

Key: Balance economic, ecological, social aspects

- ▶ Finance fundamental changes:
 - Internal combustion engine \Rightarrow electric, hybrid, fuel cell, CO₂-reduced fuels
 - Automated driving
 - Heating systems for buildings: from fossil fuels to CO₂-neutral energy
- ▶ IoT: viable business models at scale remain a challenge
- ▶ AI: job losses or job transformations?



Climate neutrality as a fundamental requirement

- ▶ Bosch first major industrial enterprise to be CO₂ neutral – already in 2020!
- ▶ Need to constantly reduce CO₂ compensation measures
- ▶ Energy efficiency is key!



Invented for life

products spark enthusiasm, improve quality of life, and help conserve natural resources.

Responsibility and sustainability for the benefit of society

Technology has to be: safe, secure, and trustworthy

Take people with us: Bosch invests EUR 250m / year in associate training (e.g. IoT, AI, software)



AISC



Economy



Ecology



Society



IOT

Bring digital and physical worlds together

ENABLEMENT



GOOD PROGRESS OVERALL

- ▶ 30 billion devices connectable worldwide
- ▶ Ubiquitous connectivity

Bosch

- ▶ 92% electronic product classes connectable in 2020
- ▶ IoT Tech-stack completed (IoT Suite)
- ▶ 10 Mio. devices connected to Bosch IoT-Suite

DIGITIZE EXISTING ECOSYSTEMS



ADVANCES

- ▶ Productivity increase with i4.0

CHALLENGES

- ▶ Heterogeneous landscape of ecosystems
- ▶ Limited use cases within ecosystem/domain constraints
- ▶ Cost / benefit often not yet attractive

CROSS-DOMAIN ECOSYSTEMS

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FUTURE POTENTIAL

Car



Home



Manufacturing

BCW20

 BOSCH

IOT

Bring digital and
physical worlds
together



NECESSARY STEPS

- ▶ Ease-of-use, trustworthiness-of-use, availability-of-use
- ▶ Cross-ecosystem interoperability
- ▶ Open data market
- ▶ Fundamental requirement:
Climate-neutral data storage and transfer

AI

Enabling intelligent products, machines and intelligent manufacturing

TODAY: Digital world and analytics



Picture recogn.
(photo search)

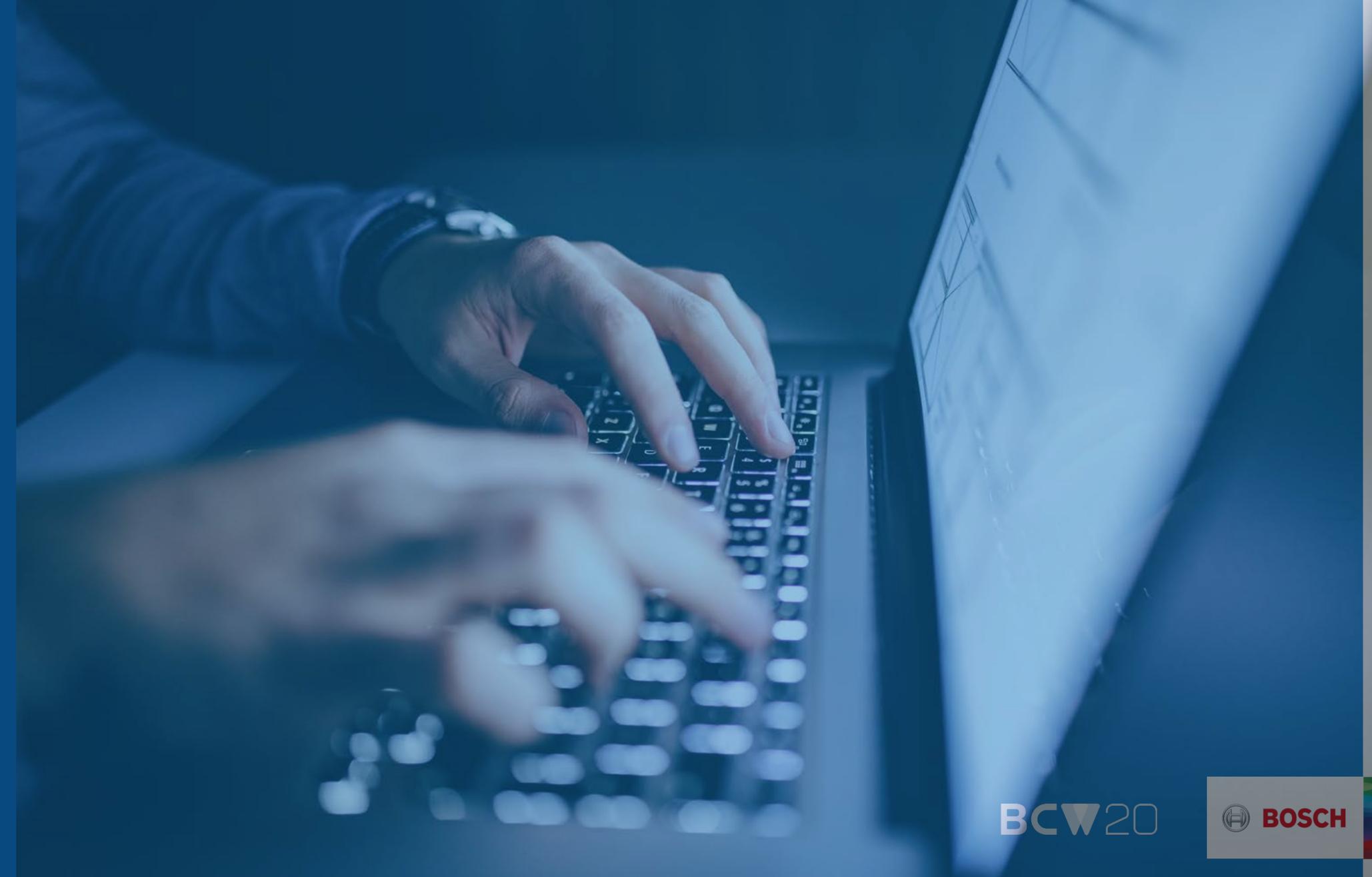


Video recogn.
(driver assistance)



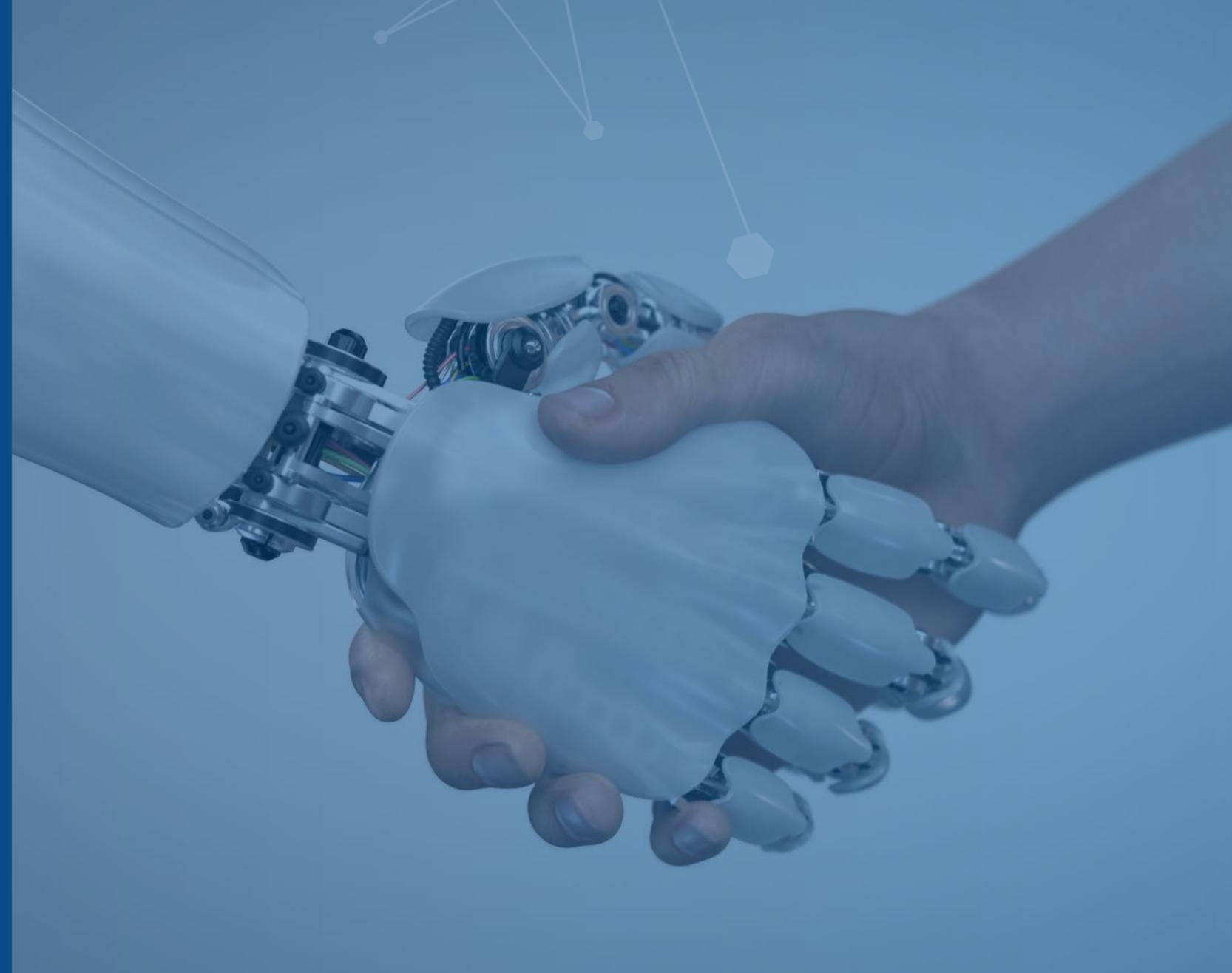
Language proc.
(translation)

- ▶ **Limited use in controlled environment**
sensitive to context changes and disturbances
- ▶ **Mostly digital use, focus on data analytics**
sometimes foolish, inexplicable results
- ▶ **Mainly cloud applications**
huge training and computing effort



AI

Enabling intelligent products, machines and intelligent manufacturing



TARGET: Physical world, control and automation



Smart robots



Automated driving



Industrial applications

- ▶ **Human interaction, complex control tasks**
- ▶ **Explainable algorithms**
- ▶ **EDGE and embedded AI**
small set of training data

AI

Enabling intelligent products, machines and intelligent manufacturing

BOSCH ACTIVITIES

Invest: research, industrial use, people

- ▶ EUR 300m in BCAI (Bosch Center for Artificial Intelligence)
- ▶ EUR 100m in AI campus (Cyber Valley Tübingen)
- ▶ 20,000 associates in training 2020

Bosch AI code of ethics:

- ▶ AI should help and support people (Invented for life)
- ▶ AI should not make decisions affecting people without human oversight
- ▶ We want safe, robust, and explainable AI
- ▶ We want to develop trustworthy AI



**SUCCESSFULLY
DRIVING CHANGE IN
CHALLENGING TIMES**

SUMMARY

- ▶ Keep economic, ecological, and social balance
- ▶ Bring digital and physical worlds together



IoT

single ecosystems

⇒ Cross-ecosystem use cases

Secure, interoperable,
open data market.



AI

narrow digital use cases

⇒ physical world, complex control tasks

Trustworthy AI
based on ethical principles

