



Data and AI Technical Challenges

Prof. dr. Milan Petković

Data Science DH, Royal Philips; Eindhoven University of Technology

VP, Big Data Value Association



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

We're aiming to **improve the lives** of

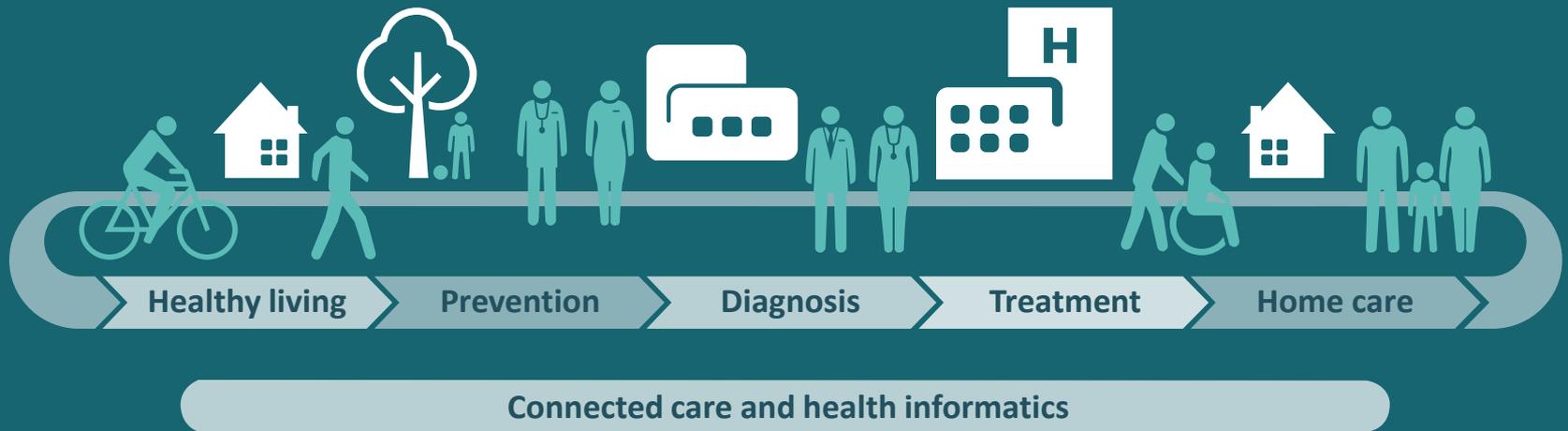
3 billion

people a year

by 2025



We target healthcare customer and consumer needs along the **health continuum**



We build on our strong leadership positions

>60% of sales from businesses with global leading positions¹

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



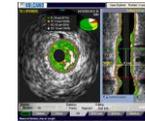
Global leader
Male Grooming



Global leader
Mother & Childcare



Global leader
Ultrasound



Global leader
Smart catheters



#1 in North America
Home Monitoring

Connected care and health informatics



Global leader
Patient Monitoring



#1 in North America
Cardiology Informatics

Global leader
Noninvasive ventilation²



Transforming healthcare delivery, improving outcomes

Healthy living

Prevention

Diagnosis

Treatment

Home care

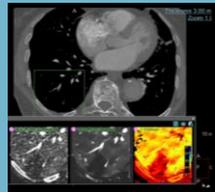
Digital Transformation of Healthcare

Enabled by Data Science and Artificial Intelligence

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



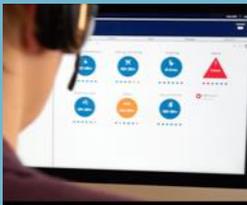
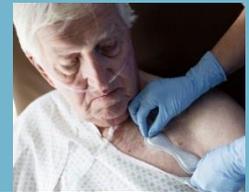
Continuous health tracking



Advanced visualization



Context-aware patient monitoring



Home monitoring



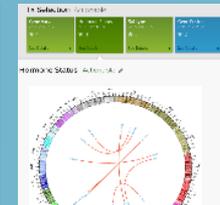
Image-guided therapy



Computational pathology



Quantification



Genomics



Adaptive interfaces

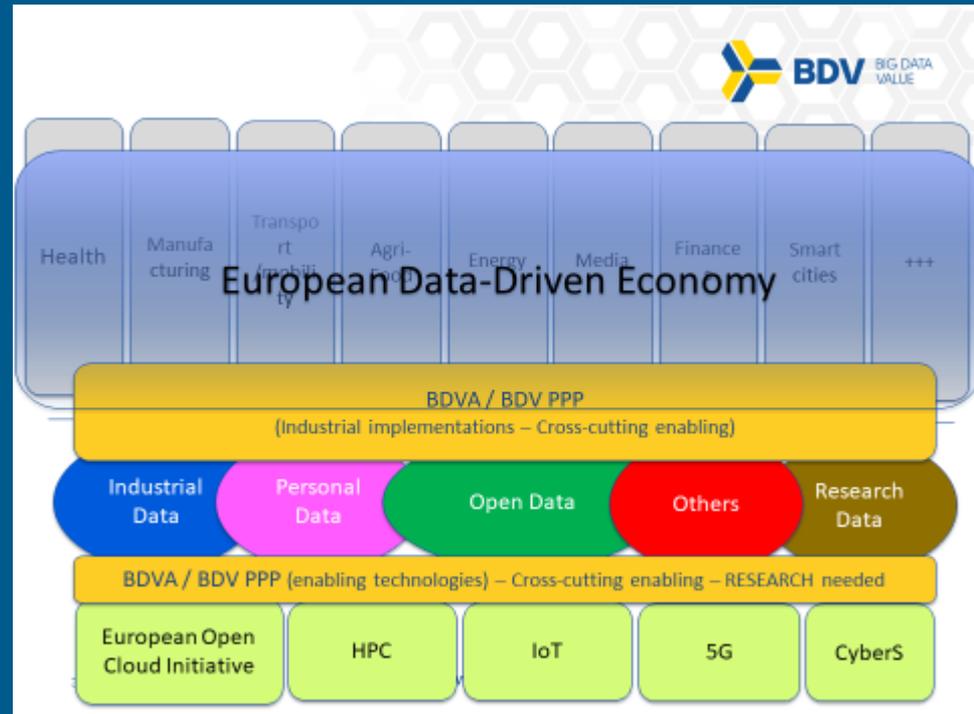
Different market reports from 2017 predict a **CAGR of 40-50%** for AI in Healthcare, with a market size of **€8-22B by 2022**

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
- ...

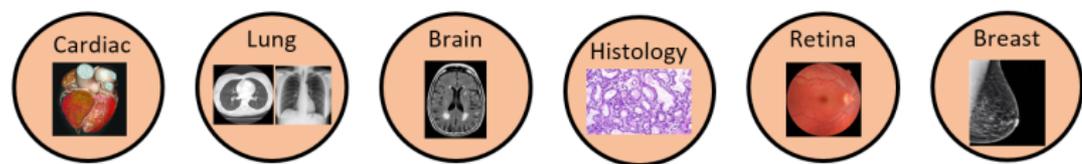




DLMedia

Deep Learning for Medical Image Analysis

Medical image analysis applications



Users

	Cardiac	Lung	Brain	Histology	Retina	Breast
Data-driven	1.1 High dimensional data	■	■	■		
	1.2 Deep generative models	■	■	■	■	■
	1.3 Deep Transfer Learning	■		■	■	
Expert-driven	2.1 Learning from weak labels		■	■	■	
	2.2 Dynamic Deep Learning	■	■		■	■

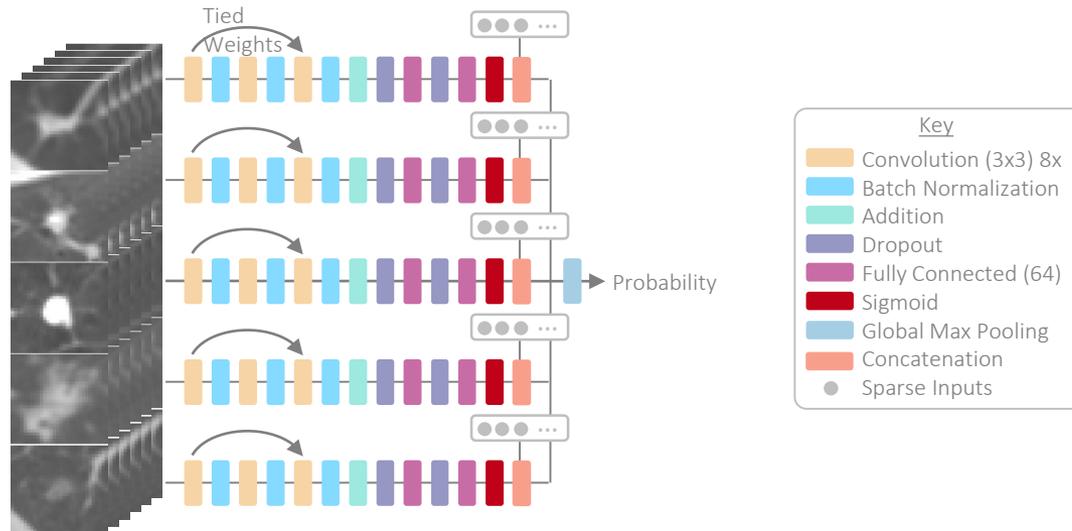
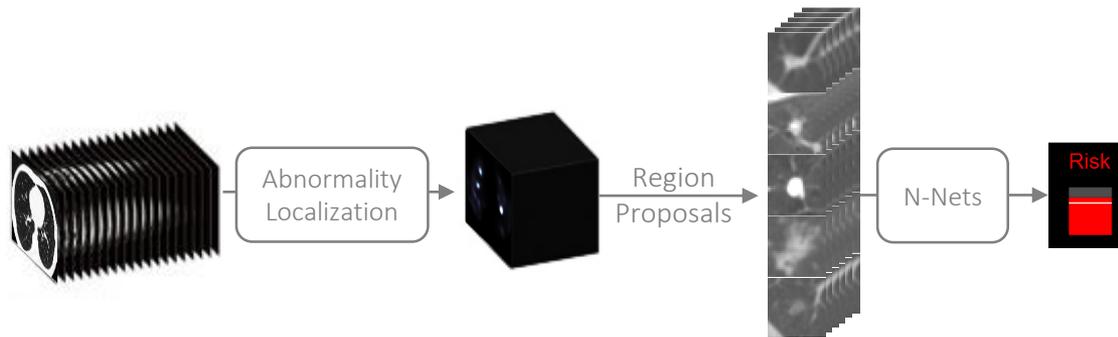


Users

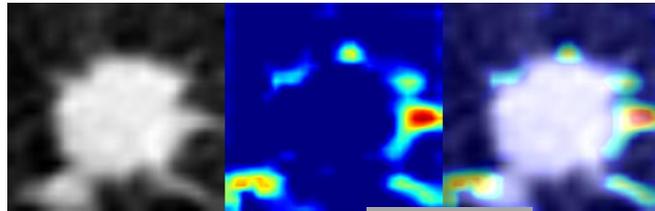


Lung Cancer Screening

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

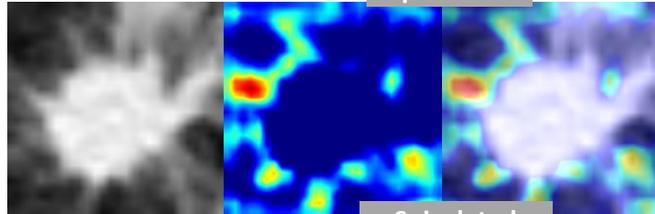


DL model visualization



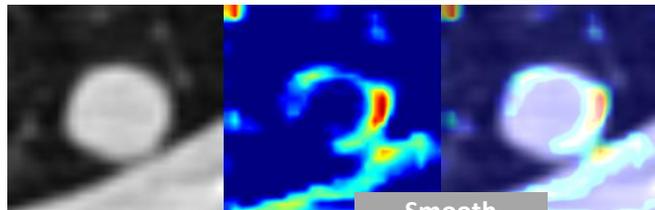
Spiculated

prediction = 0.73
correct class = 1



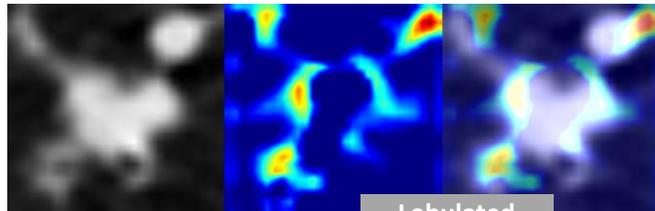
Spiculated

prediction = 0.81
correct class = 1



Smooth

prediction = 0.37
correct class = 0



Lobulated

prediction = 0.23
correct class = 0

MARGIN



SMOOTH

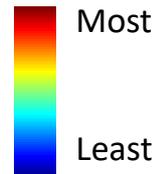


LOBULATED



SPICULATED

Pixel Importance



Philips HealthSuite Insights



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



Workbench
Development environment for AI assets



Runtime
Embed AI assets in technology products



Marketplace
Catalog of curated assets available for use



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

An example of Adaptive Intelligence



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.



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