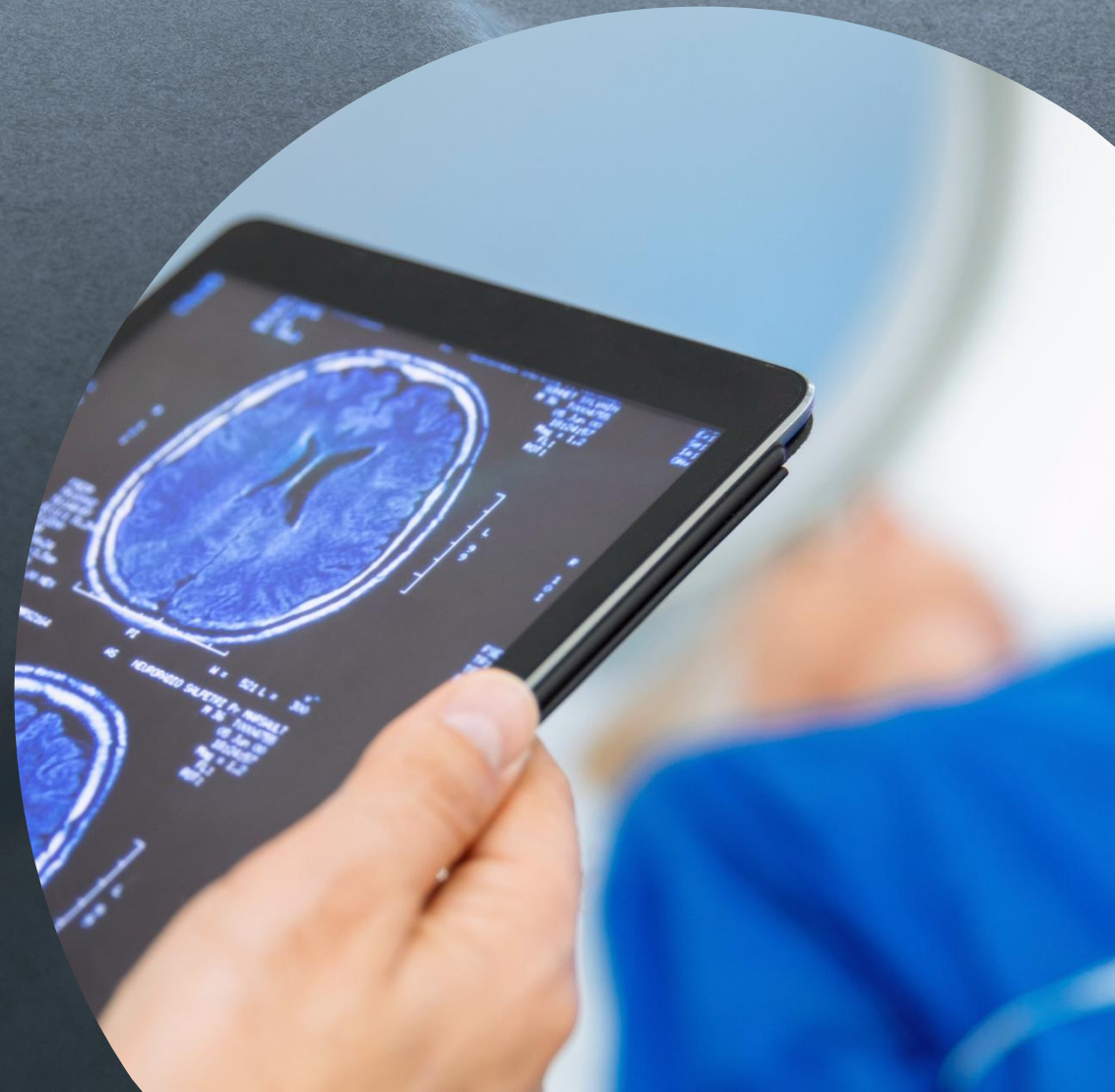


“The future of healthcare”

How the semiconductor industry is driving future healthcare

Jens Milnikel, EVP & GM BU Image Sensor Solutions
Munich, November 16, 2022



Socio-economic developments drive importance of Smart Health Solutions



Aging population



Lack of certified personnel

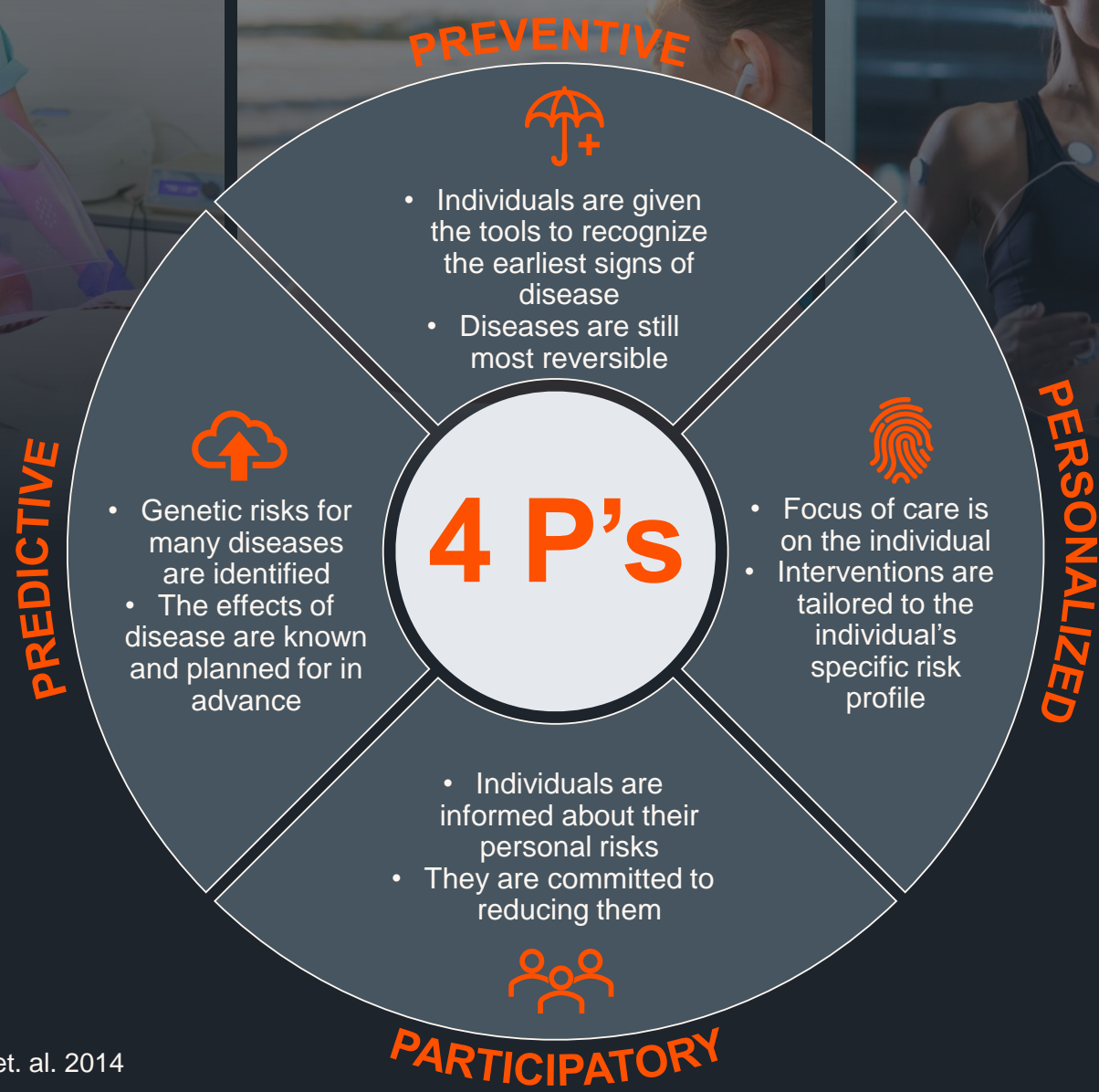


Budget constrained public health system



Digital natives

The 4 P's of healthcare continue to revolutionize the health system ...



... they are enabled by innovations in the Semiconductor Industry!

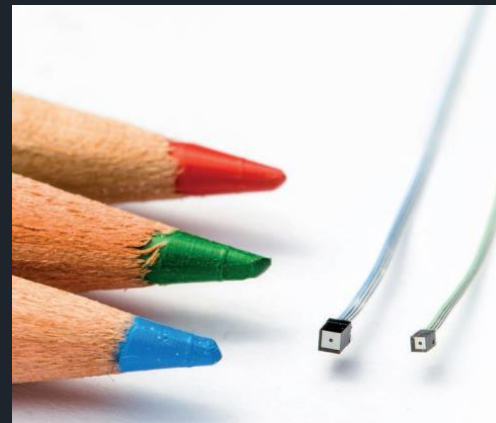


Micro Camera Endoscopy Solutions ...

PREVENTIVE

Single-Use / Disposable Endoscopy:

- Miniaturized Digital Camera solutions for ultra small form factors
- Low power consumption & high frame rates
- Application space reaching from Urology to Colonoscopy

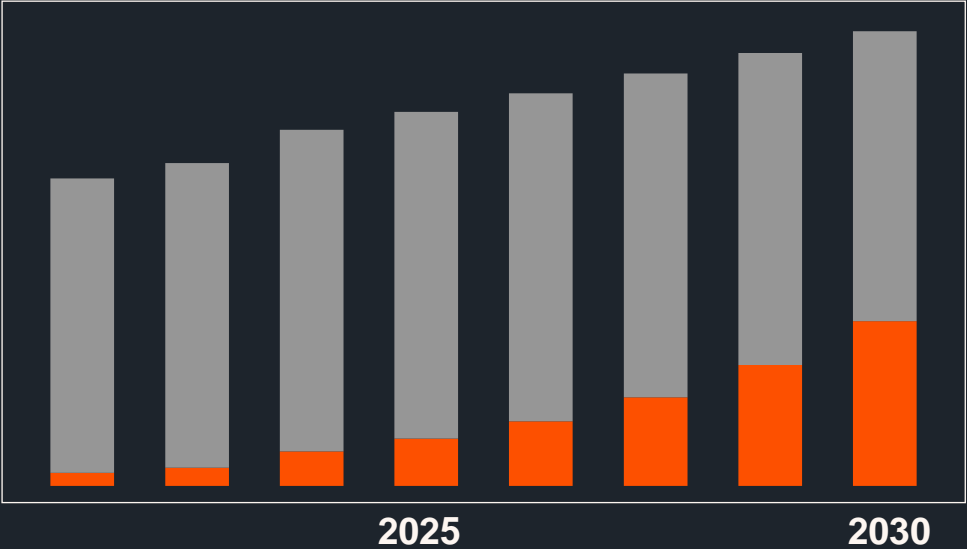


... enabling fast and safe diagnostics everywhere before it is too late...



Adoption rate for Micro Camera Endoscopy solutions is accelerating

Endoscopy equipment market – Procedures in million per year¹



○ = CAGR '21-'30

Reusable endoscopy

<1%

Disposable endoscopy

36%

Growth of disposable endoscopes driven by:

- No cross-contamination risk
- Easier logistics
- Cost advantages



Unique combination of

Image Sensor

+

Wafer-Level-Optics

+

LED

enables innovative solutions

5 1) numbers based on internal market models and external sources

UV-C Disinfection ...

PREVENTIVE



UV-C LEDs:

- Inactivating 99.9 percent of viruses and bacteria*
- Environmentally friendly in comparison to mercury lamps
- Flexible and compact designs with high durability



... nipping infections
in the bud



CT¹-Sensing with innovative Photon Counting technology ...

PERSONALIZED

Most innovative CT Photon Counting technology with:

- Sharper and colored images of the smallest regions of the body
- Lower radiation dose
- Intrinsic spectral information

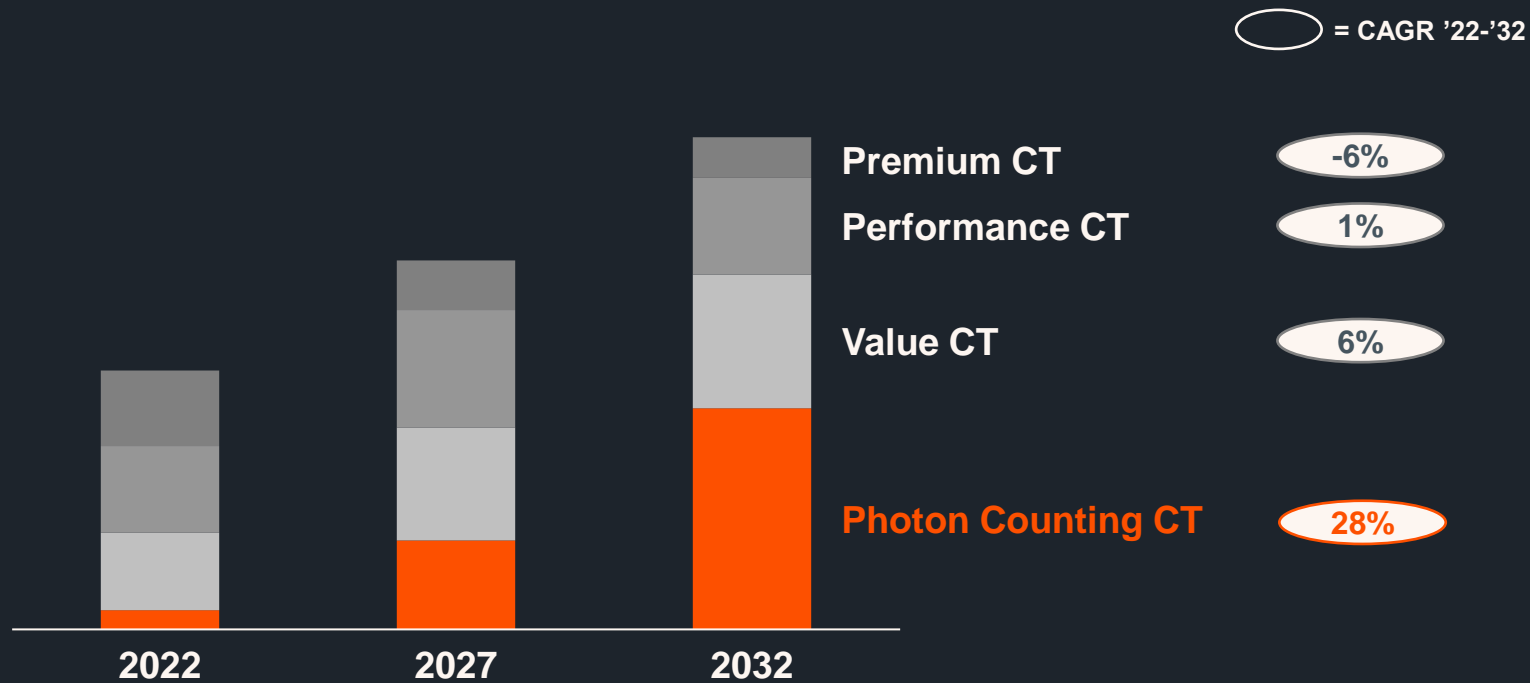
... enables precise diagnostics
for accurate and targeted treatment





Future CT market growth is driven by Photon Counting Technology

CT Market in m€ by major segments¹



Growth of Photon Counting driven by:

- Improved image quality at lower dose
- Enablement of new diagnosis
- Simplification of prognosis

Unique combination of



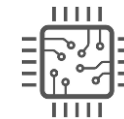
Easy sensor attachment

+



Easy module assembly

+



Best-in-class Front-End

simplifies system integration, boosts performance and enables cost efficient solutions

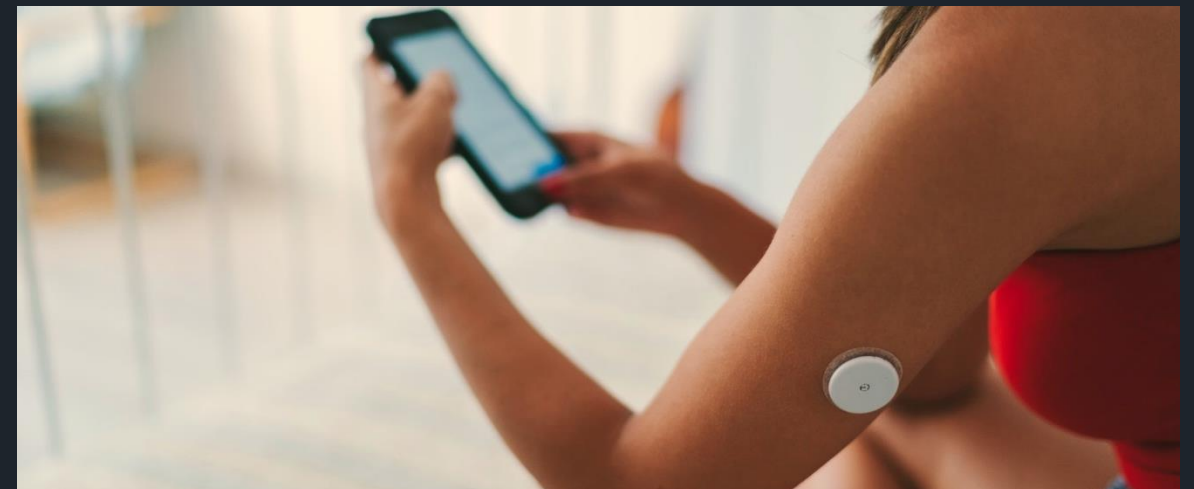
Minimal & non-invasive Sensing ...

PERSONALIZED



Miniaturized high precision sensors:

- Replacing invasive analysis
- Continuous monitoring using e.g. optical and temperature measurements (with data transmission e.g. to smartphone)
- Applications for monitoring of micronutrients and other substances in blood or body tissues to assess overall health (glucose, lactate, alcohol, ...)



... allowing real-time personalized analysis and “tailor-made” medication

Vital Sign Monitoring...

PARTICIPATORY

...describes the optical or electrical measurement of body vitals to assess the general physical wellbeing of a person



Forehead

HRM, SpO2, Temperature

Glasses

HRM, SpO2, Blood Pressure

Ear

HRM, SpO2, Blood Pressure, Temperature

Arm

HRM, SpO2, Blood Pressure, Temperature

Chest

ECG, HRM, SpO2
Respiration Rate, Temperature

Wrist (top)

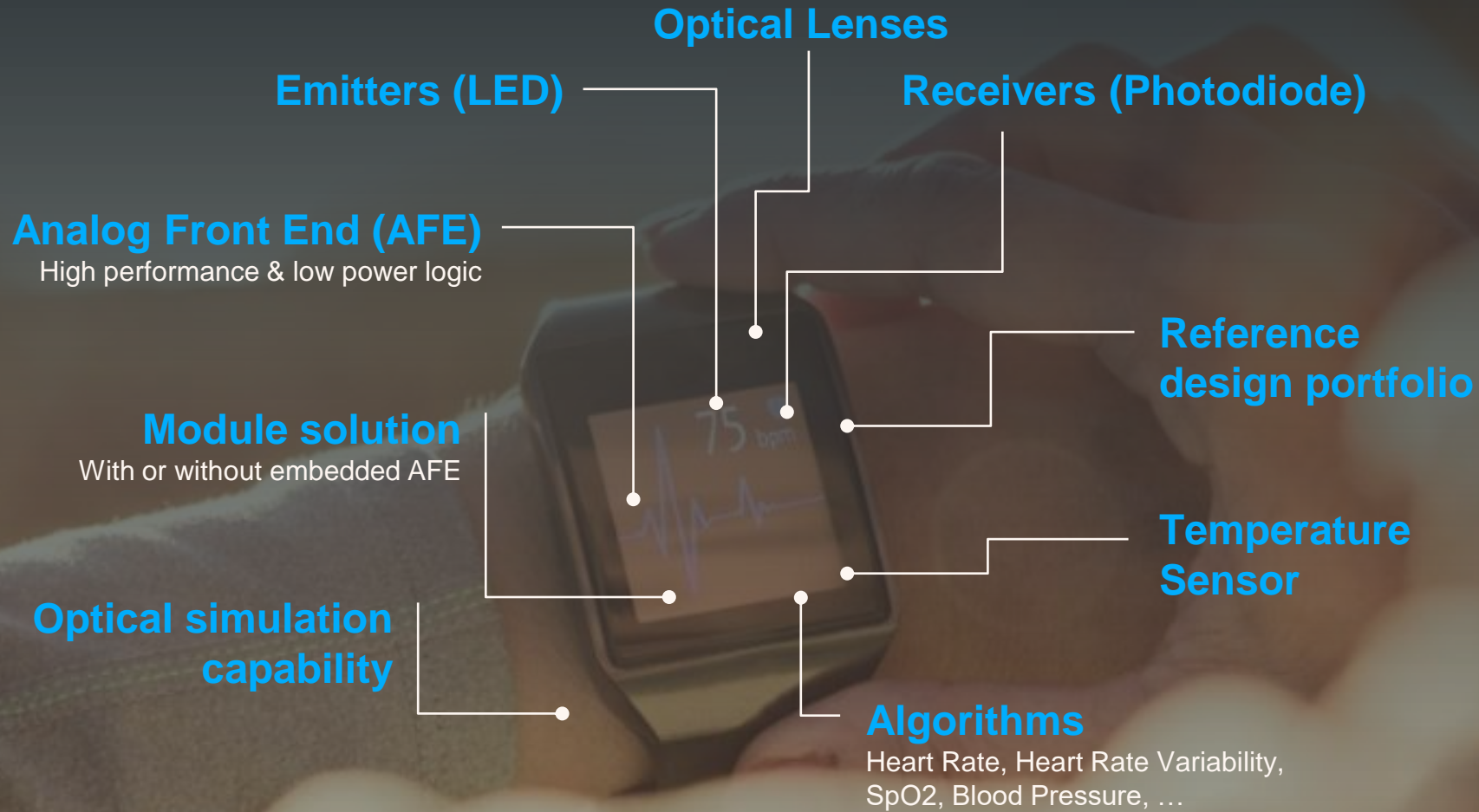
HRM, SpO2, Blood Pressure, Respiration Rate, Skin Impedance, ECG, Temperature

Finger

HRM, SpO2, Temperature



Multiple interdependent components to enable VSM functionality



**Able to fit anywhere
on the body**



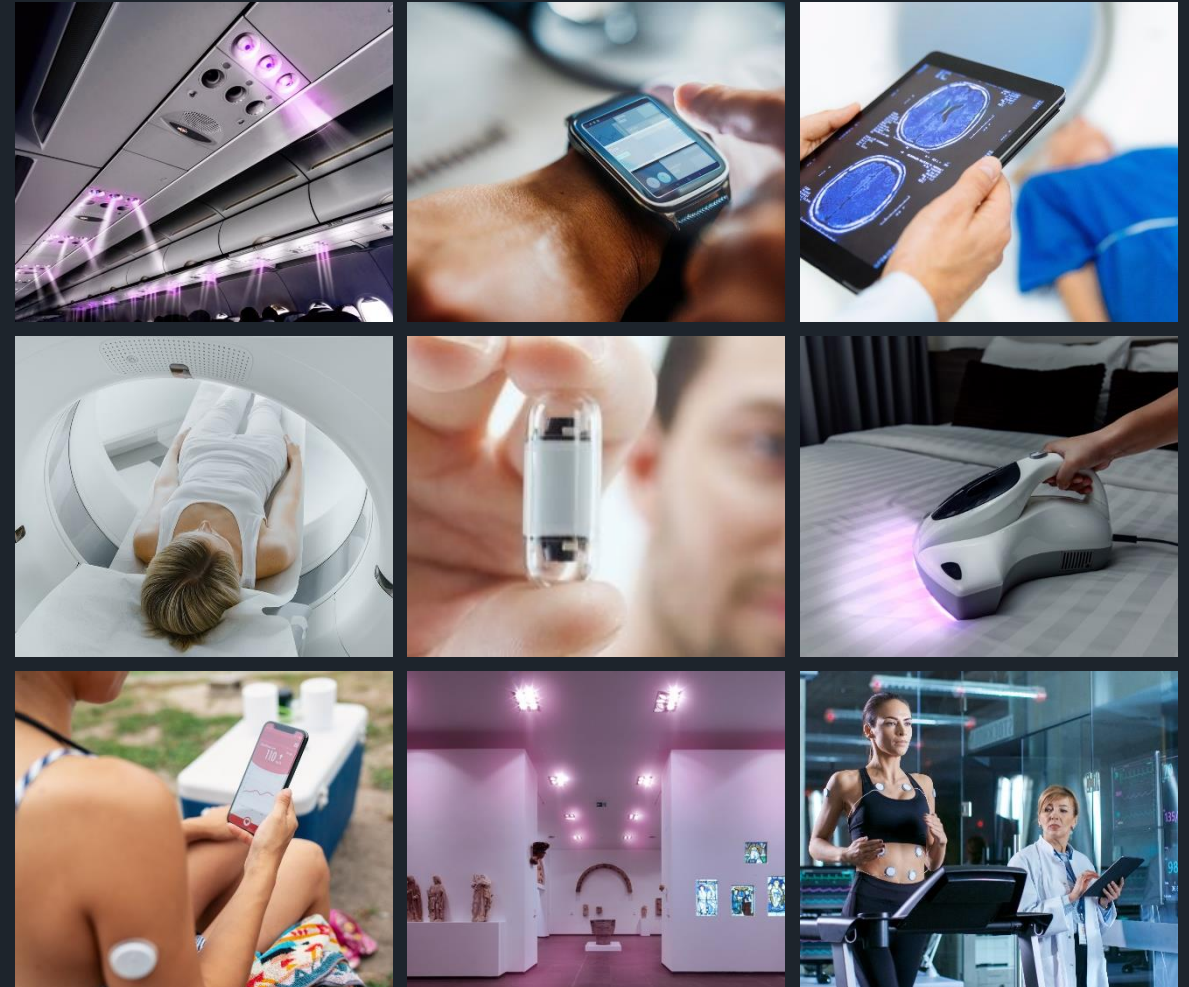
Variety of semicon enabled applications generating valuable data...

PREDICTIVE

Predictive data analytics:

- Detecting early signs of patient deterioration in the ICU and the general ward
- Delivering predictive care for at-risk patients in their homes
- Identifying equipment maintenance needs before they arise

...culminating in the possibility to even predict and therefore prevent diseases



Key takeaways



Smart Semicon-enabled Medical solutions will **shape the healthcare system** of tomorrow



Socio-economic developments drive importance of Smart Health Solutions – therefore providing significant market growth potential



Value add of Semicon technology reaches from **Preventive**, to **Personalized, Participatory** to even **Predictive Medical applications** – putting the patient in the focus – moving more and more from the hospital into our homes



ams OSRAM is **innovation leader** with unique offering in each growth area

