The New Era of Health Industry driven by Intelligent Technology and Big Data

San-Cheng (Simon) Chang, Ph. D.
President, Institute for Biotech and Medicine Industry
Former Prime Minister, Taiwan, Rep. of China

Patient-friendly & Smarter Healthcare
Shift to value-based world

**“Old World”**
- Fee-for-service: volume based
- Independent practices practicing independently, often in silos
- Limited clinical integration & information sharing
- Reactive “sick-care”

**“New World”**
- Aligned incentives via value-based contracts across multiple products
- Common governance & shared data
- Emphasis on wellness, prevention & population health management
- Proactive “health care”

**“Future World”**
- Integrated & aligned partners that unlock the value of the partnership
- Division of responsibilities to each party based on who’s best positioned to serve the patient
- Next-generation insurance products with unique value propositions & patient experience
Healthcare in Smart City

Working across the full spectrum of where, when and how health happens

<table>
<thead>
<tr>
<th>Across settings</th>
<th>Continuous care as patients transition from one context to another</th>
</tr>
</thead>
<tbody>
<tr>
<td>Across people</td>
<td>Continuity across the care team, populations, and conditions</td>
</tr>
<tr>
<td>Across data</td>
<td>Continuous and holistic analysis of all types of data</td>
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<tr>
<td>Across time</td>
<td>Continuous, proactive engagements throughout a person’s lifetime.</td>
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</tbody>
</table>
IoT Solution Architecture

source: Advantech
Digital Healthcare of IoT

Domain Specific Application Cloud (SaaS & S/I)

iHospital Solution Platform

Medical Computing Platform

Medical Devices & Sensors

Source: Advantech
The Rise of Consumer Health Wearables

- Headbands
- Sociometric badges
- Camera clips
- Smartwatches
- Sensors embedded in clothing

- Accelerometer
- Altimeter
- Digital camera
- Electrocardiogram
- Electromyograph
- Electroencephalogram
- Electrodermograph
- Location GPS
- Microphone
- Oximeter
- Bluetooth proximity
- Pressure
- Thermometer
Road Map of Continuous Care

Heart Disease Patient

Discharge Preparation

Postoperative home monitoring

Heart disease community
- Health management services
- Healthy environment building
- Disease surveillance support
- Community resource exchange
- Data analysis applications

Long-term Care Service

Disease monitoring
- Mobile ECG

Self health management
- Sport heart rate
- Heart rate test
- Other Devices

source: OmniHealth
Smart Care Platform

Target Customer
- Heart disease (Disease)
  - (I) 2H
  - Enterprise (Healthy)
- (II) 2B2C

Devices
- Professional heartbeat record
- Chest strap

Smart Health Cloud Service
- Health Management
  - Blood sugar, blood pressure, heart rate and visceral fat measurement
  - Follow-up, smart alert
- Call Center Service
  - System debug

Advanced Functionality
- Heart index monitor
  - 1. Heart function assessment (heartbeat)
  - 2. System outliers warning
- Heart health consultation
  - 1. Abnormal data tracking
  - 2. Abnormal habit tracking
  - 3. Online consulting services
- Sport Heart Power
  - 1. Heart real-time monitoring
  - 2. Abnormal warning
  - 3. Browse activities (cumulative steps / movement time / calories consumption)

source: OmniHealth
From Big Data to Precision Medicine

Data Sources
- Device connectivity
- Vital Data Management
- Fitness Management
- Nutrition Management
- Family Health

Data Aggregation
- Variety
  - Different Forms of Data
- Volume
  - Scale of Data
- Velocity
  - Analysis of Streaming Data
- Veracity
  - Uncertainty of Data

Applications
- Patient Portal
  - Member Management
  - Health Risk Assessment
  - Abnormal Management
  - Health Counseling
  - Health Care
  - Coordination
- PhenoFinder
  - Medical Records Storage
  - Cross-hospitals EMR check
  - Environment Data Storage *
  - Gene Records Storage *
  - Protocol Designer
  - Site Finder
  - Patient Finder
  - Study Quality Assessment
  - Trial Site Assessment

source: Asus Life
Transforming healthcare through artificial intelligence

**Last decade**
Medical Products
Equipment, Hardware, Consumables

Differentiation is solely through product innovation. Focused on historic and evidence based-care.

**Current decade**
Medical Platforms
Wearable, Big Data, Health Analytics

Differentiation by providing services to key stakeholders. Focused on real time outcome based-care.

**Next decade**
Medical Solutions
Robotics, AI, Augmented Reality

Differentiation via intelligent solutions for evidence/outcome based health. Focused on preventive care.

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AI drives hardware innovation
Artificial intelligence in disease diagnostics

1. **Data input**

Data: 3mm x 3mm

2. **Data definition and handling**

X-ray image

3. **Sample for training**

Doctor/Radiologist

4. **Analysis tool to build model**

Deep learning and build model

Deep neural network

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Google Uses AI to Diagnose Breast Cancer

Google AI achieves an **92.4 percent** accuracy rate, which is quite a bit ahead of an average score of **73.2 percent** for a human.
Nvidia identifies the top 5 AI startups for medical

- **Genetesis**
  - Genetesis is using deep learning, sensors, and physics to diagnose chest pain properly

- **Lunit**
  - Developing advanced software for medical data analysis and interpretation via cutting-edge deep learning technology.

- **Insilico Medicine**
  - Use artificial intelligence for drug discovery and aging research

- **SigTuple**
  - Use AI to dramatically improve the speed, accuracy, and consistency of various screening processes

- **Bay Labs**
  - Working to increase quality, value and access to medical imaging by combining deep learning and ultrasound.
Make a human doctor to be scalable

- Logical
- Artificial Neural Network
- Deep Learning
Block Chain Brings New Opportunities

- Drug Maker
- Patient
- CRO Laboratory
- Researcher
- Physician
- Patient

Cryptocurrency
- Patient Stratification
- Lifestyle Advice
- Real-time Data

Omics Data
- SOPs Validation

AI
- Clinical Decision Support
- Predictive Analytics
- Unstructured Data

MRI/Images

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What Taiwan has achieved?

• Taiwan citizens have health insurance “Smart Cards” with memory chips, giving instant access to medical history, what medications a person takes and the results of prior hospitalizations.

• Taiwan doctors can access patient medication history via national pharma cloud.

• All hospitals “have electronic medical records linked into the main system.

• The Taiwan system is paperless, allowing doctors and hospitals to get paid in two weeks or less and keeping administrative costs down.

• Barcodes are used on patient wristbands and records “to keep from making mistakes”.

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Taiwan healthcare IT landscape
National Medical Cloud Platform

- Specific Medication (Controlled drugs)
- History of Drug Allergy
- Rehabilitation Care
- Chinese Medicine

**PharmaCloud**
- No. of Surgeries
- Records of Test/Examinations
- Dental Services

**NHI Medical Cloud System**
- Discharge Summary

**Results of Tests/Examinations**
As of July 31, 2015, all hospitals in Taiwan were connected to the NHI PharmaCloud System, and a total of 15,108 contracted medical institutions, including hospitals, clinics, pharmacies, and home care institutions, have conducted searches on the system.
Personalized Care: My Health Bank

*My Health Bank* was put in place in September 2014 and, under layers of protection for data security, allows the insured individuals to retrieve their health data stored on the NHI's data warehouse to facilitate their health management and to keep track of their insurance status.
Taiwan Healthcare Expo 12.7 – 12.10 Taipei Nangang Exhibition Center

Connecting all healthcare-related sectors in one place

01 Medical Centers
02 ICT & Electronics
03 Biopharmaceuticals
04 Precision Medicine
05 Medical Device
06 Bio Innovation
07 Bio Agriculture
08 Business Solutions
TAIWAN
Where innovations are shaping a new era of intelligent healthcare

World-class medical centers and hospitals
Over 1800 biotech companies
Best healthcare system in the world
Top-ranked life science research institutes and universities
Most influential ICT & electronics industry in the world
Growing number of emerging biotech startups

Who Should Attend?

Healthcare professionals
Hospital management executives
Pharmaceutical professionals
Medical device professionals
Biotech professionals
Clinical research professionals
Academic researchers and scientists
Healthcare IT professionals
Digital health professionals
Medical electronics professionals
Health insurance professionals
Government representatives
Biotech startup entrepreneurs
Investors
Venture capitalists
Distributors
Foreign trade professionals and representatives
Media

Endless Potential & Opportunities
From Taiwan to the World

ICT
Smart Building
Aging Biz
Hospital Mgt.
Smart city
Big Data

On-Line
Off-Line

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Thank you