



# AI in Health Practice

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Annemarie van 't Veen  
MD PhD MBA  
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# Speaker disclosure

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Annemarie van 't Veen,

- Speaks on personal capacity
- Uses examples from previous position lead data science @UMC Utrecht and literature
- Is freelancer advisor and visiting staff member @UMC Utrecht
- Has no relevant financial relationship to any party discussed

# AI TRANSFORMS HEALTHCARE

**Robotics:** surgery, prosthesis, social robotics

**Clinical decision support:** predictive algorithms, supporting personalized medicine, personalized treatment pathways, screening rare diseases, complication risks, contraindications signalling.

**Image recognition applications:** supporting radiologists, pathologists, endoscopists in detection and identification of anomalies, ECG automation

**Sensors:** monitoring and prediction, eg monitoring disease progress, disease detection

**Virtual Reality:** patient training, rehabilitation programs, patient information and education

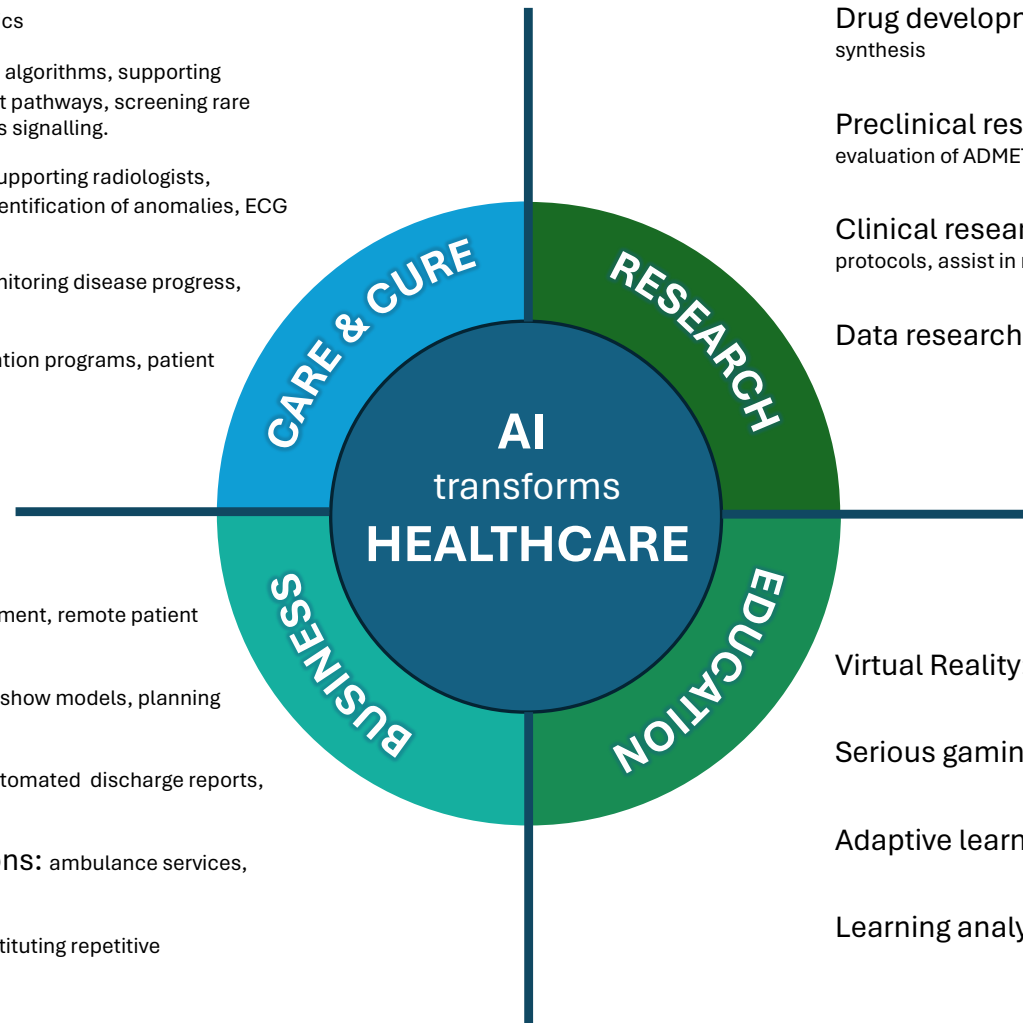
**IoT:** inventory management, capacity management, remote patient monitoring, smart beds

**Data analysis:** patient flow prediction, no show models, planning capacity, human resource management.

**LLM:** speech to text to report applications, automated discharge reports, standardization data recording

**Triage and prioritization applications:** ambulance services, triage at GP practices

**Robotic Process Automation:** substituting repetitive administrative load.



**Drug development:** target discovery, substance discovery, de novo synthesis

**Preclinical research:** evaluation physicochemical properties, evaluation of ADMET specifications

**Clinical research:** assist in design and rationale clinical trial protocols, assist in monitoring, assist in patient selection and inclusion.

**Data research:** assist in data mining, processing and analysis

**Virtual Reality:** simulation, training skills, protocols

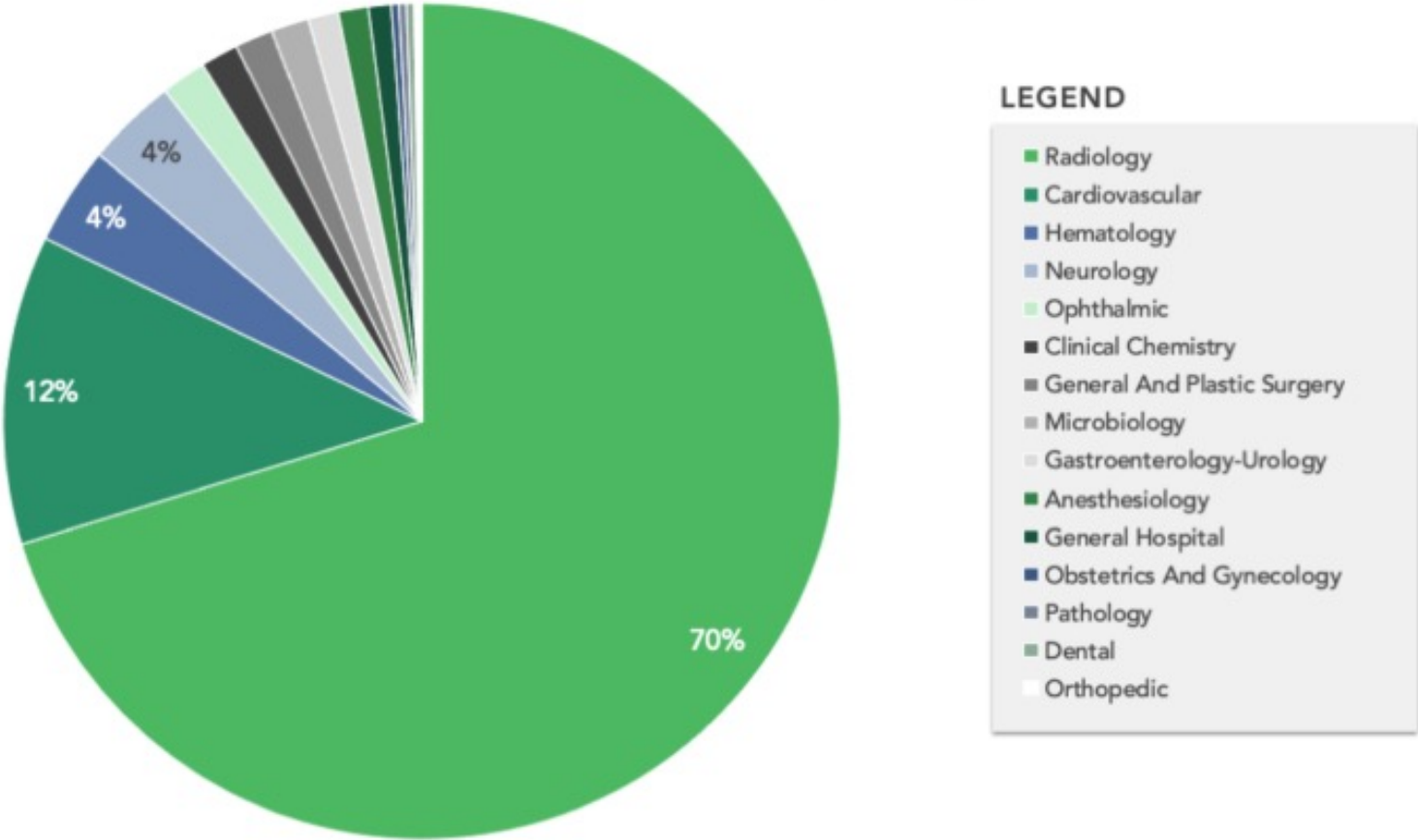
**Serious gaming:** training, simulation

**Adaptive learning platforms:** supports personalized learning

**Learning analytics:** assist in student outcomes and learning pathways

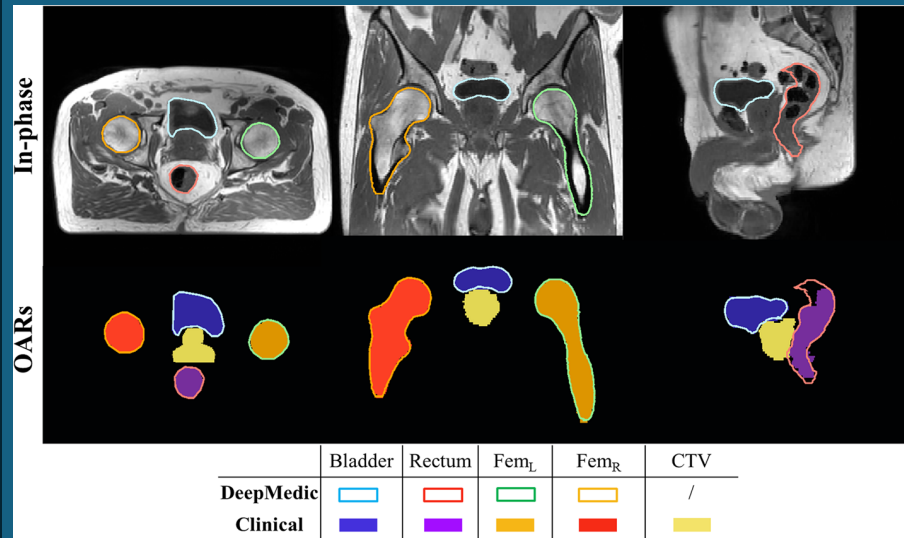
# AI/ML-ENABLED DEVICES BY THERAPEUTIC AREA

FDA approvals and clearances from 1997-2021<sup>1</sup>



Note: 1. 2021 includes FDA approvals and clearances for AI- and ML-enabled devices through June 17, 2021  
Source: FDA list of Artificial Intelligence and Machine Learning (AI/ML)-Enabled Medical Devices as of 09/22/2021

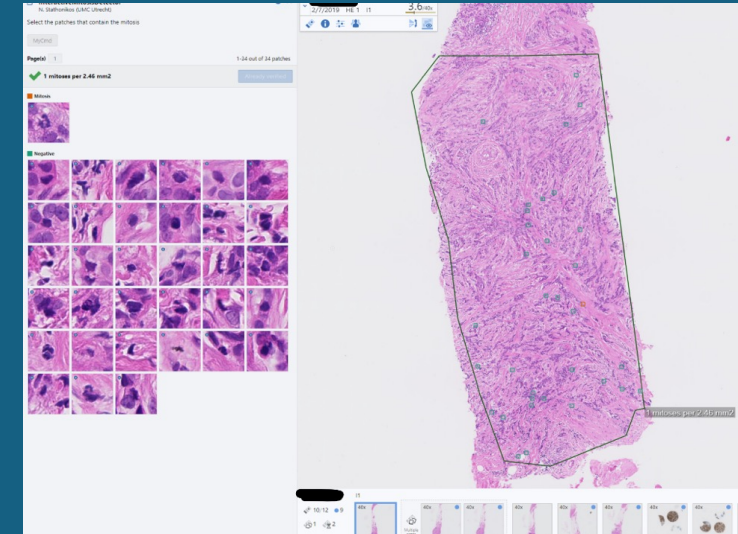
# IMAGE RECOGNITION



**RADIOTHERAPY**



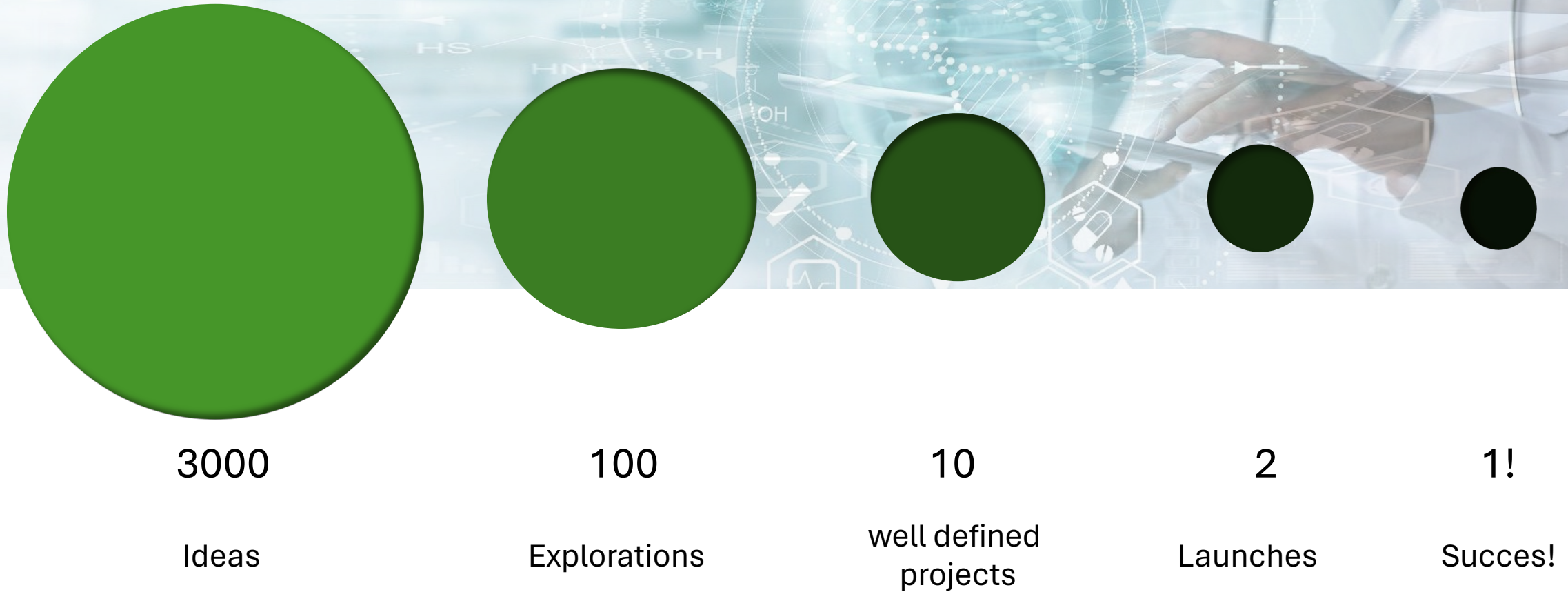
**RADIOLOGY**



**PATHOLOGY**

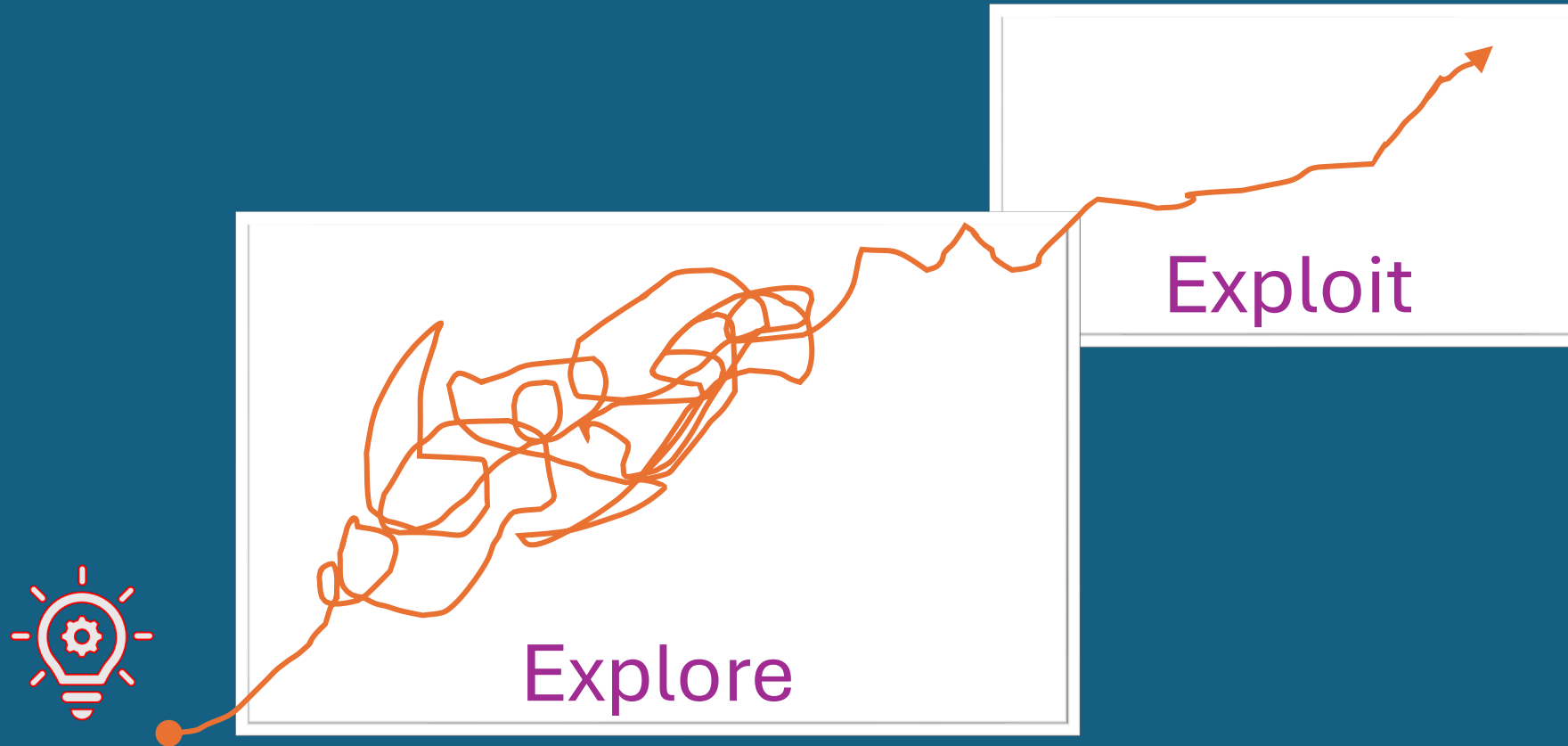


# From research AI model to implemented AI application, innovation is ....



*Adapted from Stevens, G.A. and Burley J. 3000 Raw Ideas = 1 Commercial succes!. Research Technology Management. Vol. 40, #3, pp16-27.*

# Dit is geen lineair proces ...



# Push valuable AI/datascience to foster innovation & change @UMC Utrecht

Built with directions and divisions a UMC Utrecht AI implementation project portfolio

Develop supportive policies & structures

Provide supportive capacity

Develop & organize training & education

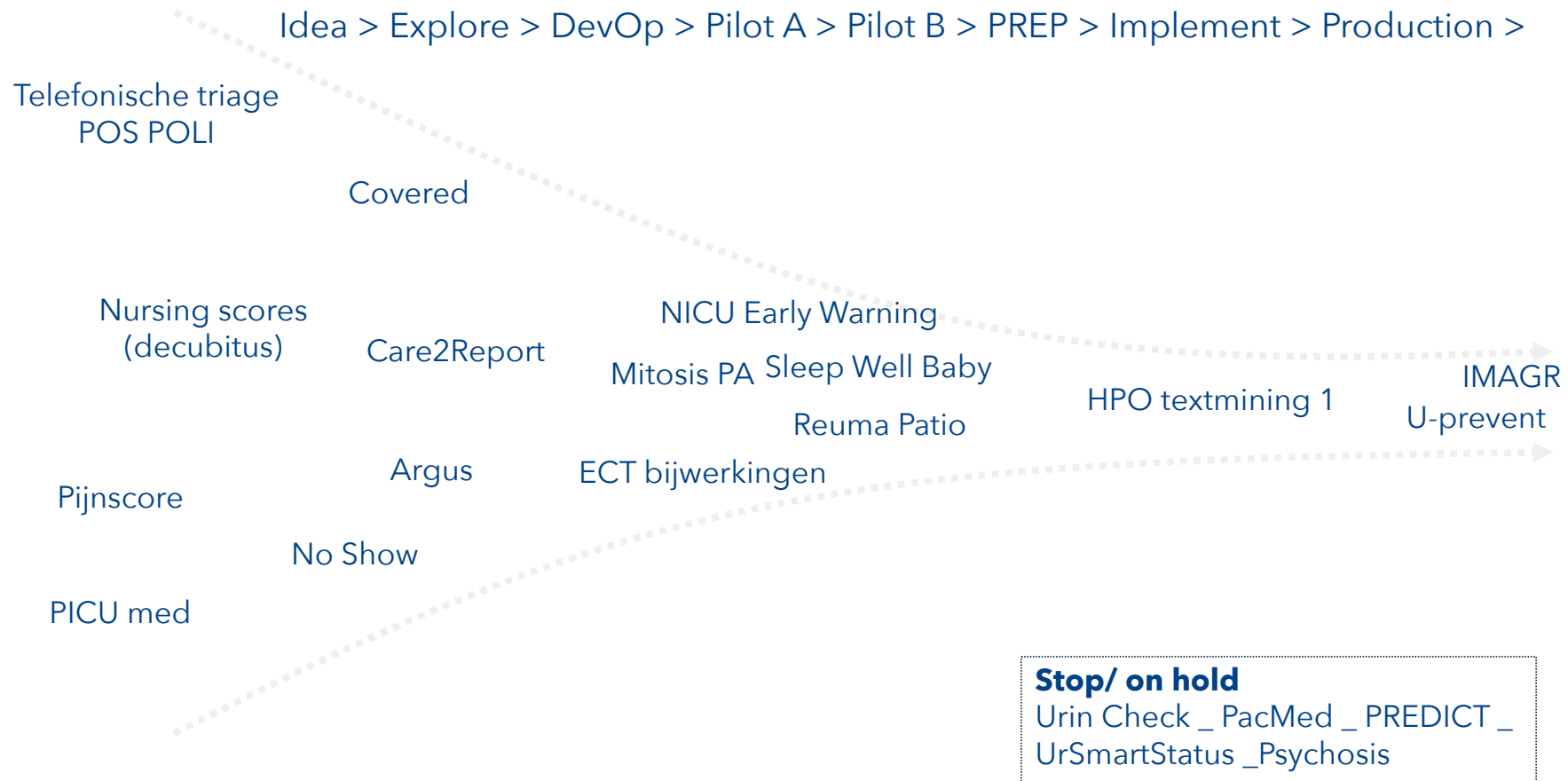
Share knowledge

Built a network for learning by doing

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- Dedicated clinical data science team
  - Co-creation and multidisciplinary projects
  - Standardized innovation approach with standardized risk assessments
  - Quality Management System for AI LCM
  - Portfolio shifts from high research profile towards business supportive models influenced by LLM development



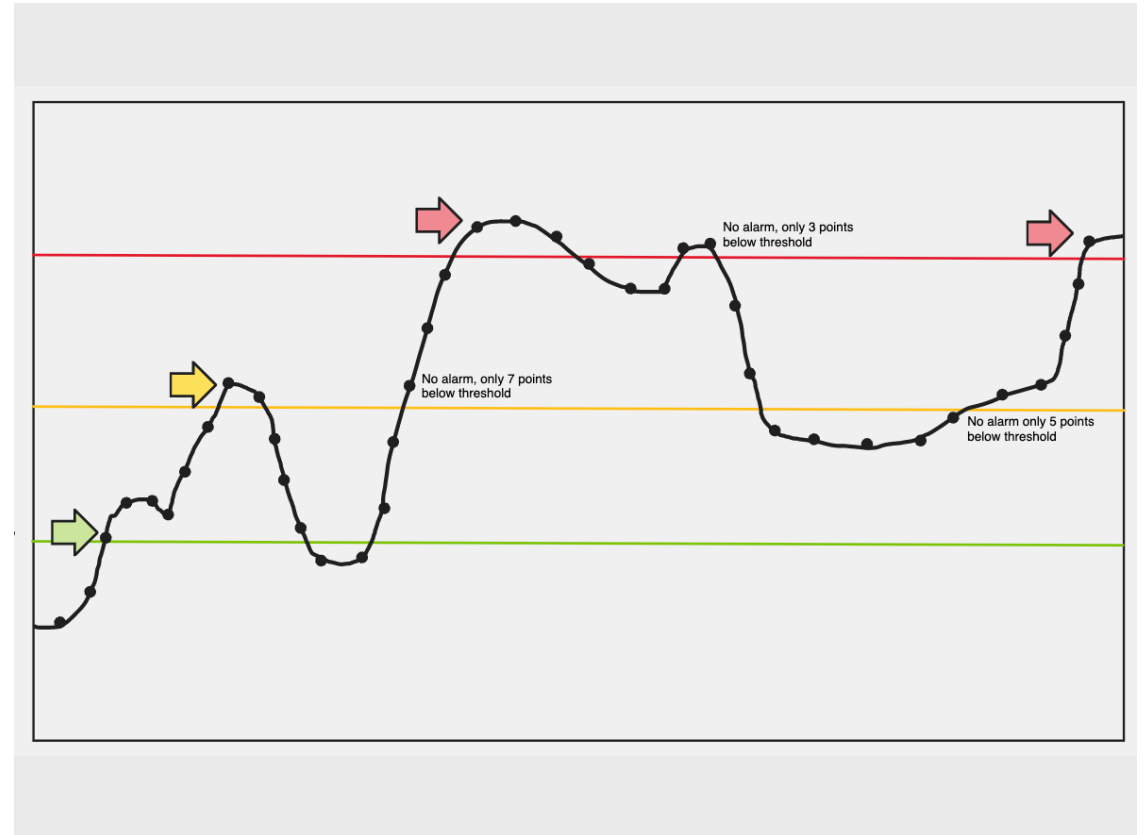
# Project portfolio applied data science



# NICU Early Warning Signals

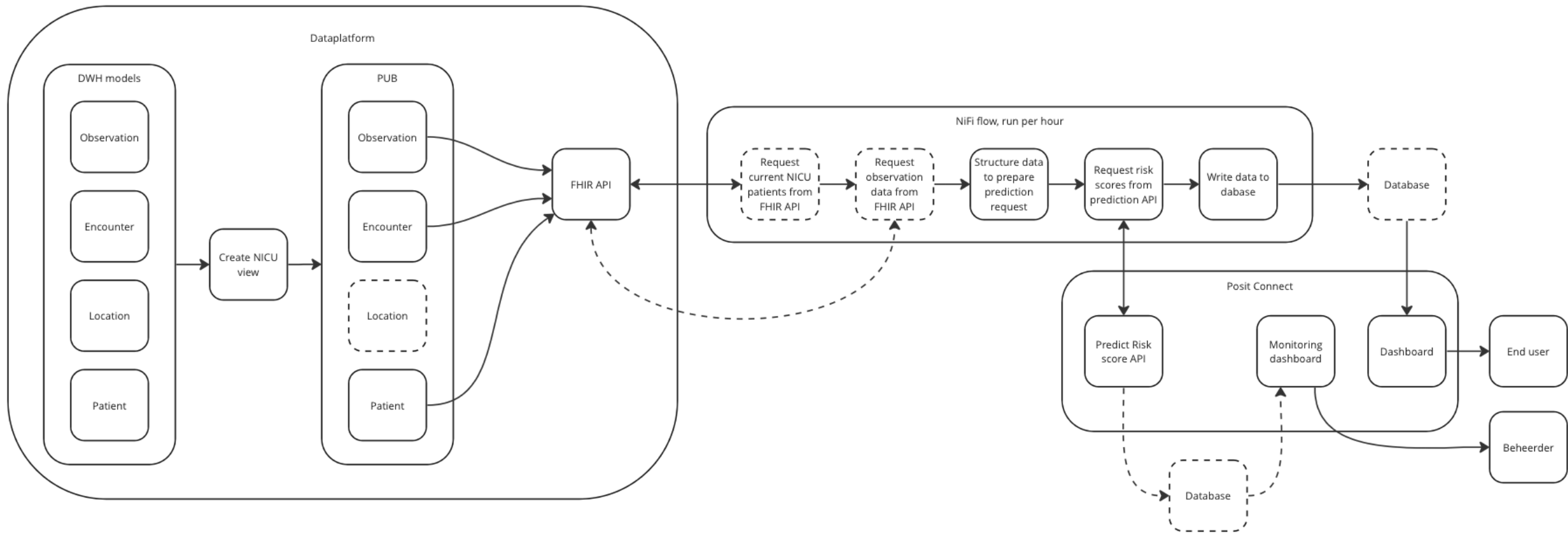
## NICU EWS

- early detection risk of sepsis
- Intended use: clinical management by physician team
- extreme-preterm (<32 gestational age)
- logistic regression, risk prediction variables heartrate and oxygen saturation
- RUO runs in background for validation



- NICU dashboard concept, credits: Ruben Peters

# NICU EWS architecture



# Development Reuma PATIO

van der Leeuw *et al.*  
*Arthritis Research & Therapy* (2022) 24:74  
<https://doi.org/10.1186/s13075-022-02751-8>

Arthritis Research & Therapy

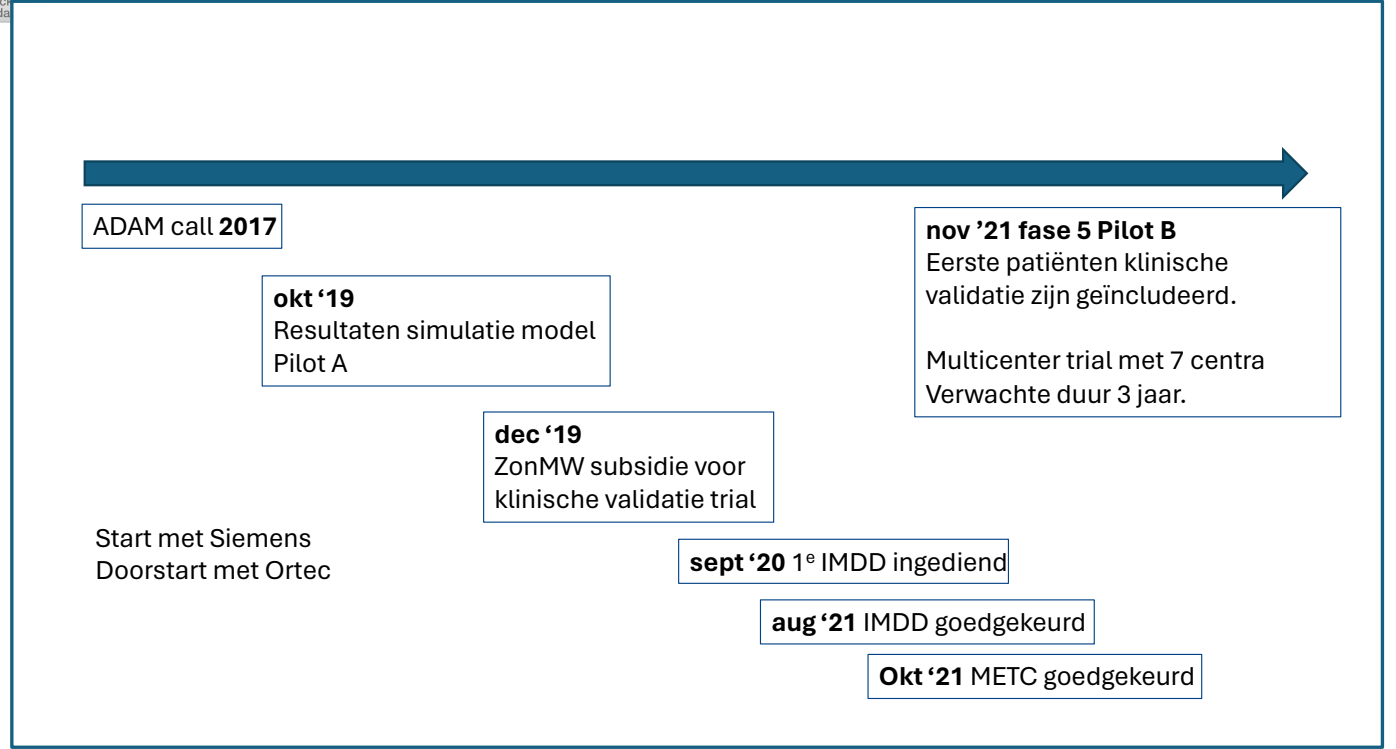
RESEARCH ARTICLE

Open Access

## Using real-world data to dynamically predict flares during tapering of biological DMARDs in rheumatoid arthritis: development, validation, and potential impact of prediction-aided decisions

Matthijs S. van der Leeuw<sup>1†</sup>, Marianne A. Messelink<sup>1\*†</sup>, Janneke Tekstra<sup>1</sup>, Ojay Medina<sup>2</sup>, Jaap M. van Laar<sup>1</sup>, Saskia Haitjema<sup>3</sup>, Floris Lafeber<sup>1</sup>, Josien J. Veris-van Dieren<sup>4</sup>, Marlies C. van der Goes<sup>5</sup>, Alfons A. den Broeder<sup>6</sup> and Paco M. J. Welsing<sup>1</sup>

### ML model predicting risk of flare in RD patients Built on historical data analysis and guidelines



# Development Reuma PATIO



Risk assessments performed:

- Data Privacy Impact Assessment
- Software Security Assessment
- ISO 14971 assessment medical device
- SAFER assessment work process

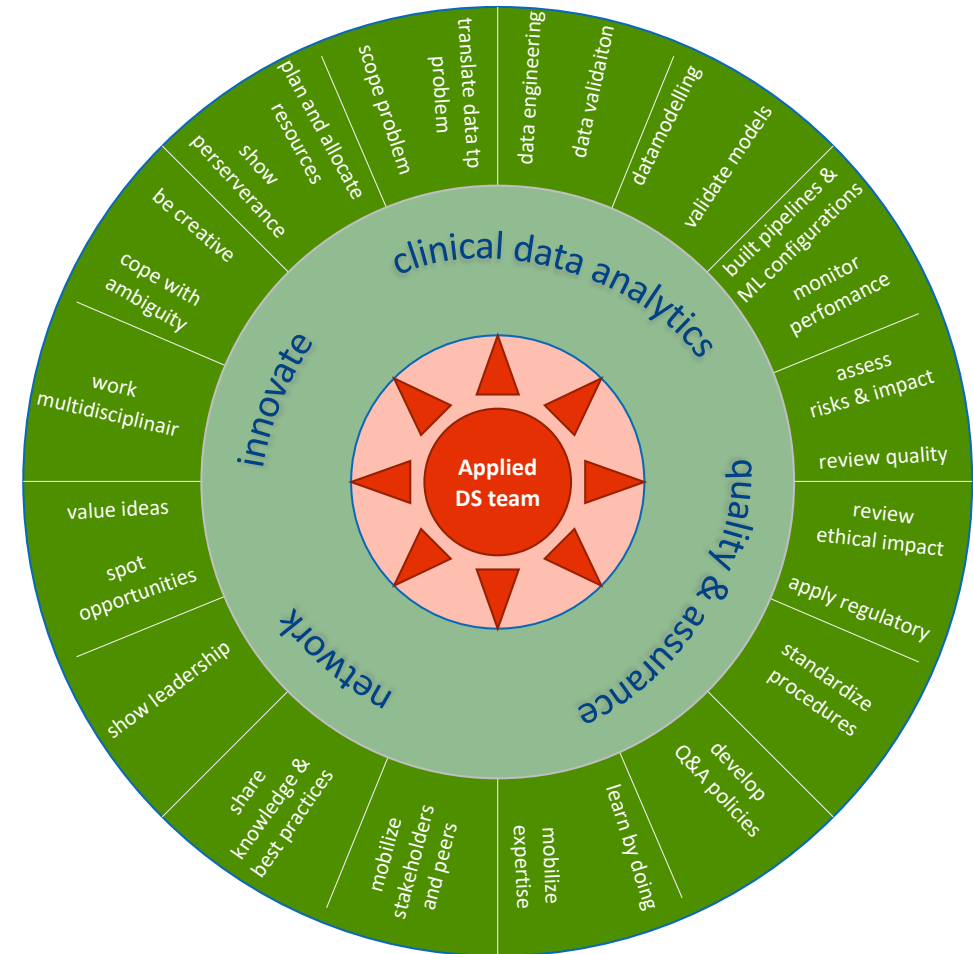
Investigational Medical Device Dossier  
METC assessment / approval

Developed for RUO for use in the trial.



# Lessons learned

- Push to implementation
- Built competencies within the organisation
- Set goals and KPIs at project portfolio level
- Decision taking authority is scattered and often unknown
- Create culture of quality and safety thinking
- Governance in operation remains topic of debate
- Be stubborn



Thank you.

Annemarie van 't Veen

[linkedin.com/in/annemarievantveen](https://www.linkedin.com/in/annemarievantveen)

