

Rethinking unused medicine management

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Anuja More October, 2017

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Introduction

A number of barriers prevent people from accessing the medicines they need: Unaffordable costs, ineffective distribution chains, mismanagement of supply chains, difficulties in forecasting demand, policy limitations – all contribute to this problem. Included in this list, and perhaps even a symptom, is the issue of drug wastage. The World Health Organization estimates that more than half of all medicines are prescribed, dispensed or sold inappropriately, & that half of all patients fail to take them correctly. This contributes to wastage of scarce and essential resources.

India experiences wastage of at least 50 percent of vaccines stocked by various entities like households, pharmacies, hospitals and eventually end up in waste-bins. (3)

Hence, there is a need to connect dots between widespread medicine wastage and lack of access through medicine recycling initiatives, which seek to improve access for low-income groups.

What if we were able to take the millions and billions of potentially wasted medicines and redirect them to those who lack access?

User Study

Critical Incident Technique (CIT)

The CIT is a qualitative research method being used and talked about as early as 1975.(1) It remains one of the popular method in service research. In CIT the users are asked to narrate any event, incident, process or issues that are critical to them. It helps in understanding what incidents (service encounters) are critical to the users and make maximum impact on them. It also helps to gain an understanding of an incident from the perspective of user with the cognitive, affective and behavioural elements taken into account.

The CIT is good at eliminating biases from the reserachers' end as he has no preconceived answers to look for. Though this technique being largely dependant on the memory of the user is quetioned for its credibility. In spite this flaw CIT still remains as one of the best ways in service research area as it helps reveal many things, (e.g. beliefs, behavioural patterns) which would hard to find using a structured approach.

On the basis of the advantages that CIT method has offered, it was chosen as one of the method of user investigation. Also, it is often seen when one starts speaking about their current scenario at home, one gets very emotional and get carried away and provide unnecessary information. Asking the user to narrate incidents helps to structure the study as well as realise the points which make maximum impact on the experience of the user.

All interviews were taken as part of the primary data collection.

User stories and semi-structured interviews

While talking to hospitals who already deal with so many incidents on a daily basis doing a semi-structured interview regarding the issues faced by them made more sense. Where as with donors, receivers, doctors, the CIT method or the User stories method helped a lot.

Data was collected from many patients at four government hospitals, one charitable trust in Mumbai. Along with the study was also conducted amongst my relatives and friends, pharmacies, doctors nearby my house in Dombivli.

Hospitals:

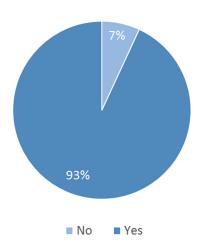
- 1. Thane Civil hospital, Thane
- 2. Central Hospital, Ulhasnagar
- 3. Tata Memorial Hospital, Mumbai
- 4. K.E.M. Hospital, Mumbai
- 5. Giants International

Interviews were conducted with Stakeholders:

- 30 patients (medicine receivers)
- 35 donors
- 4 hospital administrative officers
- 3 pharmacists
- 2 doctors
- 1 charitable trust

User Study responses

Stockpiling and discarding medicines



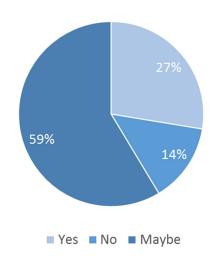
More than 90% people accept the fact that they stockpile and discard medicines knowingly or unknowingly.

Discarding medicines is not good and medicines can be put to better use.



90% of the wealthy crowd accepts, it is a waste of money to throw medicines. It can be better planned.

Acceptance of donated medicines



Only 27% people agree to accept medicines from others.

73% people are unsure about accepting medicines due to trust issues.

User stories

Using User Stories as a method gave very interesting insights and glimpses for understanding how people thought, acted & reacted regarding certain concepts and in certain situations.

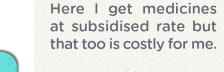
I skip medications as I can't afford both food and medicines.

A patient at K.E.M. hospital sharing how he has lack access to medicines due to poverty.



70% amount of hospital overall expenditure is being spent on buying medicines itself.

Administrative officer at Central Hospital, Ulhasnagar talking about the huge expenses of hospital on medicines.



A patient at Thane Civil Hospital, telling how medicines are beyond his reach.

I feel bad when I throw unused medicines. It's such a waste of money. What about people who can't afford?



A lady talking about wastage of money spent on medicines. Also showing empathy towards underprivileged part of the society.

Problems

Post the primary data collection, some issues were identified related to major activities in the system.

- Society has a general opinion of insecurity towards second hand medicines. They think these medicines are hazardous to health though they are sealed and unused.
- 2. Privileged people have trust issues with these medicines as they doubt the efficacy of such medicines.
- 3. Excessive medicines are being trashed away by the privileged part of the society.
- 4. They are also worried about money spent on these unused, excessive medicines as at the end of day it goes in vein.
- 5. People under poverty line have to choose either food or medicines due to overpricing of medicines.
- 6. Most of them are in medical debts in order to survive or get cured from ailments.
- 7. Sometimes these poor people get some assistance from the charitable trusts but that is so rare. very few organisation show interest in providing long term medications like in case of chronic diseases.

- 8. As they can't affort private healthcare they approach government hospitals for the treament. Government hospitals provide medicines at subsidised rate i.e. at 10% discount on M.R.P. Even that amount is also not managable with such lower income.
- 9. Hospitals spends almost 70% amount of overall expenditure on medicines itself. It's hard for them to manage other services expenses within allowed budget.

Insights

Primary data collection also gave insights which could lead to design interventions.

- 1. People who can afford to buy medicines, they deny second hand medicines for their treatment. So, they will play role of a donor only.
- 2. If free medicines are made available to the underprivileged a positive change can be brought in their lives.
- 3. If government hospitals will accept unused medicines from the privileged part of the society and provide those to the hospitalised patients, the amount being spent to buy bulk medicines which is biggest part of overall expenses can be reduced at some degrees. Eventually hospitals will be able to invest in other necessary services needs to be offered.

Secondary research

After understanding the problems it was important to find out what was being done to solve this problem. The following initiatives were found where people or organisations were trying to solve the problem in their own unique ways. All these efforts as mentioned earlier were isolated and not enough to solve the task at hand. Though some of them could be moulded into design interventions that work.



Onkar Nath. a retired lab technician widely know as 'Medicine baba' in Delhi. travels daily and asks for unused medicines to people who can easily afford to donate and then give those collected medicines in nearby clinics.



DROP UNUSED MEDS, BOOKS, TOYS HERE

Helping Hands Donation Box set up near Kushaiguda Police Station will provide space for donors and hand it over to the needy

Express Features

elping Hands "Donation Box," a novel initiative by Zone info Media supported by Lions Club ECIL - Elite, was launched in near Kushaiguda Police Station this week. Donors can give unused (but usable) medicines, toys, clothes, books, stationery, and any other utilities which will reach the needy through this initiative.

The initiative seeks to evoke community response on sensitive issues like health,

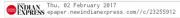
poverty, concern for the under privileged who require a helping hand from the larger tive. society. Principal architect of the initiative, S.Kushal, says, "We often come across people who want to donate unused items in their house to the needy, but don't know where to donate. Based on our earlier experiences we thought of having a point which will act as a sensitising agent to the society.'

So he set up the box after deliberating the installation process with government bodies like the Kushaiguda police and the Lions

Club ECIL - Elite who supported the initia-

The Lions Club ECIL-Elite District Governor Lion Dr Sunaina Aminha inaugurated the box and appreciated the initiative. ACP Syed Rafeeg said that their department would extend their maximum support to the activity.

The youth promised support to Zone Adds, the Implementation partner. The ad agency has been promoting "Donate Un-used medicines" since May 2015



A 'Donation box' has been installed in Hyderabad where people can donate unused medicines, books and toys which afterwards will be provided to needy people.



Dimensions of the problem

Characteristics of a service

After understanding the problem from all ends, it seemed more like a service design problem as it had all the characteristics of a service.

Intangibility

The possible service will be provided by the involved entities would not be seen or touched, but their effects would be visible, i.e. free availability of medicines to needy people.

Perishability

Services could not be stored and kept for use later. Donated medicines has to reach to the needy people before its expiry.

Inseparability

Both service provider and receiver need to be present for the service to be used or consumed. In absence of medical officer correct sorting of medicines won't happen and the service inspite of being available would never get consumed.

Non-ownership

The consumer can't secure complete ownership on the service like product. He only pays for what gaining access to or using the service. Though this feature will not apply on this service as it falls under free help zone.

Apart from all these features, the problem dealt with,

Various stakeholders Multiple touchpoints Interactions changing over a period of time Multiple places of interactions

All this makes this problem a service design problem.

Project scope

Once enough understanding about problem was developed the project scope was decided.

Experience of the service

The reason why a person should collect unused medicines from his house and donate them to needy people is due to the empathy he has towards the underprivilged part of the society. The entire service is based on the empathy and joy derived out of helping a needy, which are experiencial factors.

Consumers of the service i.e. donors are people who have empathy towards less fortunates while the ultimate beneficiaries are the needy people.

The aim will be to help people with empathy for underprivileged come forward and contribute to the system.

The focus will be to foster the feeling of empathy

Since all activities start and end with this feeling, the solution will be focused on fostering this feeling as this will make sure that people will keep contributing to the system.

An overview of the system

Unused medicines in house are taken to nearest pharmacy by the donors.

Medicines are
then put in a paper
bag with donor's name
& contact number
written over it & then
droped in an authorised
dropbox installed
there in pharmacies.

Donated medicines will be collected on regular basis from the dropboxes & will be brought at the medicine bank. First paper bags will be opened one by one and expired medicines will be kept aside. Then cost will be calculated of remaining medicines in bag. Using that cost & donor's details written over that envelope, a unique QR code will be generated. It will be pasted on the back of medicine. Then medicines will be sorted again disease wise.

Expired medicines will be sent to medicine disposal unit for their proper disposal.

Donor will
get a SMS of safe
handover of their
donated medicines
to needy and
gratitude, from
the hospital.

Needy people will receive medicines from the hospitals for free. sorted, unexpired medicines will be sent to the hospitals. Calculated cost of donated medicines will be informed to pharmacies to keep donor's record.

Incentive-centered design

To induce desirable behaviors from users, such as participation and cooperation and to achieve goal of the system, incentives play pivotal role. It can help systems benefit their users and ultimately achieve better results.

And hence, it is necessary to provide stakeholders of the system with the incetives. In order to achieve the same three main stakeholders are focused, donors, pharmacies and hospitals.

Donor's problem

Because of many reasons people end up with spare medicines and then they don't have option other than trashing those medicines. They also think that, instead of throwing these medicines, these could be used by one who in need.

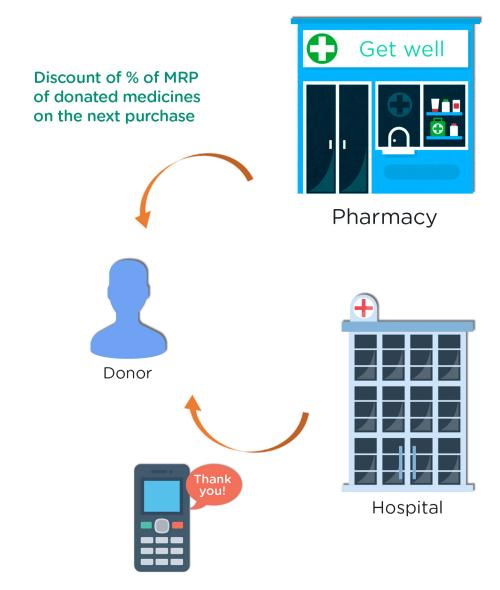
Solution

People can donate their spare medicines out of the empathy towards people with lack access. But, somewhere they had spent money to buy those medicines and it won't be a fair idea to keep them empty handed.

so, a strategic incentive plan could be designed.i.e.

donors will drop their unused medicines in a dropbox at nearest authorised pharmacy, covered in an envelpe on which they have to write down their name and contact number. So that, the pharmacy can keep their donation record and the certain percentage of discounts of M.R.P. of donated medicines can be offered to avail by the donors on their next medicine purchase from the same pharmacy. This will give them an opportunity to show their empathy towards needy people and indirectly motivate them to contubute more to the system.

Also, when a poor hospitalised patient will receive the donated medicine, donor of that medicine will receive a SMS of gratitude which certainly give the donor a joy of helping.

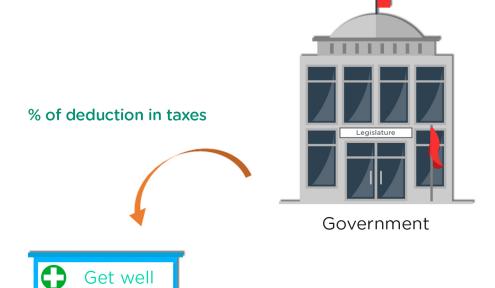


Pharmacies

Pharmacies will provide space to install medicine dropboxes. They will also keep the record of donation in order to make donors available with the discounts. They will be playing an important role in running the system and hence it is necessary to motivate them with the incentives.

Solution

The pharmacies will be able to avail certain percentage of deduction in their yearly taxes.



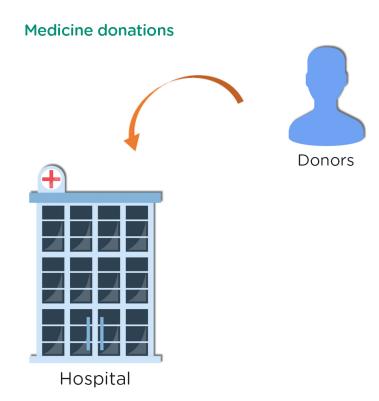
Pharmacy

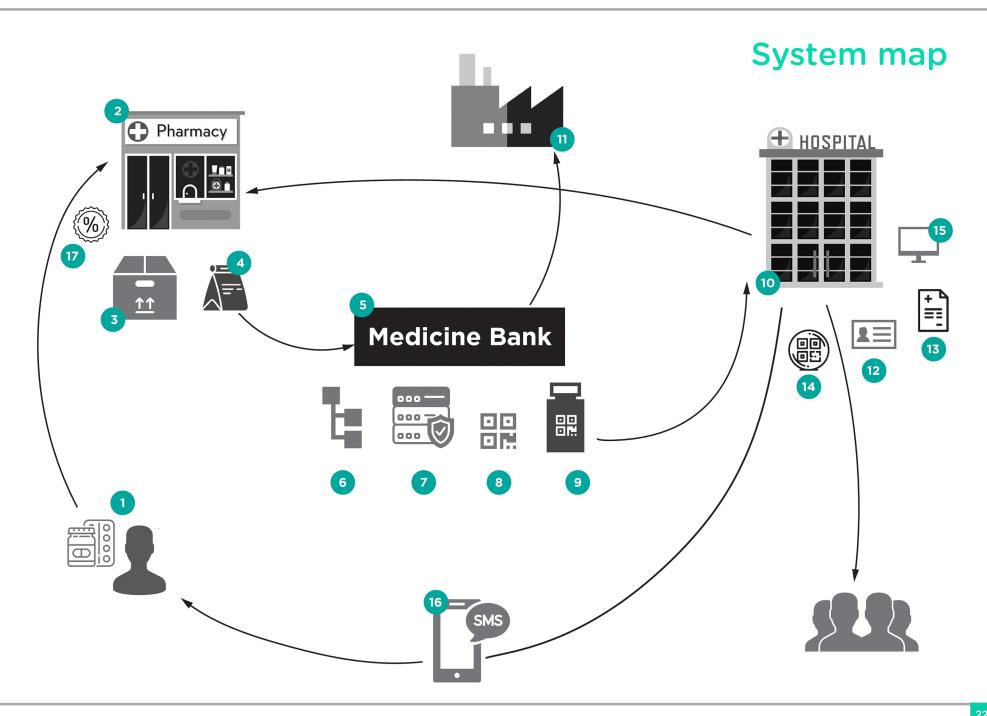
Problems faced by goverment hospitals

Government hospitals spends 70% amount of their overall expenditure just to buy medicines in bulk for the hospitalised patients.(2) Eventually they end up with small amount for other necessary facilities and inspite of getting enough budget, it affects the overall quality of facilities being provided by the government hospitals.

Solution

If government hospitals will accept medicine donations from wealthy people and distribute them to the poor hospitalised patients, they can trim down huge medicine expenses at some degree which will be an incentive to the hospital, in a way and will be able to cater better medical services too.





System map

- After substantial amount of ideas were generated, these ideas were mapped on a system map to see which part of the journey they fall into.
- Though the journey is shown as a linear one in the map, it is important to note that it may not be so in reality as contributors and context can vary.
- The possible activities and emotions involved at every stage of the journey are noted along touchpoints used by the entities to interact with the service.

The proposed system is demonstrated in system map. (Please refer to the system map on previous page. The map has been marked for all features listed below. The feature number is indicated within a blue circle on the map.)

- 1. The system starts with the people who have stockpiled, unused medicines.
- 2. A donor will collect all his unused medicines and will take them to the nearby pharmacy which will be authorised by the system.
- 3. At that pharmacy a medicine drop box will be installed.
- 4. Pharmacy will also have paper bags,
 - first of all donor needs to get a paper bag from them.
 - then the donor needs to keep all his medicines together in it.
 - he should write down his name & contact number on it with he pen attached to the dropbox.
- 5. Medicine bank will collect medicines from the dropboxes on regular basis.
- 6. At medicine bank sorting will be done on two level,
 - collected medicines will be sorted as expired & unexpired.
 - in second round medicines will get sort out diseases wise.
- 7. At medicine bank, when each paper bag will get open, all details mentioned over it with pharmacy details will be store to a cloud database and a QR code will be generated with the help of it. Every donor's donation details will be sent to pharmacy by the bank via a safe cloud database server.

- 8. This QR code will help pharmacy to track down donation history of donor.
- 9. This QR code will get pasted on the back of each of the donated (unexpired) medicines from the respective envelope.
- 10. Medicines with QR code will be sent to the government hospitals to distribute amongst their patients.
- 11. Expired medicines will be sent to drug disposal unit for their safe disposal.
- 12. Goverment hospitals follow certain rule while providing free treatment and medicines at subsidised rate. Only those are under poverty line can avail these facilities. People have to provide valid proofs (like aadhar card/ yellow ration card which is usually given to the people under poverty line) in order to avail these facilities.
- 13. Only those people who produces these proofs, can get treatment for free of cost. Because they genuinely can't afford the treatment and medicines. Same procedure will be followed to avail free medicines with the valid prescription from the doctor in that specific hospital itself. Otherwise it will be difficult to keep the track of malpractices if free medicines will be distributed to anyone asking for it.
- 14. While giving free medicines to people, QR code on the back of the medicines will be scanned first.
- 15. QR code which carries donor's name and contact number. Those details will be verified with the data in the database. All these tasks will be taken care of by the separate administrative department in the hospital.

- 16. The database will send, donor a SMS of appreciation and safe handover of their donated medicine to the needy people.
- 17. As mentioned earlier, pharmacies will receive donor's donation record sent by medicine bank from the database. When donor will come to the pharmacy to purchase medicnes, pharmacy will offer discount on it depend upon his donation record, if he asks for it.

System rules

To avoid misfunctioning and malpracties in the system some rules has to be followed. These practices will help to ensure the smooth system flow.

- Medicines have to be kept together in a paper bag provided besides medicine dropbox at the pharmacy with donors' name & contact number written over it. As it will help system to keep the record of his donated medicines and further in the system flow while sending the gratification SMS when these medicines will be received by the needy people at the government hospitals.
- 2. Donor should avoid donating medicines without expiry date (e.g. loose tablets and pills don't have expiry date printed over them), otherwise such medicines will be counted as expired medicines as it involves risk to reuse these medicines for the treatment.
- 3. If donated medicines includes any expired medicines, those won't be taken into account while offering discounts in its return.
- 4. Free medicines will be available only to the people who are under poverty line.
- 5. Free medicines can be availed by needy people at the goverment hospital only where he or she is taking treatment and only after showing prescription by an authorised medical practitioner in that specific hospital.

- 6. Donor have to choose single pharmacy near his or her house for medicine donation as once registered with the system, data server wil generate a unique Donor ID for each donorwhich will be used further to keep record of all his/ her transactions during whole system usage.
- 7. In the same manner, to avoid misuse of incentive method, redemption of incentives (in the form of discounts in return of donations) offered by the sytem can be availed by the donor at the same pharmacy only where he/she has donated medicines.

Known constraints and assumptions

Following are some of the known constrains and assumptions.

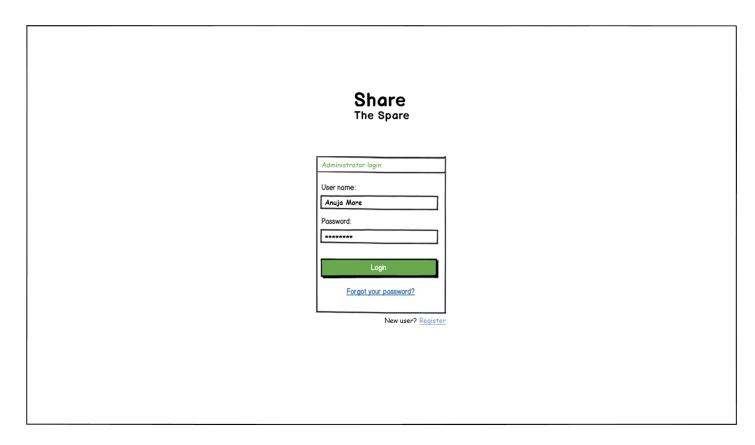
- 1. The system assumes that all the stakeholders will be willing to work together and will pool their resources.
- 2. It is assumed that establishing the back end operations will be possible.
- 3. There will be enough people, establishments and businesses that will sign up as partners.
- 4. The thank you message might not be sent in case the donated medicines will not be required by any receiver.
- 5. There will be enough funds available with the system to employ working staff and pay them regularly.

Final design

Once the ideas were mapped to the journey map it gave a better view of which ideas could be combined to form the system. Though not all ideas were not converted into design they were not abondoned. Due to duration constrains, they have been kept aside. Given time they can be worked upon to integrate them into the proposed system.

Hence, out of whole proposed system, have focused on the Medicine bank. Final design will be the online record management platform of the medicine bank.

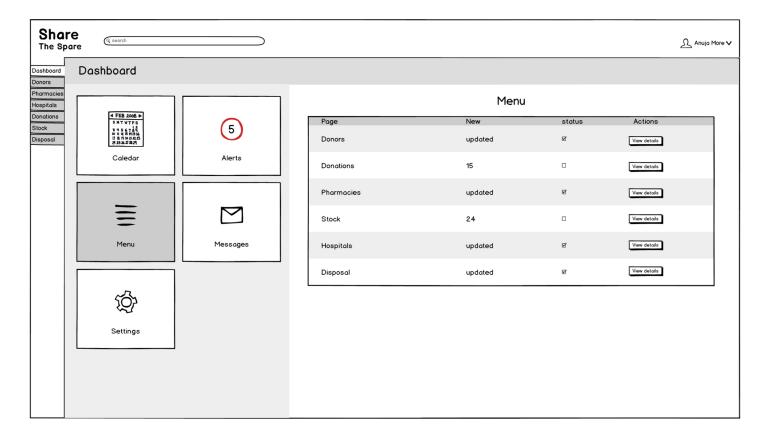
Wireframes



Login Page

Clicking on login tab, administrator will be redirected to the dashboard.

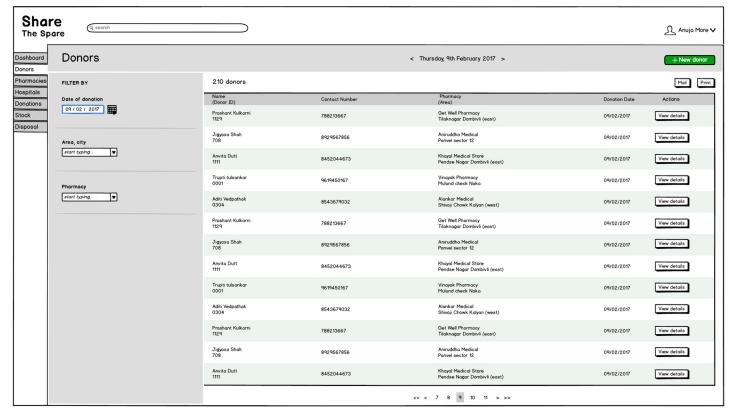
Options of forgot password and register are also available.



Dashboard

It will show current updates of all the transactions happened in the medicine bank on that day.

Administrator can manage menu, look through schedule of medicine collection and delivery, any official messages shared by other administrators, any important alerts like data syncing, etc.



Donors

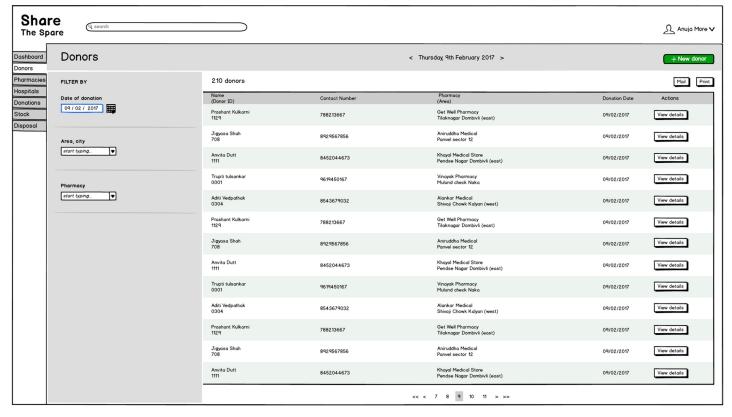
Here you can access through the list of medicine donors.

Results can be filter by the donation date, area, pharmacy, etc.

This list can be printed or mailed if needed.

On clicking 'view details' button will redirect the user to donors' details like contact no., donated medicines, their expiry status, cost, donation date, quantity of the medicines.

In the same manner record of pharmacies, hospitals, donations, medicine stock in the bank, disposal of medicines can be accessed.



Donors

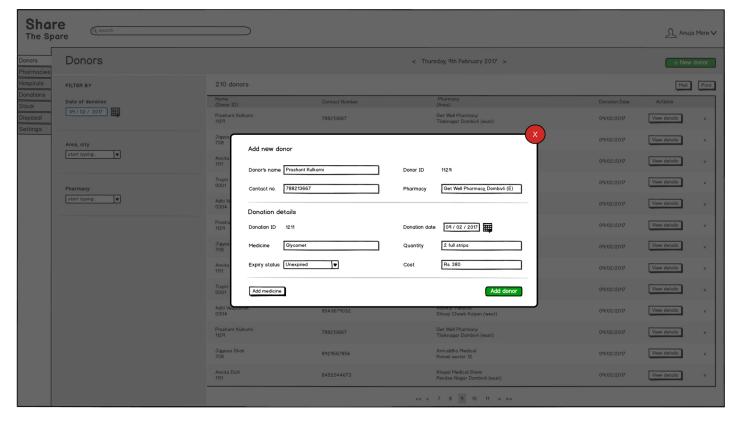
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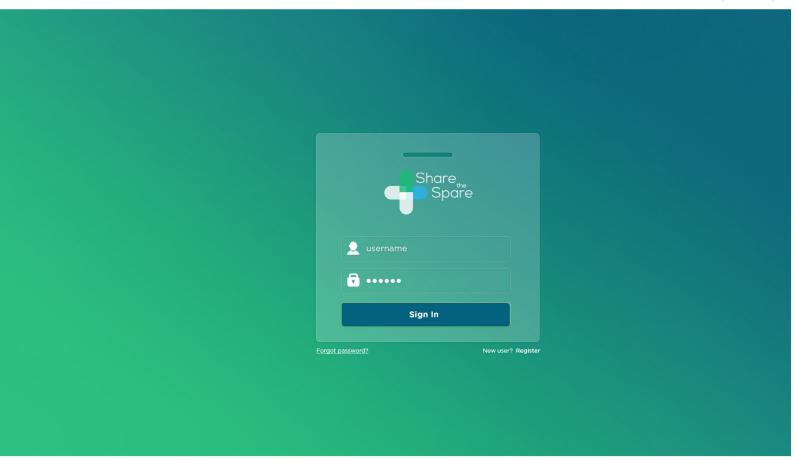
Add new donor

By clicking green button at the top left side of the donors page, administrator can add new donors to the list.

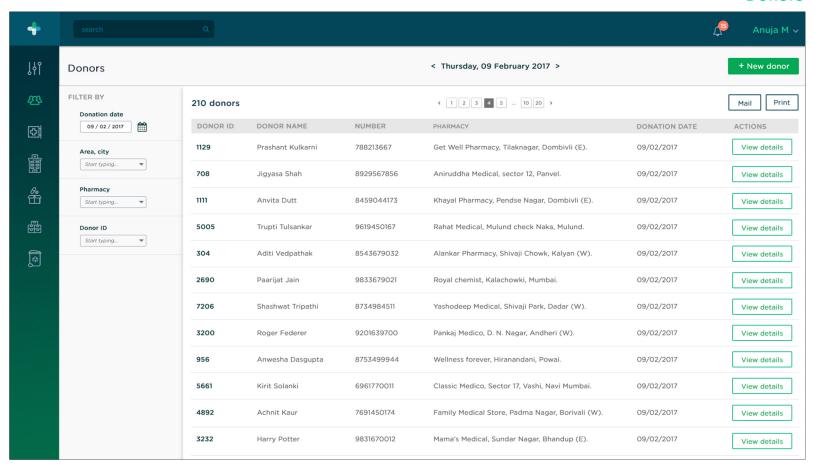
On clicking that button, a pop-up window can be seen with the necessary fields needs to be fill-up in order to feed donors details to the data server.

In the same manner record of pharmacies, hospitals, donations, medicine stock in the bank, disposal of medicines can be accessed.





Donors

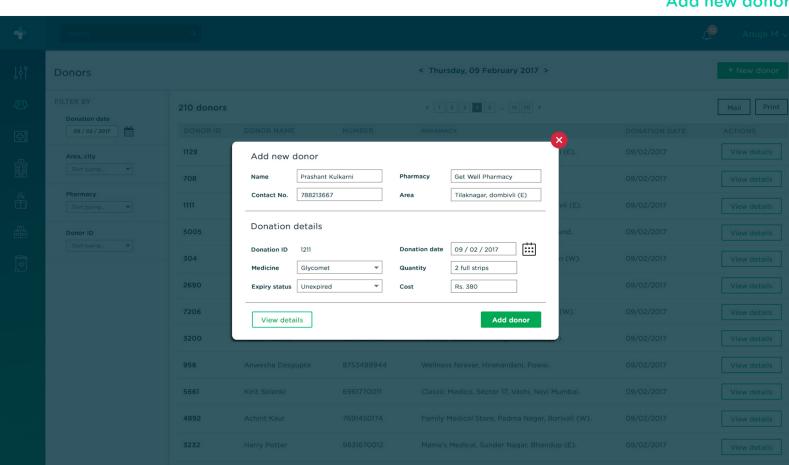


Donor details

Graphical User Interface

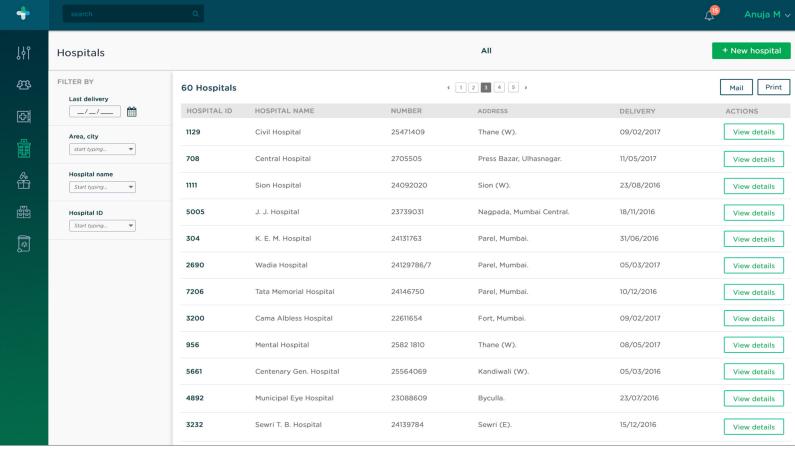
Donor details Donation details Donor ID: 1129 Pharmacy: Get Well Pharmacy Name: Prashant Kulkarni Area: Tilakangar Contact No.: 788213667 City: Dombivli (East) Donation history Print Mail Donation ID Medicine name Quantity **Expiry Status** Cost Donation date Rs. 380 09/02/2017 Glycomet 2 strips Unexpired Galvas Met Rs. 500 half strip About to expire Rs. 420 Razel 3 strips Unexpired Volini half strip Unexpired Rs. 250 Betadin Rs. 150

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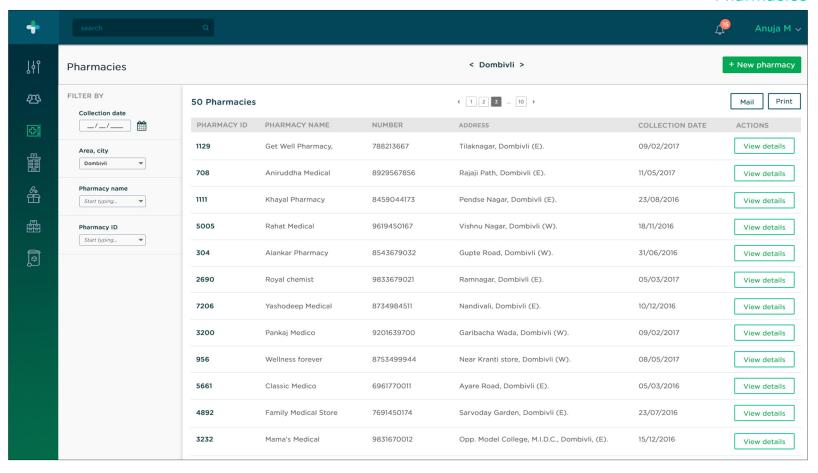


Add new donor

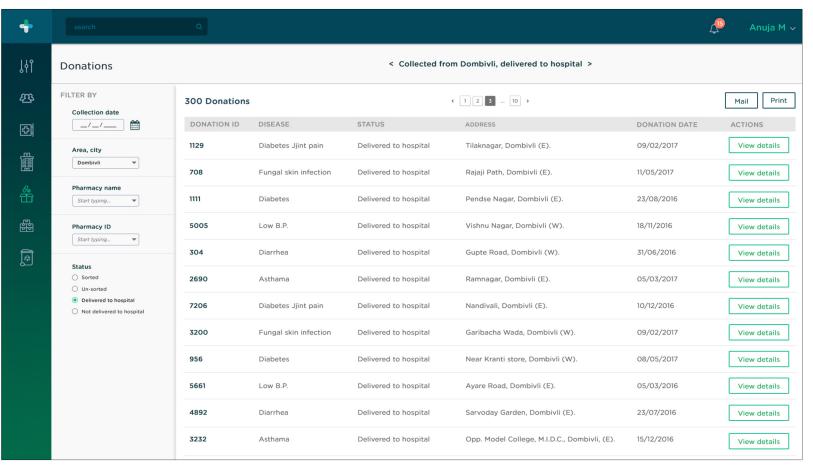
Hospitals



Pharmacies



Donations



Resources acknowledgement

Adobe Creative Suite Microsoft office Google forms Balsamiq

Fonts

Gotham Rounded by Tobias Frere-Jones Gotham Rounded medium for headlines | 24 pt Gotham Rounded medium for titles | 12 pt Gotham Rounded book for body text | 10 pt Gotham Rounded book for notes | 8 pt Comic sans by Vincent Connare for wireframes

Vectors and images

www.flaticon.com for various icons www.istockphoto.com for report cover image

Papers

The critical incident technique in service research, DD Gremler Journal of service research, 2004

Drug donation in US by Mark Thomas

Targeted Drug Donations: A Necessary Evil in Need of a Global Harness and a Possible Cure for TRIPS Shortcomings by Gabriella Tzeneva

Understanding the Drivers of Expired Pharmaceutical Returns by Healthcare Distribution Management association (HDMA)

WHO_guidelines for medicine donation_revised 2010

References

1

Dwayne D. Gremler, The Critical Incident Technique in Service Research. Article, Journal of Service Research, Volume 7, No.1, August 2004, Pages 65-89.

Evaluating Pharmaceuticals for Health Policy and Reimbursement/ chapter 14/ Evaluating Pharmaceuticals for Health Policy in Low and Middle Income Country Settings

3. http://www.dailymail.co.uk/indiahome/indianews/article-3061428/India-explores-heat-proof-vaccines-stop-vital-medicines-going-waste.html

References

http://www.servicedesigntools.org/tools/28

http://www.who.int/medicines/publications/med_donations-guide2011/en/

https://en.wikipedia.org/wiki/Incentive-centered_design

http://www.thehindu.com/opinion/columns/drug-pricing-a-bit-ter-pill-to-swallow/article8281282.ece

https://blogs.economictimes.indiatimes.com/et-commentary/-can-healthcare-costs-in-india-come-down-further/

http://meghalayatimes.info/index.php/editorial/31278-every-fourth-household-in-india-driven-to-debt-by-medical-bills

http://www.star2.com/health/wellness/2017/04/09/extra-drugs-throw-them-flush-them-or-reuse-them/