Internet of Things for Health & Safety

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Healthcare is accessible to only few residents in a city; it is either overburdened or not affordable for others.

Adequate preventive healthcare, specialized health advice and individual health monitoring facilities for weaker or essential section.

A fitting emergency response system that assists ambulance services by connecting the needy, authorities and relevant citizens.

Foresee/track likely potential diseases and respond with a preventive system.

(source: adopted from CDAC Mohali/Open domain)
• One of the top ten killer in the world
• Kills one out of three hundred people
• Kills over 50,000 people every year in US alone and 10 times more world wide
• Goes unnoticed in India at times ...
• Preventable Medical Error
• Not new – Decades ago technology changed the health-care system
• Monitoring improves results
• No doubt – healthcare has improved drastically
• Errors/Gaps Persist!
• Devices in Silos/Island
• Combined information from various devices to know patient status
• False Alarms
• Misconfiguration Unnoticed
• Critical Conditions Unaddressed

ICU - Drug Administration using infusion pumps
Value Creation - Need of the hour

Connected Things; ‘Things Layer’ is making the difference
Value Creation - Need of the hour

- Technologies; Stages; Value drivers
- Tennis player no longer values tennis racquet alone (frame, string tension, weight)
- Value: Insights about the players tennis stroke, speed, direction, timing and likewise
- Scope and areas of improvement
- Not just the product/service; but the information around it creates the value

Source: Article DUPress.com by MICHAEL E. RAYNOR AND MARK J. COTTELEER
Value Creation - Need of the hour

- **Glowcap**: David Rose – MIT Media Lab
- US Dept. of Health and Human Services estimates systematic cost – Non-adherence ~ \$105 Bn/year
- Value Creation: Patient-Health-Insurance-Hospitals-Governance

Source: http://www.stephensonstrategies.com
IoT for Health and Safety ...

- Genuinity of life saving medicine/drugs
- Expired drug racket: Drugs past the sell by date; Repackaged with new expiry dates - Re-sold in the market
- CDAC has come-up (deployment in the process) with an simple IoT system to track the genuineness of the medicines
IoT for Health and Safety ...

Connected Medi-Assist:
• Remote health monitoring
• Pregnant women and elderly people (fall detection) monitoring
• Child Immunization Tracking and Monitoring System
• U-Sehat (Wireless Body Area Nw), MOTHER
Medical devices and SDK’s

• **SDKs (DICOM/HL7):** C-DAC Medical Informatics SDK is a suite of API libraries/toolkit that provides medical standards compliance to the implementing applications/medical devices
• SDK for DICOM is licensed under Apache License v2.0 (Open Source License) – Free for both personal and commercial use
• **Wireless Digital Stethoscope:** Data can be stored for monitoring progress and/or transmitted for remote diagnosis in tele-care settings
Medical devices and SDK’s ...

- **TARANG** is a programmable intelligent hearing aid
- **MoSQuIT** is an advanced mobile based surveillance tool for surveying Malaria prone areas in order to track and monitor the status of malaria prevalence
- **MOTHER** is a Push method based personalized advice based on the health parameters of pregnant women and mothers for child care and reminders
- **Smart-Bed** senses heart rate and other vital parameters to identify early stage sleeping disorders
- **Sajeevan (Help on wheels)** last-mile connectivity to healthcare
Green Corridor for Ambulance

- C-DAC has developed a technology/platform to track the position of the emergency vehicles and to establish communication amongst authorities/officials from various departments
Green Corridor for Ambulance ...

- Percolation of messages to corresponding officials responsible for delivering emergency services like green corridor for ambulance etc.
- Individual or a group of vehicles can be easily monitored and handled.
IoT Framework

DDS, GSN, MQTT, SOAP, REST, WebIOPi

Skynet.im APIs
Node-RED

Data Visualization & Analysis

Web-based IoT framework (Node.js/REST)

Integration of Semantic Web

Device Abstraction Legacy APIs

Source: http://www.tml.tkk.fi

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IoT Framework ...
IoT Framework ...

• Truly justifiable smartness cares differently-abled, senior citizens and like

• Targeted assistive/IoT solution encourages social participation, independency and quality of life
IoT Framework ...

- Northeast Focus: To create technical manpower and promote IoT technologies to cater to the domestic and international market
- Basic and advanced program
- IoT Labs/CoE
HOW STANDARDS PROLIFERATE:
(SEE A/C CHARGERS, CHARACTER ENCODINGS, INSTANT MESSAGING, ETC)

**Situation:**
There are 14 competing standards.

**Reply:**
Yeah!

**Situation:**
There are 15 competing standards.

**Reply:**
Ridiculous! We need to develop one universal standard that covers everyone’s use cases.

Source: https://xkcd.com/927/
Summary

- Electronic Health Record (EHR); People, Policy and Technology need to join hands to address Security/Privacy concerns in Healthcare
- Rural Healthcare still a major concern in India and there is a great need. Mission hospital Vs Government Vs Private players ; Affordability to standards compliance
- Telecom service providers coming-up with managed IoT/healthcare services - Regulatory concerns
Summary

• Adhoc solutions may perhaps meet the immediate and local requirements. At large, non-compliance will have its own impact and challenge the very vision of IoT

• Need for retrofitting, greenfield/brownfield; slowly hurry-up approach

• OneM2M can possibly be the game changer; the eco-system will evolve

• IoT task force opens a channel (testbed) for the industry partners to join hands in implementing an open, transparent, standard complaint and India specific solutions
जय हिंद
Thank you