Internet of Everything in Healthcare
The Paradigm Shift

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Change Is Everywhere

- Aging Population
- Chronic Disease
- Shortages in Key Specialties
- Affordability Crisis
- New Uses of IT
- Focus on Wellness
- R&D Productivity and Innovation
- Privacy and Security Concerns
- Federal IT Investment
Adapting to Change

Providers  Payers  Pharmaceutical and Biotech  Medical Device Manufacturers
Providers Respond to New Pressures

Providers

- Consolidate
- Reduce costs
- Increase productivity
- Shift to new care settings

Payers

Pharmaceutical and Biotech

Medical Device Manufacturers
Payers Explore Healthier Incentives

- Inspire better choices
- Reward preventative behaviors
- Reduce administration, not access
Pharmaceuticals Refocus Innovation

- Innovation/sales effectiveness
- Shift to more generic drugs
- Increasing importance of developing countries
Medical Devices Recalibrate to Trends

Medical Device Manufacturers

- Monitor chronic conditions
- Develop for an aging population
- Balance innovation with cost
Healthcare: The Paradigm Shift

WHAT IS CHANGING?

- 41% of patients would switch hospitals for a **BETTER EXPERIENCE**
- 80% of doctors use **MOBILE DEVICES** at work
- Significant new hospital builds in East and consolidation/ACOs in West
- Investment in **wellness pays off** - For every 1% increase in wellness, likelihood of ER visit goes down by 1.7% and of hospital admission goes down by 2.2%
- 76% global patients find **ACCESS to CARE** more important than physical contact with their care provider
- 74% global patients are comfortable having their records in a **HEALTHCARE CLOUD** assuming adequate security
Healthcare: Then & Now

**Access**

OLD
Patient goes to the service and waits.

NEW
Service comes to the patient. The best possible expert sees the patient, even if the patient is far away.

**Productivity**

OLD
Caregiver’s time is lost between patient encounters; geographical coverage is limited.

NEW
More patient encounters, less in-between time, and broader geographical coverage boost productivity.

**Efficiency**

OLD
Heavy use of emergency rooms and overburdened systems constrain resources.

NEW
Patients can access routine and specialty medical care using offsite clinics in urban and remote areas.
Technology as a Driver

Technology……Enables It

Economics……Requires It

Demographics…..Demands It

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Emphasis on administrative systems and automation

Adoption of clinical systems

Patient Self-Management

Emphasis on Home Healthcare Services

Opportunities in the Indian HIT Market

2005-2015

Adoption of Clinical Systems
- Efficient medication management
- Management of chronic diseases and mental health
- Availability of patient information for mapping disease patterns to be used in R&D of drugs and treatment techniques/technologies

Patient ability to self-manage disease
- Remote consultation and monitoring
- Self-testing, early treatment and the management of medication

Greater application of bioinformatics in healthcare

Emphasis on home healthcare services to improve hospital efficiencies and save patient costs.

2015

2020

Fully integrated healthcare delivery

• Private hospital groups and public hospitals integrated to deliver patient-centric healthcare services with better outreach.

• Patient expectations on safety
  - Safe data sharing and safe care
  - Patient data security

• Patient-centric healthcare delivery
  - Patient portals and mobile technologies of patient monitoring and management

2020

Active use of biometrics as healthcare becomes more patient-centric

Optimal efficiency in healthcare delivery using IT, as number of patients and costs rise.

Need for cost and quality transparencies will drive the use of IT in healthcare services and improved medical tourism.

Courtesy Frost & Sullivan, 2009
THE UNIVERSAL THEMES IN HEALTHCARE

Reduce Cost

- Rapid deployment of HIS / EMR / CPOE Solutions
- Move towards Centralized PACS / RIS
- Scale the business and manage OpEx.
- Increase Ops. Efficiency through automation of Health System

Improve Quality of Care

- Disease Management
- Decision Support
- Care Coordination
- Quality Metrics
- Patient Engagement Models
- Adoption of Standards to drive interoperability
- Revenue Cycle Management

Improve Outcomes
Technology-enabled collaboration will be a key enabler of future success.

Enabling transformation

- **Connect** the right people, resources, and content at the right time
- **Communicate** more effectively and efficiently
- **Collaborate** internally and externally
- **Learn** from all

Goal is to drive productivity, growth, and innovation.
The Internet of Everything: Networked Connection of People, Process, Data, Things

People
Connecting people in more relevant, valuable ways

Process
Delivering the right information to the right person (or machine) at the right time

Data
Leveraging data into more useful information for decision making

Things
Physical devices and objects connected to the Internet and each other for intelligent decision making
Use Cases and Market Disruptors
Wearable technologies could provide the means to access new sources of data

• “Wearables could provide the backbone for the next evolution of big data analytics from unstructured data (that isn't packaged neatly into databases) to uncaptured data (that isn't collected at all).”

• Credit Suisse
  http://www.thefinancialist.com/wearable-tech-beyond-google-glass-kulbinder-garcha/
Ingestible Sensors Take Patient Data New Levels

Proteus ingestible event marker is an FDA-approved sand-sized chip integrated into pills - uses body fluids to activate and send signal via skin patch to smartphone app.
Ingestible sensors take the ability to collect patient data to a whole new level

Proteus ingestible event marker

Digestible sensor activated by stomach fluids after swallowing

Creates ultra-low power digital signal detected by microelectronic recorder (skin-patch or tiny device inserted under skin)

Records date and time, type of drug, dose and physiologic parameters such as heart rate, activity and respiratory rate

Source: Proteus Biomedical
Patient Monitoring

In Hospital

In Trials

At Home
Patients Taking Control of Their Own Health

Provides a web-based, personalized path to health, wellness and performance
mHealth market 2015: 500m people will be using healthcare smartphone applications

Smartphone user base in 2015 (million)

- Total: 1.400
- mHealth: 500

30% of total smartphone users will have used mHealth applications by 2015

Share of mHealth revenue sources of total mHealth market opportunity in 2010-2015 (%)

- Services: 46%
- Device sales: 30%
- Paid downloads: 14%
- Transaction: 8%
- Advertisement: 1%

Those mHealth users will mainly pay for services and devices

Smartphone applications will become the killer applications for mobile health solutions.

Source of graph: research2guidance
Bob as seen by his friends and family

Bob as seen by the healthcare system

Source: Pumprco
Healthpump: How it enables collaboration

1. Connecting people
   - healthpump's contacts, groups, sharing and communication support helps people to get involved, build and strengthen relationships, and work collaboratively.

2. Connecting everything else
   - healthpump can connect up a wide range of devices and systems, from iPads and smart phones to monitoring, fitness and medical equipment and computer systems and networks like GP systems or a hospital PAS (patient administration system).

3. Rapid assembly (and reassembly)
   - the healthpump architecture allows applications to be combined in flexible ways within a secure, robust infrastructure; apps can be as small as a calendar function or as large as a diabetes management system.
Bringing together disparate data sources can unlock real value e.g. www.asthmapolis.com

- Developed by David Van Sickle, Spiroscout captures location and time of inhaler use
- When matched to patient diary information and other local information sources it provides an insight into ...
  - Potential asthma triggers
  - Medication use
  - Patients whose asthma is not under proper control
- Providing new insights into how best to manage asthma

Spiroscout – inhaler with built-in GPS locator and wireless link to internet

Mobile diary to map and track asthma symptoms, triggers and medication use
Appropriate support will help patients to unlock value from expert resources

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<th>Interacting</th>
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<td>Searching for and identifying the relevant expert resource</td>
<td>Making the most appropriate expert resource connection</td>
<td>Communicating via chat, voice and/or video and sharing content as needed</td>
<td>Changing behaviour as a result of the interaction</td>
<td>Becoming an expert resource in your own right and advising others</td>
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This is something I need to investigate

I’ve found the right resource

This is what I need to know. Can you help me?

It’s working for me

I can share what I’ve learnt with others
How much is wasted today?

750 Billion

Out of 2.6 Trillion dollars spend in healthcare in 2012, 750 Billion dollars did nothing to make anyone healthier

1/3 of the spending is wasted
The Waste and Inefficiencies

Less than 50% of elderly patients are up to date on clinical preventive services.

Elderly patients with co-morbidities require up to 19 medication doses daily.

Every year the average elderly patient sees 7 doctors across 4 practices.

1 out of 5 elderly patients are readmitted within 30 days.

Less than half of non-surgical patients follow-up with their primary care provider after discharge.

Average surgery patient is seen by 27 different health care providers.

Science → Evidence → Care

Insights poorly managed → Evidence poorly used → Experience poorly captured

Missed Opportunities, Waste, and Harm

Reference: Institute of Medicine - Best care at Lower Cost
The Internet of Everything...in Healthcare

- Web, Mobile, Social
- Community
- Providers and Payers: Care Team
- Family / Caregivers
- Patient

It’s All About Connecting the Unconnected

Enabling Diverse Applications and Data Sets

Intelligent Network Is the Foundation
Three Key Opportunities in IoE

- Mature and scale Cisco’s **Connected Hospital architecture** that enables:
  - Differentiated patient experience
  - Mobility and productivity for clinicians & care givers
  - Highly secure and compliant ICT assets

- Round up and scale Cisco’s **Healthcare Collaboration offerings** that enable:
  - Access to Healthcare via focus on Tele-health
  - Care at Home and Wellness
  - Enable customers to move to Care continuum

- Invest and scale Cisco’s **Healthcare Data Center and Cloud offerings** that enable:
  - Healthcare Interoperability to enable data exchange
  - Healthcare Applications by supporting secure data centers and private Healthcare Clouds
  - Enable customers to move to Healthcare Analytics
  - Move to Healthcare Service Exchange Platform
Connected Health Services

Note: Medical Grade Network is a set of Cisco recommended guidelines for building an optimal in-hospital network.
Summary

Connecting

Securing

Engaging

Collaborating

Reducing Complexities

Enabling Care Coordination

GLOBALIZATION + LOCALIZATION = GLOCALIZATION

Bringing together People, Processes, Devices and Information – the internet of Everything

Technologies

- Storage Technologies
- Adhoc Network
- M2M
- Sensors
- Social Network Technologies
  - Information Management
  - Smartphone Applications
- RFID
- SmartGrid
- Robotics
- City/Road/Traffic Infrastructure

IT Skills

- Wireless, Wireless Mesh Networking, Applications: Operating Systems, XML, SQL, Scripting Languages, PHP, Ruby, Lua
- Mobile Applications Development and Management, 4G
  - Web development/programming, HTML5, XML, Scripting Languages, Database design, Data integration & Analysis/Analytics
- Voice, Video, Conferencing

Basic Networking Technologies

- IPv6

Collaboration

- Data Centre, Cloud

Web

- Mobile Internet, 4G
About the Speaker

Qualifications:

• Degree in Biomedical Engineering
• Masters in Health Systems Management
• Degree in Medical Law & Ethics

Work Experience: 11 years in Healthcare

• Worked at a 1000 bed Super Speciality hospital
• In Cisco for over 4 years, defining Telehealth strategy, Clinical workflows & healthcare pre-sales
• Authored several articles in internationally renowned, peer-reviewed journals and also co-authored a chapter in the book, *Telenursing*, published by Springer.
Thank you.