Kunstig Intelligens i Norsk helsetjeneste - KIN

Nettverksmøte nr. 5 2022
Digitalt møte/Teams

1. desember 2022

Dagens Menti-kode: 1835 1441

Velkommen og nytt om KIN

Dagens Menti-kode:
1835 1441

Agenda kl 12.00-14.30:

12:00-12:05 Velkommen v. Vibeke Binz Vallevik, DNV helseforskn.

12.05-12.35 "AI-Mind (Artificial intelligence for dementia prevention) – ambisjoner og utfordringer" v. Christoffer Hatlestad-Hall, OUS

12:35-13:05 User trust in AI-enabled systems: An HCI perspective. v. Tita Bach, DNV research

13:05-13:20 Pause

13:20-13:50 "Kunstig intelligens innen radiologi i Helse Nord" rapport, Nov. 2022 - Arbeidsgruppens anbefalinger v. Finn Henry Hansen/Karl Øyvind Mikalsen

13:50-14:20 Paneldebatt knyttet til Helse Nord-rapporten.

I panelet:

- Leif Oltedal, nevroradiolog HUS / 1. am UiB
- Edmund Søvik, medisinsk fagsjef i Klinikk for bildediagnostikk, St. Olavs Hospital;
- Ulf Sigurdsen, leder for e-Helse, HSØ

Modererator: Arvid Lundervold, UiB/MMIV

14:20-14:30 Oppsummering og kort mentimeterundersøkelse

Dagens Menti-kode: 1835 1441

Kunstig intelligens i norsk helsetjeneste

KIN bidrar til åpen utveksling av erfaringer, idéer og meninger for å styrke fagfellesskapet, gjennom møter og seminarer.

Sammen setter vi viktige problemstillinger rundt klinisk implementering av kunstig intelligens på agendaen.

Bottom-up

Tverrfaglig

Åpen

Fra 18 til 199 medlemmer på to år

November 2022

November 2020

KIN opp til i dag

Aktiviteter 2022

- Kartlegging av pågående KI-initiativer nasjonalt
- 2 konferanser (stafett)
- 5 nettverksmøter i 2022
- Innspillsmøter med HOD, direktoratene mm om veikart for implementering av KI I helsetjenesten, ink. vært observatør i styringsgruppen for koordineringsprosjektet
- Arendalsuka: "Vi trenger et veikart for implementering av KI I helsetjenesten"

Temaer 2021:

- Kartlegging av fagmiljøer og aktivitet
- Juss, tilgang til data
- Kvalitetssikring
- Anskaffelse

Temaer 2022:

- Kompetanseøkning
- Helsedata i skyen
- Veikart for implementering
- Kompetanse-kartlegging
- Brukeres tillit og KI-strategi

“AI-Mind (Artificial intelligence for dementia prevention) – ambisjoner og utfordringer”

v. Christoffer Hatlestad-Hall, OUS

Dagens Menti-kode:
1835 1441

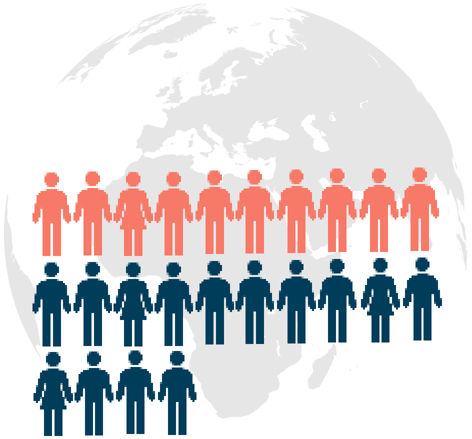
Intelligent digital tools for screening of brain connectivity and dementia risk estimation in people affected by mild cognitive impairment

Project overview

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 964220.

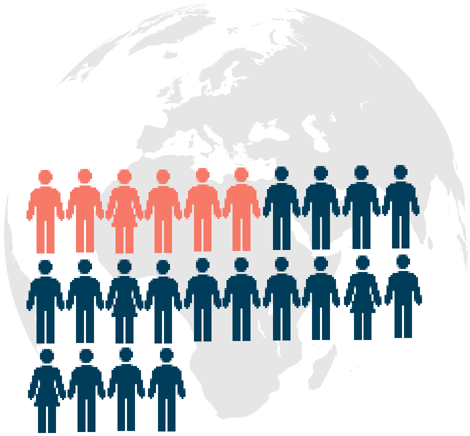
Rationale of dementia

Worldwide



50M

People worldwide affected with dementia



2x

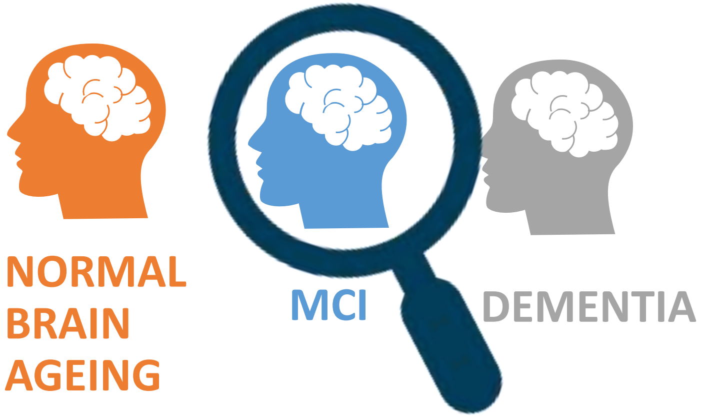
Expected increase in the number of people with dementia over the next 20 years

Europe

10M

People in Europe alone affected by dementia

Mild Cognitive Impairment (MCI)

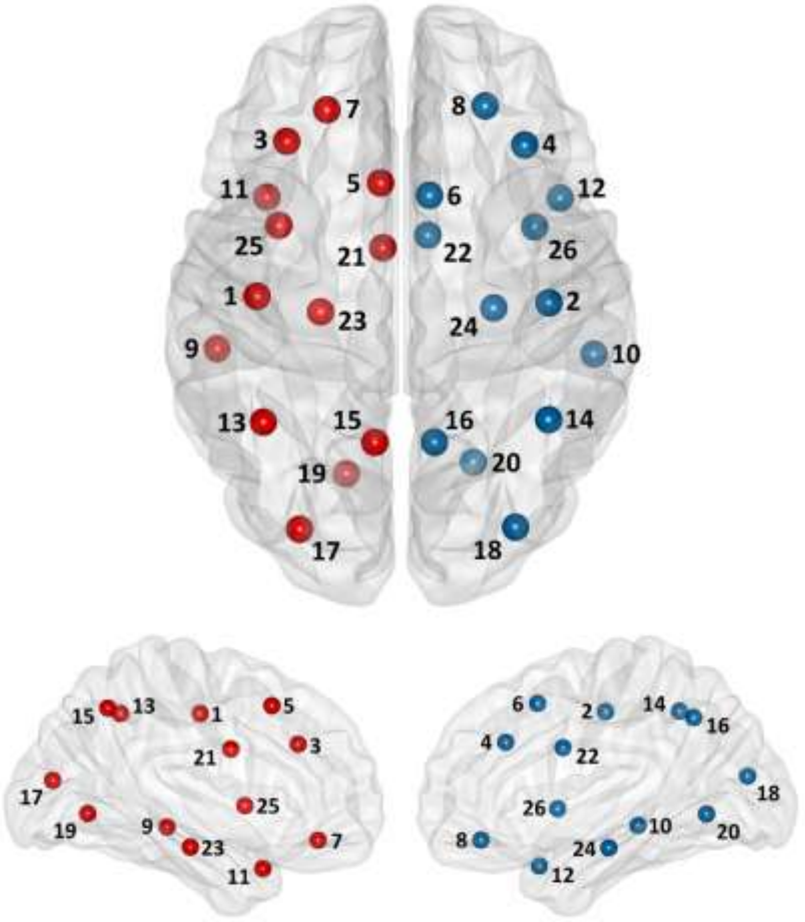


MCI – a condition intermediate between normal brain ageing and dementia

up to 50%

People with MCI are at risk of developing dementia within 5 years

- Annual incidence of MCI ranges from **5-20%** in people older than **60 years of age**
- Current clinical practice **doesn't include screening for MCI**, nor dedicated methods for discrimination of people who are prodromal to dementia



AI-Mind Ambition

Improve the healthcare systems with use of AI

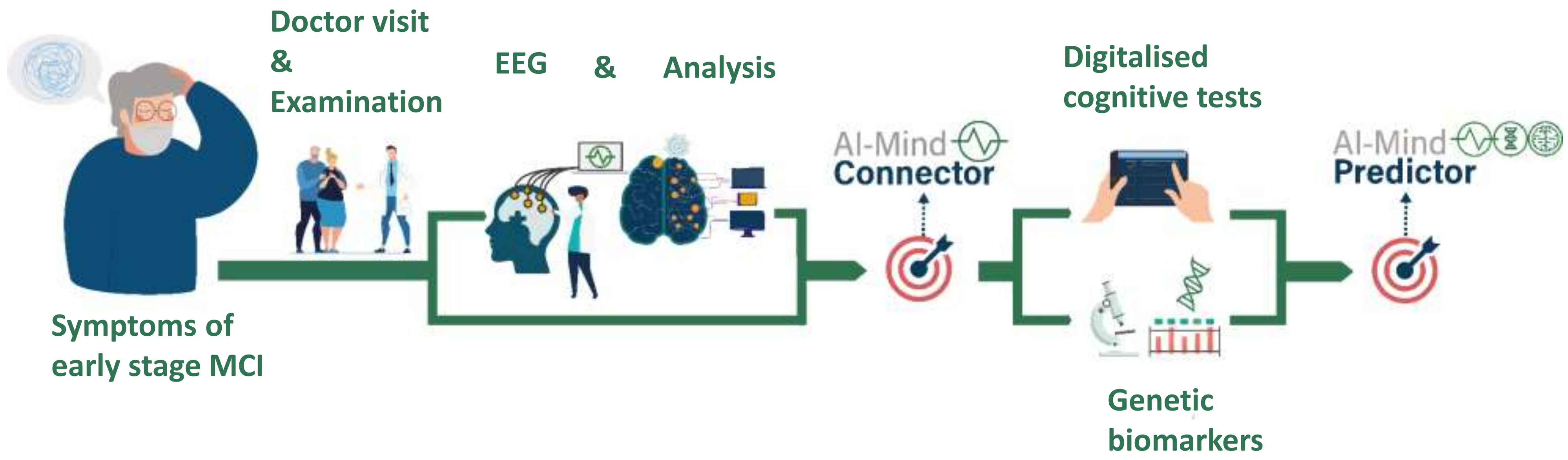
Use therapeutic window before the onset of dementia

Deliver timely and reliable dementia risk estimation

Increase the MCI screening rate

Strengthen research & innovation capacity

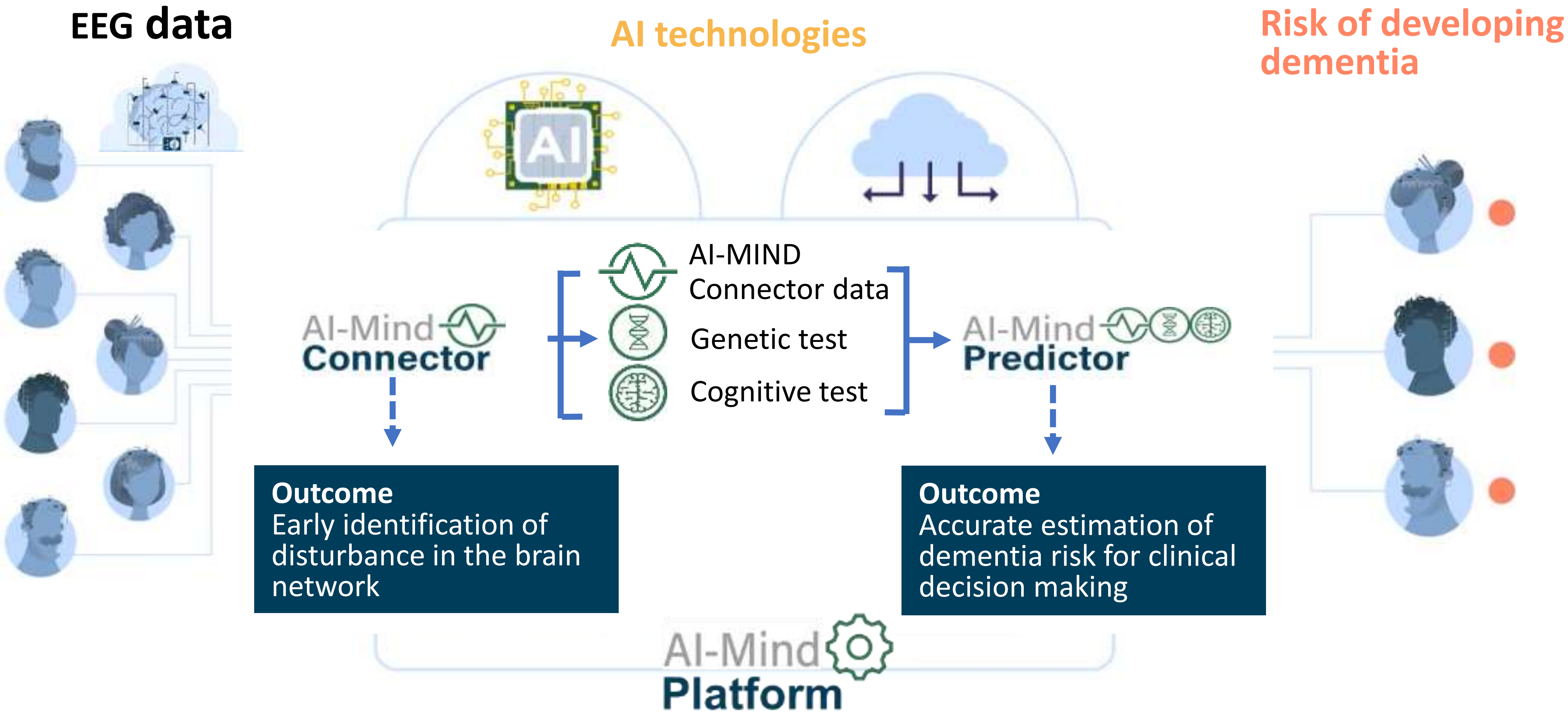
WE AIM TO REDUCE THE CURRENT PATIENT JOURNEY FROM SEVERAL YEARS TO ONLY ONE WEEK OF INVESTIGATION.



1 week later

- Early risk estimation
- Further investigation
- Personalised report
- Recommendations on the lifestyle changes

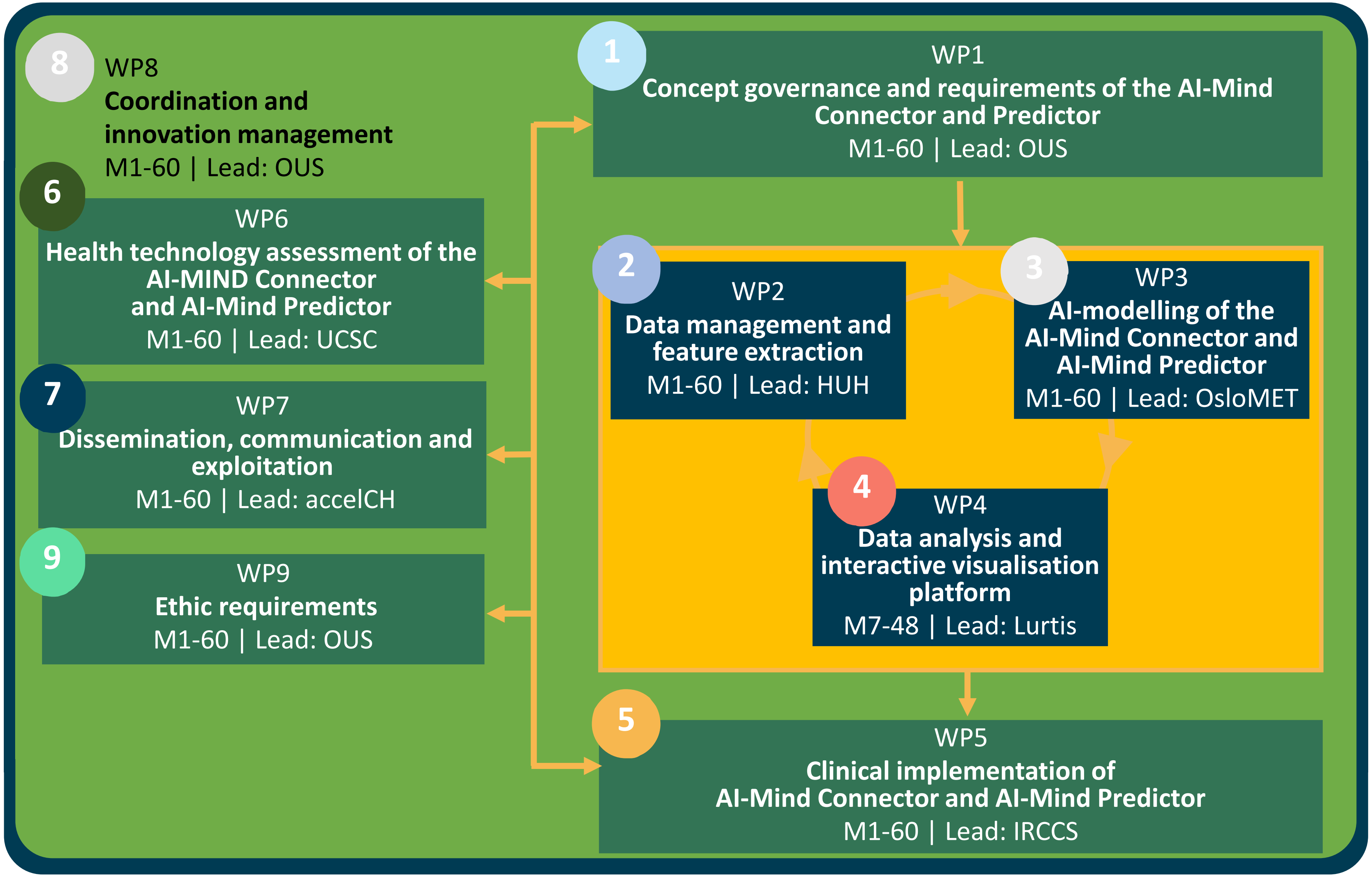
AI-Mind concept



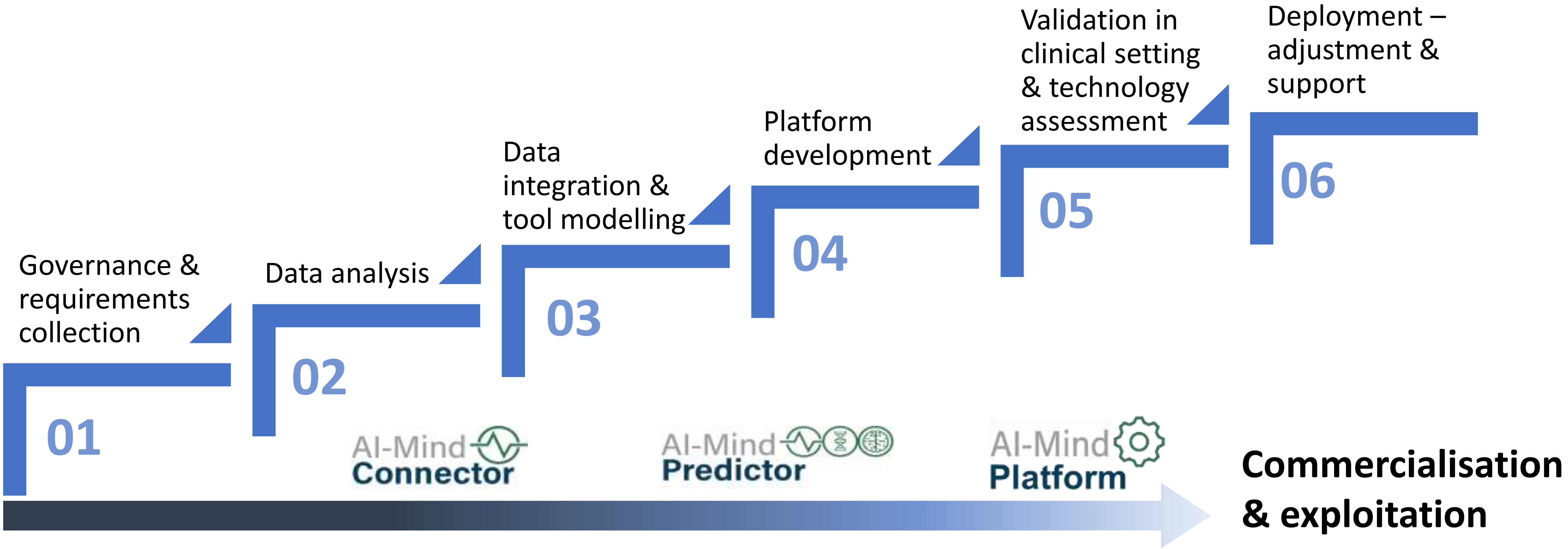
Project objectives translated into nine Work Packages

1. Design new AI-Mind technologies based on safety requirements and governance regarding medical device and data management.
2. Develop automated data processing pipelines for source reconstruction and identify features from EEG imaging data to be used as inputs for the AI models.
3. Develop a new AI-based medical biomarker for early identification of brain network disturbance. Develop a new tool for prediction of dementia risk in people with MCI.
4. Develop an AI-based platform service for easy integration into current clinical practices.
5. Implement and validate the AI-Mind Connector and Predictor in four European hospitals.
6. Deliver a health technological, economic and social assessment of the AI-Mind tools.
7. Maximise the impact of AI-Mind through effective communication, dissemination and exploitation.
8. Ensure successful project implementation through effective coordination and professional EU project management.
9. Ensure compliance with the 'ethics requirements'.

Collaboration between Work Packages



Exploitation (non commercial and commercial use of results)



Impact of AI-Mind

Contribution to the research of dementia and other neurological diseases to strengthen Europe's innovation capacity

New opportunities for innovative SMEs and industries for personalised medicine

Facilitate the developments of a regulatory framework for AI and big data in healthcare

Short-term (1-5 years)

- Increase diagnostic of MCI
- Improve sustainability of the healthcare systems
- Boost R&D in Pharma sector focusing on dementia preventive therapeutics

Medium-term (5-10 years)

- Delay progression into dementia in people with MCI
- Enrich the pipelines of Pharma companies with therapeutics for dementia
- Release burden from informal careers

Long-term (+10 years)

- Decrease prevalence of people with dementia
- Exploit AI-Mind Connector and Predictor to be used in other brain diseases

Innovation within AI-Mind

Clinical Innovation

- AI-Mind Platform
- AI-Mind Connector
- AI-Mind Predictor
- Fully digitalised procedure
- Personalised patient report

Technical Innovation

- Data flows
- Database Standardisation
- openMINDS metadata knowledge graph

AI-Mind

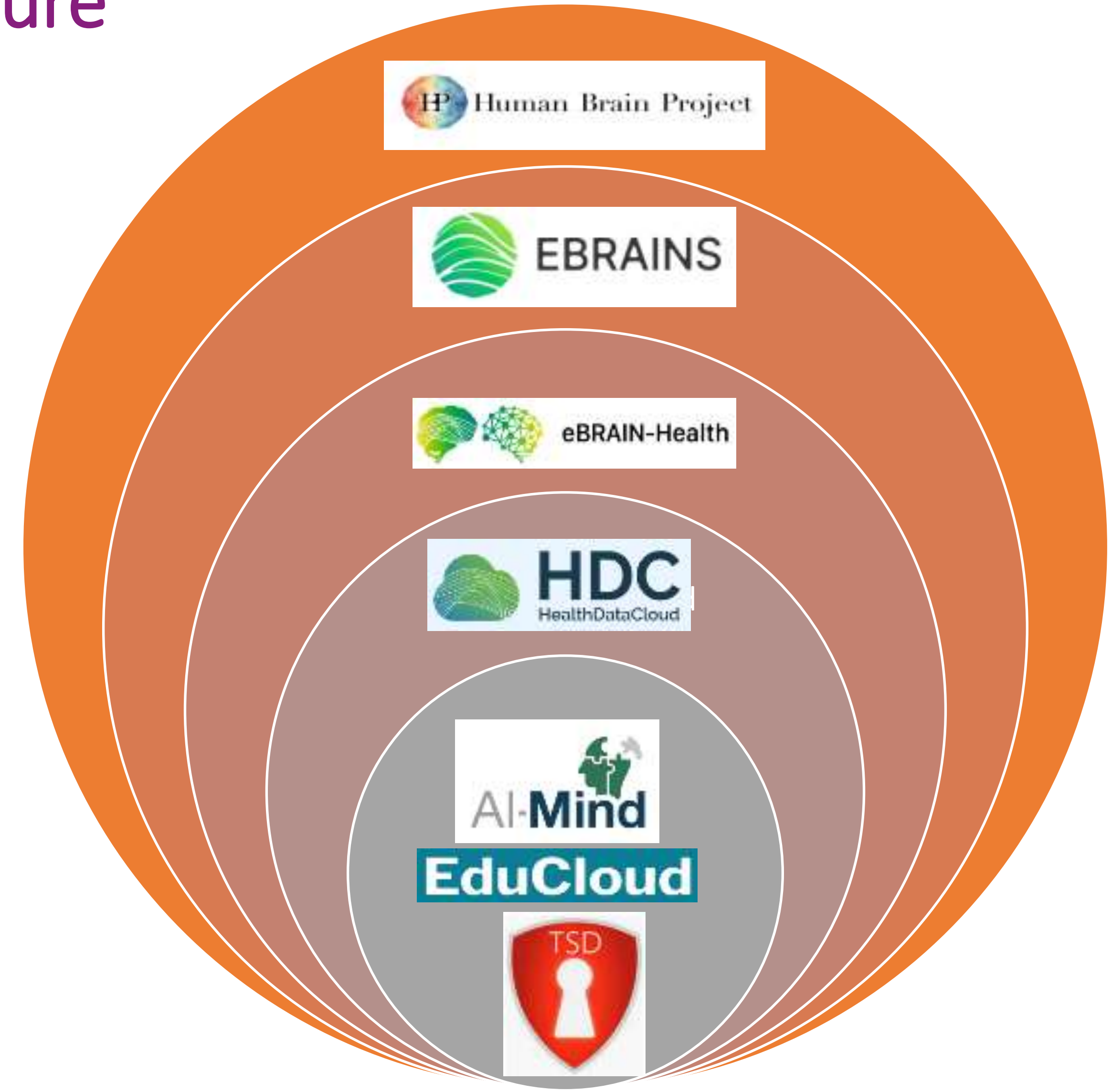
Regulatory & Decision making

- MDR, AIA requirements
- Data Governance Plan
- HTA & Decision analytical mode

SME Innovation

- EU Project management tool (accelCH)
- Software platform (Lurtis)
- 3D-scanning EEG (BrainSymph)
- Biomarkers (Prediagnostics)

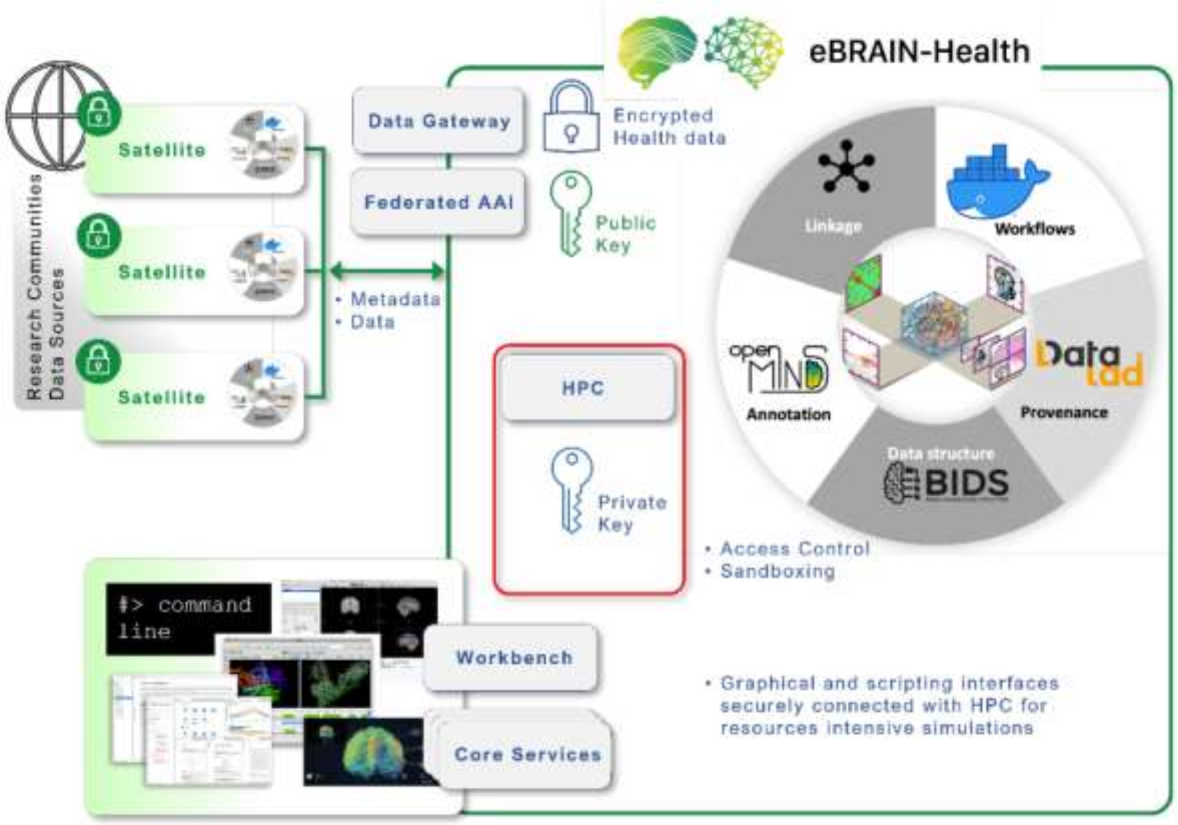
Innovation beyond AI-Mind: integration with European infrastructure



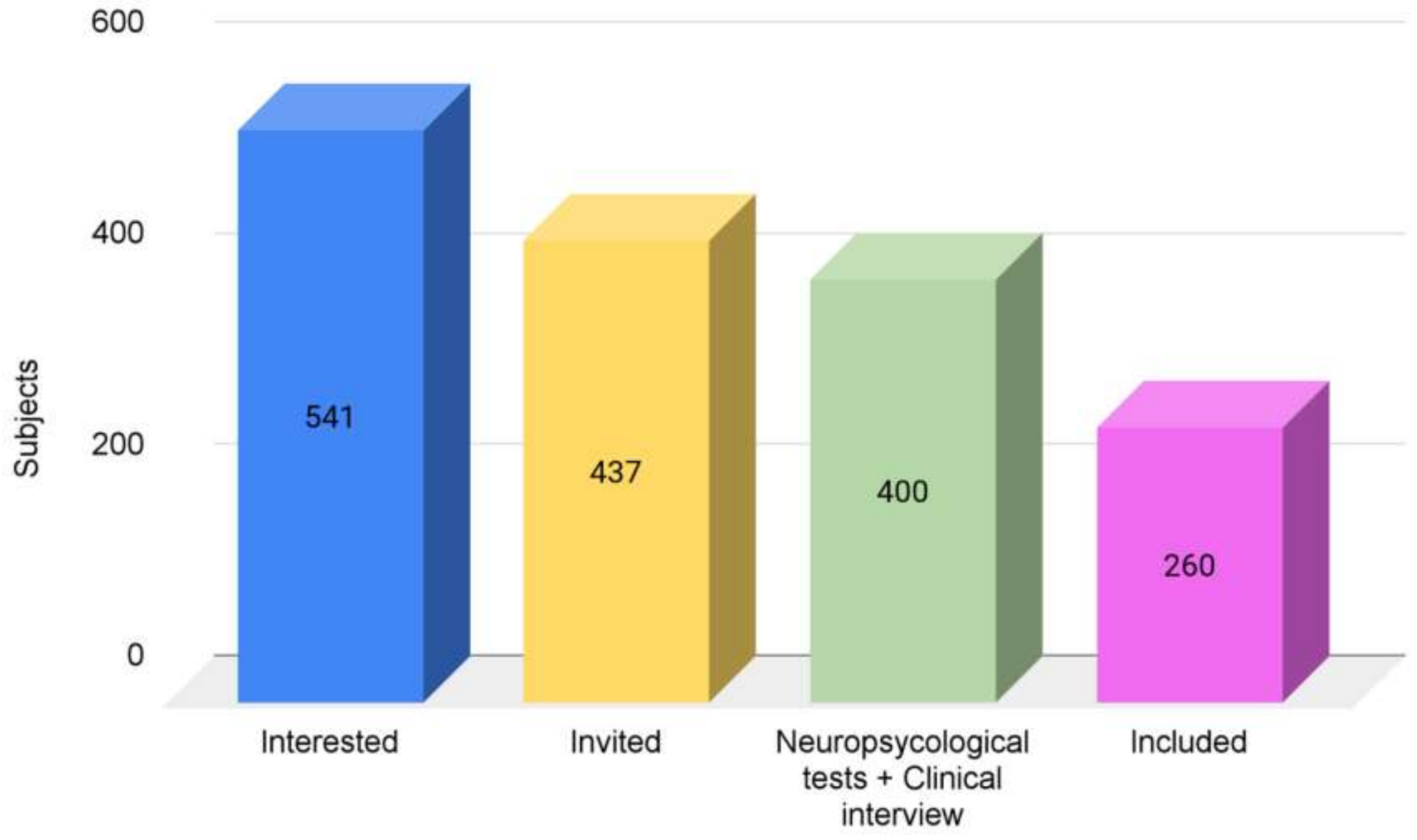
eBRAIN-Health

WP8 – Big Data Analytics & Curation
Kick off November 2022

eBRAIN-Health - Actionable Multilevel Health Data
Coordinated by Prof. Petra Ritter, CHARITE, project management by tp21.
Duration: 4 years, starting 1 July 2022 - Total funding: approximately € 13 million.



Enrolment Progress: 10 Jan - 14 Nov 2022

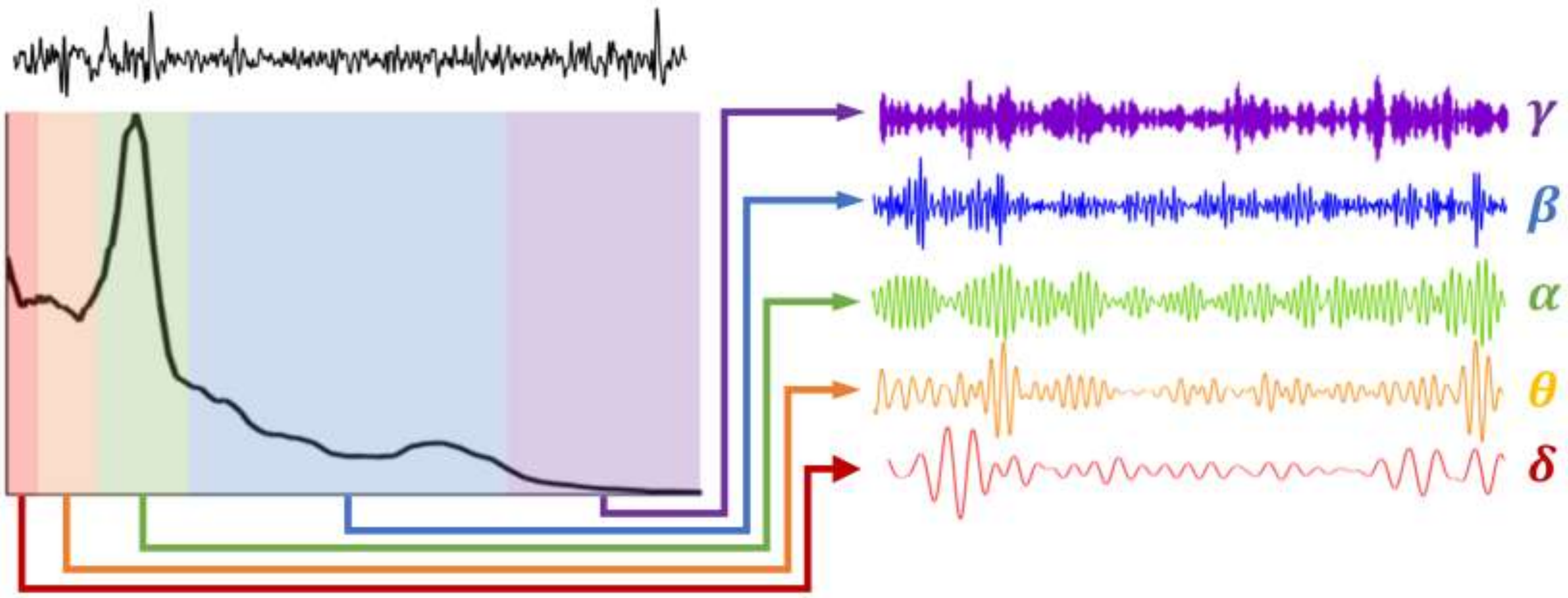


Ana Peréz

Features in EEG (or even MEG) data

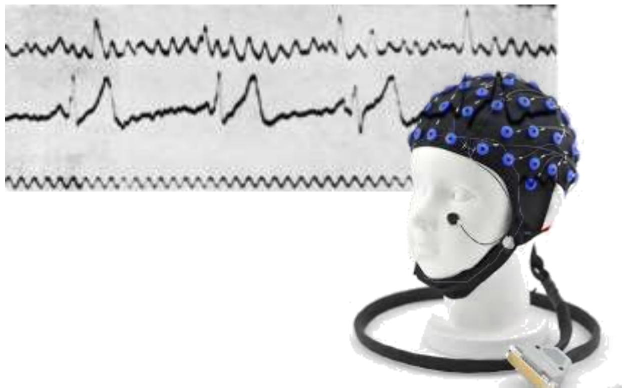
Ricardo Bruña

- We can decompose each signal in its spectral (this is, frequency) information.

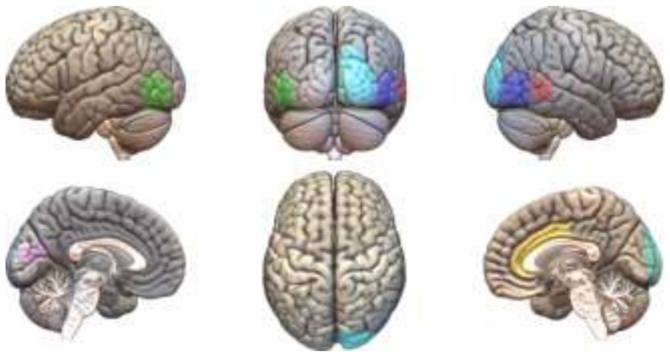


Features in EEG (or even MEG) data

- We can use spatial information (position of the sensors, shape of the head, even tissue distribution if we have MRI) to “guess” the origin of the signals.

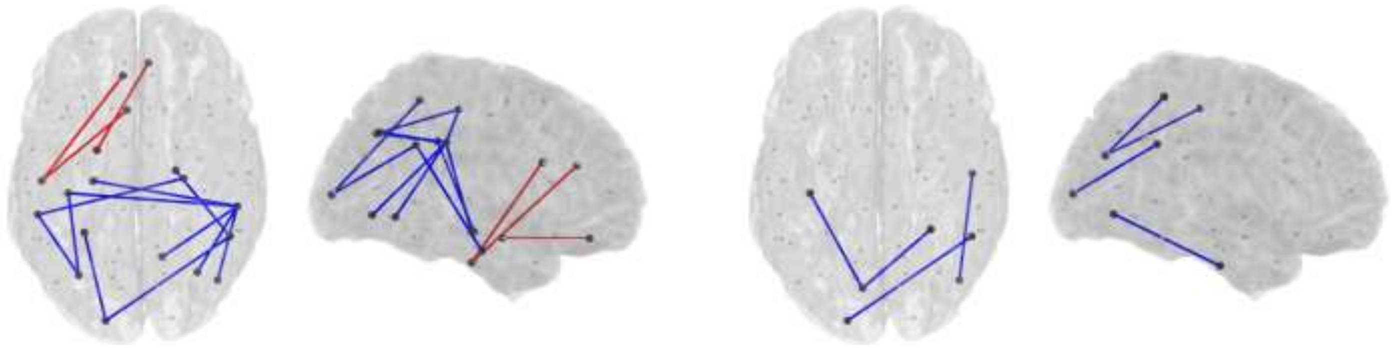


And math,
lots of math

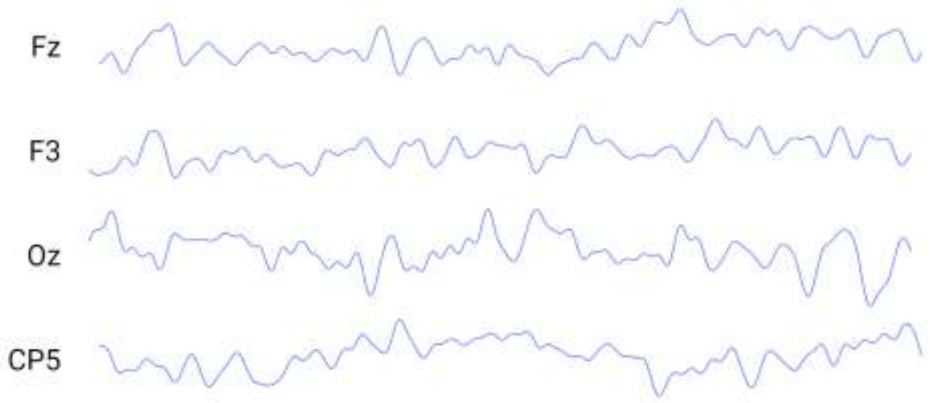


Features in EEG (or even MEG) data

- We can see how different sensors, areas or brain regions “synchronize” to work together.

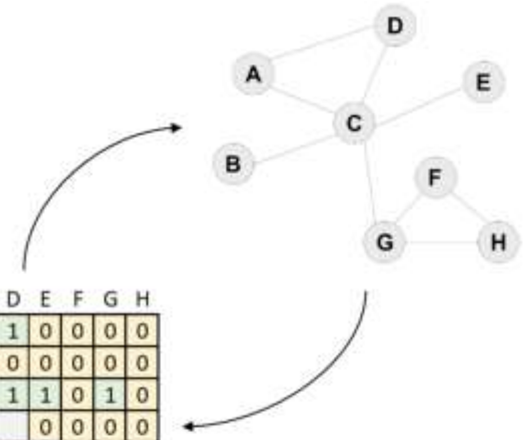


Connectivity and network example



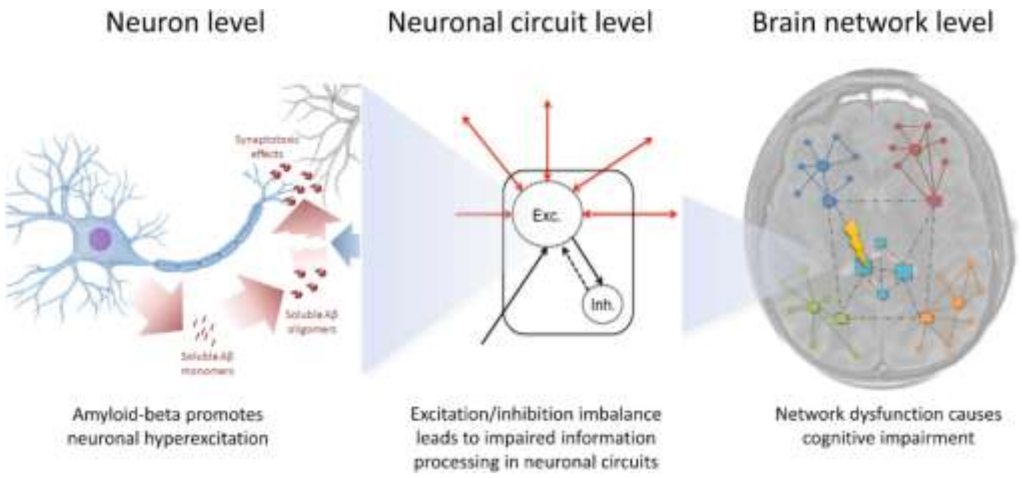
	Fz	F3	Oz	CP5
Fz		0.58	-0.54	-0.37
F3	0.58		-0.47	0.12
Oz	-0.54	-0.47		-0.11
CP5	-0.37	0.12	-0.11	

	A	B	C	D	E	F	G	H
A		0	1	1	0	0	0	0
B	0		1	0	0	0	0	0
C	1	1		1	1	0	1	0
D	1	0	1		0	0	0	0
E	0	0	1	0		0	0	0
F	0	0	0	0	0		1	1
G	0	0	1	0	0	1		1
H	0	0	0	0	0	1	1	



Why functional brain networks?

- Meso- and macro scale network changes reflect synaptic pathology
- Cognitive changes are associated with macro scale network changes



Maestú, F., de Haan, W., Busche, M. A., & DeFelipe, J. (2021). Neuronal excitation/inhibition imbalance: core element of a translational perspective on Alzheimer pathophysiology. *Ageing Research Reviews*, *69*, 101372. https://doi.org/10.1016/j.arr.2021.101372

Challenge: Knowledge transfer

Mats Tveter

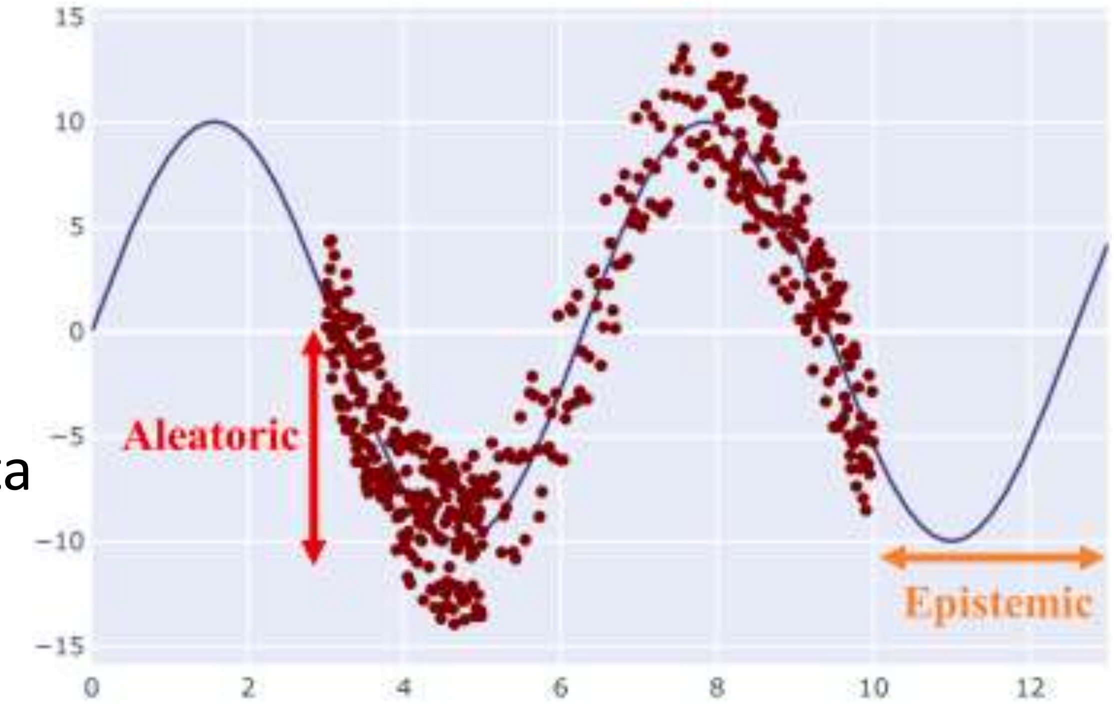
Thomas Tveitstøl

- Machine learning <--> medicine/neuroscience
- What *is* EEG?
  - Definitely not just numbers
  - Signal vs. noise
- Availability of EEG
  - Techniques for *transfer learning*
- Clinical confidence in AI: *Explainability* and *trustworthiness*
  - Uncertainty modelling
  - Diagnostic *support* tool

Uncertainty in Deep Learning

- Epistemic (Model Uncertainty)
  - Can be reduced by adding more data

- Aleatoric (Data Uncertainty)
  - Inherent noise/randomness in the data



https://link.springer.com/chapter/10.1007/978-3-030-64610-3_114

Motivation: Using a Dummy Example

Dog / Cat Classifier

Dog - 97.3 %

Cat - 2.7 %

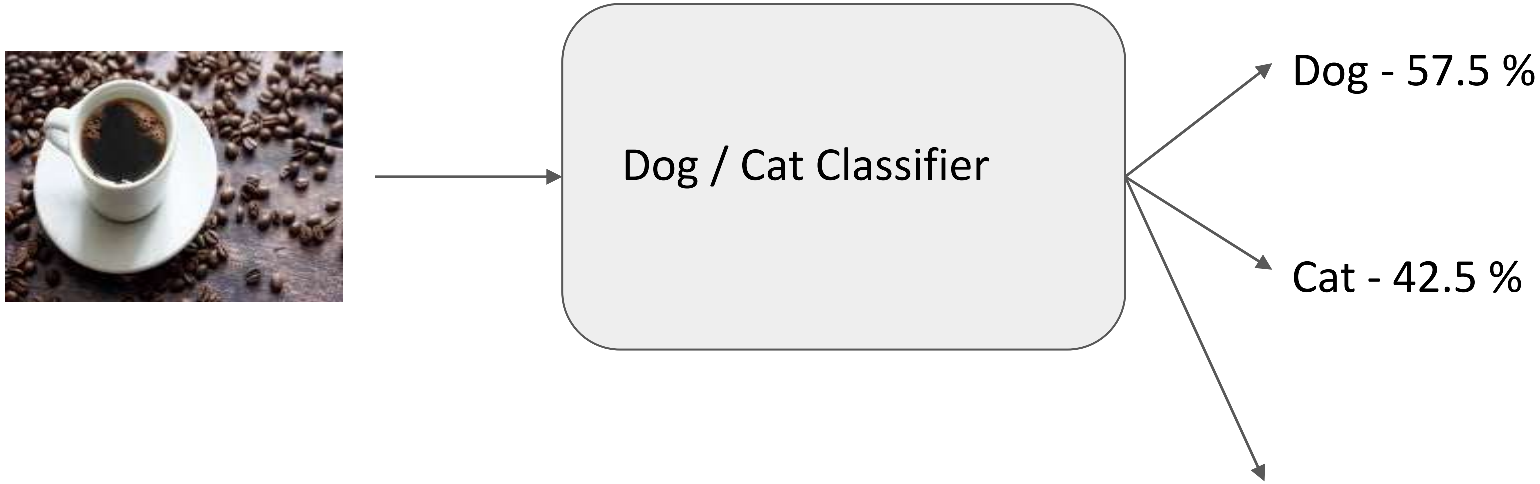
Dog / Cat Classifier

Dog - 3.5 %

Cat - 96.5 %

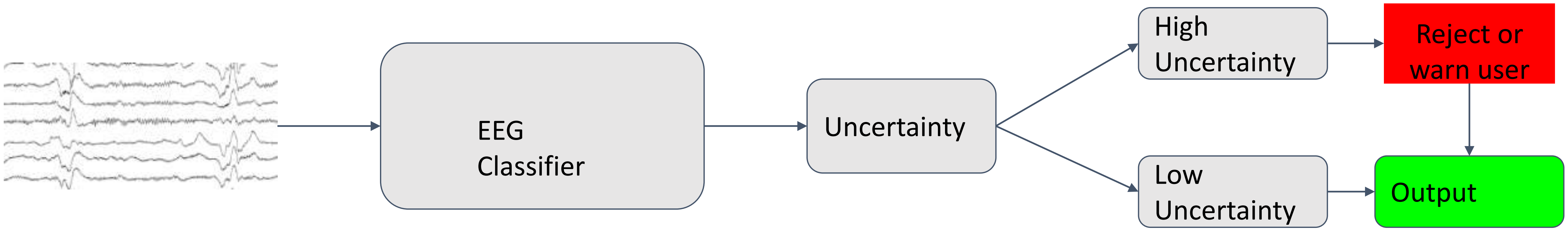
Motivation: Using a Dummy Example

Wanted Outcome



WARNING: I am unsure about this input, this is only a random guess, do not trust my predictions!

Uncertainty in Testing



AI-Mind

Project's key facts

Duration
5 years
Kick-off March 2021

Budget
14 million €

Collaborations
EBRAINS
Human Brain Project

Outreach
www.ai-mind.eu

Consortium

8 countries **15 partners**

Oslo universitetssykehus
OSLOMET
HUS
Universidad Complutense Madrid
Tallinna Ülikool
IRCCS San Raffaele Roma
Aalto University
Università Cattolica del Sacro Cuore
Radboudumc university medical center
BrainSymph
DNV
Alzheimer Europe
Neuro Connect
Lurtis Rules
accelopment

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 964220.

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Visit: ai-mind.eu

User trust in AI-enabled systems: An HCI perspective

v. Tita Bach, DNV research

Dagens Menti-kode:
1835 1441

DNV

WHEN TRUST MATTERS

A Systematic Literature Review of User Trust in AI-Enabled Systems: An HCI Perspective

Tita Alissa Bach*, Amna Khan**, Harry Hallock*, Gabriela Beltrão**, Sonia **Sousa****

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01 December 2022

https://www.tandfonline.com/doi/full/10.1080/10447318.2022.2138826

Research Article

A Systematic Literature Review of User Trust in AI-Enabled Systems: An HCI Perspective

Tita Alissa Bach, Amna Khan, Harry Hallock, Gabriela Beltrão & Sonia Sousa

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Abstract

User trust in Artificial Intelligence (AI) enabled systems has been increasingly recognized and proven as a key element to fostering adoption. It has been suggested that AI-enabled systems must go beyond technical-centric approaches and towards embracing a more human-centric approach, a core principle of the human-computer interaction (HCI) field. This review aims to provide an overview of the user trust definitions, influencing factors, and measurement methods from 23 empirical studies to gather insight for future technical and design strategies, research, and initiatives to calibrate the user-AI relationship. The findings confirm that there is more than one way to define trust. Selecting the most appropriate trust definition to depict user trust in a specific context should be the focus instead of comparing definitions.


AI
Do you trust AI?

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NEWS | 28 July 2022 | Correction 29 July 2022

‘The entire protein u

MIT News

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WORLD ECONOMIC FORUM

IMPACT DRONES

How drones delivering vaccines are saving lives in India

KHARI JOHNSON BUSINESS APR 19, 2022 7:00 AM

Hospital Robots Are Helping Combat a Wave of Nurse Burnout

Moxi and other delivery-focused assistants have become even more critical as the Covid-19 pandemic has pushed health care workers to their limits.

Enabling Pedestrian Safety using Computer Vision Techni
the 2018 Uber Inc. Self-driving Car Cr

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Abstract

Human lives are important. The decision to allow self-driving vehicles operate on our roads carries great weight. This has been a hot topic of debate between policy-makers, technologists and public safety institutions. The recent Uber Inc. self-driving car crash, resulting in the death of a pedestrian, has strengthened the argument that autonomous vehicle technology is still not ready for deployment on public roads. In this work, we analyze the Uber car crash and shed light on the question, "Could the Uber Car Crash have been avoided?". We apply state-of-the-art Computer Vision models to this highly practical scenario. More generally, our experimental results are an evaluation of various image enhancement and object recognition techniques for enabling pedestrian safety in low-lighting conditions using the Uber crash as a case study.

stitutions alike have start
autonomous vehicles on
to secure a foothold on t
The Uber Inc.
[1]https://youtu.be/XtTB8
Tempe, Arizona (USA)
cidents involving self-
resulted in the demise of
Volvo XC90 sport utility
hitting a pedestrian as s
in a generally low visib
and still unknown as to v
detect the pedestrian bef
reports claim that the ca
pedestrian due to the lig
shows that their propriet
detect the pedestrian one
[6].
On similar lines we e

2 Killed in Driverless Tesla Car Crash, Officials Say

"No one was driving the vehicle" when the car crashed and burst into flames, killing two men, a constable said.

Give this article

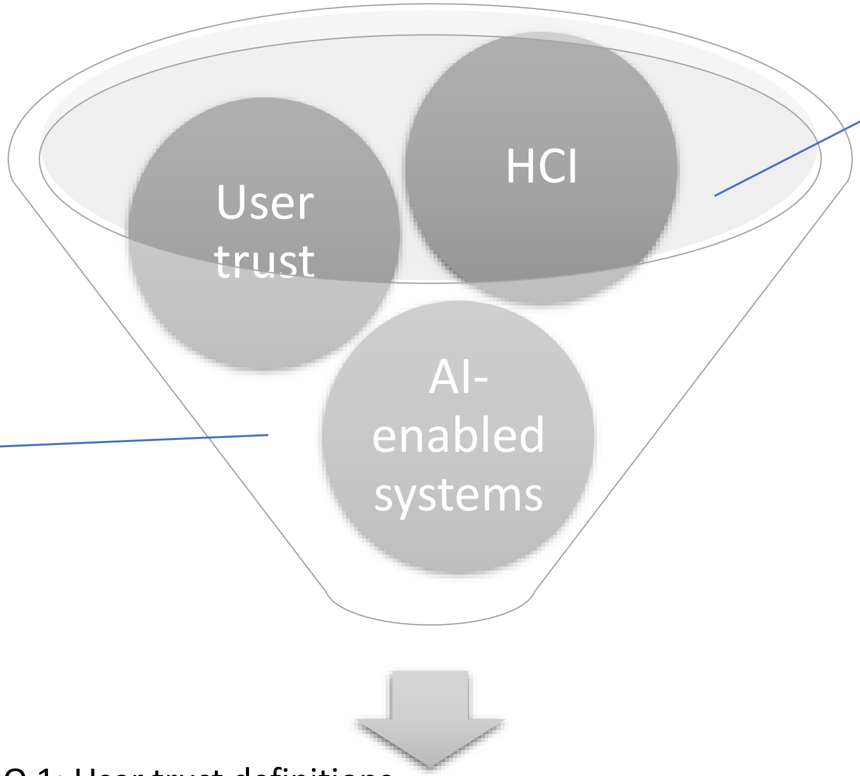
The men killed in the crash said just before they left that they wanted to go for a drive and were talking about the vehicle's driverless features, an official said. KTRK-TV - ABC13


AI
How can we trust AI

The study concept:
User Trust in AI-Enabled Systems: An HCI Perspective

- An interdisciplinary view of technology
- Focuses on the development, evaluation, and dissemination of technology to meet users' needs by optimizing how users and technology interact

Here, AI-enabled systems are defined as AI systems with capabilities ***to improve existing systems' performance***, i.e., AI enhanced systems (e.g. recommender systems), and/or AI systems with capabilities ***to develop new applications,*** i.e., AI-based systems (e.g. virtual agents and robotic surgery).



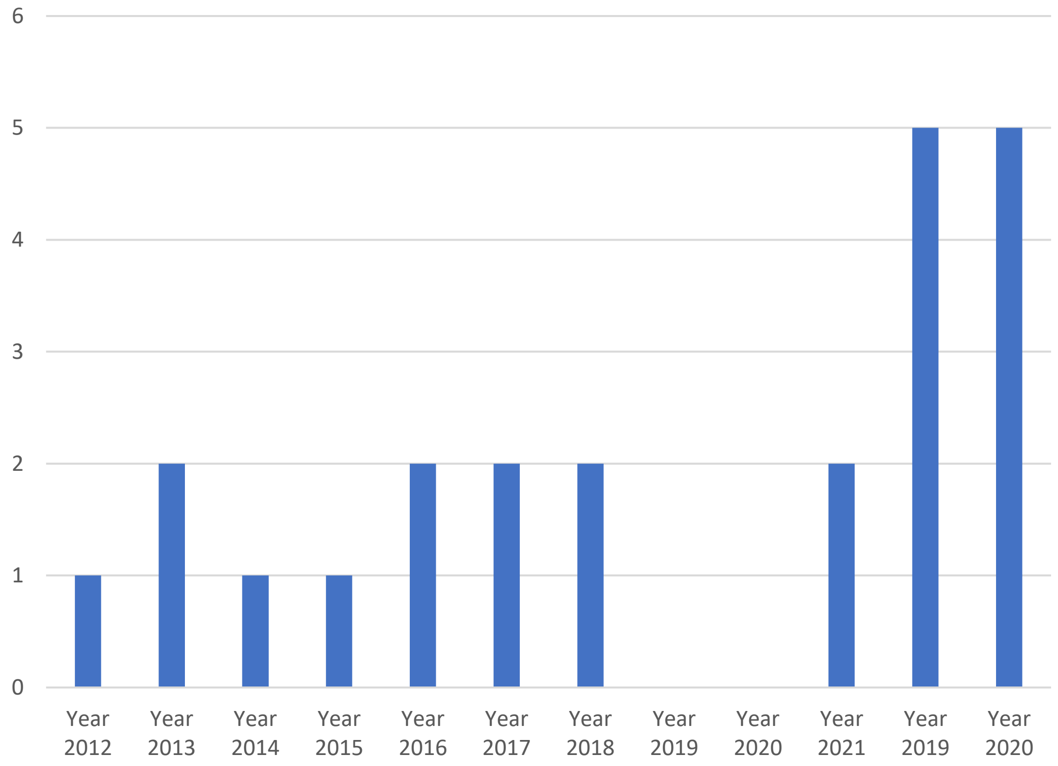
RQ 1: User trust definitions

RQ 2: User trust influencing factors

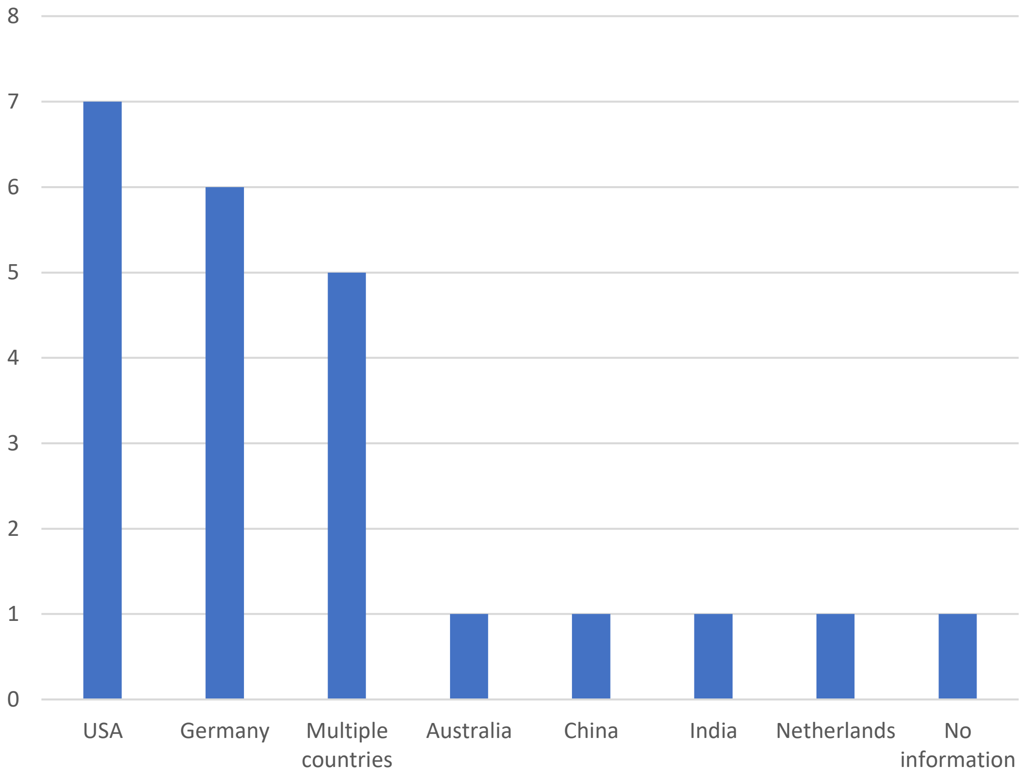
RQ 3: User trust measurement methods

Demographic information of 23 included studies

- Year of publication

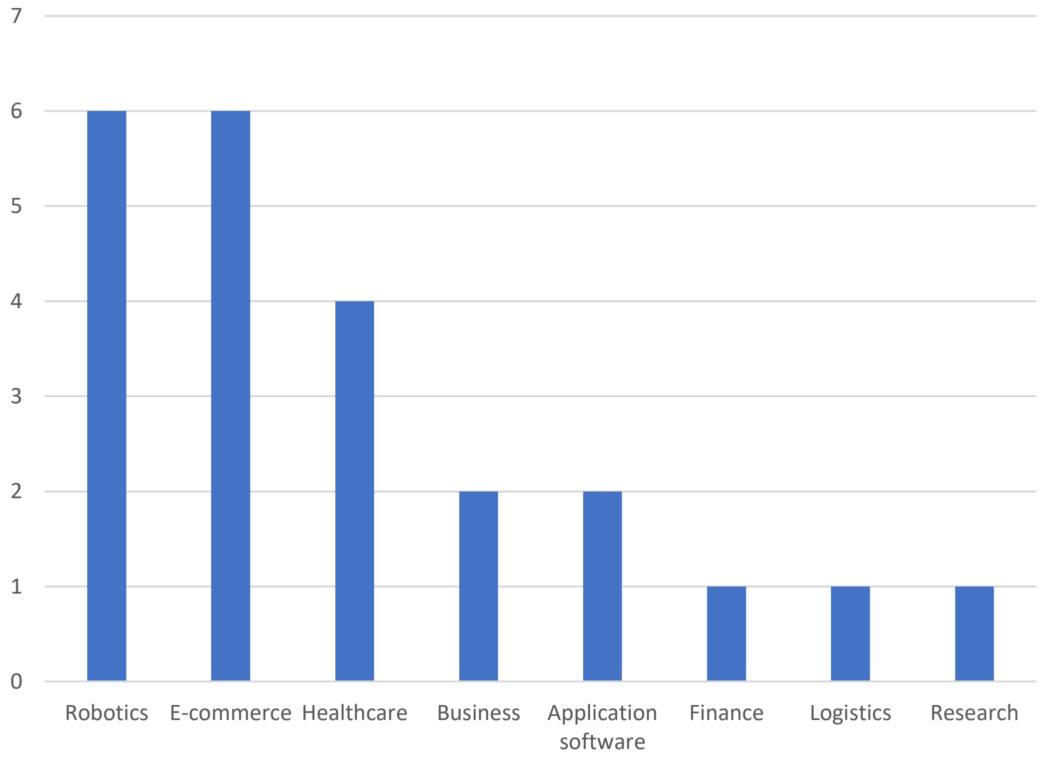


- The geographical location of the data collection/study

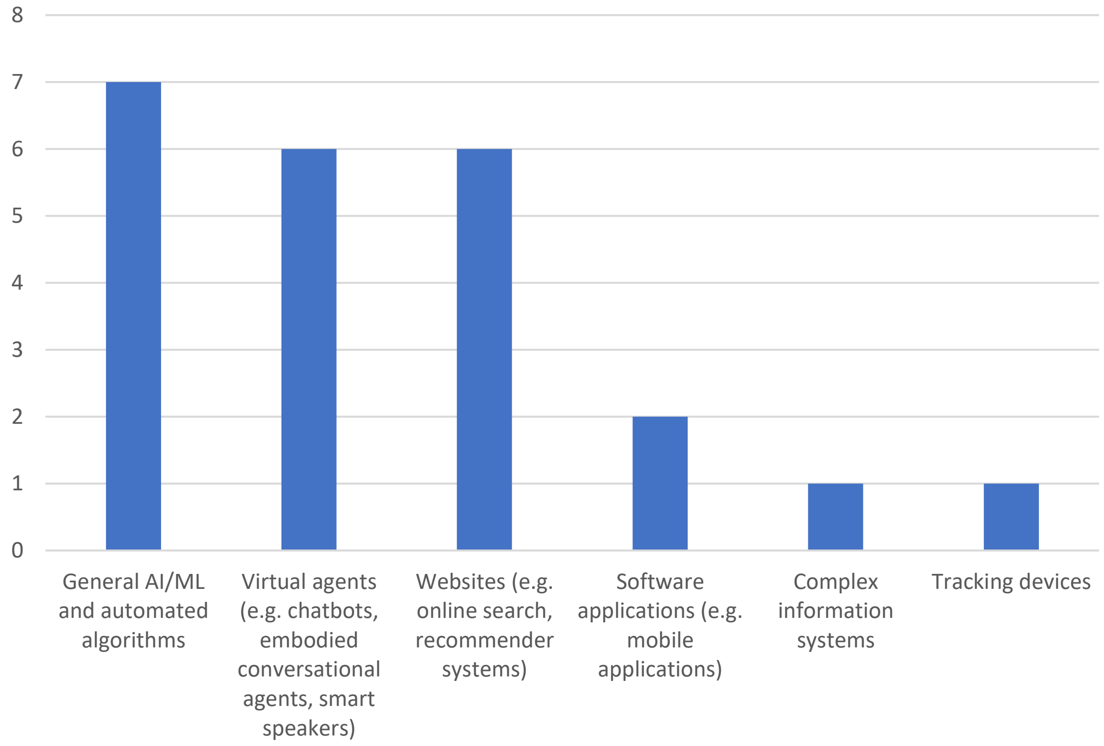


Demographic information of 23 included studies

- The study area/domain/industry

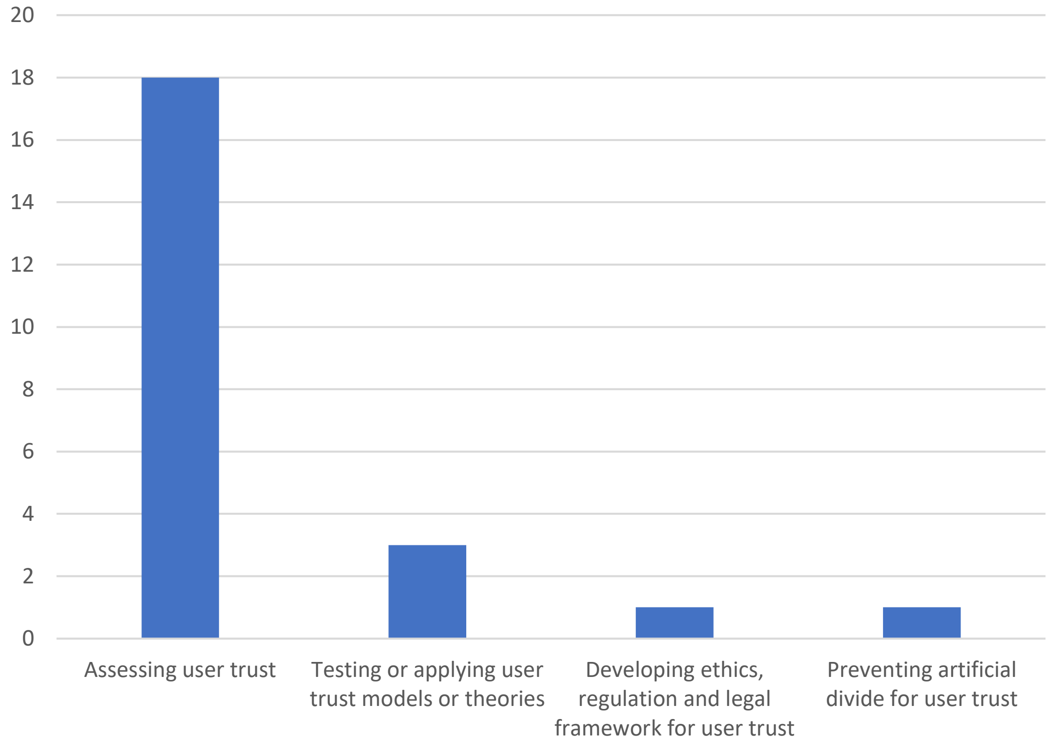


- Types of AI-enabled systems



Demographic information of 23 included studies

- Study focus



RQ1: User trust definitions (7/23)

8 conceptualized trust, 8 neither defined nor conceptualized trust

N	Trust definition	Trust definition references
3	The willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party.	(Mayer et al., 2006)
2	The attitude that an agent will help achieve an individual's goals in a situation characterized by uncertainty and vulnerability.	(J. D. Lee & See, 2004)
1	His/her belief on whether the application could fulfill a task as expected (the trustworthiness of mobile applications relates to their dependability, security, and usability).	Own definition and referenced (Avizienis et al., 2004)
1	The willingness to depend on and be vulnerable to an Information System in uncertain and risky environments.	(Gefen et al., 2008; Mayer et al., 2006; Meeßen et al., 2020; Wang & Emurian, 2005)

RQ2: User trust influencing factors

Socio-ethical considerations

Technical and design features

User characteristics

User inherent characteristics (i.e. personality traits, gender, self trust)

User acquired characteristics (i.e. user experience, educational levels)

User attitudes (i.e. user acceptance and readiness, needs, and expectations, judgement and perceptions)

User external variables (i.e. initial interactions, user interactions, cognitive load levels, time and usage

Socio-ethical considerations

- Prepare and adjust the environment where an AI-enabled system is (to be) implemented to match readiness levels of users and the systems
- Mechanisms to foster, maintain, recover user trust by e.g. ensure data protection, high quality user interactions, solution-oriented technical support
- Build open communication with users by e.g. asking for feedback
- Setting up ethical-legal boundaries is challenging – unclear accountability of parties and unclarity of a determinant if harm occurred to users:
  - Manufacturer
  - Operator
  - Maintenance/adjustment responsible

Technical and design features

A virtual agent (e.g. chatbots, embodied conversational agents, smart speakers):

- anthropomorphism and human-like features, especially benevolent features (e.g., smiling, showing interest in the user)
- immediacy behaviours in which the AI-enabled system could create and project a perception of physical and psychological closeness to the user
- social presence of the AI-enabled system
- integrity of the AI-enabled system (i.e., repeatedly satisfactory task fulfillment)
- additional text/speech output when communicating with users
- providing users with texts rather than a synthetic voice
- a lower vocal pitch of the AI-enabled system

Technical and design features

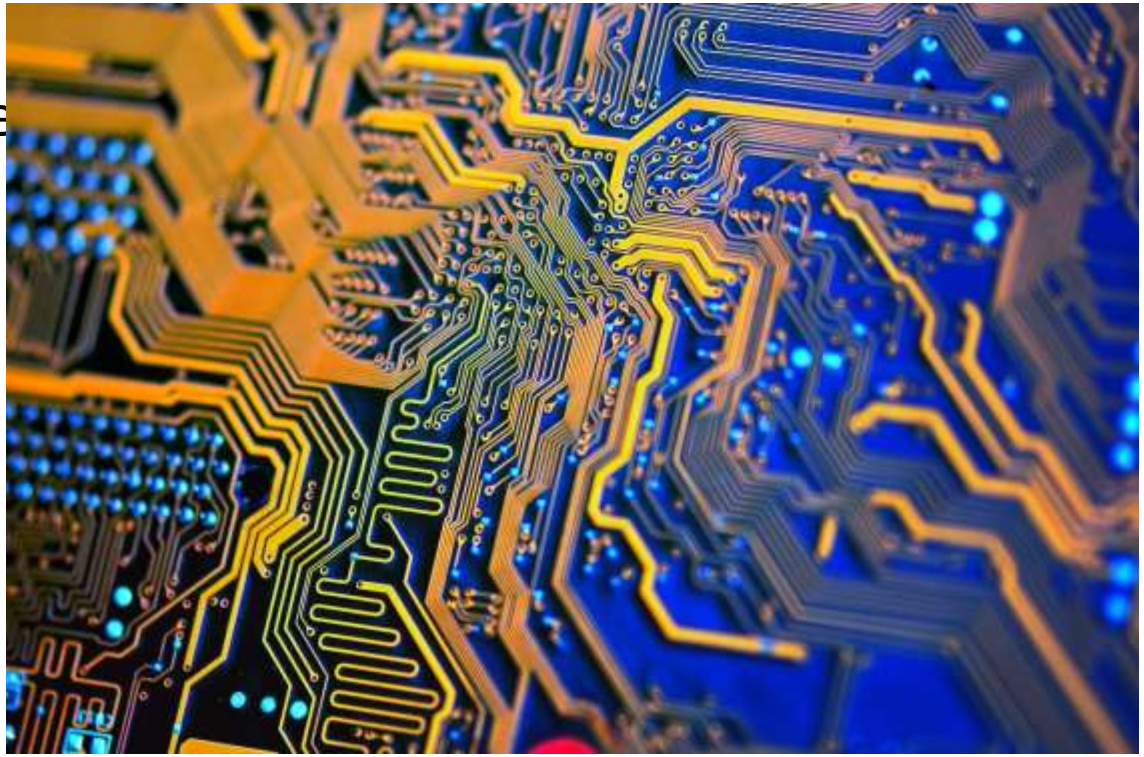
AI/ML and automated algorithms:

- Explanations and information regarding:
  - how the algorithm worked
  - AI's actions
  - reflections of AI reliability
  - model performance
  - feature influence methods
  - risk factors to predictive models
  - contextual information
  - interactive risk explanation tools (baseline risk

- Correctness of AI/ ML predictions (accuracy)

Technical and design features

- **Complex information systems**
  - System reliability (dependability, lack and correctness of data, technical verification, distribution of the system)
  - The quality of the system information
  - High dependency of users to the syste



RQ2: Factors influencing user trust

- Socio-ethical considerations
- Technical and design features
- User characteristics
  - **User inherent characteristics** (i.e. personality traits, gender, self trust)
  - **User acquired characteristics** (i.e. user experience, educational levels)
  - **User attitudes** (i.e. user acceptance and readiness, needs, and expectations, judgement and perceptions)
  - **User external variables** (i.e. initial interactions, user interactions, cognitive load levels, time and usage

User inherent characteristics

- **Personality traits**
  - Using the big five personality traits theory, it is found that Low Openness traits (practical, conventional, prefers routine) have the highest trust
  - Followed by Low Conscientiousness (impulsive, careless, disorganized), Low Extraversion (quiet, reserved, withdrawn), and High Neuroticism (anxious, unhappy, prone to negative emotions)
- **Gender**
  - Women are more likely to yield a higher level of trust
- **Self trust**
  - Users are likely to use their own skills to gather and analyze information to decide whether to trust a system

User acquired characteristics

- **User experiences**
  - User previous experience with a provider/producer of an AI-enabled system
  - User need and dependency on AI-enabled systems
- **Educational levels**
  - Users with college education > without college education

User attitudes (1/2)

User acceptance and readiness

- Addressing artificial divide (i.e. ability or lack thereof to cooperate successfully with an AI-enabled system) by:
  - Motivating and training users
  - Early stage user involvement
  - Enhanced user experience and empowerment
- Addressing user uncertainties by:
  - Identifying and prioritizing the sources of user uncertainties
  - Improving user understandability, sense of control, and information accuracy

User attitudes (1/2)

User needs and expectations

- User intention to use a system
- Usefulness of a system
- Technical system quality (e.g. Reliability)
- Information quality (e.g. Credibility)

User judgement and perceptions

- Perceived credibility (e.g., expertise, honesty, reputation, and predictability)
- Perceived risk (i.e., likelihood and severity of negative outcomes),
- Perceived ease of use (e.g., searching, transacting and navigating)
- Perceived benevolence, integrity and transparency
- Perceived relatability
- Understandability of a system's rationale and performance

User external variables

Initial interactions

- The level of trust for the person introducing the AI-enabled system to a user
- E.g. an AI-enabled system is introduced by close relatives/friends

User-user interactions

- Similarities between users (e.g. preferences and interests) increase user trust in the system
- Creating an effective environment to encourage users to interact with one another using the AI-enabled system can increase trust

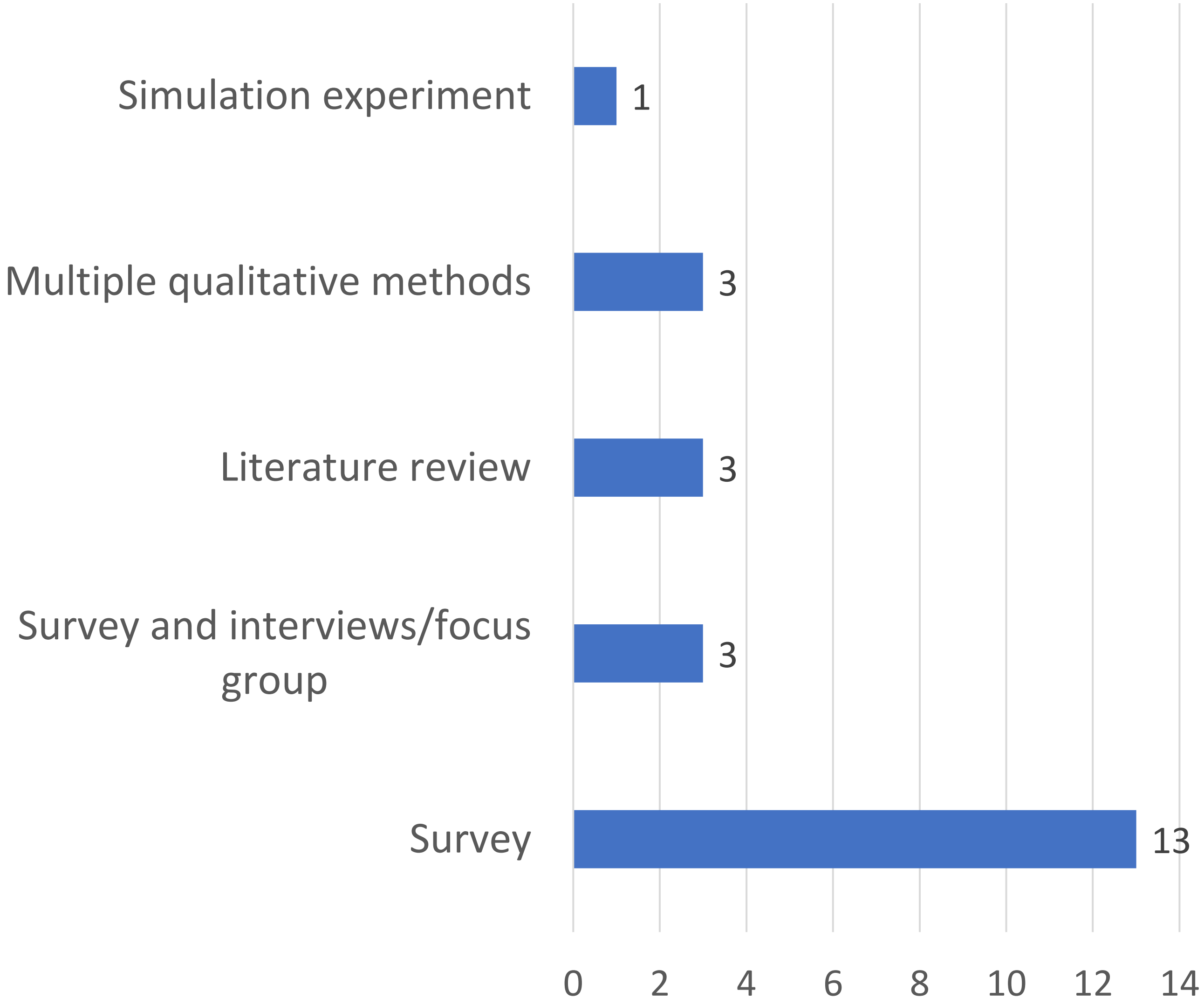
Cognitive load levels

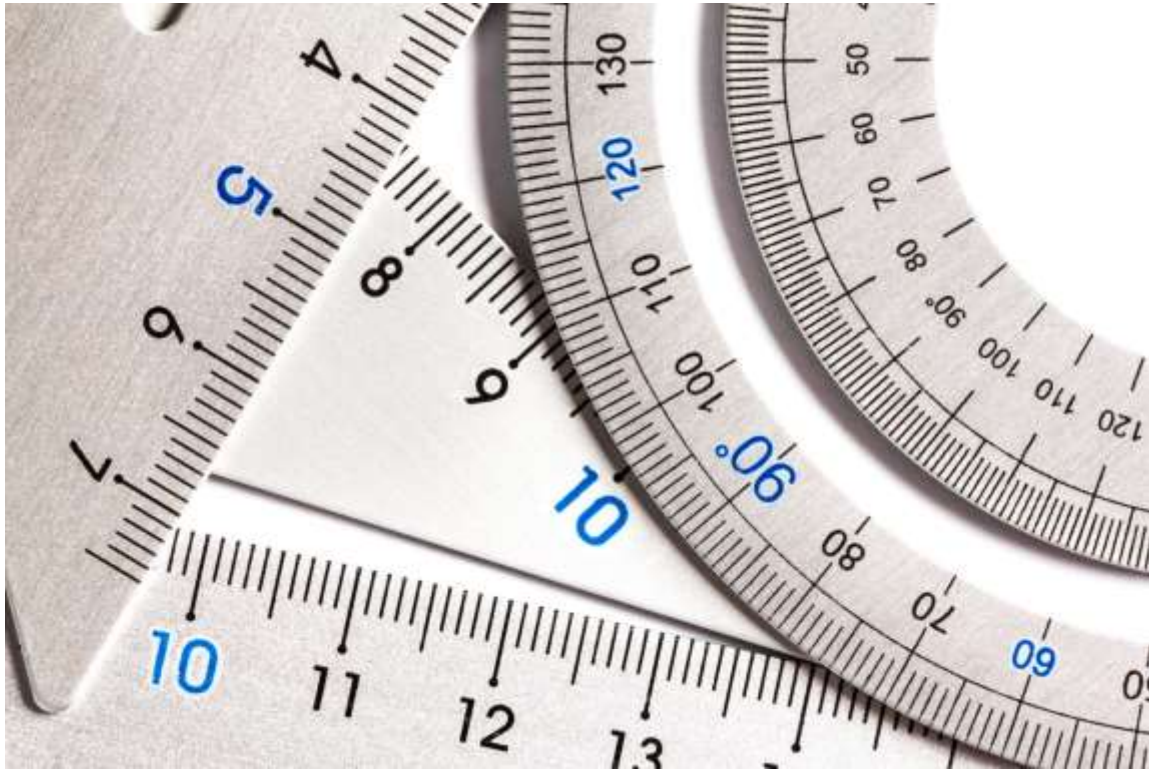
- Low cognitive load → more trust
- High cognitive load → less trust
- Due to a greater availability of cognitive resources to allow more confidence and willingness to analyze and understand the AI-enabled system

Time and usage

- User trust increases with more time interacting with the AI-enabled system → more understanding of the system
- More use → more trust

RQ3: Methods to measure user trust





Survey to measure user trust

From 16 studies:

- 12 (75%) developed own questionnaires:
  - 10 studies used questionnaires to measure participant trust
  - 1 study used it as a pre-survey to collect participant demographic information
  - 1 study used it to collect participant preferred design options.
- 2 (12.5%) developed their own and used previously developed questionnaires
- 2 (12.5%) only used previously developed questionnaires

Conclusion

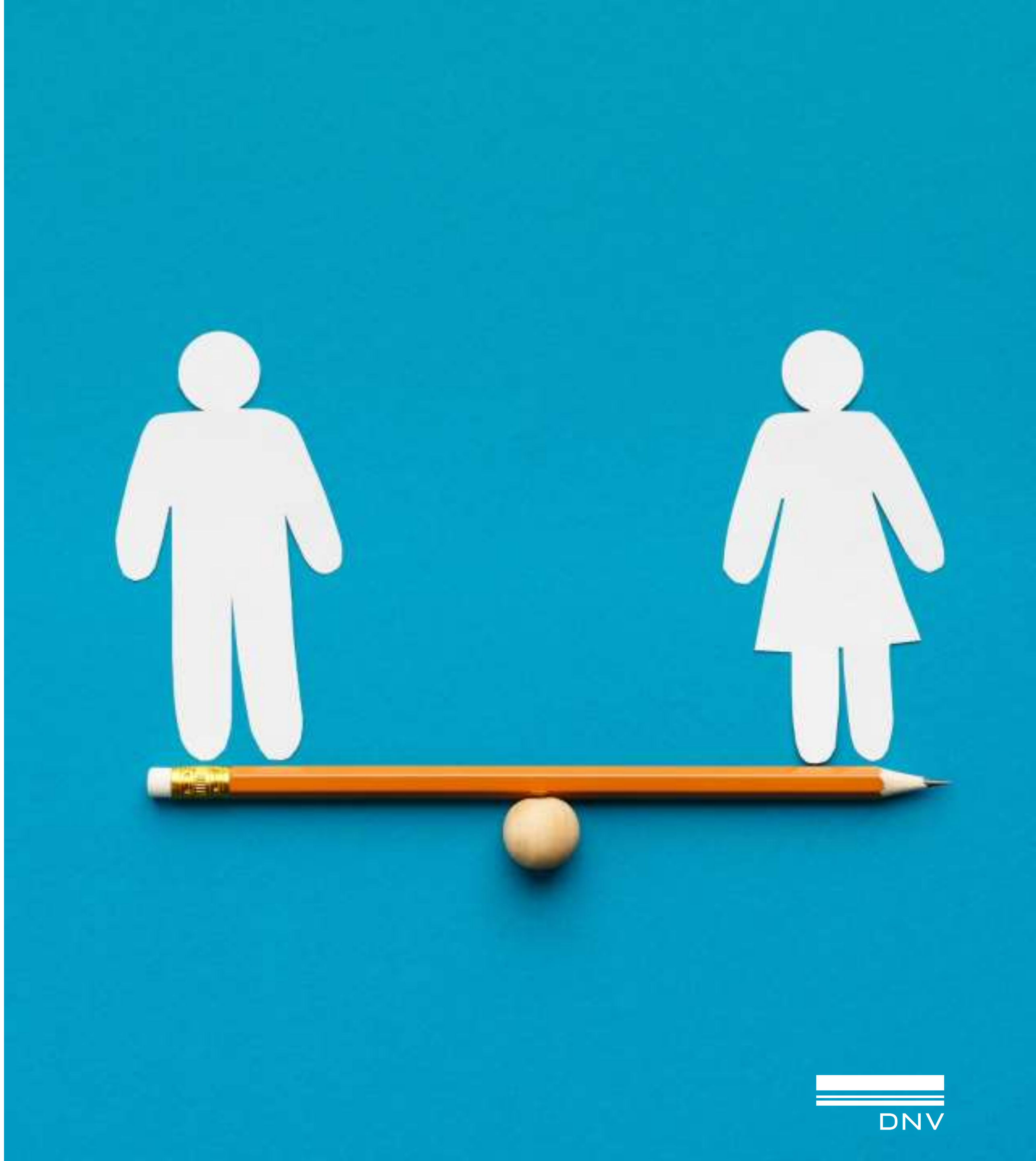
RQ1: How is user trust in AI-enabled systems defined?

- More than one way to define user trust
- We propose that instead of pursuing better trust definitions or comparing which definitions are better, probably more beneficial to select the most appropriate trust definition according to the context
- E.g. based on the level of risk an output may affect a user
  - Mayer's trust definition → for outputs that can have a significant personal impact to the user (e.g., personal finance, health).
  - Lee and See's →for outputs that have a less personal impact to the user (e.g., complex information systems at workplace).
- The more accurate a trust definition is being used in specific contexts, the easier it is to understand user trust and factors influencing it.

Conclusion

RQ2: What factors influence user trust in AI-enabled systems

- **User characteristics dominate findings**
  - User involvement from system development through to system implementation and monitoring
- **User trust increases over time due to more user-system interactions**
  - Low initial trust can be improved
  - Human-system interactions are crucial for system understanding and familiarity, and thus ultimately for trust building
- **Different factors influence user trust based on different contexts and characteristics of the users and systems**
  - Necessity to select and tailor features of the systems according to the targeted user group
  - E.g. technical and design features found to influence user trust can guide AI-enabled system design strategy
  - E.g. User inherent characteristics (more permanent characteristics) vs. user attitudes, experiences, and external variables (more dynamic and open for change



DNV

Conclusion

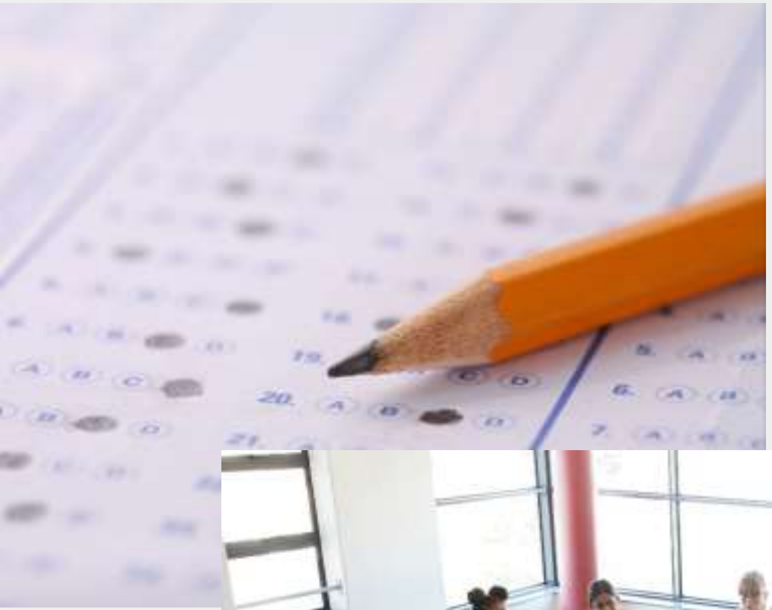
RQ2: What factors influence user trust in AI-enabled systems

Socio-ethical considerations: paving way to ensure environments where user-AI interactions happen is sufficiently conducive for these interactions to develop into trusted relationships

- Explanations of AI-enabled systems
- Closing the gap between regulations and practices

Conclusion

RQ3: How user trust in AI-enabled systems is measured



- Survey is the most common method followed by qualitative methods (e.g. interviews, focus groups)
- There are different questionnaires being used to measure trust:
  - trust can be understood in different ways
  - need for a validated tool for empirical measurement across environments and contexts (e.g. 12-item Human-Computer Trust Scale (HCTS)

DNV's roles in Healthcare

- Quality and risk management in technology adoption
- Hospital Accreditation
- Data sharing, harmonization, and governance
- EU Notified Body
- Management System Certification
- Cybersecurity
- Solutions for the digital health sector

Upcoming DNV white paper on AI adoption in healthcare

Pre-register to receive the white paper:

https://www.dnv.com/research/healthcare-programme/adoption-of-ai-in-healthcare.html

DNV is interested in partnering for funding applications related to *trust and AI in healthcare*, for example:

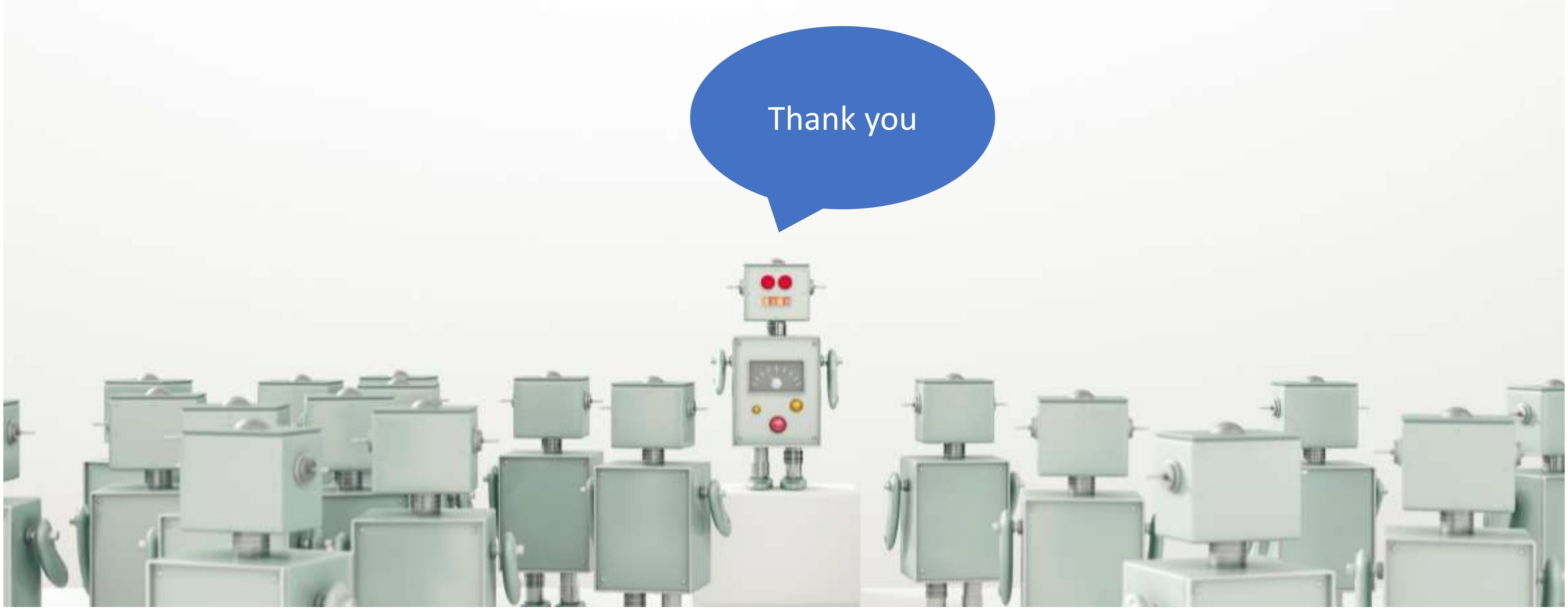
EU

Better integration and use of health-related real-world and research data, including genomics, for improved clinical outcomes	HORIZON-HLTH-2023-TOOL-05-04
Developing a Data Quality and Utility Label for the European Health Data Space	HORIZON-HLTH-2023-TOOL-05-09
Expanding the European Electronic Health Record exchange Format to improve interoperability within the European Health Data Space	HORIZON-HLTH-2023-IND-06-02
Development and harmonisation of methodologies for assessing digital health technologies in Europe	HORIZON-HLTH-2023-IND-06-07
Developing EU methodological frameworks for clinical/performance evaluation and post-market clinical/performance follow-up of medical devices and in vitro diagnostic medical devices (IVDs)	HORIZON-HLTH-2024-IND-06-08
Efficient trustworthy AI - making the best of data (AI, Data and Robotics Partnership) (RIA)	HORIZON-CL4-2023-HUMAN-01-01
Support facility for digital standardisation and international cooperation in digital partnerships (CSA)	HORIZON-CL4-2023-HUMAN-01-65
Explainable and Robust AI (AI Data and Robotics Partnership) (RIA)	HORIZON-CL4-2024-HUMAN-01-06
Collaborative intelligence – combining the best of machine and human (AI Data and Robotics Partnership) (RIA)	HORIZON-CL4-2024-HUMAN-01-07
Support for transnational activities of National Contact Points in the thematic areas of Digital, Industry and Space (CSA)	HORIZON-CL4-2024-HUMAN-01-34

National/Nordic

Applied Ethical AI on Nordic Patient Records	Nordic innovation
Innovation potential on Nordic patient records	Nordic innovation
Collaborative Project to Meet Societal and Industry-related Challenges	NFR

Contact:
Oleg.Agafonov@dnv.com


Thank you

https://www.tandfonline.com/doi/full/10.1080
funding/10447318.2022.2138826

Research Article

A Systematic Literature Review of User Trust in AI-Enabled Systems: An HCI Perspective

Tita Alissa Bach, Amna Khan, Harry Hallock, Gabriela Beltrão & Sonia Sousa

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Abstract

User trust in Artificial Intelligence (AI) enabled systems has been increasingly recognized and proven as a key element to fostering adoption. It has been suggested that AI-enabled systems must go beyond technical-centric approaches and towards embracing a more human-centric approach, a core principle of the human-computer interaction (HCI) field. This review aims to provide an overview of the user trust definitions, influencing factors, and measurement methods from 23 empirical studies to gather insight for future technical and design strategies, research, and initiatives to calibrate the user-AI relationship. The findings confirm that there is more than one way to define trust. Selecting the most appropriate trust definition to depict user trust in a specific context should be the focus instead of comparing definitions.

WHEN TRUST MATTERS

www.dnv.com

“Kunstig intelligens innen radiologi i Helse Nord“ rapport, Nov. 2022 – Arbeidsgruppens anbefalinger

v. Finn Henry Hansen/Karl Øyvind Mikalsen

Dagens Menti-kode:
1835 1441

Arbeidsgruppens sammensetning og arbeidsform

- Arbeidsgruppen har hatt 10 medlemmer
  - 4 radiologer, 2 radiografer, to fra Helse Nord RHF, 1 konsern-tillitsvalgt og 1 brukerrepresentant
  - SPKI v/Karl Øyvind Mikalsen utreder sammen med lederen av arbeidsgruppen
- Arbeidet gjennomført i løpet av 11 måneder med 11 møter, hvorav 10 digitale (Teams)
- Møter med flere leverandører
- Deltagelse fra og møter med både nasjonale og utenlandske ressurspersoner på KI-feltet innen radiologi
  - Vestre Viken-prosjektet, Radboud-universitetet i Nederland
  - AIforradiology.com

Global status for radiologifaget

- Sterk økning av antall undersøkelser
  - Særlig innen modalitetene CT og MR som tas i bruk for nye sykdomsgrupper, er som er mer tidkrevende og faglig mer komplekse å tolke
  - Økt forekomst av intervensjonsradiologi (behandling)
  - Økt bruk av radiologi for å måle/evaluere effekt av (kreft)-behandling
- Konsekvens:
  - Store og økende kapasitetsutfordringer for radiologene
  - Økt forekomst av utbrenthet blant radiologer
  - Økt risiko for å gjøre feil
  - Vanskeligere å rekruttere

Tabell 3.1: Endring i antallet radiologiske undersøkelser i Danmark 2011-2021

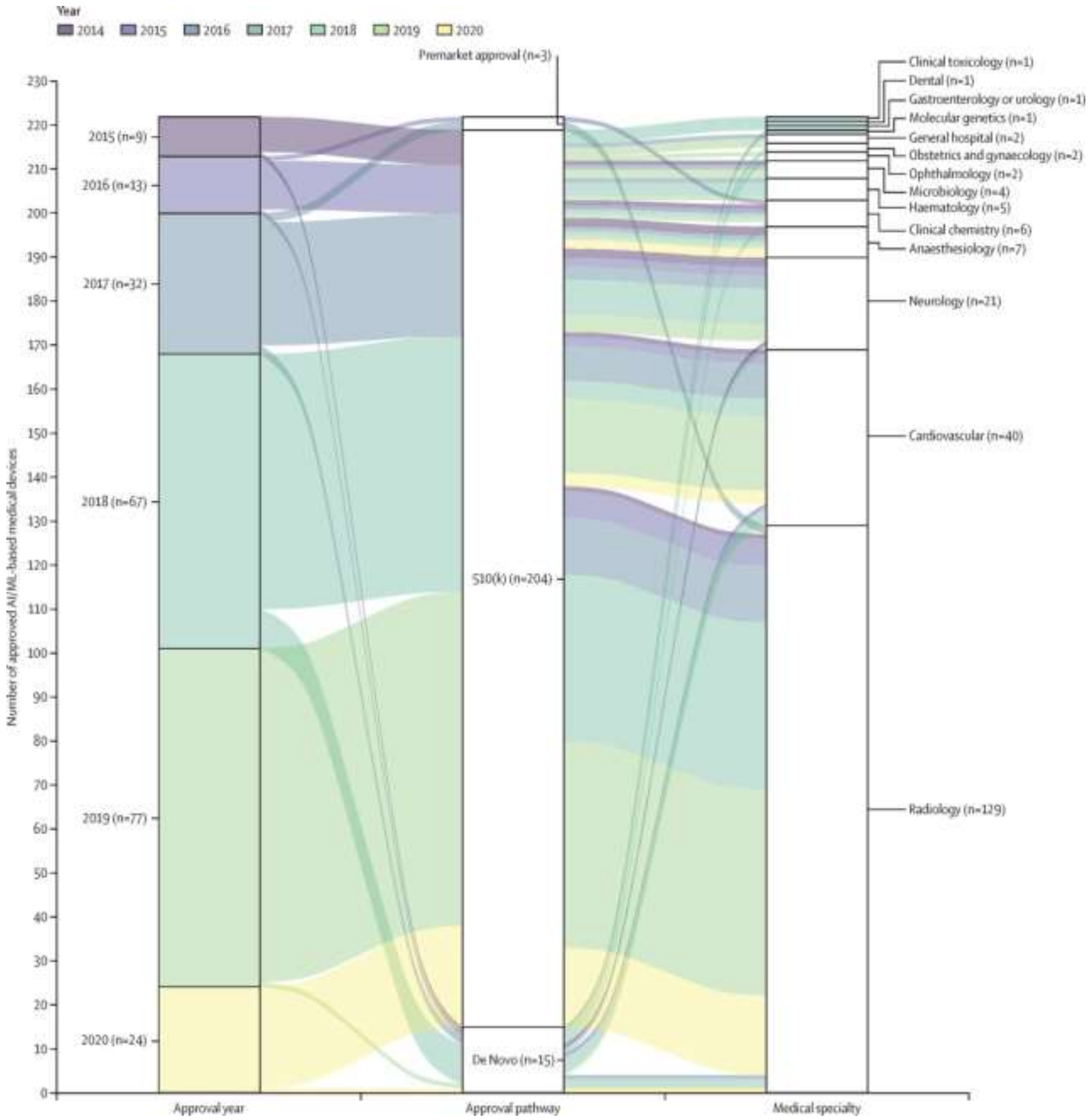
Proceduretype	2011	2021	Endring
UXA - Angiografier	45 645	39 060	-14 %
UXC - CT-skanninger	648 020	1 176 230	82 %
UXM - MR-skanninger	343 105	555 250	62 %
UXR - Røntgenundersøgelser	2 440 530	2 446 150	0 %
UXU - Ultralyds-undersøgelser	1 409 190	1 888 285	34 %
Totalsum	**4 886 490**	**6 104 975**	**25 %**

Særlige utfordringer for radiologien i Helse Nord

- Store og økende kapasitetsutfordringer – økende kjøp av tjenester hos private aktører
- Stor turnover av radiologer, mister unge radiologer etter LiS-tjeneste
  - Vanskelig å rekruttere – for liten utdanningskapasitet
- Fersk rapport: Betydelige og organisatoriske utfordringer
- Arbeidsgruppen vurderer KI som ett av flere tiltak som på sikt kan avlaste radiologene

Markedet modner

- Minst halvparten av de tilgjengelige KI-produktene på markedet er innen radiologi.



- Muehlematter, U. J., et al. (2021). Approval of artificial intelligence and machine learning-based medical devices in the USA and Europe (2015-20): a comparative analysis. *Lancet Digit Health*

Den radiologiske arbeidsflyten

Forfase: Timesetting og henvisning

Etterfase: Kommunikasjon med kliniker/pasient

Behovskartlegging

- Viktige bidrag fra radiologene og radiografene i arbeidsgruppa

Innledende analyse:

1. Markering av områder med patologiske funn: kreft, brudd, MS, slag, lungeemboli, hjerte, lungesykdommer,
2. Triagering av undersøkelser
3. Triagering av henvisninger,
4. Støtte til både henviser og radiologisk avdeling for å sikre riktig og nødvendig informasjon,
5. Annotering/segmentering av anatomi,
6. Talegjenkjenning,
7. Automatisk skjelettalder,
8. Forbedret bildekvalitet
9. Forbedret pasientlogistikk.
10. Strålereduksjon

Konkretisering av behov:
- Sammenstilling med volum og aktivitet

Elektive undersøkelser

- Hovedsaklig kreftdiagnostikk, utredninger og kontroller.
- Undersøkelsestyper
  - CT Thorax,
  - CT/MR Abdomen,
  - RG Thorax,
  - MR Mamma,
  - RG Mammografi,
  - MR Prostata,
  - Nukleærmedisin: f.eks. PET/MR prostata,
  - UL thyreoidea

  - MR Caput (slag, MS, demens),
  - MR Skjelett,
  - RG Skjelettalder,
  - MR Hjerte,
  - MR kolumna.

Øyeblikkelig hjelp undersøkelser

- Triagering (hva haster mest å se på)
- Avlastning på vakt (brudd-deteksjon)
- Kvalitet (Redusere feiltolkning og oversett patologi)
- Deteksjon (Påvise patologi)

Undersøkelsestyper:

- CTANG Angiografi av Thorax og CT Thorax (lungeemboli, fortetninger, noduli),
- CT Caput (blødning, infarkt, karokklusjon),
- CT Abdomen (fri luft, blødning, ileus, infeksjoner, nyrestein)
- RG Skjelett
- RG Thorax

Behov blant radiografene

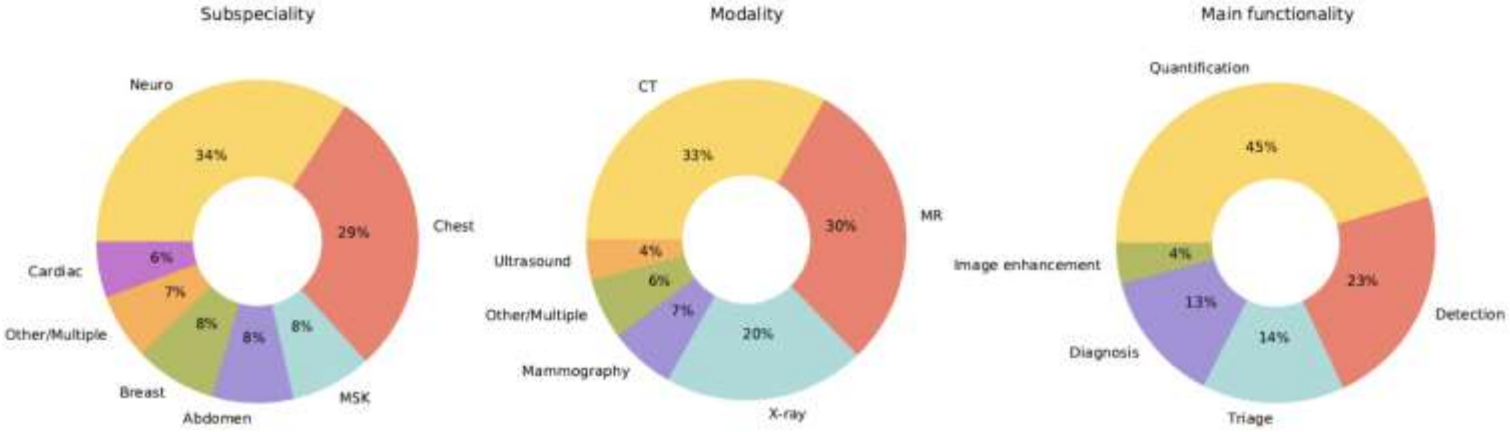
- Radiografene har utformet følgende liste over behov der KI potensielt kan bidra:
  - foreslå protokoll for undersøkelser, basert på informasjon i henvisning,
  - posisjonering av pasient,
  - velge sekvenser og vinkling (MR),
  - bruddalgoritme for å avlaste radiolog på vakt,
  - triagering,
  - opplæring,
  - automatisert link mellom prioriteringskode/protokoll og prosedyre,

Tilbudssiden: fasene før bildetolkning

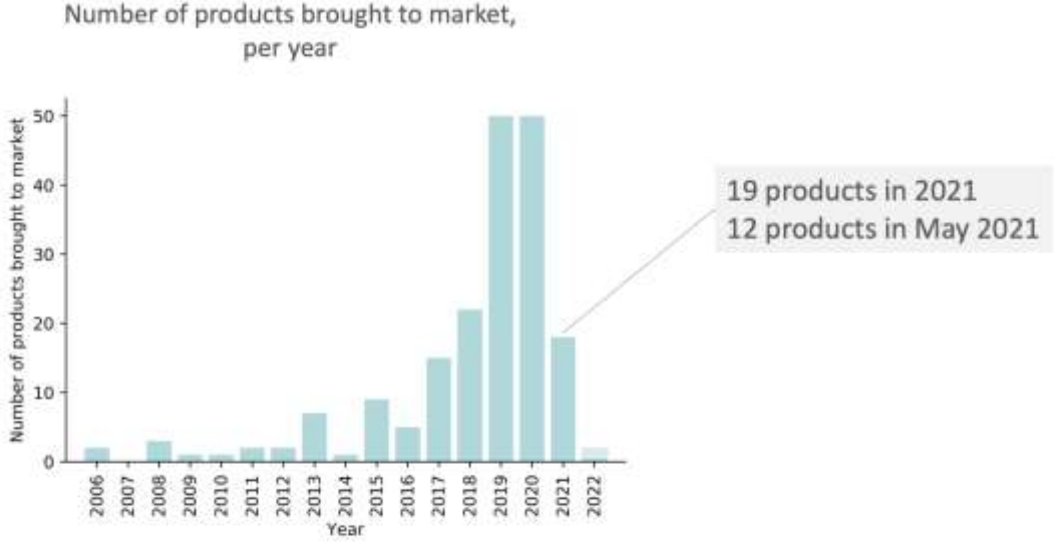
- Få KI-verktøy knyttet til henvisning og timesetting.
- Oppgavene knyttet til planlegging og gjennomføring av billedtaking, og rekonstruksjon av bilder er tett tilknyttet maskinvaren som brukes for å gjennomføre skanningen.
  - Varierer mellom maskinleverandørene i hvor stor grad de bruker KI-basert programvare
  - Lavere fleksibilitet og derfor lavere prioritert i rapporten.
  - Viktig å være være klar over ved fornyelse av maskinparken.

Tilbudssiden innen bildetolkning

- AIforradiology som kilde
- Gjennomgått over 200 produkter og vurdert om de er av interesse for vårt bruk
- Totalt 25-30 aktuelle produkter



Inklusjon	Eksklusjon
- Fokusert på radiologi eller nukleærmedisin	- Plattformer og markedsplasser (se kap. 10)
- Basert på maskinlæring	- Forskningsprogramvare
- Hovedsakelig beregnet for klinisk bruk	- Bildeprogramvare brukt under billedtaking, intervensjon eller kirurgi
- CE-merket	- Programvare for diktering



Kicky van Leeuwen – Aiforradiology.com

Arbeidsgruppens anbefalinger

Har sammenstilt behovssiden med tilbudssiden og identifisert ca 25 aktuelle algoritmer innen bildetolkning.

Rangert prioriteringsliste

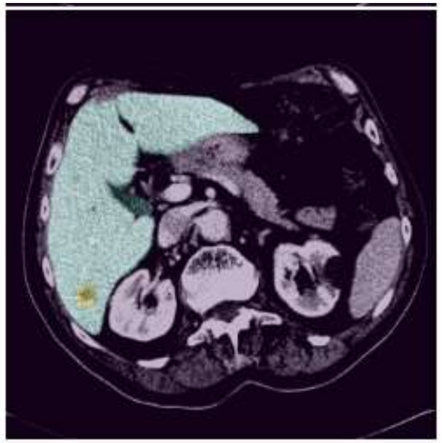
1. Brudd: deteksjon og triagering (RG skjelett)
2. Kreftdiagnostikk
   - Diagnostikk av lungekreft (CT thorax)
   - Diagnostikk av prostatakreft (MR prostata)
   - Diagnostikk av brystkreft (MR mamma)
3. Tolkning, deteksjon av patologi og triagering for røntgen thorax
4. Slagdeteksjon (CT caput)
5. Deteksjon og triagering av lungeemboli (CT thorax)
6. Tolkning av lungefortetninger/ ILD (CT Thorax)
7. Tolkning av MR hjerte

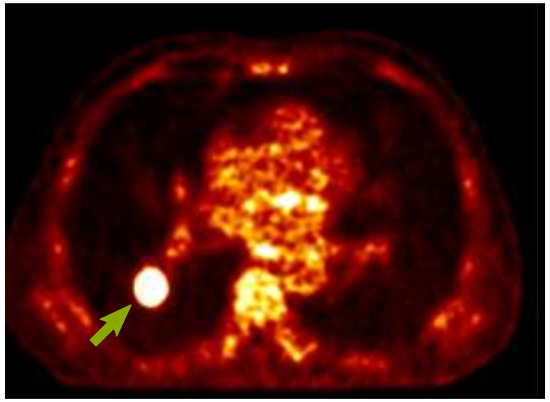
Davendralingam N, Sebire NJ, Arthurs OJ, Shelmerdine SC. Artificial intelligence in paediatric radiology: 1;94(1117Future opportunities. Br J Radiol. 2021 Jan):20200975.

Løsningene er prioritert basert på en rekke kriterier: grad av arbeidsbesparelse, kvalitet, grad av multifunksjonalitet, grad av evidens, pasientperspektivet (hvor akutt? hva hjelper pasienten mest?), etc

Egenutvikling/forskning må fortsatt prioriteres

- En rekke av behovene dekkes ikke godt nok av tilbudet på markedet:
    - talegjenkjenning, forbedring og triagering av henvisninger, forbedret pasientlogistikk og på generell basis flere løsninger som kan bidra til fase 0-3 i den radiologiske arbeidsflyten
- Dårlig dekt innen bildetolkning:
    - Abdomen
    - Nukleærmedisin
    - Ultralyd
- Andre områder innen medisinsk bildeanalyse:
    - oftalmologi (diabetisk retinopati), kardiovaskulær medisin og nevrologi brukbart dekt.
    - Dårlig dekt: dermatologi (hud), odontology (tann), strålingsonkologi, gastroenterologi, gynekologi og digital patologi
- Slå sammen bilder med data fra andre modaliteter
- Ikke bare utvikling av verktøy
    - (følge)forskning med fokus på utprøving, validering og implementering. Slik kompetanse er viktig å bygge opp i fagmiljøer som SPKI.





Norske erfaringer – Vestre Viken

- Vestre Viken har sjenerøst delt sine erfaringer med Helse Nord
- Viktige læringspunkter fra anskaffelsen:
  - Burde avholdt leverandørkonferanse før utlysning av konkurranse
  - Krevende å frigjøre arbeidstid blant radiologene
  - Gode erfaringer med konkurransepreget dialog som anskaffelsesform
  - Viktig og nødvendig samarbeid med Sykehuspartner og Sykehusinnkjøp
- Anbefales å følge med på nye læringspunkter fra implementeringen:
  - ROS-analyser, løsningsdesign, Mini-HTA av algoritmer før implementering
  - Selve implementeringsprosessen når algoritmene tas i bruk

VESTRE VIKEN

UNN HFs opsjon for avrop på rammeavtalen for Vestre Viken

- UNN HF kan gjøre avrop på rammeavtalen inngått med Vestre Viken
- Arbeidsgruppen anbefaler at UNN HF – under gitte vilkår - gjør avrop på algoritme for deteksjon av frakturer
  - Det gjelder en fransk algoritme med god dokumentasjon gjennom flere fagfellevurderte studier
- Viktig å komme i gang og vinne erfaringer
  - Utvikle implementeringskompetanse i SPKI
  - Utveksle erfaringer med andre HF om implementering og validering
- Utfordringen er kapasitet (og motivasjon?) ved røntgenavd. UNN og krevende økonomisk situasjon i hele foretaksgruppen

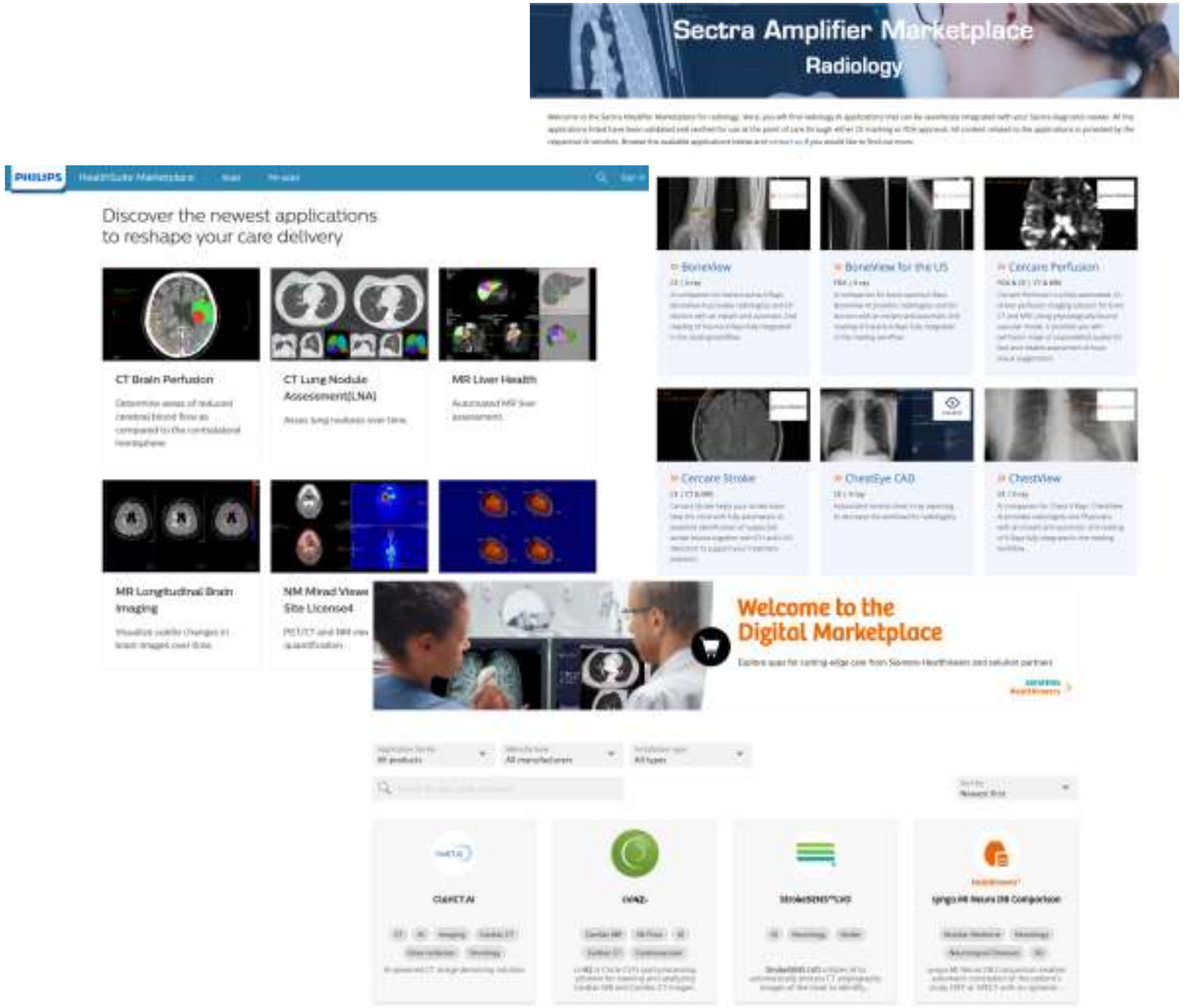
Davendralingam N, Sebire NJ, Arthurs OJ, Shelmerdine SC. Artificial intelligence in paediatric radiology: 1;94(1117Future opportunities. Br J Radiol. 2021 Jan):20200975.

Anskaffelsesprosedyre

- Arbeidsgruppen anbefaler avholdt en leverandørkonferanse før kunngjøring av konkurranse
  - Dette for å bli oppdatert på produkter og tjenester
- På grunnlag av erfaringer fra Vestre Viken anbefales konkurranse-preget dialog som anskaffelsesform
  - For å fange opp dynamikken i markedet
- Arbeidsgruppen har redegjort for noen hensyn som bør vektlegges gjennom kunngjøring og kravspesifikasjon
  - Ønskelig å få tilgang til algoritmer for utprøving på retrospektive data
- Det foreslås utlysning av konkurranse for hele Helse Nord høsten 2023 med ambisjon om avtale medio 2024

Valg av plattform som strategisk beslutning

- Både erfaringer fra Vestre Viken-prosjektet og egen kontakt med leverandørene tilsier kjøp av plattform for å organisere tilgangen til algoritmene
  - Plattform gir tilgang til algoritmene ved skytjenester levert av leverandør
  - Plattform særlig viktig når man skal håndtere et større antall algoritmer
  - Tilsynelatende liten funksjonell forskjell mellom plattformene som leveres av de større kommersielle leverandørene
  - Viktig at plattformleverandørene gir god tilgang til relevante, MDR-godkjente tredjepartsalgoritmer



Forutsetninger for vellykket implementering

- Siste del av rapporten drøfter en rekke forhold som må være på plass for lykkes med implementering av KI-løsninger
  - Tilrettelagt logistikk og arbeidsflyt
  - Nødvendig infrastruktur og tilgang til data
  - Overholdelse av regulatoriske regler og ordninger
  - Kost-nytteanalyser i forkant av storskala implementering
  - Utdanning og opplæring av helsepersonell og støttepersonell
  - Validering og kvalitetssikting av algoritmer som tas i bruk
  - Gode systemer for forvaltning av løsningene

Kicky van Leeuwen – AIforRadiology.com

Arbeidsdelingen mellom algoritme og radiolog

- Man kan sammenligne algoritmer alene mot radiolog alene
- Som beslutningsstøtte er det ofte mer relevant å vurdere gevinsten av samspillet mellom algoritmer og radiolog
  - Der algoritmen grovsorterer i sannsynlig syke, sannsynlig friske og eventuelle pasienter i en mer usikker gråsone
  - Og lar radiologen – etter gitte kriterier/terskler følge opp nærmere angitte subpopulasjoner for «human granskning» – «human in the loop»
    - Triagering under vakt (utenom ordinær arbeidstid)
    - Triagering av store screeningpopulasjoner (for eksempel mammografi)

Viktig referanse for vurdering av algoritmers nøyaktighet – radiologer som komparenter

- Gullstandarden for nøyaktighet er «the ground truth»
  - Informasjon som er bekreftet ved observasjon eller måling
- Både algoritmer og radiologer bør måles mot denne standarden
- Men algoritmer må også vurderes med radiologer som komparenter
- Det er en betydelig litteratur innen kognitiv forskning som dokumenterer begrensninger ved menneskelige ekspertvurderinger
  - Det gjelder også innen radiologien
  - Stor dokumentert variasjon både mellom radiologer og for radiologers vurderinger av samme bilder på ulike tidspunkter
- Algoritmers nøyaktighet versus gjennomsnitt for radiologer

Oppsummerende hovedbudskap

- Viktig å komme i gang med kontrollert og kvalitetssikret implementering i kliniske settinger – læring via iterative prosesser
- Velg løsninger som er MDR-sertifiserte og gjerne med dokumentasjon gjennom fagfellevurderte uavhengige studier
- Foreta valideringer av algoritmene mot egne pasientdata
- Foreta løpende oppdateringer av markedet
- De rammeavtalene som inngås med leverandør bør ha et dynamisk element tilpasset utviklingen av markedet for tredjepartsalgoritmer

Rapporten kan leses her: https://www.spki.no/prosjekter/utredning-av-ki-innen-medisinsk-radiologi-i-helse-nord/

Paneldiskusjon: Strategi for Kunstig Intelligens innen radiologi

I panelet:

- Leif Oltedal, nevroradiolog HUS / 1. am UiB
- Edmund Søvik, medisinsk fagsjef i Klinikk for bildediagnostikk, St. Olavs Hospital;
- Ulf Sigurdsen, leder for e-Helse, HSØ

Modererator: Arvid Lundervold, UiB/MMIV

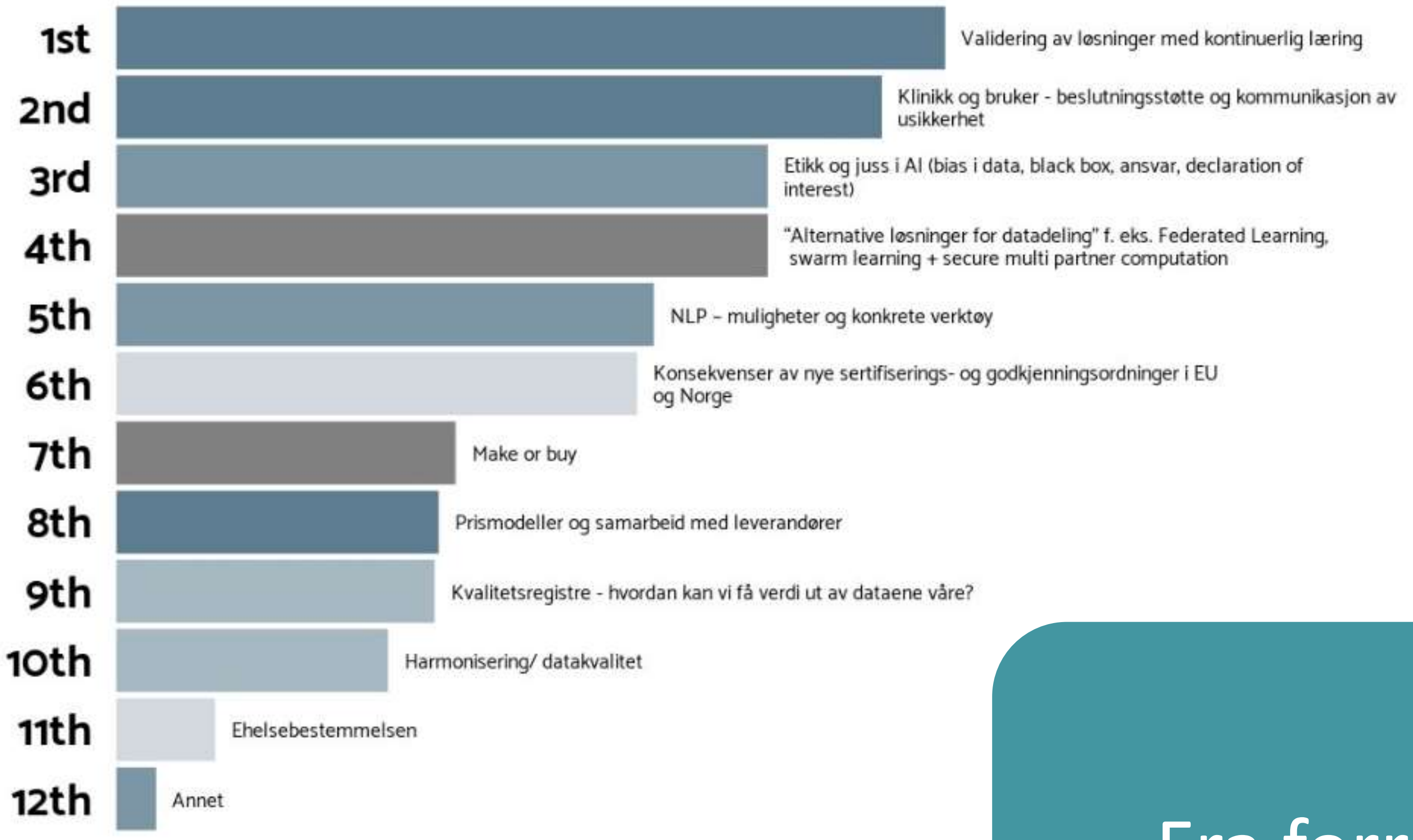
Dagens Menti-kode:
1835 1441

Kommende møter – temaer og innspill

Temperatursjekk

Dagens Menti-kode:
1835 1441

Hva synes du er viktige temaer å diskutere i møtene fremover? Prioriter temaene i listen.



Fra forrige møte

Hva synes du er viktige temaer å diskutere i møtene fremover? Prioriter temaene i listen.

Frem til nå, på hvilken måte tenker du KIN har gitt nytteverdi?

Lettere å knytte kontakter

Fora for læring og diskusjon

Oversikt

God innsikt i pågående prosjekter som gir godt grunnlag for læring og samarbeid.

Oversikt

Ønsker mer fokus på implementering av løsninger. Planer og diskusjoner

Viser fremdrift i Norge. Inspirasjon. Konkrete koblinger til prosjekter. Holde fokus på behov.

Oppdateringer om bruk av AI i primær- og spesialist-helse tjeneste

Nettverk og kunnskap

Diskusjon på tvers av region 👍

God informasjon om aktivitet og KI-miljøer i Norge

Nettverk, kunnskapsdeling

Kunnskapsdeling

Nyttig erfaringsdeling

Kobling mellom EU AI act, MDR og kommende ISO 42001. mulig samarbeid med standard norge

- Nettverksmøte
- Konferanser
- Konferanser med assosierte etapper

2022

MMIV Conference 2022: Patient-centered AI and novel imaging methods advancing medicine

08.12 - 09.12.2022 Bergen

Welcome to the fifth annual MMIV conference held in collaboration with PRESIMAL. The conference's theme is patient-centered AI and imaging methods that are advancing medicine, and we have an exciting program and an excellent line-up of speakers.

The conference will be held at Grand Bergen and is open to everyone. There is no admission fee, but registration is required. **Please register via the conference website before 24.11.2022.**

Nettverksmøte #5/2022

01.12.2022 Videomøte

Utvikling av KI-basert beslutningsstøtte, brukertillit og strategi

Høstseminar Oslo. HSØ mfl.

07.11.2022 Oslo

Slik lykkes vi med innføring av AI på sykehusene

Nettverksmøte #4/2022

04.10.2022 Videomøte

Tilgang til data, kompetanse.

Datoer for 2023 kommer snart på nettsiden!

Takk for idag!

www.bigmed.no

https://ehealthresearch.no/kin/

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@BigMedProject

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