STATE OF MOBILE HEALTH

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Group Chairman & CEO
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SOME INITIAL THOUGHTS…..

- **WHAT IS MOBILE HEALTH?**
  - **Is it an EHR that is running on a mobile?**
  - **Is it PHR that connect to an EHR – tethered?**
  - **Is it a standalone PHR?**
  - **Is it a consumer Mobile Health app?**
  - **Is it "name your vendor" implementation of an EHR?**
  - ➢ **Not a vertical domain**
  - ➢ **But a horizontal framework that cuts across all healthcare domains: mobility is the common factor**

GORA's "DEFINITION"

- **WHAT IS LIFE!**
  - **Animate**
  - **Communicate**
- **WHAT IS IoT? (Internet of Things)**
  - **Inanimate**
  - **Communicate**
- **WHAT IS "HoT"*?**
  - **Healthcare of Things**
- **WHAT is mH4ALL*?**
  - **Mobile Health 4 All**

MOBILE HEALTH MARKET SIZE

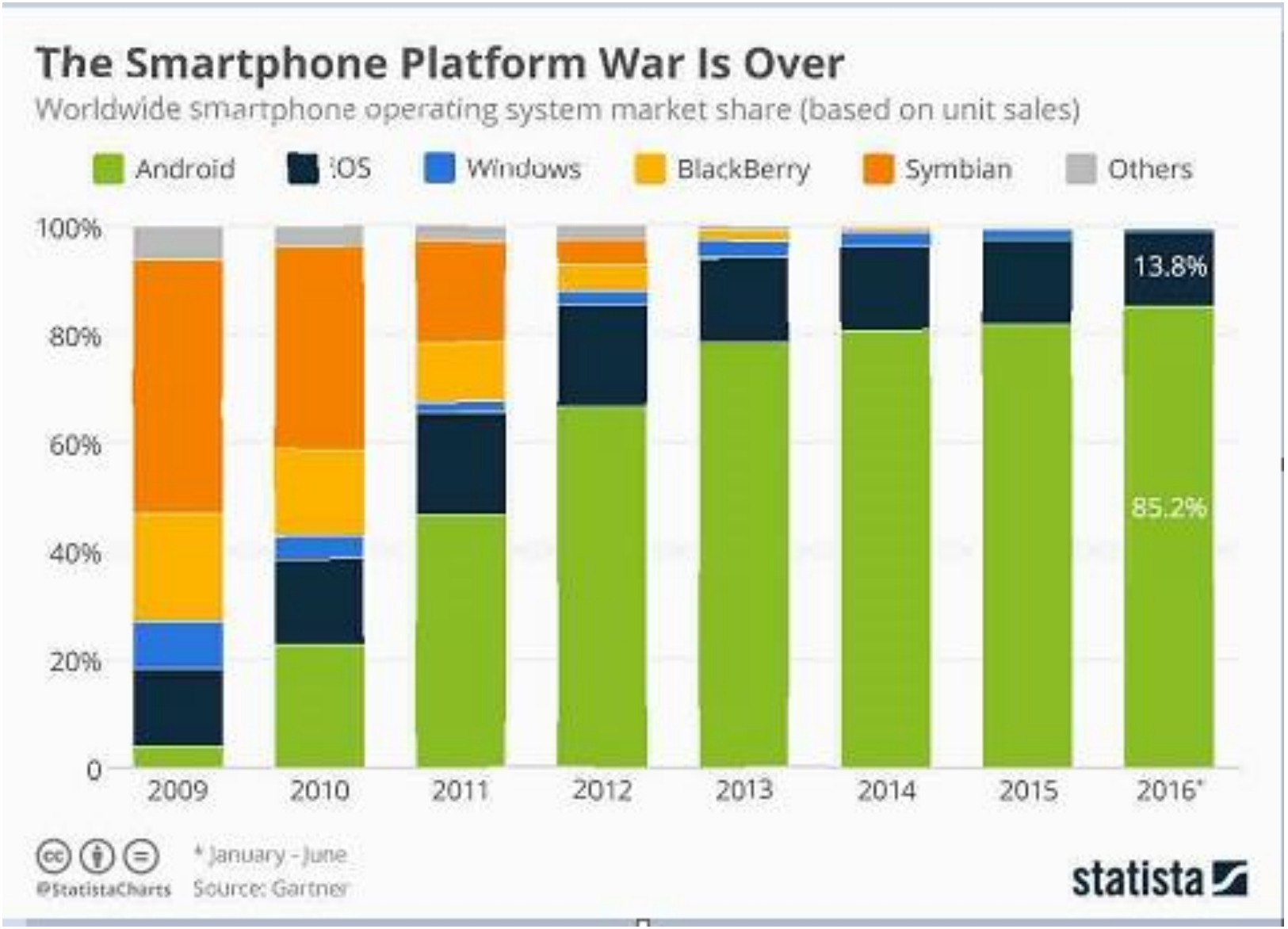
- 2016 projection: > $13B
- By 2017, it is estimated, the market for Mobile Health apps, will be…
  - $26 billion
- By 2020:
  - > $50B

MOBILE & IoT REVOLUTION!

- **Mobile phone market**
  - first billion mobile phones: 20 years
  - second billion phones: 4 years
  - third billion: 2 years
  - Fourth & fifth billion: 1 year – in 2013
  - 2014: nearly One Billion "smart" mobile phones sold globally
  - 2015 – > 1.2B units
  - 2016 – > 1.5B units

- **IoT connected world by 2020**
  - Projected to be 50 Billion devices

MOBILE PLATFORM in 2016



CHALLENGES & OPPORTUNITIES

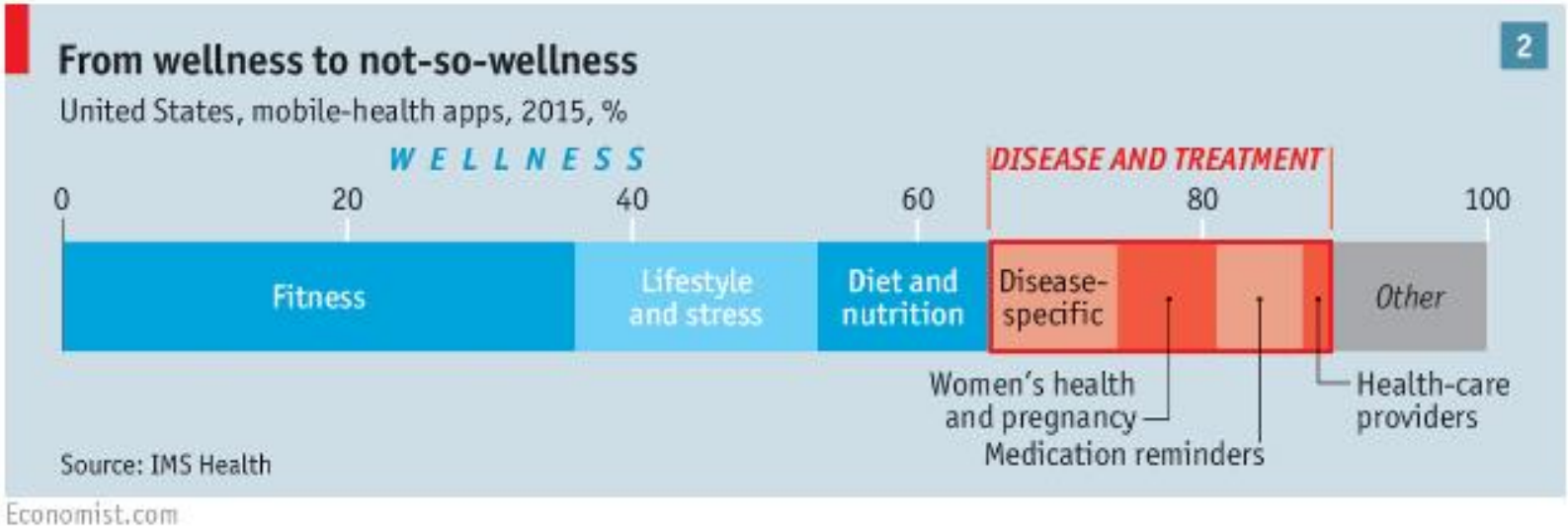
- **There are over 165,000 mobile health apps**
  - **RIME OF THE MODERN TECHNOLOGIST - "mobile, mobile everywhere….none *talk* to anyone"**
  - **12% of mHealth apps account for more than 90% of all consumer downloads**
  - **with nearly half of all downloads generated by just 36 apps**
- **VC Funding for MH Apps hits all-time record in 2016**
- **90% of MH (and financial) apps are vulnerable to critical security risks**
- **Mobile Health app are projected to become a regular part of our care (over the next 5 years)**

MOBILE HEALTH MARKET TREND

1. Main driver: Ever increasing global smartphone users
2. Young Customers will drive the market
3. MH apps leveraging features of smartphones or tablets
   - Location service
   - IM
   - Picture, Video
   - Gyroscope
   - Micro payment service
4. MH apps native rather than web-based applications
5. Rise of MH app stores
6. 2nd generation mHealth applications will focus on chronic diseases
7. MH will push/expand/broaden the health business model
8. MH apps entering traditional (health) distribution channels
9. MH apps will bridge the global health divide
10. Evolving MH standards

Mobile Health trends: 2016 - 2020

- Wearable & Smart Diagnostics
- Healthier Living
- Predictive Diagnostics
- TeleHealth
- Personalized Medicine



MOBILE HEALTH STAKEHOLDERS

MOBILE HEALTH: Not a vertical domain

But a horizontal framework that cuts across and impacts all health care domains

Source: HL7 Mobile Health Newsletter V1Is1

USA: Federal Government & other Entities

- FDA
  - Mobile Medical Application (MMA) Guidance
  - RF Wireless Technology in Medical Devices Guidance
  - Unique Device Identification (UDI)
  - FDASIA (ONC, FCC + FDA: Safety & Innovation Act)
- FCC
  - FCC Smart Phone Security Guidelines
  - FCC Health
- FTC Mobile Privacy Disclosures
- HHS Mobile Device Privacy & Security Guidelines
- OCR (Office of Civil Rights) – HIPAA Guidelines
- House Panel (Energy & Commerce Committee)
- NIST Mobile Apps Security vetting
- US Meaningful Use EHR Program
- US Quality Payment Program (MACRA:QPP)
- NIH Mobile Health Grants

HL7 MOBILE HEALTH WG MISSION

- **The HL7 Mobile Health Work Group creates and promotes health information technology standards and frameworks for mobile health.**

- **http://wiki.hl7.org/index.php?title=Mobile_Health**

HL7 Mobile Health Activities

- **Emerging Standards**
  - **Consumer Mobile Health Application Functional Framework - cMHAFF**
  - **Mobile Framework for Healthcare Adoption of Short-Message Technologies (mFHAST)**
- **Projects**
  - **MH API Interoperability Environmental Scan**
  - **Graphical Symbols/Pictorial Representation in MH**

A PLUG! – Invitation to join HL7 MH WG

- This is an exciting new opportunity in an exploding space: get in on the ground floor!
- We have leeway to make broad changes to meet emerging needs
- Help us take a right-sized approach, addressing important gaps without stifling innovation or being too prescriptive
- Help HL7 collaborate well with the public and private sectors

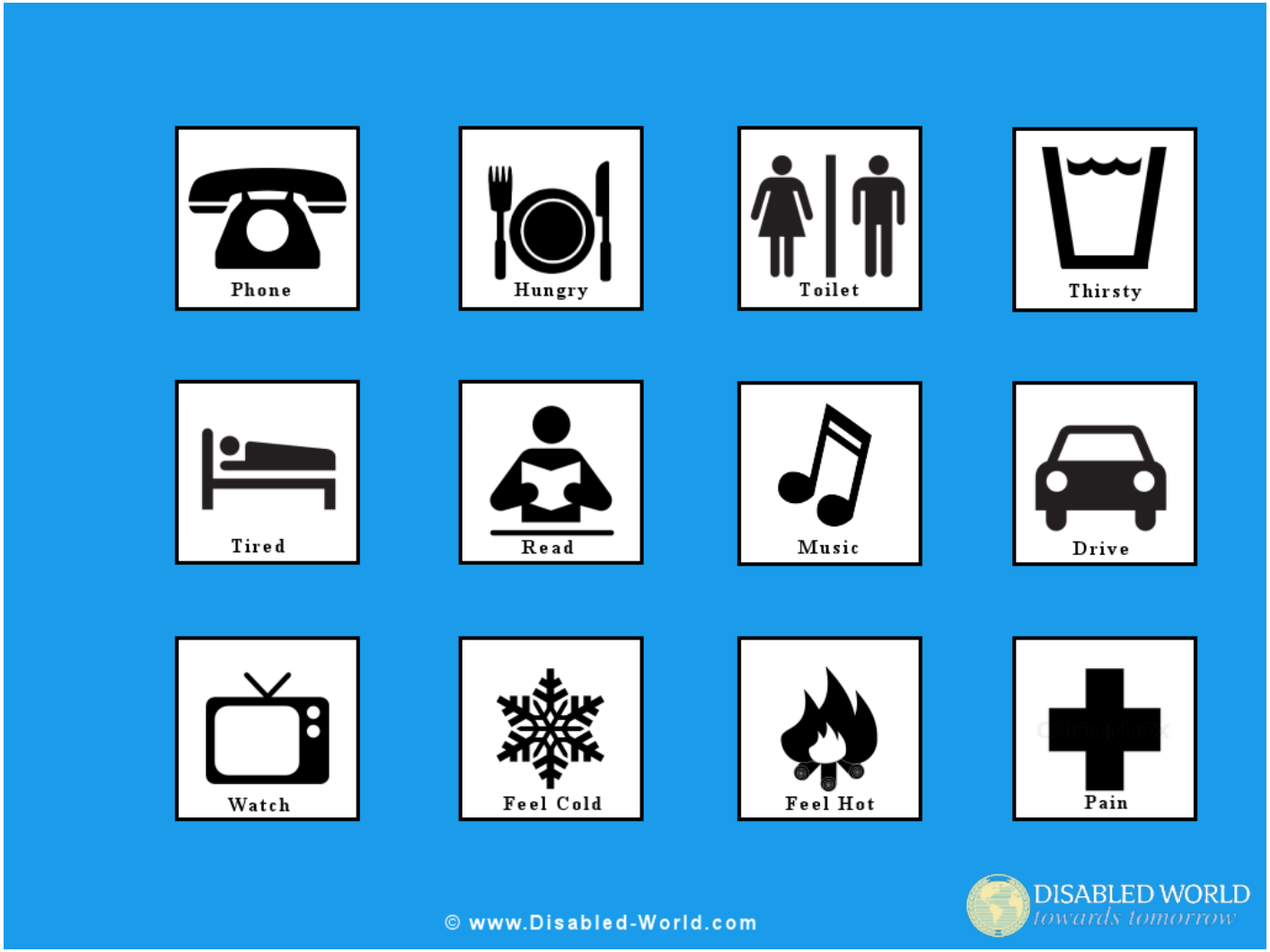
ISO/TC215

Graphical Symbol/Pictorial Representation in Mobile Health

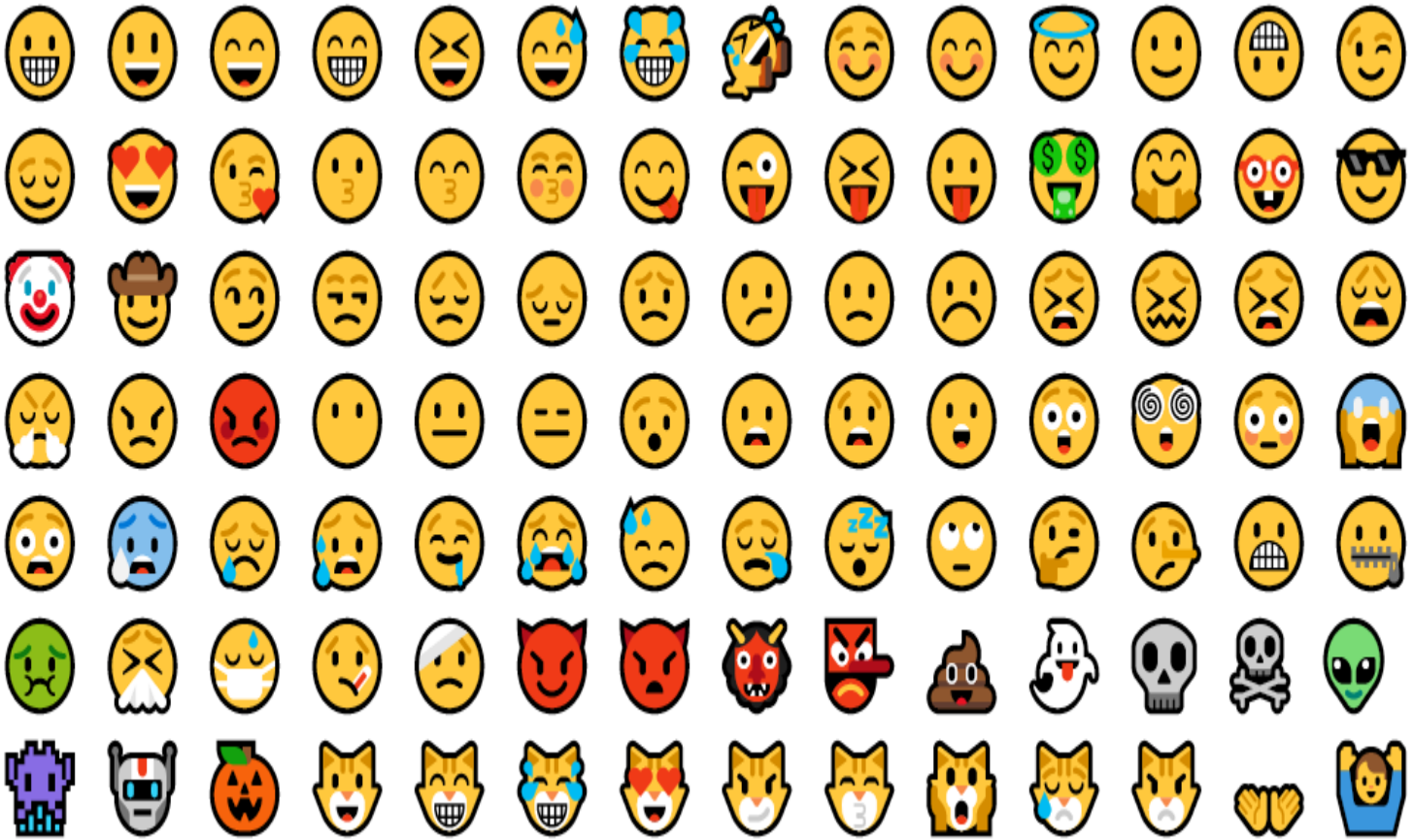
a proposed standard of ISO/TC215
New Work Item (NWI) approved in Oct 2016

Do you know these?

How about these?



Your age is showing if you don't know these! ☺



The Issue / Current Environment

- Mobile platforms have become consumers' preferred means for communication
- Mobile devices are a big driver of consumer engagement in management of their health
- Mobile apps present an opportunity to facilitate monitoring consumer safety and wellbeing, promoting maximal independence
- Standardized graphics promote safety

Standards for Symbols

- Standards exist to enable rapid, non-verbal communication in domains such as transportation and occupational safety
- No analogous standards exist for the health care domain
- ISO has multiple standards guiding choice of text size, colors, shapes, and placement, among other things.

ISO Standards
Graphical Symbols

- **ISO/TC 8**
- **ISO/TC 20**
- **ISO/TC 22**
- **ISO/TC 23**
- **ISO/TC 36**
- **ISO/TC 38**
- **ISO/TC 44**
- **ISO/TC 70**
- ISO/TC 72
- ISO/TC 85
- ISO/TC 96
- ISO/TC 106
- ISO/TC 110
- ISO/TC 127
- ISO/TC 130
- ISO/TC 145
- ISO/TC 150
- ISO/TC 184
- ISO/TC 188
- ISO/TC 210
- ISO/TC 214
- ~~ISO/TC 215~~
- ISO/IEC JTC 1/SC 35

Potential applications#1

- **Mobile devices could enable symbols related to healthcare needs to be accessed even on a locked screen**

Potential applications#2

- **Multiple possibilities:**
  - **Aging Communities**
  - **Behavioral health**
  - **School health**
  - **Child health**
  - **Non-verbal Consumers**
  - **Care across language barrier**
  - **……..**

IEEE Medical Devices Standards

IEEE 11073 Standards (recognized by FDA)

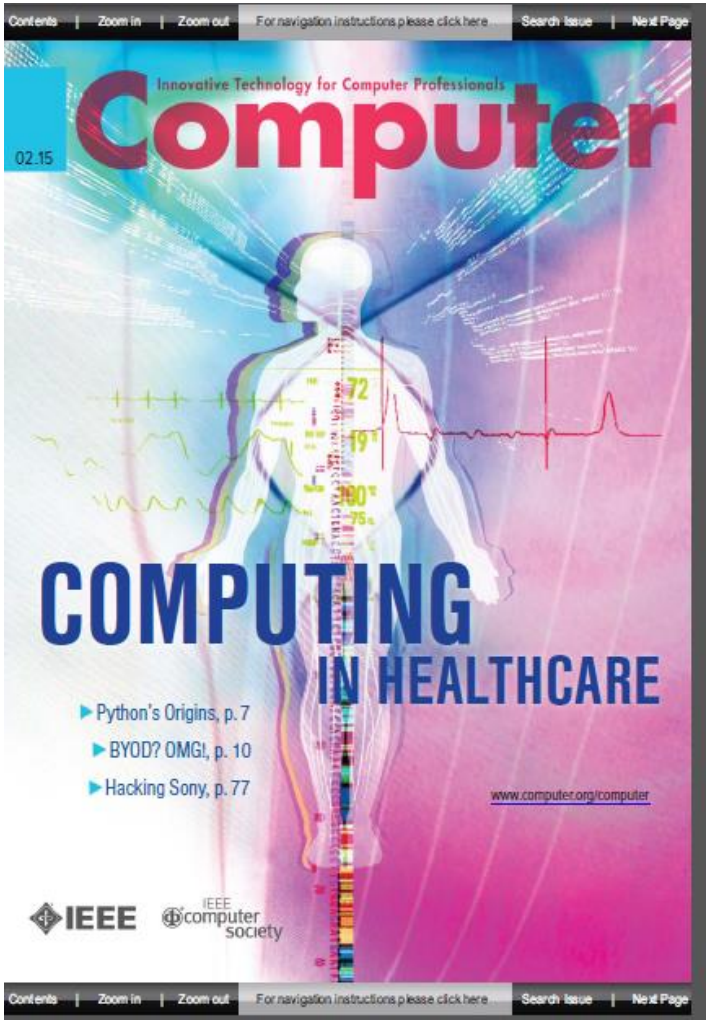
ISO/IEEE 11073 standard family defines parts of a system, with which it is possible, to exchange and evaluate vital signs data between different medical devices, as well as remote control these devices.

1. IEEE 11073-10101™ "Health informatics—**Point-of-care medical device communication**—Part 10101: Nomenclature“
2. IEEE 11073-10201™ “Health informatics—Point-of-care medical device communication—Domain information model”
3. IEEE 11073- 20101™ “Health informatics—Point-of-care medical device communication—Application profile—Base standard”
4. IEEE 11073-20601™ “Health informatics—**Personal health device communication**—Part 20601: Application profile—Optimized exchange protocol”
5. IEEE 11073-20601a-2010™ “Health informatics—Personal health device communication—Part 20601: Application profile—Optimized exchange protocol”
6. IEEE 11073-10408™ “Health informatics—Personal health device communication—Part 10408: Device specialization—**Thermometer**”

IEEE 11073 Standards (cont.)

7. IEEE 11073-10415™ “Health informatics—Personal health device communication—Part 10415: Device specialization—**Weighing scale**”
8. IEEE 11073-10404™ “Health informatics—Personal health device communication—Part 10404: Device specialization—**Pulse oximeter**”
9. IEEE 11073-10421-2010™ “Health informatics—Personal health device communication Part 10421: Device specialization—**Peak expiratory flow monitor (peak flow)**”
10. IEEE 11073-10406-2011™ “Health informatics—Personal health device communication Part 10406: Device specialization—**Basic electrocardiograph (ECG) (1- to 3-lead ECG)**”
11. IEEE 11073-10407™ “IEEE ISO/IEEE Health informatics—Personal health device communication—Part 10407: Device specialization—**Blood pressure monitor**”
12. IEEE 11073-10417™ “IEEE ISO/IEEE Health informatics—Personal health device communication—Part 10417: Device specialization—**Glucose meter**”

THE FUTURE



"through the looking glass"

Changing Landscape: Paper to Digital

- **Stage 1: capture coded data**
  - 1) Capturing health information in a coded format,
  - 2) Using the information to track key clinical conditions;
  - 3) Communicating captured information for care coordination purposes;
  - 4) Reporting of clinical quality measures and public health information.
- **Stage 2: share information**
  - Focus on interoperability, disease management, clinical decision support, support for patient access to their health information, transitions in care, quality measurement, research, and bi-directional communication with public health agencies.
- **Stage 3: convert data to knowledge**
  - Focus on achieving improvements in quality, safety and efficiency, focusing on decision support for national high priority conditions, patient access to self-management tools, access to comprehensive patient data and improving population health outcomes.

Changing Landscape: Payment Model

20th Century Payment Model

- **FEE FOR SERVICE (FFS) – Volume based**
  - **Payment is based on**
    - **# of Service provided**

21st Century Payment Model

- **P4P: Pay For Performance – Value based**
  - **Payment is based on**
    - **Improved health**
    - **Higher quality of service (Quality Measures)**
    - **Lower cost**

WHY THE CHANGE?

Source: https://en.wikipedia.org/wiki/1917

HEALTHCARE MARKET SIZE

- US GDP (2016)
  - $18.6T (=$18,569.1 Billion)*
- US Healthcare spending: 18% of GDP = $3.3T
  - (> ∑ of healthcare spending of rest of the world!)
- US Projected GDP by 2022
  - $23T
- US (projected) healthcare spending in 2020**

  20% of the GDP = $4.6T

* https://www.bea.gov/newsreleases/national/gdp/gdpnewsrelease.htm

** http://www.tradingeconomics.com/united-states/gdp

What is driving this phenomenal growth?

- **KEY DRIVERS**
  - **Increasing global population**
  - **Aging population (in Western world)**
  - **Higher Life Expectancy (people living longer)**
  - **Increasing Chronic diseases*: e.g., diabetes, obesity, heart disease etc.**
  - **Technological advances**
  - **Emergence of Personalized medicine**
  - **Global reach of diseases**

[Chronic Disease is a long-lasting condition that can be controlled but not cured]

HEALTHCARE IN THE 21st CENTURY

1. **Next generation: "iPAD™" kids**
2. **Blurred Lines:**
   - **Impact of Social Media**
   - **Concept of Privacy**
3. **Are we there yet: I want it NOW**
4. **Take Charge: Consumer Health, Predictive Analytics**
5. **Gene to genes: from Star-Trek (Gene Roddenberry) to Genetic Health – personalized medicine**
6. **Space – The Final Frontier: "Healthy" flights**

…..21st CENTURY (cont.)

7. Back to the Future: Longitudinal Health Record
8. Live long & prosper: from provenance to preservation
9. Emerging Areas: HoT, Big Data, Cloud, AR/VR/MR
10. Global Village: Urban, Rural, Remote, Underserved
11. “l'addition s'il vous plaît”: Mobile micro-payments
12. Take care: CyberHealth, Blockchain, H-Bots

MIND THE GAP!

- CAN TECHNOLOGY BE THE ENABLER THAT **REDUCES** THE GAP?
- CAN TECHNOLOGY BE THE ENABLER THAT **ELEMINATES** THE GAP?

THE CHALLENGE

THE OPPORTUNITY!

DEFINITION

Population ageing—the increasing share of older persons in the population—is poised to become one of the most significant social transformations of the twenty-first century, with implications for nearly all sectors of society, including labour and financial markets, the demand for goods and services, such as housing, transportation and social protection, as well as family structures and intergenerational ties.

- "World Population Ageing" 2015 Report by United Nations Department of Economic and Social Affairs Population Division

Source: http://www.un.org/en/development/desa/population/publications/pdf/ageing/WPA2015_Report.pdf

From the Report

Globally, the number of older persons is growing faster than the numbers of people in any other age group. As a result, the share of older persons in the total population is increasing virtually everywhere.

While population ageing is a global phenomenon, the ageing process is more advanced in some regions than in others, having begun more than a century ago in countries that developed earlier, and getting underway only recently in many countries where the development process has occurred later, including the decline of fertility.

Exhibit 9. Select Population Health Outcomes and Risk Factors

	Life exp. at birth, 2013[a]	Infant mortality, per 1,000 live births, 2013[a]	Percent of pop. age 65+ with two or more chronic conditions, 2014[b]	Obesity rate (BMI>30), 2013[a,c]	Percent of pop. (age 15+) who are daily smokers, 2013[a]	Percent of pop. age 65+
Australia	82.2	3.6	54	28.3[e]	12.8	14.4
Canada	81.5[e]	4.8[e]	56	25.8	14.9	15.2
Denmark	80.4	3.5	–	14.2	17.0	17.8
France	82.3	3.6	43	14.5[d]	24.1[d]	17.7
Germany	80.9	3.3	49	23.6	20.9	21.1
Japan	83.4	2.1	–	3.7	19.3	25.1
Netherlands	81.4	3.8	46	11.8	18.5	16.8
New Zealand	81.4	5.2[e]	37	30.6	15.5	14.2
Norway	81.8	2.4	43	10.0[d]	15.0	15.6
Sweden	82.0	2.7	42	11.7	10.7	19.0
Switzerland	82.9	3.9	44	10.3[d]	20.4[d]	17.3
United Kingdom	81.1	3.8	33	24.9	20.0[d]	17.1
United States	78.8	6.1[e]	68	35.3[d]	13.7	14.1
OECD median	81.2	3.5	–	28.3	18.9	17.0

[a] Source: OECD Health Data 2015.
[b] Includes: hypertension or high blood pressure, heart disease, diabetes, lung problems, mental health problems, cancer, and joint pain/arthritis. Source: Commonwealth Fund International Health Policy Survey of Older Adults, 2014.
[c] DEN, FR, NETH, NOR, SWE, and SWIZ based on self-reported data; all other countries based on measured data.
[d] 2012. [e] 2011.

Additional Source: http://www.commonwealthfund.org/publications/issue-briefs/2015/oct/us-health-care-from-a-global-perspective

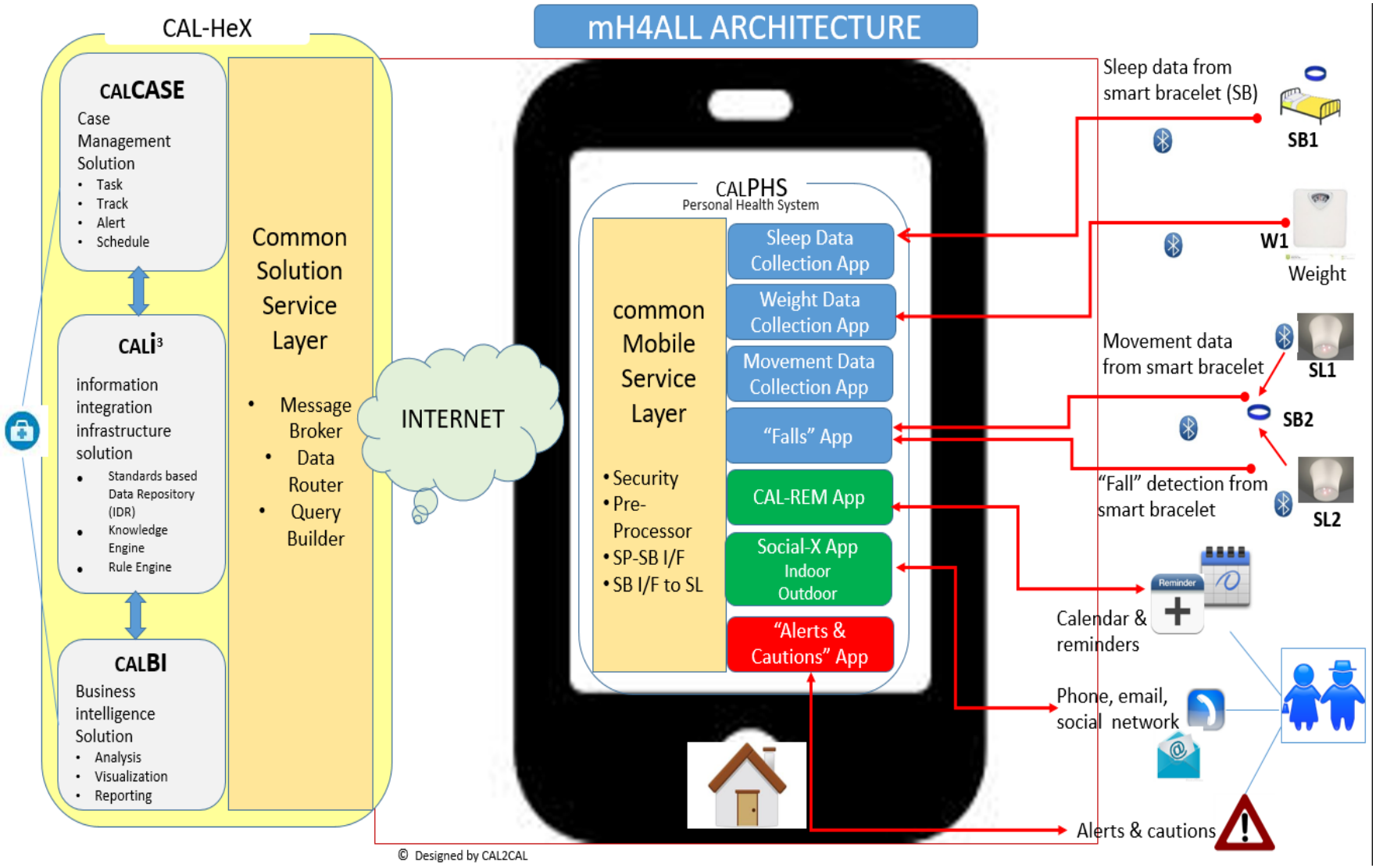
A FEW EXAMPLES…..

- PBS HOUR: How emerging technologies can help with care for ill or frail family members
- MIT AGE LAB: Old Age, New Technology, and Future Innovations in Disease Management and Home Health Care
- Leading Age talk: Innovation & the Future of Aging Services
- HomeCareMagazine: Top 10 Technology Devices for Seniors

More Examples…..

- **International Federation of Aging Report:** LONG TERM CARE AND TECHNOLOGY
- **UK – The TELEGRAPH:** Technology's biggest untapped market is elderly care
- Smart home technology: Providing independence to the elderly while strengthening family ties
- Silverevolution: New Tech for Old Age: A Growing Number of High Tech Solutions Aim to Improve Life for the Elderly

An Example Architecture



FUTURE POSSIBILITIES!

- **Mobile Health Apps Certifications & Accreditation**
- **Prescribing Mobile Health Apps**
- **UHAI: Unique Health App Identifier! (UDI for Mobile Health Apps)**

SOME FINAL THOUGHTS….

- Skill Gap
- Cultural Outreach
- Socio-economic impact
- Key Question
  - Will Technology “bridge the gap” – the health divide between the young and the old?
  - WHEN and NOT WILL?
    - up to us – the standards community!!!

SUMMARY!

- As we transition to a digital health record framework; use of Mobile Health leads the way (in access, capture and dissemination of health information)
- As Mobile & IoT Devices become more and more ubiquitous, accessing our Health Information is only a few tap/swipe/transmit away!
- HEALTHCARE IN 21st CENTURY
  - Cloud connected, IoT driven, micro-services enabled Mobile Health Enterprise
- Mobile Health Standards is the key to this future!

THANK YOU

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