ITU-SUDACAD Regional Forum on Internet of Things for Development of Smart and Sustainable Cities

Khartoum, Sudan 13-14 Dec 2017

Medical Internet of Things (mIoT); 2020 and Beyond.

Ahmed Almobarak; MBBS, MD, DCP.
Faculty of Medicine - UMST

Outlines :

1- What is mIoT.

2- Values & Applications.

3- Obstacles.

4- Future prospects.

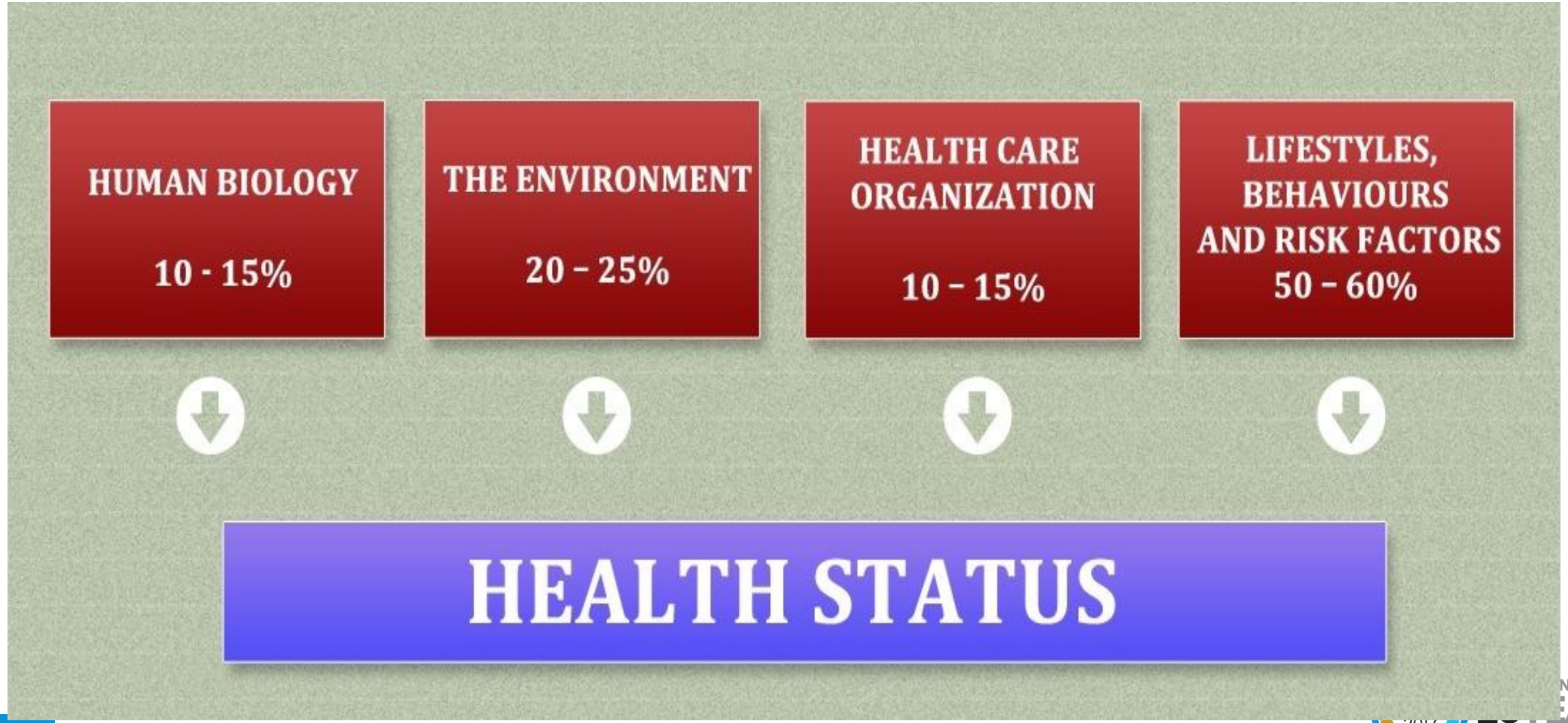
What is mIoT

• Convergence between ICT & Medicine lead to booming of digital medicine, telemedicine, or telehealth via the **medical Internet of Things** (mIoT).

• The **mIoT** refers to physical devices connect to the internet and transform information from the physical world in to the digital world.

• The applications of IoT are nowhere essential in transforming lives of people than in healthcare.

Determinants of Health



Healthcare Trends

- IoT basic functions is to Connect / Search / Monitor / Manage / Control.
- The major **mIoT** applications can be grouped in to following categories based on the functionality.

1. Tracking of objects and people.
2. Identification and authentication.
3. Automatic data collection and sensing.

mIoT

Applications & Values

wearable Devices

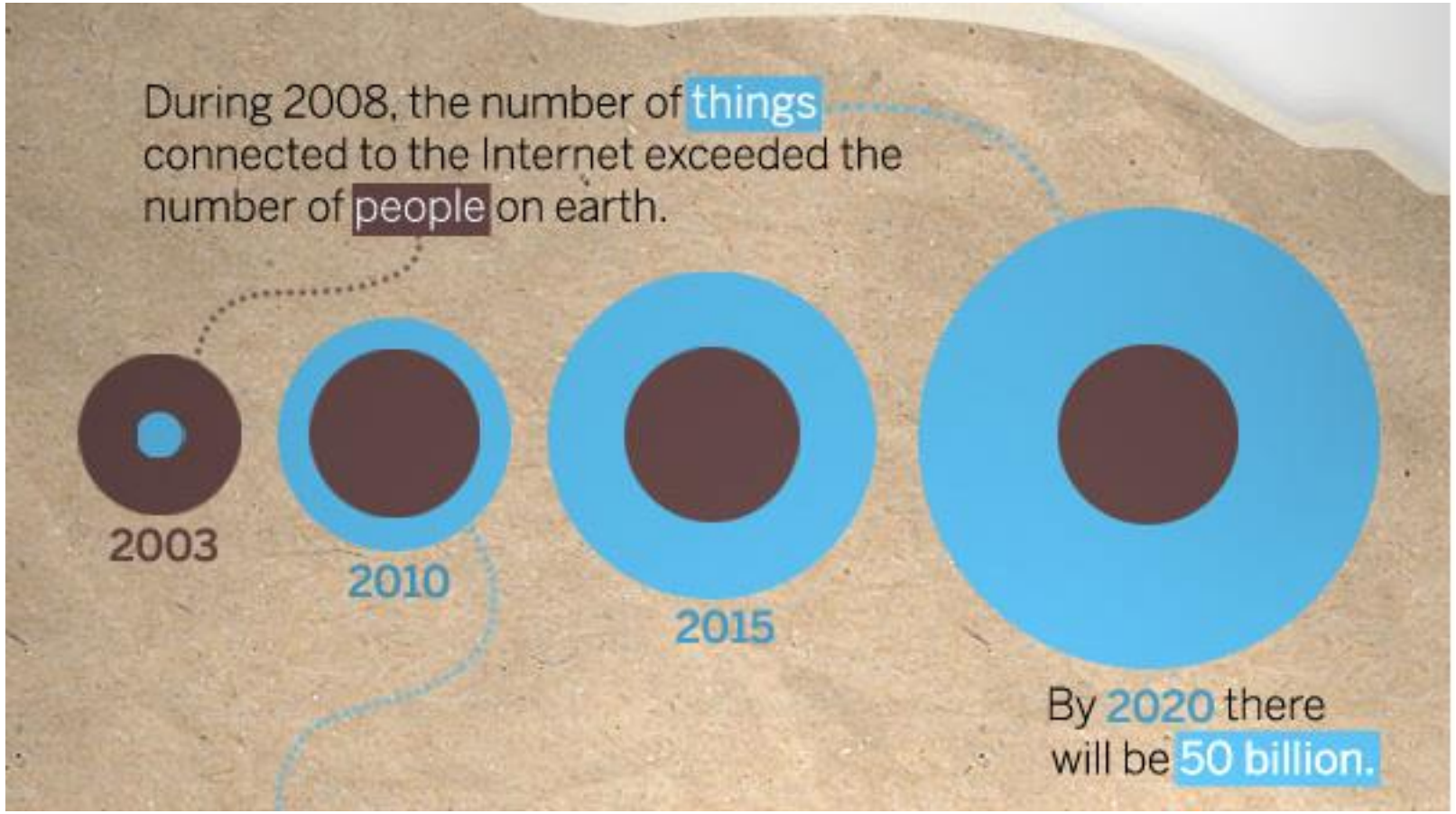
- Wireless patient monitoring :

i) Monitoring NCDs.

ii) Monitored pacemakers and automatic defibrillator.

iii) Tracking Pt activities “Fitness”.

iv) Smart Diagnostic Devices “Glucometer”.



Sources: Cisco IBSG, Jim Cicconi, AT&T , Steve Leibson, Computer History Museum, CNN, University of Michigan, Fraunhofer

Mobile System Access

- Based on the smart mobile technologies.

- Enable remote/virtual access to
  - EMRs.
  - Picture archiving and communication systems [PACS].

Virtual consultation (telemedicine)

- Based on remote connectivity and multimedia solutions :

i) Medical consultation.

ii) Diagnostic service (Tele-pathology).

iii) E- medical education.

iv) Tele-surgery using robots and nurse assistants.

Virtual Consultation

Geriatric Medicine

- The slogan will be “Aging in place” :

i) Monitoring for independent living of aging populations.

ii) Real-time care via transmission of data to the doctor.

iii) Personal emergency responses systems (PERS),

iv) Robotic assisted physiotherapy.

Values of mIoT

1. Real time assessment.

2. Better decision-making capability.

3. Increasing its efficiency.

4- Lowering costs.

Pharma IOT

- ‘**Beyond the pill**’ Pharma.

- Electroceutical Vs Pharmaceutical industry.

Beyond the pill Pharmacy

Ingestible sensor

• The **ingestible sensor** is the sensor based technology swallowed as a pill:

- Tracking the compliance to medication.
- Powered by the human body fluids.
- There are no battery and no antenna.

- Technology to monitor drug adherence & competence.

• Proteus, Digital health feedback system, http://www.proteus.com/technology/digital-health-feedback-system

Artificial Pancreatic System

- **OpenAPS:** combination of CGM & Insulin pump.
- Connected inhaler from Novartis for COPD.

Obstacles :

1- Safety of patients:

• If used on patients as implantable or wearable, any breaches in security are life threatening and considered very critical.

2- Challenge of BIG DATA for hospital IT

i) Scalability of IT for better storage & analysis of data.

ii) Interoperability challenges keep mIoT data at different silos.

•Solutions to avoid Technocracy:

- Smart people “data scientists”.
- Effective ways for data mining.

Challenges

3- Security and personal privacy:

• The mIoT should ensure Confidentiality, Integrity, and Availability of patients' personal data.

4- Design challenges:

• Technology improving, nevertheless these are still challenges as on today, while designing an IoT based system [1]:

- Energy, memory & computer power limitations.

Projected Figures 2020

- By 2020, 40% of IoT-related technology will be health-related, more than any other category [2]

- By 2020, IoT devices ranging from 26 – 212 billions IoT devices according to different studies[3].

- By 2020 mIoT making up around 117billion USD market share[2].

Future Prospects

- Convergence of consumer devices and medical devices.
- Via **mIoT** medicine will be participatory (4Ps instead of 3Ps).
- Robotic assisted surgery, physiotherapy, … etc.
- A new category of “coaches” Digital Health Advisors will emerge.
- Emergence of “Beyond the Pill” Pharmacy.
- Booming of electroceutical business industry.

References :

[1] D. Christin, A. Reinhardt, P. Mogre and R. Steinmed, “Wireless Sensor Networks and the Internet of Things: Selected Challenges,” in Proceedings of the 8th GI/ITG KuVS Fachgespräch “Drahtlose Sensornede, pp. 31-33, 2009.

[2] Bauer H, Patel M, Veira J. The Internet of Things: sizing

up the opportunity [Internet]. New York (NY): McKinsey & Company; c2016 [cited at 2016 Jul 1]. Available from: http://www.mckinsey.com/industries/hightech/ our-insights/the-internet-of-things-sizing-up-theopportunity.

[3] Flores M, Glusman G, Brogaard K, Price ND, Hood L.

P4 medicine: how systems medicine will transform the

healthcare sector and society. Per Med 2013;10(6):565-76.


sudacad
سودا كاد
أكاديمية سودا تل للإتصالات
SUDATEL TELECOMMUNICATIONS ACADEMY


ITUWTDC
BUENOS AIRES 2017
9-20 October

Thank You


ITU-D
1992
2017
CELEBRATING
25YEARS
OF ACHIEVEMENTS