

Think Tank MHeNS & IDS

20-05-2019

Maastricht University

An introduction to MHeNS and IDS members to share our work, research interests and identify opportunities and themes for joint research or funding collaborations



Think Tank MHeNS & IDS

- 13:00 Welcome
- 13:05 Introduction of the School for Mental Health and Neuroscience (MHeNS) by Professor David Linden
- 13:15 Introduction of the Institute of Data Science (IDS@UM) by Professor Michel Dumontier
- 13:25 Session I: 1-minute pitches
- 14:15 Session II: Break-out groups
- 14:50 Summary of break-out groups & follow-up action items
- 15:00 End of the event



Think Tank MHeNS & IDS

**Introduction of the School for
Mental Health and Neuroscience
(MHeNS) by Professor David
Linden**



Think Tank MHeNS & IDS

**Introduction of the Institute of
Data Science (IDS@UM) by
Professor Michel Dumontier**



1-Minute Pitch Round

The main idea with the pitches is to very briefly introduce yourself and your research interests in a way to help participants from the other institute identify common interests and opportunities to collaborate with you



Nadine Rouleaux

Institute of Data Science UM

NeuroInformatics Researcher

Background

RM Cognitive & Clinical Neuroscience

- Fundamental Neuroscience
- Alzheimer's disease

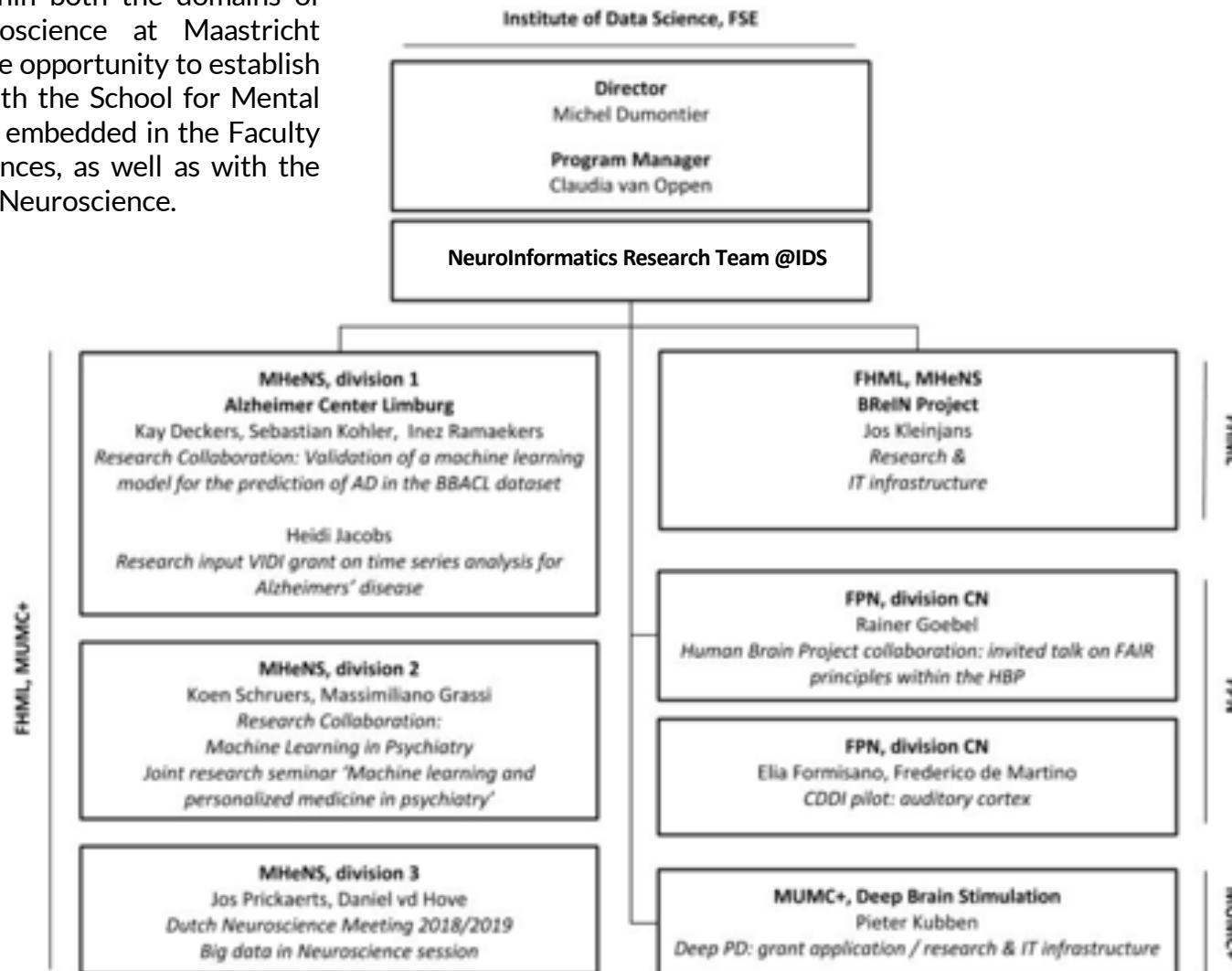
Researcher, NeuroInformatics Research Coordinator

Event organizer, Partnerships, Community building



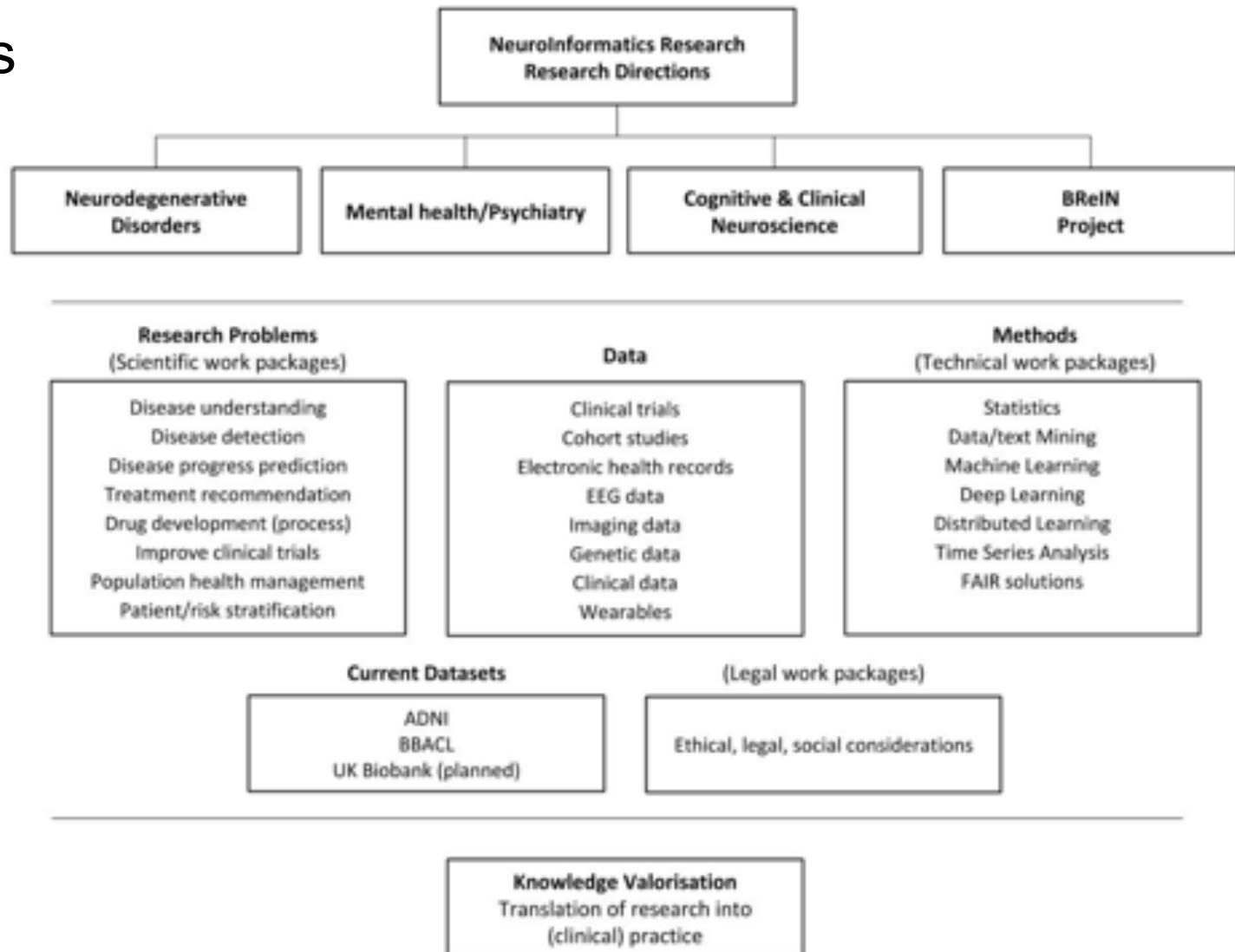
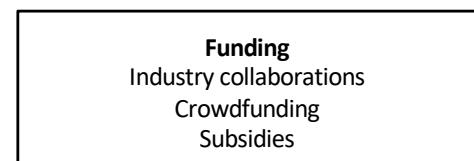
NeuroInformatics

The strong expertise within both the domains of data science and neuroscience at Maastricht University, has given us the opportunity to establish multiple collaborations with the School for Mental Health and Neuroscience, embedded in the Faculty of Medicine and Life Sciences, as well as with the Faculty of Psychology and Neuroscience.



NeuroInformatics

It is IDS' ambition to foster a collaborative, inter-faculty environment, accelerating team science and interdisciplinary training for a new generation of collaborative, entrepreneurial and innovative (data) scientists, who are able to face current and future challenges and convert knowledge and ideas into products and services for societal (and economic) benefit within the area of NeuroInformatics.



PredictAD

A predictive machine learning model for Alzheimer's disease

Massimiliano Grassi, Nadine Rouleaux,
Daniela Caldirola, David Loewenstein,
Koen Schruers, Giampaolo Perna, Michel
Dumontier



Stijn Michielse, PhD

Department of Neurosurgery

Post-doc

- Previous research;
MRI in psychotic disorder.
- Knowledge on MRI methods and
imaging techniques.
- Ecological Momentary
Assessment using the PsyMate.
- Current work;
Understanding and Tracking
Parkinson's Disease using MRI.
- Network of collaborators at
University of Cambridge (UK) and
University of Alberta (Canada).



IDEAS

Collaboration between MHeNS and IDS research:

- Knowledge on processing methods of large MRI datasets
- Infrastructure for large scale processing – cluster computing
- Experience Sampling Method; large scale daily life questionnaires

Projects or topics of common interest:

- Large scale MRI data processing
- Clinical application of neuroimaging data
- Prediction of mental disorder
- Research Domain Criteria (RDoC)

Roy van Hooren
PhD student @ FHTML
MHeNS, Division 1
Department of P+N

- Research project: The organization of brain networks and their relationship with pathology and cognitive decline across the lifespan. Data is collected in the STRAIN-study.
- Methods:
 - fMRI (connectivity analysis & Graph theory)
 - Diffusion imaging analysis



Risk factors of chronic Postsurgical Pain

Roel van Reij MSc & Prof. Bert Joosten

Anaesthesiology and Pain Management | MHeNS & MUMC+

Large database containing

- Psychological & demographical variables
- Genome-Wide Association Study



• Collaborations

- University Clinic Bonn (Bonn, IMBIE & Dr. Ramirez)
- McGill University (Montreal, Prof. Diatchenko)
- Italian Pain Group (Parma, Dr. Allegri)

• Experience

- Large scale genetics
- Machine learning
- Human datasets



Maastricht University

Ideas

For collaboration between
Anaesthesiology/MHeNs and IDS research:

Data-Omics:

Integration of different research lines!

- find the common ground between

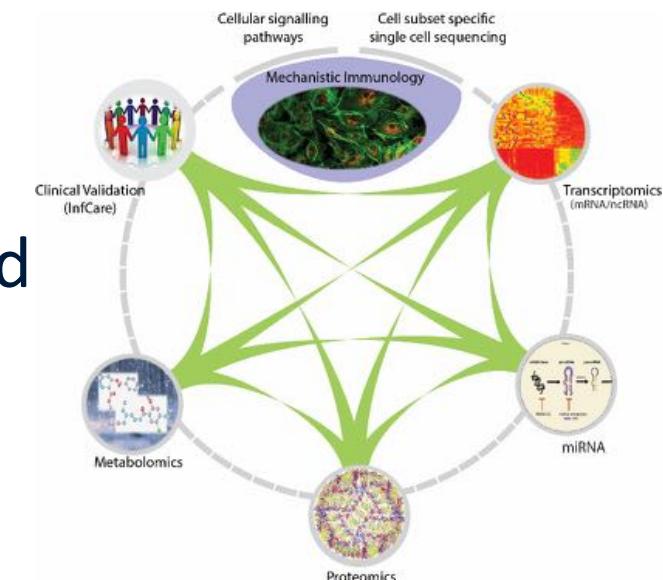
GWAS, Machine Learning and eQTLs

- finding new angles in existing data

Projects or topics of common interest:

Data Handling:

How to deal with the large datasets and time-consuming analyses?



Remzi Celebi

Institute of Data Science UM

Postdoctoral Researcher

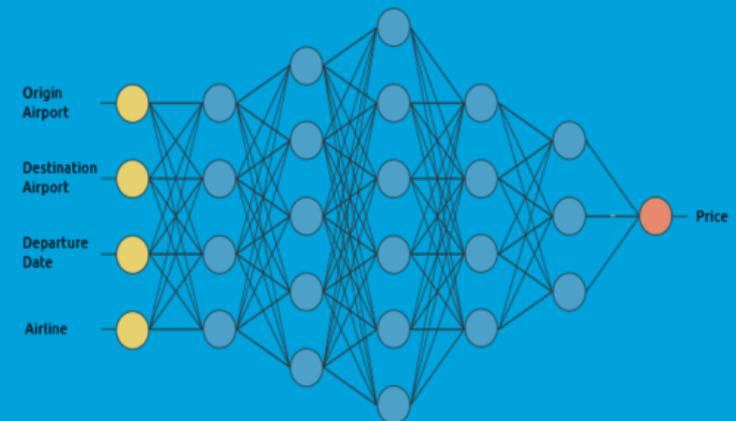
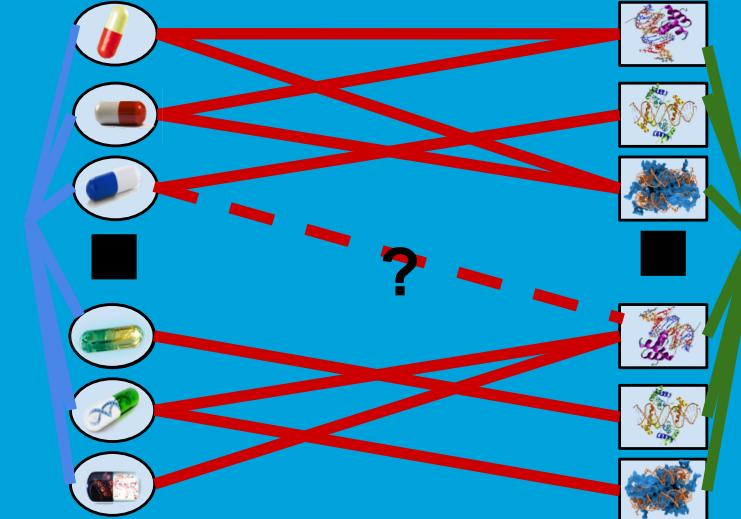
Background: PhD in Computer Engineering

- Knowledge Graphs
 - Link Prediction
- Machine Learning/Deep Learning
 - Graph Embeddings / Deep Autoencoders
- Drug Repurposing (Finding new uses for existing drugs)
- FAIRifying data and workflows



Collaboration ideas

- Data-driven models to identify new uses of existing drugs for neurological disorders such as Alzheimer
- How to make your data/workflows FAIR
- Integration of omics data into knowledge graphs, developing deep learning applications using knowledge graphs



Alzheimer (decision) modelling

Ron Handels (PhD) MHENS div1 ACL

Cost-effectiveness:

- Hypothetical treatment
- Primary prevention
- Care interventions

Alzheimer (natural progression) modelling:

- Decision-analytic modelling
- Individual patient simulation
- Markov
- Dutch/Swedish dementia registry

Diagnostics

- Risk prediction
- Clinical utility

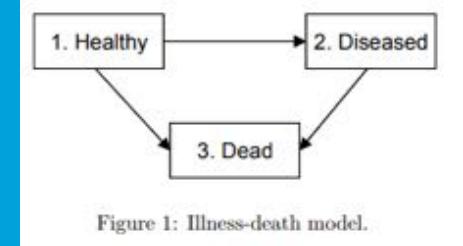
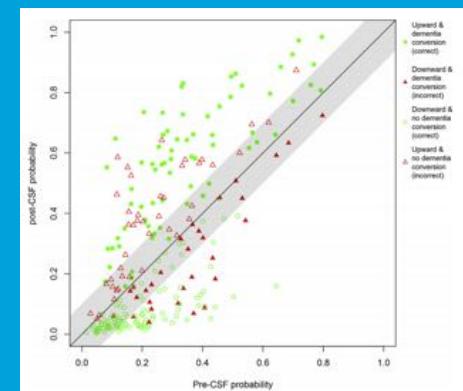
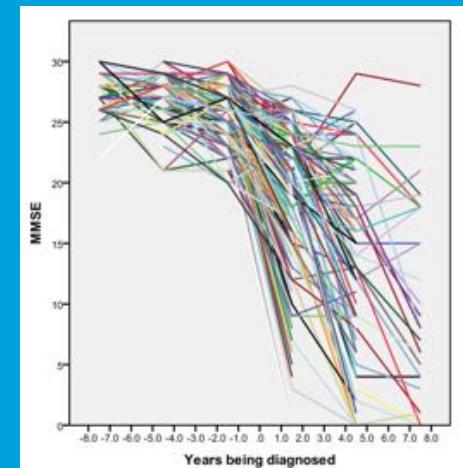


Figure 1: Illness-death model.



Wishlist

- Merge cohorts
 - Harmonization
 - Different missing factors in cohorts
 - Mapping
- Simulation
 - (individual patient) Markov simulation in R (KEMTA)
 - Multi-state modelling
 - Predicted values from general linear mixed model (and growth mixture model)

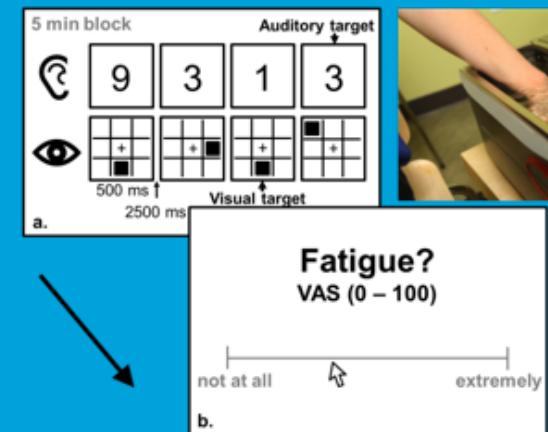


Bert Lenaert
MHeNS, Limburg Brain Injury Center
Post-doc

Previous research:
Fear learning and Anxiety



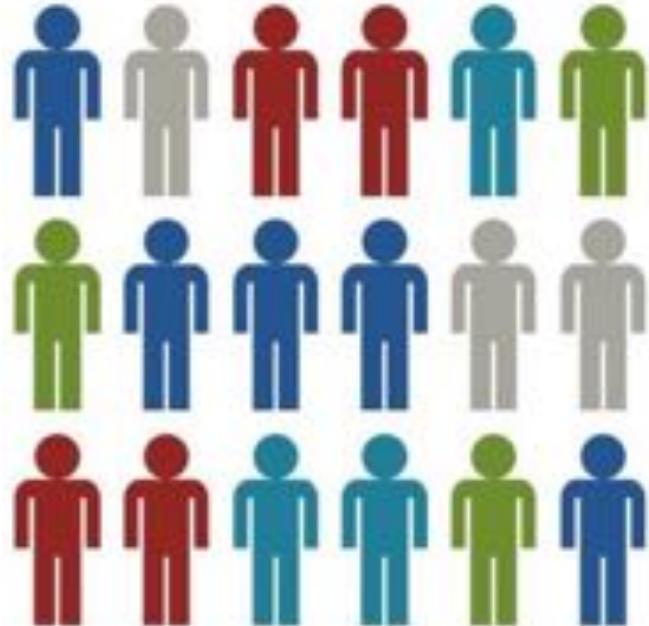
Current research:
Brain injury and chronic fatigue



Collaborators:
University of Leuven, Belgium
University of Groningen, Netherlands
Trinity College Institute of Neuroscience, Ireland
Università Cattolica del Sacro Cuore, Roma, Italia

IDEAS

Turn PsyMate™ into a **learning** mHealth system: 'Precision Medicine'



Alexander Malic

Institute of Data Science UM

Data Science Architect

Background:

- Software development
- Database engineering
- Requirements engineering
- Project management
- Infrastructure
- System / Enterprise Architecture



Ideas

- Collaborate on shared infrastructure(DSRI)
 - High performance computing (CPU & GPU)
 - Scalable high availability storage
 - Data processing pipelines
 - Databases
- Aphasia project
 - Extend the concept of Adaptive Learning for Aphasia patients to other areas
- CDDI project - 500TB of MRI brain scans
- Internet Of Things (sensors, mobile platforms) for data collection



Name: Daan van Kruining

Affiliation: MHeNS – Division 3: Translational Neuroscience

Position: PhD student

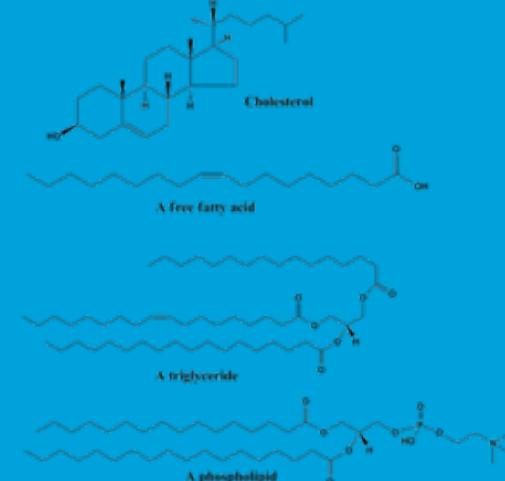
Previous relevant research projects, networks, experience:

Lipids in Alzheimer's Disease

Brain and plasma lipidomics in mild cognitive impairment (MCI)

Lipid/protein changes in transgenic AD mice

Liquid chromatography–mass spectrometry (LC-MS)



IDEAS

for collaboration between MHeNS and IDS
research:

**Big data coming from lipidomic/proteomic
research in
Alzheimers disease**



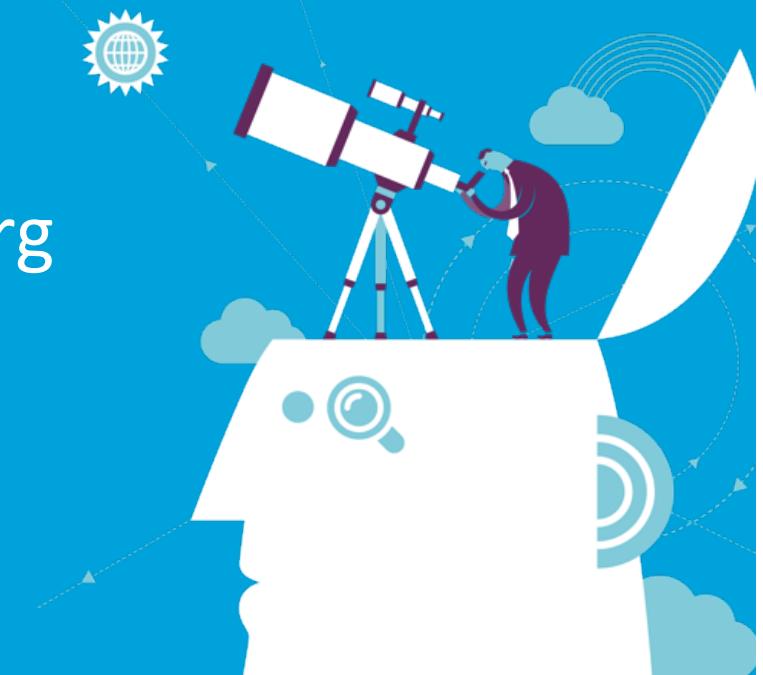
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Name: Angélique Gruters

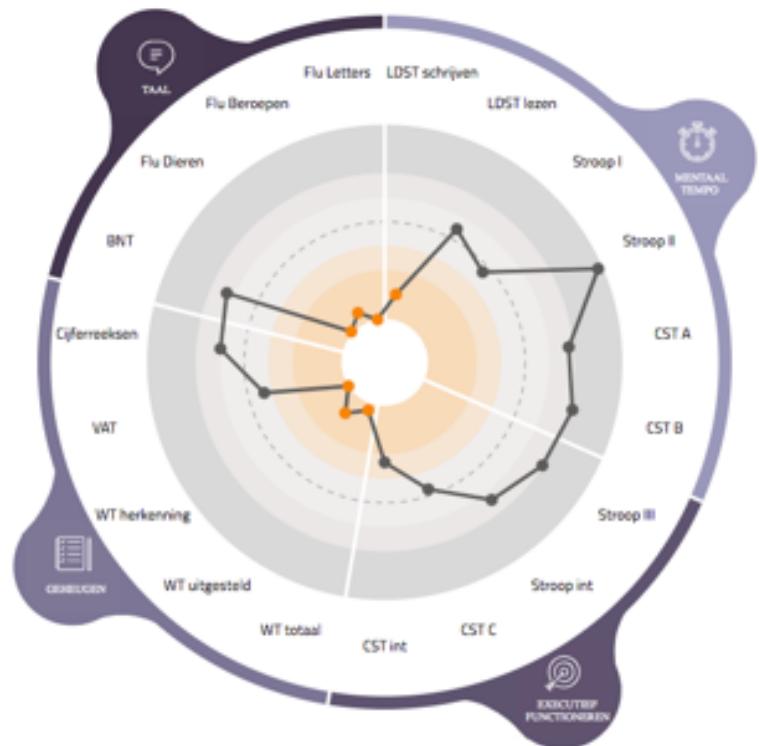
Affiliation: MHeNS, division 1, Alzheimer Center Limburg

Position: PhD Student

- 1) Innovations in NeuroPsychological Assessment in the timely Diagnostics of Dementia (INPAD): development visual tool.
- 2) Development memory clinics
- 3) Qualitative studies
- 4) BioBank-Alzheimer Center Limburg cohort study



Example visual tool



Name: Olin Janssen

Affiliation: Alzheimer Centre Limburg, Department of Psychiatry and Neuropsychology, School for Mental Health and Neuroscience.

Position: PhD candidate

**Previous relevant research projects,
networks, experience:**

Re-use of existing data

- Identification and integration of real-world AD data sources across Europe
- Estimating dementia care durations and their determinants
- Pooling data from studies investigating AD biomarkers



IDEAS

for collaboration between MHeNS and IDS
research:

Explore ways to apply machine learning
algorithms to our research data

projects or topics of common interest:

Name: Chang Sun

Affiliation: Institute of Data Science

Position: PhD candidate

Experience:

Studied Artificial Intelligence master program
at DKE

Started PhD at IDS Oct 2017

Research focus:

1. Privacy-preserving data mining
2. Distributed machine learning
3. Health data analysis
 - currently working on diabetes data
 - build predictive models or discovery potential knowledge



Name: Huibert Tange, Jean Muris

Affiliation: Dept of Family Medicine

Position: Research Network Family Medicine (RNFM)

Purposes RNFM:

- Epidemiologic research
- Criteria-based patient recruitment

Previous relevant research projects:

- >250 publications
- >50 PhD theses
- 166.000 patients (80.000 active)
- MAAS-study

Recent upgrade:

- ALL EPR-data, including narratives
- “Intercity”: collaboration 5 networks
→ data pooling
- New team



IDEAS

for collaboration between MHeNS and IDS research:

- Text mining SOAP-narratives
- Predictive models for dementia, depression, burnout, SOLK, ...
- Combination with psychiatric and laboratory data

projects or topics of common interest:

- Early diagnosis of dementia
- ...

Name: Daniël van den Hove

Affiliation: Dept. Psychiatry & Neuropsychology

Position: Associate Professor

Outline

- Head Neuroepigenetics
- Coordinator EPI-AD (H2020/JPND): Epigenetic dysregulation in aging and AD (ongoing)
- WP leader BReIN

Keywords

- Epigenetics, DNA (hydroxy)methylation, EWAS, single cell methylation profiling, developmental programming, aging, stress, mood and anxiety disorders, Alzheimer's disease, biomarkers, of mice and men, epigenetic editing.

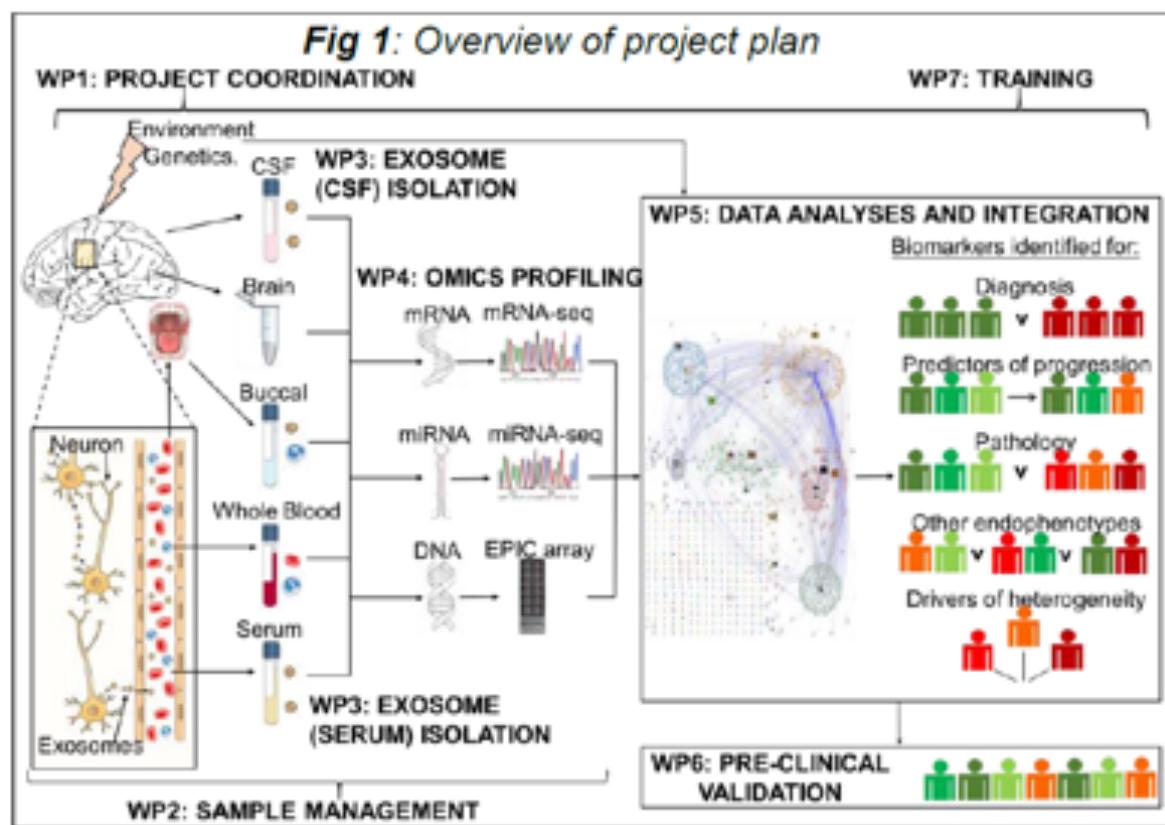
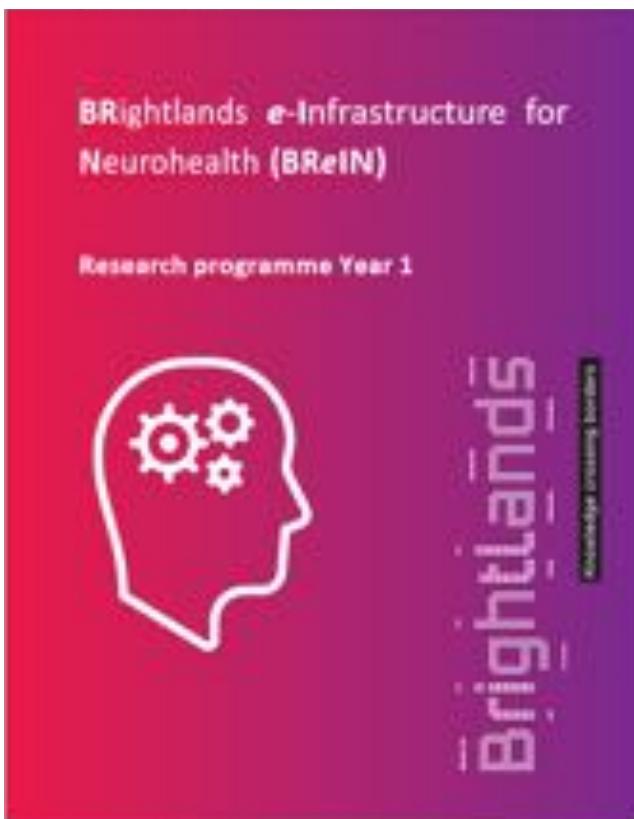
Network

- UM (Kenis, Rutten, Pishva, Prickaerts, Verhey, Kleinjans, Eijssen, Ramakers, Schruers), Heerlen/Brightlands (Mintjens), Hasselt (VanMierlo), Exeter (Mill, Lunnon); Wuerzburg (Lesch, Haaf); Bonn/Cologne (Ramirez, Wagner), Luxembourg (Del Sol, Glaab), Barcelona (Esteller, Delgado); Sun City (Coleman, Mastroeni); New York (Ginsberg); Boston/Goettingen (Lardenoije).



IDEAS

Future: BReIN/EPI-AD2/IMOS-AD: Individualised multi-omics signatures of Alzheimer's disease molecular and pathological endophenotypes



Name: Linda Pagen

Affiliation: MHeNS, div 1, Alzheimer Center Limburg
Centre for Integrative Neuroscience

Position: PhD Student

Previous relevant research projects, networks, experience:

- STRAIN-study: longitudinal study investigating stress, the brain and memory performance across the age-span
- Multimodal data collection:
Combining (f)MRI with physiological data including pupil dilation measurements.



Name: Leonie Banning

Affiliation: MHeNS, div. 1, Alzheimer Center
Limburg

Position: PhD candidate

Previous relevant research projects/experience:

- RM Cognitive and Clinical Neuroscience, Psychopathology
- Harmonization and pooling of datasets (NL: BBACL, 4C-MCI, PSI-NDZ; USA: ADNI, NACC)
- AD biomarkers and neuropsychiatric symptoms
- Interest: trajectories of disease progression (e.g. NPS)

Collaborated with
Johns Hopkins University School of Medicine,
Baltimore (Jeannie-Marie Leoutsakos,
Kostas Lyketsos, Paul Rosenberg)



Jackson Boonstra
MHeNs, Neurosurgery dept.
Promovendus

In Vivo MRI: *Structural Brain Alterations in Cannabis Users: The Role of Cannabis Use Disorder Severity and Tobacco Smoking**

Ex Vivo IHC: *Sexual Dimorphisms of Protein Accumulation in the Human Entorhinal Cortex of Preclinical Alzheimer Patients Across Age***

*Spinoza Centre for Neuroimaging

**Netherlands Institute for Neuroscience



IDEAS

for collaboration between MHeNS and IDS research:

MRI Data Archiving
Machine Learning with MRI data

projects or topics of common interest:

“Neuroanatomical basis of tremor-dominant and akineto-rigid types of Parkinson’s disease” @ Scannexus + Division 3

Name: Seun Adekunle

Affiliation: Institute of Data Science

Position: Data Scientist

Experience:

Studied Computer science at Saarland University
Germany

Started Position at IDS in May 2018

Research focus:

1. Application of machine learning
2. Software engineering
3. Data mining and analysis
 - currently working on text classification of technologies given the project description
 - develop machine learning models and pipelines for inference and prediction



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Irene Heger

MHeNs, Alzheimer Centrum Limburg

PhD student

- Medical psychology
- Clinical work in hospital and lifestyle clinic
- MijnBreincoach project: primary prevention of dementia
- Awareness campaign and MijnBreincoach app



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Erik Gommer PhD

MHeNS, Clinical Neurophysiology clinical physicist

Previous relevant research projects,
networks, experience:

QEEG and ML methods for seizure
detection & cerebral asymmetry (J. G.
Bogaarts, MHeNS)

Towards closed loop DBS for epilepsy:
Development of a seizure prediction
framework (D. Tenbrock, J. Karel, P.
Bonizzi, DKE)

Predicting sex from brain rhythms with
deep learning (M. van Putten, MST)



IDEAS

for collaboration between MHeNS and IDS research:

Early seizure detection for closed loop direct neurostimulation devices in epilepsy

Early prediction of Alzheimer's disease or mental disorders on EEG data

projects or topics of common interest:

Data collection: standard EEG, longterm rerecording at EMU and ICU, coregistration in DBS-patients.

Name: Anne-Fleur Domensino

Affiliation: MHeNs – Limburg Brain Injury Center

Position: PhD Student

*Previous relevant research projects,
networks, experience:*

**Development of a minimal dataset
for people with acquired brain injury**

A set of standardised measurement instruments that is used to obtain an overall image of persons with ABI across all healthcare sectors and disciplines and in every stage of the injury.

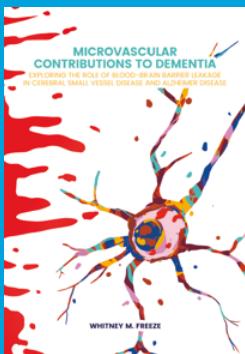
- ✓ Facilitate FAIR data collection in the field of ABI
- ✓ Reduce the administrative burden on patients and clinicians



Whitney Freeze

MHeNS, Alzheimer Center Limburg Postdoc

Experience:



Research interests:



Disease focus:

- Alzheimer's disease¹
- Cerebral small vessel disease (hereditary cerebral amyloid angiopathy)²

Collaborators:

University of California San Francisco (UCSF, dr. Lea Grinberg)

Massachusetts General Hospital (MGH, dr. Steve Greenberg, dr. Susanne van Veluw)

University of Denmark (dr. Akshay Pai)



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¹ Department of Neuropsychology and Psychiatry, Maastricht University

² Department of Radiology, C.J. Gorter Center, Leiden University Medical Center



Name: Martin van Boxtel, MD PhD

Affiliation: Division 1 MHeNs

Position: Associate professor

Previous relevant research
projects, networks, experience:

- Maastricht Aging Study (MAAS)
- Healthy Cognitive Ageing (NWO-FES)
- Dementia interventions (TANDEM/InLife)
- Dementia prevention (EU In-MINDD/MBC)



IDEAS

for collaboration between MHeNS and IDS research:

- Risk algorithm improvement (e.g. LIBRA)
- EMA in diagnostics and intervention
- Persuasive technologies in intervention research

projects or topics of common interest:

- Maastricht Aging Study (maastrichtagingstudy.nl)
- MijnBreincoach

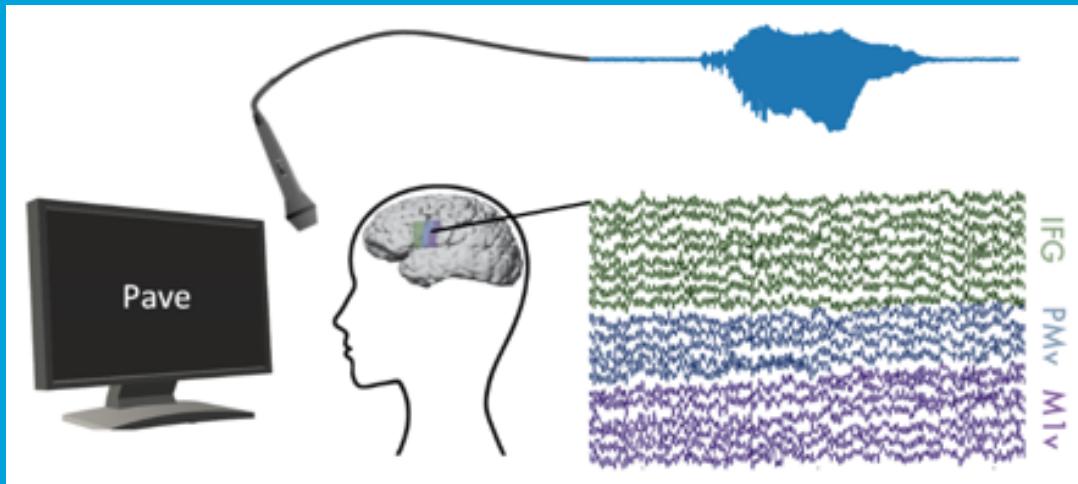


Name: Christian Herff

Affiliation: Department of Neurosurgery

Position: Postdoctoral Researcher

Brain State Decoding from
Invasive Electrophysiology



Expertise: Signal Processing,
Time Series



Name: Jeroen Habets

Affiliation: MHeNs

Position: PhD-student

Previous relevant research projects, networks, experience:

- Monitoring Parkinson motor symptoms in their home situation with wearable sensors and experience sampling method
- Predicting individual deep brain stimulation outcome based on preoperative clinical variables



IDEAS

for collaboration between MHeNS and IDS research:

- Analysis of wearable sensor data; prediction of subjective answers based on accelerometer and gyroscope data

projects or topics of common interest:

- Improving current care pathways by adding value in home situation based on modern technologies and analyses

Name: Karin Faber

Affiliation: Dep of Neurology, MH&NS, UM

Position: MD, PhD, prof Neuromuscular
Disorders

H2020 PROPANE:

Probing the role of sodium
channelopathies in painful
neuropathies

H2020 MARIE SKŁODOWSKA-CURIE
ACTIONS Innovative Training
Networks. PAIN-Net

Myotonic dystrophy – multisystem
disease



IDEAS

for collaboration between MH&NS and IDS research:

projects or topics of common interest:

Risk factors for development of (chronic) neuropathic pain

Complex genetics

Machine learning

Myotonic dystrophy – natural course, cardiac and pulmonary complications, treatment response

Clinimetrics – transforming outcome measurements



Name: Inge Verheggen

Affiliation: MHeNS, division 1, Alzheimer Center
Limburg

Position: 4th year PhD student

Research Master in Cognitive and Clinical
Neuroscience, Neuropsychology

- Research project:
Blood-Brain Barrier leakage in healthy cognitive aging,
Combining dynamic contrast-enhanced MRI data with longitudinal cognitive data from the Maastricht Aging Study (MAAS)
- Network:
Collaboration with the Department of Radiology & Nuclear Medicine



Lianne Ippel, PhD

Institute of Data Science

Statistician

Background: Sociology, Statistics in Social Sciences

PhD: (Social science related) Statistical Models for streaming data



At IDS

- FAIRHealth: privacy preserving & distributed Machine Learning
- CDDI: community for data driven insights

Research interest:

- Survey Methodology,
- incorporating and comparing Machine Learning with established social science methods
- Patient Reported Outcome Measurements (PROM)

Current Projects

IDS+FPN
Pestvrij

Interdisciplinary Collaboration for Research and Education

IDS+SBE
Pension
preferences

IDS+UCM/V
Teaching:
Intro to
statistics

IDS+Law
Counter Nudging
consumer
protection

IDS+FHML
Teaching:
Statistics in
Global
health, MSc

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Break-out groups



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**Summary of break-out groups &
follow-up action items**

