Problem Overview & Design Rationale

Ground Reality
Tuberculosis (TB) is an airborne disease that accounts for nearly 15% of 2010 deaths in Mumbai and has killed 1.6 million people worldwide. Left untreated, the person with active TB infects 10-15 people a year. A baseline survey conducted in 2011 to understand the TB situation in the city of Mumbai.

Recent formative research was done to understand needs from patients, caregivers, health workers and medical doctors: (i) interviewed healthcare professionals and TB survivors; and (ii) visited public and private hospitals to understand TB treatment regimes.

Initial findings show:
- Harsh side effects of drugs and loss of income may cause individuals to default from treatment
- Stigma associated with TB prevents individuals from seeking a diagnosis and health advice
- Some patients feel that their doctors don’t give them enough information, care and attention for their disease or illness

Need Gaps
The recent 2012 TB situation in India has highlighted these salient problems:
- TB patients are not completing treatment regimens and developing resistance to current TB drugs
- Challenges faced by health authorities in caring for and curbing the spread of TB from patients to their surroundings
- Lack of proper information catered personally to individuals (patient, caregiver, health worker & general public) regarding TB

Design Rationale
With mobile phone ownership among the middle-of-the-pyramid segment in India being among the highest in the world and the introduction of low-cost tablets, MobITB-ACE project addresses urgent need for TB control in treatment monitoring, care, education and infection control through the use of social media, mobile and web-based technologies.

Objectives

The Proposed System
- Monitors TB patients for the completion of their drug treatment regime through alerts, reminders and testimonials to TB patients to complete their TB treatment in a timely manner
- Supports active assessment and monitoring of possible exposure to TB of families, friends, neighbours & community
- Disseminates timely information about TB-prone areas and outbreaks to relevant health authorities for further action
- Provides information educating the public on TB through multi-pronged strategies (e.g., campaigns and games)

Overview of ACE-TB
- Alerts
- Care
- Education
- Social Support
- Macro and Microeconomic Data
- Health-Venue Data
- Civic Health Library

Components of the System
- Patient device for alerts, care and information
- Information Management System for Patients (IMSP)
- Public Display for Education and Care
- Medical timeline
- Social timeline
- Caregiver timeline
- Manager for Care and Education
- Educating about TB
- CARE
- Chronic Disease Management
- Health-Venue Data
- Civic Health Library

Concrete Design
Using Scenario-Based Design and Claims Analysis, the design team brainstormed on the conceptual design of MobITB-ACE undertaken in three sets of activities:
- Information-gathering developing front-end applications to gather reliable information (e.g., diseases, location, time and socio-demographics)
- Sensor-making developing back-end applications to make sense out of information gathered through intelligent computation and algorithms
- Information-dissemination developing front-end applications to disseminate reliable information (e.g., forecasts of diseases, location, and time) to the MOP population.

Key Features
- Actively monitors and encourages adherence to treatment regime
- Provides social connections for patient-patient, patient-caregiver, patient-medical professionals, and caregiver-medical professionals, through social media
- Analyses TB-prone areas and high-risk groups of people using sociodemographic and environmental data
- Warning system for public health authorities and communities

Future Directions
- Data Analysis of MOP survey to understand the user needs and perceptions related to TB, general health and media usage
- Design and development of concepts, rationale and scenarios of interactions within ACE-TB system
- Design of alert and care messages in CuePbox: a (virtual and physical) pillbox

Acknowledgements
We would like to acknowledge the following people for their help in our project:
Jeffrey Hong (NTU)
Owen Nosal Newton Fernando (NTU)
S B Mudiagde Charnika Desh (NTU)

Supported by
This research is supported by the Singapore National Research Foundation under its International Research Centre @ Singapore Funding Initiative and administered by the IBM Programme Office.

Partners
NIT Bombay
Nanyang Technological University
NUS
Singapore National University