

ZGT Research Infrastructuur

Een robuuste architectuur voor klinisch en academisch onderzoek

Jorn-Jan van de Beld



Promovendus Utwente Computer Science
Aandachtsgebied: Multimodal machine
Learning en Slokdarmchirurgie

Anouk Veldhuis



Klinisch Informaticus
Aandachtsgebied: Data en Research

In de Spotlight



Jeroen Geerdink
Klinisch Informaticus



Ronald Maatman
Senior System Engineer



Raymond Kamphuis
Senior Server beheerder



Jeffrey ten Tusscher
Senior System Engineer



Dennis Havekes
Senior System Engineer



Robert Dekkers
Senior Server beheerder

Hoe het begon...



2017: Pitch ZGT bij PIHC, contact met UT

2017: **Shreyasi Pathak** eerste computer science student

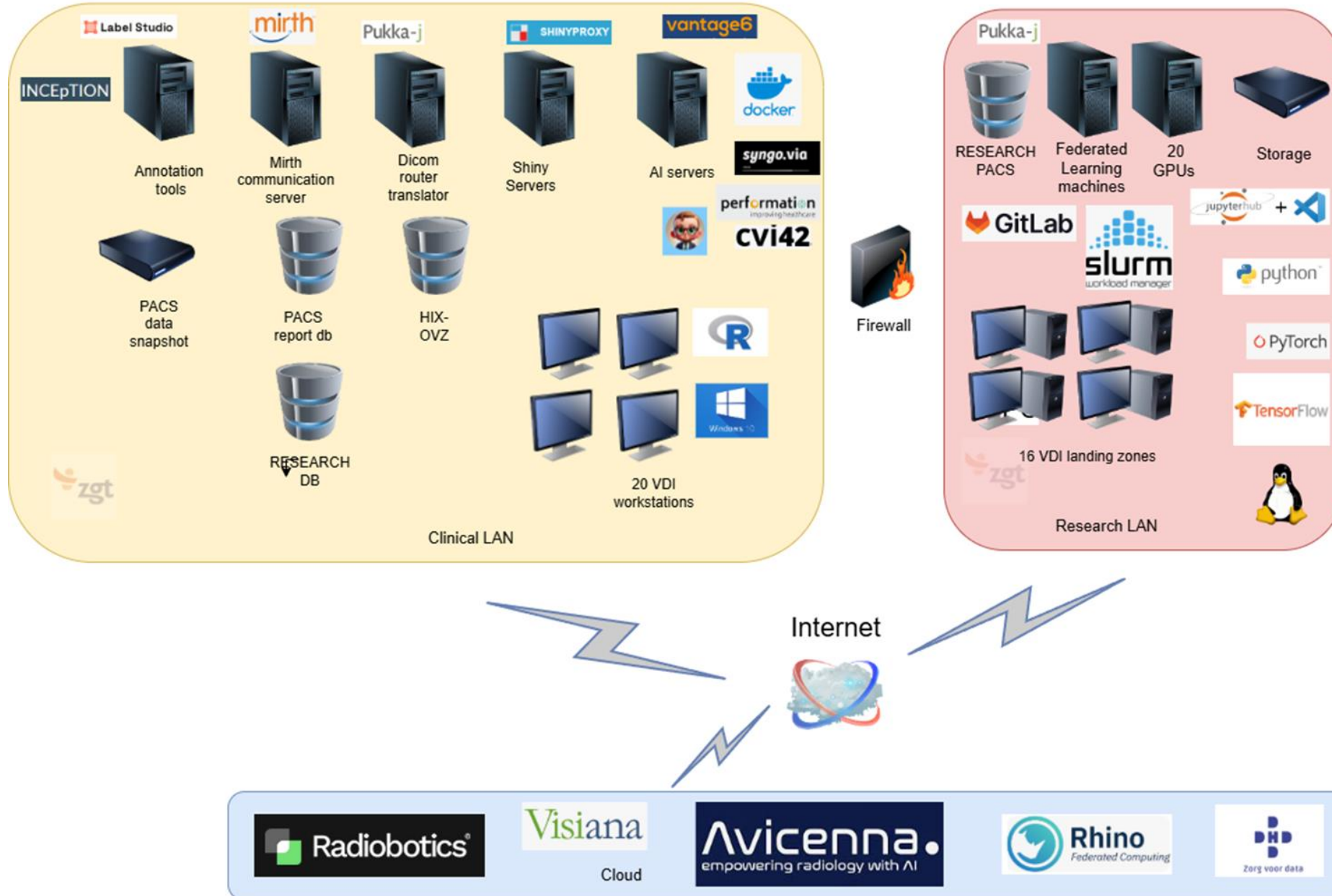
2017: 1 Linux machine in ZGT

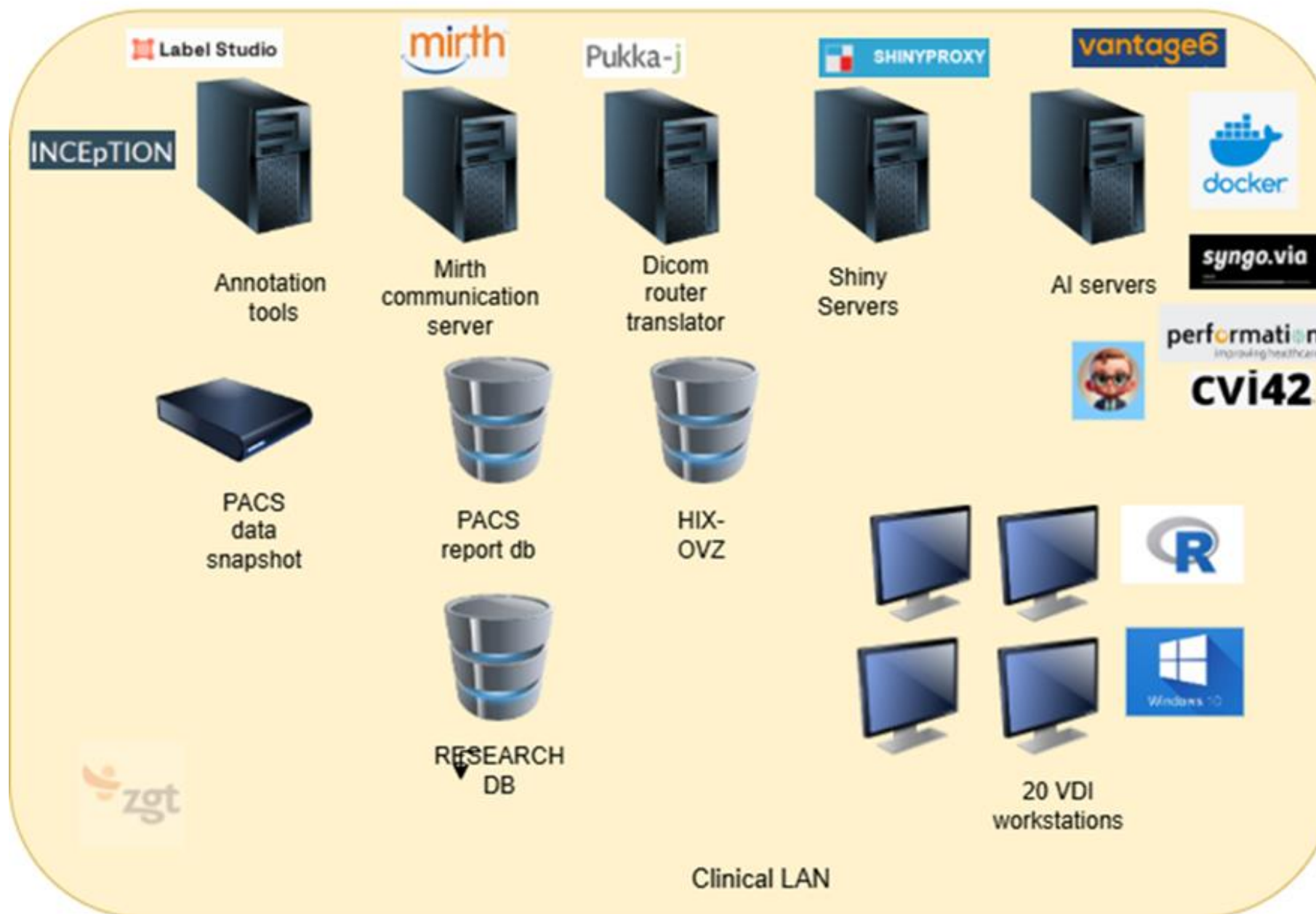
2019: PhD traject Shreyasi gestart

2020: Opschaling machines naar 16 landing zones (**Linux**) en 20 Windows research machines

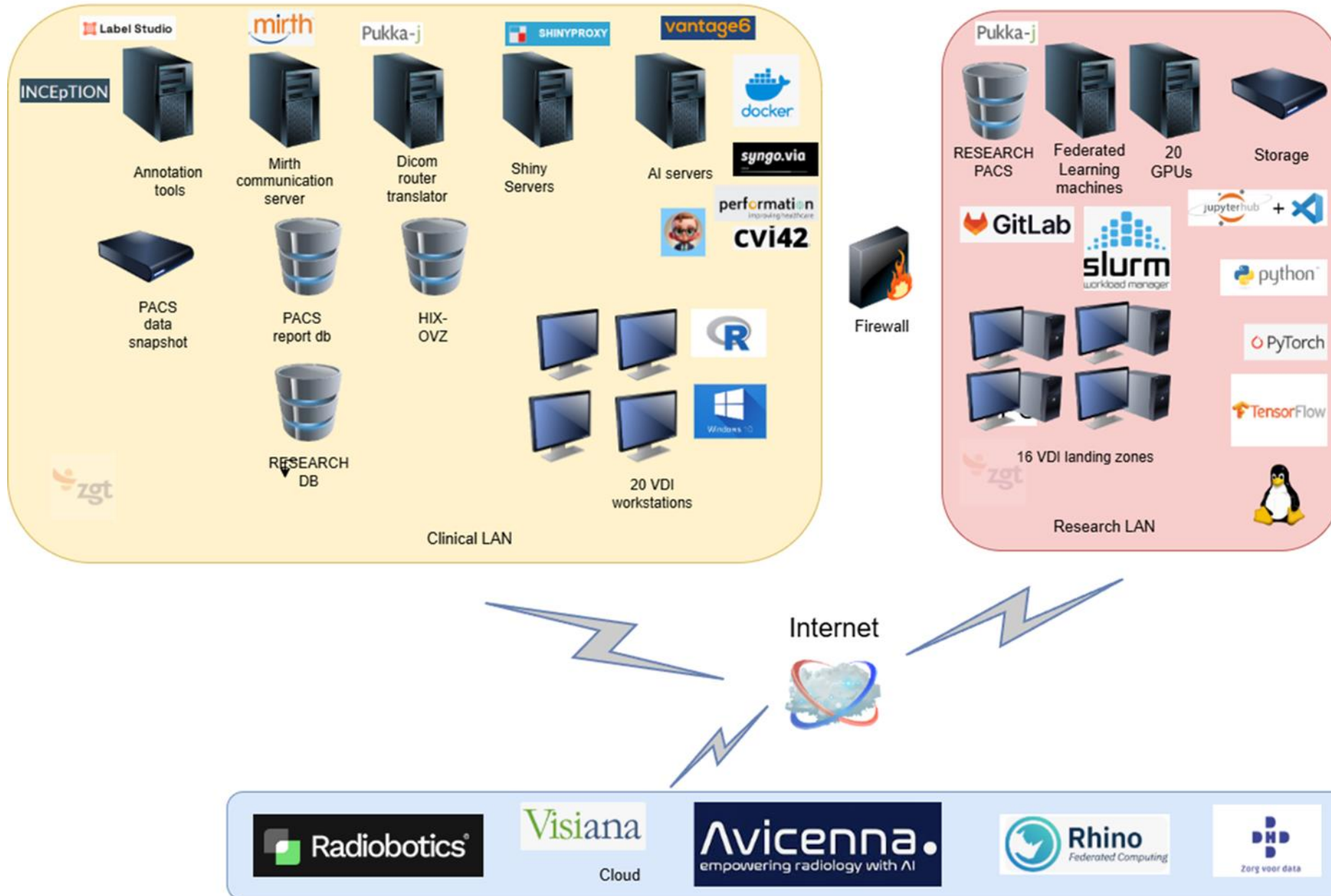
Nu: 150+ technische studenten











Randvoorwaarden

- Deployment via **Docker**
- ShinyProxy server voor dashboard
- GitLab voor intern
- GitHub delen modellen extern



GitLab

Opbrengst

150+ technische studenten (TG, CS, BMT, HS, DS)

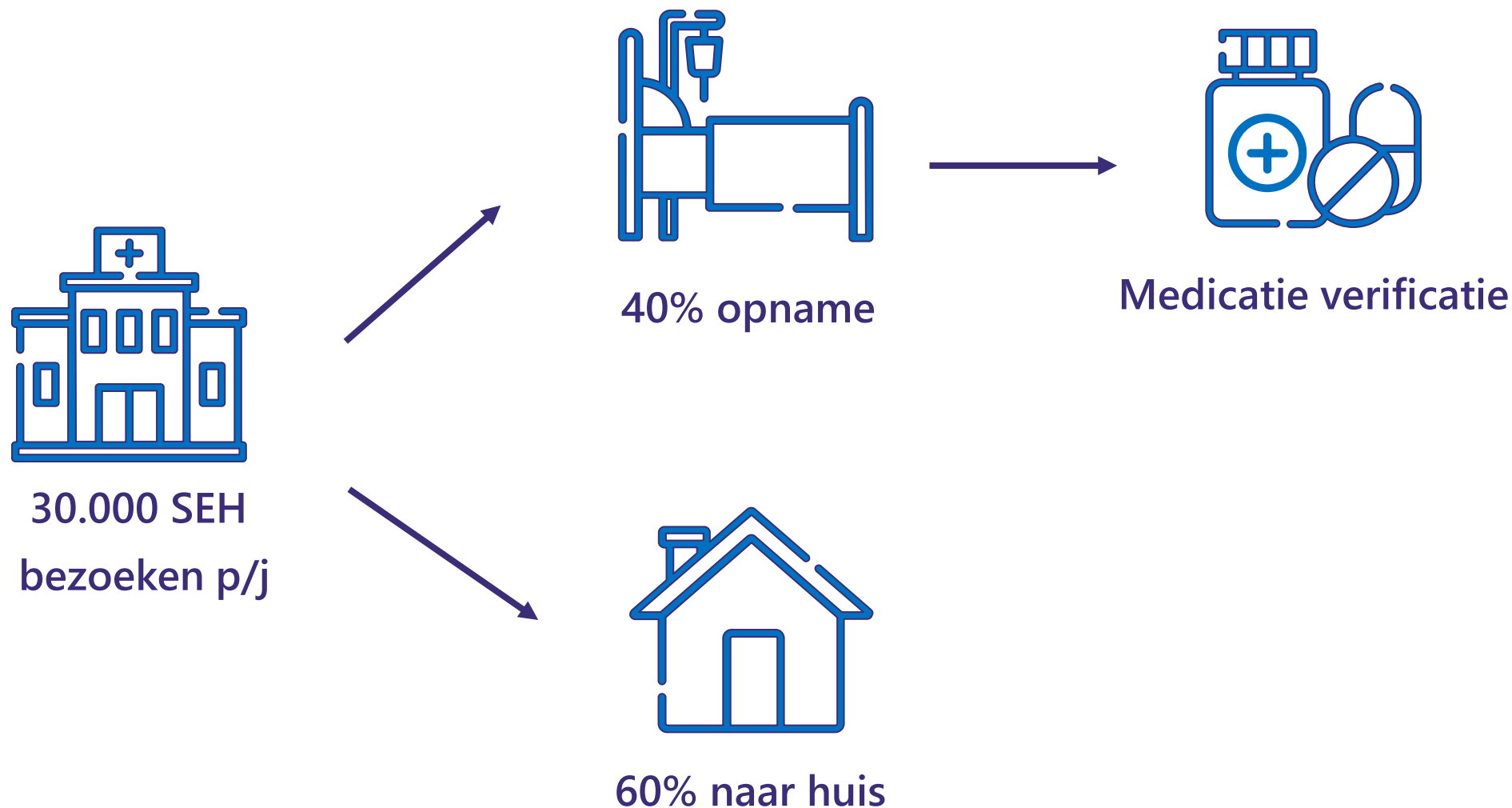
Promotie dr. Meike Nauta op Explainable AI in 2023

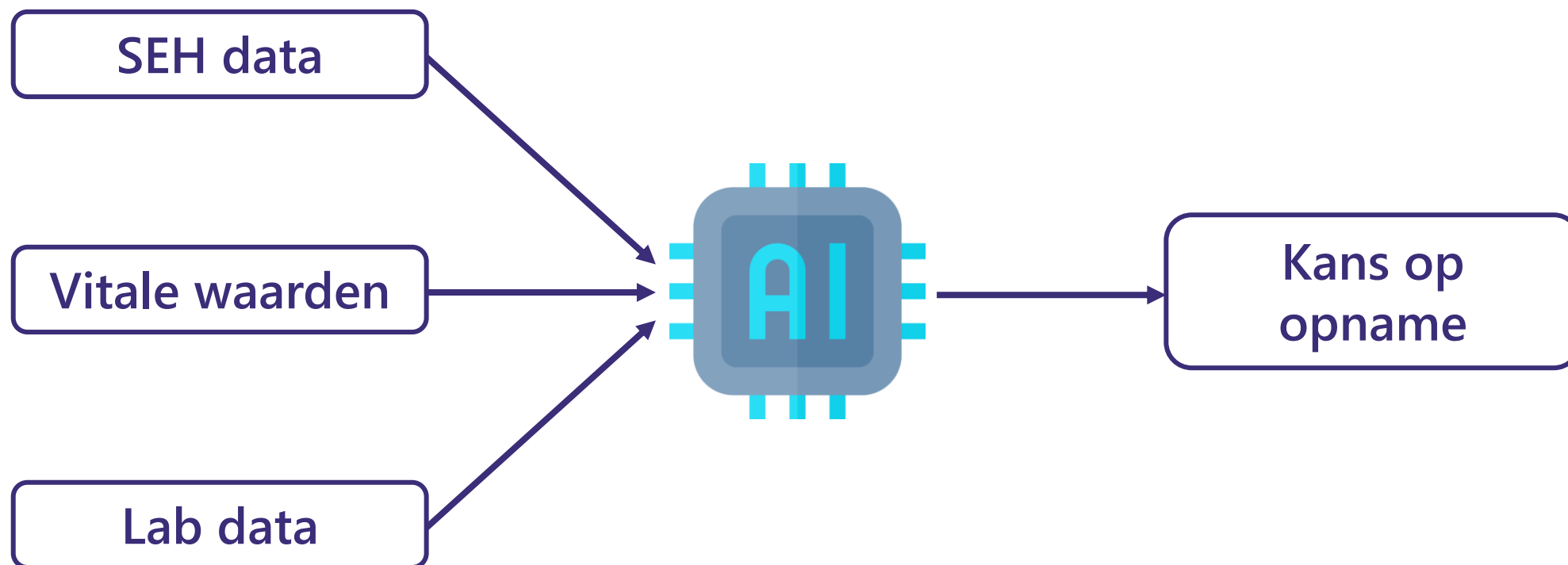
Data scientist Job Maathuis vanaf 2024

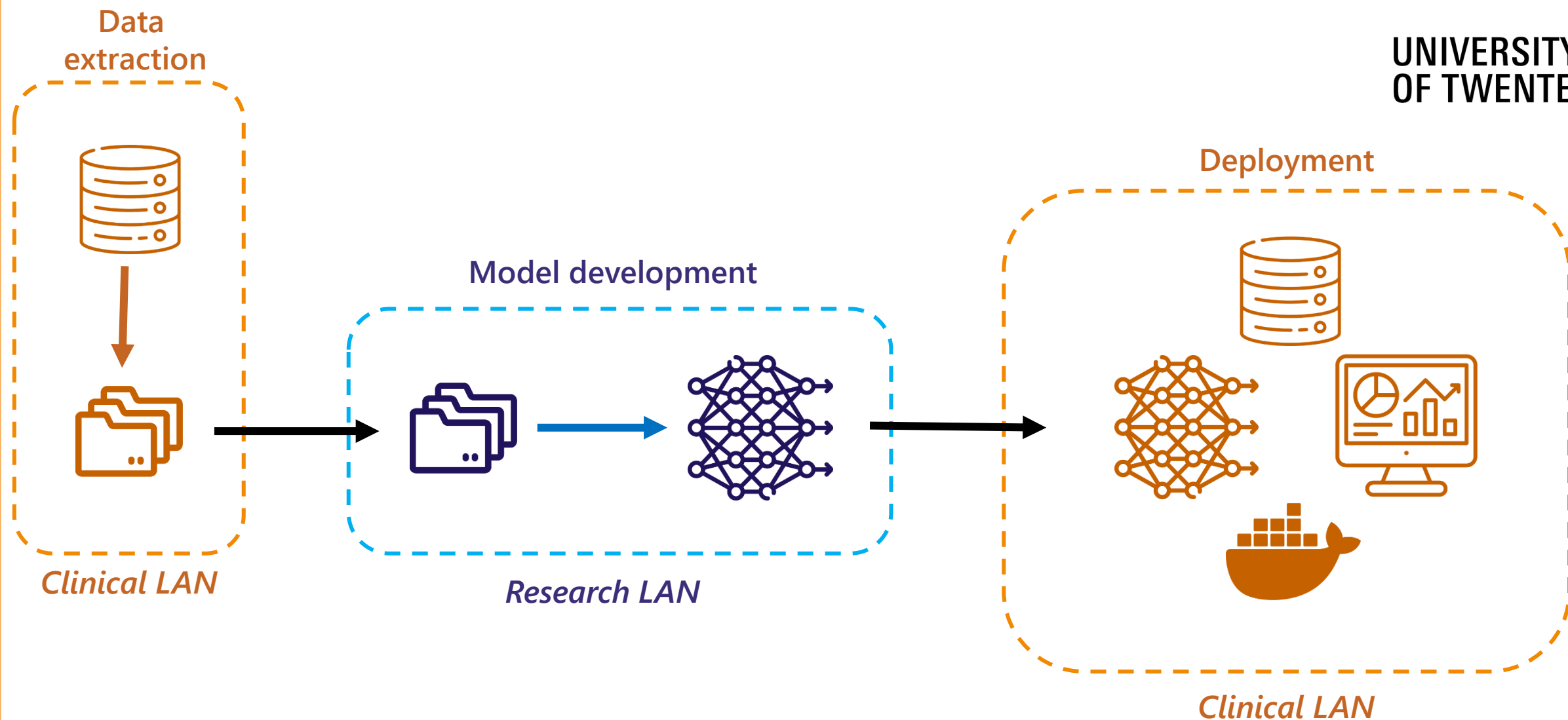
Promotie Shreyasi Pathak sep 2025



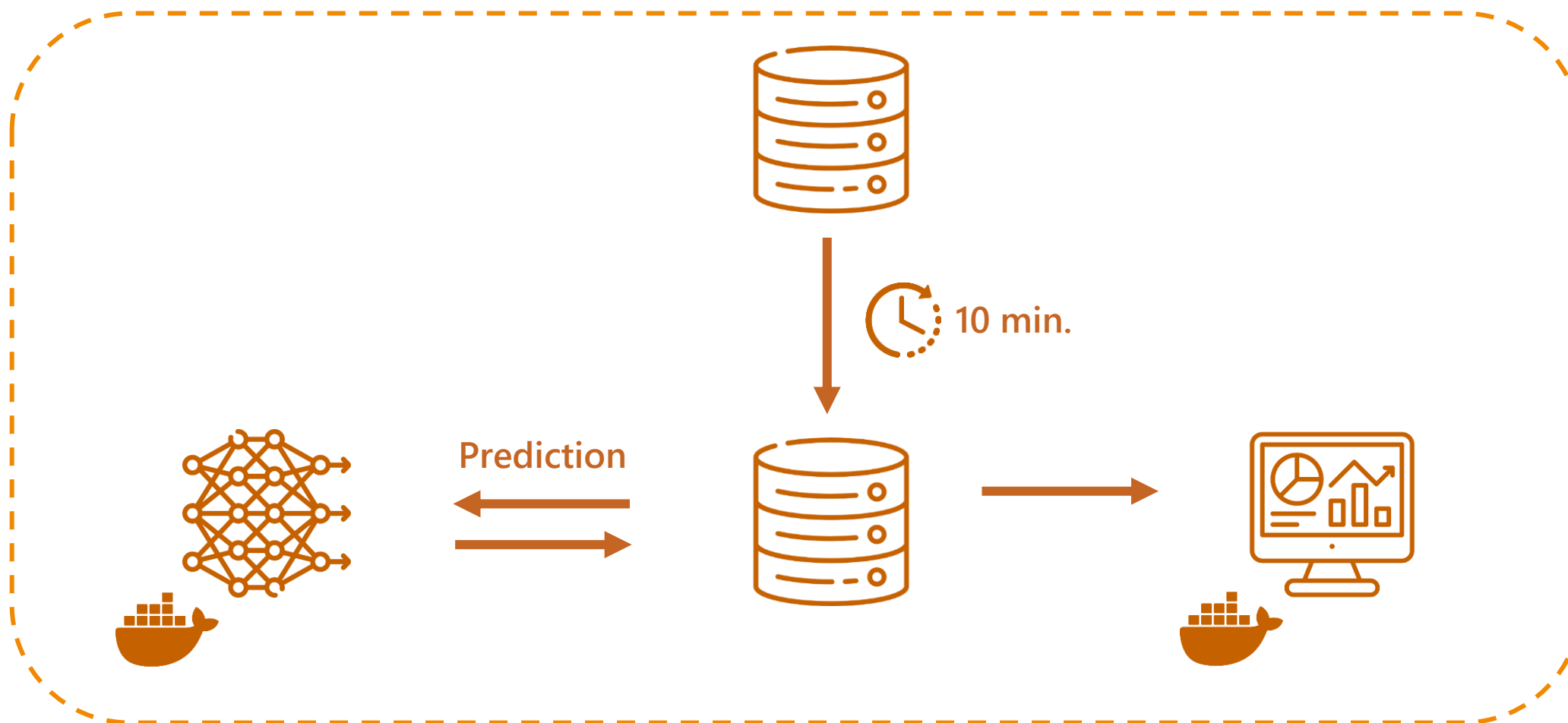
Praktijkvoorbeeld: SEH opnamevoorspelling







Deployment

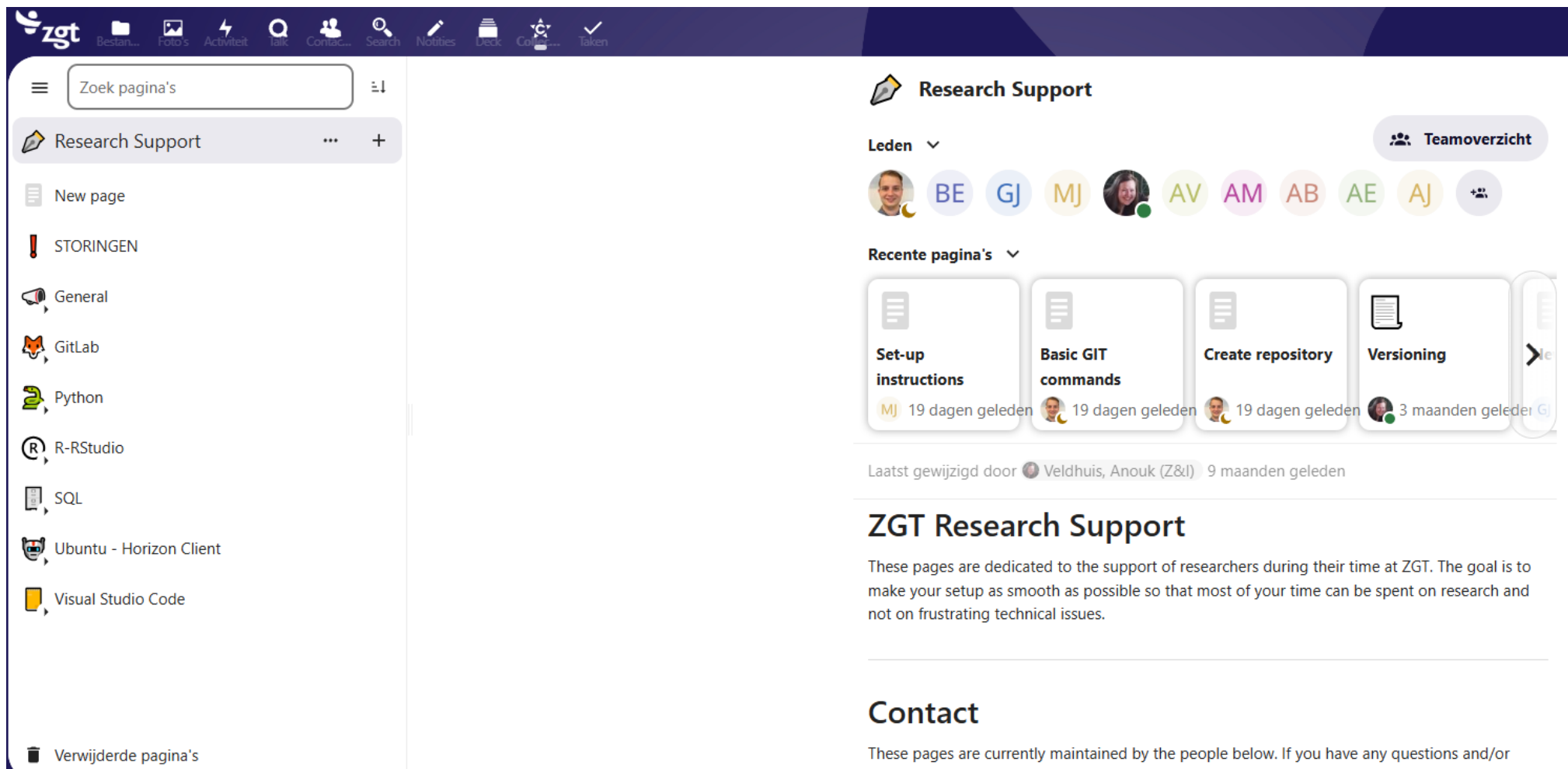


Clinical LAN

Ervaring van een onderzoeker

- **Tooling** (oa Dox collectives)
- Klinische stakeholders
- **Multidisciplinaire** uitdagingen
- Rol PIHC

Wiki - Dox collectives



The screenshot shows the ZGT Research Support Wiki interface. The top navigation bar includes the ZGT logo and various utility icons. A left sidebar contains a search bar and a list of categories: Research Support, New page, STORINGEN, General, GitLab, Python, R-RStudio, SQL, Ubuntu - Horizon Client, and Visual Studio Code. The main content area is titled 'Research Support' and features a 'Leden' (Members) section with a 'Teamoverzicht' button and a row of member avatars. Below this is a 'Recente pagina's' (Recent pages) section displaying four cards: 'Set-up instructions', 'Basic GIT commands', 'Create repository', and 'Versioning', each with a thumbnail icon and a timestamp. At the bottom, there is a 'Contact' section with a brief description of the wiki's purpose.

Research Support

Leden Teamoverzicht

Recente pagina's

- Set-up instructions (MJ, 19 dagen geleden)
- Basic GIT commands (MJ, 19 dagen geleden)
- Create repository (MJ, 19 dagen geleden)
- Versioning (MJ, 3 maanden geleden)

Laatst gewijzigd door Veldhuis, Anouk (Z&I) 9 maanden geleden

ZGT Research Support

These pages are dedicated to the support of researchers during their time at ZGT. The goal is to make your setup as smooth as possible so that most of your time can be spent on research and not on frustrating technical issues.

Contact

These pages are currently maintained by the people below. If you have any questions and/or

Ervaring van een onderzoeker

- **Tooling** (oa Dox collectives)
- Klinische stakeholders
- **Multidisciplinaire** uitdagingen
- Rol PIHC

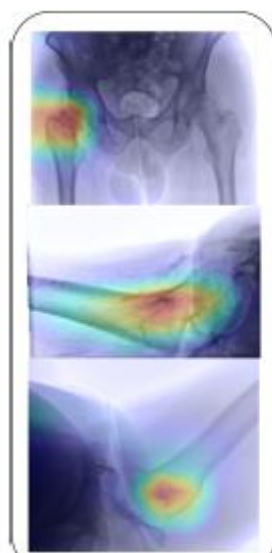
Mijn ZGT Reis

2019:

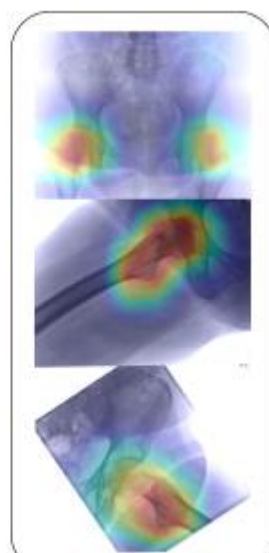
Supervised classification and unsupervised
localisation of femur fractures; improving
explainability of deep learning models

Jorn-Jan van de Beld, j.vandebeld@student.utwente.nl, s1683489, Computer Science

Olivier Paalvast, o.t.paalvast@student.utwente.nl, s1590707, Computer Science, Technical Medicine



(a) Fracture images



(b) No fracture images



(a) Grayed out patch



(b) CAM applied to (a)

Mijn ZGT Reis

2022:

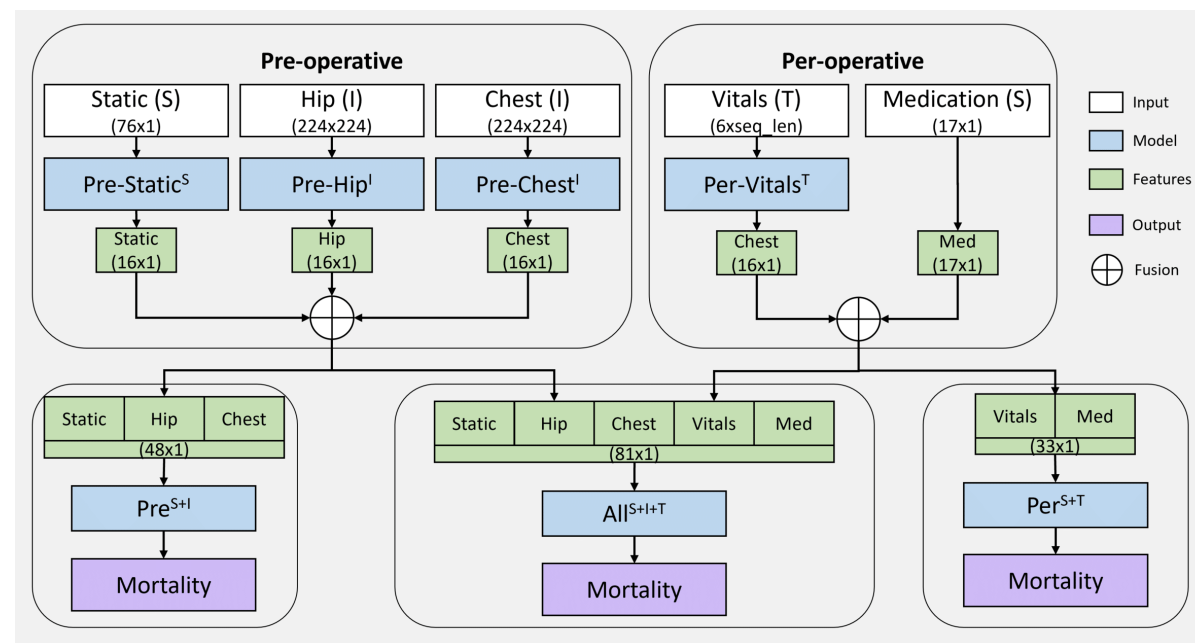
Feature Importance to Explain Multimodal Prediction Models. a Clinical Use Case

Jorn-Jan van de Beld^{1,2}, Shreyasi Pathak¹, Jeroen Geerdink², Johannes H. Hegeman^{1,2}, and Christin Seifert³

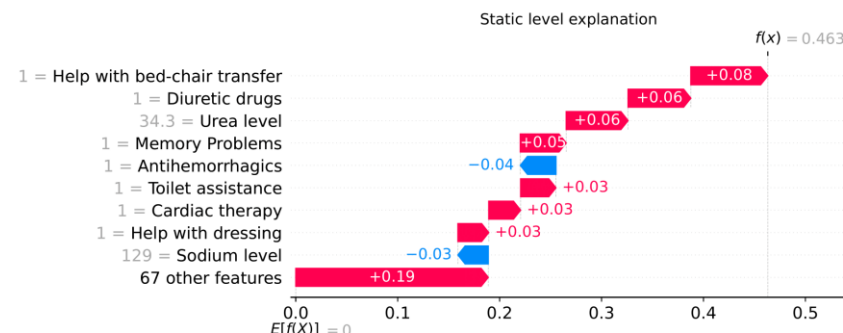
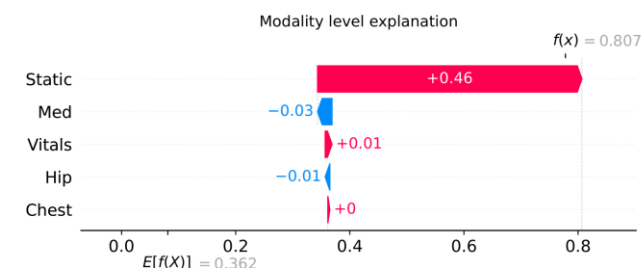
¹ Faculty of EEMCS, University of Twente, 7500 AE Enschede, The Netherlands
{j.j.vandebeld,s.pathak}@utwente.nl

² Hospital Group Twente (ZGT), 7609 PP Almelo, The Netherlands
{j.geerdink,h.hegeman}@zgt.nl

³ University of Marburg, 35037 Marburg, Germany
christin.seifert@uni-marburg.de



Positive case explanation
Mortality prediction: 80.7%



Mijn ZGT Reis

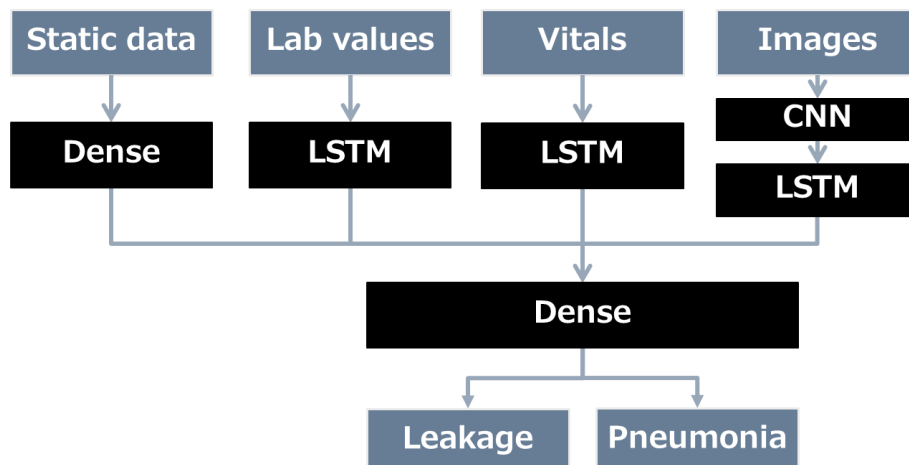
- Heden:



Article

Complication Prediction after Esophagectomy with Machine Learning

Jorn-Jan van de Beld ^{1,2,*}, David Crull ², Julia Mikhal ^{2,3}, Jeroen Geerdink ², Anouk Veldhuis ², Mannes Poel ¹ and Ewout A. Kouwenhoven ²

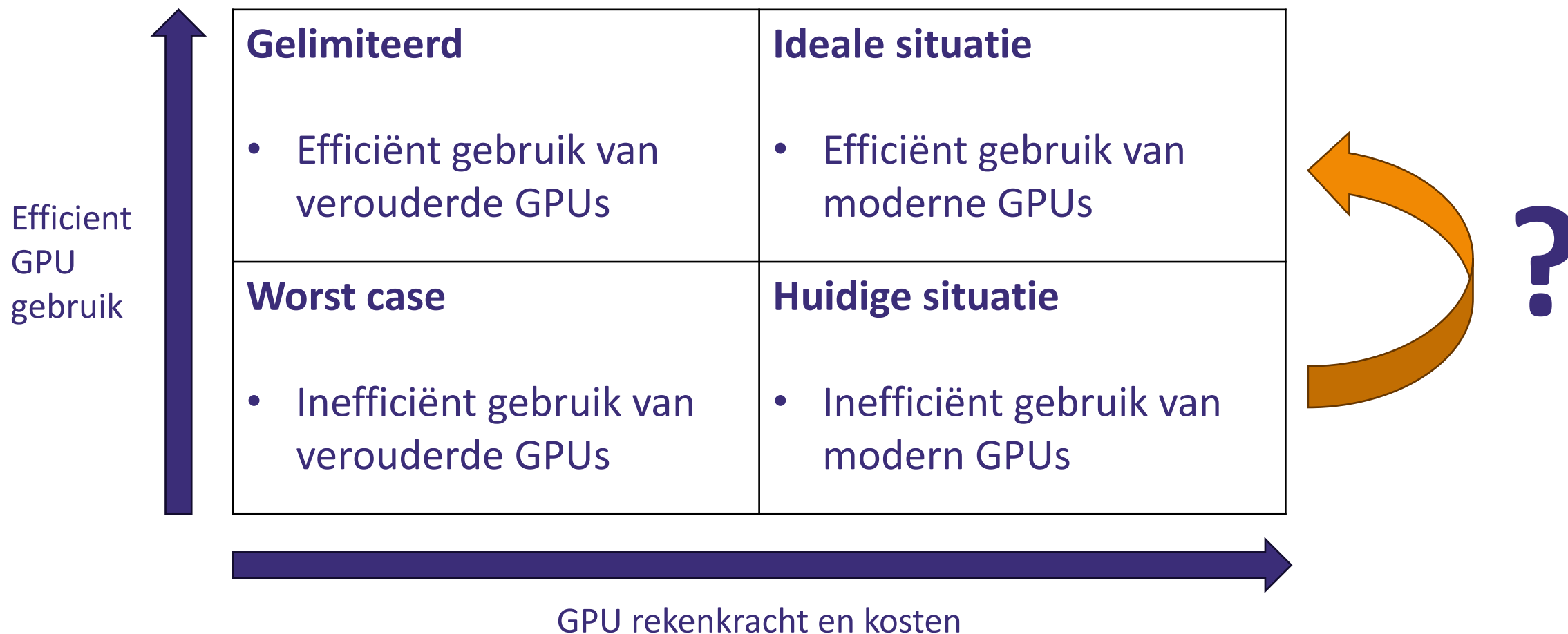


Pneumonia	Mean AUROC		
	0 days ahead	1 day ahead	2 days ahead
Considered modalities			
Lab	0.85	0.70	0.60
Vitals	0.71	0.68	0.58
Multimodal	0.86	0.74	0.61

Vrije tekst modellen

- Shreyasi
 - Structureren van radiologische verslagen
- Sylvain
 - Extractie van commorbiditeiten uit eerste hulp notities
- Max
 - Correct en betrouwbare classificatie van radiologische rapporten met LLMs

Slurm-dilemma



Slurm-dilemma

Cloud



Slurm



Slurm-dilemma

Cloud



Slurm



Samenvatting

Learning by doing!

ZGT Research infrastructuur



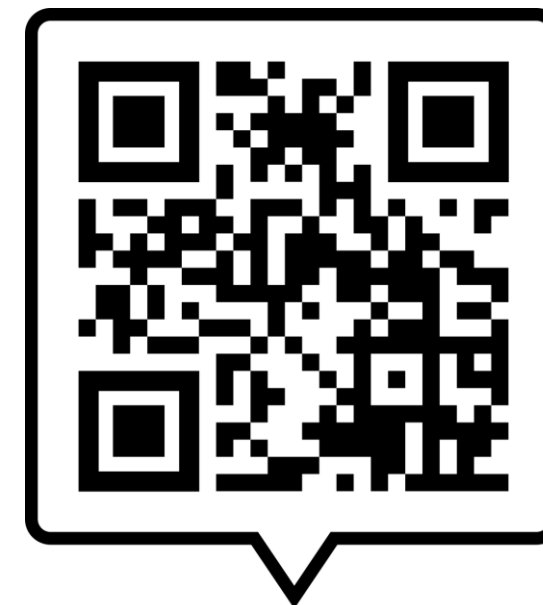
Jorn-Jan van de Beld
j.j.vandebeld@utwente.nl



Anouk Veldhuis
an.veldhuis@zgt.nl



<https://github.com/hospitalgrouptwente>



SCAN ME

Wat zou jij doen?

- Wat zou jij wijzigen aan onze infrastructuur? Of toevoegen?
- Wat voor onderzoek of project zou jij opstarten?
- Waar ben je verbaasd of verwonderd over?