

# frugal innovation

## creative solutions for emerging markets

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Faculty Summit  
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devices are scarce

paper is plentiful

# Engaging students with Clickers



\*image from <http://www1.iclicker.com>

# Engaging students with qCards



# Improving medication adherence with electronic pillboxes



\*image from <http://www.vitality.net>

# Improving medication adherence with paper envelopes (99DOTS)



# Non-Adherence to Medication

A \$300 billion problem

- WHO: In developed countries, 50% having chronic disease take medication as directed
- In US, non-adherence causes 10% of hospital admissions
- Globally, non-adherence claims millions of lives and poses threat of untreatable diseases

Vermeire, E., Hearnshaw, H., Van Royen, P., & Denekens, J. (2001). Patient adherence to treatment: three decades of research. A comprehensive review. *Journal of Clinical Pharmacy and Therapeutics*, 26(5), 331-342.



# Extensively Drug-Resistant Tuberculosis



*Countries Notifying At Least One Case by the End of 2013*

\*image from <http://www.who.int>

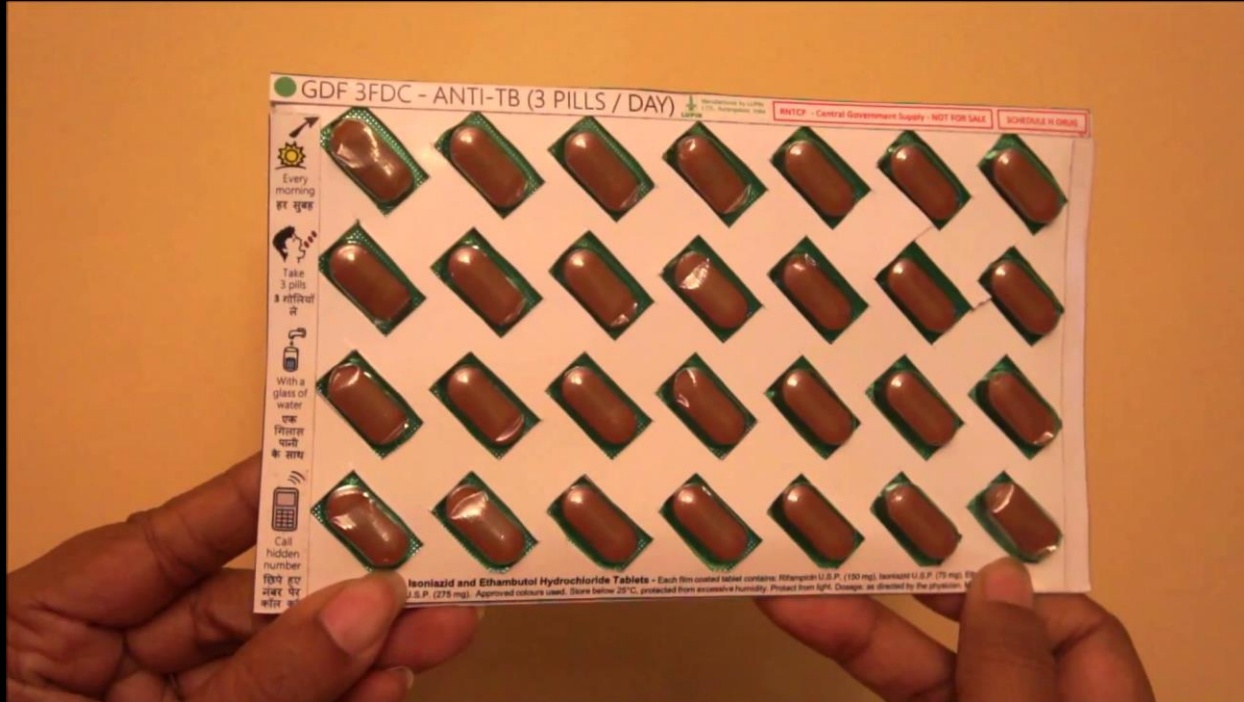
# Directly Observed Therapy (DOTS)



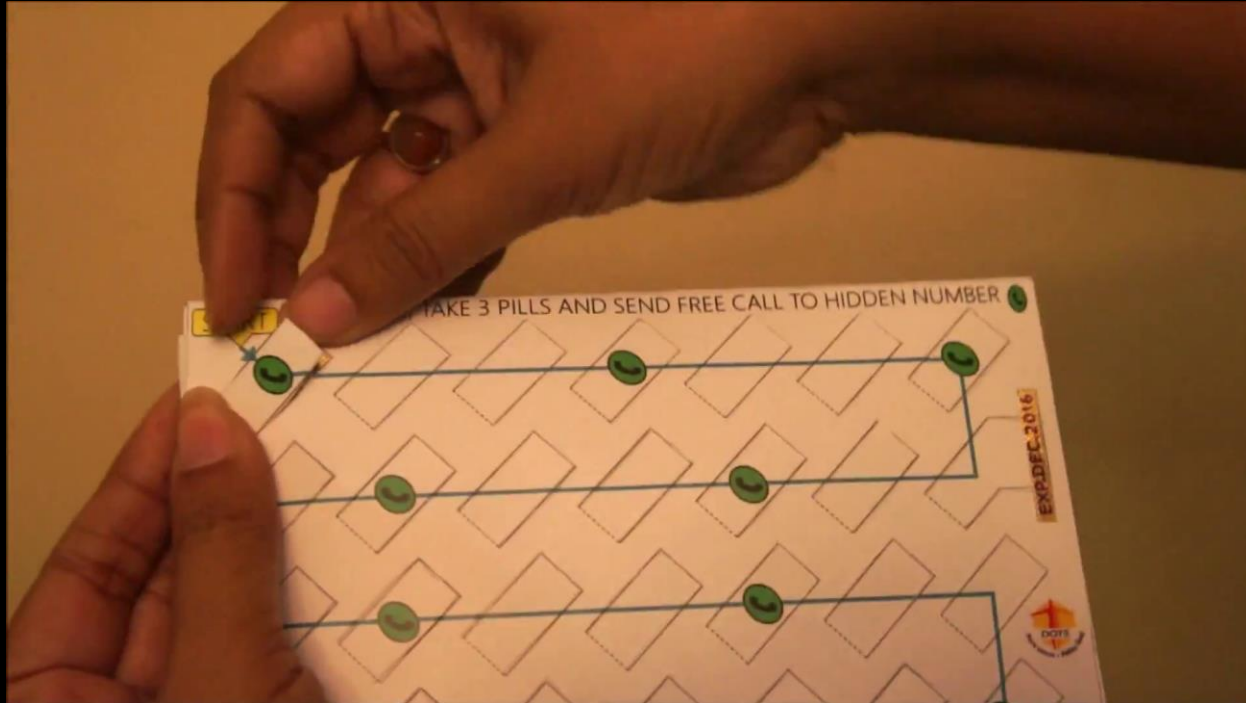
\*image from Operation ASHA

# Our Solution

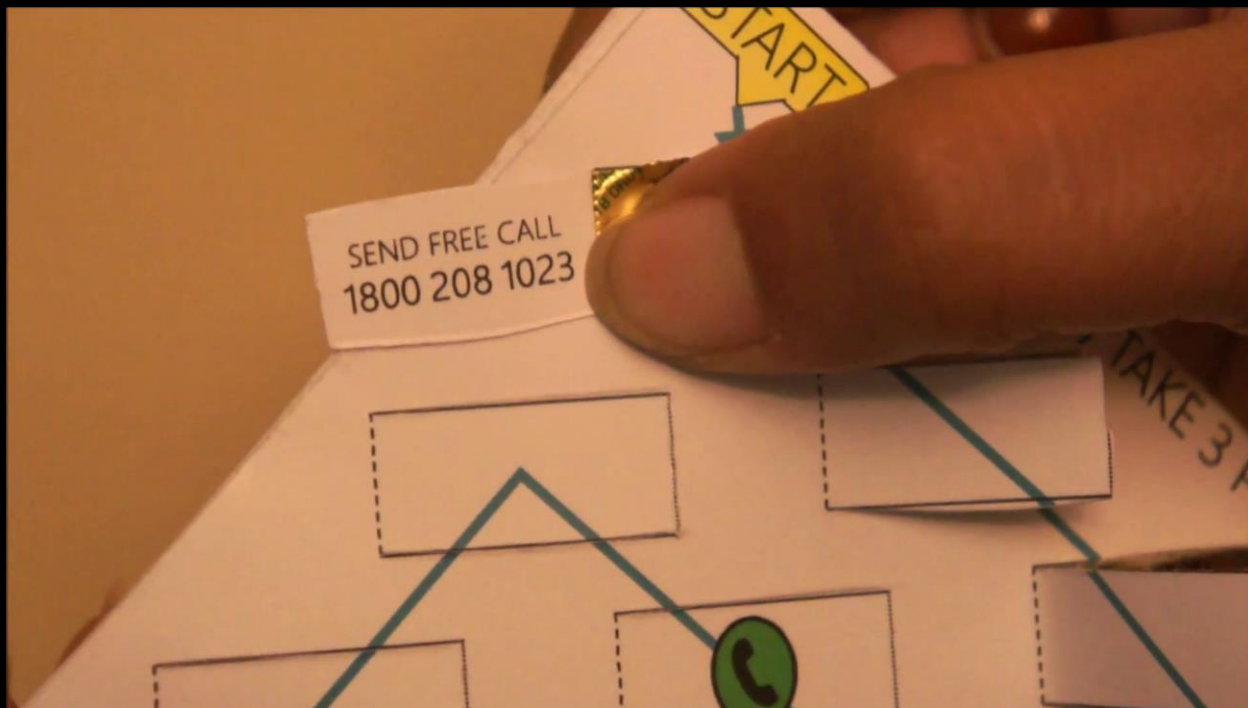
# 99DOTS: Augmented packaging



# 99DOTS: Patient dispense medication



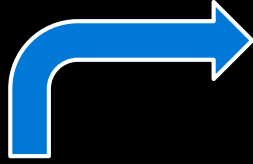
# 99DOTS: Reveals hidden number



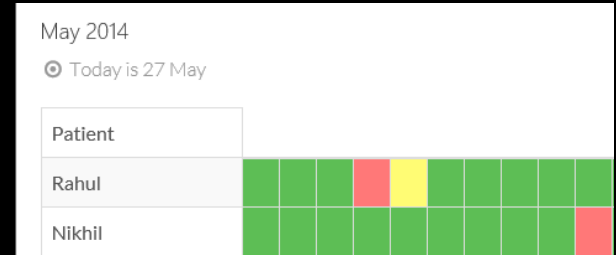
# 99DOTS: Sends free call to number



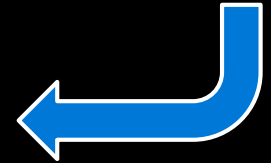
# Reminders and alerts



[0000]  
Please take pills

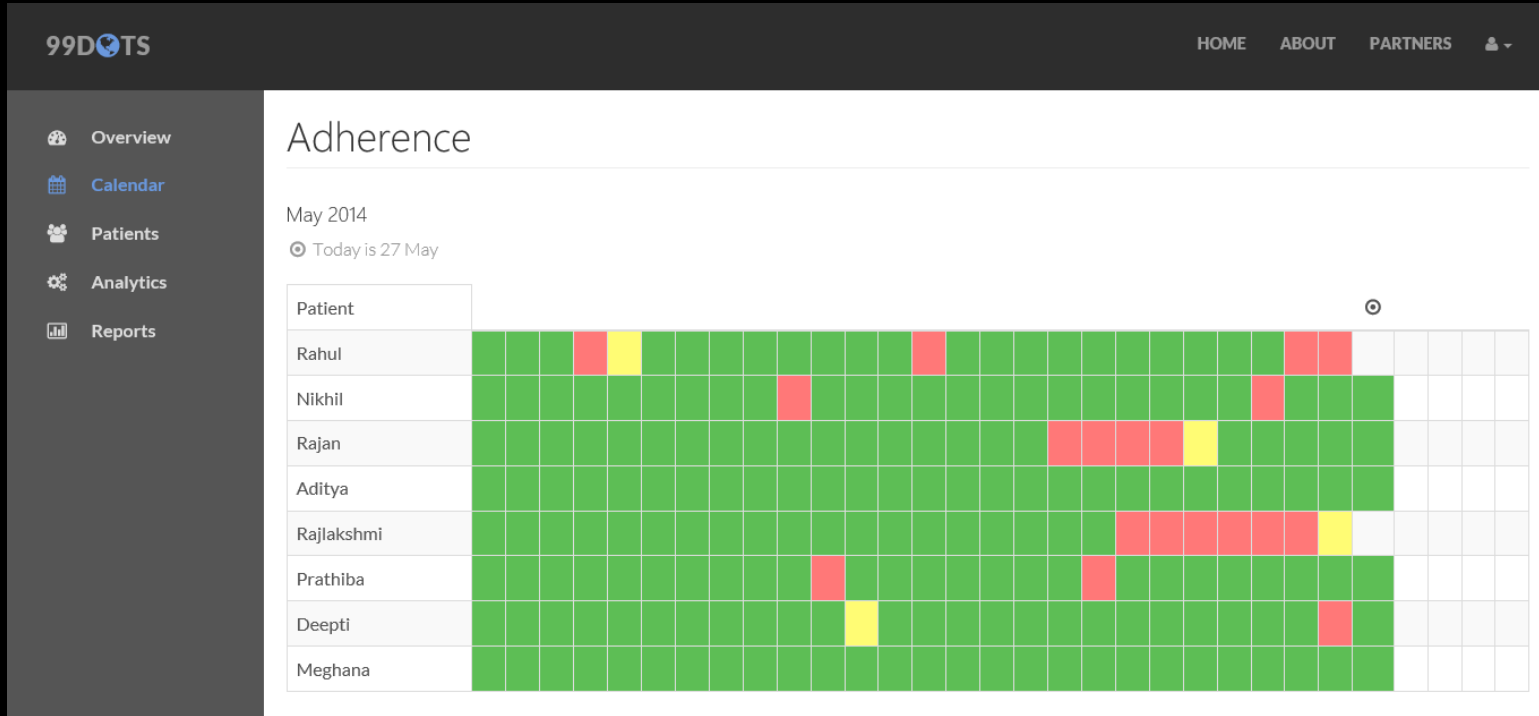


Nikhil did not take medicine today. Please follow up.

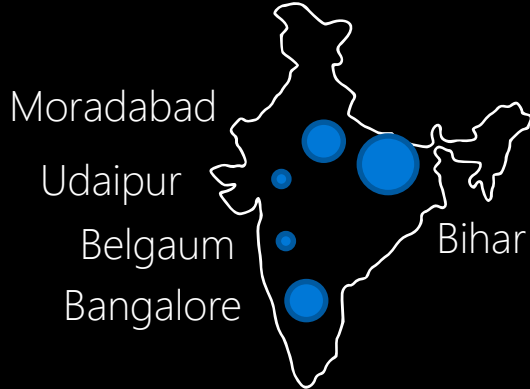




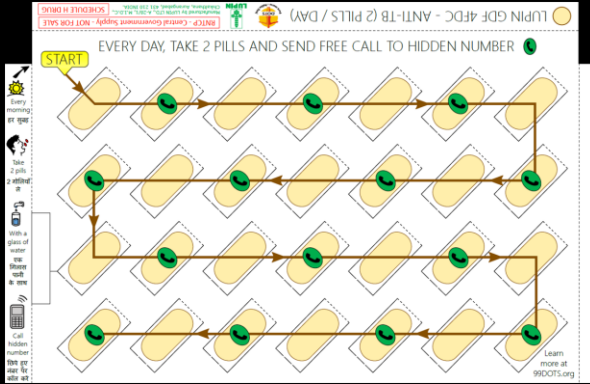
# Empowering patients and healthcare



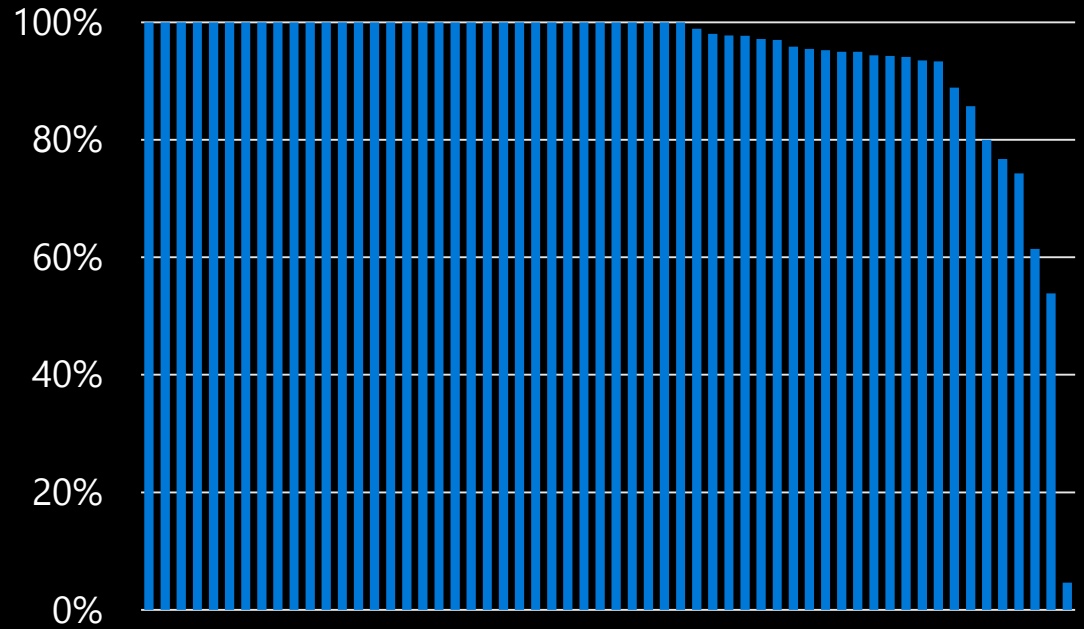
# Deployments in India



# Research



Adherence across 6 months for 58 patients



\* image from <https://www.asc.upenn.edu>

# frugal innovation

optimizing for cost and environment  
participatory design  
using existing infrastructure

