Data and AI Technical Challenges

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We strive to make the world healthier and more sustainable through innovation.

We’re aiming to **improve the lives** of 3 billion people a year by 2025.
We target healthcare customer and consumer needs along the **health continuum**

- Healthy living
- Prevention
- Diagnosis
- Treatment
- Home care

**Connected care and health informatics**
We build on our strong leadership positions

>60% of sales from businesses with global leading positions\(^1\)

**Healthy living** | **Prevention** | **Diagnosis** | **Treatment** | **Home care**
---|---|---|---|---
#1 in China Air | Global leader Oral Healthcare | Global top 3 Magnetic Resonance | Global leader Image-guided interventions | Global leader Sleep & Respiratory Care
Global leader Male Grooming | Global leader Mother & Childcare | Global leader Ultrasound | Global leader Smart catheters | #1 in North America Home Monitoring

Source: GfK, Nielsen, Euromonitor, Frost and Sullivan, Home Healthcare TBS, PCMS market insight. \(^1\) Defined as the positions in which Philips has a top 3 position globally. \(^2\) Based on non-invasive ventilators for the home.
Transforming healthcare delivery, improving outcomes
Digital Transformation of Healthcare
Enabled by Data Science and Artificial Intelligence

Cloud     Internet of Things     Artificial Intelligence     Sensors
Conversational interfaces     Micro-systems     Robotics     Autonomous systems

Continuous health tracking     Advanced visualization     Context-aware patient monitoring

Home monitoring     Image-guided therapy     Computational pathology     Quantification     Genomics     Adaptive interfaces

Different market reports from 2017 predict a **CAGR of 40-50%** for AI in Healthcare, with a market size of **€8-22B by 2022**
Data & AI Technical Challenges

- Interoperability
- Methods and ecosystems for data sharing
- Missing and noisy data
- Platforms (fast to the market)

- Explainable AI models
- Reliable AI methods
- Combining knowledge-based approaches and data driven approaches
- AI with small data
- Collaborative human-friendly AI
- ...

European Data-Driven Economy
DLMedIA
*Deep Learning for Medical Image Analysis*

### Medical image analysis applications

![Images of various medical regions: Cardiac, Lung, Brain, Histology, Retina, Breast]

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<tr>
<th>Data-driven</th>
<th>Users</th>
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<td>1.1 High dimensional data</td>
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<td>1.2 Deep generative models</td>
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<td>1.3 Deep Transfer Learning</td>
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<th>Expert-driven</th>
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<td>2.1 Learning from weak labels</td>
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<td>2.2 Dynamic Deep Learning</td>
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Lung Cancer Screening

- In US, lung cancer strikes 225,000 people/year,
- $12 billion in health care costs
DL model visualization

Spiculated
prediction = 0.73
correct class = 1

Spiculated
prediction = 0.81
correct class = 1

Smooth
prediction = 0.37
correct class = 0

Lobulated
prediction = 0.23
correct class = 0

Pixel Importance

| Most | Least |

Confidential

Philips Research
HealthSuite Insights is an end-to-end data science platform uniquely designed to enable data scientists and clinicians to develop groundbreaking solutions for healthcare.
HealthSuite Insights
The Philips HealthSuite Insights platform components

The HealthSuite Insights platform is a set of tools and technologies to address the advancing adoption of analytics and artificial intelligence in healthcare. The platform addresses the complete ‘end to end’ process of analytics and AI asset creation, deployment, and support.
Adaptive intelligence combines the power of AI and other technologies with clinical and operational domain knowledge.
Adaptive Intelligence

Enhances the people who use it
Adapts to the context
Is embedded into people’s workflows or daily environment
Adaptive intelligence can augment healthcare providers to deliver high-quality care and increase operational efficiency

- Making sense of large amounts of data
- Making workflows in hospitals more efficient
- Allowing for timely interventions using predictive analytics
Acute care

Philips IntelliVue Guardian System

Philips IntelliVue Guardian System with Early Warning Scoring (EWS) aids in identifying subtle signs of deterioration in a general floor patient’s condition at the point of care. IntelliVue Guardian automated EWS helps to reduce ICU transfers and readmissions, and adverse events.

An example of Adaptive Intelligence