Service Leaders Summit 2022

Presentation Session 1

Deloitte.

Meeting the challenges of the future with the technology of yesterday? — No way!

Prof. Dr. Sabina Jeschke, Senior Advisor to Deloitte

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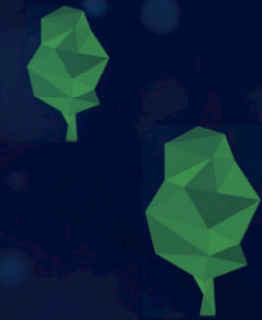


Prof. Dr. Sabina Jeschke

Senior Advisor Deloitte // Non Executive Board Member // Former Board Member Deutsche Bahn AG
CEO KI Park e.V. // CEO Arctic Brains AB // CTO Quantagonia GmbH
Hon.-Prof. RWTH Aachen University & TU Berlin

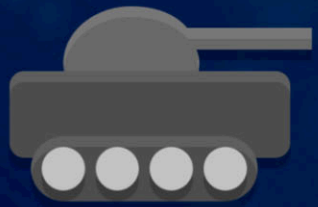
Five drivers –
Different timescales –
Several trends

Climate Change

Individualization

Virtualization

The End of Peace



Covid-19

Automatization

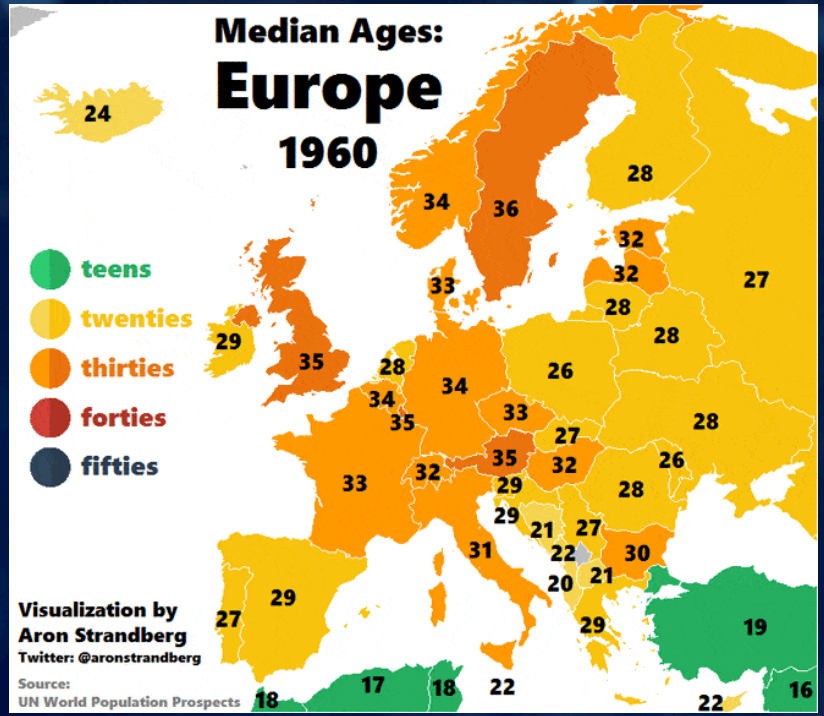
Industry 4.0

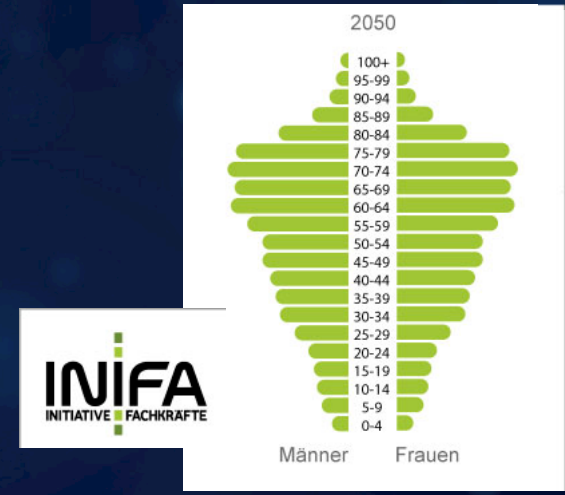
Demographic Change


Automa-
tization
New ways
of work
Hybrid
Teams
Getting
green
The future
of AI
. . .

Let’s automize

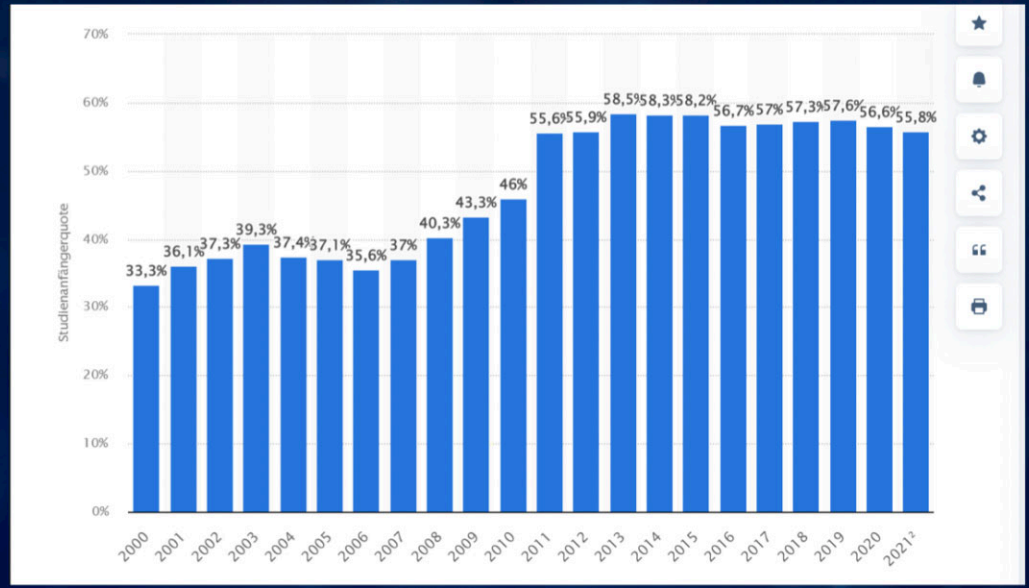
Aging societies in Europe





… having massive impact
on the labor force available

Academization „doubles“ the effect in certain fields and branches



- GERMANY:
  51% High School (2018)
  57% University (2019)
- SWEDEN:
  90% High School (2019)
  60% University (2019)

[src: Statista, last visited 05/2022, Development of the first-year student rate[1] in Germany from 2000 to 2021]

Alternatives to deal with the challenge

Reduction of productivity, reduced efforts for sustainability, …

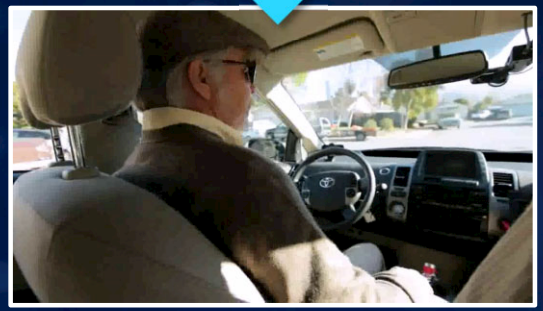
OR

directed, comprehensive migration

Comprehensive automation !

4th industrial revolution – The AI revolution

Google Car 2012

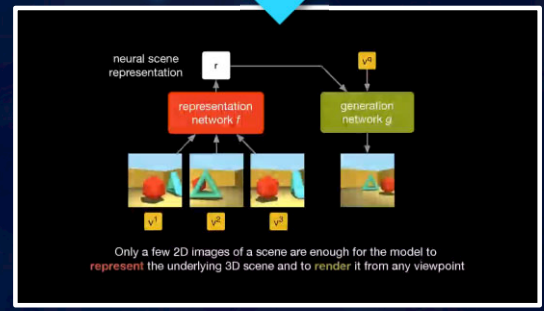


AI right among us

Car2Infra-structure

Networked intelligence

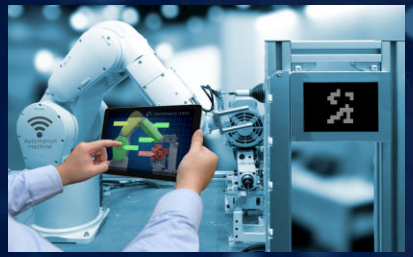
Scene understanding (2018)



Creative minds

Artificial intelligence – New ways of automatization

AI in law and legal services



… not restricted to production only!

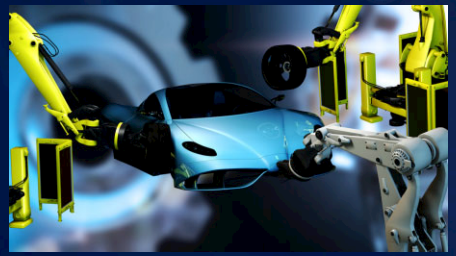
Explainable AI

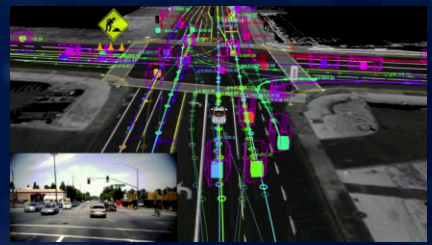
Certifiable AI

Cognitive computing

Affective computing

AI in finance and insurance





AI in mobility

AI in medicine

AI getting emphatic

AI & emotions

Covid-19 – proof of concept

Enhanced virtualization

Home office

Home schooling

> "The **coronavirus**, and its economic and social fallout, is a **time machine to the future**.
>
> Changes that many of us predicted would happen over decades are instead taking place in the span of weeks."
>
> Anne-Marie Slaughter (2020),
> President of the New America Foundation

Long-distance working

Distance universities

Remote office

Virtual meetings

Virtual team building


Let’s make work
more flexible

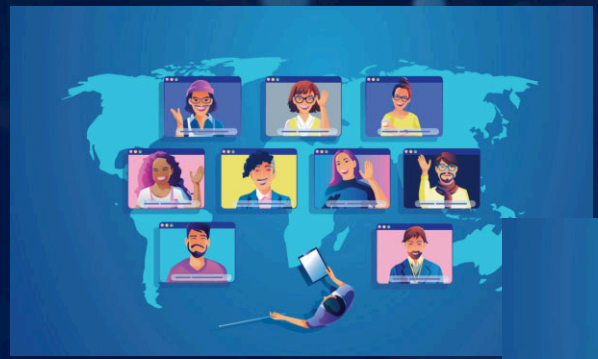
The real impact of Covid-19 – Not the trigger, but the…

Accelerator

Proof of Concept

Professionalizer

Virtual meeting environments – New ways of communication



worldwide

digital

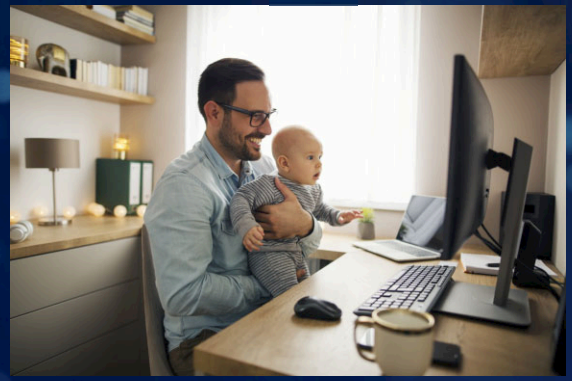
text-, audio-,
and video-based

1:1
1:m
m:n

extremely fast change (“over night”)

Free choice of place of work

An old idea… enhanced



Work at home

Dynamical assimilation

The third place

Digital nomads, extended

Work abroad

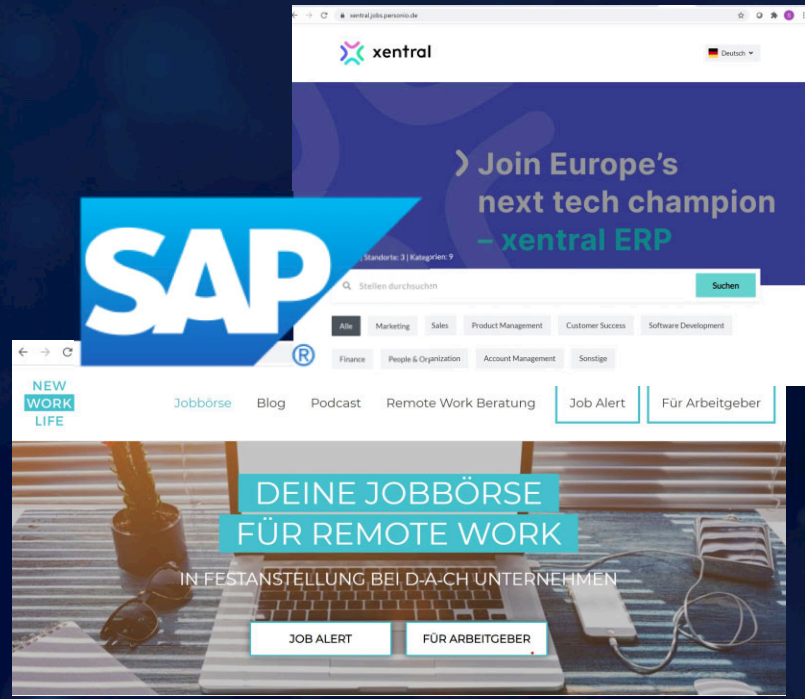
Leading to new “family living models”

… also leading to severe consequences for HR

Remote work entering new fields

New areas getting automated

(New) players fighting for talents

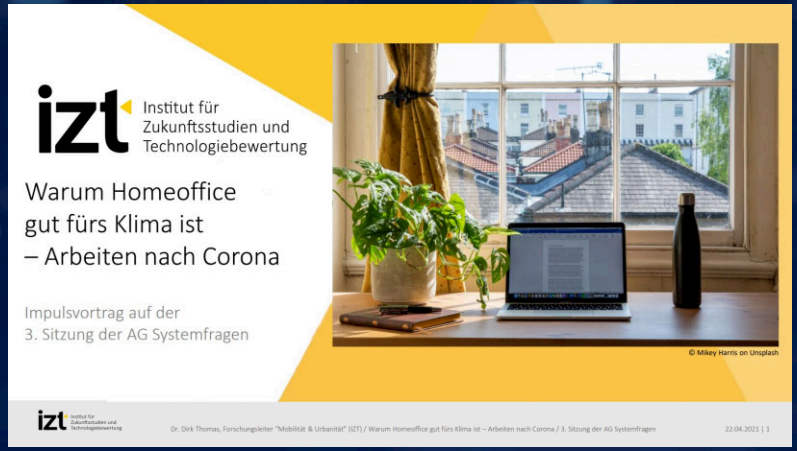


AR and VR allowing for new cooperation models over distance

Professionalization
of digital collaboration
beyond video conferencing tools

„Home office for sustainability“

Reducing traffic…



[src: Dirk Thomas - Head of Research "Mobility & Urbanity" at the Institute for Future Studies and Technology Assessment (IZT)]

… versus reducing rushhour peaks:

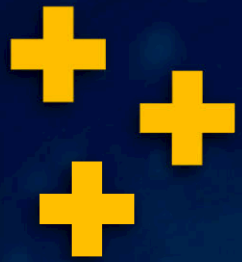
- public transport must always be designed for peak loads, these are caused by rush hour traffic
- thus, enhancing home office leads to a better usage of existing infrastructure

How about “the others”…

- In nursing professions
- in medical professions
- in logistics
- in trade
- in education
- …

For those employment areas,
“home office” is often not an option!

Disadvantages, e.g., due to additional travel times



Let’s embrace diversity

New (inter-) national recruiting/working opportunities

Challenge language

Chance diversity

Welcoming Ukrainian and Russian refugees

- Temporary Protection Directive (Council Directive 2001/55/EC) allowes refugues from the Ukraine to stay up to 3 years, incl. access to the labor market, schools, universities etc,.
- Large number of IT specialists, but also other important fields as e.g. health care
- By 22-04-22, about 3-4 Mio people left the Ukraine, estimation go up to 10 Mio
- Estimation for Russia: about 10% of the IT people are about to leave their country

→ Enhancing the welcome culture, e.g. towards language issues

Hybrid teams taking over: new partners WITHOUT bodies

From recommendation systems for information…

Google

amazon

alexa

… or private use of e-Commerce, more and more based on natural language

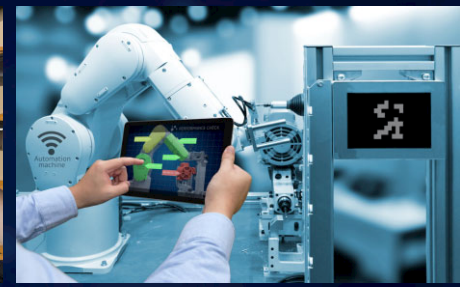
DB

… to data driven AI agents in the job

… and WITH bodies:
Robots, cobots, and other autonomous systems

… to new shapes

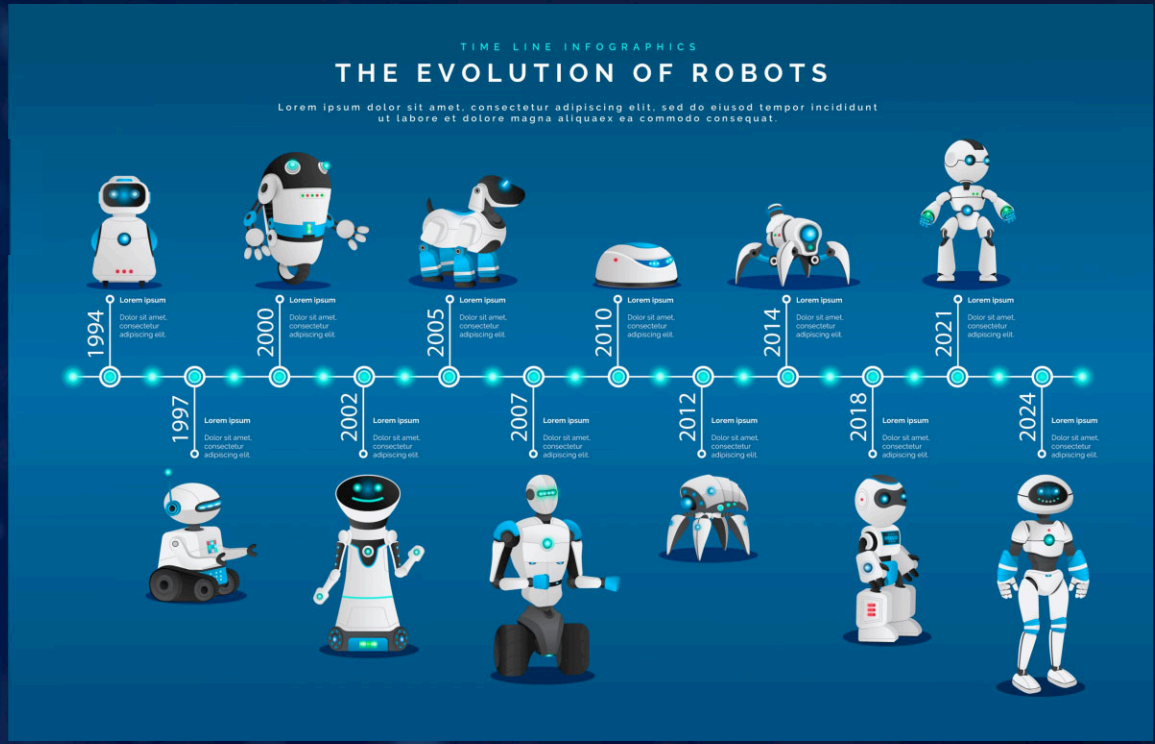
… in near contact



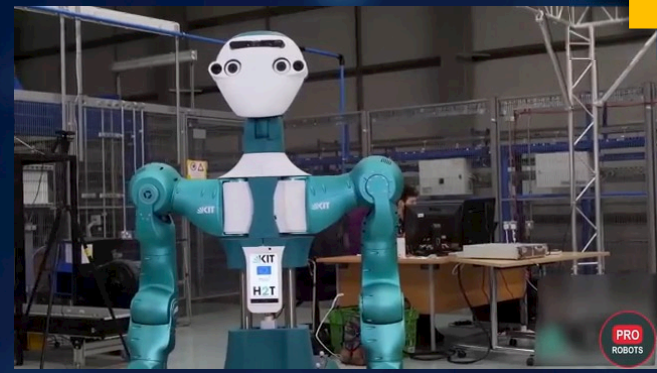
Trend towards humanoids or semi-humanoids – resulting from hybrid teams

Why?

- simple and uniform interaction with the natural human environment
- Useful in particular when the natural environment of people should be changed as little as possible (e.g. in the private environment, but also in office environments, care facilities, etc.)

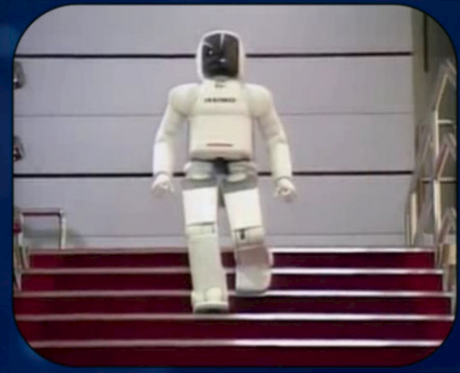


Humanoids in action



AMAR 6, KIT

Robonaut 2 (R2) - NASA



Asimo Honda

Atlas Boston Dynamics

Autonomous Systems for sustainable mobility

Autonomous trains (e.g. SNCF, planned from 2023)
- less energy consumption via autonomous driving
- better usage of existing infrastructure
- AI solving the problem of the non-existing train drivers

Platooning (e.g. „Konvoi“, 2009 RWTH)
- slip stream effect reduces Diesel consumption
- ensures more efficient use of freeway space


Get green actively!

Reduce – Optimize – Improve!

Strong limitations, in particular because of the need of worldwide common actions!

Reduce –
„stop doing“

Reduce – Optimize – Improve!

Strong limitations, in particular because of the need of worldwide common actions!

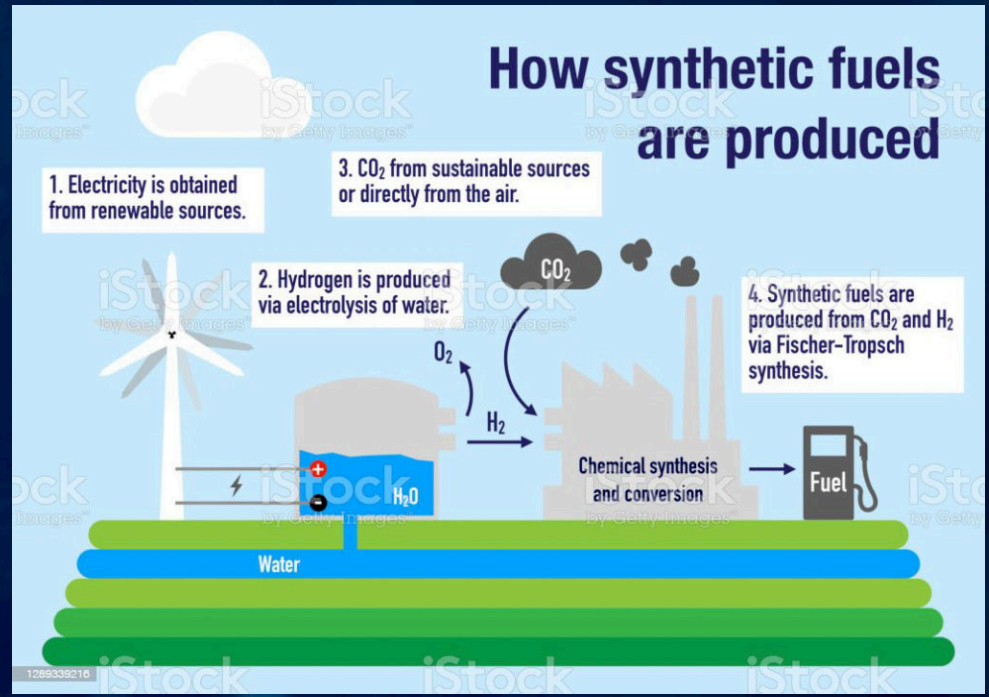
Reduce –
„stop doing“

Better chances as solutions can often be “shared” and transferred

Optimize –
„improve process“

Synthetic fuels

- For planes, trains, ships and others
- Of strong importance to systems with a very long lifetimes (about 30-40 years for trains, e.g.)
- Technologies are pretty clear by today, but the production is still in it still in an earky stage
- Solutions can be “shared” all over the world

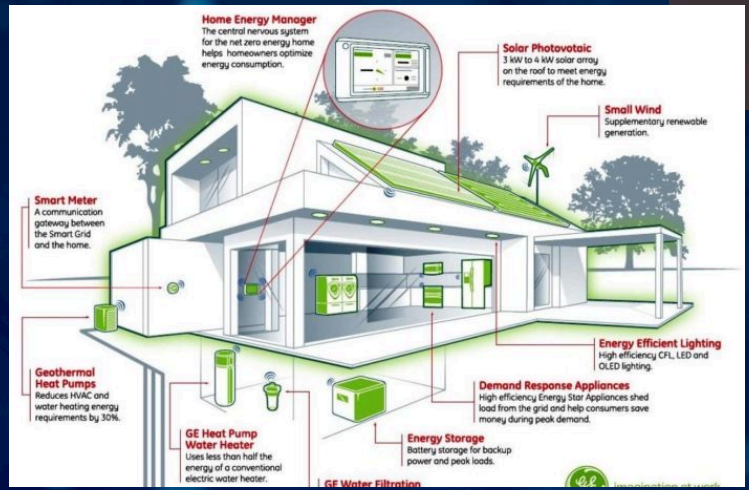


Condensation trails of airplanes

- Only 1/3 of negative climate impact of planes comes from kerosene combustion
- About 50% comes from condensation trails, leading to heating effects
- However, these heating effects can be reduced by variations in flight altitude and flight route (in some cases even leading to cooling)
- solutions can be “implemented” all over the world

Simulations and solutions for …

In-vitro meat



Climate-friendly houses

… and many more topics!

Climate-smart cities

Reduce – Optimize – Improve!

Strong limitations, in particular because of the need of worldwide common actions!

Reduce –
„stop doing“

Better chances as solutions can often be “shared” and transferred

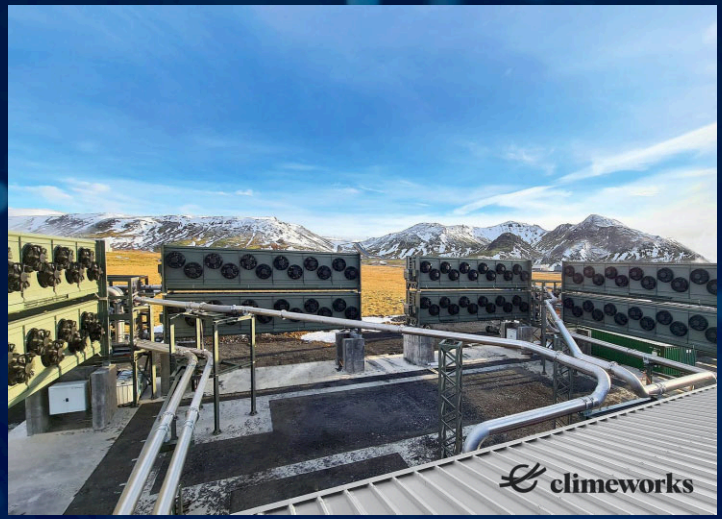
Optimize –
„improve process“

very demanding but with opportunities for a better world

Improve –
„reverse damages“

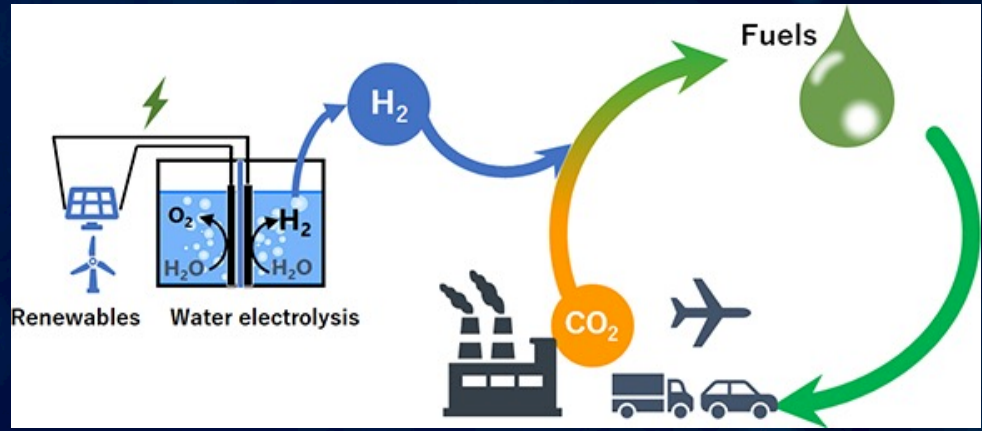
Removing CO2 out of the air

In order to achieve the Paris goals, the world must not only emit fewer greenhouse gases, but also get CO2 out of the air again. Changes for outstanding engineering nations!



1st step: Hellisheidi/Iceland (Climeworks, Swiss): todays' largest machine that extracts CO2 from the air. So far to small and to expensive, but technology still young, not yet on an industrial scale

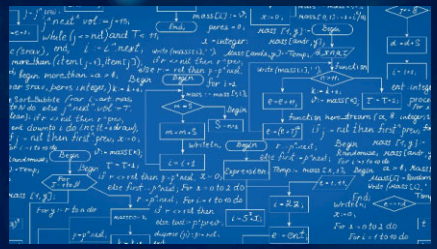
2nd step: either store it – or re-use it as a rwa material, e.g. for synthetic fuels for aircraft, cargo trains and trucks



The Future of AI

The 3 shades of AI

TODAY



Algorithm-driven phase,

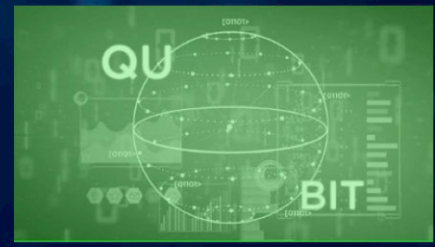
e.g. deep learning

TOMORROW

Connectivity-driven phase,

e.g. 5G

DAY AFTER TOMORROW



HPC-driven phase,

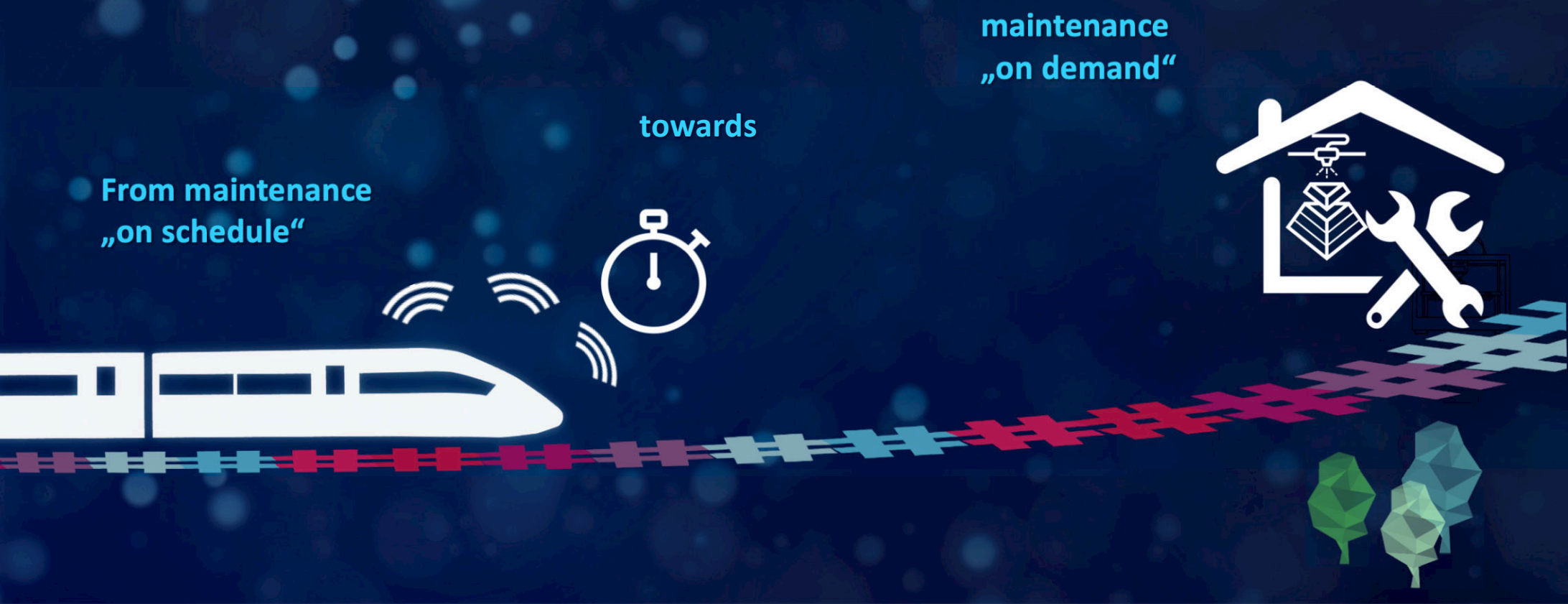
e.g. Quantum Computing

I - Algorithm-driven phase

Supervised	Unsupervised	Reinforcement
data driven	data driven	trial and error driven
((classification/ regression)	((clustering/ similarity detection)	(learn to react to environment)
prognosis	analysis	acting with decisions

Deep learning (deep neural networks)

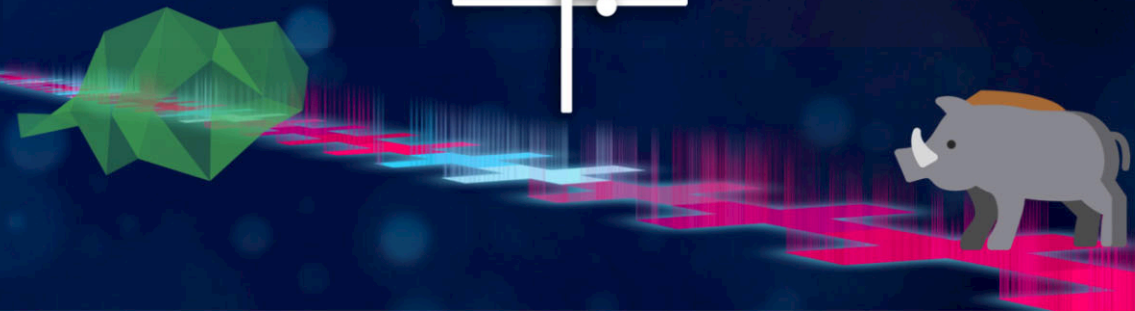
I - Algorithm-driven change in business models



II - Connectivity-driven phase

5G triagle by 3GPP

Allowing to separate
„brain“ and „body“



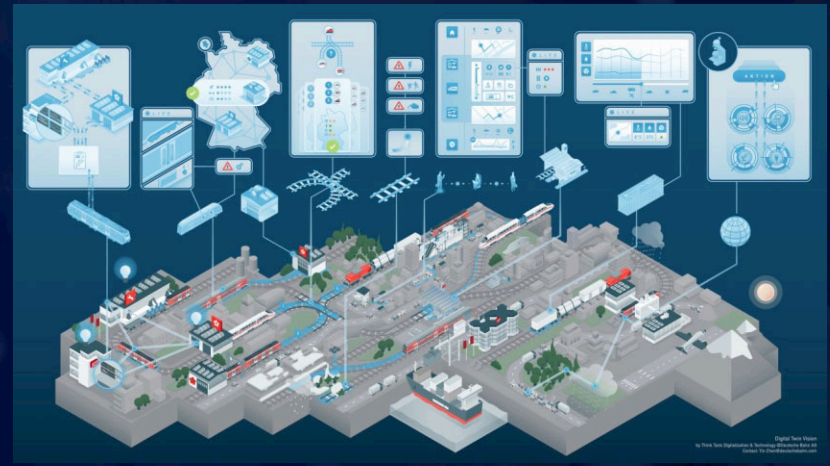
II - Connectivity-driven digital twins

A **digital twin** is a “physically correct” virtual representation of a physical object category, e.g. of ICE4-trains. It serves as the digital counterpart e.g. in simulations and test environments.

An **“individualized/personalized digital twin”** would be the twin of a specific entity oft the fleet, say “ICE-4 no. 9001”.

Realtime-capability of individualized digital twins allows to control and steer the individual physical objects in realtime, thus forming the basic for networked autonomous systems.

Digital twin as representative vs. digital twin of a individual object



III – Quantum Computing-driven phase

You have a problem? Quantum computing is here to help!

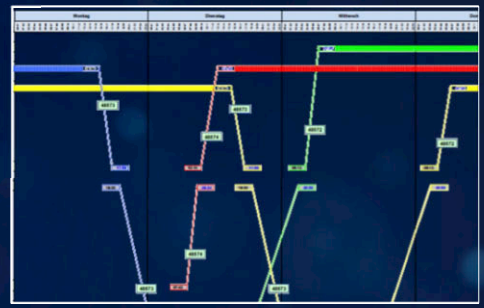
Computational types of problems

Areas of application	Optimization	Simulation	Machine Learning
	Identify the best solution among a set of feasible options.	Natural processes that are difficult/impossible to compute today.	Identify patterns in data to train novel algorithms.
General	Problems that appear in a wide range of businesses, organizations and industries. *For example: supply chain optimization, route planning, allocation of resources, energy distribution, etc.*		
Specific	Problems that appear only in selected industries that tend to be research-/science-intensive. *For example: drug discovery in pharma, catalyst design in chemistry, fluid dynamics in material science, etc.*		
Product-oriented	Enhancing existing or future products with quantum computing. *For example: real-time analysis of sensor data, IoT, etc.*		
Security-related	Enhancing current encryption protocols with post-quantum cryptography. *For example: quantum cryptography, general encryption, prime factorization, IT/cyber security, etc.*		

III – Quantum Computing examples

„understanding“ pictures…

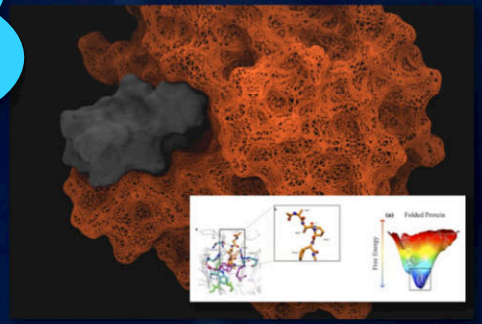
Optimizing routes and utilization of infrastructure



Portfolio optimization

In common: enhanced computational power to reduce risk and uncertainty

Speeding up reinforcement learning, replacing Teach-In



Discovering new proteins, sppeding up development time

III – Quantum Computing for sustainability

Reducing energy: A quantum processor has to be isolated from its surroundings. This is done by shielding it and operating it at extremely low temperatures - about 15 millikelvin, colder than interstellar space. Hence, the processor is superconducting, which means that it can conduct electricity with virtually no resistance. This processor uses almost no energy and generates almost no heat, so that the amount of energy it consumes is just a fraction of a classical computer's.

Summary

Last thoughts

The **AI-driven** 4th industrial revolution leads to great opportunities, but also lead to extensive technological AND cultural changes in the companies.

The **new world of work** allows a greater degree of self-determination. New hybrid teams however form a new challenge. Rethinking leadership in hybrid worlds is a must.

The **War in Ukraine** defines a historical turning point for Europe. It is unexpected and disturbing as it questions well-established principles of modern humanity.

Thanks!

Meet me at

LinkedIn

Prof. Dr. Sabina Jeschke

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