Medical Sensor Solutions for Early and Reliable Diagnosis

ams sensor solutions

Dr. Filip Frederix, Senior Marketing Manager Smart Medical Devices
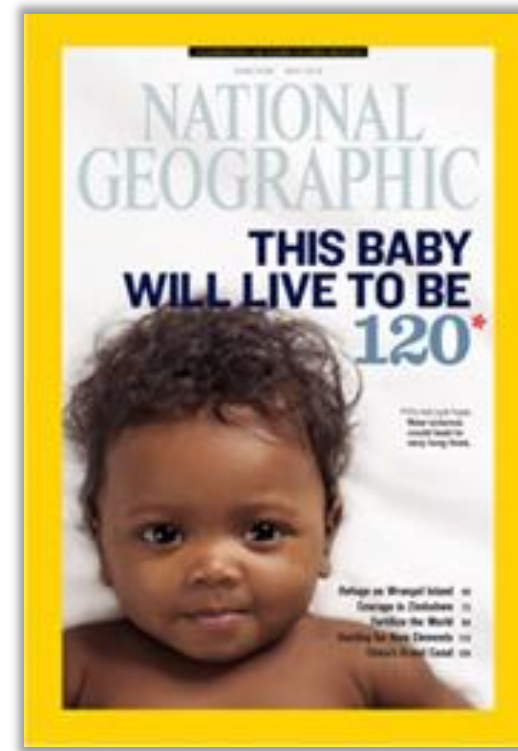
Dr. Michael Leitner, VP & GM Medical Solutions
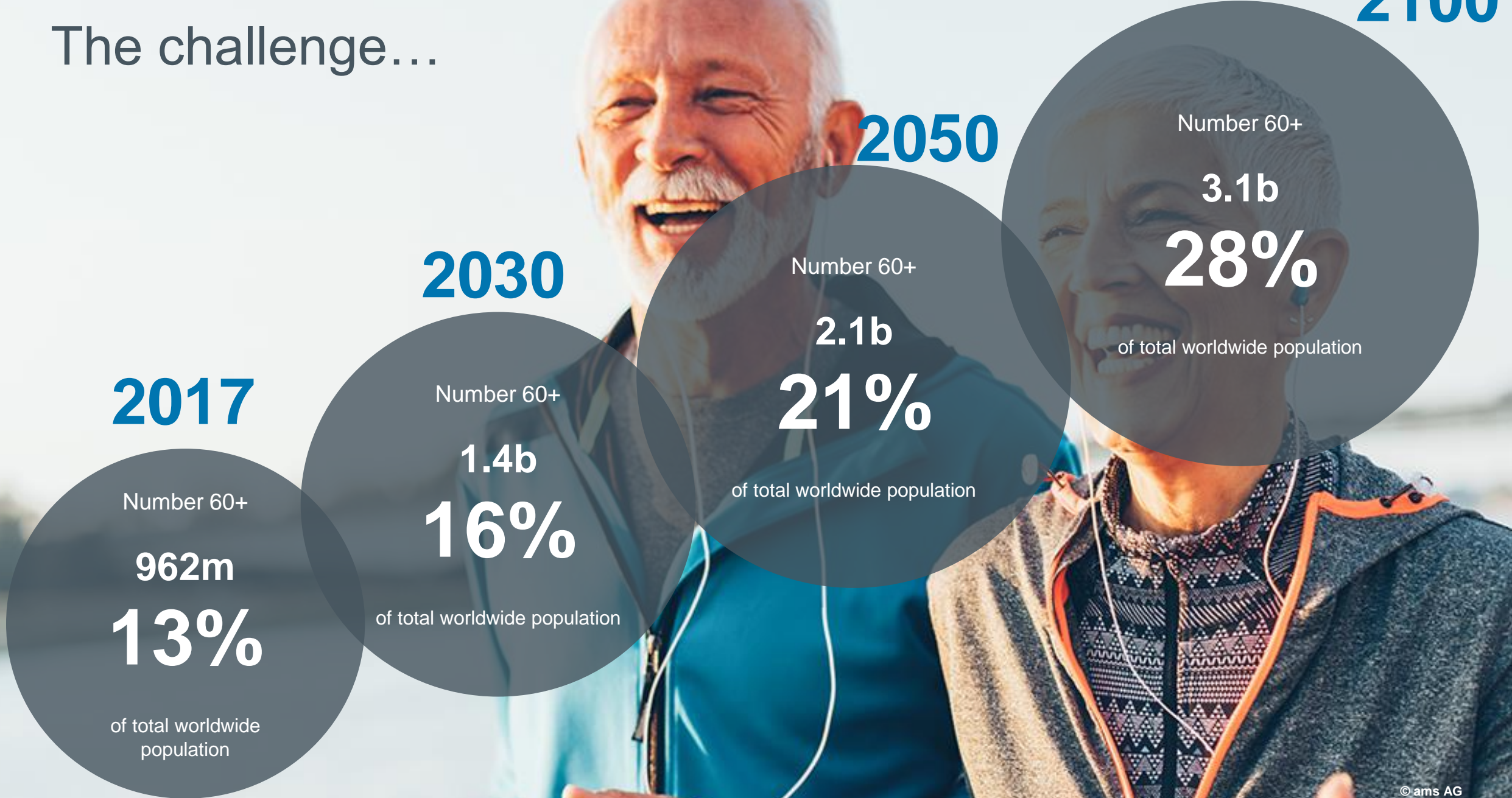
Electronica 2018

ams

Sensing **is life.**
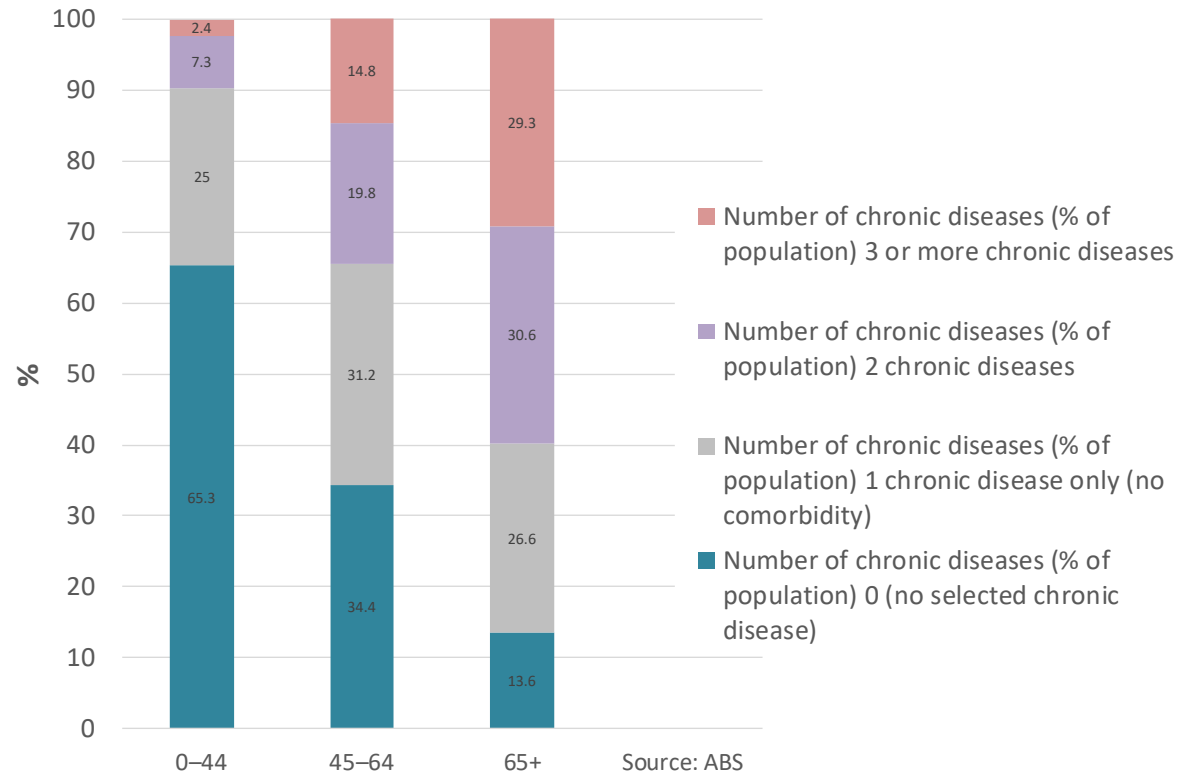
The good news …

The challenge…

2100

2050

2030

2017

Number 60+

962m

13%

of total worldwide population

Number 60+

1.4b

16%

of total worldwide population

Number 60+

2.1b

21%

of total worldwide population

Number 60+

3.1b

28%

of total worldwide population

World Population Prospects, 2017 revision, United Nations

The bad news …

Legend (left chart):
- Number of chronic diseases (% of population) 3 or more chronic diseases
- Number of chronic diseases (% of population) 2 chronic diseases
- Number of chronic diseases (% of population) 1 chronic disease only (no comorbidity)
- Number of chronic diseases (% of population) 0 (no selected chronic disease)

Source: ABS 2015 (Table 18.3); Table S3.3.2.

Left chart values:
- 0–44: 65.3, 25, 7.3, 2.4
- 45–64: 34.4, 31.2, 19.8, 14.8
- 65+: 13.6, 26.6, 30.6, 29.3

Right chart — Number of chronic conditions (5+, 3–4, 1–2, 0):
- Total population: 40%, 31%, 16%, 12%
- Total expenditures: 10%, 23%, 26%, 41%

NOTE: Total health care spending defined as the amount spent on all outpatient and inpatient health care services across all payers, including out-of-pocket payments.

Percentages may not total 100 because of rounding.

The challenge…

The challenge…

Health care costs as a percentage of U.S. GDP

40%

18%

7.2%

1970 · 2010 · 2050*
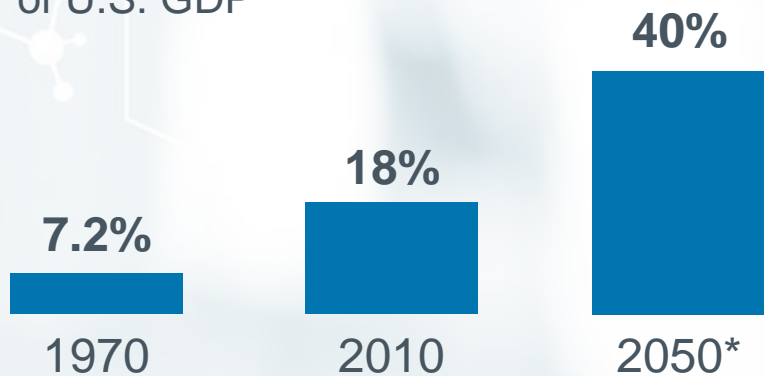
Annual U.S: health care spending

$2.6 TRILLION

$4.6 TRILLION

2010 · 2020*

What can we do about this?

Prevention

Sensors solutions are crucial!

Advice on your physical activity	**Personalized prevention programs** **and** **Health monitoring**	**Food (quality) advice** **and** **Environmental feedback**

- 2% spent on diagnostic but influencing 70% of treatment decisions → earlier diagnostics?

- **$10 per person per year** on prevention could yield **$16 billion** in medical cost savings annually within 5 years.

- **1$ investment makes $5.60 gain**, without considering the additional gains in worker productivity and enhanced quality of life.

References: www.cdc.gov/chronicdisease/pdf/2009-Power-of-Prevention.pdf & www.thejournalofprecisionmedicine.com/wp-content/uploads/2017/09/ARTICLE-3.pdf

Decentralized testing

From hospital testing to testing at GP office or home testing

Now

Towards
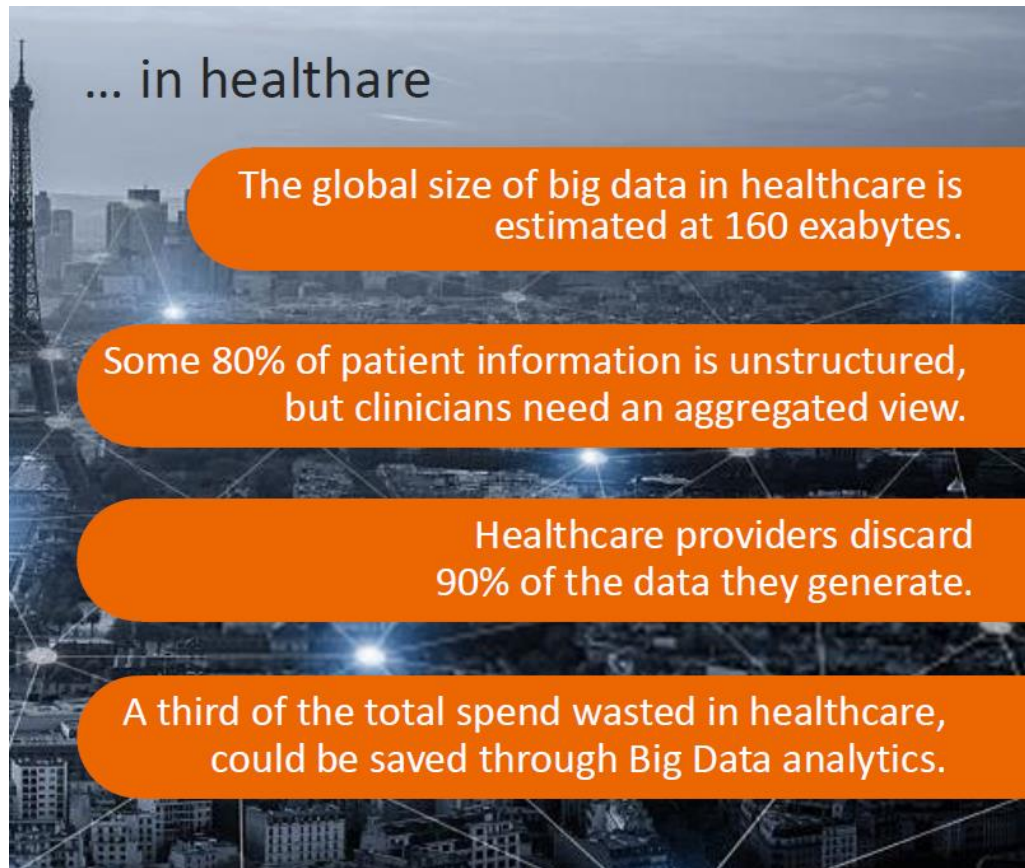
Home Testing

Non-invasive monitoring

mysugarwatch.com

Big Data & Artificial Intelligence
Can play in important role in future healthcare

> 100.000 Health Apps are available for Smart Phones

... in healthare

The global size of big data in healthcare is estimated at 160 exabytes.

Some 80% of patient information is unstructured, but clinicians need an aggregated view.

Healthcare providers discard 90% of the data they generate.

A third of the total spend wasted in healthcare, could be saved through Big Data analytics.

Wednesday, May 2, 2018

Artificial intelligence better than most human experts at detecting cause of preemie blindness

New algorithm could help overcome shortage of physicians trained in disease diagnosis

---

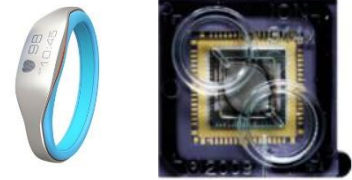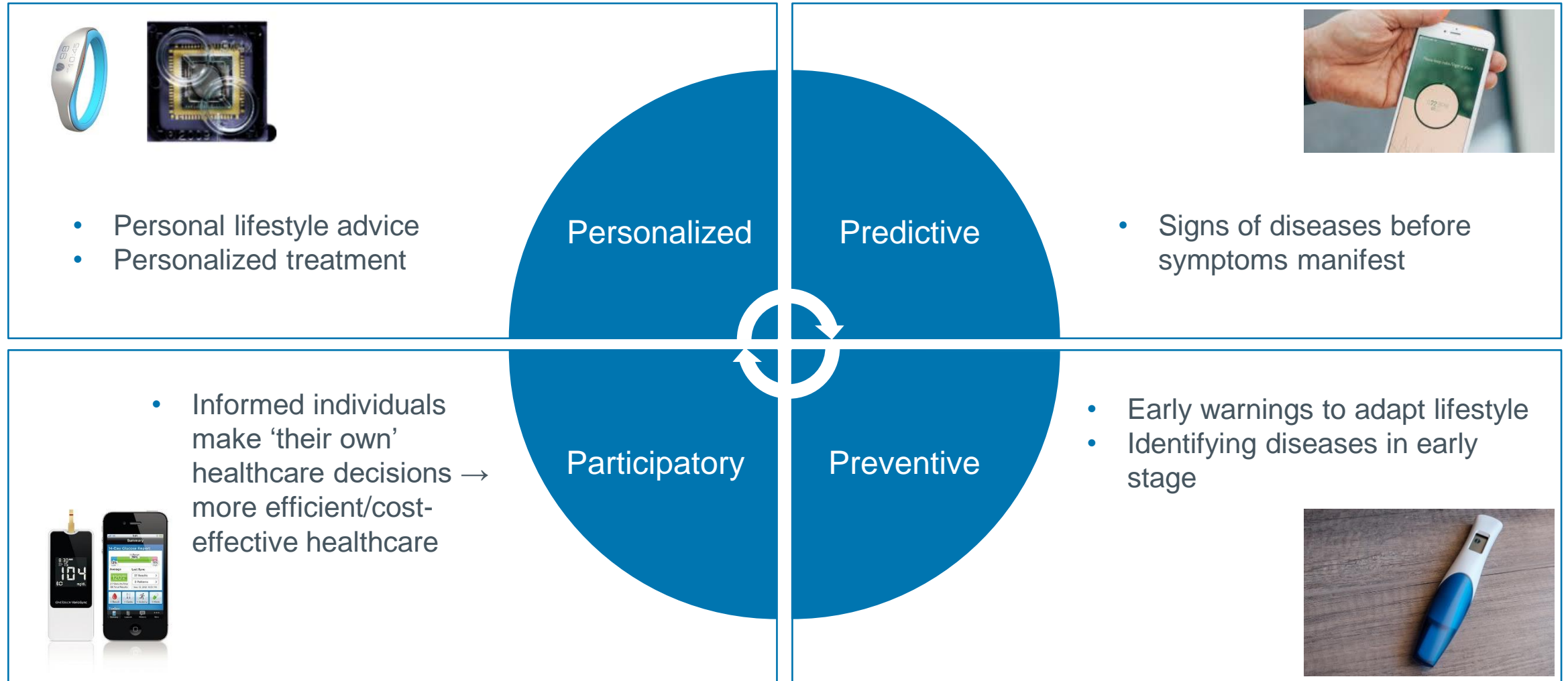### Man against machine: AI is better than dermatologists at diagnosing skin cancer

Date: May 28, 2018

Source: European Society for Medical Oncology

Summary: Researchers have shown for the first time that a form of artificial intelligence or machine learning known as a deep learning convolutional neural network (CNN) is better than experienced dermatologists at detecting skin cancer.

Towards 4P medicine

Sensors solutions are key!

- Personal lifestyle advice
- Personalized treatment

Personalized

Predictive

- Signs of diseases before symptoms manifest

- Informed individuals make 'their own' healthcare decisions → more efficient/cost-effective healthcare

Participatory

Preventive

- Early warnings to adapt lifestyle
- Identifying diseases in early stage

Sensor Technology Demands

Features

- Accurate sensors
- Connection to healthcare professional/database
- Actionable output and/or data analysis
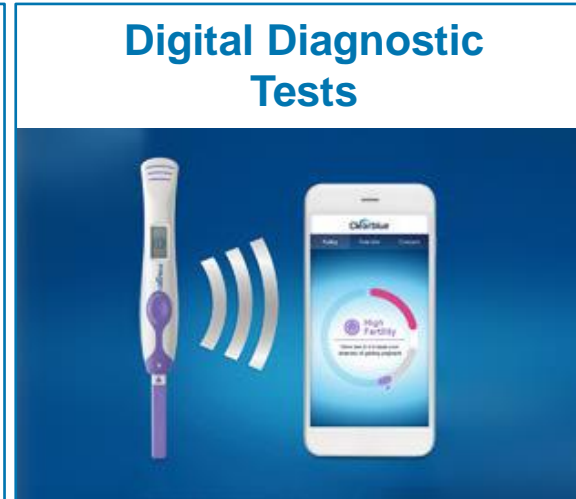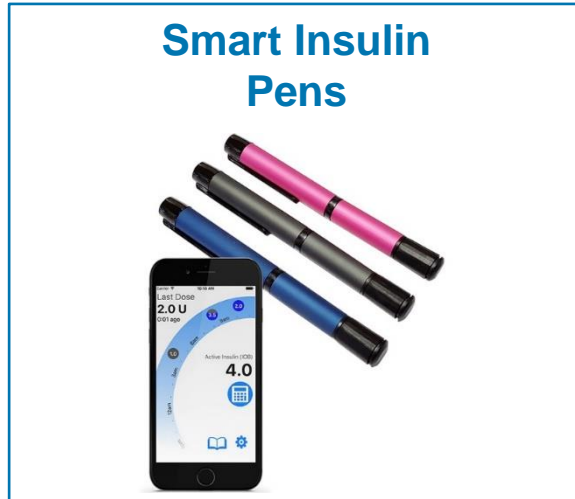- Used at home or by nonprofessional

Technology demands

- Miniaturized, cost effective, sensitive, selective, sensors
- Connectivity
- Big data, AI, …
- Consumer like technology

Healthcare companies

Consumer health

Consumer companies

Benefits

- Prevent diseases
- Follow up the treatment
- Decentralized healthcare
- …

Recent example of smart sensor solutions

Smart Insulin Pens

Digital Diagnostic Tests

Smart Inhalers

Connected Wearable Glucose Patch

Benefits for patients:

- Better follow-up treatment

- Better accuracy

- But also potential future better treatment due to big data / AI

Medical Sensor Solutions

Smart Monitoring, Effective Data versus Doctor Skills, Sensors + Usability

Dr. Michael Leitner VP & GM

Sensing is life.

Sensors – an integral part of the digital transformation in Healthcare

The Clinical and Medical Practitioners Environment

The Job of Sensor Solutions in the Clinical and Medical Practitioners Environment

- Minimize Cost of Ownership

- Enable Sensing principles to less invasive methods, minimizing the cost of accurate diagnosis to the patient

- Get the clinical lab into the doctors office for immediate diagnosis instead of days waiting time

- Maximize the knowledge retrieved from raw measurement data, to enable medical doctors in as accurate as possible diagnosis.

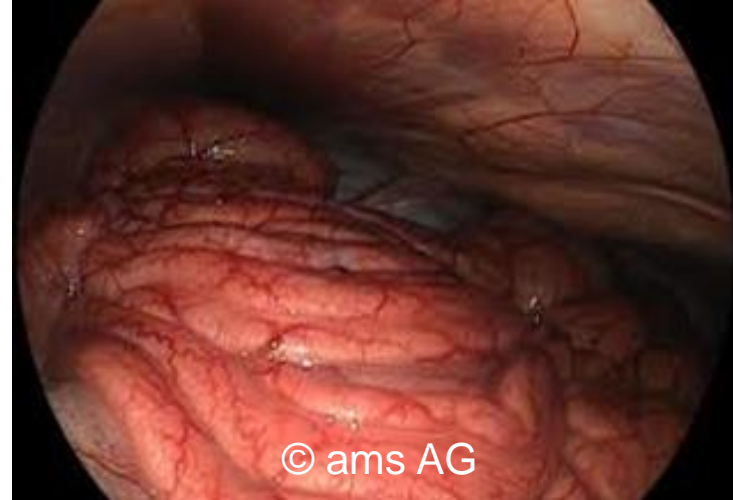# The Clinical and Medical Practitioners Environment

Examples for Optimized Sensor Solutions in the clinical and practitioners environment

© ams AG

Computed Tomography:

- Clear images at lowest dose
- System and system environment cost minimization
- Artificial Intelligence and Cloud Services for efficient Pre-Diagnosis

Endoscopy:

- Cost of Ownership reduction by using high volume technology
- Reducing infections by disposable technology
- Multiple-Sensor Technology integration to enable multiple Senses. (Capacitive, Temperature, Spectroscopy,…)

Bringing the Lab to the Sample:

- Bio-chemical
- IR - Spectroscopy
- Photoacoustic
- Raman Spectroscopy

Your Personal Environment

The Job of Sensor Solutions at the Medical Practitioner

- "Downsize" and "down price" sensors to fit into our everyday devices (bathroom, car, watch, earbuds, shoes, …)

- Combine sensor signals and generate pre-diagnosis information for you and your doctor

- **Securely communicate the personal data and guaranty data access by your approved and trusted parties**

Your personal environment

Examples for optimized sensor solutions in your personal environment

On and around your body:

- Heart Rate, HRV, ECG, blood pressure, arterial elasticity, vagal tone
- SpO_2, skin temperature, Respiration
- Aerobe threshold (O_2 / CO_2 breath analysis)
- Emotional stress / depression (audio sensing)

In your body:

- Breath analysis (infrared/raman spectroscopy)
- Skin analysis (spectral sensing)
- Urine analysis (infrared spectroscopy)
- Blood analysis (spectroscopy)

Around your body:

- Sunlight radiation (UVA, UVB)
- Circadian lighting (color sensing)
- Food quality (spectral sensing)

Semiconductors in Healthcare

Connect with us:

Filip.Frederix@ams.com

Michael.Leitner @ams.com

Thank you!

Please visit our website
www.ams.com

Follow us on social media: