ARTIFICIËLE INTELLIGENTIE

WETENSCHAPPELIJKE NAVORMING KOKSIJDE

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(Hybrid AI) for real world maintenance and healthcare challenges

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SESSIE 1 - SOFIE

Artificiële Intelligentie (AI) en machine learning

History of AI

What is AI?

Examples from team

Summary

1955

JOHN McCARTHY

John McCarthy was an American computer scientist and cognitive scientist.
McCarthy was one of the funders of the discipline of artifical intelligence.
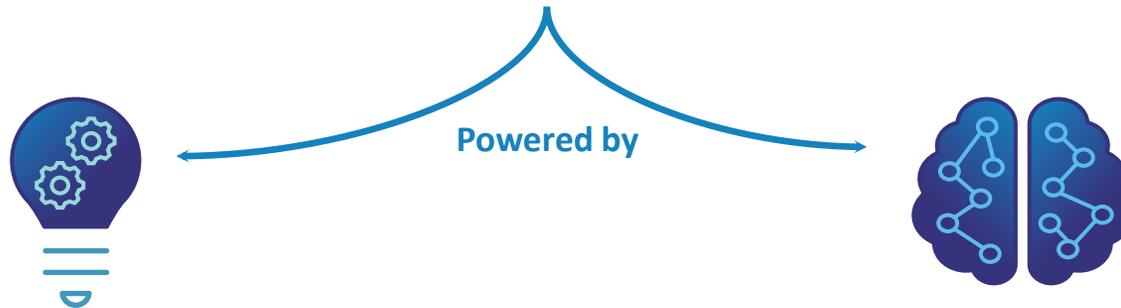He coined the term "Artificial Intelligence".
He won the Turing Award in 1971.

MORE INFO ON THE HISTORY OF AI

- https://en.wikipedia.org/wiki/History_of_artificial_intelligence
- https://www.ibm.com/think/topics/history-of-artificial-intelligence

WHAT IS AI

Generative AI
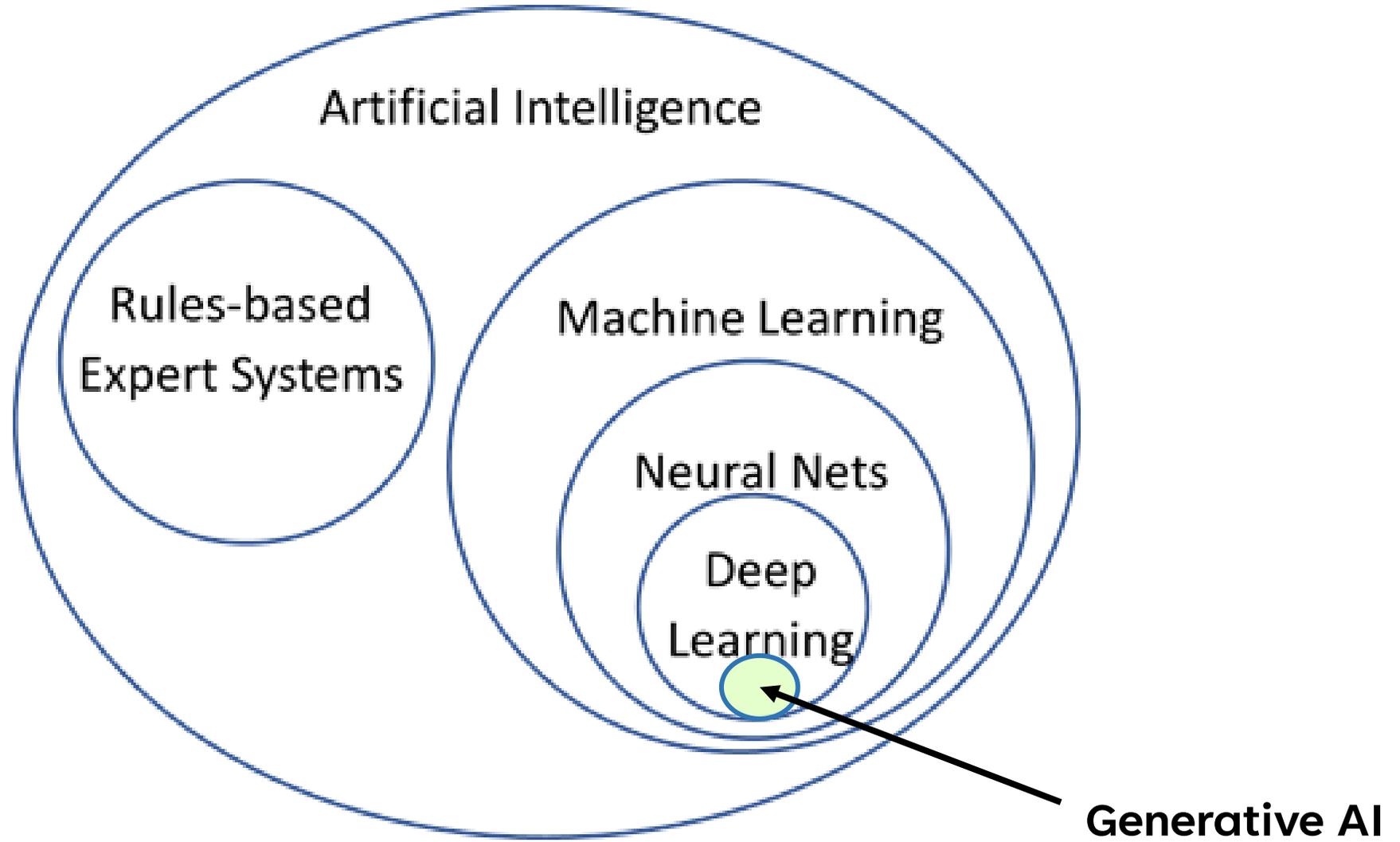
DECISION SUPPORT SYSTEMS POWERED BY AI

Decision Support System

Powered by

Data-driven analytics – Machine learning

Knowledge-driven analytics – Expert systems

- Directly learn patterns from the data
- (Often) black-box
- Dependent on availability of quality data sets → bias
- Minimal human intervention
- Perform efficiently
- Able to handle/adapt to new situations

- Based on evidence, guidelines, domain expertise
- White-box
- Highly complex
- Difficult to construct & maintain → incomplete
- Computationally intensive & slow
- Unable to handle unknown situations

TYPES OF MACHINE LEARNING

Supervised (e.g., Google Vision AI)

- Given example pairs of inputs and outputs, predict outputs on new data
- Examples: regression, classification, …
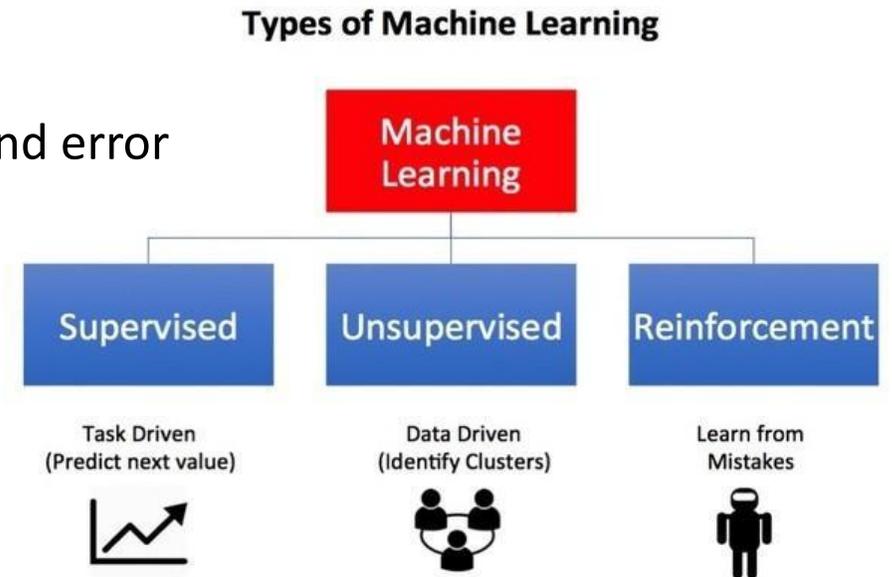
Unsupervised (e.g., Netflix' Recommendation Engine)

- Given only input data, automatically discover structure, features, …
- Examples: clustering, compression, …

Reinforcement Learning (e.g., Google's Alpha Go)

- Learning how to best-react to situations, through trial and error

Several other types

- Semi-supervised learning, …

Types of Machine Learning

Machine Learning

Supervised	Unsupervised	Reinforcement
Task Driven (Predict next value)	Data Driven (Identify Clusters)	Learn from Mistakes

USE CASES FROM THE TEAM

http://predict.idlab.ugent.be

CONCLUSION

- AI/ML brings **transformational opportunities** for **maintenance, healthcare, ...**

- However, it also brings challenges
  - More about the need for explainable AI, trustworthy AI, ... in **session 3**

SESSIE 2 - TONY

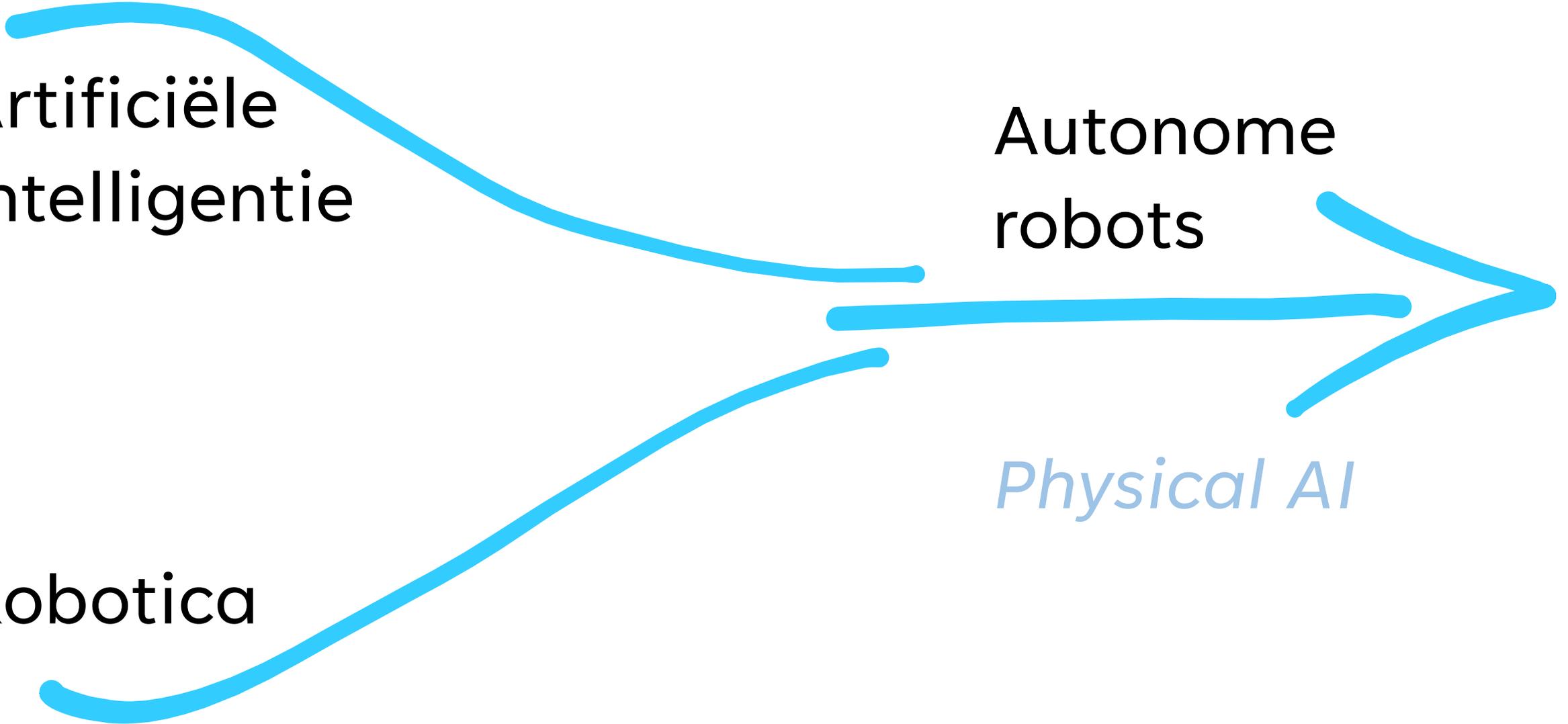**Robotica**

History of AI

What is AI?

Examples from team
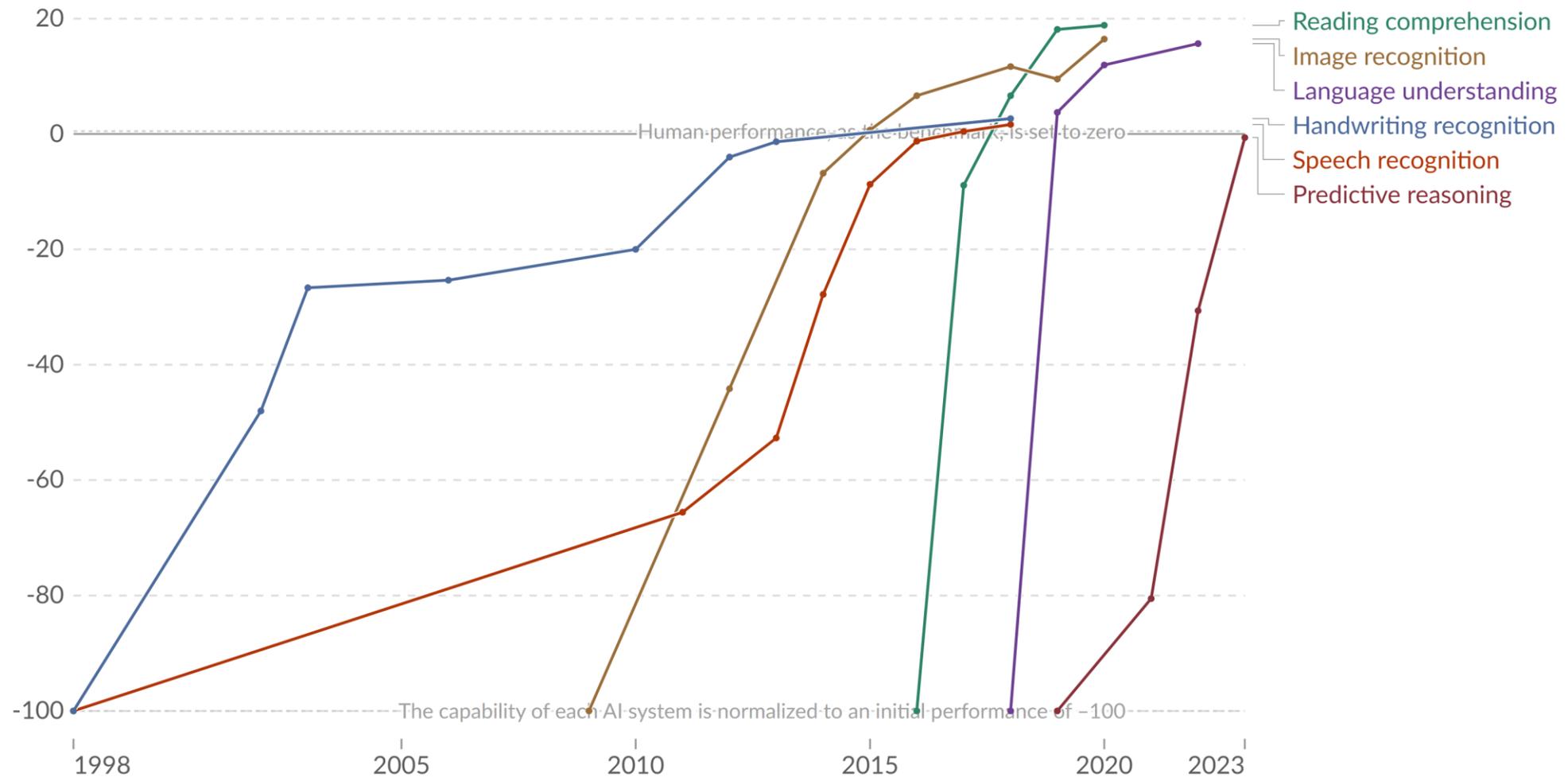
Summary

Artificiële
Intelligentie

Robotica

Autonome
robots

Physical AI

Test scores of AI systems on various capabilities relative to human performance

Within each domain, the initial performance of the AI is set to –100. Human performance is used as a baseline, set to zero. When the AI's performance crosses the zero line, it scored more points than humans.

Reading comprehension
Image recognition
Language understanding
Handwriting recognition
Speech recognition
Predictive reasoning

Human performance as the benchmark, is set to zero

The capability of each AI system is normalized to an initial performance of –100

OurWorldinData.org/artificial-intelligence | CC BY

Note: For each capability, the first year always shows a baseline of –100, even if better performance was recorded later that year.

ROBOTS HEBBEN MEER NODIG

De nieuwe AI kan data **omzetten** en nieuwe data **genereren**, maar...

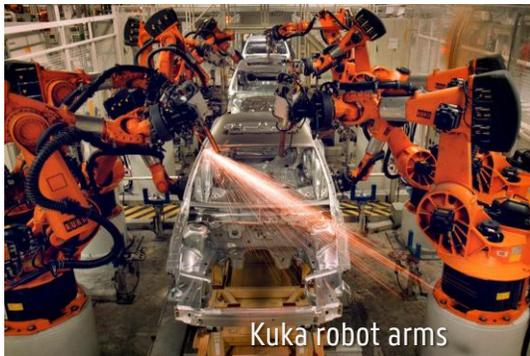dingen **doen** is nog steeds een uitdaging.
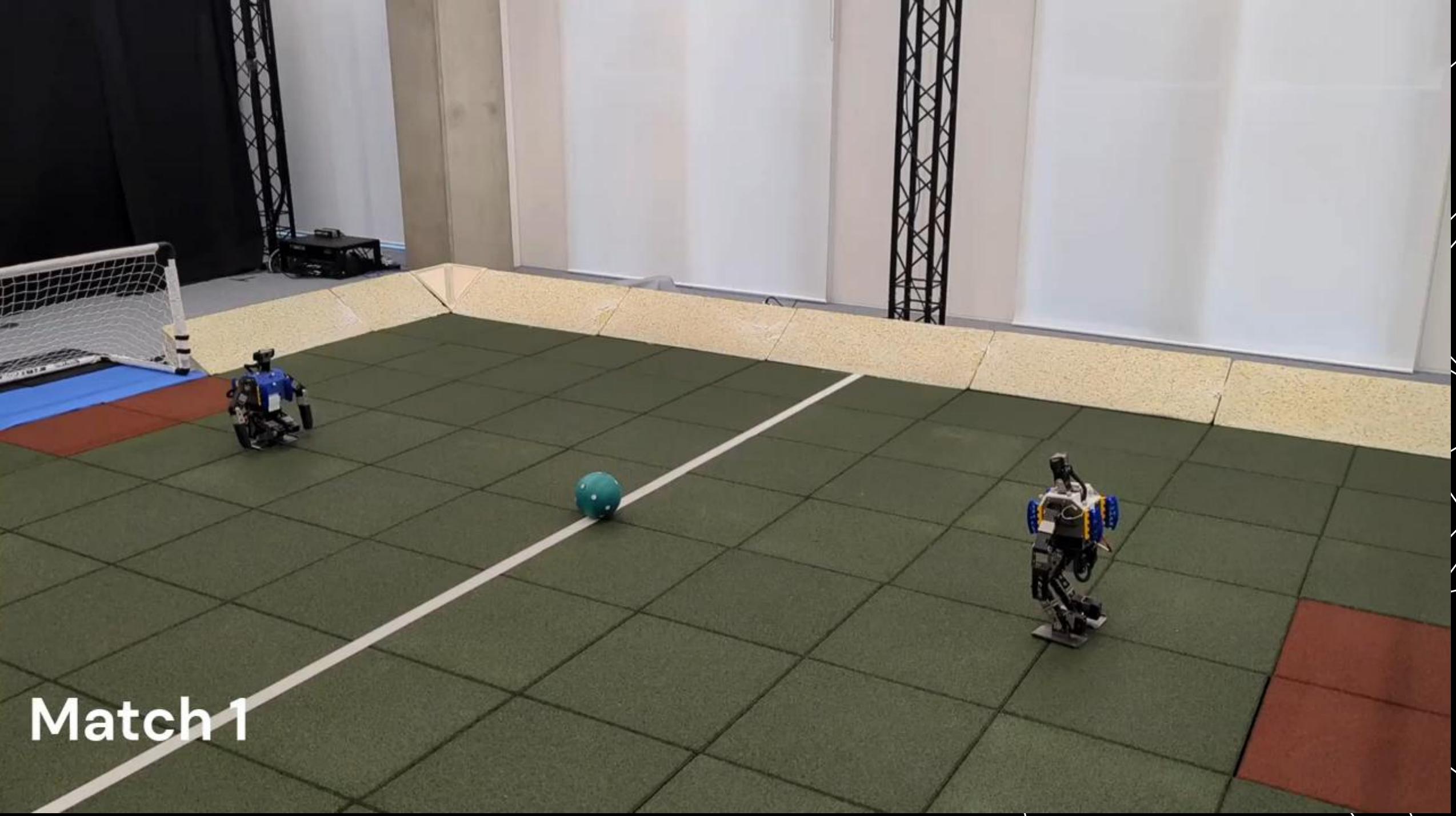
Match 1

Paradox van Moravec

Alles wat **moeilijk** is voor ons, is **makkelijk** voor robots

Alles wat **makkelijk** is voor ons, is **moeilijk** voor robots

Omgaan met de
fysieke wereld

Omgaan met de
social wereld

Kuka robot arms

Waymo self-driving car

Sawyer collaborative robot

Navel Robotics

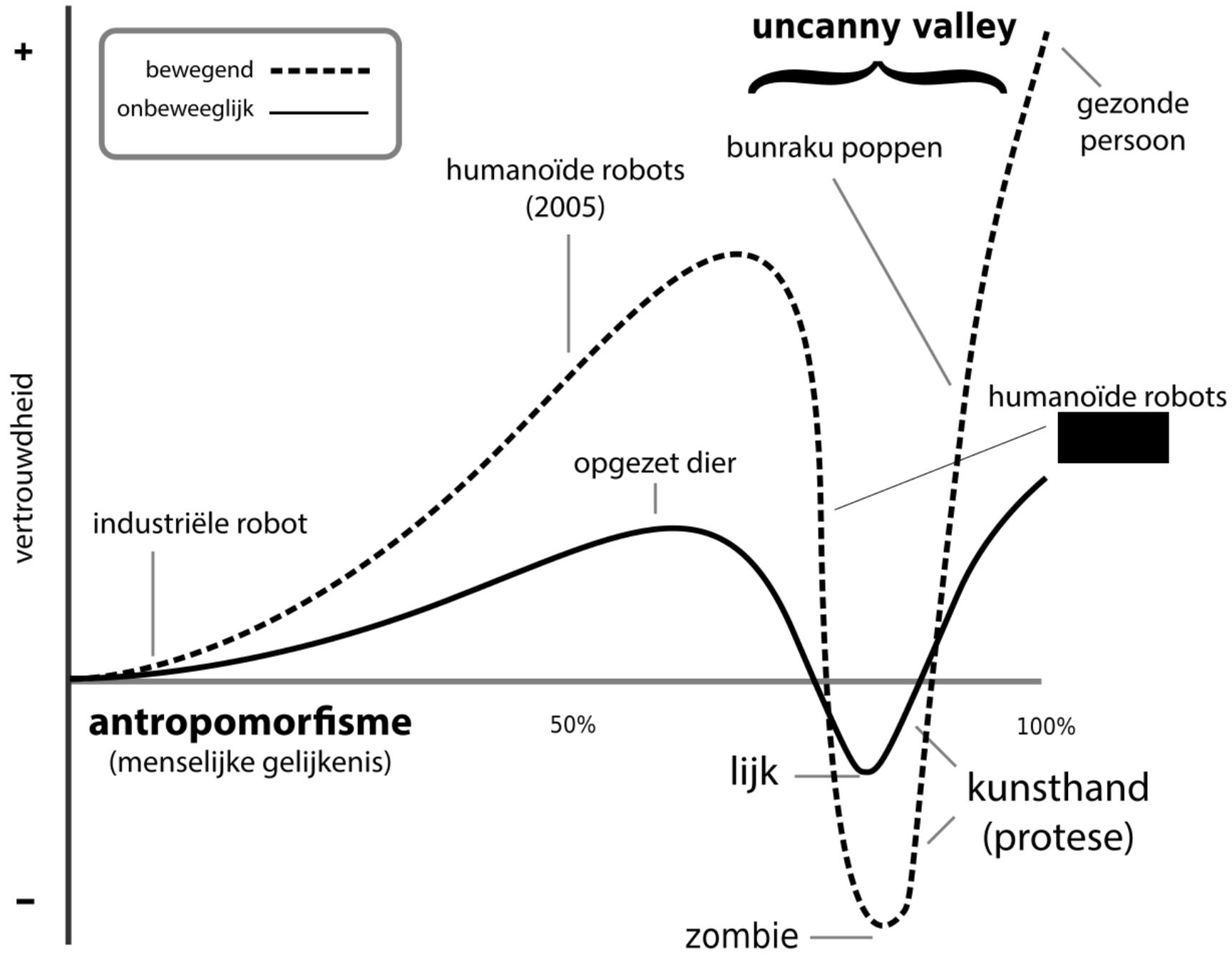iRobot Roomba vacuum cleaner

Geminoid android

WAAROM ROBOTS BOUWEN DIE OP MENSEN LIJKEN?

Humanoïden kunnen in menselijke omgevingen werken en ons gereedschap gebruiken.

We hoeven onze leefwereld niet aan te passen.

We kunnen naast elkaar werken, of zelfs samenwerken.

uncanny valley

bewegend - - - -
onbeweeglijk ——

vertrouwdheid

+

−

humanoïde robots (2005)

bunraku poppen

gezonde persoon

humanoïde robots

opgezet dier

industriële robot

antropomorfisme
(menselijke gelijkenis)

50%

100%

lijk

kunsthand (protese)

zombie

VERDER LEZEN

- De [griezelvallei](#) (uncanny valley).
- De [zelfrijdende auto](#).
- IEEE [nieuws over robotica](#).
- [China's dancing robots: how worried should we be](#) (The Guardian)

SESSIE 3 – SOFIE EN TONY

Uitdagingen en gevaren van AI

Job displacement

Bias

Privacy

Deepfakes

Trustworthiness

Weaponization

Ethical

Fear of AI

More info

- https://www.forbes.com/sites/bernardmarr/2023/06/02/the-15-biggest-risks-of-artificial-intelligence/
- https://it.tufts.edu/costs-and-risks-artificial-intelligence
- https://www.ibm.com/think/insights/10-ai-dangers-and-risks-and-how-to-manage-them
- https://www.ibm.com/think/topics/trustworthy-ai

THANK YOU

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