

## **ID583-037 / IPRO 497 – 304**

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### **Background:**

Honeywell, Inc. with headquarters in Minneapolis, Minnesota and laboratories in India, is excited about establishing an IPRO project with Illinois Institute of Technology and its Institute of Design in collaboration with the Indian Institute of Technology, Bombay and its Industrial Design Centre (<http://www.idc.iitb.ac.in>). The team will coordinate with Honeywell International's Industrial Technology Solutions Laboratory (<http://www.honeywell.com/sites/india/HTSL.htm>) in Bangalore, India. The principal liaison for the IPRO project team is Mr. Fred Rose, Director of Technology and Strategy, Honeywell Technology Solutions Lab, Minneapolis, MN.

### **Problem Statement & Objective:**

The purpose of this project that will begin in Spring 2007 is to increase the "footprint" of health care workers in rural areas of India, that is, leverage the time and expertise of the workers to achieve a bigger and broader benefit to those who need health care. The basic question is how to increase the ability of health care workers to see more patients, increase their diagnostic capabilities and track patients on a regular basis within the existing rural environment. The objective has not changed since the beginning of the project.

**Methodology:**

The scope of the project will likely require (1) characterizing the current health care delivery environment in rural India (some of this effort has already begun via IIT-Bombay), (2) understanding the capabilities and limitations of rural health care workers, (3) summarizing the range of health care needs and the extent to which they are being met, (4) evaluating the current level of technology used by rural health care workers, (5) identifying opportunities for using or adapting information or medical diagnostic technologies within the rural India setting, (6) determining the extent of education and training needed to introduce solutions, (7) creating a decision matrix that offers a way to evaluate the extent to which new design concepts and IT solutions can impact the performance and effectiveness of the rural health care worker in India, etc. Investigation of the above issues will lead to consideration and evaluation of various concepts and solutions. These concepts and solutions will be prototyped in an iterative fashion that integrates new ideas and constraints and can lead to follow-on projects for further development.

During the course of this workshop we will implement the formative stages of a user-centered design process by developing and prototyping design concepts aimed at increasing the "footprint" of health care workers in rural areas of India. The flavor of this effort will be a practical or professional one, working towards implementation and design refinement.

At the end of this experience, you'll have:

1. a solid understanding of methods and artifacts necessary to conduct design research internationally
2. a basic understanding of the challenges faced by health care workers in rural India and how design can help address these
3. established professional relationships with Indian designers who share a human-centered mindset
4. a portfolio-ready project, complete with a recognizable client

**Task Assignments:**

Task assignments remain the same. Each team has selected a concept to develop to a state of prototyping. Attached are midterm summary reports delivered to the client on 3/8/2007. As our teams are composed of peers, each member is generally expected to contribute their fair share to project direction and production.

**Schedule**

The schedule remains as it was before. This workshop is divided into 3 main work phases:

1. Research & Concept Development (8 weeks)
2. Prototype Testing I (3 weeks)
3. Prototype Testing II (4 weeks)

1.18 | Research & Concept Development | Orientation and discussion of project statement and goals

Assignment: Conduct a broad industry survey in order to establish a basic understanding of existing products and best practices in this arena(individual assignment).

1.25 | Research & Concept Development | Introduce client, form teams and begin research planning

Assignment: Develop a preliminary research plan and draft of protocol.

2.1 | Research & Concept Development | Finalize research plans and match with partners in India

Assignment: Contact partner in India and begin the data collection process.

2.8 | Research & Concept Development | Working session

Report on research efforts. Refinement of research plan if necessary.

Assignment: Continue with research efforts implementing refined plan. List insights and begin developing corresponding design recommendations.

2.15 | Research & Concept Development | Working session

Report on research efforts. Refinement of research plan if necessary.

Assignment: Analysis and brainstorming: List research insights and begin developing corresponding design recommendations. Begin visualizing design concepts (thumbnails).

2.22 | Research & Concept Development | Submit brainstorming results

(Key insights, design recommendations and thumbnail concepts)

Assignment: Visualize design concepts(3+) in sketch form.

3.1 | Research & Concept Development | Working session

Internal design review with guest designers & engineers

Assignment: Pick the most promising design concepts and develop sketches to further explain design idea if necessary. Develop Phase 1 presentation.

3.8 | Research & Concept Development | Present research results & first concepts to Honeywell.

Assignment: Based on feedback, build mock-ups and develop plan for prototyping phase (to be conducted in Chicago).

3.22 | Prototype Testing I | Working session

Discuss and finalize prototyping plan.

Assignment: Test prototype.

3.29 | Prototype Testing I | Working session

Discuss prototype testing and refinements to process if necessary.

Assignment: Prepare presentation to discuss prototype testing results and implications for design refinement.

4.5 | Prototype Testing I | Present prototype testing results internally.

Assignment: Begin developing prototyping plan for Phase 3.

4.12 | Prototype Testing II | Working session

Discuss and finalize prototyping plan.

Assignment: Contact researcher in India and build prototype.

4.19 | Prototype Testing II | Working session

Discuss prototype testing and refinements to process if necessary.

Assignment: Prototype testing.

4.26 | Prototype Testing II | Working session

Assignment: Prepare presentation to present final design to Honeywell.

5.3 | Prototype Testing II | Present final designs to Honeywell

# Healthcare in Rural India

## Initial Concepts

Maura Collins

Asha Joseph

Dan O'Brien

Marieke Smets



## Problem Statement

# How can we **increase the footprint** of health care workers in rural India?

How can we increase the ability of health care workers like doctors, ANMs, and pharmacists, to treat patients? How can we make healthcare more available to people in need? How can we enhance diagnostic capabilities, record keeping, and drug delivery in a rural environment?

Problem Exploration :: **How do patients seek out healthcare?**



**Evaluate  
Home**



**Travel**



**Wait**



**Visit**



**Treat**



**Opportunity areas exist in each of these six stages of the process.**

## Problem Exploration :: Deciding whether or not to go to the doctor



**Evaluate**



Travel



Wait



Visit



Treat



Home

### What are the issues?

It takes people an entire day to go; Going means giving up a day's wages; Women especially often postpone doctor's visits

### Why is this a problem?

Deciding to go to the doctor is not an easy decision; Women often have more to lose because housework and childcare are work that cannot be saved up or done in advance.

### How can this be solved?

Can we help people decide whether they should go to the doctor or not? How can we make the decision easier for women?

## Problem Exploration :: **Traveling to the nearest doctor**



Evaluate



**Travel**



Wait



Visit



Treat



### **What are the issues?**

It takes people an entire day to go on foot; long travel times mean giving up a day's wages; sometimes the doctors isn't there, or the right equipment is not available

### **Why is this a problem?**

As a doctor's visit is time consuming and expensive people postpone or even put off a visit. This can result in even bigger health problems. Limited resources are available at each office; deciding to go to the doctor is not an easy decision

### **How can this be solved?**

Can we help people decide whether they should go to the doctor or not? How can we make the decision easier for women?

## Problem Exploration :: **Traveling to the nearest doctor**



The doctor serving this village is 9km away



The bus in this village makes two trips per day

\* Photos from field visits by Nakul

## Problem Exploration :: **Waiting in line at the doctor's office**



Evaluate  
Home



Travel



**Wait**



Visit



Treat



### **What are the issues?**

Lines at the doctor's office are long and waiting in them time consuming

### **Why is this a problem?**

Sometimes people have to wait an entire day to find that a visit wasn't necessary; waiting longer means losing more time and money.

### **How can this be solved?**

How can we make the doctor's visit, particularly waiting in line, more efficient?

## Problem Exploration :: **Waiting in line at the doctor's office**



Health assistant

**Patients waiting their turn for the doctor at the  
PHC**

\* Photos from field visits by  
Nakul

## Problem Exploration :: Interacting with the doctor



Evaluate  
Home



Travel



Wait



Visit



Treat



### What are the issues?

The doctor sees hundreds, sometimes 200+, people a day; patient records are difficult to track;

### Why is this a problem?

the doctor does not have enough time to spend per patient - especially for patients with more complex problems.

### How can this be solved?

How can we make the doctor's visit, particularly in regard to record-keeping and diagnostics, more effective?

## Problem Exploration :: Interacting with the doctor

ಕಿರಿಯ ಮೂಲಕ ಆಯುಗ್ಯ ಸಲಹೆಯೊಂದಿಗೆ ನಗವಕ ತ್ವರಿತವಾಗಿ  
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4	ಬಸವರಾಜ	50	ಮ									
5	ಬಸವರಾಜ	50	ಮ									
6	ಬಸವರಾಜ	50	ಮ									
	8			99			99			99		

Medical Records are currently taken with pen and pencil.

\* Photos from field visits by Nakul

## Problem Exploration :: Drug treatments



Evaluate  
Home



Travel



Wait



Visit



Treat



### What are the issues?

Treatment often involves return visits to doctors, pharmacists to monitor dosage compliance; sometimes pharmacists and drugs are difficult to track down

### Why is this a problem?

There is a big risk of people not returning to take their medicine; drug supplies are limited or unevenly dispersed

### How can we solve this problem?

How can we make drug treatment and drug distribution easier for the patient and more efficient as a system?

## Problem Exploration :: **At home**



Evaluate



Travel



Wait



Visit



Treat



### Home

#### What are the issues?

Human bodies are the biggest asset to people in rural India (for manual labor jobs); keeping house is a full-time job, especially for women with children; once home, patients have a difficult time with treatment compliance

#### Why is this a problem?

Preventative measures should be especially important, but taking time to do that makes it impossible for the people who need it most.

#### How can we solve this problem?

How can we bring healthcare into or closer to the home?



## Concept 1 :: Mobile Pharmacist

### What are the issues?

It is time consuming and expensive to get to the PHU (Doctor and Pharmacist). People have to go to the pharmacist to take their medicine, missing a day of work. Sometimes the pharmacist is not available or drugs are out of stock.

### Why is this a problem?

Risk of treatment failure because of the high cost of return visits

### What can we do to help?

Mobile Pharmacist could make drugs more accessible.





## Concept 1 :: Mobile Pharmacist

**Mobile Pharmacist** is about facilitating the distribution of drugs among rural villages

Drug carts would be purchased by pharmacists as a way to increase access to their current offerings (to increase their profits) and to allow them a means to more actively control their inventory.

### Point to Point

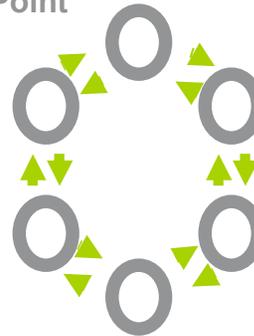
A relay system could be set up where pharmacists travel from one end of an area to the next, coming in contact with, and trading/ buying supplies with, other pharmacists at these touch points.

### Distribution Center

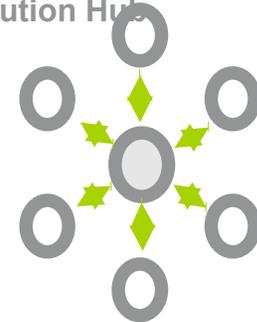
A central town could be used as a distribution hub, where rural pharmacists make journeys to the distribution hub as needed.

**Which is a better model for distribution in rural India?**

Point to Point



Central Distribution Hub



Currently point to point models work well.  
The Indian Postal service is one example.



## Concept 2 :: Stationary Drug Dispenser

### What are the issues?

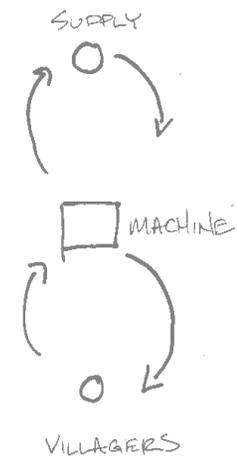
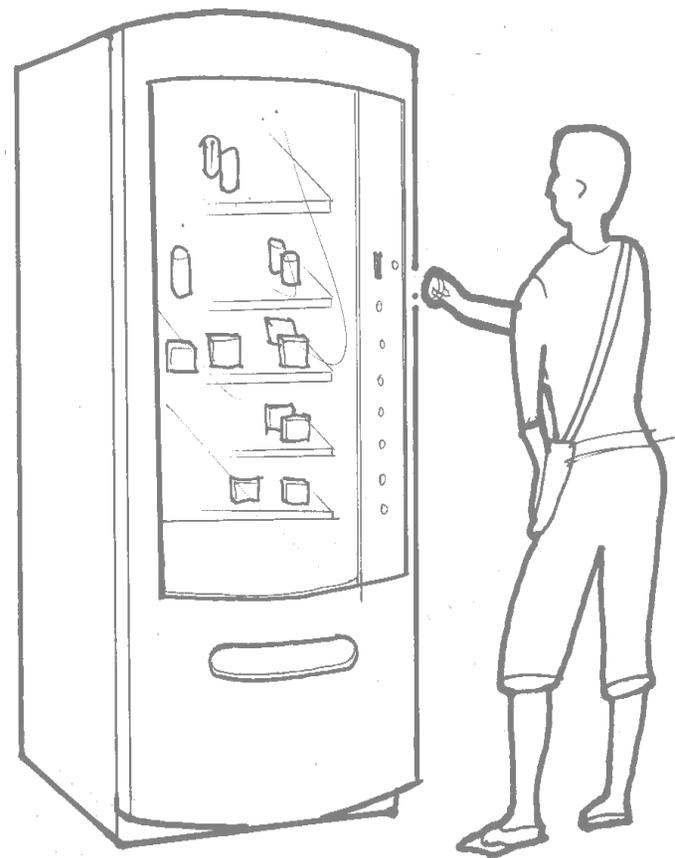
It is time consuming and expensive to get to the PHU (Doctor and Pharmacist). People have to go to the pharmacist to take their medicine, missing a day of work. Sometimes the pharmacist is not available or drugs are out of stock.

### Why is this a problem?

Risk of treatment failure because of the high cost of return visits

### What can we do to help?

A Stationary Drug Dispenser could make drugs more accessible.





## Concept 2 :: Stationary Drug Dispenser

### **Stationary Drug Dispenser** is about enabling constant access to drugs

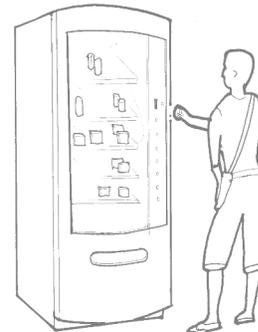
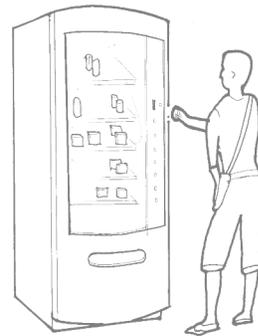
A supplier or a mobile pharmacist could keep the machine stocked; patients could use the machine for drugs instead of taking a long or costly trip to the doctor.

### **Supports treatment compliance**

Later versions of the machine could utilize an electronic record-keeping card where doctors input a prescription and the patient uses the card to access drugs in the machine. The doctor could have access to whether or not a patient took his medicine.

### **Vending Machines are already popular in India**

Especially for the treatment/ prevention of issues with social stigmas—machines sell condoms, birth control, etc. and are often located at gas stations.





## Concept 3 :: Pill Deposit System

### What are the issues?

It is time consuming and expensive to get to the PHU (Doctor and Pharmacist). People have to go to the pharmacist to take their medicine.

### Why is this a problem?

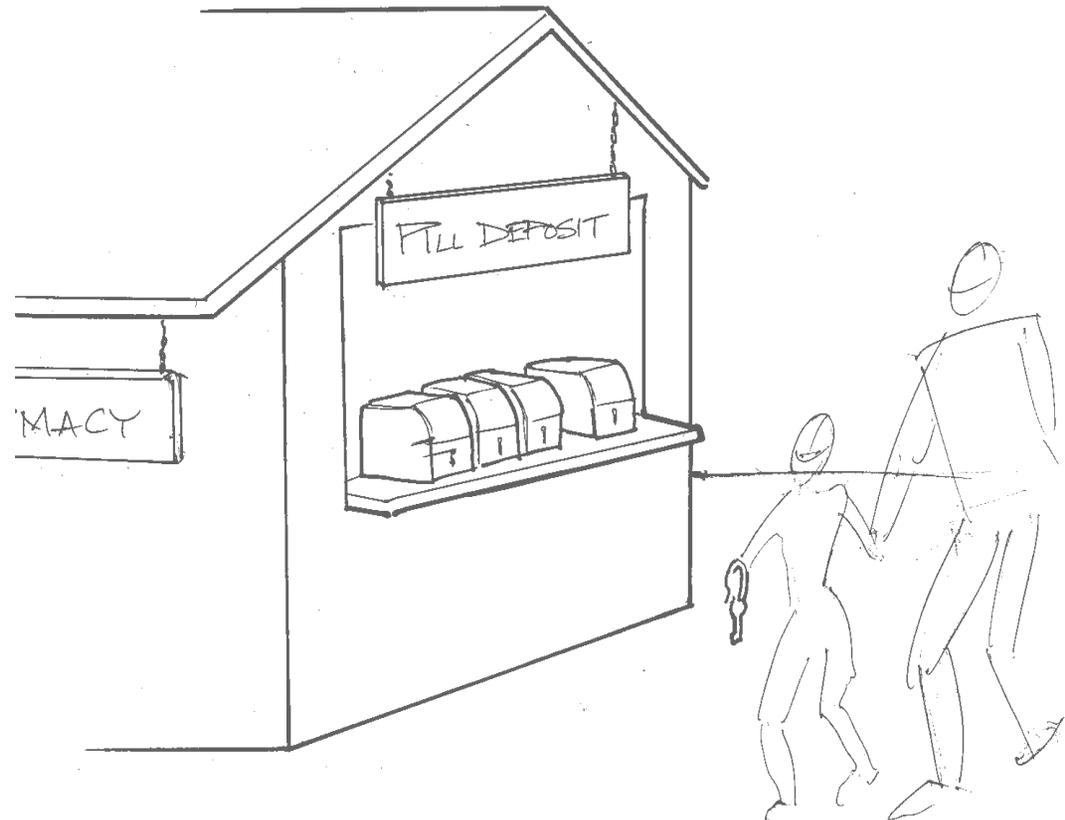
Risk of treatment failure because of the high cost of return visits

### What can we do to help?

Is it possible to make the pharmacist more accessible?

### What is a Pill Deposit System?

Deposit box provides an incentive to continue taking medication. The box is locked and controlled by pharmacist. It provides medicine on set time - through watch-like mechanical system. Provides drugs on times set by pharmacist. Easy to repair by local community.





## Concept 3 :: Pill Deposit System

An analogous product worked in the United States during the Depression to encourage people to save money for a savings account. Banks issues lock boxes for people to save nickels and dimes. When they took the box to the bank to be opened, the bank would suggest starting a savings account.

In India, people could insert money to get a pill at designated times each day. Then when the medicine is complete, they would take the 'lock box' to the pharmacist for a return of the money they spent getting the pills out of the box—even better, the money could be put aside for medical savings. Because the person would not have lost a day's wages trying to get to the pharmacy, a product like this could allow a person to save.





## Concept 4 :: Diagnose in Line

### **What are the issues?**

It is time consuming to visit the doctor.  
The doctor sees 100-200 patients a day.  
Waiting in line is very common.

### **Why is this a problem?**

Doctor's visit takes a long time

### **What can we do to help?**

Is it possible to make the doctor's visit more efficient?

### **How would Diagnose in Line Help?**

Nurse OR health assistant can gather patients information/ pre-diagnose while people are waiting in line. Device is easy to Carry and facilitates quick Diagnosis. Decreases workload for doctor. Decreases patient's time investment for doctor's visit.





## Concept 5 :: Remote Diagnosis

### What are the issues?

It is time consuming to visit the doctor.  
The doctor sees 100-200 patients a day.  
Waiting in line is very common.

### Why is this a problem?

Doctor's visit takes a long time

### What can we do to help?

Is it possible to make the doctor's visit more efficient?

### How would Remote Diagnosis Help?

Determine if a visit is necessary.  
Determine if a problem is urgent - if one should go to the doctor very soon or not.  
Device could potentially set up appointments or keep records.



WHAT HURTS?

WHEN DOES IT HURT?

FOR HOW LONG?

SEE A DOCTOR!



## Concept 6 :: Return Visit Coupon/Medical Record Card

### What are the issues?

It is time consuming to visit the doctor.  
The doctor sees 100-200 patients a day.  
Medical record keeping is time consuming and analogue

### Why is this a problem?

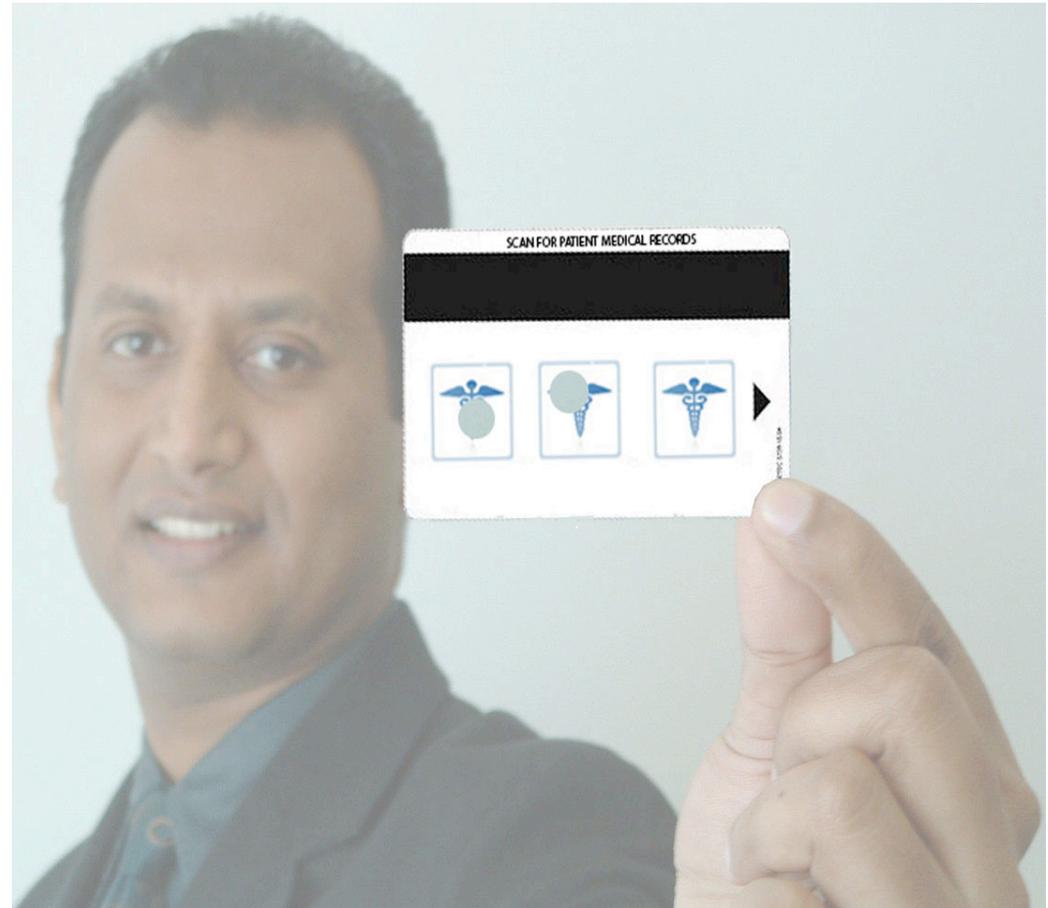
There is a risk of failing return visits.  
There is a risk of incomplete medical records and health implications.

### What can we do to help?

Is it possible to decrease the risk of failed return visits? Is it possible to facilitate record keeping becoming easier and less time consuming?

### How would Diagnose in Line Help?

Medical card to both facilitate returning visits and record keeping. Easy to Carry. Includes Medical History. Motivates returning visits (coupon). Can be integrated with OPD slip (provided by doctor and carried by patient to pharmacist who registers and provides drugs to the patient.





## Concept 7 :: Women's Check-Up Bus

### What are the issues?

Women are often afraid or uncomfortable of going to the doctor. Thus many diseases often go unchecked or unreported.

### Why is this a problem?

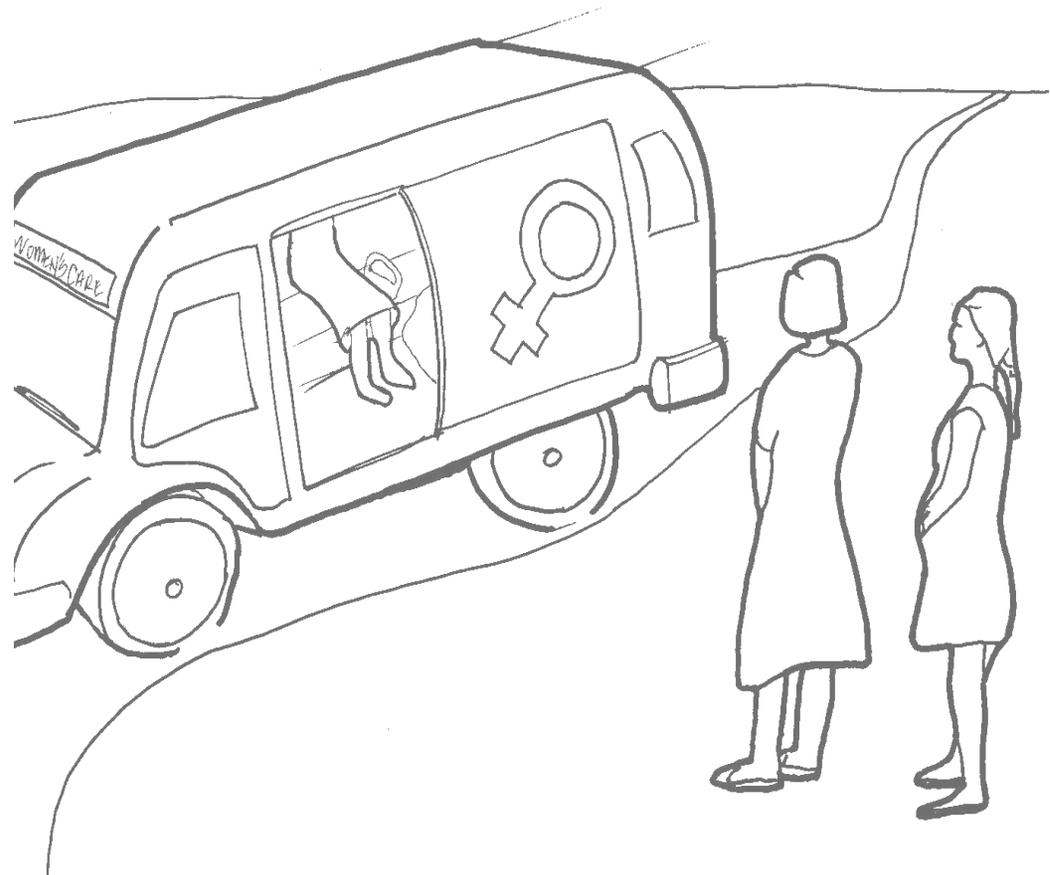
More than 130,000 new cases of cervical cancer, roughly  $\frac{1}{4}$  of the global total, are reported in India every year. Breast cancer now on the rise.

### What can we do to help?

Provide an accessible, safe, secure, and sterile environment where women will feel comfortable addressing their medical needs.

### What is a Women and Children Check up Bus?

Periodically, a bus equipped with a private exam room to administer a variety of tests will travel to various villages assisting and educating women of the importance of their own as well as their children's health needs.





## Concept 8 :: Women's Nutrition Pack

### What are the issues?

Malnutrition is a problem, especially for expectant mothers. It increases the chances of birthing problems.

### Why is this a problem?

Birth defects and other childhood nutritional issues could be prevented with proper nutrition and health supplements.

### What can we do to help?

Educate women about the importance of a healthy diet and the proper nutrients and vitamins that need to be incorporated to increase chances of delivering a healthy baby.

### What is a Women's Nutrition Pack?

Distributed by an ANM or doctor, a nutrition pack based on woman's trimester, containing nutritional supplements and informational packets.





The background image is a faded, sepia-toned photograph of a rural market. In the foreground, a man is seated on a bicycle with a large basket on the back. To his right, another man stands, possibly interacting with him. In the background, several other people are visible, some sitting on chairs or stools, and a white car is parked. The scene is set in front of a building with a corrugated metal roof.

Digital WOM | A Communication System

A faded, sepia-toned photograph of a rural street scene. In the foreground, a person is riding a bicycle with a large basket on the back. Several other people are visible in the background, some sitting on a bench or on the ground. The scene is set in front of a building with a corrugated metal roof. The overall image has a soft, historical feel.

Innovative Honeywell Technology |  
| Existing Infrastructure and Cultural Norms

**Project Challenge:**  
Develop products and/or services that will increase the “footprint” of healthcare workers in rural India?



**“There is a school nearby [the health center]...  
I often know that someone in a village needs my assistance,  
because a child coming off the school bus tells me so.”**

-taken from video research conducted in Tamil Nadu, India

### Observation

- » Word of mouth is often used to communicate between patients and ANM's when they cannot physically be near each other. Messages are often relayed through neighbors, children, or other members of the patient's village that may be in contact with the ANM.

### Implication

- » Communication between the patients and ANM's is infrequent and indirect due to distance and technology constraints.

**Consideration:**

Facilitate more frequent, reliable, and thorough communication between the ANM and the villages?

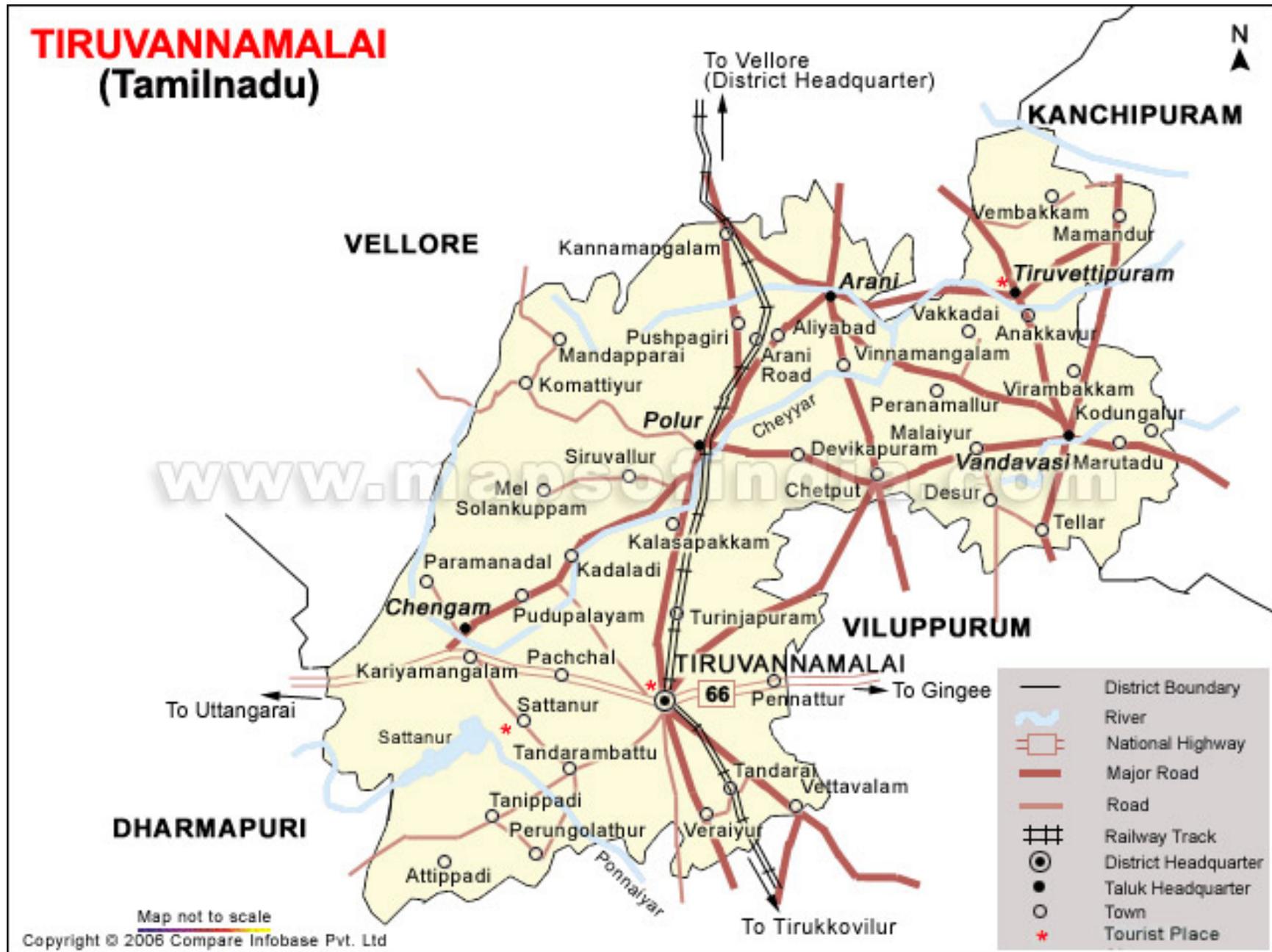


## Potential Effects:

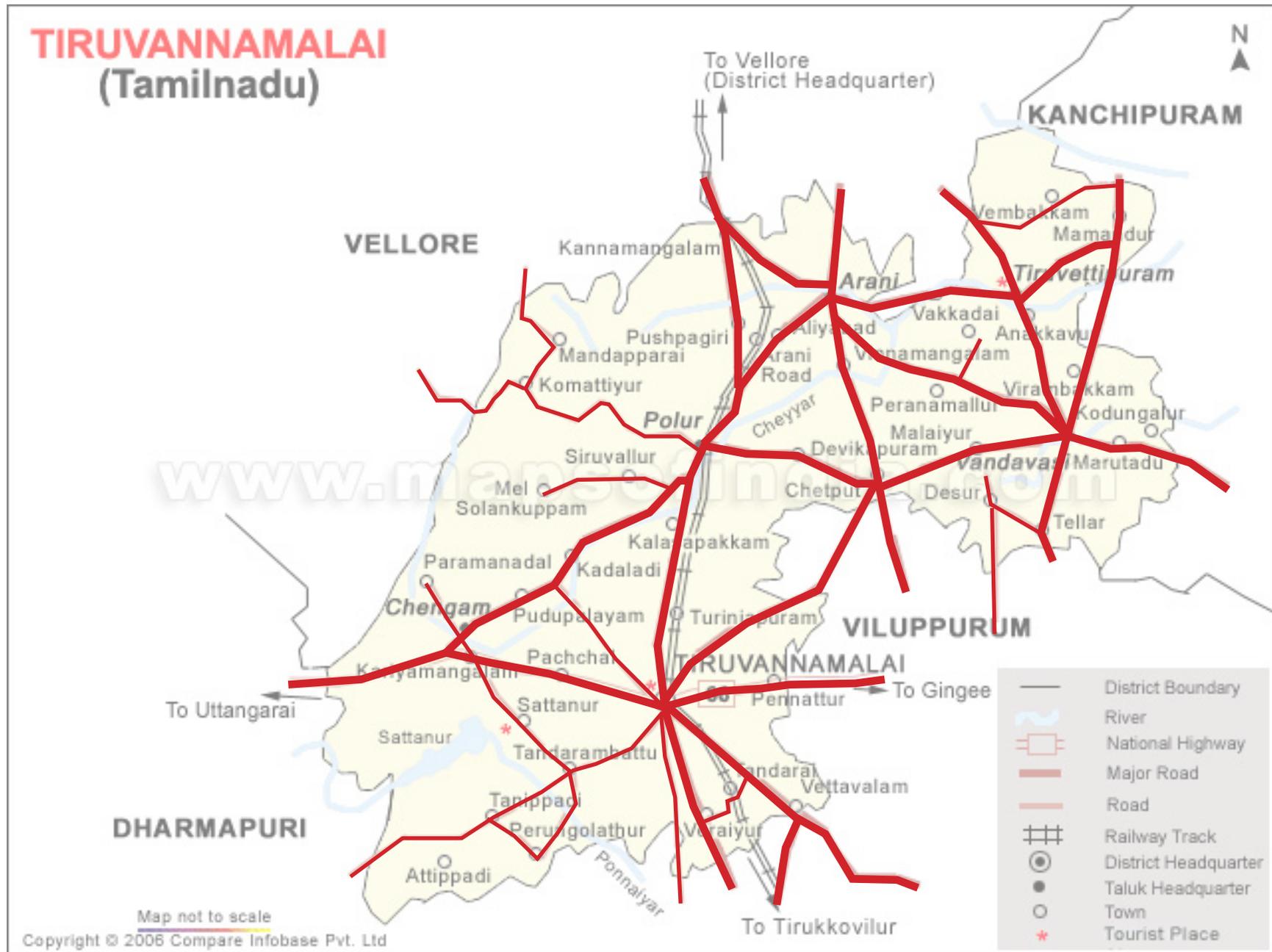
- » the ANM's village visit routine may change according to village needs
- » villagers may avoid unnecessary trips to health center seeking help that cannot be provided at this facility
- » diagnosis may happen remotely in certain cases
- » mass messaging can educate whole villages about health concerns and procedures



# How? | Using Existing Infrastructure



# Paved Roadways | Forming an Arterial Network





Frequent Traffic |

| Telephone Poles/Lines

Village and ANM Access |

| Recognized as an Artery



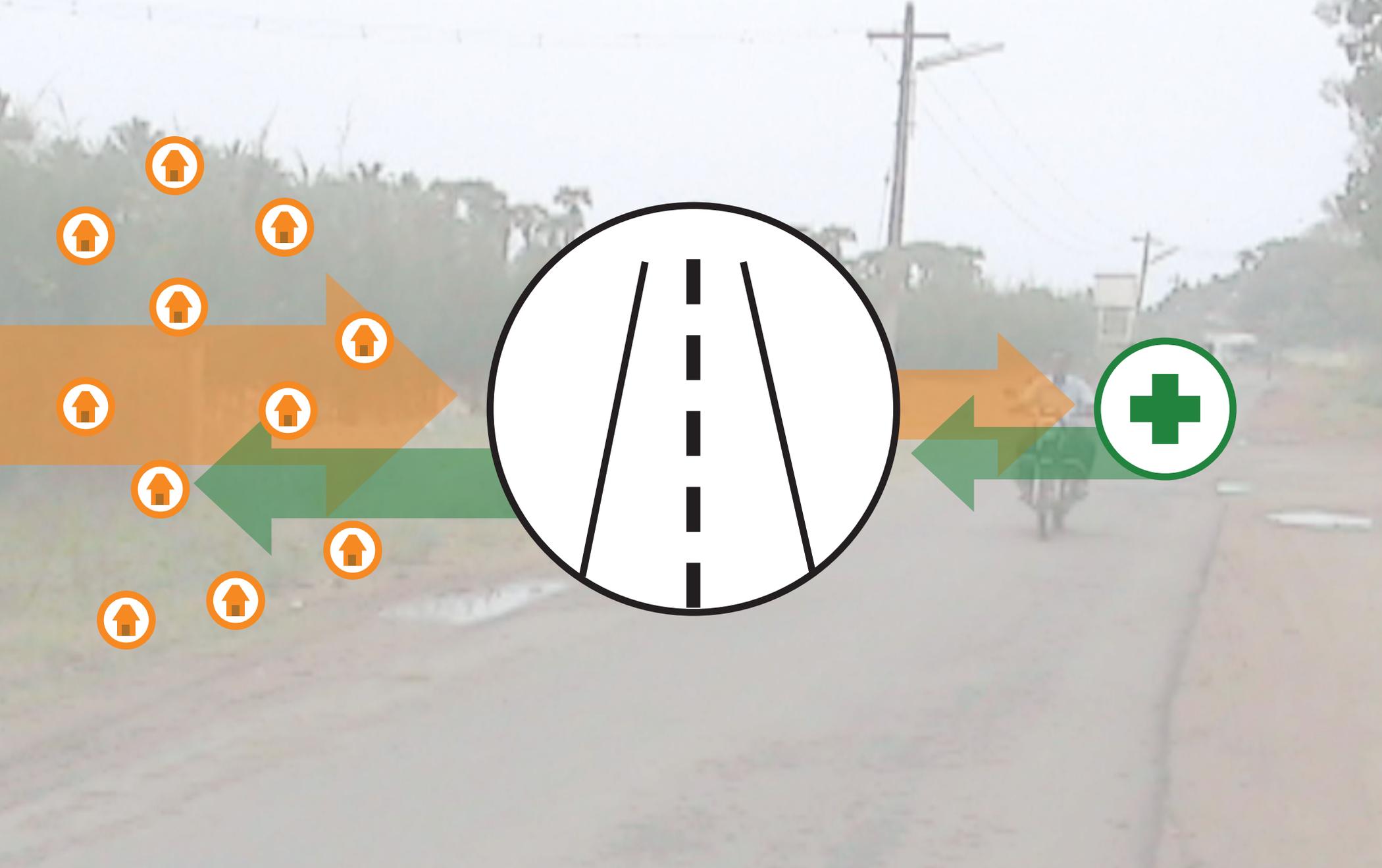
## Concept:

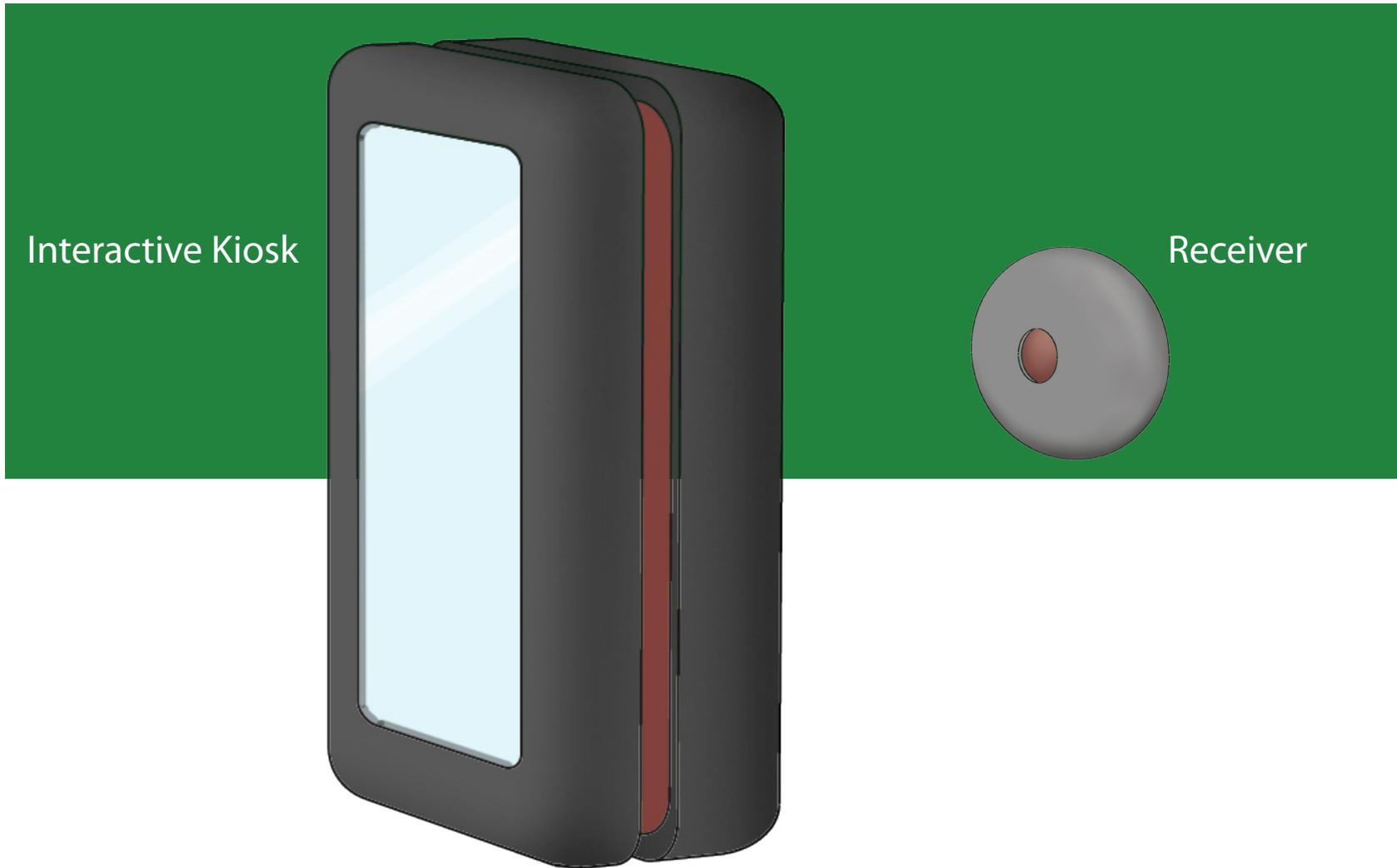
Facilitate the interaction between patients and ANM's by developing a passive communication network comprised of:

- » communication nodes along traffic corridors that run alongside the villages
- » small transceivers mounted on the vehicles that run on these roads



# Digital WOM | A Communication System



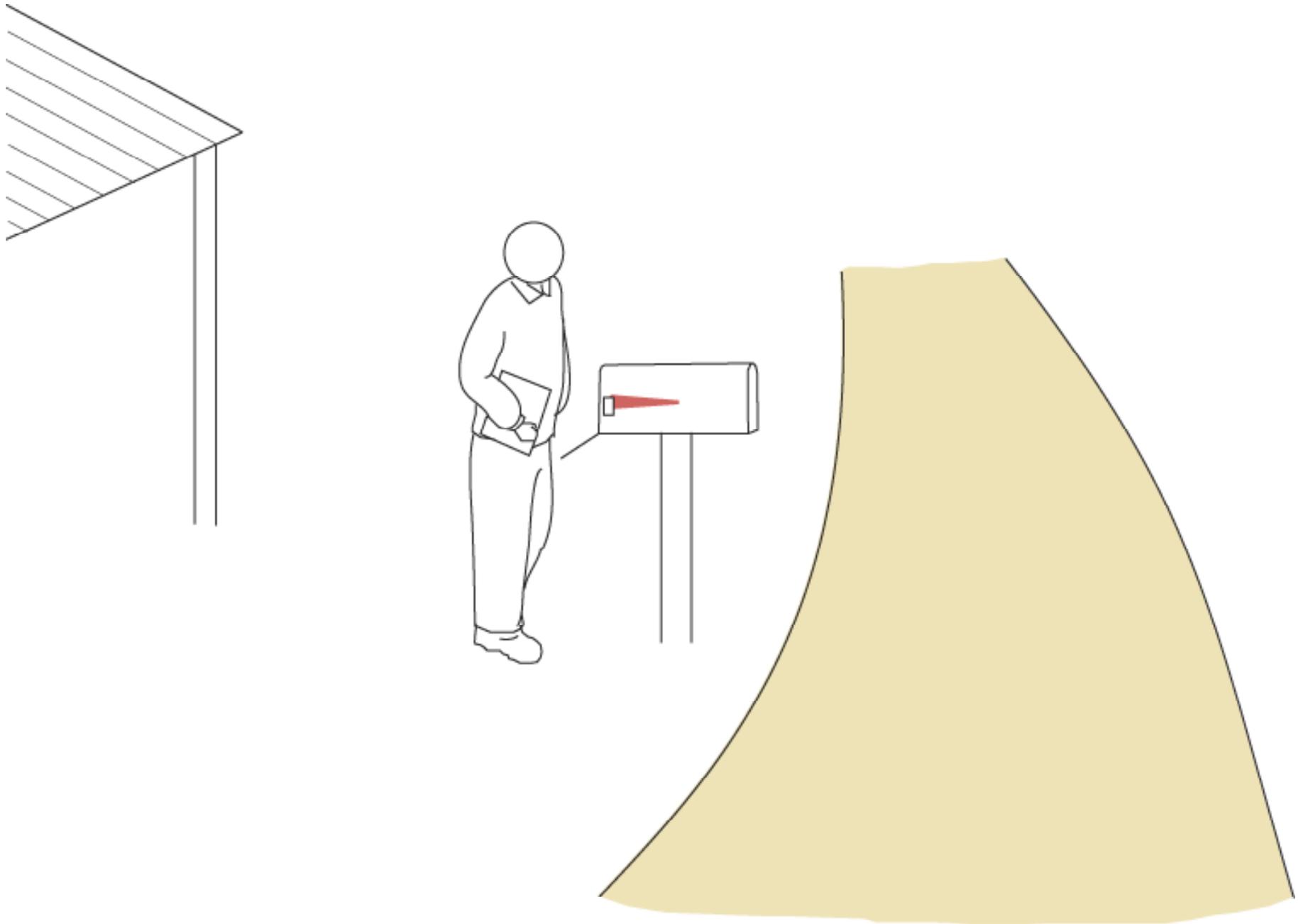


# Digital WOM | Kiosk



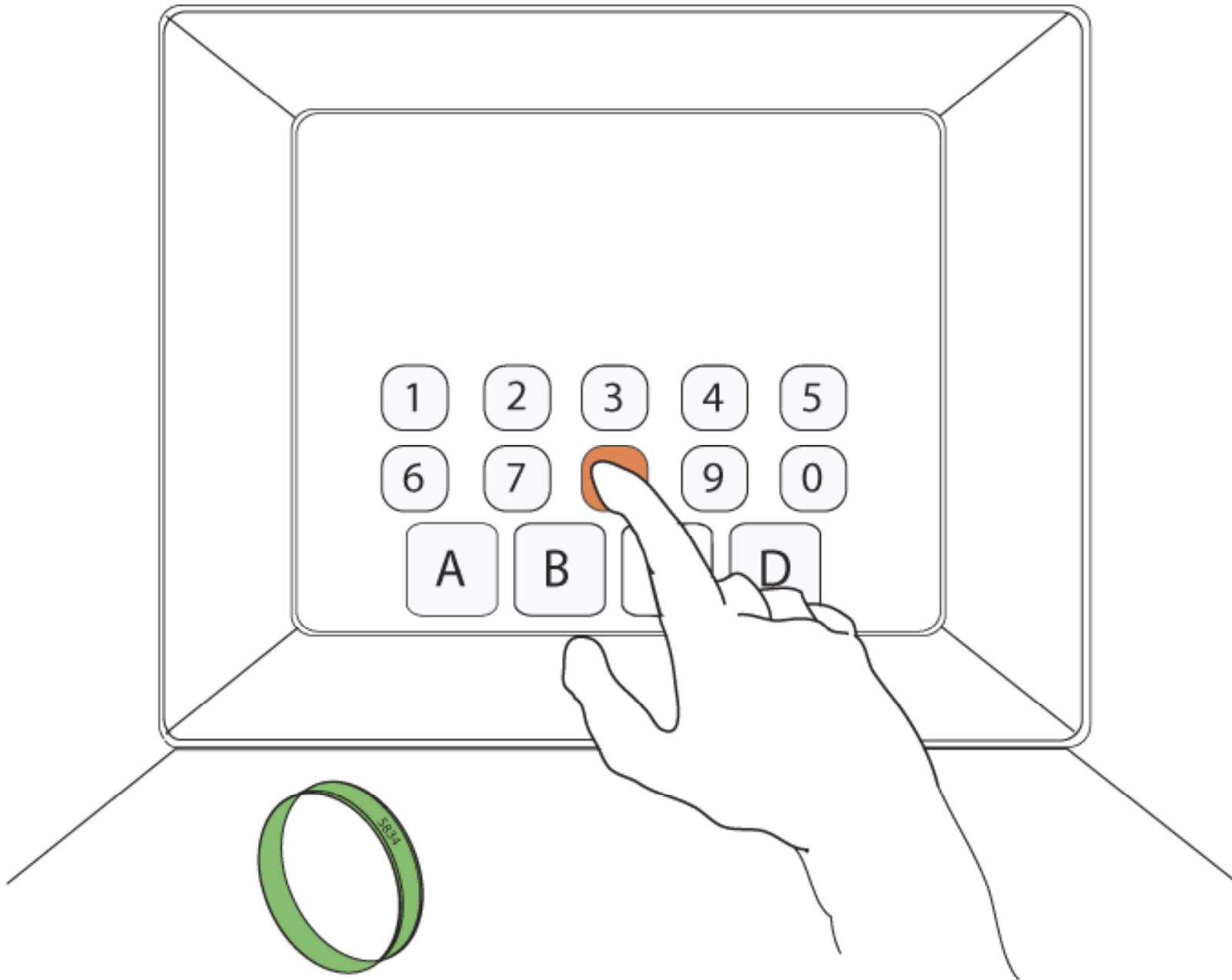
# User Experience | Villager Enters Data into a Drop Box Kiosk

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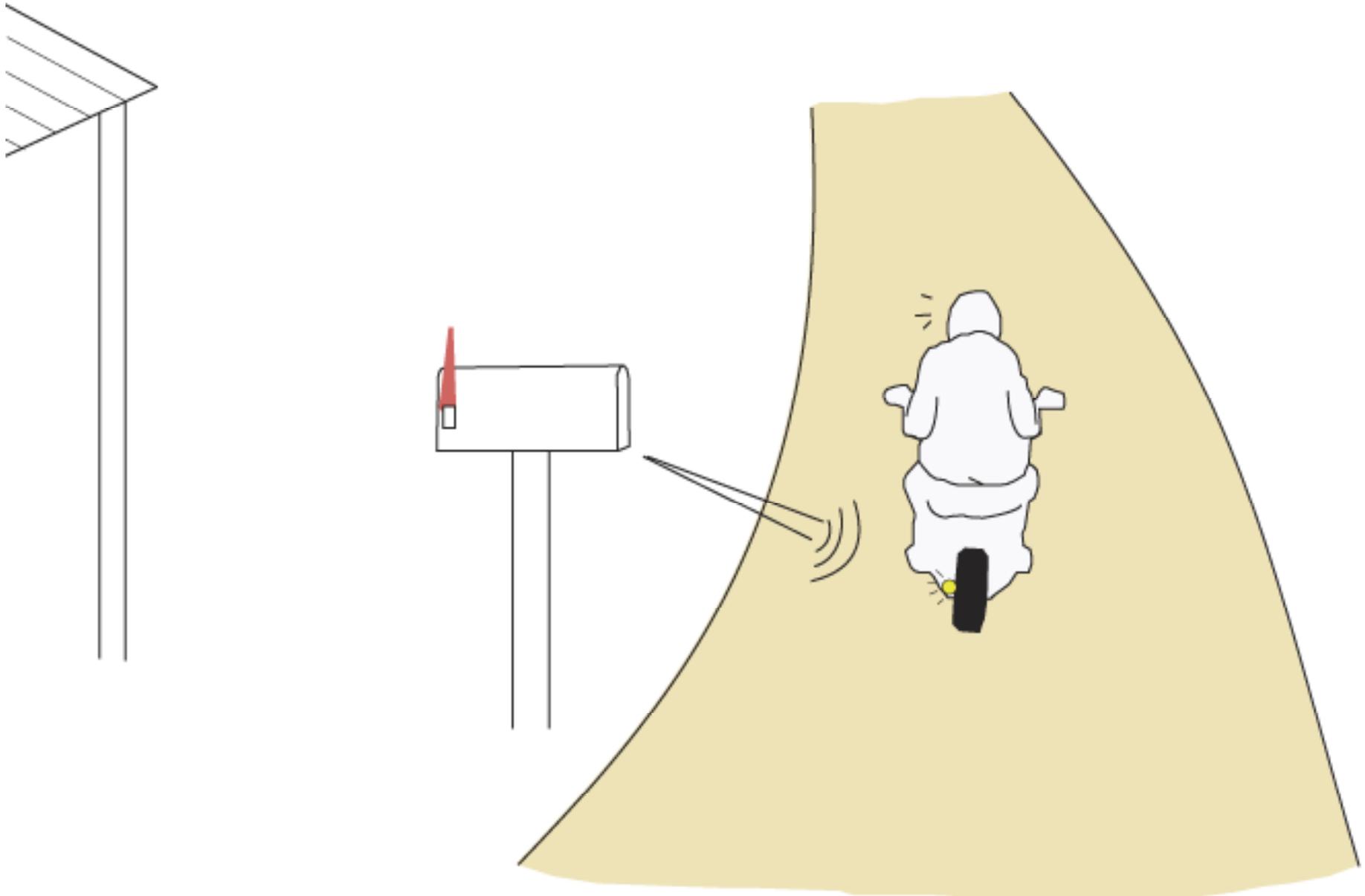
## User Experience | Villager Can Enter ID# for Confidentiality

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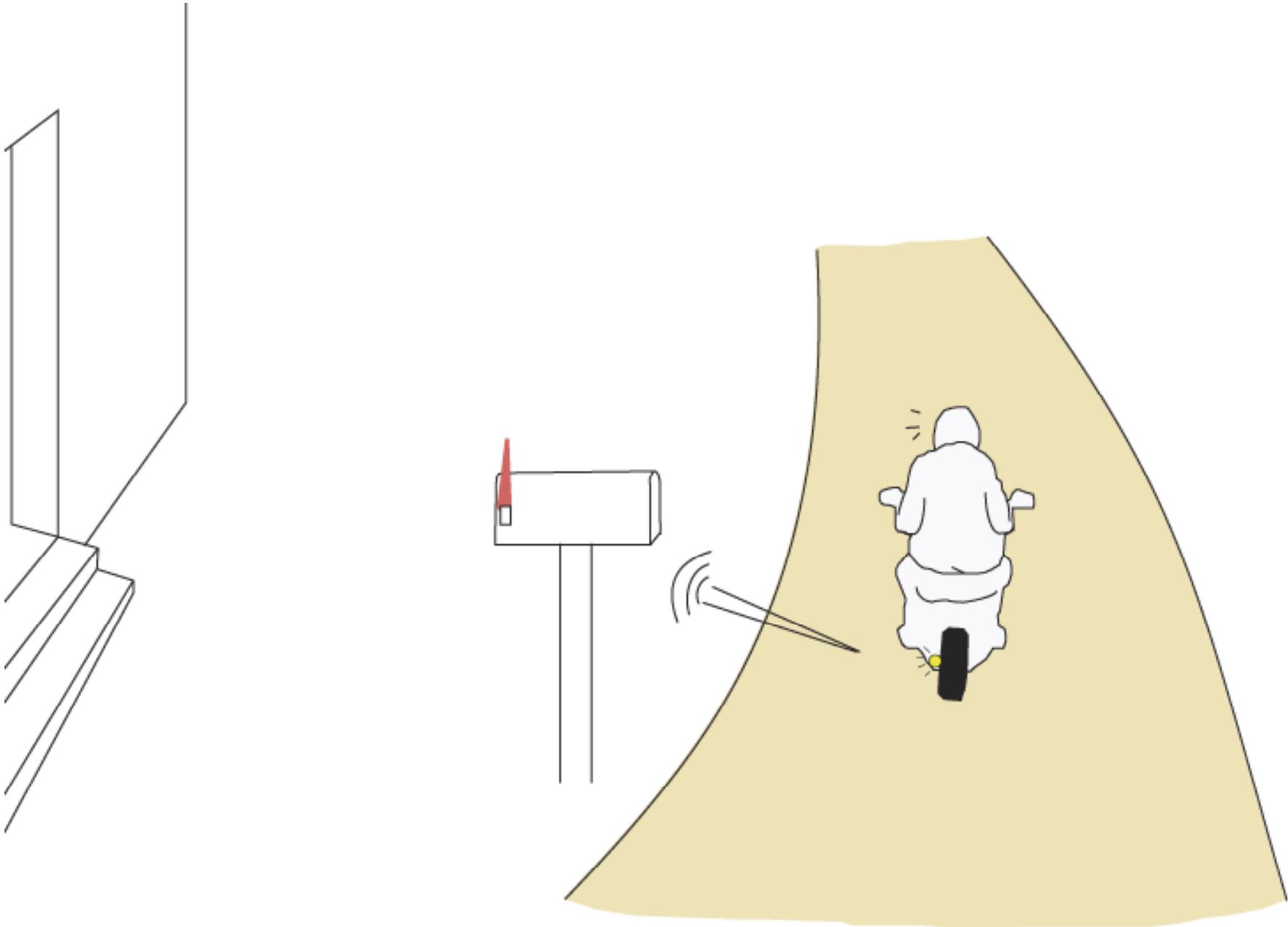


# User Experience | Village Kiosk Relays Data to Passing Motorist

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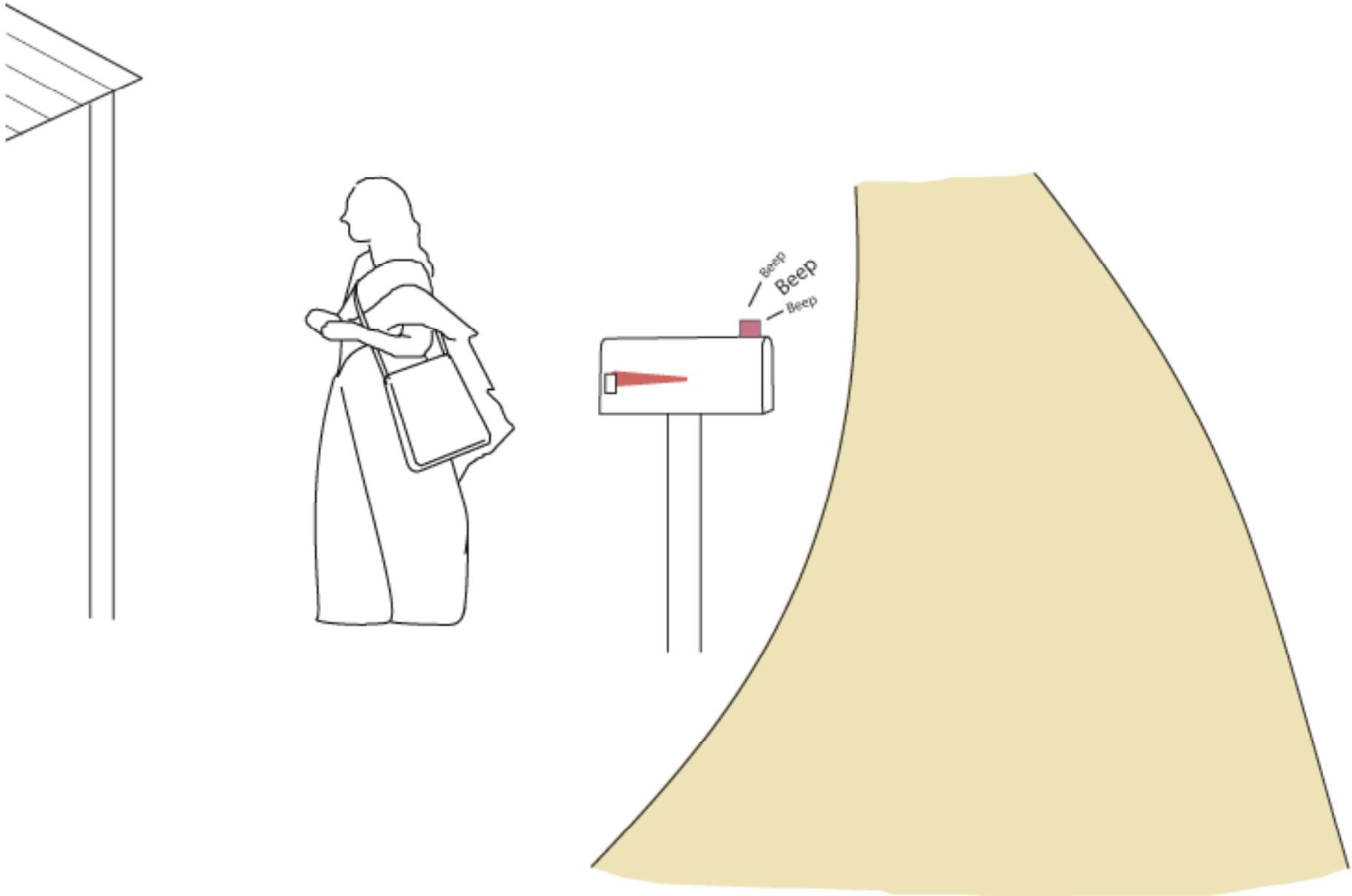


# User Experience | Motorist Transports and Relays Back to ANM Kiosk



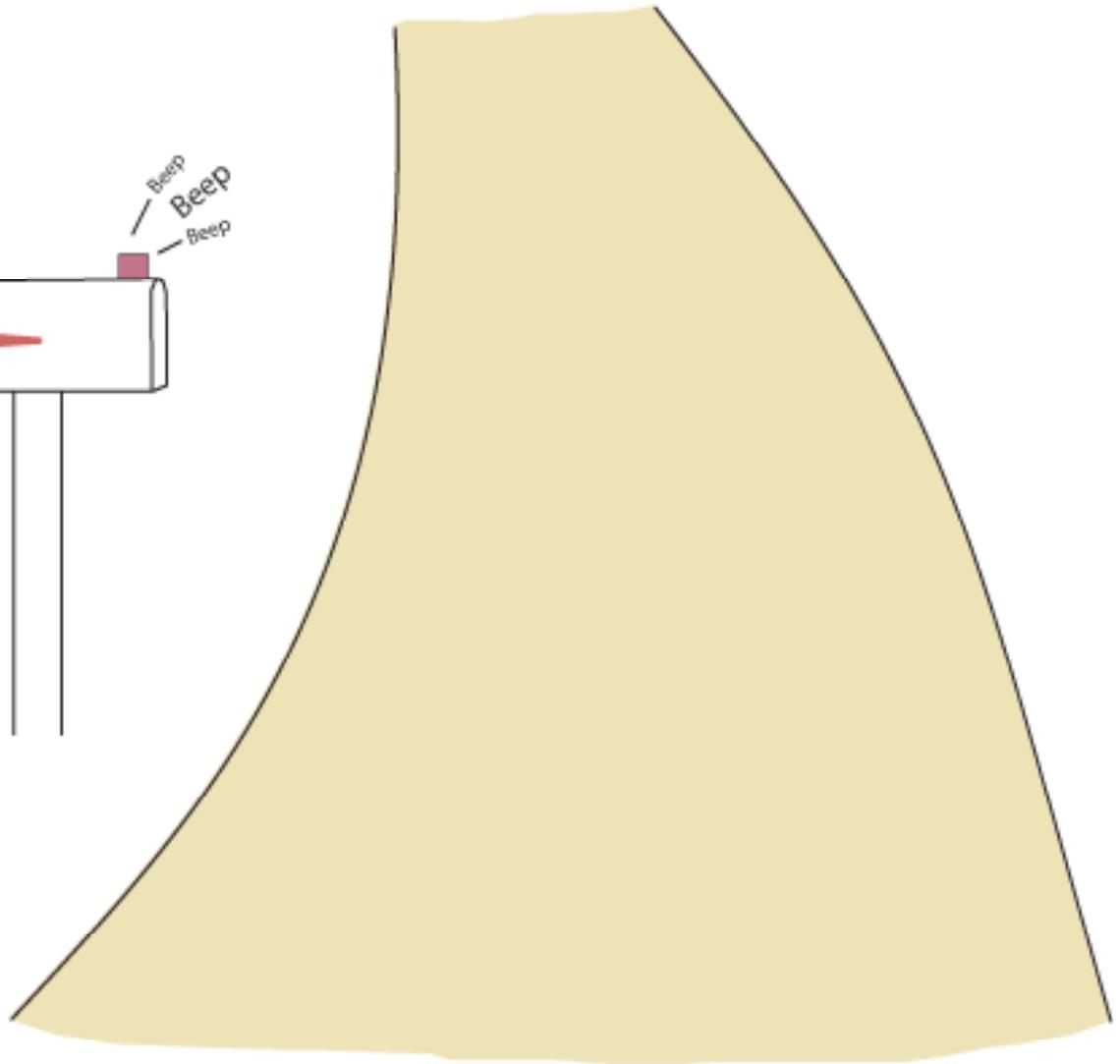
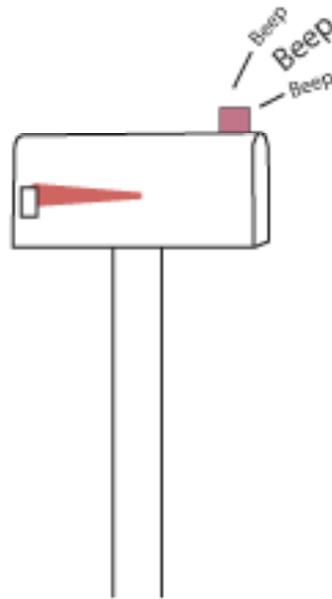
# User Experience | ANM Sends/Receives Messages to/from Kiosk

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## User Experience | Villager Checks Back for Response from ANM

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## Considerations | RFID Technology

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- » kiosk can be positioned as much as 300 feet away from passing vehicles
- » power/electricity issues for village terminals
- » RFID devices are robust; village terminals would be custom designed
- » exact locations of transmitters, transponders and receivers on vehicles
- » potential RFID privacy/security issues at a high level
- » analog possibilities

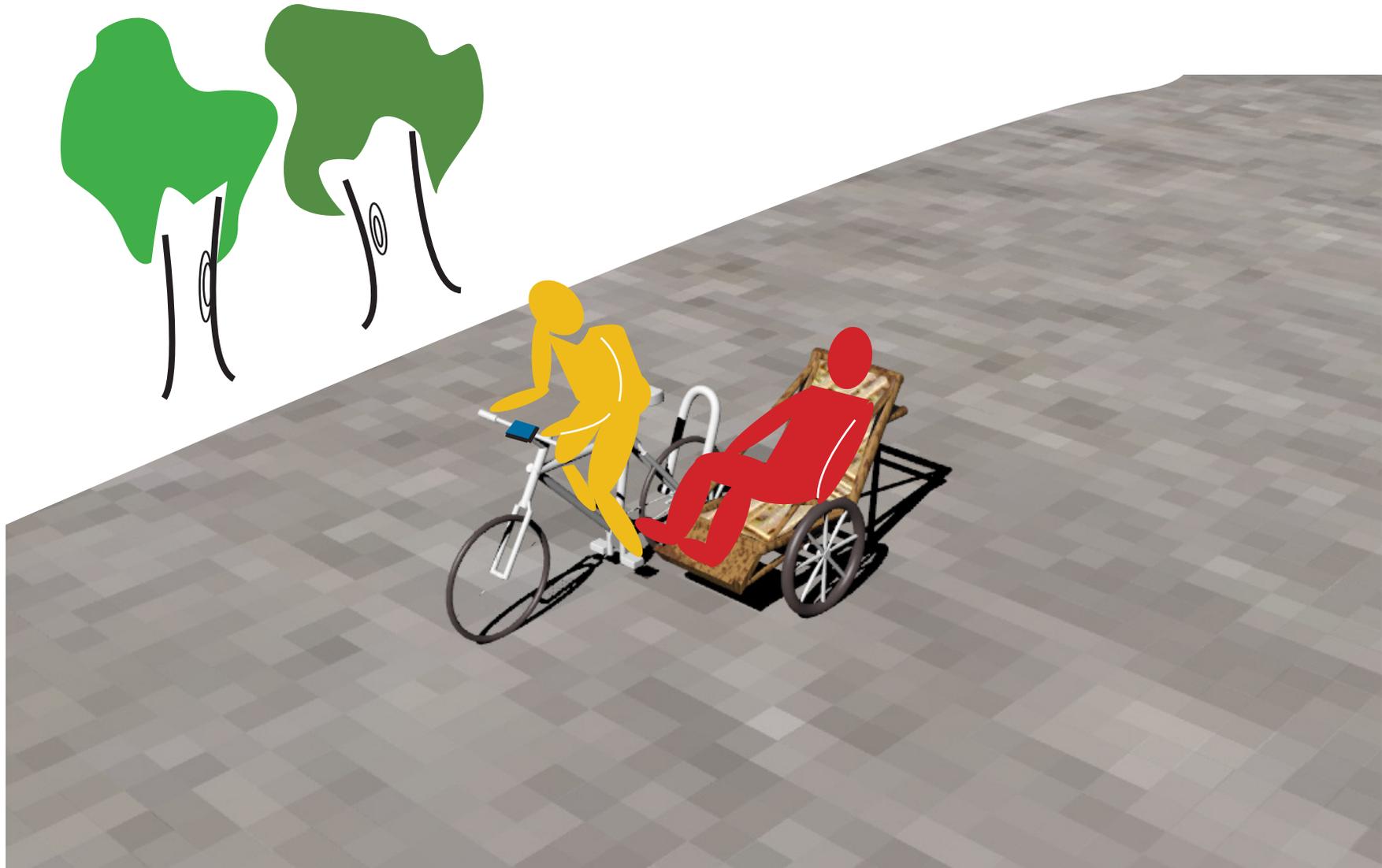


# Extension Product | Patient Transport with Motorist Alert Signal



## Extension Product | Transport Attachable to Several Vehicle Types

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Connecting |  
| Integrating  
Communicating |  
| Facilitating





Digital WOM | A Communication System

# The Distribution of Medicine in India

# Research | Research From Nakul

20 pages of photos with captions

7 pages of additional research information

Will upload to iGroups to share with class



# Analysis

# Analysis | POEMS sort

We started by listing the key insights gathered by Nakul

We sorted the insights using POEMS and also by their correlation with three topics: Communication, Medicine, and Transportation

## Insights

P	O	E	M	S	Issues	meds	transp	comm
x	x			x	ANMs carry basic meds and vaccinations	x	x	
	x			x	keep huge numbers of ice packs on hand	x	x	
	x			x	cold chain for moving vaccines dependent on ice pack	x	x	
	x			x	medicines are shipped in large plain boxes	x	x	
			x	x	medicine deliveries come monthly; uncertainty when	x	x	x
x				x	people don't know proper dosage for drugs	x		x
	x		x	x	@PHU, shortage of meds and no phone	x		x
				x	private pharmacies make medicines available	x		
			x	x	ineffective tracking of medicine use and dispensing	x		x
				x	medicines run out	x		
x				x	patient must go through a lot of stops when intermittent clinics can't help them if they have a big problem		x	
x				x	no support staff @ PHC			
x			x	x	some villages have 24hr access to ANM			
x		x		x	clinics are crowded			
x				x	ANMs visit once every two weeks			
	x			x	electricity unreliable			
	x			x	there isn't enough equipment			
				x	laborers make ~\$1 a day, 50c per day for food; insurance would cost 02c per day			
				x	loans for healthcare cause rural debt			
		x		x	hygiene sucks			
x	x				medicines make people tired, so they often don't take them	x		
x			x		little communication with medicine vendors	x		x
x		x			social stigmas often prevent compliance	x		x
	x				medicines not well catalogued or organized	x		x
	x		x		medicines are poorly marked	x		x
	x				tablets are often counted by hand	x		
x			x		patients don't know if doctor will be available until they arrive at clinic		x	x
x					low literacy			x
x		x			cultural habits cause people to wait 2 days trying herbal medicines & quacks before finding a doctor			x

# Analysis | Semantic Profile of Medical Care Givers

Put all medical care givers through semantic profile to see opportunities

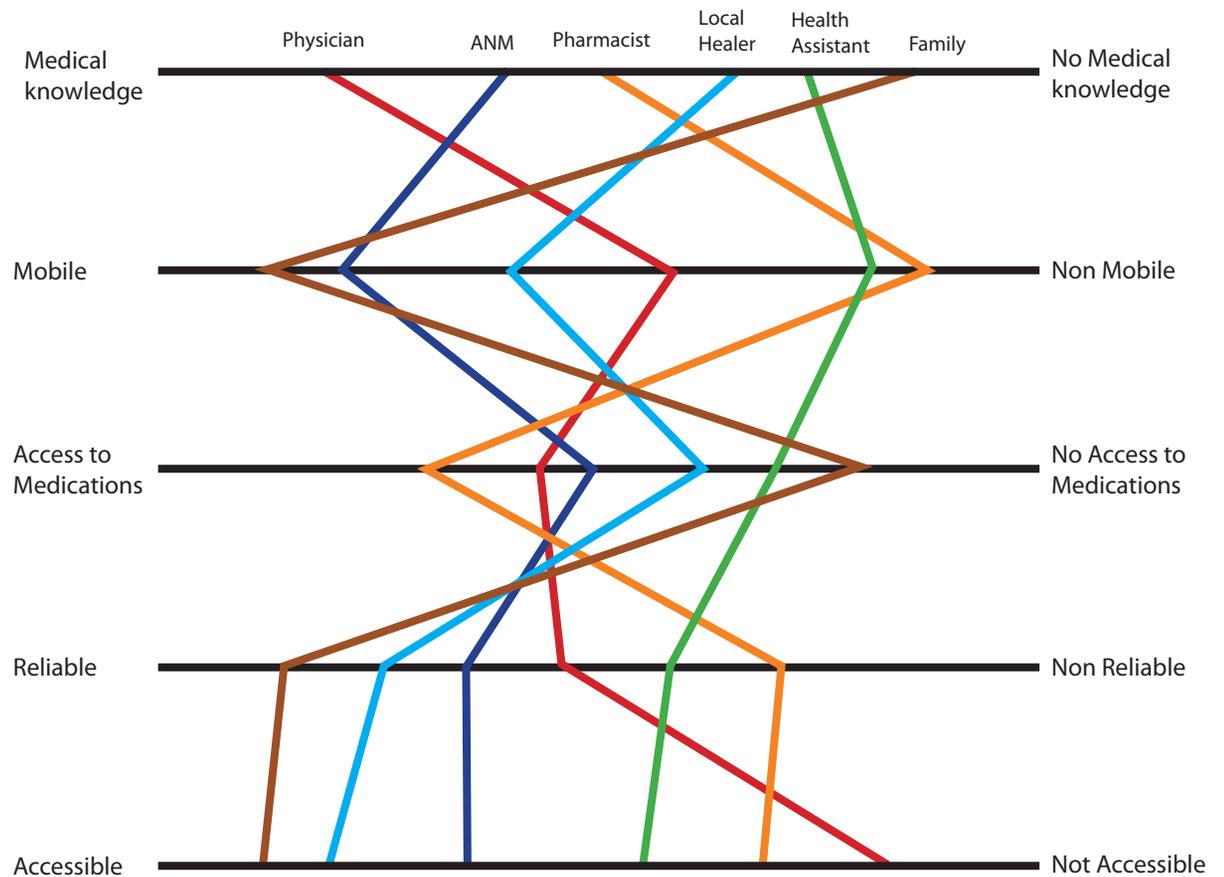
Insights:

ANM and the local healer have similar roles in the community

No one has great access to medications

Knowledge and medications are difficult to access

ANM position has value



# Concepts

# Concept | Using Local Leadership and Skills

## Observations:

There are several key figures in the villages that have skills that we could potentially leverage.

These figures have high accessibility, reliability, and mobility.



Post Office

reliable delivery chain  
banking capacity  
record keeping



Police

respected leaders  
authority within village



Quack

have limited medical knowledge  
not necessarily respected or reliable

## Concept:

Educating/training panchayat, anganwadi, or the local healer to administer medication.

Greater access

Local medical knowledge source



Local Healer

respected source of medical knowledge  
knowledge of traditional medicine



Anganwadi

able to work with women and children  
working to educate women and children about healthcare



Panchayat

leadership council  
deal more with legislative issues  
conflict resolution

# Concept | Improve supply chain

Medicine usage is rarely tracked

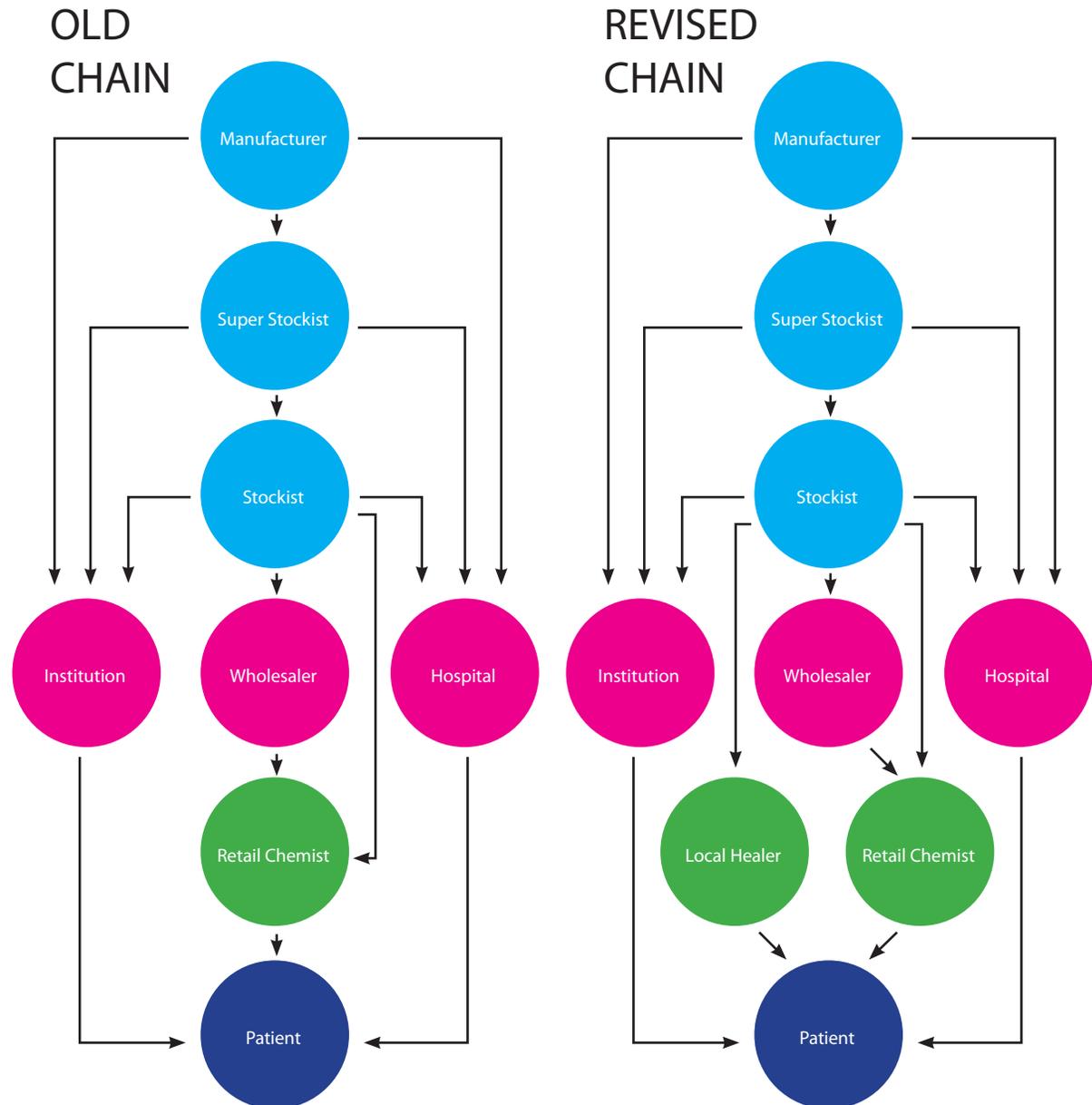
Pharmacies have insufficient supplies

Much of what they have is old and expired

Problems with pilferage at the district level

How can we improve the supply chain?

Potential to add new position in individual villages or leverage current leadership



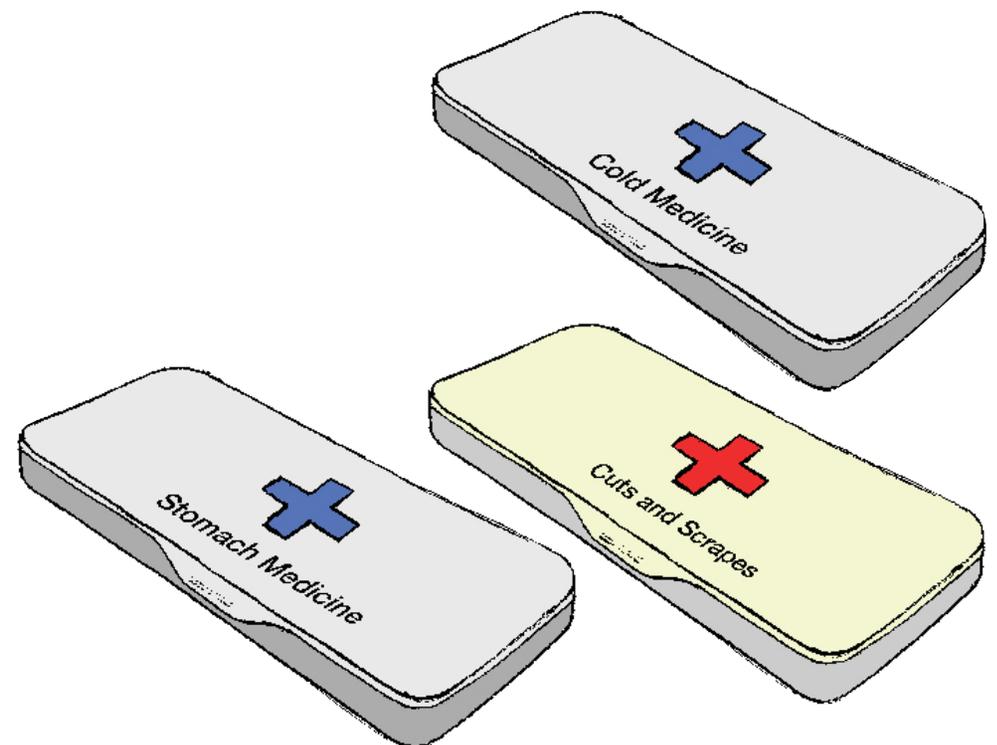
# Concept | Modular Medical Kits

Small modular medical kits that would be available at low cost through a local leader or resource

Would be regulated and restocked by the ANM

Kits would include cards that would visually indicate how the medicine should be used

Kits for the most common ailments



# Concept | A better method of shipping medicines

The shipment of medicine to pharmacies is unreliable

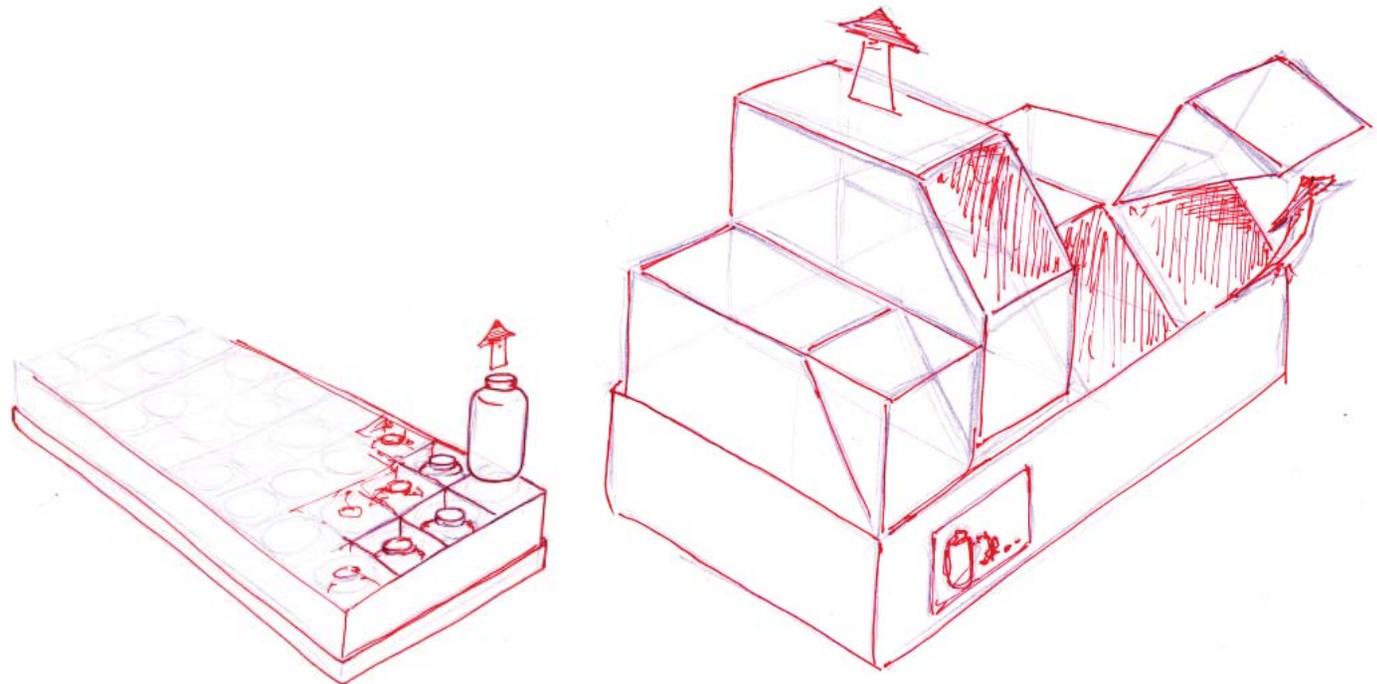
Medicine storage at pharmacies is unorganized

There are old, spoiled medicines mixed in with fresh ones

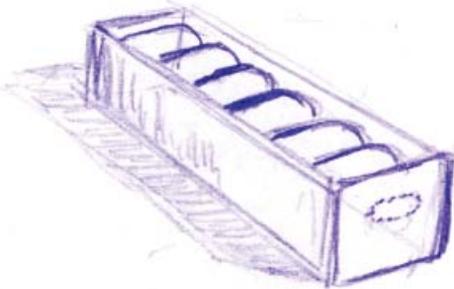
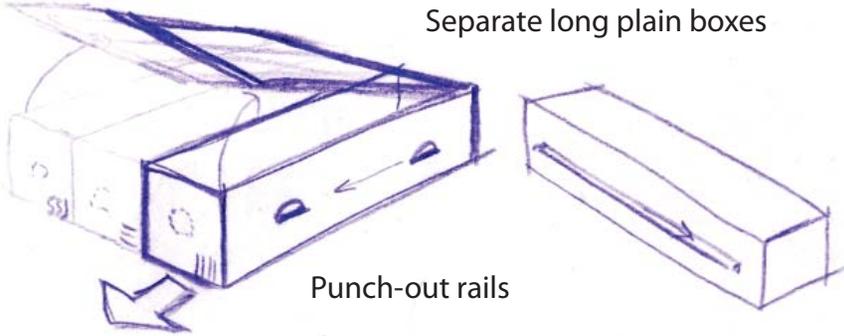
Medicines are put in large boxes and not sorted out

We could ship things in ways that will keep items organized once they reach the pharmacy

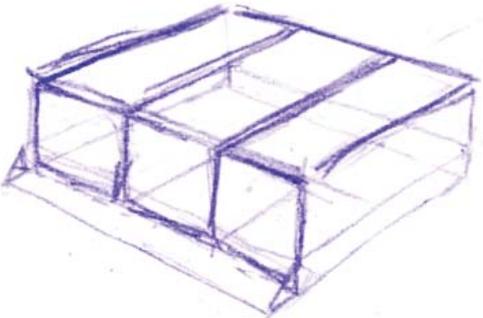
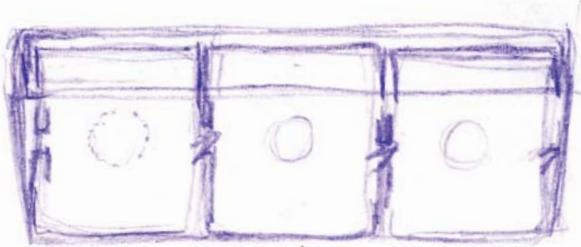
Modular containers or better systems or packing could improve the distribution of medicine



# Concept | Flexible Packaging System



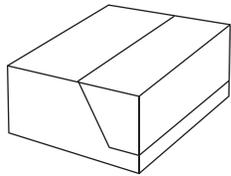
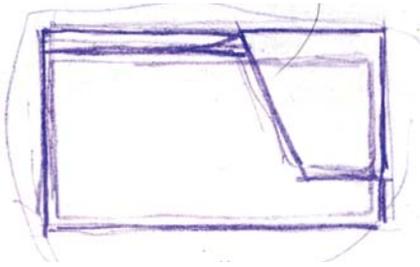
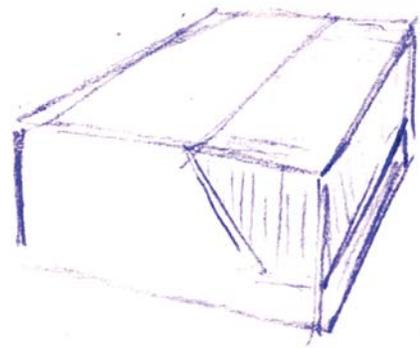
Separate lid to hold in contents of multiple boxes



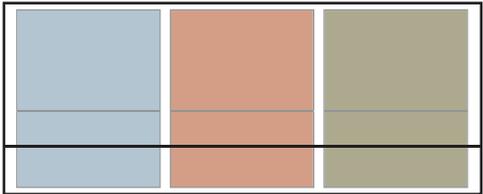
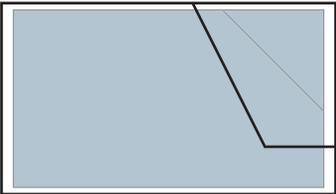
Lid turns over to hold boxes together; front opens so boxes can slide out like drawers.



# Concept | Flexible Packaging System



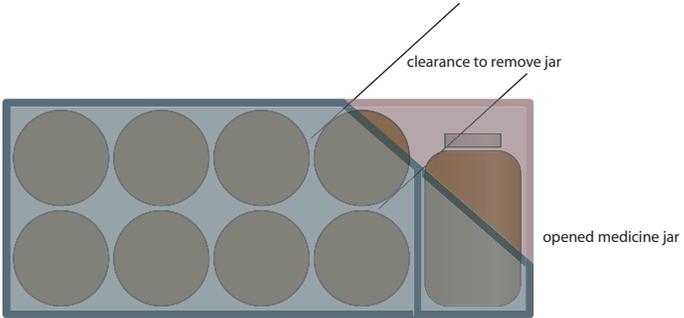
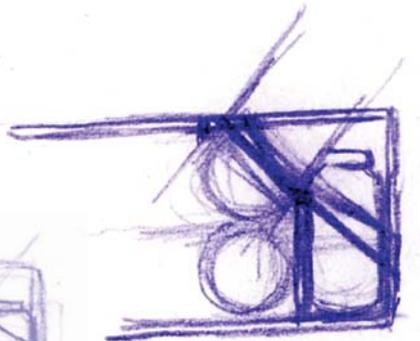
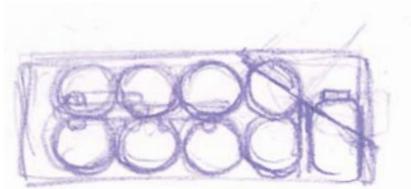
Outer container with smaller individual units



left side

front

Individual unit packaging with front holder for open bottles.



A photograph of a rural Indian room. In the foreground, a woman wearing a yellow and green patterned sari sits on a bed covered with white sheets. She is looking towards the camera. In the background, another person is lying on the bed, partially covered with a pink blanket. The room has light blue walls and a yellow door. A window with a white frame is visible above the door. The floor is made of concrete tiles.

# Healthcare in Rural India **Concept Generation**

*John Ekholm, Pushkar Vichare, Syed Khan, Taeho Wang*

*Product Design Workshop  
Spring, 2007*

# Problems - insight matrix

Poor hygiene at PHC  
 Lack of appropriate sterilization equipment  
 Poor quality of patient beds  
 Poor quality of building  
 Irregular electrical supply  
 Overload of patients at PHC  
 Lack of regular transportation to PHC  
 Lack of emergency transportation  
 Absenteeism  
 No way to tell if PHC is open prior to travel  
 Lack of sufficient medicine  
 Difficulty maintaining "cold chain"  
 Patients may need to visit multiple clinics for diagnosis  
 Lack of transportation for ANMs  
 Lack of individual patient records  
 Lack of communication between village and PHC  
 Lack of suitable patient wards  
 Lack of facilities for natal care  
 Limited diagnostic equipment availability  
 Lack of appropriate storage facilities  
 Cumbersome governmental record keeping  
 Limited privacy  
 No dedicated facilities for vaccine preparation  
 No standardized ANM record keeping  
 no appropriate biohazard disposal methods  
 Long lines at PHC  
 Loss of wages when visiting PHC  
 illiteracy limits dissemination of info  
 infrequency of anm visits to villages

Poor hygiene at PHC	3	3	3	3	1	2	0	0	2	0	1	1	1	0	0	0	2	2	0	2	0	1	3	0	3	1	0	0	0
Lack of appropriate sterilization equipment	3	3	2	2	2	0	0	0	0	0	1	1	1	0	0	0	1	1	2	1	0	1	3	0	3	0	0	0	0
Poor quality of patient beds	3	2	3	3	1	1	0	0	1	0	1	0	0	0	0	0	3	3	1	2	0	3	1	0	0	1	0	0	
Poor quality of building	3	2	3	3	3	2	0	0	2	0	1	1	0	0	0	0	3	3	1	3	0	3	2	0	2	1	0	0	
Irregular electrical supply	1	2	1	3	3	0	0	0	0	0	2	3	0	0	0	1	2	2	1	2	0	0	0	0	1	0	0	0	
Overload of patients at PHC	2	0	1	2	0	3	2	1	3	1	3	0	2	1	2	3	2	1	2	1	2	3	1	1	0	3	2	2	3
Lack of regular transportation to PHC	0	0	0	0	0	2	3	3	2	2	0	0	3	3	0	2	0	0	0	0	0	0	0	0	0	2	3	1	2
Lack of emergency transportation	0	0	0	0	0	1	3	3	0	1	0	0	2	3	0	1	0	0	0	0	0	0	0	0	0	2	2	0	0
Absenteeism	2	0	1	2	0	3	2	0	3	3	0	0	1	1	0	1	0	0	0	1	1	0	0	0	2	0	0	1	
No way to tell if PHC is open prior to travel	0	0	0	0	0	1	2	1	3	3	0	0	1	1	0	3	0	0	0	0	0	0	0	0	0	2	2	1	1
Lack of sufficient medicine	1	1	1	1	2	3	0	0	0	0	3	3	1	0	1	0	1	0	1	1	1	0	2	0	1	1	0	0	
Difficulty maintaining "cold chain"	1	1	0	1	3	0	0	0	0	0	3	3	0	2	0	0	0	0	0	3	0	0	3	0	1	0	0	0	
Patients may need to visit multiple clinics for diagnosis	1	1	0	0	0	2	3	2	1	1	1	0	3	1	3	1	0	2	3	0	1	0	0	0	2	3	1	1	
Lack of transportation for ANMs	0	0	0	0	0	1	3	3	1	1	0	2	1	3	0	2	0	0	0	0	0	0	0	2	0	1	1	0	3
Lack of individual patient records	0	0	0	0	0	2	0	0	0	0	1	0	3	0	3	1	0	0	0	0	3	1	0	3	0	1	0	0	0
Lack of communication between village and PHC	0	0	0	0	1	3	2	1	1	3	0	0	1	2	1	3	0	0	0	0	0	1	0	3	0	2	2	2	3
Lack of suitable patient wards	2	1	3	3	2	2	0	0	0	0	1	0	0	0	0	0	3	3	1	2	0	3	2	0	1	1	0	0	0
Lack of facilities for natal care	2	1	3	3	2	1	0	0	0	0	0	0	2	0	0	0	3	3	1	2	0	3	2	0	1	0	0	0	0
Limited diagnostic equipment availability	0	2	1	1	1	2	0	0	0	0	1	0	3	0	0	0	1	1	3	0	0	0	1	0	0	1	2	0	0
Lack of appropriate storage facilities	2	1	2	3	2	1	0	0	1	0	1	3	0	0	0	0	2	2	0	3	1	0	3	0	2	0	0	0	0
Cumbersome governmental record keeping	0	0	0	0	0	2	0	0	1	0	1	0	3	0	0	0	0	0	0	1	3	0	0	1	0	0	0	0	0
Limited privacy	1	1	3	3	0	3	0	0	0	0	0	0	1	1	3	3	0	0	0	0	3	0	1	0	2	0	0	0	0
No dedicated facilities for vaccine preparation	3	3	1	2	0	1	0	0	0	0	2	3	0	0	0	0	2	2	1	3	0	0	3	0	2	0	0	0	0
No standardized ANM record keeping	0	0	0	0	0	1	0	0	0	0	0	0	2	3	3	0	0	0	0	1	1	0	3	0	0	0	0	0	1
no appropriate biohazard disposal methods	3	3	0	2	1	0	0	0	0	0	1	1	0	0	0	0	1	1	0	2	0	0	2	0	3	0	0	0	0
Long lines at PHC	1	0	1	1	0	3	2	2	2	2	1	0	2	1	1	2	1	0	1	0	0	2	0	0	0	3	2	2	2
Loss of wages when visiting PHC	0	0	0	0	0	2	3	2	0	2	0	0	3	1	0	2	0	0	2	0	0	0	0	0	0	2	3	1	2
illiteracy limits dissemination of info	0	0	0	0	0	2	1	0	0	1	0	0	1	0	0	2	0	0	0	0	0	0	0	0	0	2	1	3	0
infrequency of anm visits to villages	0	0	0	0	0	3	2	0	1	1	0	0	1	3	0	3	0	0	0	0	0	0	0	1	0	2	2	0	3

**Key**  
 0 1 2 3  
 Mais 10,0

# Problems - insight matrix



- Poor hygiene at PHC
- Lack of appropriate sterilization equipment
- Poor quality of patient beds
- Poor quality of building
- Irregular electrical supply
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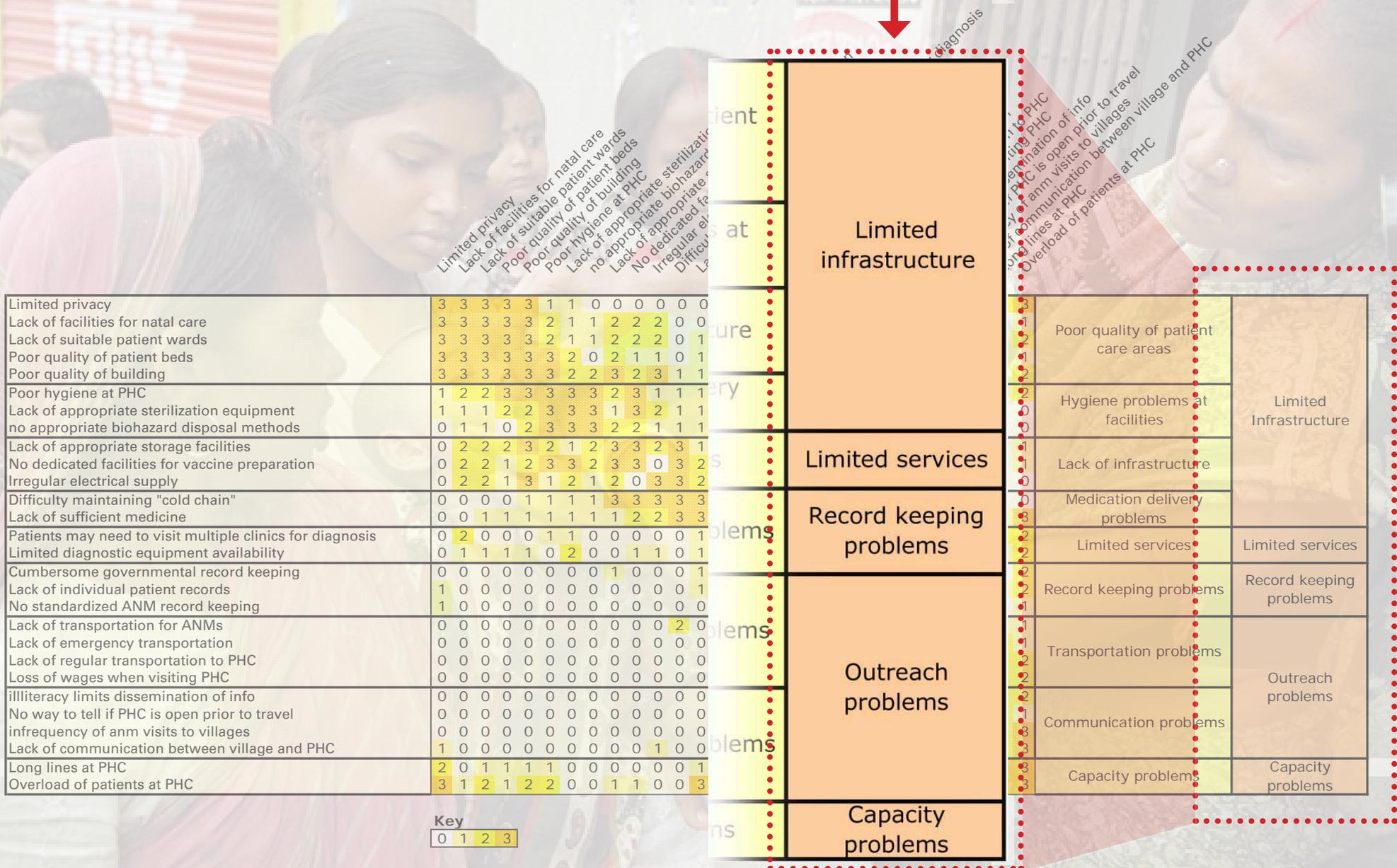
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Key  
0 1 2 3  
Mais 10,0



# Problems - Design opportunities

## Major Categories



# Problems - Design opportunities

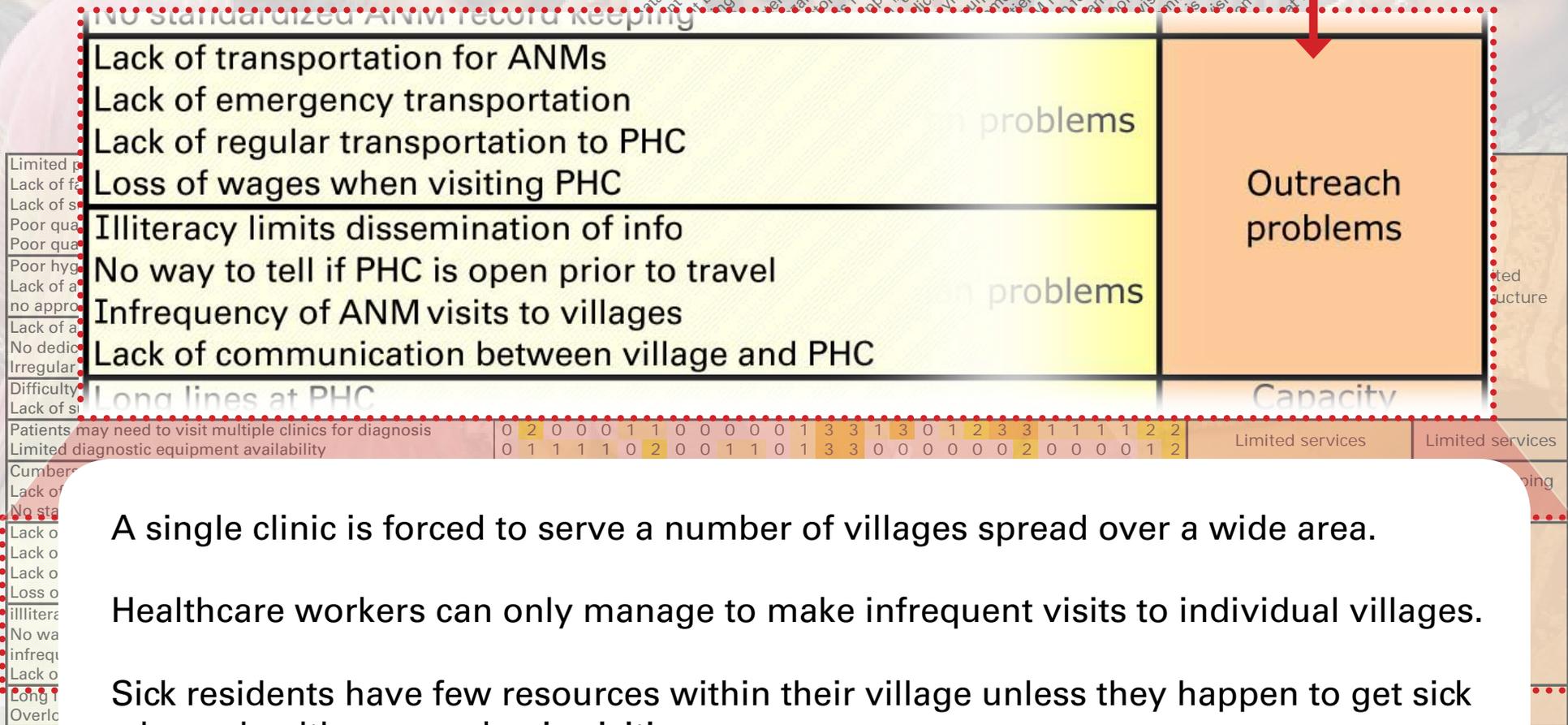
**Design opportunities**

Limited patient care Lack of beds Lack of sterilization equipment Poor disposal methods for vaccine preparation Poor quality of vaccine No way to tell if PHC is open prior to travel No dedicated staff Irregular visits to PHC	<p>NO standardized ANM record keeping</p> <p>Lack of transportation for ANMs</p> <p>Lack of emergency transportation</p> <p>Lack of regular transportation to PHC</p> <p>Loss of wages when visiting PHC</p> <p>Illiteracy limits dissemination of info</p> <p>No way to tell if PHC is open prior to travel</p> <p>Infrequency of ANM visits to villages</p> <p>Lack of communication between village and PHC</p> <p>Long lines at PHC</p>	<p>Outreach problems</p> <p>Capacity</p>																																																																																																																																																																																																																																																																																																																																																																																																																																		
<p>Patients may need to visit multiple clinics for diagnosis</p> <p>Limited diagnostic equipment availability</p> <p>Cumbersome governmental record keeping</p> <p>Lack of individual patient records</p> <p>No standardized ANM record keeping</p> <p>Lack of transportation for ANMs</p> <p>Lack of emergency transportation</p> <p>Lack of regular transportation to PHC</p> <p>Loss of wages when visiting PHC</p> <p>Illiteracy limits dissemination of info</p> <p>No way to tell if PHC is open prior to travel</p> <p>Infrequency of anm visits to villages</p> <p>Lack of communication between village and PHC</p> <p>Long lines at PHC</p> <p>Overload of patients at PHC</p>	<table border="1"> <tr> <td>0</td><td>2</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>3</td><td>3</td><td>1</td><td>3</td><td>0</td><td>1</td><td>2</td><td>3</td><td>3</td><td>1</td><td>1</td><td>1</td><td>1</td><td>2</td><td>2</td> </tr> <tr> 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# Problems - Design opportunities

**Design opportunities**



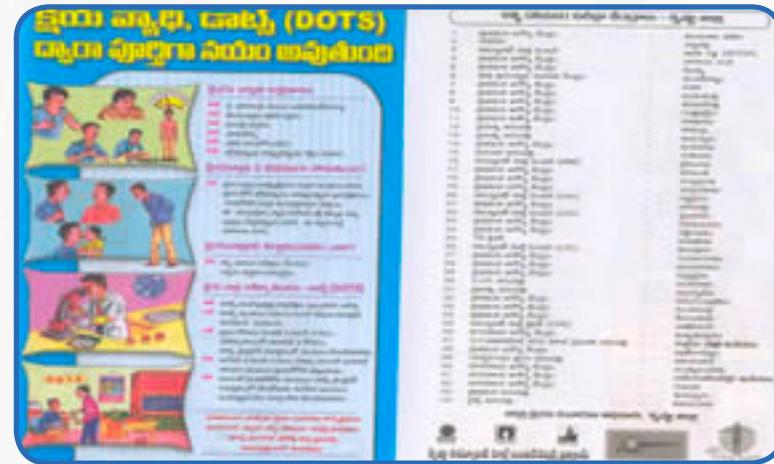
- A single clinic is forced to serve a number of villages spread over a wide area.
- Healthcare workers can only manage to make infrequent visits to individual villages.
- Sick residents have few resources within their village unless they happen to get sick when a healthcare worker is visiting.
- Transportation is difficult for both patients and healthcare workers.

# Health Stop

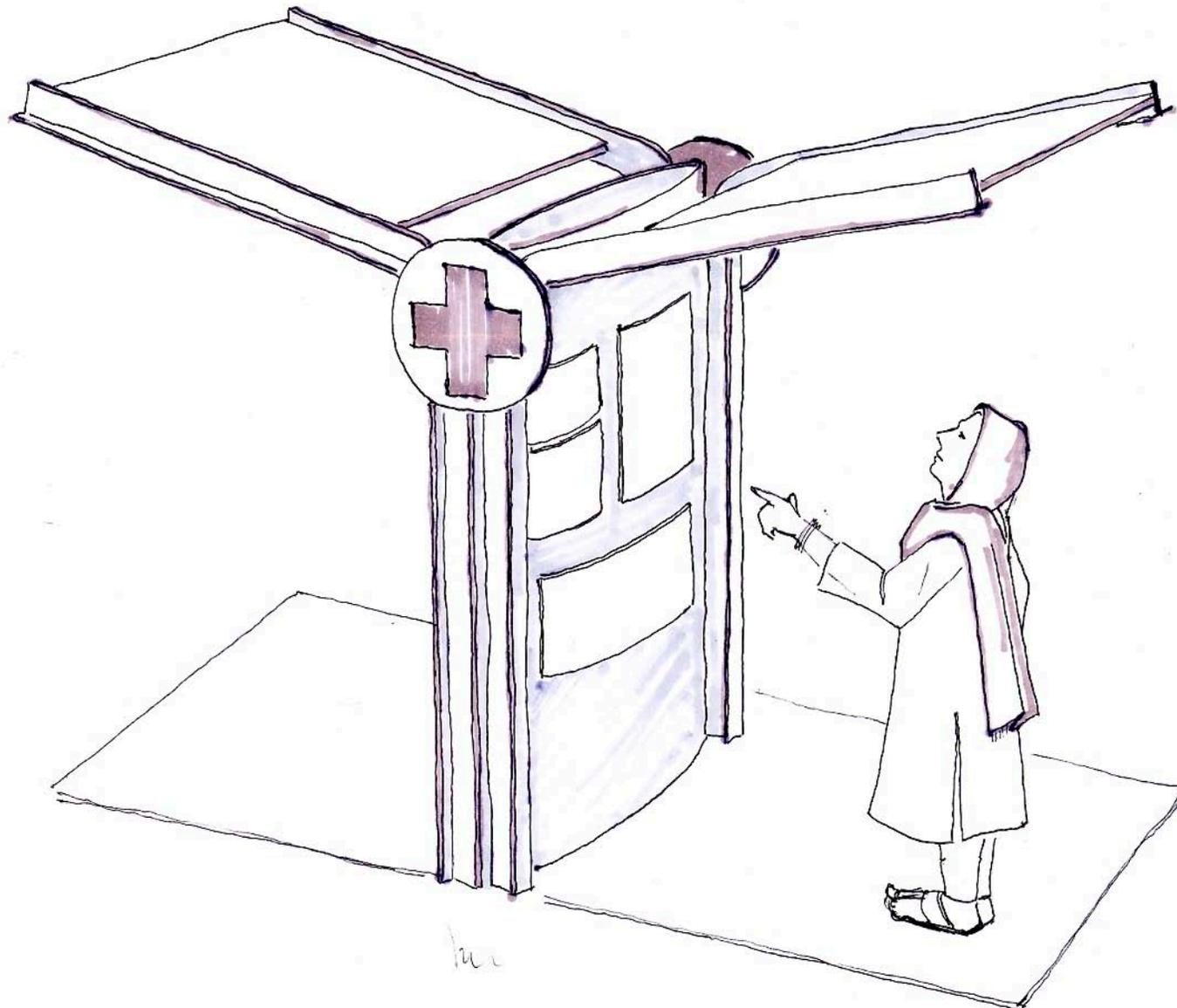
## Insights/problems



- Current methods of disseminating health and hygiene information are limited.
- Many villages have no structure dedicated to healthcare.
- Patients rarely have a means of transportation to the local clinic.

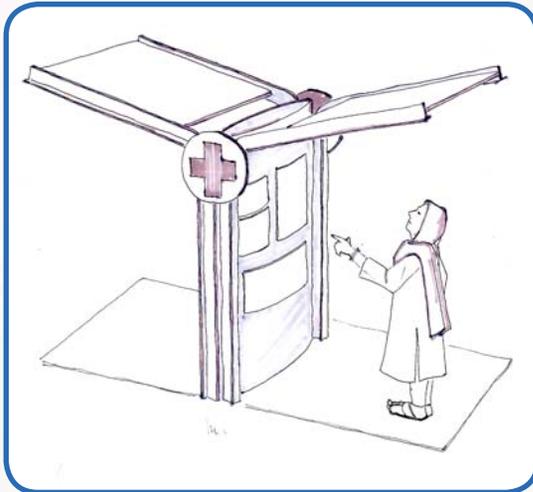


# Health Stop



# Health Stop

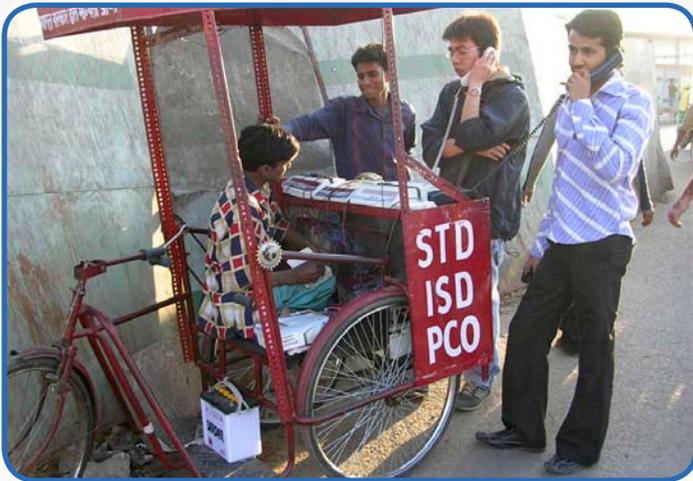
## Concept



- The “Health Stop” would serve as a meeting place for health related matters.
- Health information and advisories could be posted at the health stop.
- Patients seeking transportation to the local PHC, and those who can offer transportation could use the health stop as a meeting place.
- ANMs could use the health stop as a base of operations within each village.

# Health Stop

## Alternative version



- The “Health Stop” could be maintained and staffed by a local individual, providing a greater range of services, as well as income for its proprietor.

- The “Health Stop” worker would serve to facilitate communication between village residents and healthcare workers.



- Residents needing to contact healthcare workers could leave messages with the health stop worker, who would pass the messages on to an ANM or doctor in a daily briefing.

- In emergency situations, the health stop worker would be able to notify doctors of the patient’s condition and location.

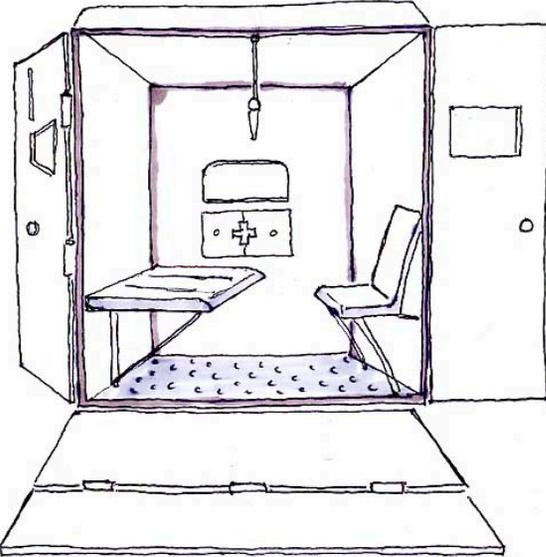
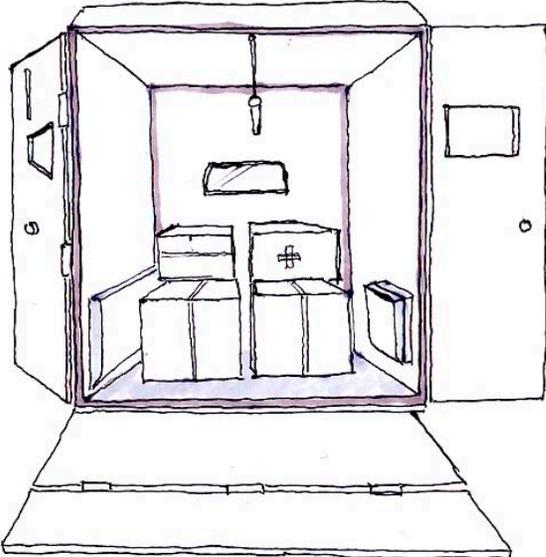
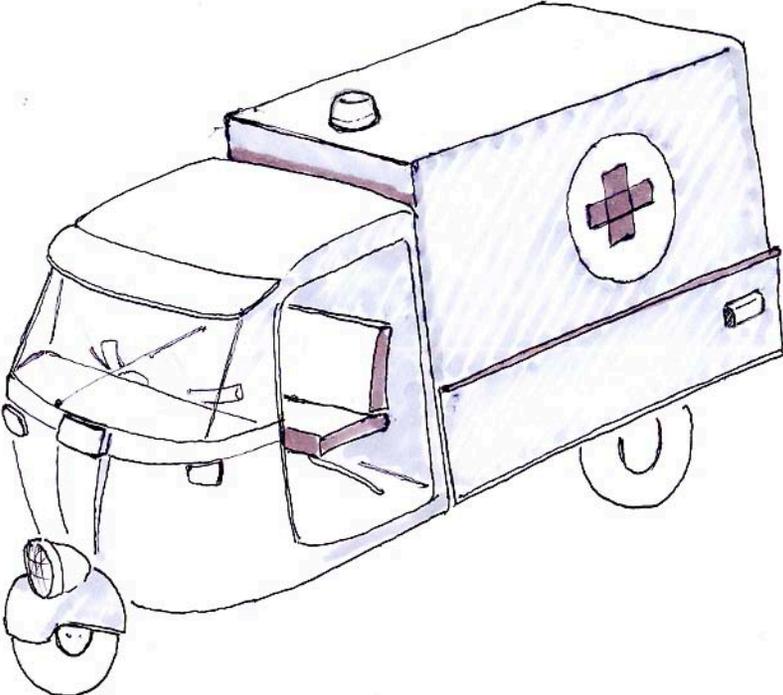
# Autorickshaw Based Ambulance

## Insights/problems



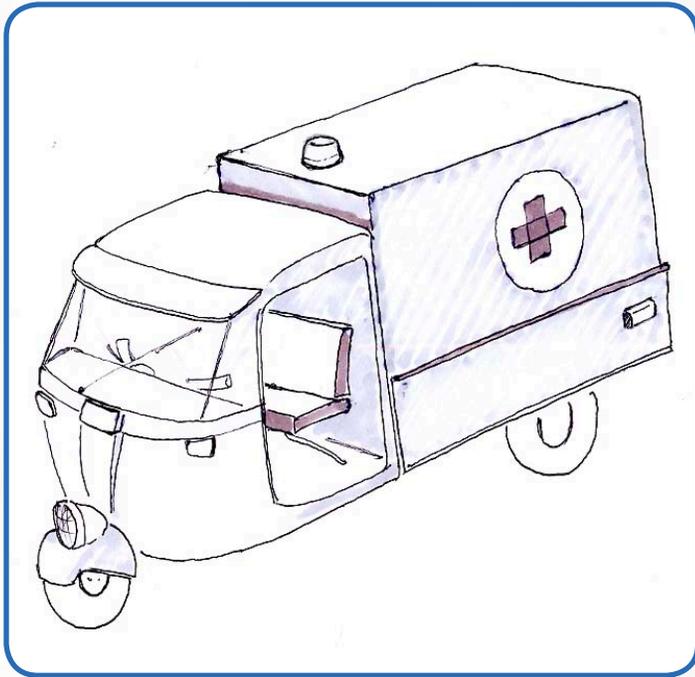
- Doctors and ANM's often lack proper transportation to and from villages.
- Most areas lack ambulance services for patient transportation.
- The lack of resources limits the implementation of new transportation methods.

# Autorickshaw Based Ambulance



# Autorickshaw Based Ambulance

## Concept



- The autorickshaw based ambulance would allow existing auto rickshaws to be converted for use as an ambulance.
- Incorporates basic healthcare amenities for transporting critically ill patients and providing basic treatment within villages.
- Provides a suitable means of transportation for doctors and ANM's to use to visit villages and transport supplies.

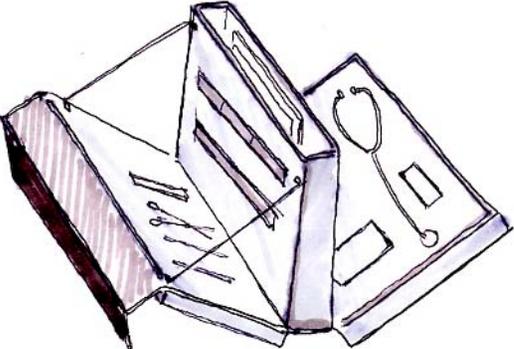
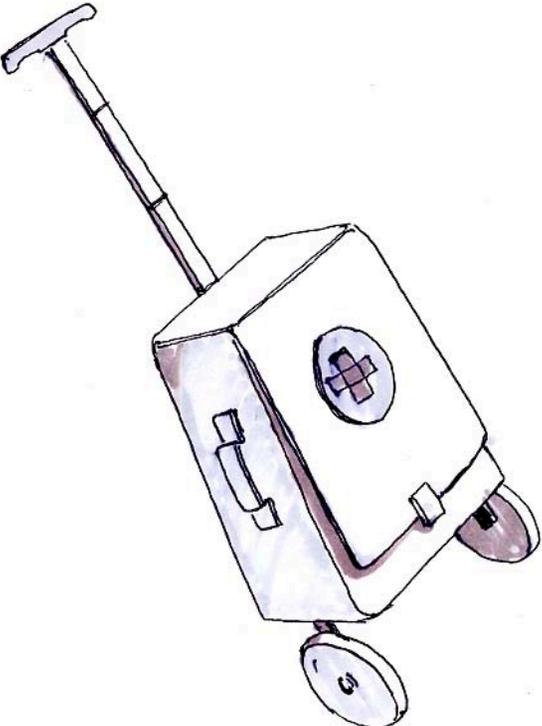
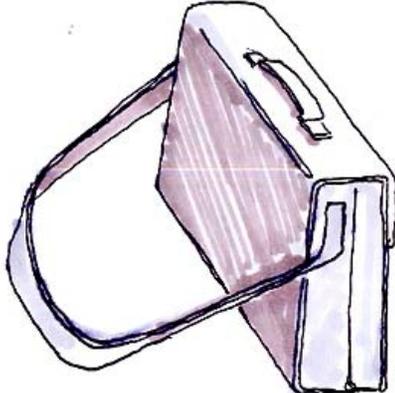
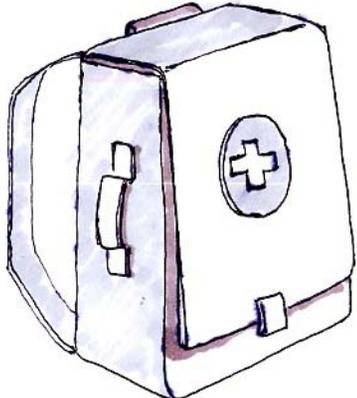
## Insights/problems



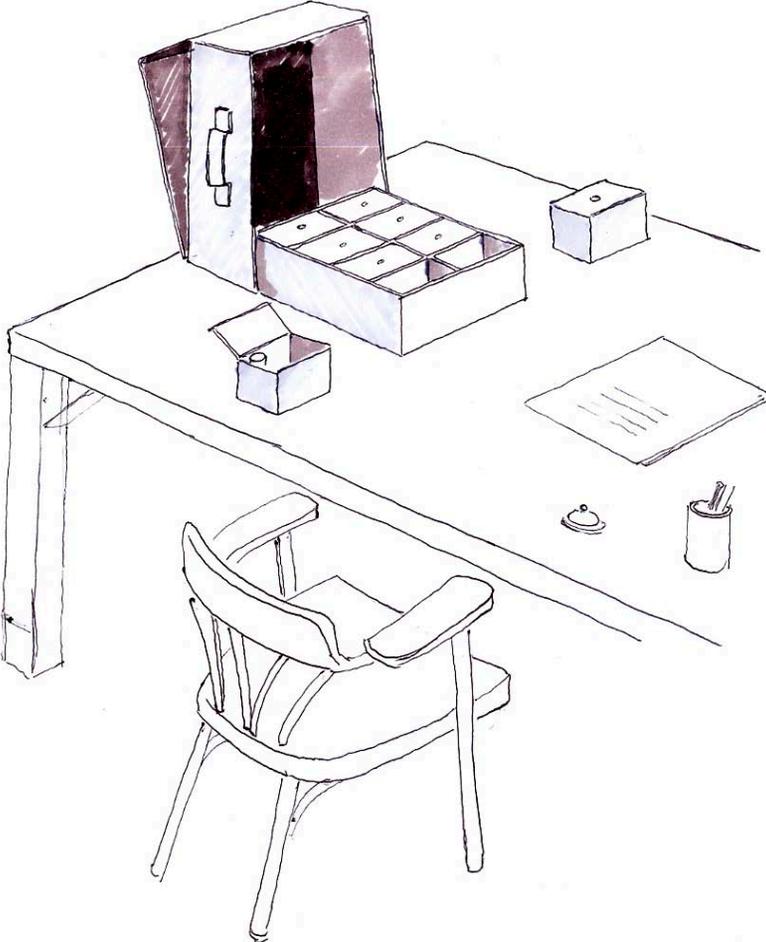
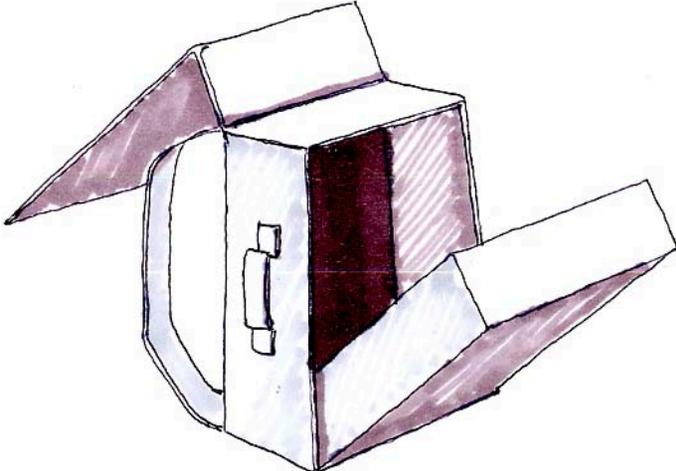
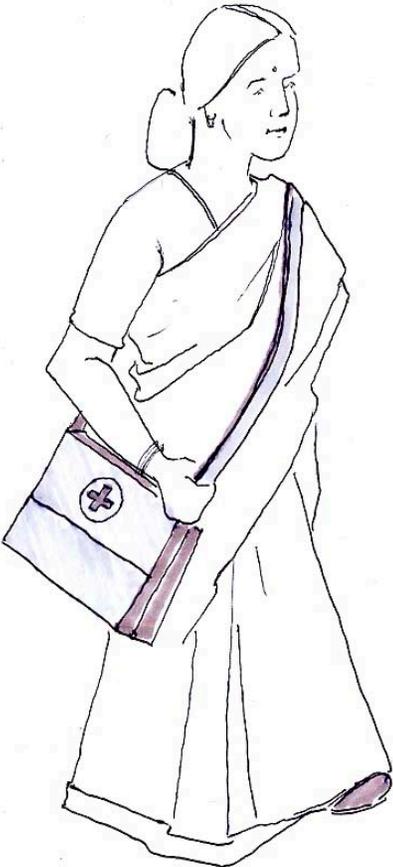
- ANM's rarely have the means to carry sufficient equipment with them to villages.
- The range of services ANM's can offer within villages is frequently very limited.
- ANM's record keeping capacity is typically limited and there is little standardization in the records that they do keep.



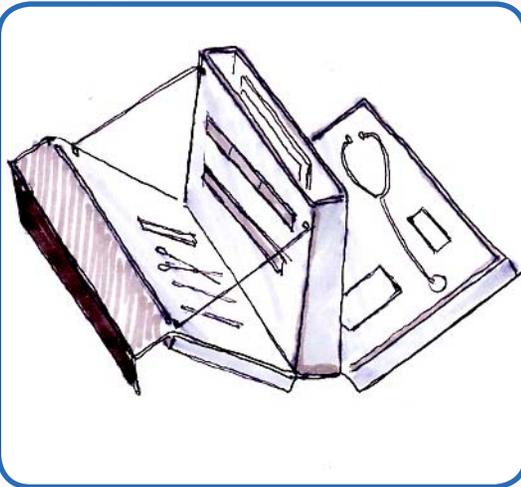
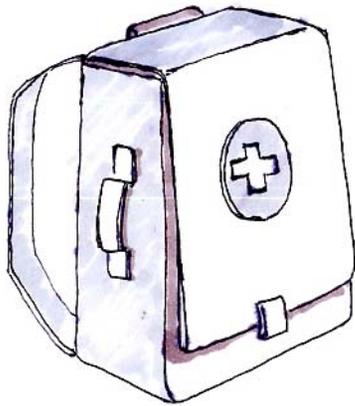
# ANM Toolkit



# ANM Toolkit



## Concept



- The ANM's Toolkit is a standardized set of equipment that would be easy to carry on village visits.
- Incorporates basic first aid supplies, diagnostic equipment, medications and standardized patient record forms.
- Helps to ensure that ANM's have the tools necessary to maximize their effectiveness within villages.
- Easily carried regardless of the ANM's mode of transportation.



# Healthcare in Rural India

## Initial Concepts

Cheek / Madraswala / Rivera-Pierola / Sitthisathainchai / Ward

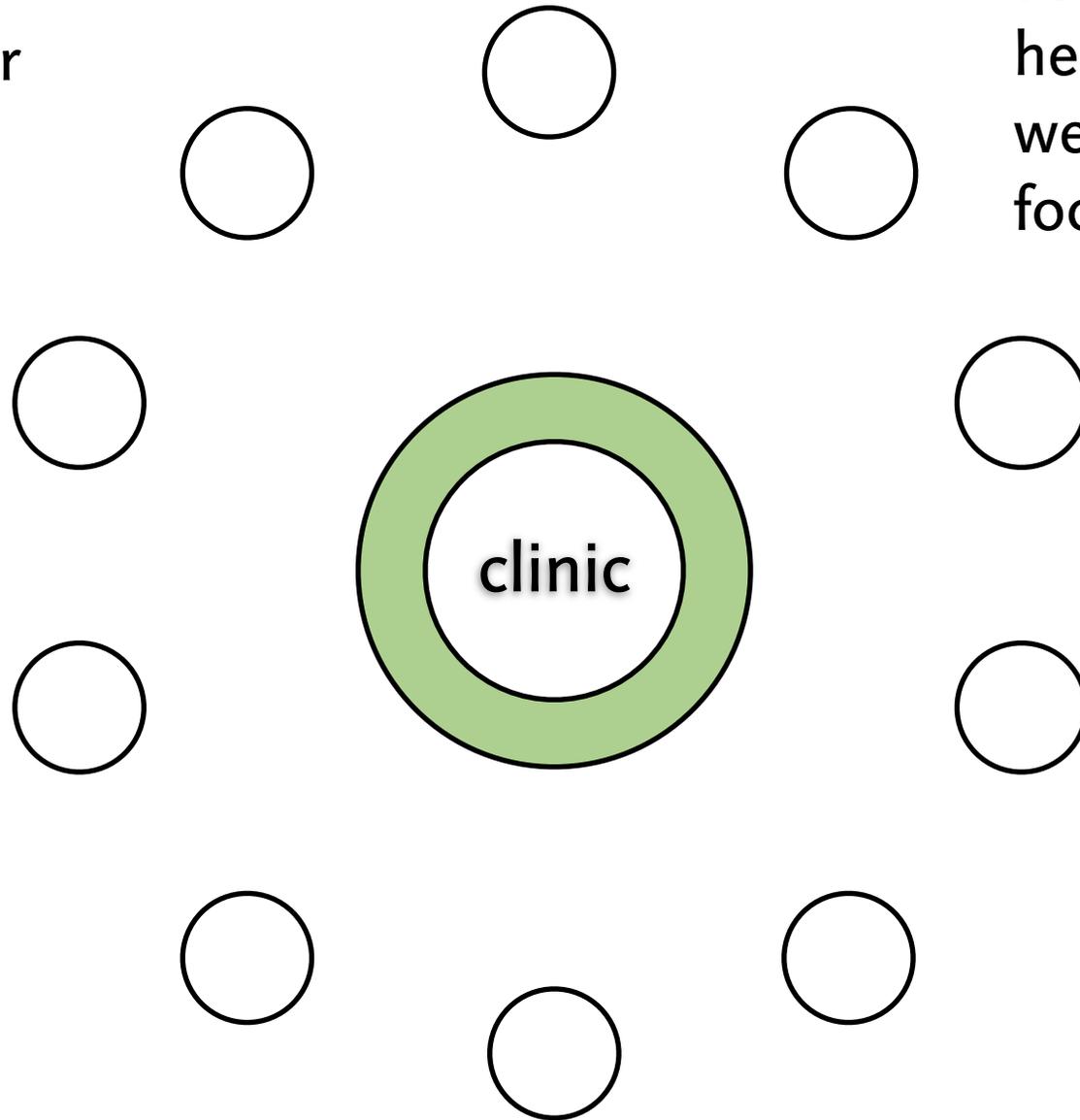
# Research and issues

With the help of our esteemed and respected colleague, Utkarsh Biradar, and his team of researchers, we have a rich set of data to work with. They presented us with many issues, and we have created concepts to address a few of them.

- Prescription security
- Vaccination scheduling
- Clinic Referalls
- Patient travel
- Educational materials
- ANM/Patient communication

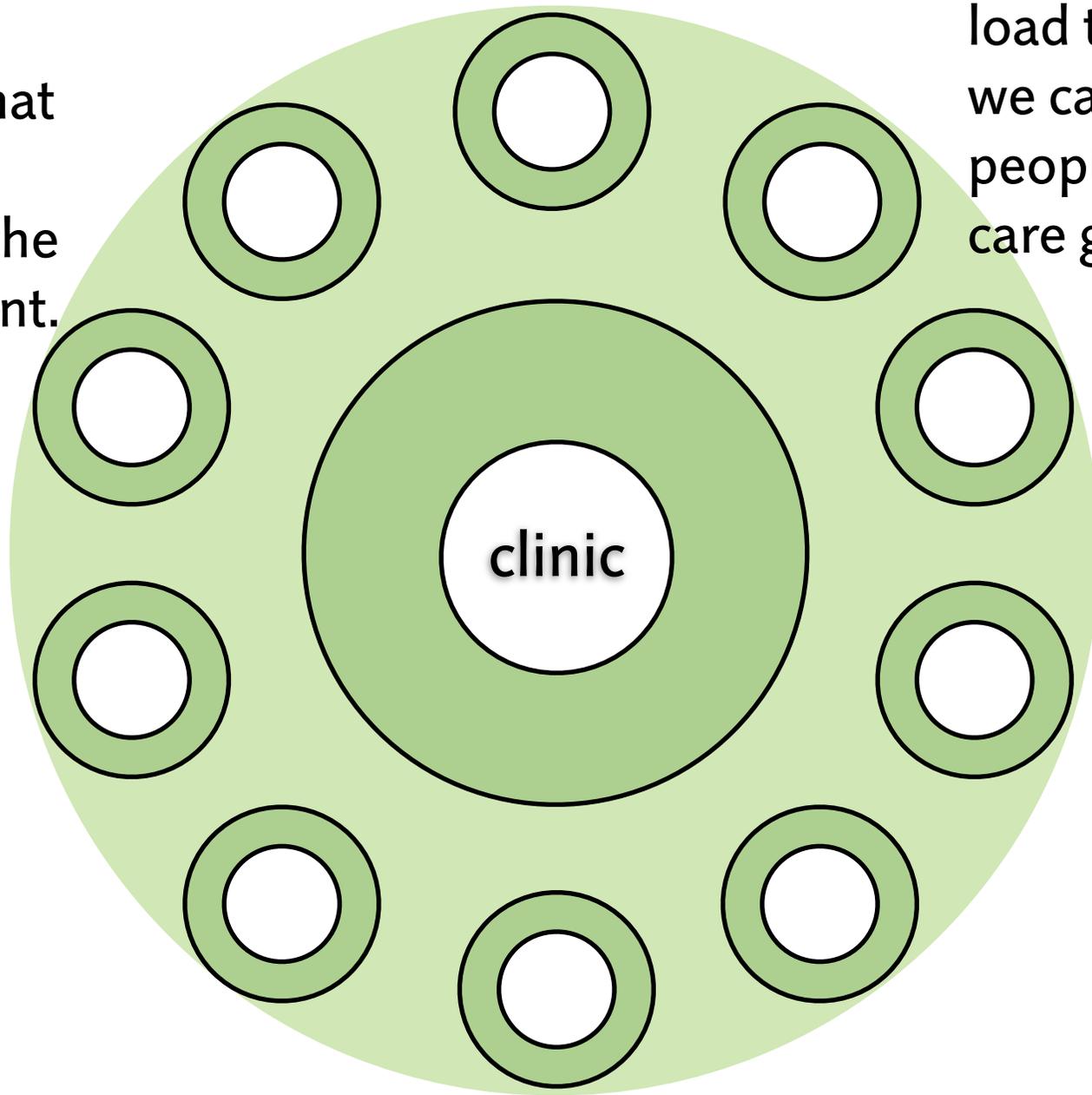


BUT, that might just spread their staff even thinner leading to eventual breakdown.



By enhancing the abilities of the healthcare workers, we will expand their footprint.

If the villages take better care of themselves, that supports the expansion of the clinic's footprint.

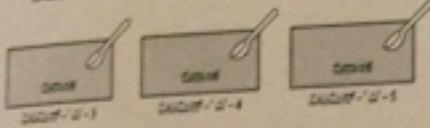
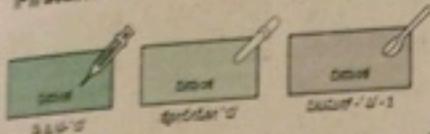


By distributing the load to the villages, we can enable the people to fill in the care gap.



# ತಾಯಿ ಮಗುವಿನ ಪ್ರತಿ ರಕ್ಷಣಾ ಫಲಕ

## I-II ವಯಸ್ಸಿನ ವರ್ಗದ ಮೂರನೇ ವರ್ಗದವರಿಗೆ (12-36 ತಿಂಗಳು)



ಕ್ರಮಿಕೆ

ನಾಗರಿಕ ಹೆಸರು

ನಿಜ ಹೆಸರು

ಮನೆಯ ವಿಳಾಸ (ಪೂರ್ಣ ವಿಳಾಸ)

ಜನನದ ದಿನಾಂಕ

ಪು.ನಂ. ಕೊಡು/ಕೂಡ

ವಿಳಾಸ/ಪಿನ್

ಮದ್ದು ಹೆಸರು

ನಿಜ ಹೆಸರು

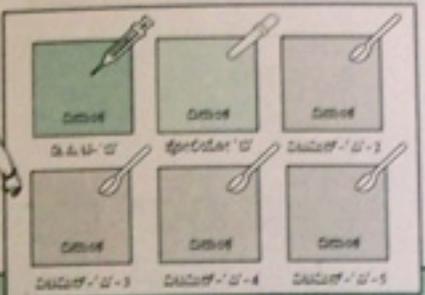
• ಈ ಮನೆಯಲ್ಲಿ ಯಾವುದೇ ವ್ಯಾಧಿ/ಜೀವಿ/ಕೊಬ್ಬು

• ಇತರ ಯಾವುದೇ ವ್ಯಾಧಿ/ಜೀವಿ/ಕೊಬ್ಬು

• ಇತರ ಯಾವುದೇ ವ್ಯಾಧಿ/ಜೀವಿ/ಕೊಬ್ಬು

ಆರೋಗ್ಯ ಕಾರ್ಯದರ್ಶಿ

## II-III ವಯಸ್ಸಿನ ವರ್ಗದ ಮೂರನೇ ವರ್ಗದವರಿಗೆ (12-36 ತಿಂಗಳು)



ಸರಿಯಾದ ಲಾಗಿ ನೀಡುವ ವೇಳಾಪಟ್ಟಿ	
ನಾಗರಿಕ ಹೆಸರು	
ನಿಜ ಹೆಸರು	
ಮನೆಯ ವಿಳಾಸ (ಪೂರ್ಣ ವಿಳಾಸ)	
ಜನನದ ದಿನಾಂಕ	
1/2 ತಿಂಗಳು	BCG - 0, DTP - 1 ಮತ್ತು ಡಿಪಿಪಿಎಂ - 1 (ಹೀನ್)
2/2 ತಿಂಗಳು	DTP - 2 ಮತ್ತು ಡಿಪಿಪಿಎಂ - 2 (ಹೀನ್)
3/2 ತಿಂಗಳು	DTP - 3 ಮತ್ತು ಡಿಪಿಪಿಎಂ - 3 (ಹೀನ್)
9 ತಿಂಗಳು	ಜಿಪಿಎಂ (ಜಿಪಿಎಂ ಮತ್ತು ಡಿಪಿಪಿಎಂ)
16 ಮತ್ತು 24 ತಿಂಗಳು	DTP - 4 ಮತ್ತು ಡಿಪಿಪಿಎಂ - 4 (ಹೀನ್)

- ಲಾಗಿ ಪಡೆಯುವುದು ಕೂಡ ಲಾಗಿ ಪಡೆಯಿರಿ. ಆರೋಗ್ಯ ಕಾರ್ಯದರ್ಶಿಯ ಸಲಹೆ ಪಡೆಯಿರಿ.
- ಈ ಲಾಗಿ ರು ಬಿಟ್ಟು ಪಟ್ಟಿ ಸರಿಯಾಗಿರಿಸಿ.
- ಆರೋಗ್ಯ ಕೇಂದ್ರಕ್ಕೆ ಬರುವಾಗ ಈ ಲಾಗಿ ರು ಮೊದಲಿಗೆ ತಿಳಿಸಿ.
- ಪ್ರತಿ ವಾರ ಲಾಗಿ ಪಡೆಯುವಾಗ, ವಿವರವಾಗಿ ಕಾರ್ಯದರ್ಶಿಯಿಂದ ತಿಳಿಸಿ.
- ಮಗು, ಆರೋಗ್ಯದ/ವಿಳಾಸದ ಮೊದಲಿಗೆ ಪಟ್ಟಿ ಕೊಡಲು ದಿ.ನಂ. - ಲಾಗಿ ಪಡೆಯಿರಿ.
- ಕಾರ್ಯದರ್ಶಿಯನ್ನು ನಾಗರಿಕ ಹೆಸರು/ನಿಜ ಹೆಸರು ಪಟ್ಟಿ ಸರಿಯಾಗಿ.

# ತಾಯಿ ಮಗುವಿನ ಪ್ರತಿ ರಕ್ಷಣಾ ಫಲಕ



ಕ್ರಮಿಕೆ

ನಾಗರಿಕ ಹೆಸರು

ನಿಜ ಹೆಸರು

ಮನೆಯ ವಿಳಾಸ (ಪೂರ್ಣ ವಿಳಾಸ)

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ವಿಳಾಸ/ಪಿನ್

ಮದ್ದು ಹೆಸರು

ನಿಜ ಹೆಸರು

Child immunization requires strict compliance, but schedules are sometimes confusing.

Vaccination Scheduling Issue

Prescriptions are informal and often forged.

Tab Per (H)  
Tab Cpm (H)  
Cap 12 (2)  
W

Tab D126 (H)  
Tab Cpm (2)  
W

Medical ID's help ensure security and reliability of info.

Reminder flashes when vaccination is due.

**Vaccination Schedule / Prescription Security Solution**



# Wearable Information Secure reminder

A



B



## Features

### Concept A

RFID is embedded into a common object such as a bracelet or charm.

The reminder light would flash in sync with the baby's vaccination schedule.

### Concept B

Integrated RFID bracelet

Allows for transfer of unique identifier.

Could expand features to provide medical history.

## Functions

### Concept A

Reduces chance of vaccination error.

Incorporation of technology into common object eases acceptance.

### Concept B

RFID provides secure patient identification, preventing misuse.

Allows for tracking of medical information.



Little trained ANM's are faced with very wide range of issues.

Patients are often referred to clinic for minor complaints, i.e. headache.

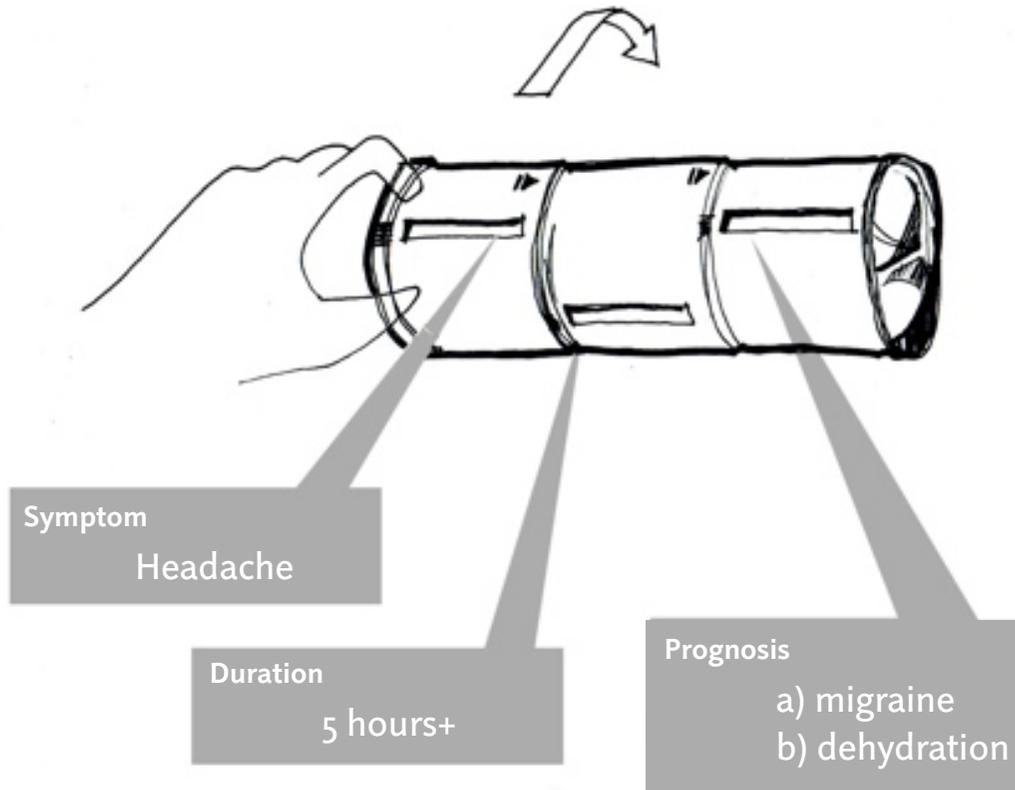


New tools can help them diagnose more accurately.



Clinic Referrals Solution

# Diagnosis Game ANM Diagnosis Aid



## FEATURES

Rotating nested cylinders that reveal sequential diagnosis information.

## FUNCTIONS

- Aids the AMNs in diagnosing.
- Helps educate the AMNs.
- Reduces unnecessary clinic visits

DISTRICT TB CONTROL SOCIETY KOLAR-563101  
 REVISED NATIONAL TUBERCULOSIS CONTROL PROGRAMME  
 Treatment Card

e-mail: DTOKAKOL@tbc  
 Ph : 08152

Patients must travel long distances to visit clinic.

State: KARNATAKA District: KOLAR  
 Name: Shankarappa  
 Sex: M Occupation: Farmer  
 Complete address: M. Mallappa (PO) Maddur (PO) Kolar - 79.

Name of TB Unit: KOLAR TU  
 Patient TB No. / Year: 01/2007  
 PHI: Maddur, PHU.  
 Name and designation of DOT provider: Suresh, PHU.  
 DOT at: PHU, Maddur.

Name and address of contact Person: \_\_\_\_\_  
 initial home visit by \_\_\_\_\_ Date \_\_\_\_\_

Signature of MO with date \_\_\_\_\_

**Disease Classification**  
 Pulmonary  
 Extra-pulmonary  
 Site: \_\_\_\_\_

**Type of patient**  
 New  
 Transfer in  
 Treatment after default  
 Relapse  
 Failure  
 others (Specify) \_\_\_\_\_

Month	Date	DMC	Lab No	Smear result
Pretreatment	3/10/06	DMC	3272	K (neg)
End of Treatment				

This leads to lost wages and skipped trips.

H/o previous Anti - TB Treatment with duration CAT-II 4 months.

1. INTENSIVE PHASE - prescribed regimen and dosages:

Tick (✓) the appropriate Category below

**Category I**   
 New Case  
 (Pulmonary smear-positive seriously ill smear-negative, or seriously ill extra-pulmonary)  
 3 times/ week  

H	R	Z	E

**Category II**   
 Retreatment  
 (relapse, failure, treatment after default others)  
 3 times/ week  

H	R	Z	E	S

**Category III**   
 New Case  
 (pulmonary smear-negative, not seriously ill; or extra-pulmonary, not seriously ill )  
 3 times/ week  

H	R	Z

Tick (✓) appropriate date when the drugs have been swallowed under direct observation

Month / year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28

Patient Travel Issue



Mobile pharmacists bring drugs to patients daily.

# Mobile Pharmacist Reduces patient travel



## Features

Adaptable to any motorcycle.

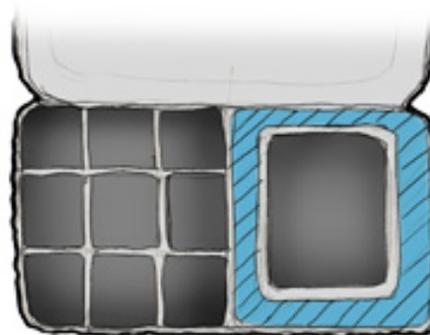
Folds out table and medical pack integrated to the bike.

Medical pack separates insulated and non-insulated compartments.

## Functions

Allows easier access to medicine especially for less mobile patients.

Cuts down on lost wages for patients who must travel to the pharmacy.





Impossible to read  
posters are not  
effective.

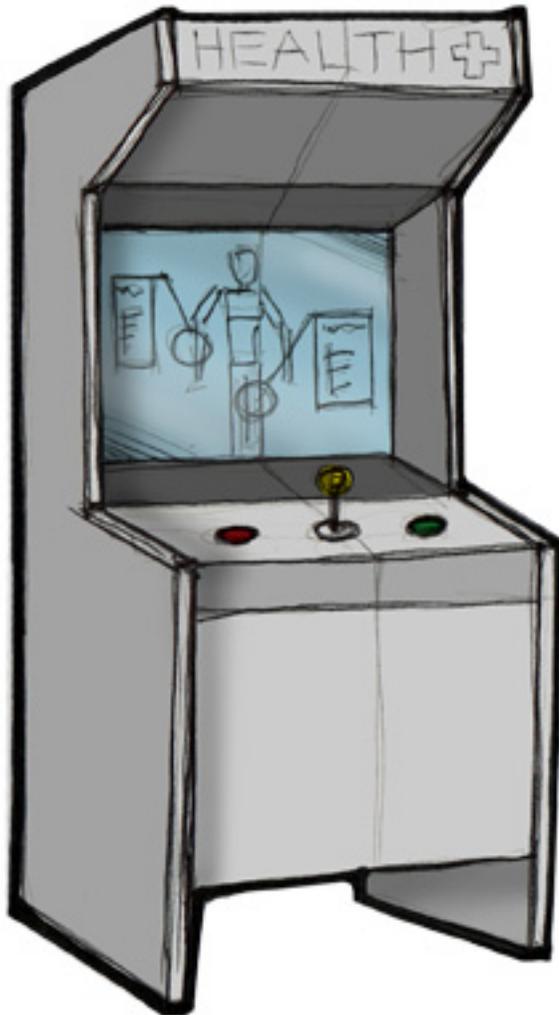
ANM's only visit  
village once a week.

Villagers are left to  
fend for themselves  
very often.



**Education Materials Solution**

# Arcade Kiosk Self diagnosis & Education



## Features

Arcade style box loaded with self-diagnosis and educational software.

Program directs the user through an image or voice based self-diagnosis.

Collects village health data for transmission to clinic staff.

## Functions

Educates village people in self-care and when clinic visit is necessary.

Engages users through game scenario.

Repurposes used arcade cabinets.



ANM's write visit information directly on wall.

No way for patients to signal for need.

Information is insecure.

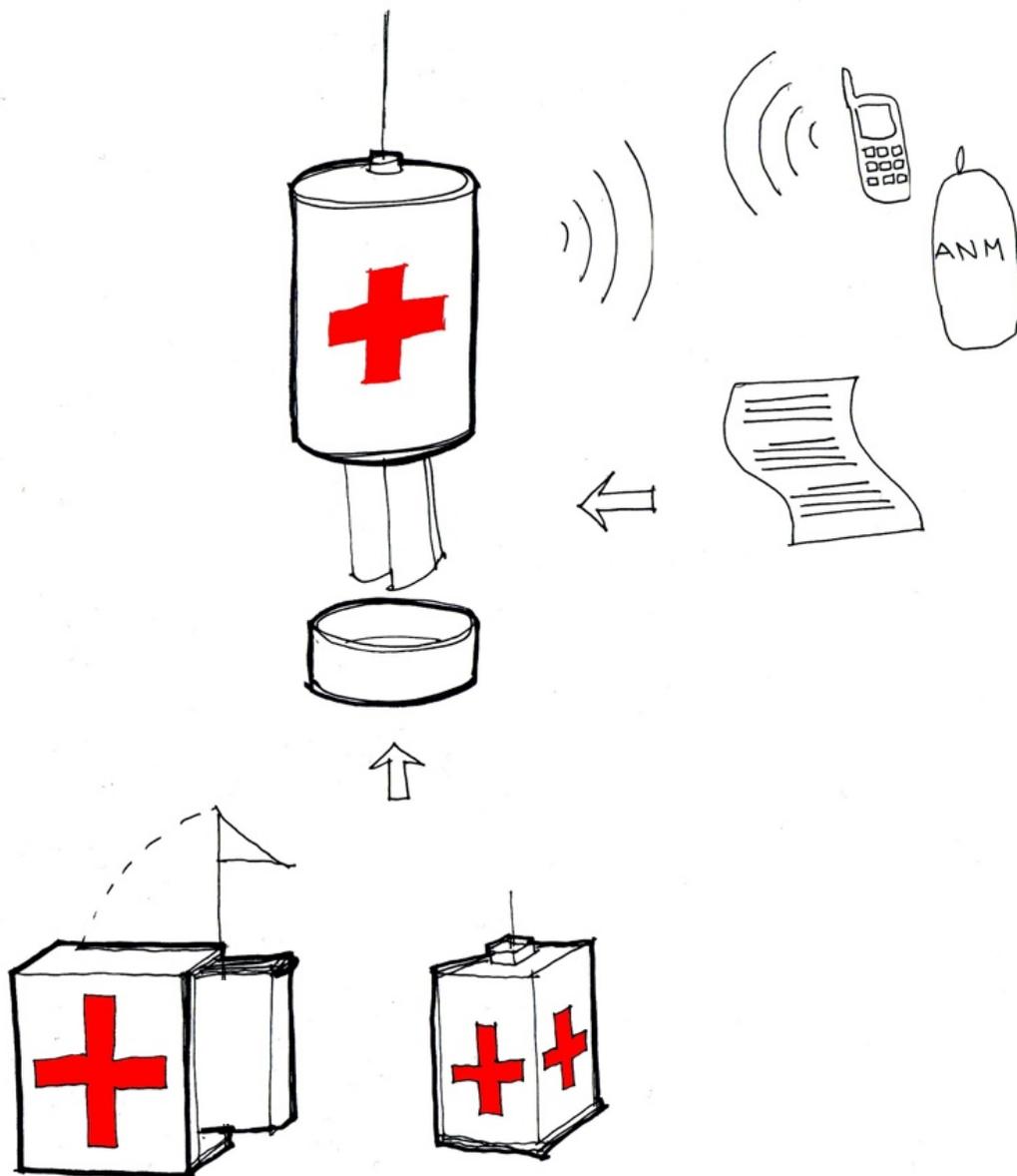
**ANM/Patient Communication Issue**



Household level records incorporated into health beacon.

**ANM/Patient Communication Solution**

# Signal Lantern Info storage & notifier



## Features

“Lantern” with compartment containing a notebook.

Notebook allows for the AMN to keep daily notes.

Signal to request attention or help.

Options: SMS message, flag, light or color

The lantern can be physically attached or hung from the side of each house.

## Functions

Allows the AMN to prioritize and triage patients.

Streamline the visits of the AMN to the villages.

Keeps more durable and secure records.



Thank you