Vertically distributed learning for CVA

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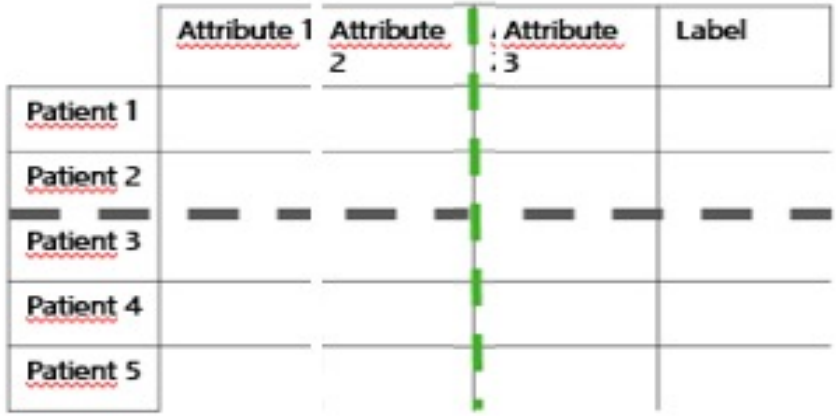
- RQ3: Vertically partitioned machine learning for prediction of cerebrovascular accident (CVA) rehabilitation

Use Case: St. Antonius

Vertically Partitioned Data :
Data of one patient in
split up over multiple institutions



Current projects

1. Survey paper on Privacy Preserving Distributed Deep Learning
2. Split Learning for Vertically Partitioned Medical and Financial Use Cases
3. Prediction Model of CVA Outcomes using Vertically Partitioned Data
4. Inclusion of Perfusion CT scan imaging in prediction model
5. Evaluation of CVA prediction models for a practical setting

Current projects

1. Survey paper on Privacy Preserving Distributed Deep Learning
2. Split Learning for Vertically Partitioned Medical and financial Use Cases
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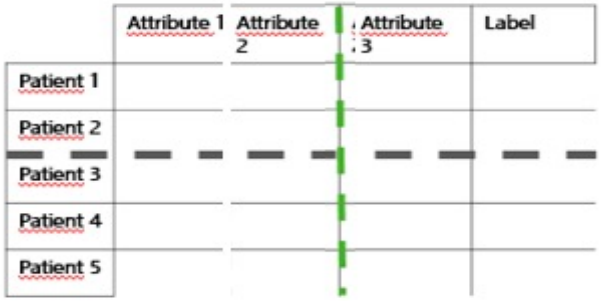
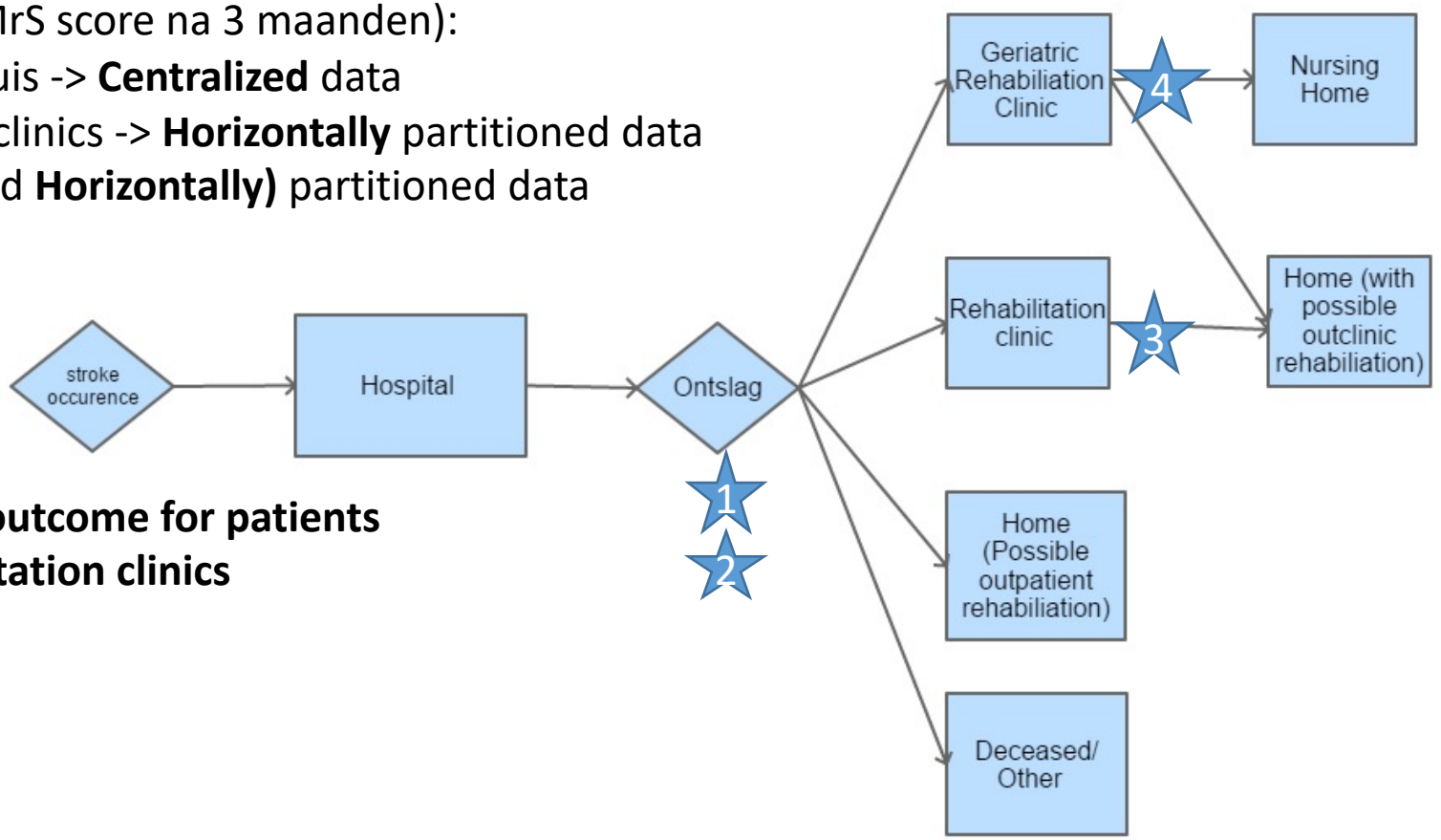
5. **Evaluation of CVA prediction models for a practical setting**

Prediction Models using vertically partitioned data



Comparison of 3 models for situation 1 (MrS score na 3 maanden):

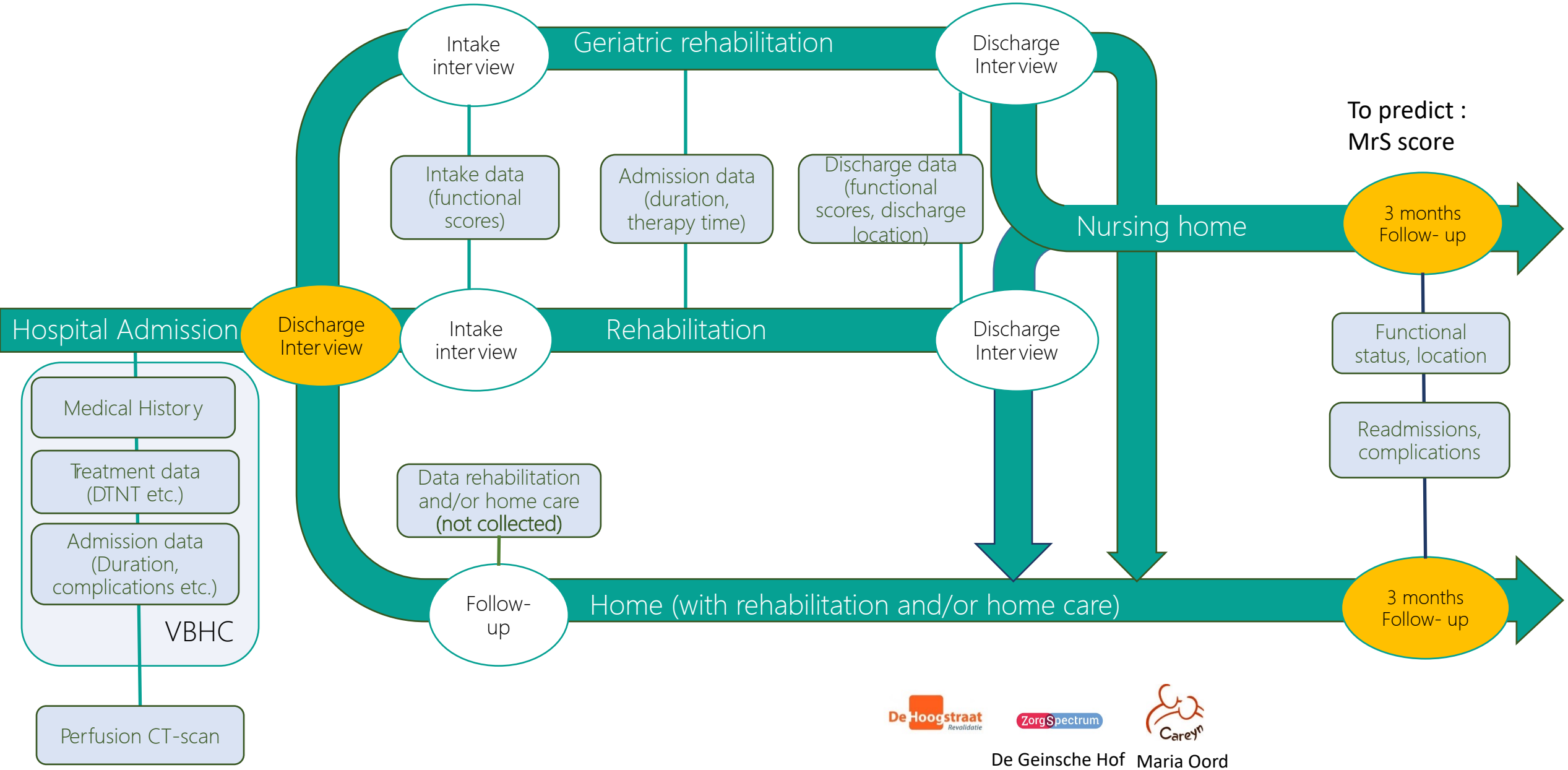
- Prediction model St. Antonius Ziekenhuis -> **Centralized** data
- Prediction model intake rehabilitation clinics -> **Horizontally** partitioned data
- Prediction model both -> **Vertically** (and **Horizontally)** partitioned data



Prediction moments*:*

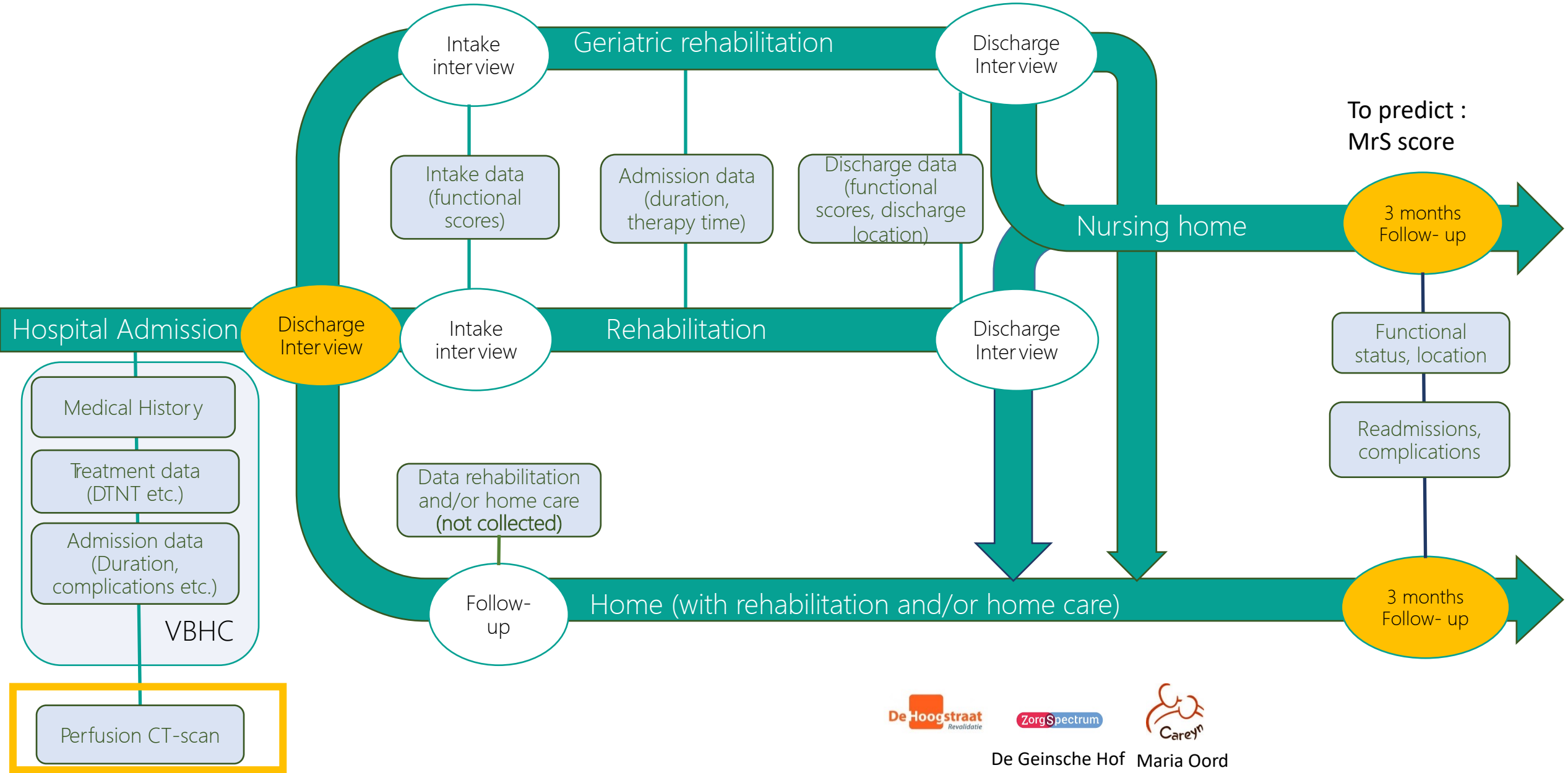
1. **Ontslaggesprek: Expected long term outcome for patients**
2. **Expected 'burden of care' for rehabilitation clinics**

USE CASE: CVA in St. Antonius Hospital



De Geinsche Hof Maria Oord

USE CASE: CVA in St. Antonius Hospital



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Perfusion CT scan

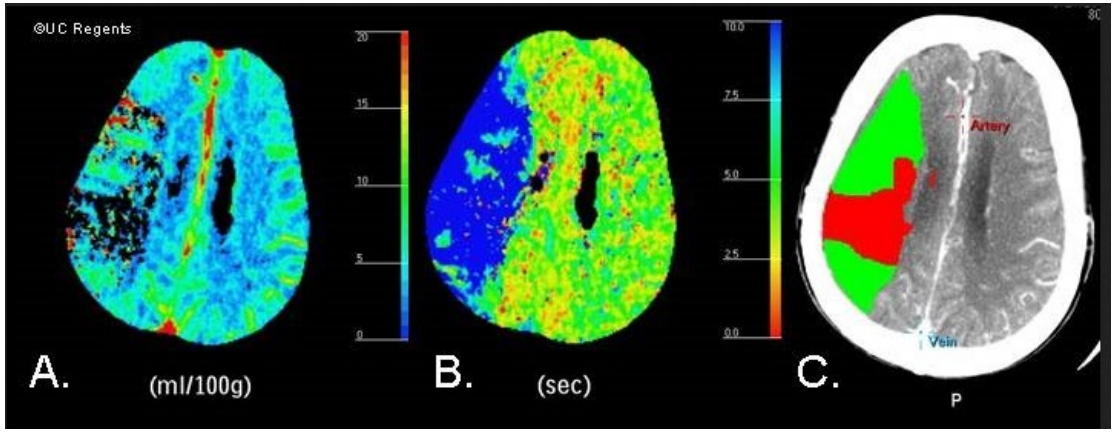
- Measure blood flow through the brain
- Collected for large set of CVA patients

Goal: to add the perfusion CT scans as input from the hospital in prediction model

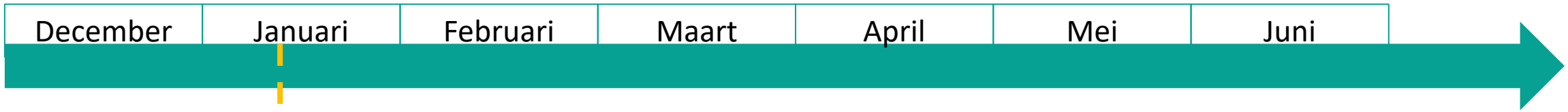
- Raw CT scans
- Analysis of scans
- Measured affected brain volume
- Radiologist report

Masterstudent Balazs Borsos (Artificial Intelligence)

- Open data set of perfusion CT scans



Timeline Perfusion CT scans



Data inventarisation
-of current dataset in St. Antonius
-Quality and amount of pCT

Data collection
-Medical ethical approval of St. Antonius
- Extraction from EHR

Algorithm development on public dataset

Preprocessing of
-Preprocessing of data collected in St. Antonius and rehabilitation clinics
- Development of centralized prediction model

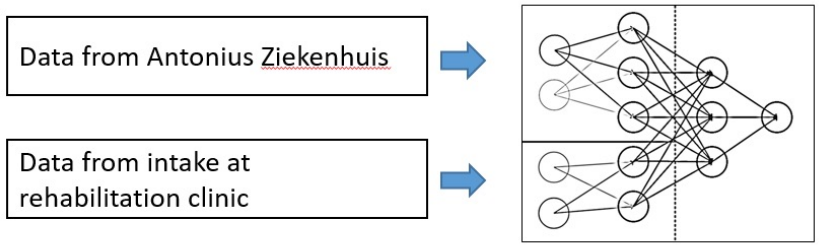
Addition of the perfusion CT scans to the prediction model

Evaluation of prediction models for a practical setting

Context of use:

- During ‘ontslaggesprek’ in hospital
  - Decision moment about rehabilitation
- To provide **support** during decision making process
  - Explainable prediction models
- Not meant for use by patient alone

Necessary for use in practice:
- Infrastructure for implementation of distributed models
- Evaluation of models by medical professionals (and patients)



Qualitative Evaluation with patients and clinicians

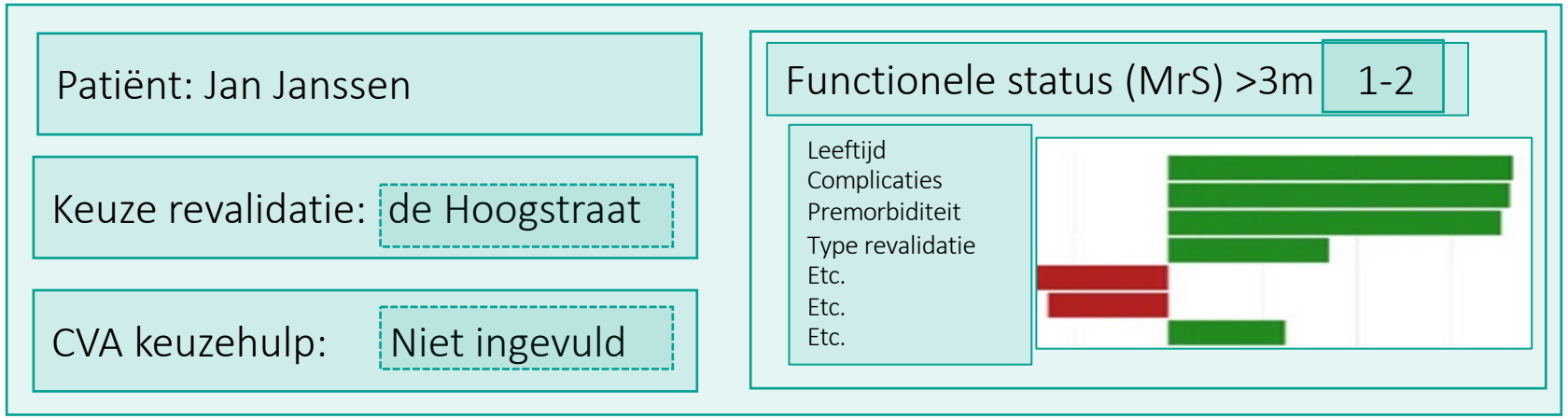
Focusgroups with patients and health care professionals

1. Experiences and expectations on data-based information about rehabilitation and recovery
2. Discussion on visualization and implementation of prediction model

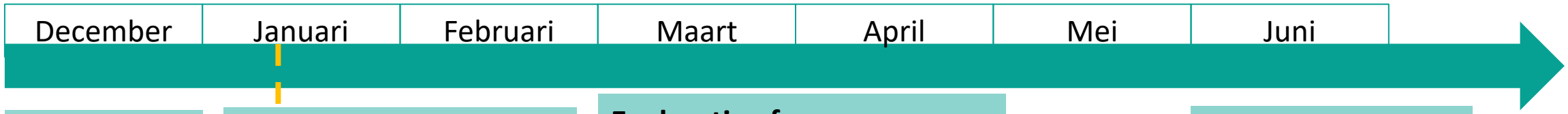
With masterstudent Sanne van Houwelingen (Gezondheidswetenschappen)

Evaluation through questionnaire

- With health care professionals on final prototype



Timeline Evaluation of prediction models



Protocol submission to medical ethical board

Preparation of focus groups
- Practice focus groups
- participants

Explorative focus groups
- With medical professionals
- Discussion of process
- Evaluation of prototypes

Explorative focus groups
- With Patients
- Expectation of rehabilitation
- Evaluation of prototypes

Final Evaluation with Questionnaires
- With medical professionals
- Discharge simulation

Prototype development
- Explainable AI

Prototype Re-evaluation