emergencies, unknown people who are not aware of their condition will not be able to help them.

The idea was to create an application that would allow the patient to carry all his diagnosis and medical reports with him along with his entire case history and doctor contacts.

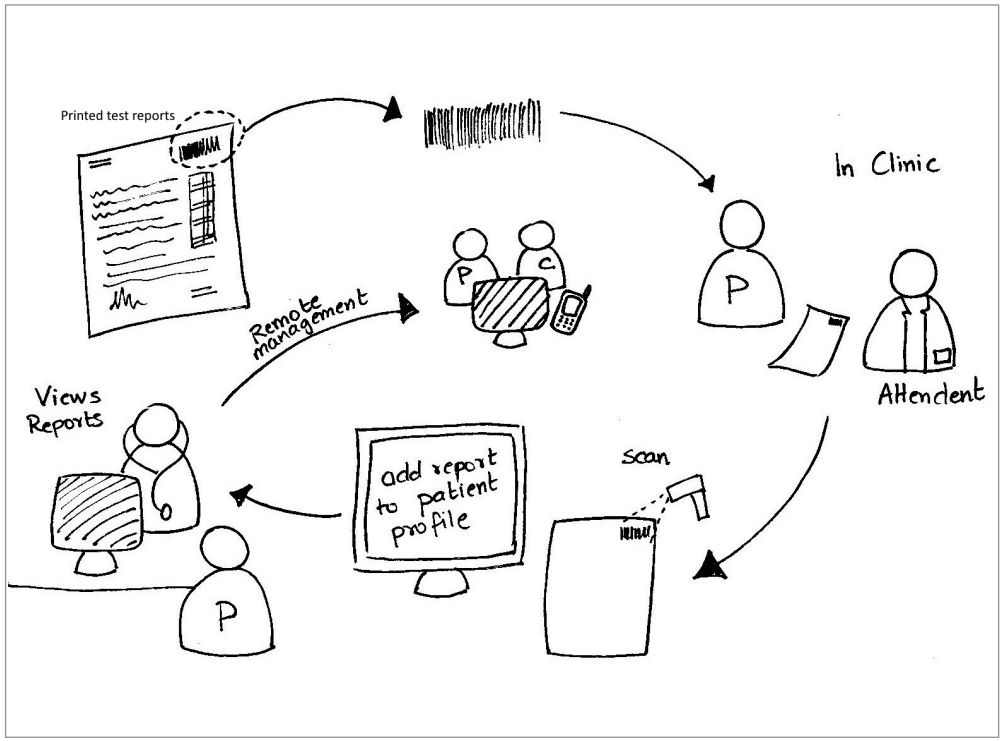
The application can be connected to the doctors software.

Thereafter the doctor can transfer all the data into the application.

The doctor also feeds in contacts for the patient in case of emergencies.

The patient while traveling can make use of the GPS based maps to find out the nearest of the doctors contacts to his place in case of emergencies.

3.2 Concepts



Concept 9

Storing reports physically is a tedious task. Very often patients are unorganized when they have to show their reports to the doctor.

This often leads to wasting time while searching for it in front of the doctor.

Through this design one can connect the lab to the clinic via a report that can be scanned.

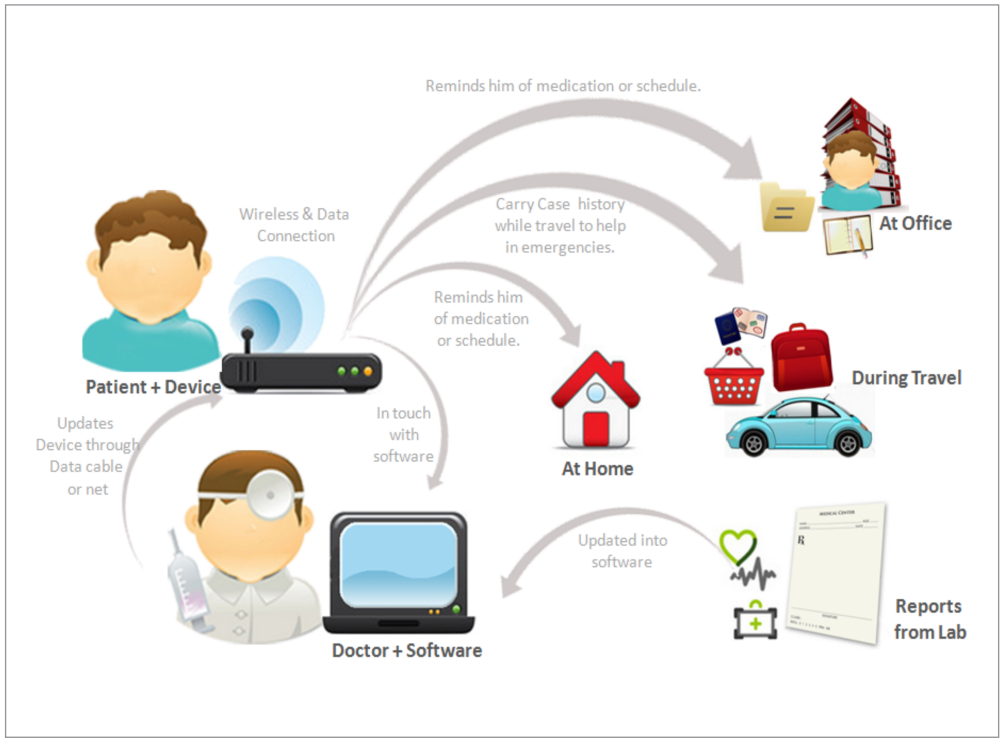
Every report printed contains a graphic that stores the data of the report.

When the patient goes to meet the doctor, he simply has to scan it into the system.

This is a quick scan that scans the symbol data into the system and stores it into the patients profile.

The doctor can then view this on his terminal and there is no need to waste anybodies time.

3.2 Concepts



Concept 10

Design of a device that will help organize the patients schedule.

The device remains In touch with software at the clinic via Wireless & Data Connection.

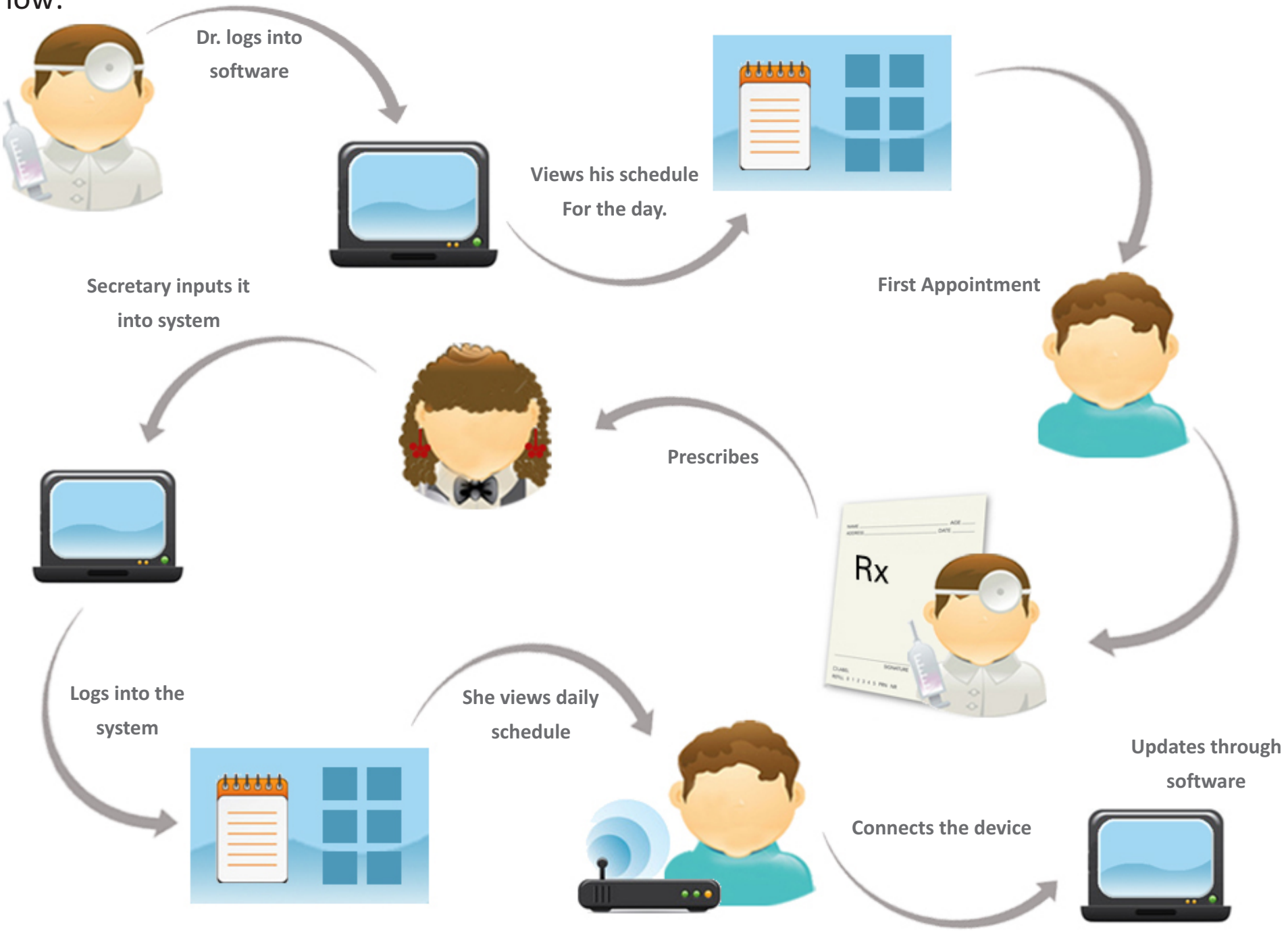
Reports from the lab are updated into software then into the device over internet.

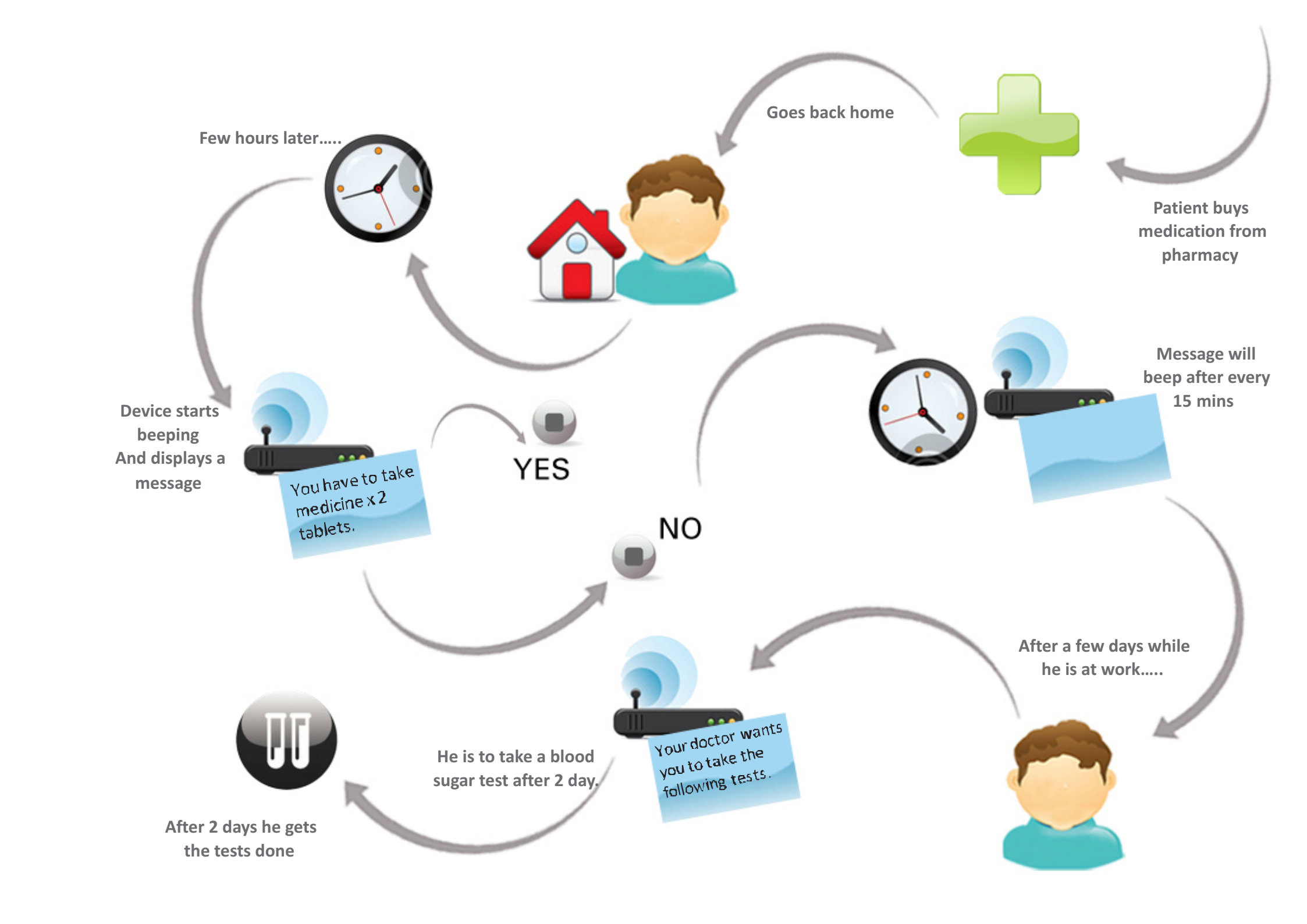
The device can be carried by the patient wherever he goes.

It will remind him of medication or schedule and enable him to carry case history while travel to help in emergencies.

Let us go through a scenario to understand this concept.

Concept Flow:




Patient buys medication from pharmacy
Goes back home
Few hours later.....
Device starts beeping And displays a message
You have to take medicine x 2 tablets.
YES
NO
Message will beep after every 15 mins
After a few days while he is at work.....
Your doctor wants you to take the following tests.
He is to take a blood sugar test after 2 day.
After 2 days he gets the tests done

The reports come



They get updated into the software.



From there they get updated into device.



Few days later he has to travel out of mumbai for meeting.





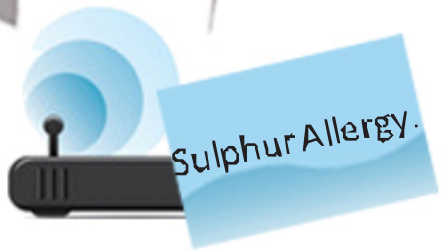
He falls ill.



A local doctor checks on him.



He checks his device for the case history.



Then he gives him some medication.



4. Final Concept

4.1 Project Focus ... 47
4.2 Concept Map ... 48
4.3 Concept Detailing ... 50
4.4 Prototyping & User Feedback ... 59

4.1 Project Focus

After analyzing all my design ideas, I identified my target users and defined a product profile.

Focus:

A mobile application for chronic patients that will:

- Remind him about his medication.
- Remind him about upcoming health schedule.
- Allow him to organize his reports.
- Enable to carry his case history with him. (emergency)

Product Profile:

- Goal Oriented product

The aim is to allow patient to follow health schedule in an organized manner.

- Premium Product

The product will be given by the doctor to his patients when he start consulting him.

- Web – Mobile

The system is a software used by the doctor and a mobile application with the patient that is updated via data cable | internet.

- Target Audience

Chronic patients (35 to 50 yrs, people having little knowledge of computers)





4.2 Concept

MedCare is a Mobile medical journal that allows a patient to update himself on his medical schedule. It allows him to set reminders for his prescribed medicines and maintain a record of his medical reports.

MedCare allows the patient to carry his medical reports on him in a very organized manner.

The patient has to create an online web account. He gets a unique id with which he can log in. He then downloads a desktop application that will guide him to installation on the phone.

He installs the application on his desktop. He fills out his profile and updates his phone.

He can then set up reminders, view his medical details and reports as and when they are updated.

The online database is linked with the doctor and the medical labs. This allows the stakeholders freedom of communication.

Fig 4.2.1: Concept Map

4.2 Concept

Initial Exploration of the MedCare application is illustrated below in Figs. 4.2.2 to Fig. 4.2.9.

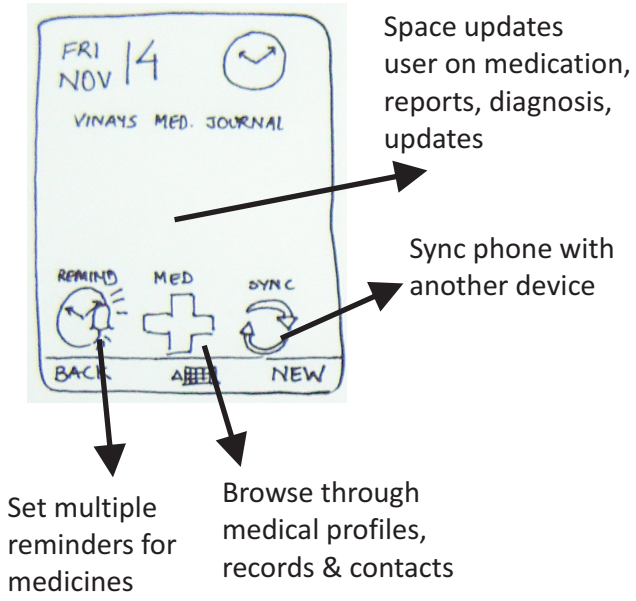


Fig 4.2.2: Main Screen

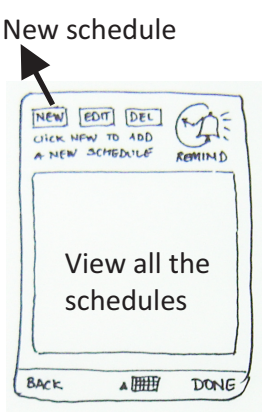


Fig 4.2.3: Schedules

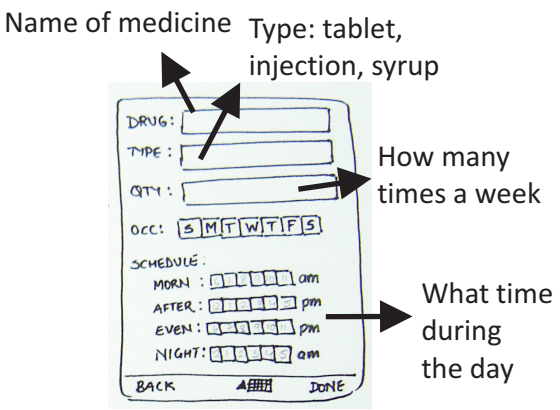


Fig 4.2.4: New Schedule

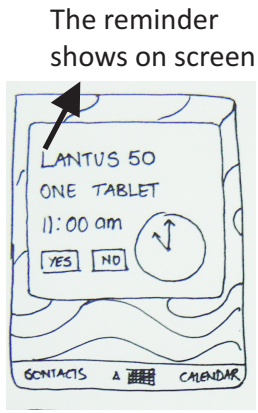


Fig 4.2.5: Alert

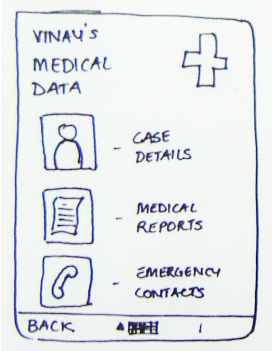


Fig 4.2.6: Medical Data

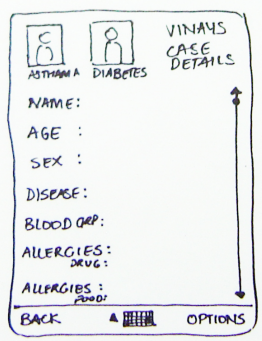


Fig 4.2.7: Reports

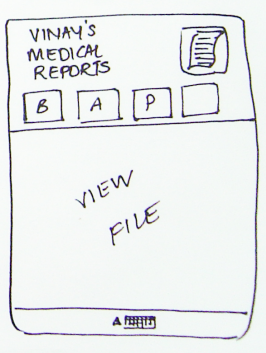


Fig 4.2.8: View Reports

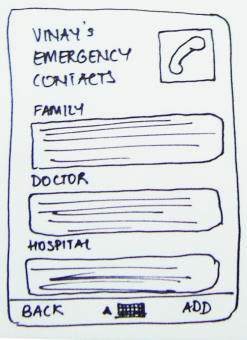


Fig 4.2.9: Emergency Contacts

4.3 Concept Detailing

After initial exploration I finalized my application and detailed it out in an appropriate layout with suitable graphics and symbols.

MedCare(Fig. 4.3.1) allows the patient to organize his medical schedule and store is reports.

The main screen (Fig. 4.3.2) of the application has 4 sections:

- Reminders
  This section allows the user to set up schedules and reminders for his prescribed medication.

- Tests & Reports
  This allows the patient to view his case history, input, store and email new home tests like blood pressure, sugar check etc and receive updates on new reports from the labs and view them.

- Sync
  This allows the user to sync his application with a desktop or any other mobile or device. This is to allow the sharing of data.

- Dynamic Diary
  This allows the user to keep tab on the daily schedule and the events that have taken place or have to take place. It also allows the user to dynamically connect with the caretaker and share live data.



Fig 4.3.1: Icon

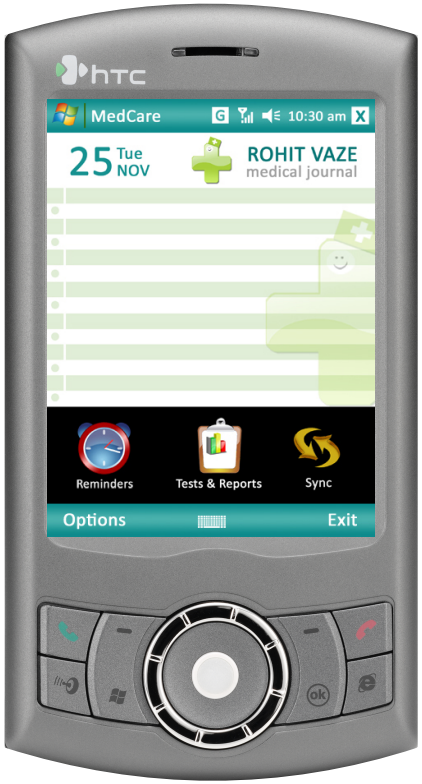
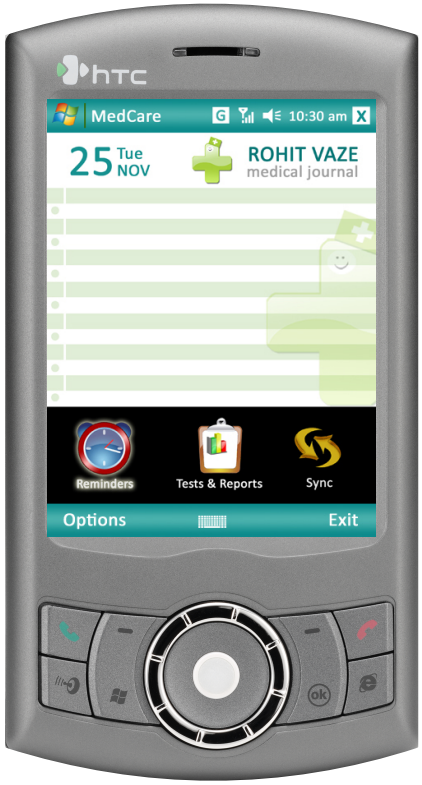


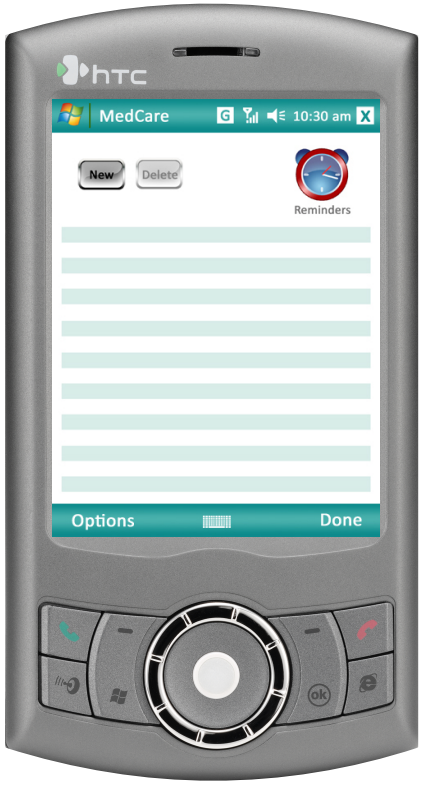
Fig 4.3.2: Main Screen

Fig 4.3.3: Reminders



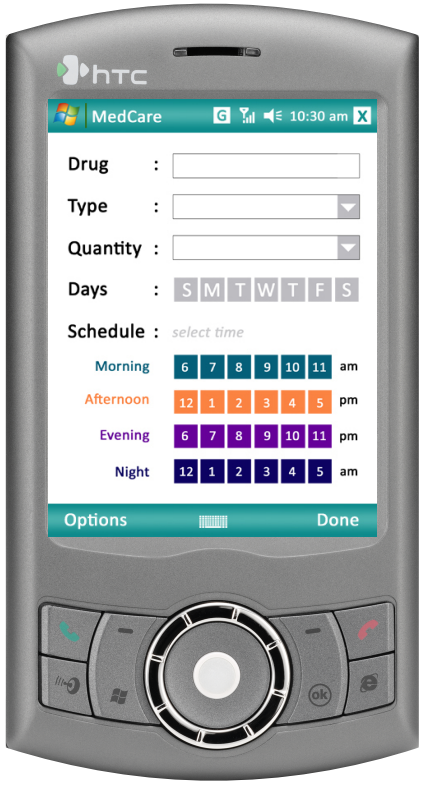
Reminders allows the user to set up schedules and reminders for his prescribed medication.

Fig 4.3.4: New Reminder



After clicking on the main reminder icon, the screen changes to the one above. This section allows the user to view existing schedules, create new schedules and delete old ones accoriding to the change in prescription.

Fig 4.3.5: Input of Drug



This is the screen that will be seen when the user clicks on New. This screen allows the user to input the drug name, the type of drug, quantity to be taken, the days of the week when it has to be taken and the time.

Fig 4.3.6: Input of Drug



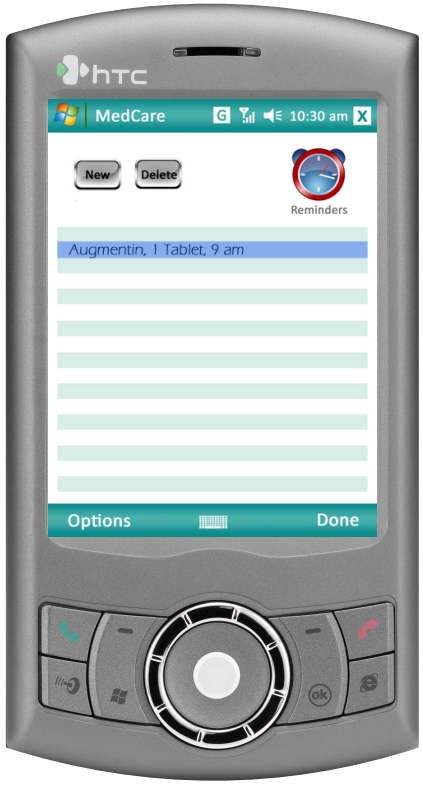
This figure shows how the screen will look when the drug details have been noted on the application.

Fig 4.3.7: Input of Drug



By clicking options one can save the drug come back to the same screen to input another schedule. If the user has to input only one drug then he can click on done which will save the drug schedule automatically.

Fig 4.3.8: View Schedules



After saving the schedule, this is how the reminder main screen will look like.

Fig 4.3.9: Tests & Reports



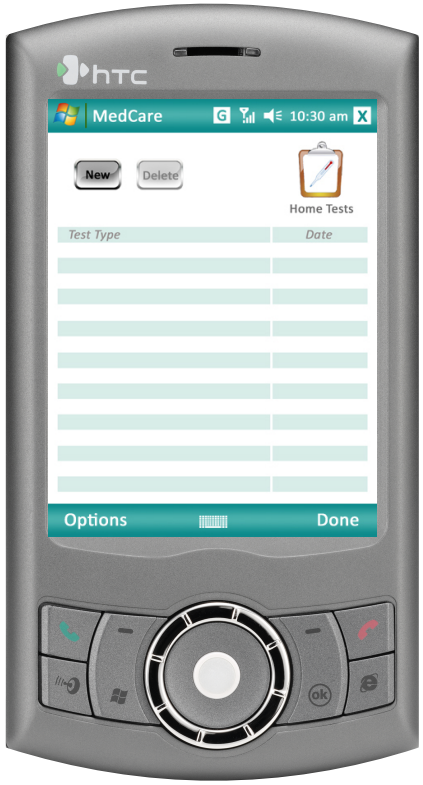
Tests & Reports allows the patient to view his case history, input, store and email new home tests like blood pressure, sugar check etc and receive updates on new reports from the labs and view them.

Fig 4.3.10: Case History



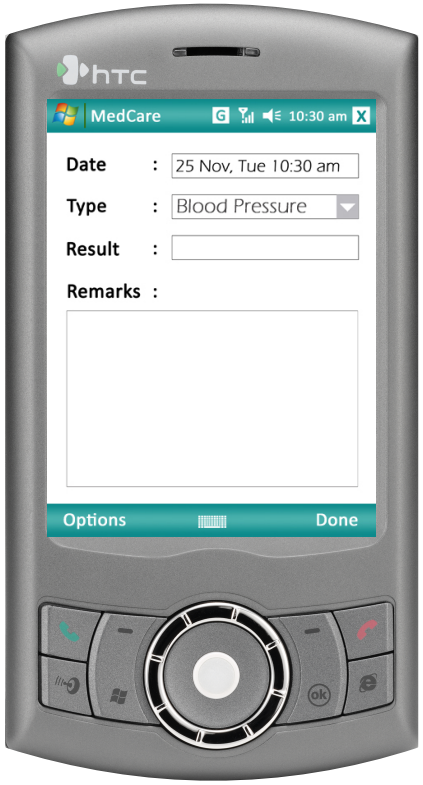
This is the main screen of Tests and Reports and here the user can view the patients case history, important details like drug allergies, food allergies etc. The user can also see two buttons thatallow him to save a home test and view reports from labs.

Fig 4.3.11: New Tests



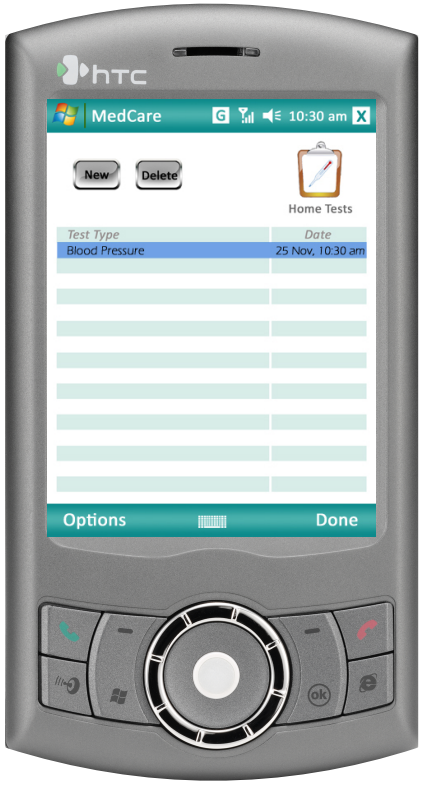
This section of the application allows the user to input a new test, view existing tests, delete a test and mail selected tests to a recipient.

Fig 4.3.12: Input of Result



This is the screen that shows when the user clicks on new tests. The date and time come automatically from the phones calender. The user can select a test from the drop down list. He can also add one if he wants. He can put in the results and also write about certain remarks.

Fig 4.3.13: View all tests



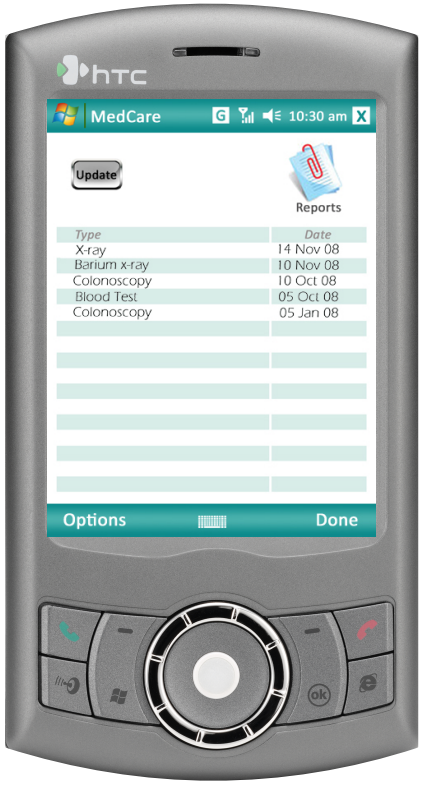
This screen shows the tests done and the timing when done. The user can view tests by clicking on them. Multiple tests can be selected and mailed to the doctor.

Fig 4.3.14: Case History



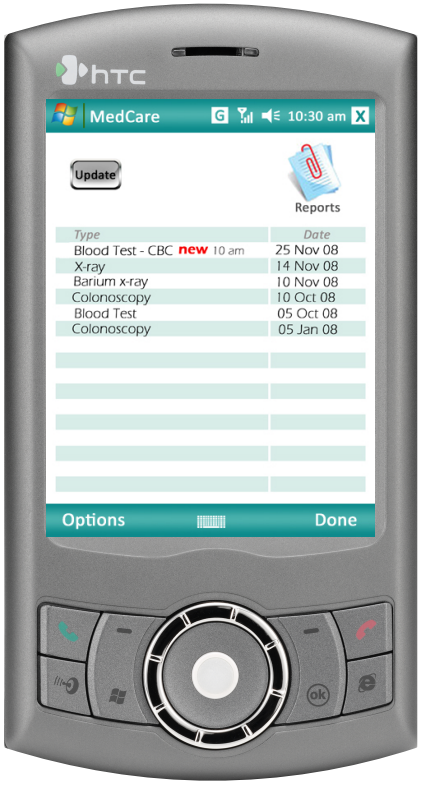
The other section of Tests and Reports is Reports that have come from labs. These test reports can only be viewed by the user. He cannot edit them.

Fig 4.3.15: Reports from labs



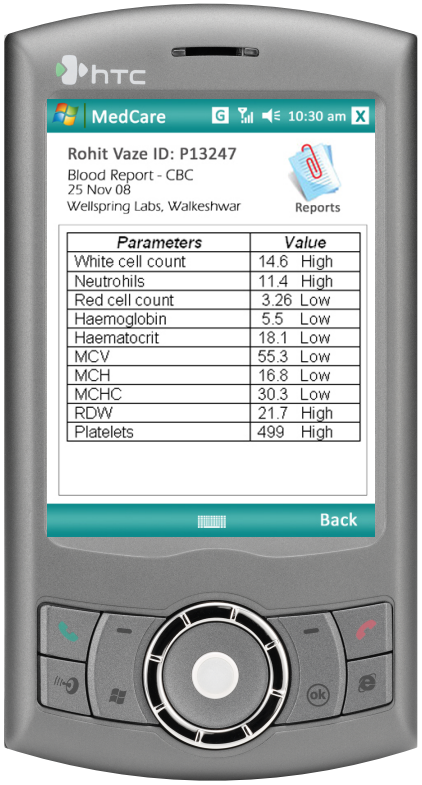
This is the Reports screen. It shows a list of reports previously received. The user can again select reports and mail them.

Fig 4.3.16: Updates



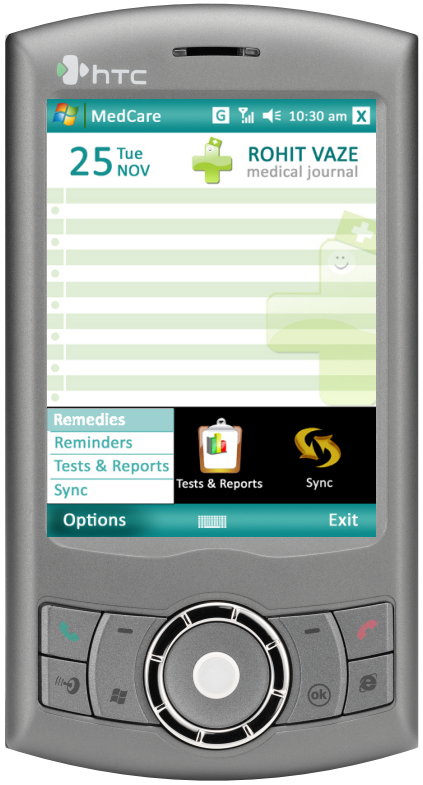
The update button checks online with the Lab server to see if any new reports have been received.

Fig 4.3.17: View report



By double clicking on a report the user can view the report.

Fig 4.3.18: New Remedies



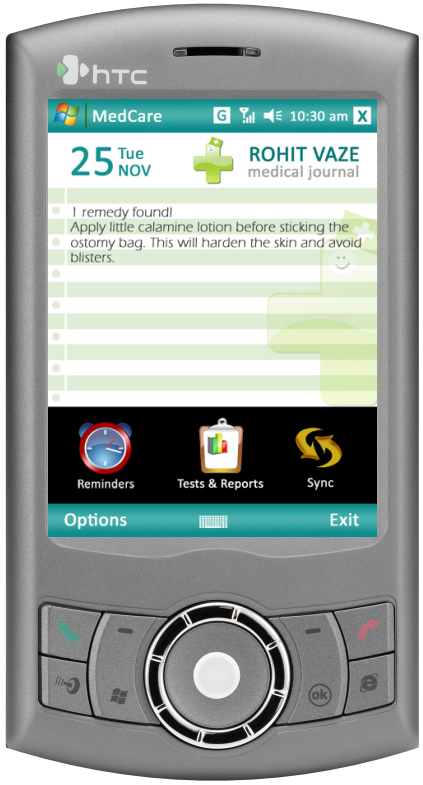
By clicking on options tab on the main screen of the application, the user can view remedies, reminders, tests and reports or exit the application.

Fig 4.3.19: Search by keywords



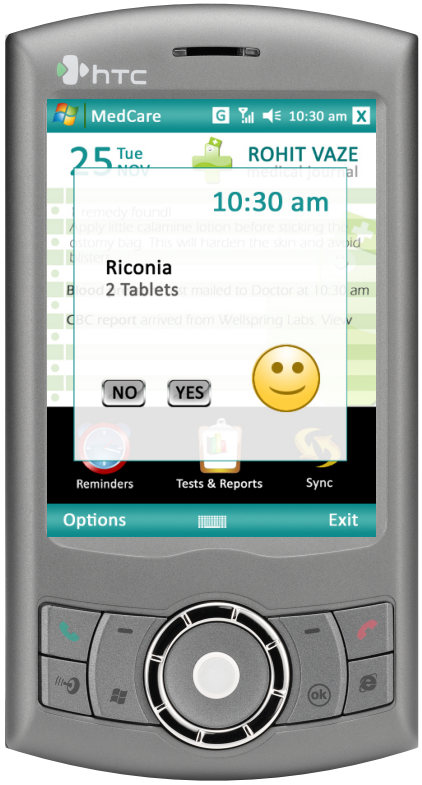
By clicking on remedies, one can search the net by keywords.

Fig 4.3.20: Display Results



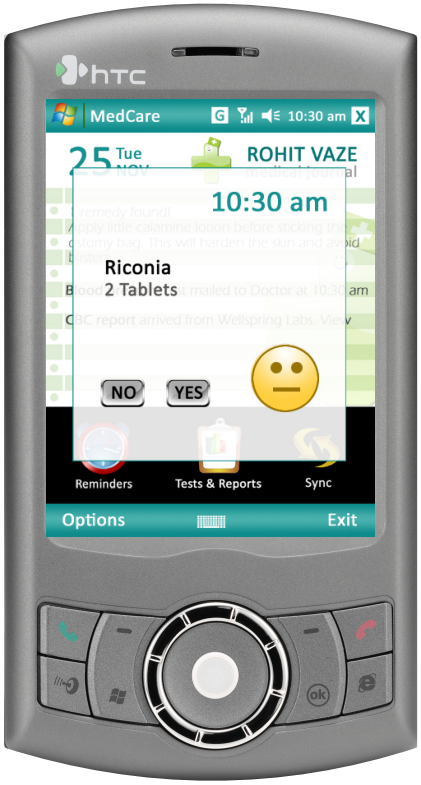
The results are displayed on the dynamic diary. The user can click on the results and that leads him to the website or blog on the internet via his network connection.

Fig 4.3.21: Alerts



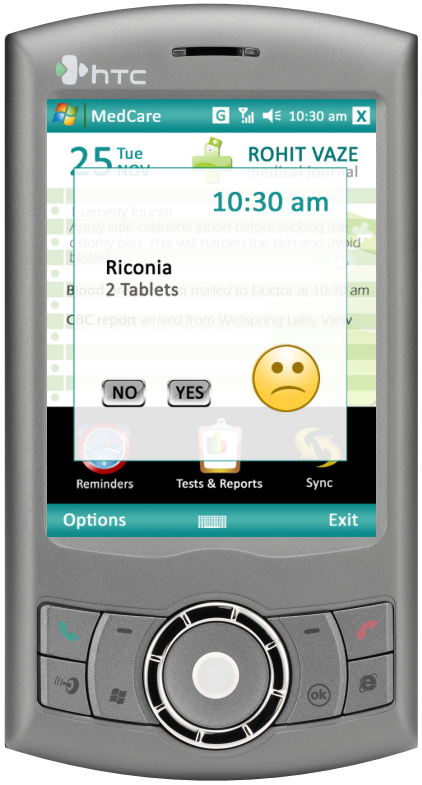
The alerts will start sounding 15 minutes before the actual set time. This allows the user to become aware. There is also an emoticon that shows the visual health of the user.

Fig 4.3.22: Alerts



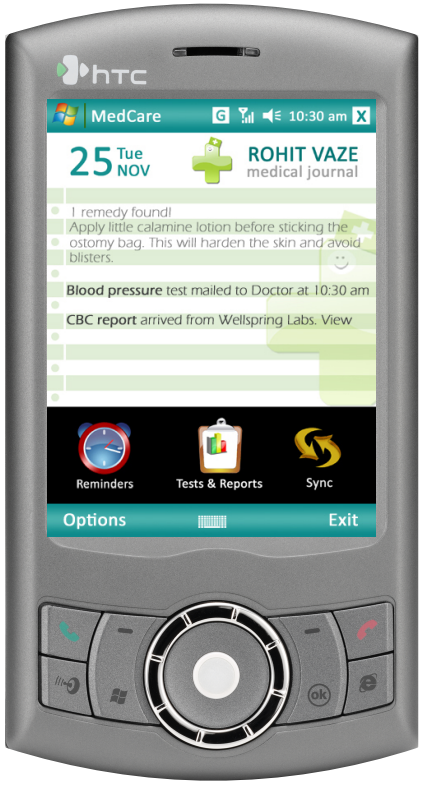
If the user keeps snoozing the alarm past the scheduled time, the visual health keeps changing.

Fig 4.3.23: Alerts



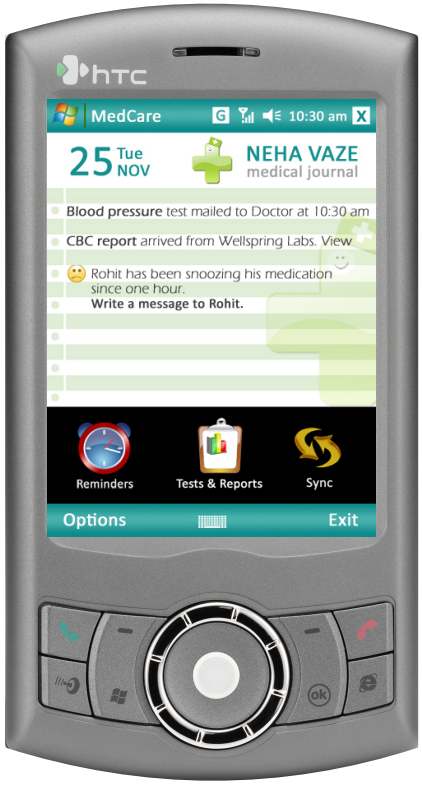
The alert sounds more frequently after the scheduled time has passed.

Fig 4.3.24: Dynamic Diary



The dynamic diary displays the events according to time. It also allows the user to connect with the caretaker. He can simply start typing by clicking on the screen and opening the keyboard.

Fig 4.3.25: Sharing



The caretaker can also remotely view that events taking place. She can also view the same details as the patient if the phones are synced. In case of schedules, if the patient snoozes the alarm, the caretaker gets an alert on the screen and she can then get in touch with the patient.



Fig 4.4.1: Flash Prototype for User Testing

4.4 Prototyping & User Feedback

A Flash prototype was made for user testing.

3 Tests were set for the user to understand the usabilty issues of the interface. The tests were task based and not time based.

Task 1: Setting a new reminder
Your doctor has prescribed to you one tablet of Augmentin. You are supposed to take this tablet everyday at 9:00 am. You have to set this reminder in the application.

Task 2: Saving a test done at home and mail to doctor
You are advised to note down your blood pressure and weight for 2 weeks and email it to your doctor. You have to input today's blood pressure and weight and email it.

Task 3: View test that has come from lab.
You have done a Complete Blood Count (CBC) report yesterday evening. Your Lab in charge told you that he will send it to you by 9 in the morning. You have to view the reports and update them.

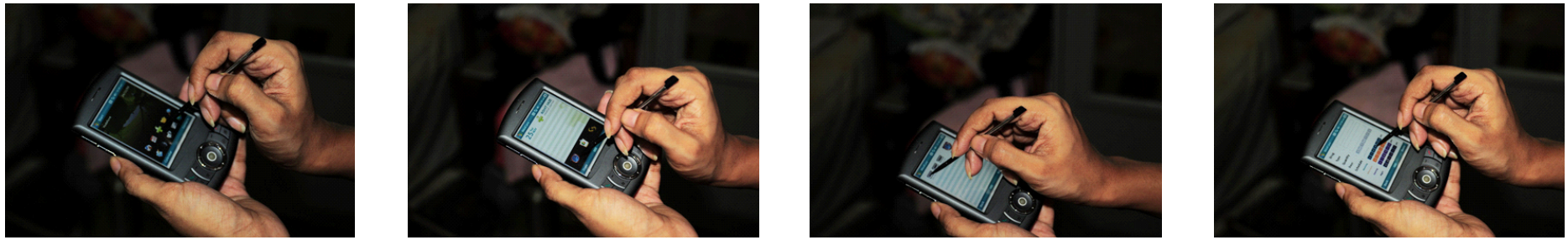


Fig 4.4.2: User Testing

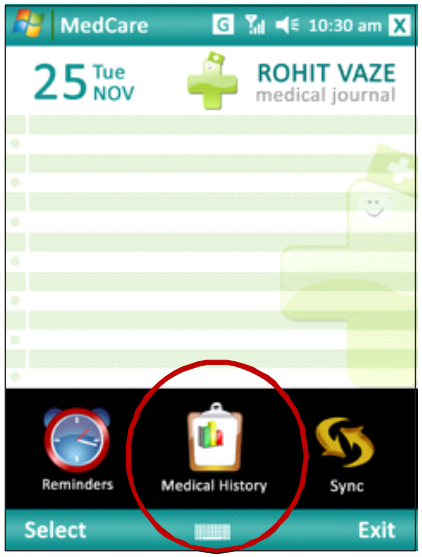


Fig 4.4.3: Usability Issues

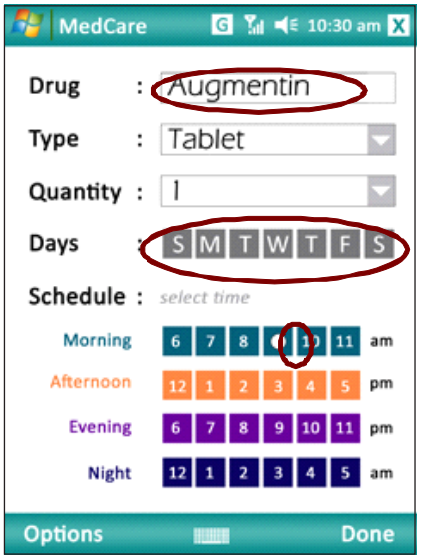


Fig 4.4.4: Usability Issues

4.4 Prototyping & User Feedback

The following Usability Issues were observed:

Fig. 4.4.3

Problem: “Where is the Medical Reports Button?”
Solution: Change the term to Tests and Reports to avoid confusion.

Fig. 4.4.4

Problem: How do I select all days?
Solution: A check box stating all days

Problem: How do I select a time on half hour basis?
Solution: Option of half hour selection on the chart

Problem: What if I want to add 2 drugs at the same time?
Solution: Options and Save & New

Problem: What about the dose of the Drug?
Solution: Auto drop down of drugs with their different doses.

5. References

[R1] - http://en.wikipedia.org/wiki/Chronic_(medicine)
[R2] - http://www.hompath.com/
[R3] - http://www.medhelp.org/
[R4] - http://www.nkfi.in/moreaboutus.htm
[R5] - http://www.saikatmandal.com/ (Interaction > DiabCare)

Other Readings:

- Chronic - Disease Classification in Evaluation of Medical Care Programs
  Sidney Katz, M.d.,* Amasa B. Ford, M.d., Thomas D. Downs, Ph.d., And Mary Adams, Ph.d.
  MEDICAL CARE MARCH-APRIL 1969, VOL. VII, NO. 2

- Application of the web-based diabetes patient data management system for epidemiological and clinical analysis
  Sonali S. Ranade, Dr. Dileep N. Deobagkar and Dr. Deepti Deobagkar
  INDIAN JOURNAL OF MEDICAL INFORMATICS, VOL 2, NO 1 (2007)

- Pharmaceuticals Market Assesment Report
  ERNST & YOUNG, APRIL 2008

- Innovative Care for Chronic Conditions: Building Blocks for Action
  WHO GLOBAL REPORT, REFERENCE NUMBER WHO/MNC/CCH/02.01

- http:/j-pouch.org/

- http://www.improvingchroniccare.org/

- If the Battle is over why am I still in Uniform?
  Humor as a survival tactic to combat cancer
  BRENDA ELSAGHER (Colo-Rectal cancer patient)