Big Data & AI – Perspectives and opportunities

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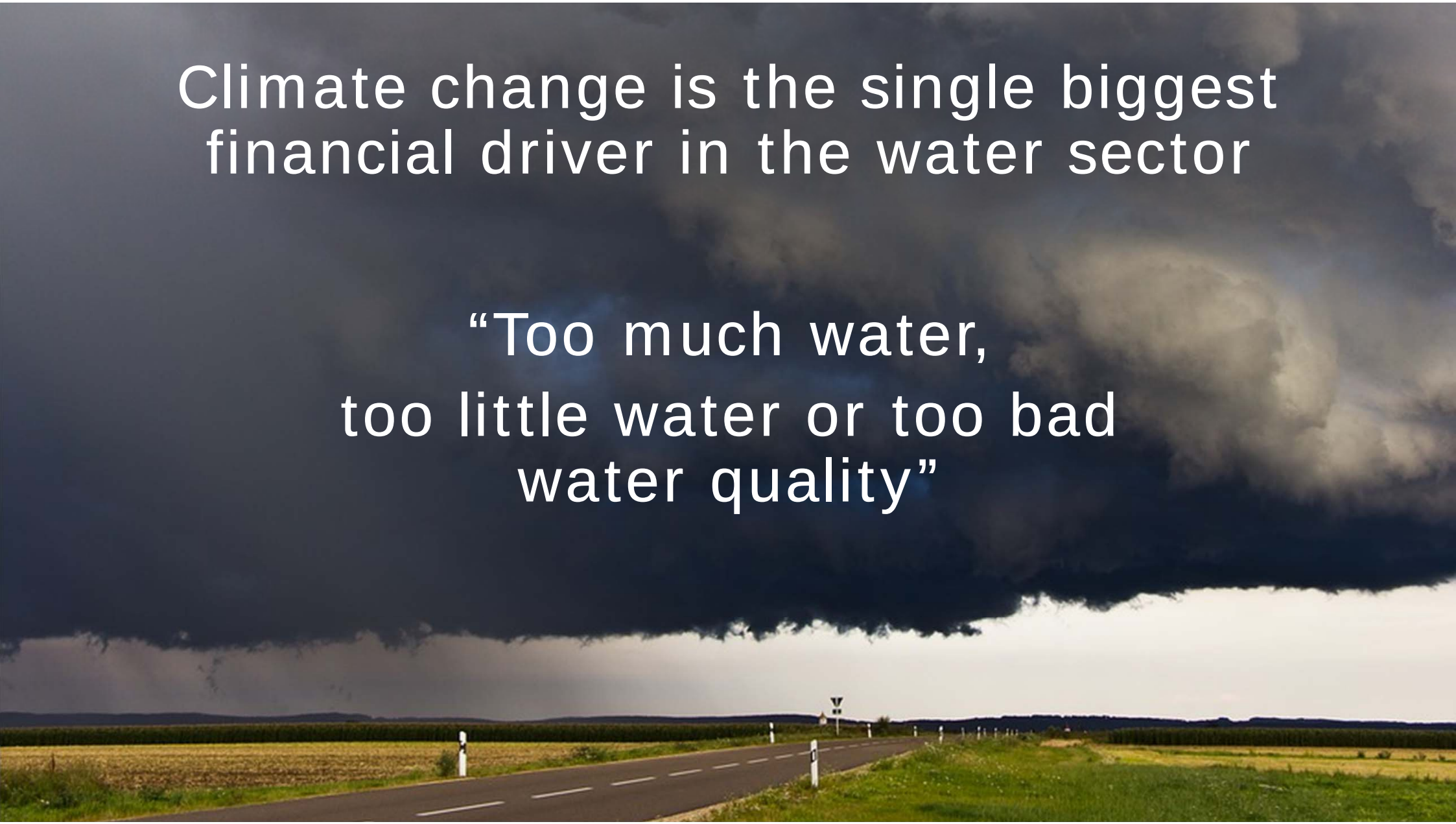
Agenda

Financial drivers and expectations

Application and maturity of AI

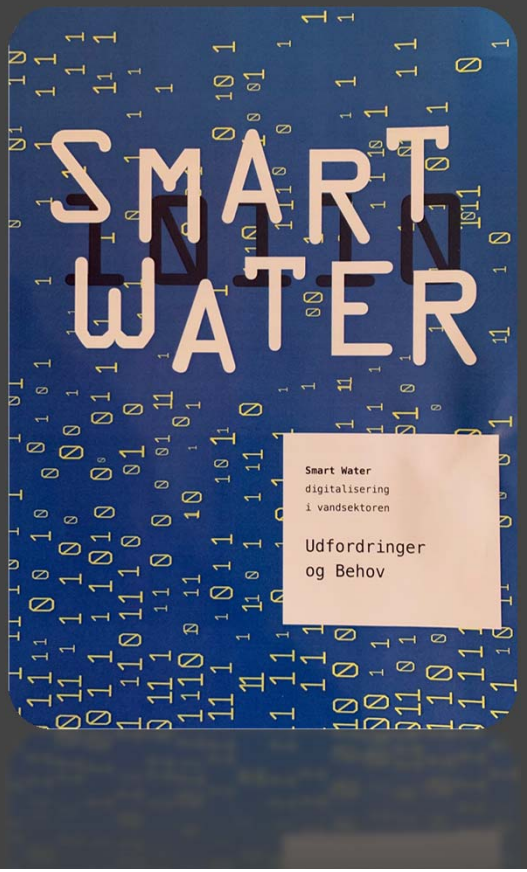
Examples of applied AI in the DK Water Sector

New players in the DK Water Sector

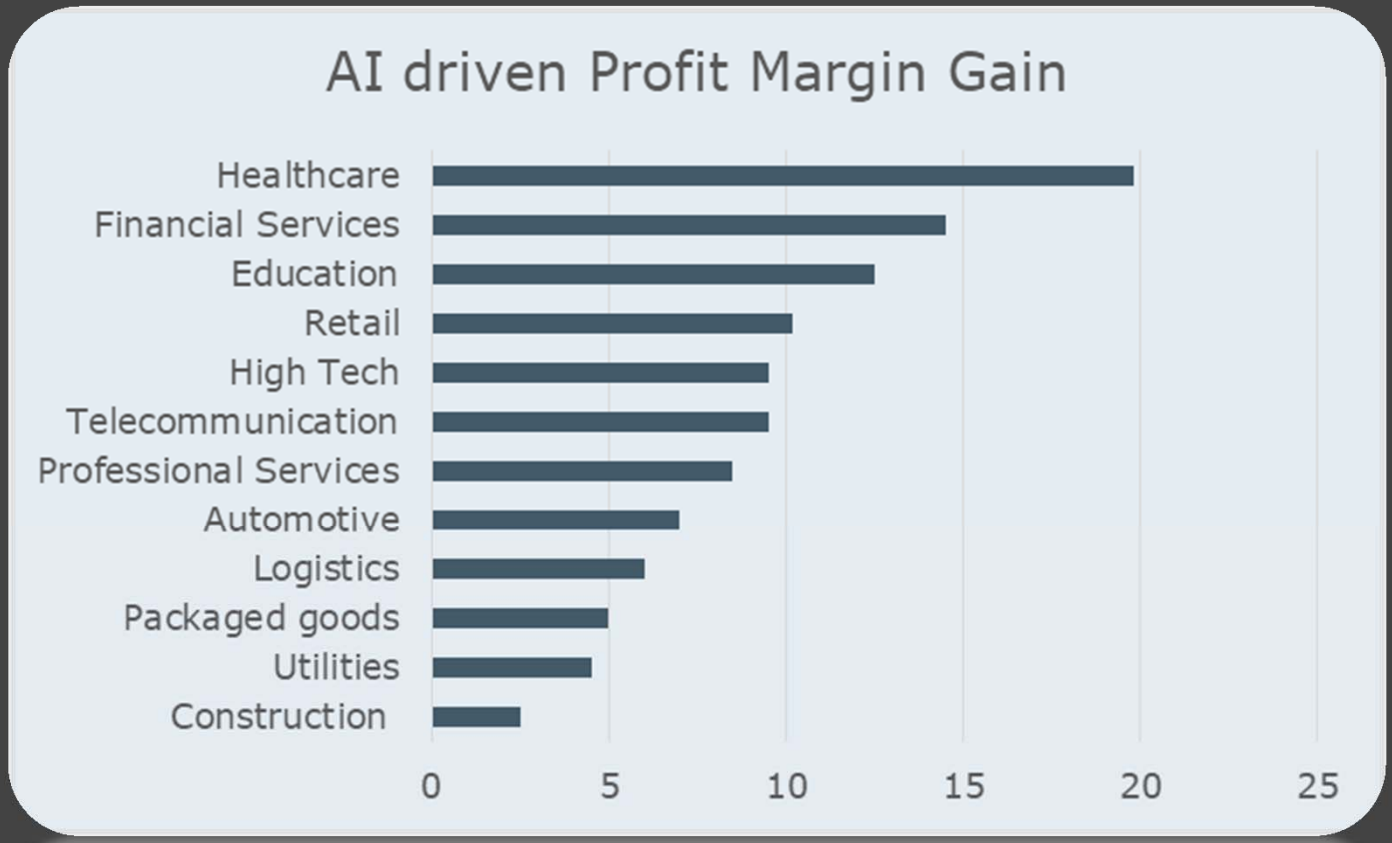

Climate change is the single biggest financial driver in the water sector
“Too much water,
too little water or too bad water quality”

Why we need a new approach…

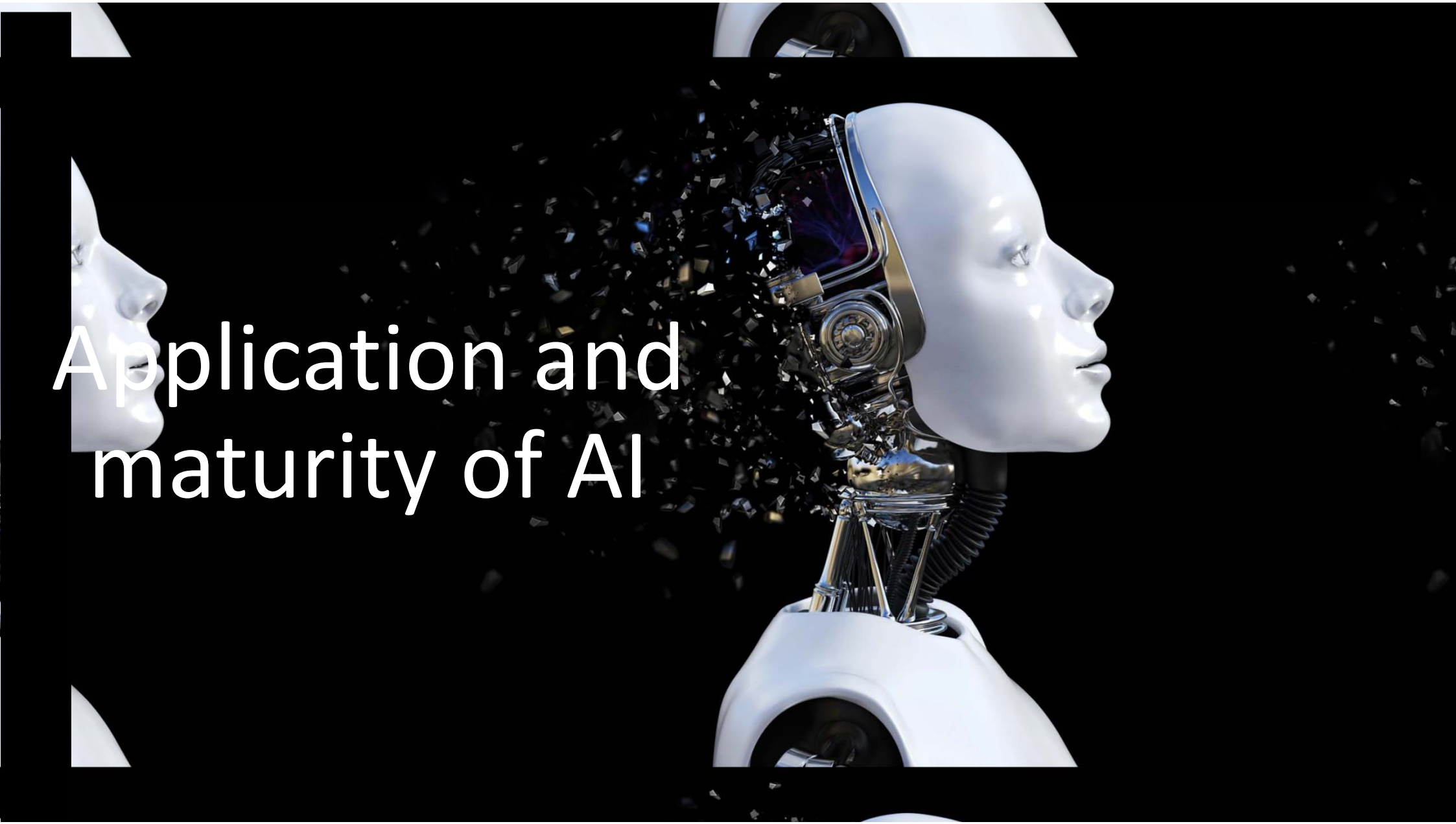
We cannot simply design and build our way out of the effects of climate change with engineering solutions alone – we need to do things smarter…



Financial expectations to applied AI



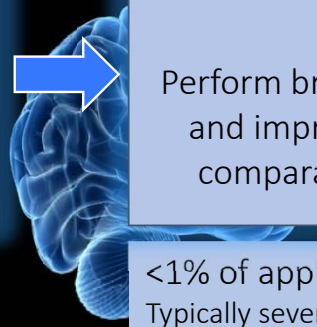
Source: MOVE TO AI 2018


Application and
maturity of AI

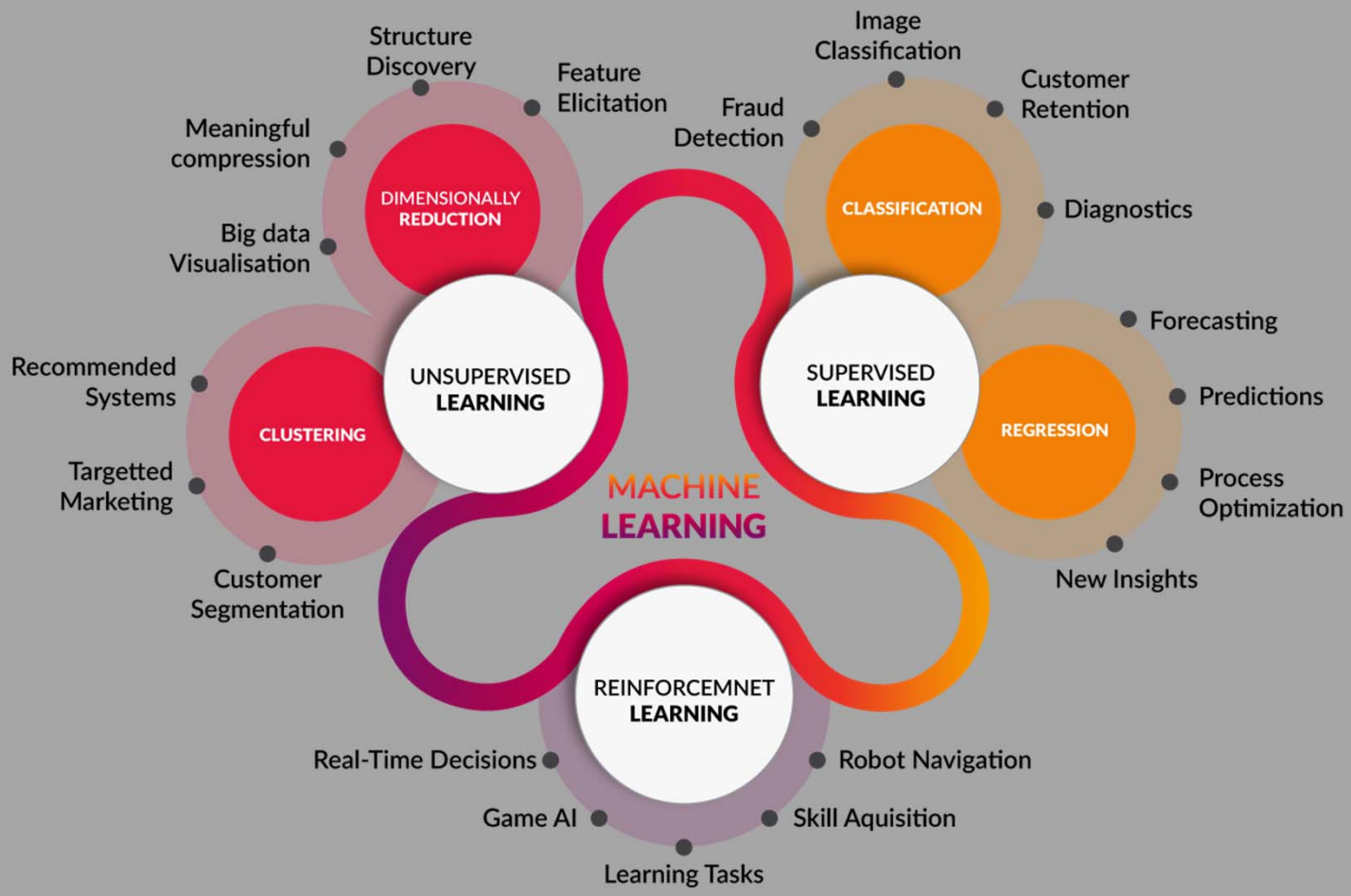
How mature is applied AI?

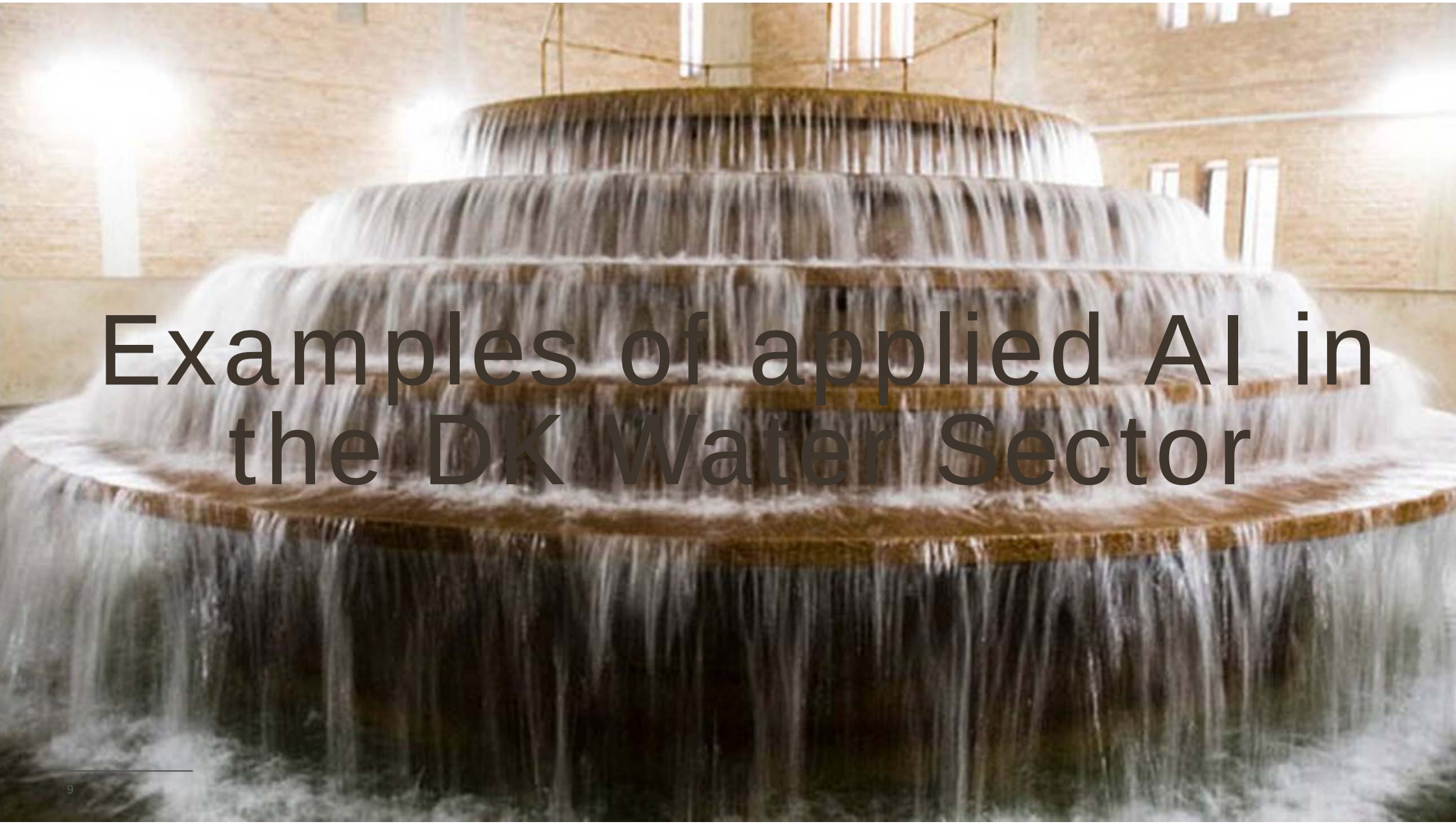
AI stages:

Artificial Narrow Intelligence (ANI)	Artificial General Intelligence (AGI)	Artificial Super Intelligence (ASI)
Execute specific focused tasks, without ability to self-expand functionality	Perform broad tasks, reason and improve capabilities comparable to humans	Demonstrate intelligence beyond human capabilities
99% of applied AI Typically Machine Learning e.g. image and speech recognition, regression modelling, play chess etc.	<1% of applied AI Typically several machine learning models co-working and removing human bias. E.g. on-line job interviews with massive ML functionality than detects sentiments, moods, lies etc.	Not applicable… yet



Machine learning in 3 dimensions…

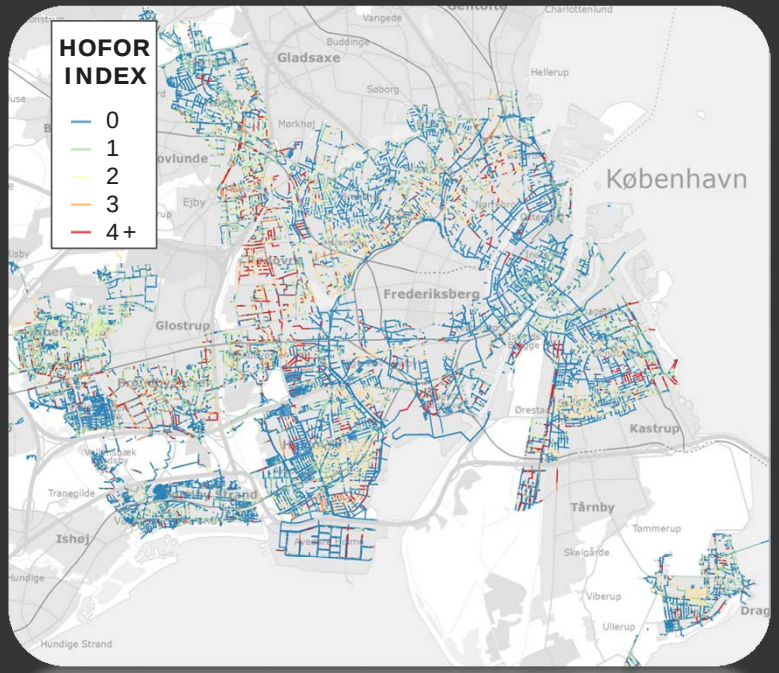




Examples of applied AI in the DK Water Sector

Predictive maintenance of sewer systems

What sewer pipes need urgent replacement?



For **all** sewer pipes we have “asset data”:

- Metadata (age, material, dimensions, length)
- Information about groundwater, soil type etc.
- Proprietary information (BBR etc.)

For **most** sewer pipes we have:

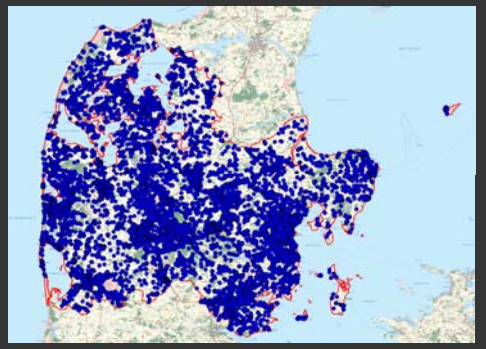
- TV-inspections (ground truth) => used to calculate a physical index.

We have trained ML algorithms by combining “asset data” and TV-inspections to:

- Calculate a physical index where TV-inspection have never been done
- Update a physical index based on age extrapolation of the pipes

Prediction of High Shallow Groundwater

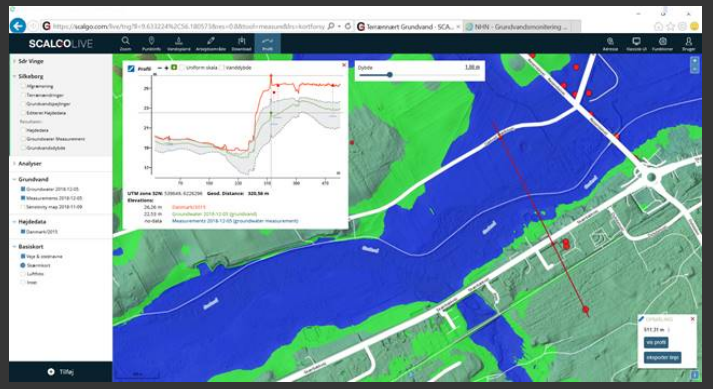
Water levels from +15.000 sampling points
Heavy statistical computation/normalisation of data (COWI Connect platform)



Patterns in areas with data is used to predict water levels in areas with no data (Random Forrest ML)

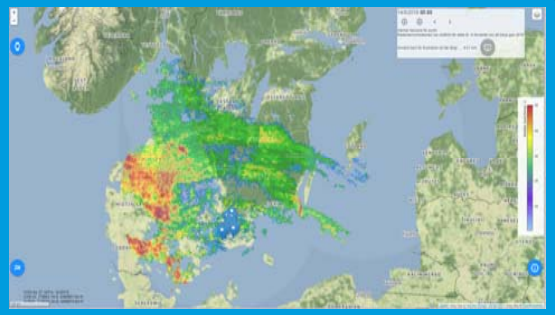
GEUS

Flooding prediction using a highly advanced 3D terrain flooding model (SCALGO LIVE)

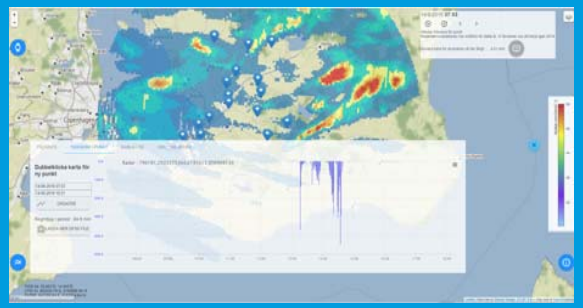


Measured Mass Balance in real-time

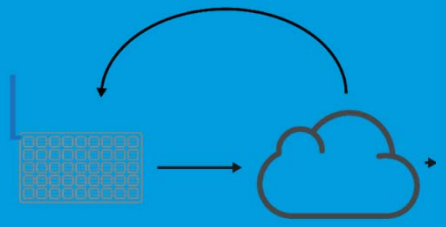
InforMetics



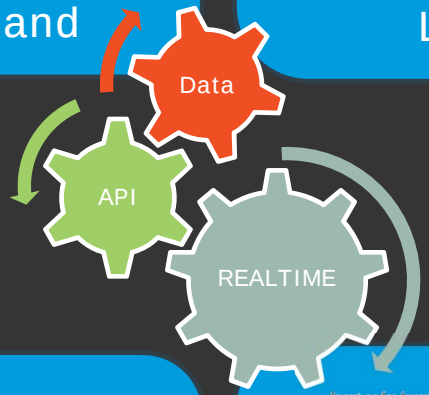
Regional C-band



Local X-band



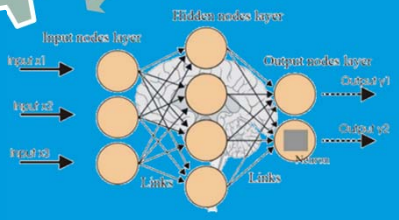
IoT - wireless measurements



MIKE Powered by DHI

Models

Quality Existing/ traditional measurements



Predictive Neural networks

Satellite Data
GIS data
Weather forecasts

New players in the DK Water Sector

Deloitte. Digital

IBM

kapacity Business Analytics

Ny teknologi på vej til miljøområdet

03-07-2018

Miljøstyrelsen hyrer eksperter for at fremme brugen af innovation og ny teknologi.

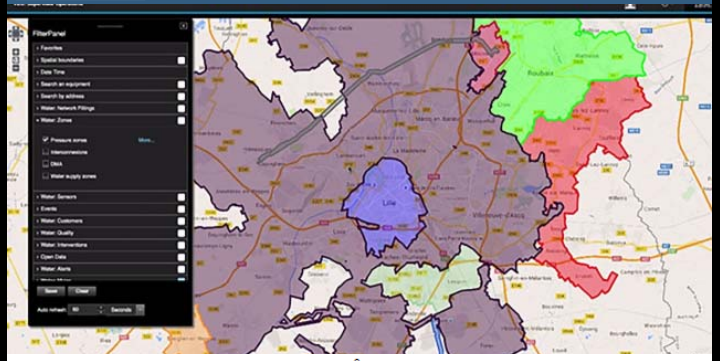
Kunstig intelligens, *internet of things*, sensorer og droner. Det er blandt andet den slags ny teknologi, som Miljøstyrelsen fremover vil bruge mere blandt andet i overvågningen af naturen og vandmiløet.

For at få analyseret mulighederne for at bruge mere ny teknologi, har Miljøstyrelsen netop indgået en 4-årig rammeaftale med konsulenter fra Deloitte Digital og Alexandra Instituttet.

IBM Water Operations for Waternamics

IBM Water Management is a predictive analytics platform that helps make sense of data deluge and engage citizens to collaborate across water operations.

Contact us



Miljøstyrelsen igangsatte derfor i foråret 2018 projektet " Digitalisering i Vandsektoren". Det overordnede formål med projektet er at bidrage til at Danmark kan fastholde en global førerposition inden for vandteknologier. Endvidere skal projektet bidrage til en øget effektivisering i forsyningsselskaberne samt bidrage til et kvalitetsløft i overvågningsprogrammer for vandkvalitet.

Conclusions

- Big Data and Applied AI is already part of the DK Water Sector
- Machine learning/Deep learning can replace or supplement traditional numerical modelling
- New players have entered the sector – strong on technology, weak on domain knowledge
- We need to embrace all technologies that can make us handle the effects of climate change on our wetlands, nature, habitats, wet utilities, infrastructure etc.
- Professional experience and domain knowledge is more important than ever…

Thank you and stay in touch!

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