# Radiological AI Testcenter (RAIT.dk)

## Rationale, mission and the need for Public-Private Partnerships


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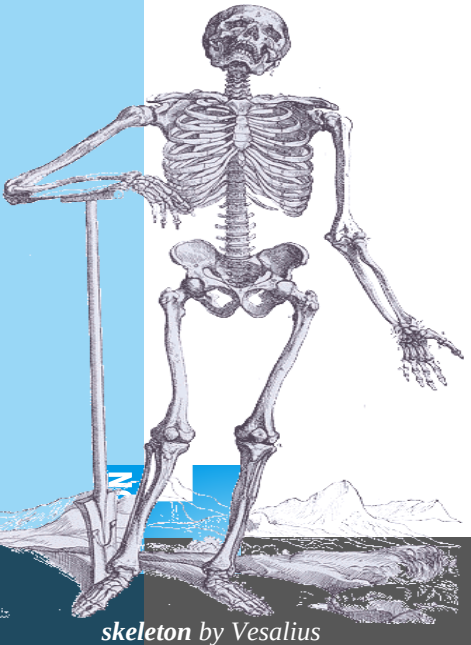
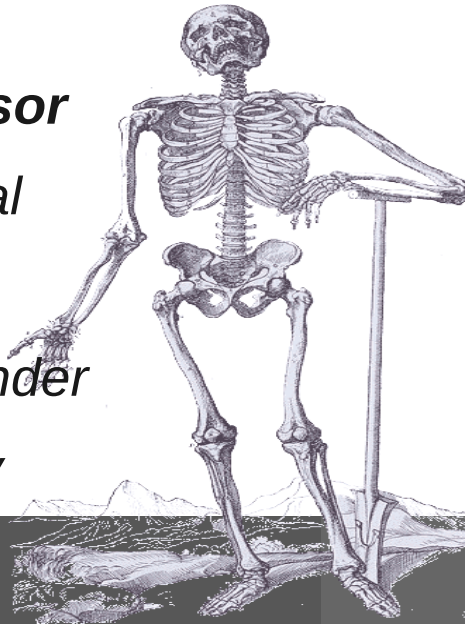
*Bispebjerg-Frederiksberg Hospital*

*Co-founder RAIT*

*Co-Chairperson of the AI network under*

*The Danish Radiological Society*



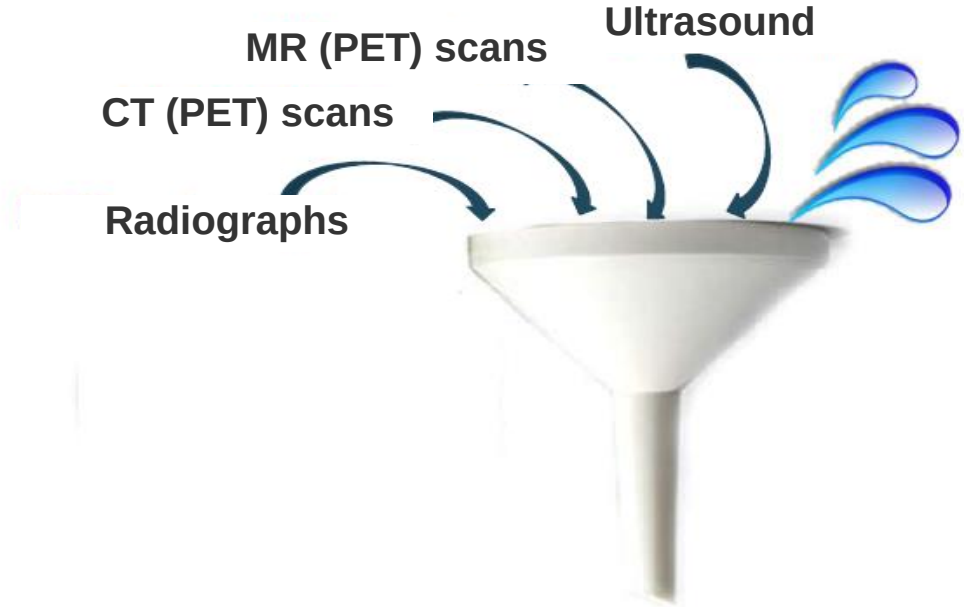
***skeleton** by Vesalius*

# We are drowning in Healthcare data

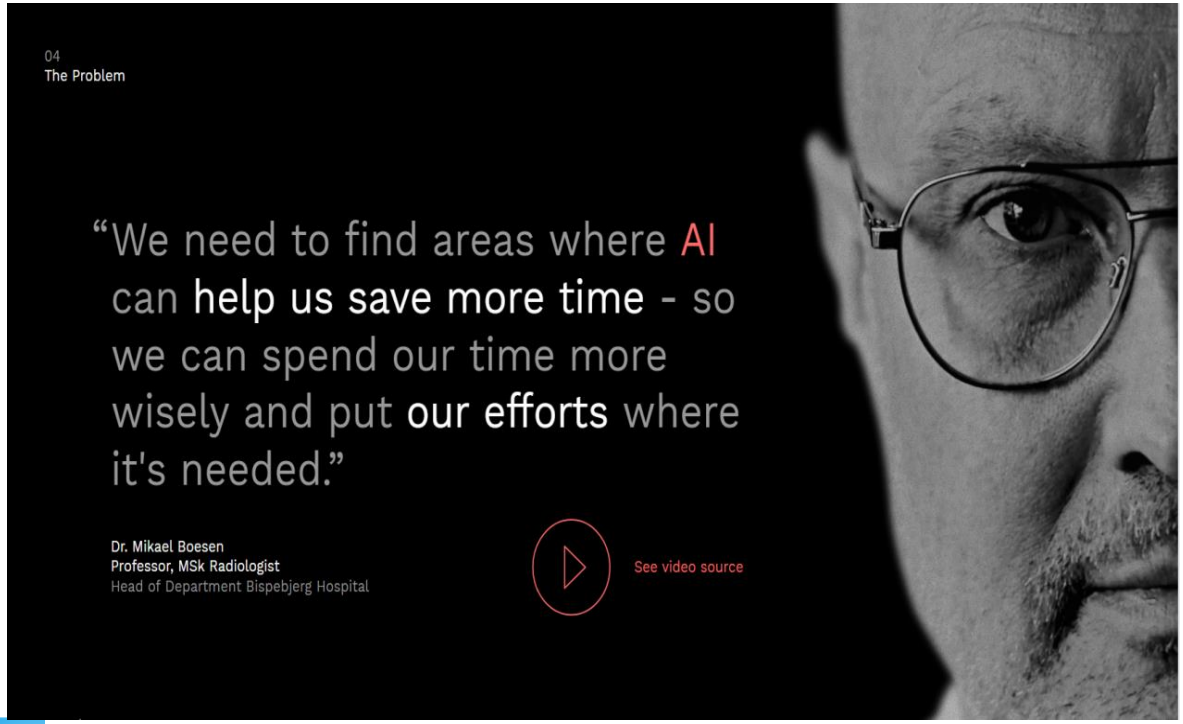

**Will AI help radiologists survive the data deluge?**
**https://www.auntminnie.com/index.aspx?sec=senl&sub=vol21_04&pag=dis&ItemID=132366**

# Bottle neck for radiology

Increasing number of complex and data heavy examinations in radiology and limited human resources to deal with it!



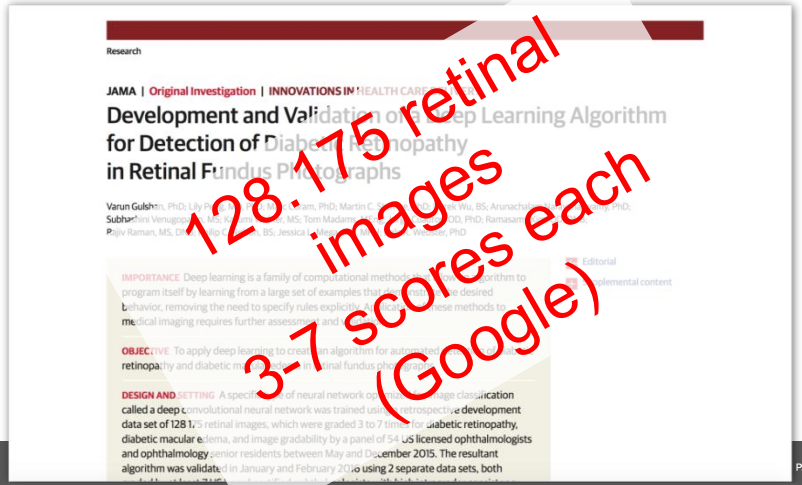

# Can AI can help radiologists tackle these challenges?

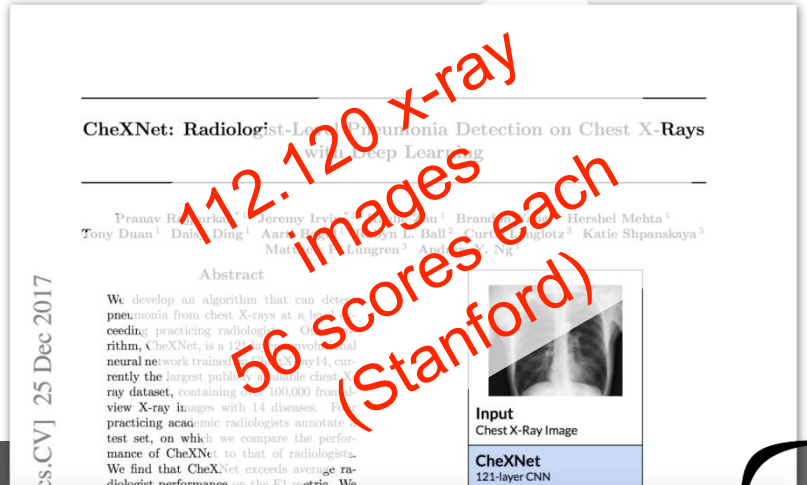



"AI is not going to replace us -- it's going to save us by improving productivity and allowing us to keep pace with imaging growth."
— Dr. Andrew Smith, PhD.

# But… there is An inconvenient truth: AI needs LOTS of data

- To reach an accuracy comparable to that of a radiologist, a neural network needs to be trained on 100.000+ annotated medical images.
- With pre-pretrained networks, a neural network needs 100-1000 images.



# Challenges with current AI algorithms

European Radiology (2021) 31:3797–3804
https://doi.org/10.1007/s00330-021-07892-z

IMAGING INFORMATICS AND ARTIFICIAL INTELLIGENCE

**Artificial intelligence in radiology: 100 commercially avail… products and their scientific evidence**

Kicky G. van Leeuwen[1] · Steven Schalekamp[1] · M…

EDITORIAL | V…

Check for updates

…1, 2021 as 10.3174/ajnr.A7179

**CONCLUSIONS:** We observed poor diagnostic accuracy of an artificial intelligence decision support system for the detection of cervical spine fractures. **Many similar algorithms have also received little or no external validation, and this study raises concerns about their generalizability, utility, and rapid pace of deployment.**

**Further rigorous evaluations are needed to understand the weaknesses of these tools before widespread implementation.**

ORIGINAL RESEARCH
SPINE

**Diagnostic Accuracy and Failure Mode Analysis of a Deep Learning Algorithm for the Detection of Cervical Spine Fractures**

A.F. Voter, M.E. Larson, J.W. Garrett, and J.-P.J. Yu

# So why aren't we seeing more AI success stories YET?


- Lots of research is focused on the models
- We have incredibly sophisticated techniques
- BUT…bottlenecks are the access to, and quality of the data!
- We need training data, and that data needs to be "**fresh**" **"clean", "continous" and "representative"**

This works well in the lab but please remember:

"***Data from the real world is an absolute mess"***

Courtesy Professor Neal Bangeter, Imperial College, London, UK

RAIT

Herlev og Gentofte Hospital

# AI – from Idea to Clinical use – need for data

1. Idea/Need (Data)
2. Prototype (Data)
3. Proof of Concept (Data)
4. Development, test and validation(Data)
5. **CE- og FDA-approval**
6. Purchase of licence/algoritm
7. Clinical validation of algorithms and domaine adoption (Data)
8. Competence development
9. Organisational readyness
10. Implementation of algoritms (Data)
11. Quality control (Data)
12. Real World Value (Data)
13. Continous approval (Data)

Phase 1-3

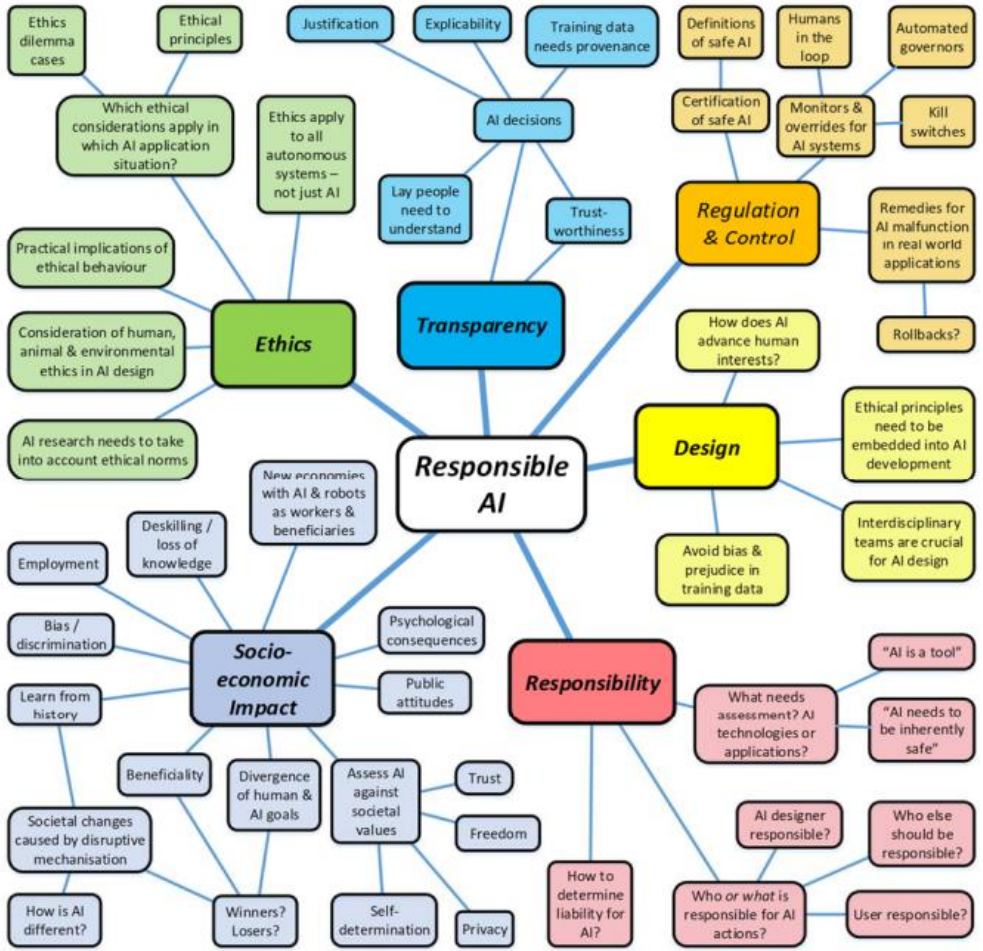
Phase 4
"Real World evidence"
(Most algorithms do not have this information - yet)


RAIT

# Challenges with current AI algorithms

# “Responsible AI”

FIGURE 1: RESPONSIBLE AI - KEY AREAS AND ISSUES




HUB4NGI

https://www.hub4ngi.eu

NEXT GENERATION INTERNET

https://www.ngi.eu

https://eprints.soton.ac.uk/426307/1/Responsible_AI_Consultation_Public_Recommendations_V1.0.pdf

# What is RAIT?

- Collaboration between Herlev-Gentofte og Bispebjerg-Frederiksberg aiming to be a national template for working with AI
- Competetion free zone
- Focus on fast-track test and clinical implementering of AI methods in radiology in public-private collaborations

- Our mission is to accelerate the development and implementation of transformative medical AI applications in radiology to advance patient health and save lives.

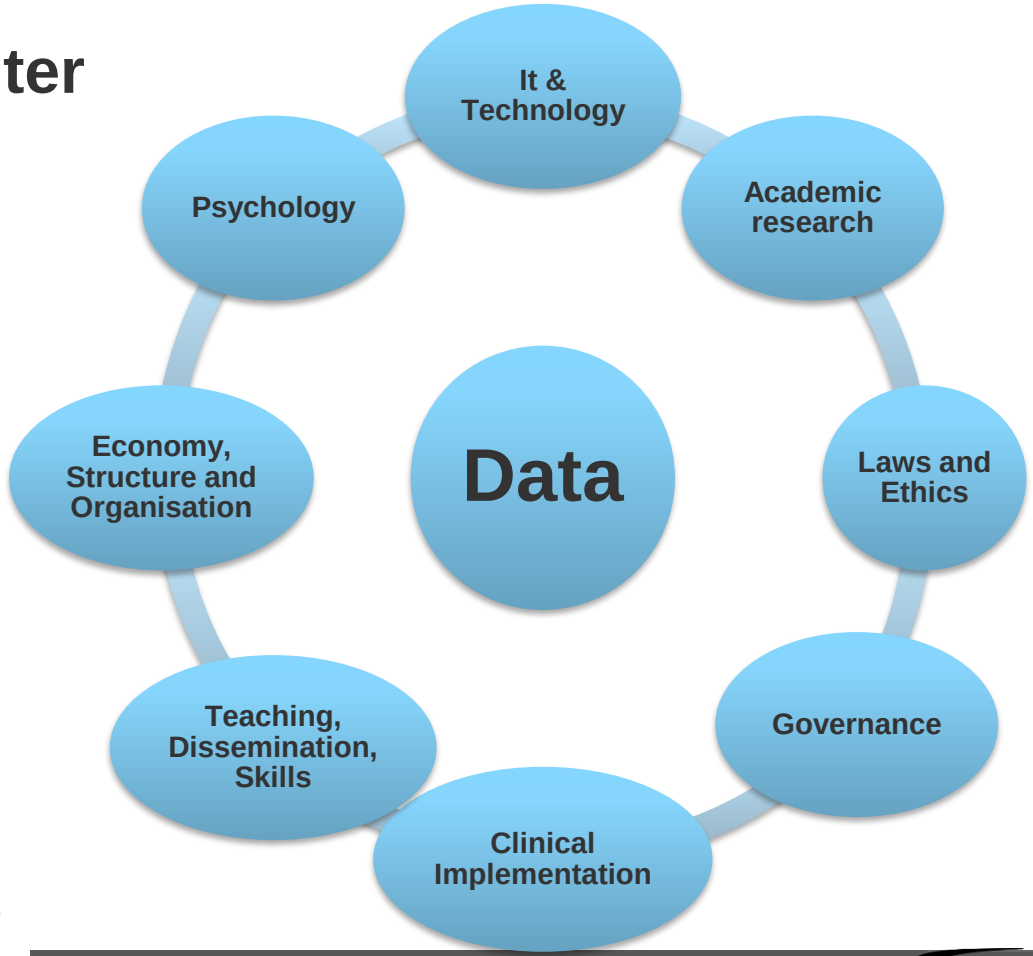
Radiological Artificial Intelligence Testcenter

# Radiological AI testcenter

## RAIT.dk

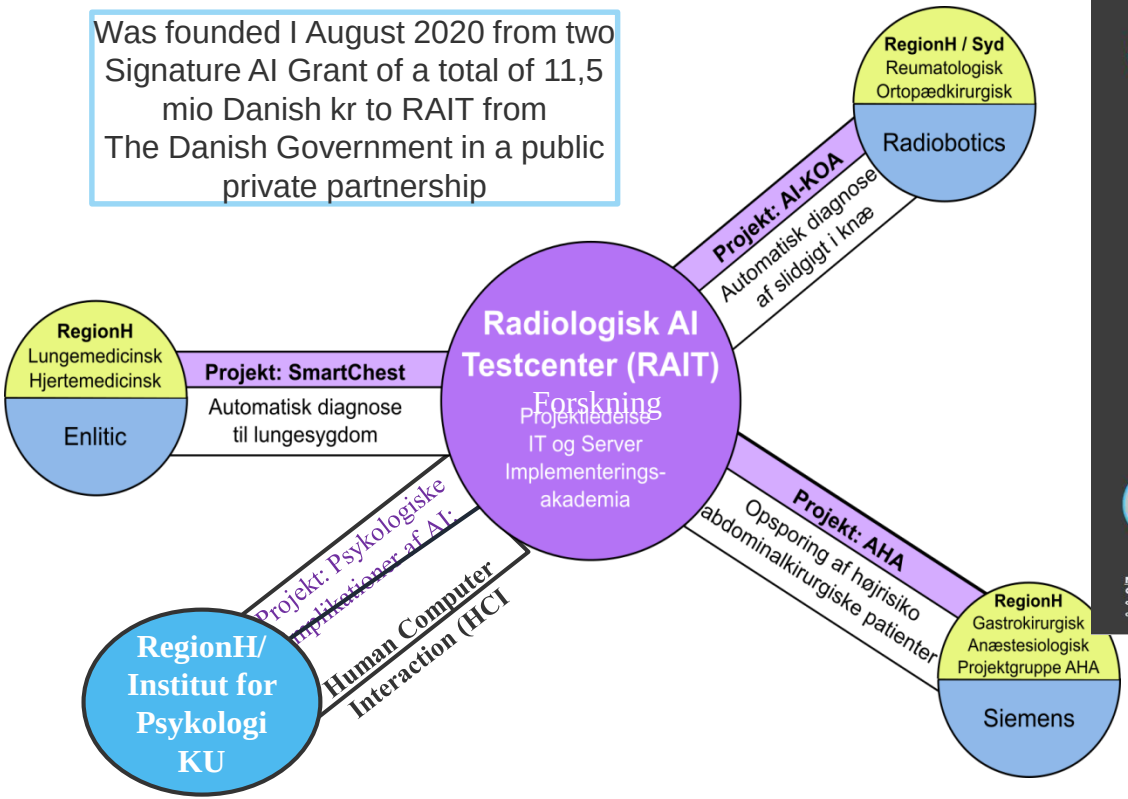
## CORE COMPETANCES

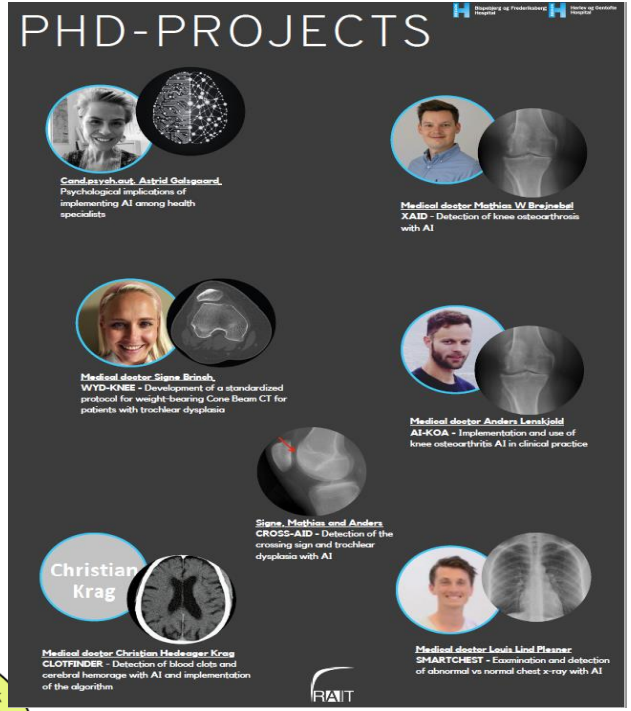
Currently 12+ multidiciplinary persons including 4 PhD's



# RAIT Molecyle

Was founded I August 2020 from two Signature AI Grant of a total of 11,5 mio Danish kr to RAIT from The Danish Government in a public private partnership

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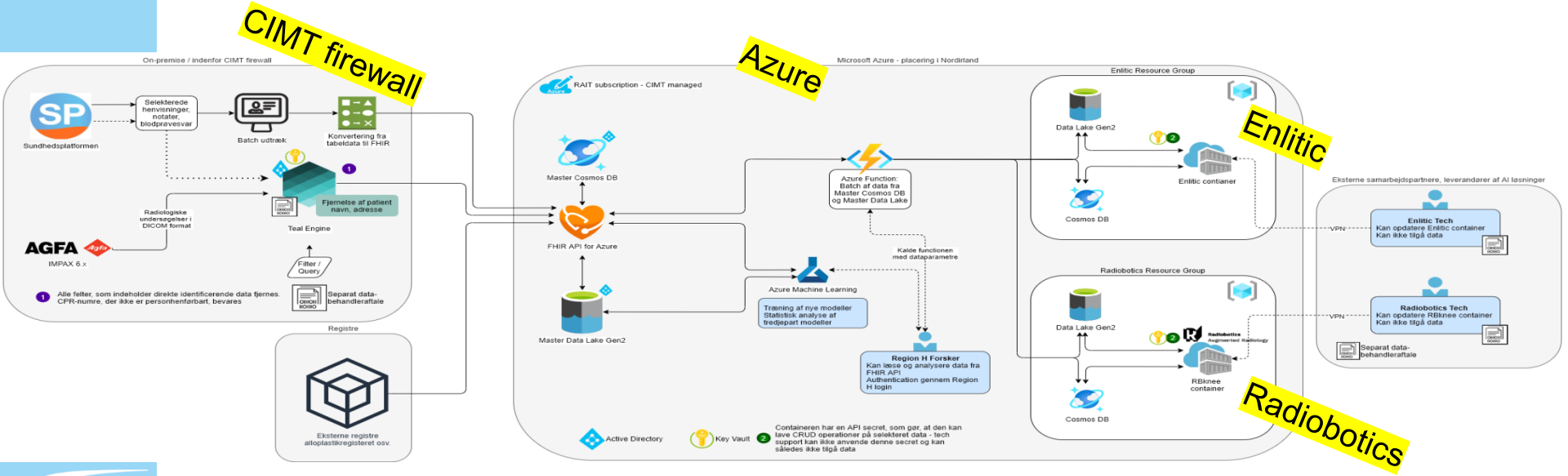
# Development of cloud platform in collaboration with CIMT and Microsoft Azure

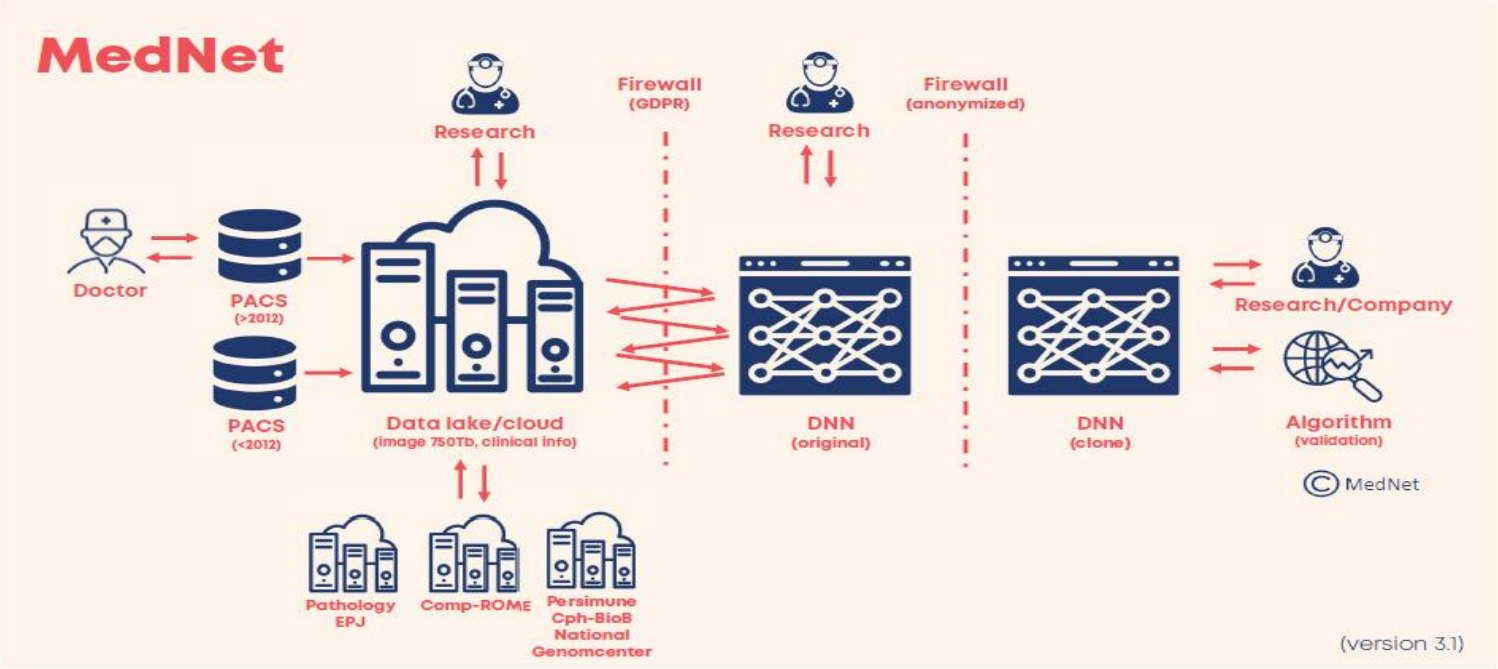



- Our current and future PACS systems is not in general build to these tasks and thus cannot be expected to deliver this infrastructure

## The solution is called ”MEDNET”

Courtsy of: PhD fellow in RAIT, Mathias Willadsen Brejnebøl

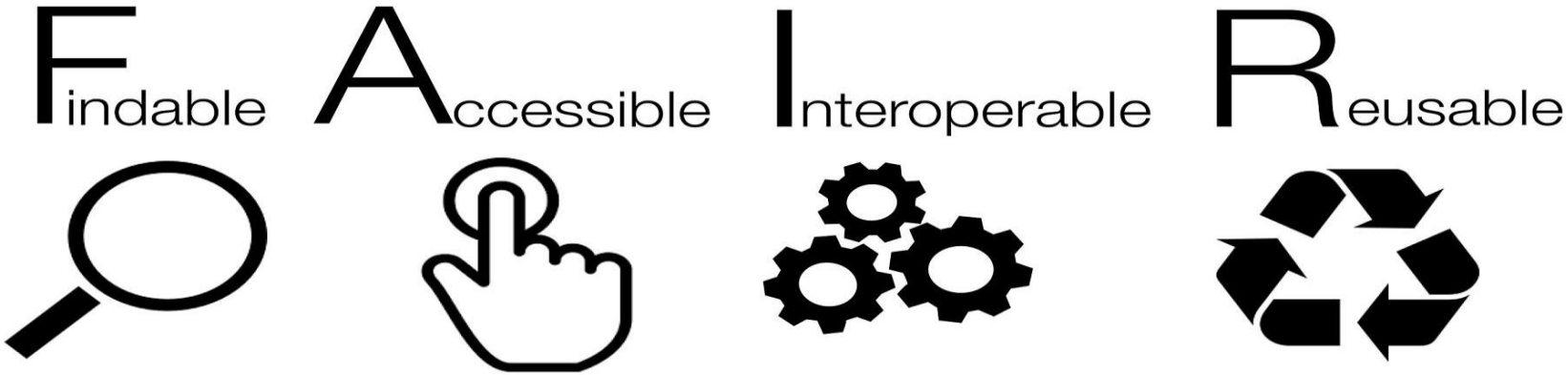
# Neccesary infrastructure → AI succes!




**Public private partnership: RAIT, Transregional innovation network, Rigshopistalet, CAMES og Depatment if Radiology SDU, DIKU DTU, DataFAIR, Microsoft, Siemens, Roche, Radiobotics Cerebriu and several other private pharma and lifescience partners**

# MEDNET fit the scope in EU F.A.I.R principles

**The need infrastructure for AI in radiology to succeed**
**Data sharing should be the norm**



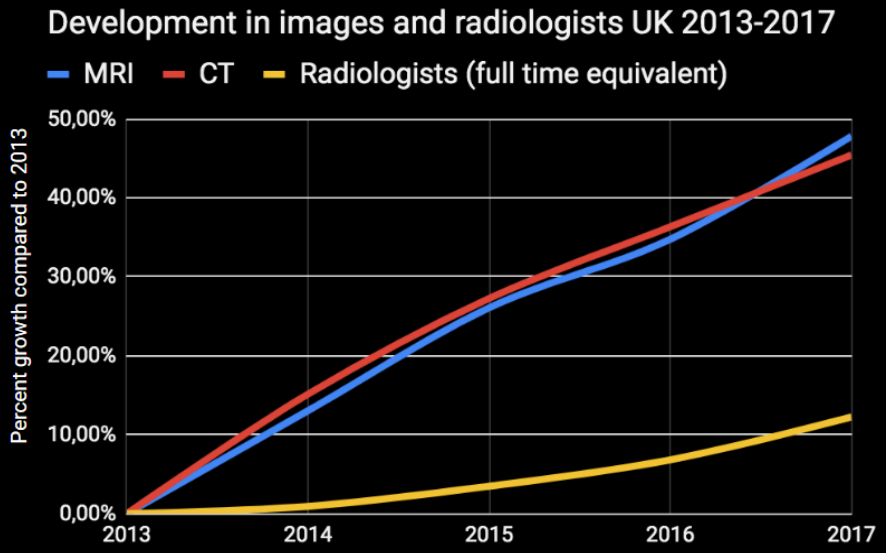

**EU published principles in 2016**
**https://en.wikipedia.org/wiki/FAIR_data**

## 5 biggest diagnostic challenges in RAIT outside the current implementations projects

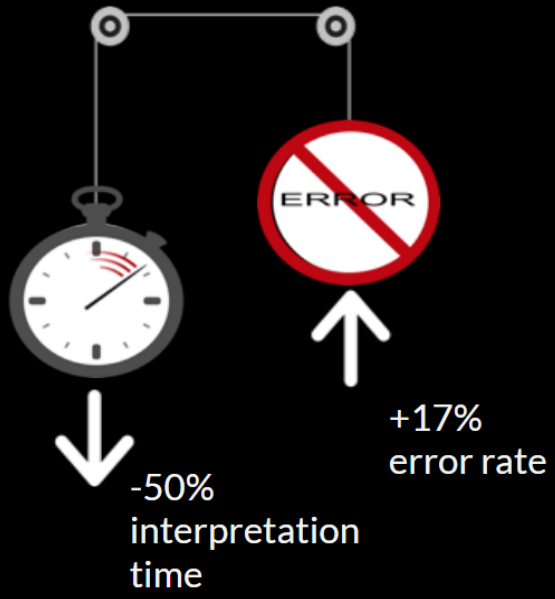
- Longitudinal control and segmentation of indeterminate pulmonary nodules
- Triage of chest X-ray in normal and abnormal examinations - Expediated reporting of chest CT and chest X-Ray
- Detection and triage of (acute) cerebral symptoms / trauma
- Detection and triage of bone fractures
- Detection and predictions of neuro degenrative diseases

# To be continued….☺

# Simply not enough radiologists to keep up with the growing amount of images at hospitals




*The Royal College of Radiologists (2017): UK workforce census 2016 report.*




*Sokolovskaya, E., et al. "The effect of faster reporting speed for imaging studies on the number of misses and interpretation errors: a pilot study." Journal of the American College of Radiology 12.7 (2015): 683-688.*