Digital Transformation
–
Drivers, Challenges & Advantages

Centre Digitization.Bavaria

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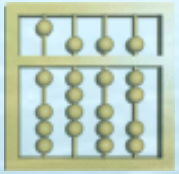

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Digital transformation is ...

... the change of the analog to digital, leading to virtual forms of information processing by

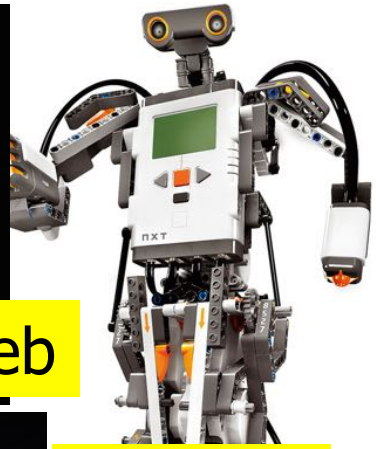
- application of digital technology,
- roll-out of digital infrastructure,
- development and usage of digital applications
- digital business models

and the induced changes in

- economy and industry
- society
- politics
- science
- education
- private life

Digital technology – changing the world

World Wide Web



Robotics

Big data

Smart phones

Internet

Mobile communication

Graphical user interfaces

Embedded systems

Data processing

High performance computing

The elements of digital change

- Digital Technology – *Technology Push*
  - ◇ Information and communication technology
  - ◇ Data and software
- Digital Infrastructure
  - ◇ devices, embedded systems, networks, …

- Digital Application – *Market Pull*
  - ◇ Diverse application areas (business, traffic, Medicine, Energy, Communication, entertainment, …)
- Digital business models – *Business Opportunities*
  - ◇ Digital value chains
- change in den enterprises – *Start Ups*
  - ◇ enterprise networks

dynamics result of an intensive mutual reinforcement

- Change of individuals' behavior and understanding of the world

Who will be transformed?

- Individuals
  - ◇ new ways to manage everyday life
  - ◇ digital literacy
- Economy – digital transformation
  - ◇ enterprises
  - ◇ start ups
- Education
- Science
- Technology
- Environment
- Society
- State, politics, and governance
- literally everything!

Drivers of digital change in the economy

- Innovative functionality
  - ◊ high acceptance, rapid adoption
- Cost pressure by rationalization of services
  - ◊ New financial models (advertising, data acquisition, ...)
- New competitors by networking
- Monopoles – acceleration effects by scaling
- Modular value chains
- Automation by innovative software
- Getting rid of locality in the market
- New business models by synergy, networking and composition
- Scaling effects – the winner takes it all
- Breath taking speed
- ...

Change the instruments and you will change the entire social theory that goes with them!

Latour, B. (2009): Tarde's idea of quantification, in: The Social after Gabriel Tarde: Debates and Assessments, Routledge, London, pp. 145– 162

Current Technology trends

- Big Data
- Cloud Platforms
- Virtualization
- Autonomy System
- Context Awareness
- Human Centric Systems
- Digital Engineering
- Augmented Reality
- ...

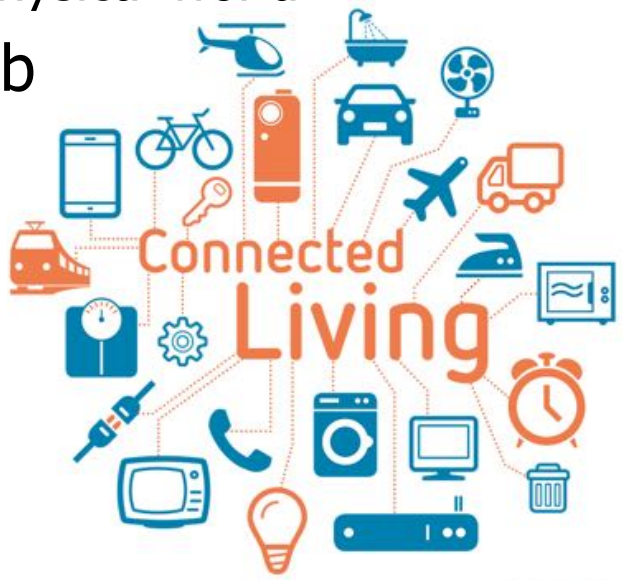
Das World Wide Web permits den worldwide access auf

- a universe of data, images, services, sounds, videos, ...

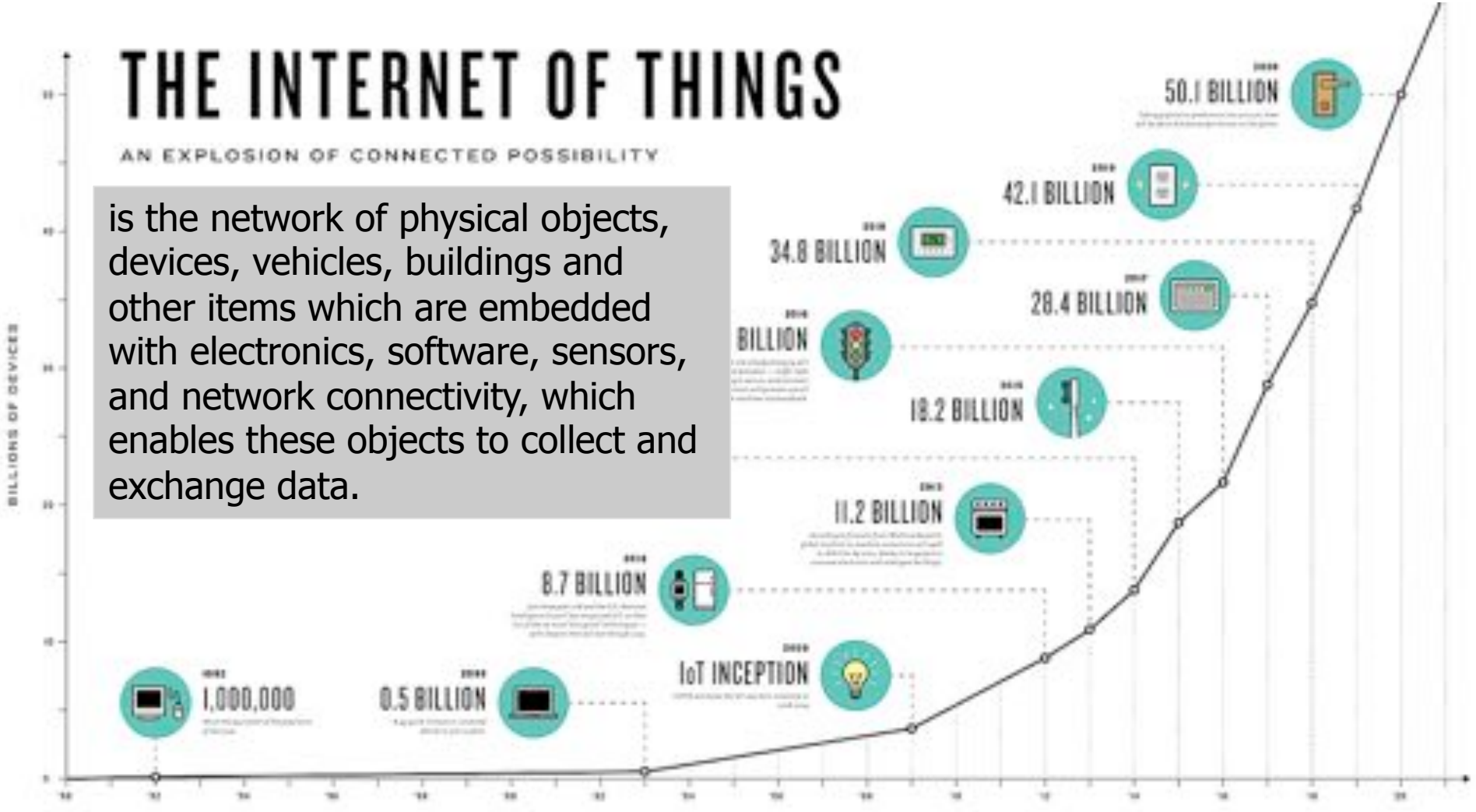
The Internet of Things: What's that?

IoT: Internet of Things: Real world aware Internet: What is it?

- Simple idea: things get Internet addresses and connected to the Internet.
- More directly
  - ◇ devices (Traffic lights, cell phones, cars, airplanes, buildings, ...) will become embedded software systems directly affiliated to the Internet
  - ◇ Exchange of mutual information and use of mutual services
  - ◇ Direct Internet access from and to the physical world
- The Internet and the World Wide Web gets real world aware



... to the Internet of things



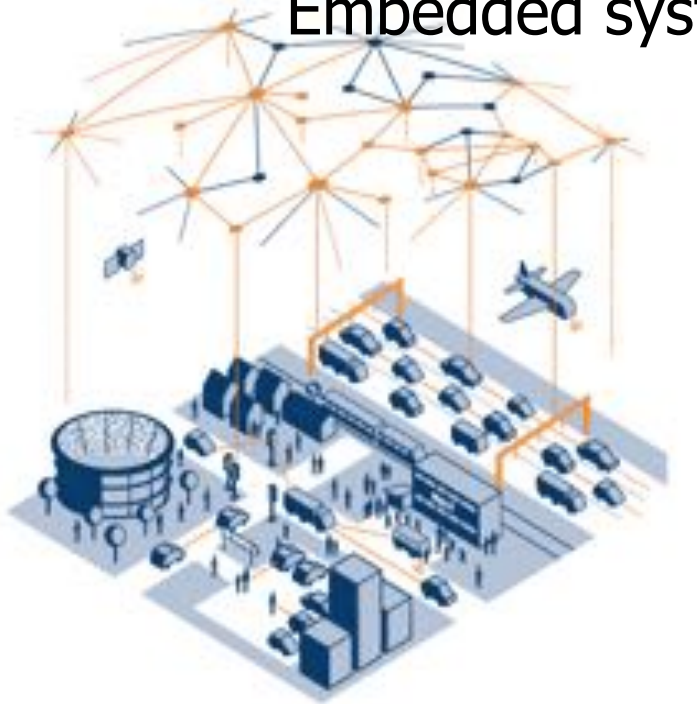
is the network of physical objects, devices, vehicles, buildings and other items which are embedded with electronics, software, sensors, and network connectivity, which enables these objects to collect and exchange data.

… the Internet of cyber-physical systems (IoCPS)

The two sides of CPS

The Internet becomes real world aware

Embedded systems get connected to cloud services



Key technology information and cyber security

Security is the most severe challenge and the largest difficulty for usage of digital technology:

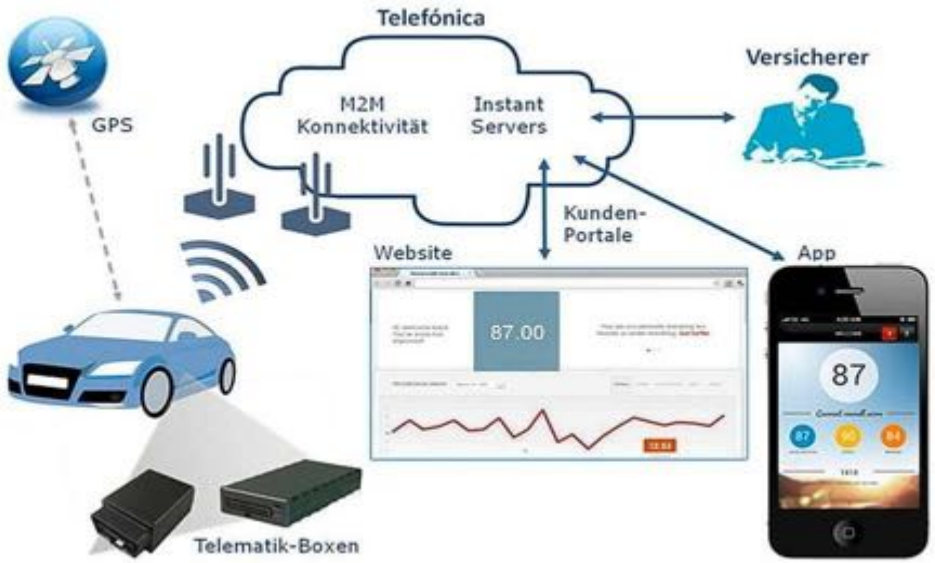
- protecting data
- protecting against digital attack
- protecting critical infrastructure
- protecting privacy
- ...

Business pull

- Work organization
  - ◇ comprehensive assistance
- Convenient living
- Efficient life style
  - ◇ environmental care
- Health
- Entertainment
- Media
  - ◇ information
- Social contacts
  - ◇ social networks
- Security
- ...

Business challenges – digital transformation

- Entrepreneurships
  - Start ups
  - Large companies
  - Disruptive business models
- Business modeling
- Enterprise eco systems
- Integrated services and products
- Customer experience



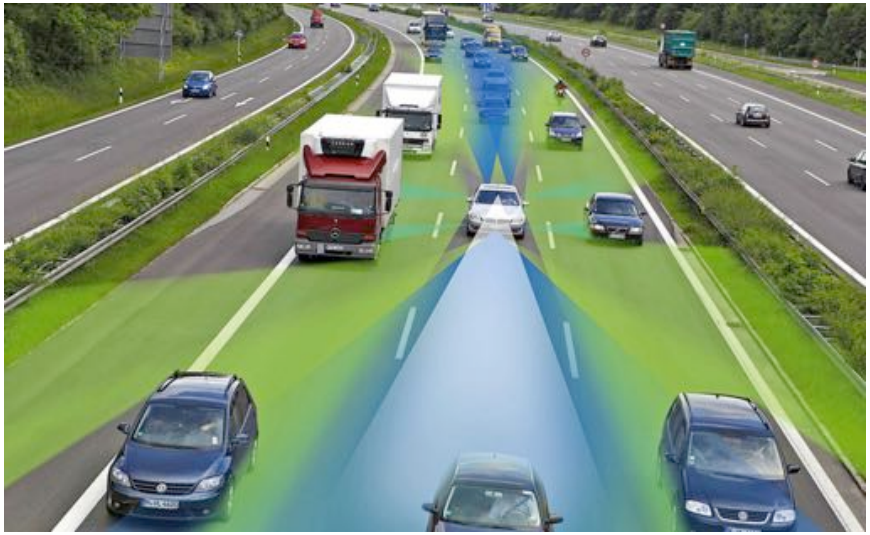
Human factors

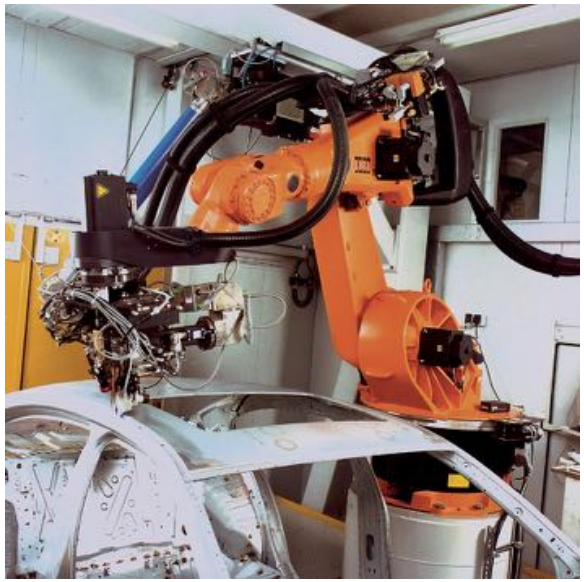
- Humans in the loop – human-centric cyber-physical systems (HC^2PS)
  - ◇ Requirements for human-centric systems
  - ◇ design of HMI
  - ◇ Deep assistance

CPS have deep impact on human behavior

- Acceptance
  - ◇ Which services to humans accept
  - ◇ What about privacy
- Human social mediator networks
  - ◇ Monitor health and emotional states
  - ◇ Mediator of human/human interaction
- Integrated socio-cyber-physical systems
  - ◇ Example. air traffic control

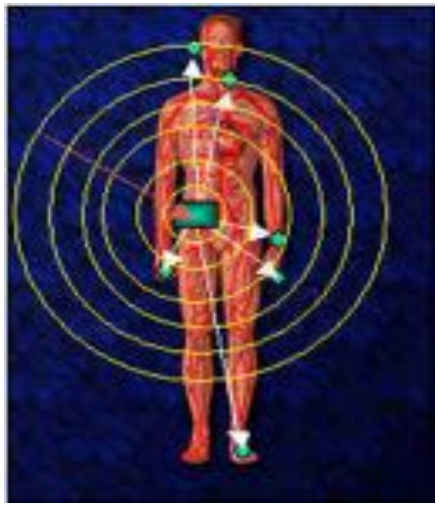
Software is everywhere





Software everywhere – data from everywhere ...

Ubiquituous Intelligent Services



Google glasses

Smart Labels

the future ...

Total connectivity?

- Computer embedded everywhere?
- Information totally connected - just in time?
- Automatized Reaction – just to the point?
- Integrated Assistance?
- Multimodale Communication?
- Data Mining?
- Social Networks?
- Autonomy vehicles?
- Business Intelligence?
- ...

Key Issues for politics

- Can the State influence digital technologies decisively?
- Why Start Ups?
- Why is the Internet so dominant?
- Is it only economy?
- Where is education in the digital change?
  - ◇ Digital Media as cultural technology

Center Digitization.Bavaria

Key mission:

Supporting and guiding

- **economy,**
- **science, and**
- **society**

on their path into the digital transformation

Center Digitization.Bavaria

Strengthening of Competences

Networking & Collaboration

Fostering the dialogue

Strengthening of Research

Strengthening of Economy

.B, we invest into people and not into concrete.“

Ilse Aigner

Key Activities at the Center

- Networking and Collaboration
  - ... in context of topics on digitization, projects, initiatives
- Coordination
  - ... of topic platforms, entrepreneurship activities
- Think Tanks
  - ... for the scientific progress in context of digitization
- Communication
  - ... for the media, associations, and the public
- Moderation
  - ... of discussions in society, economy, and politics
- Consulting
  - ... of companies, start-ups, universities, and ministries

Initiatives at the Center Digitization.Bavaria

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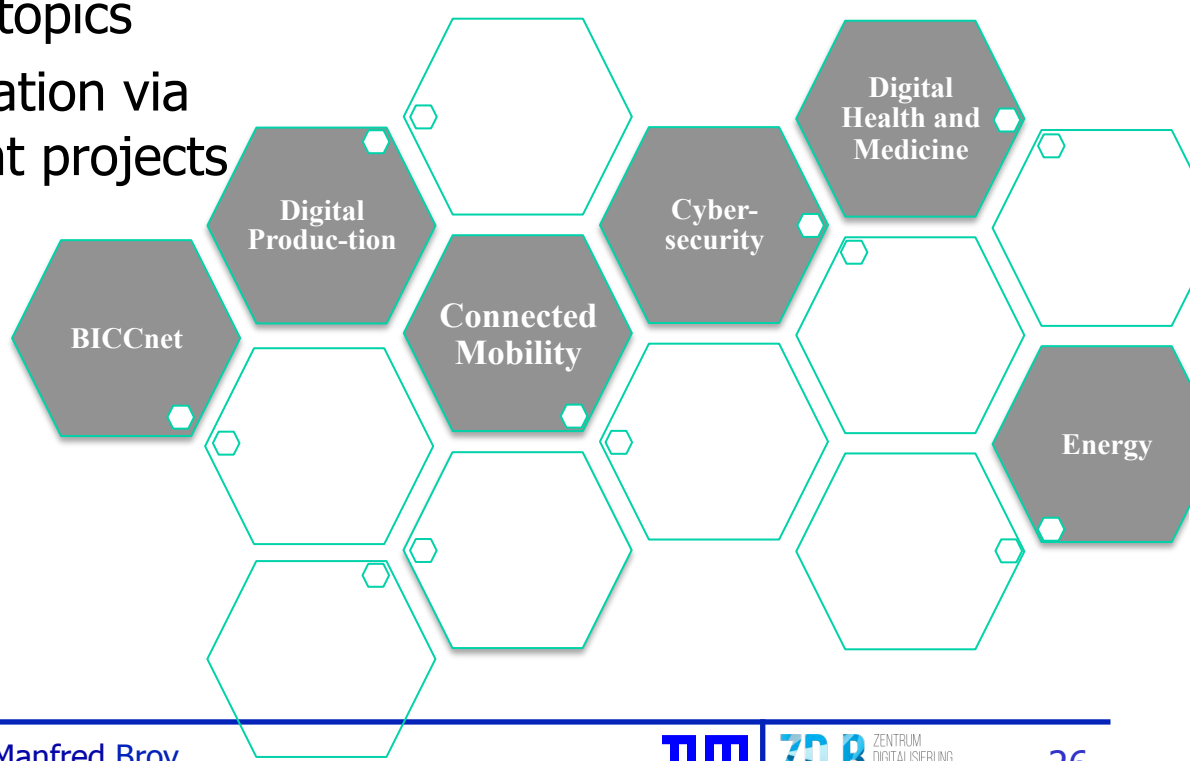
- Digital technology at universities
- Research – Topic Platforms
- Entrepreneurship in digital technology
- Digitization and society

Topic Platforms

Our topic platforms foster the collaboration and exchange between the various stakeholders from universities and research institutes, and industrial research and development with respect to central topics in context of digitisation.

- Technology and knowledge transfer
- Exchange
- Identification of relevant topics
- Cooperation and collaboration via research and development projects



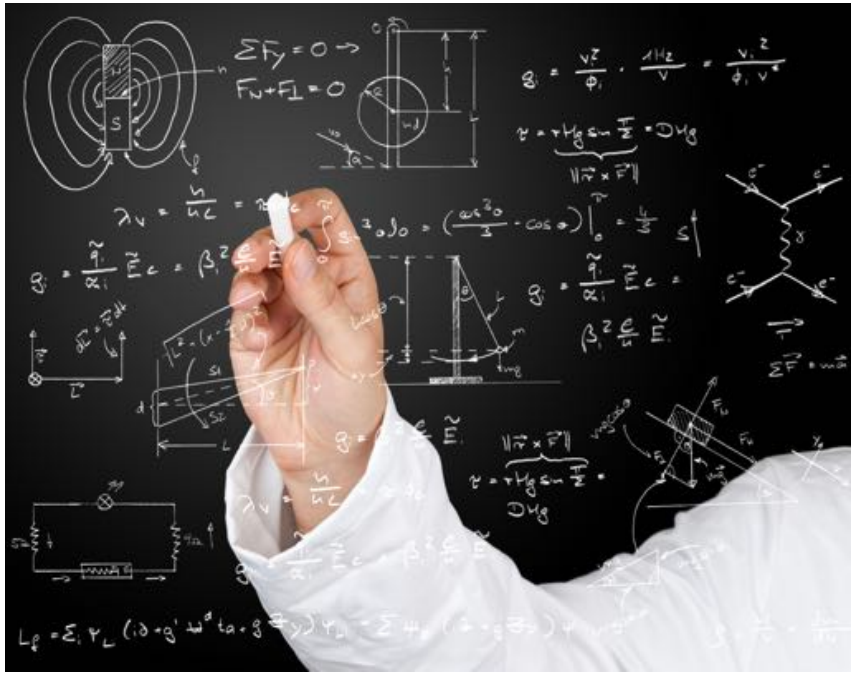
Digital technology at universities

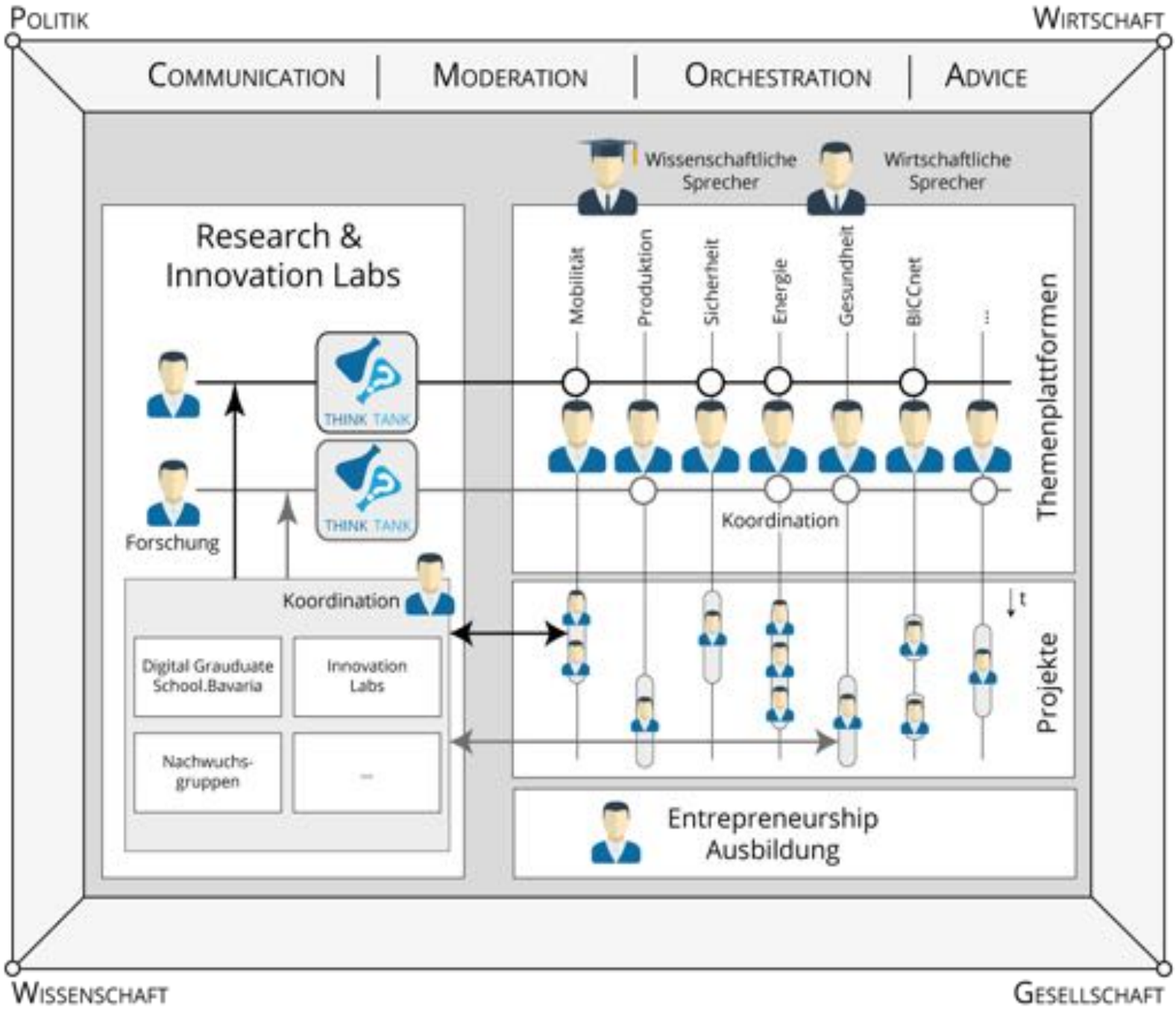
Needs

- Increase dynamics for working on innovative topics in Bavarian universities
- Support young and excellent scholars working on topics related to digitisation
- Strengthening competences and establish multiplier effects on topics of digitisation
- Foster exchange and collaboration between research and practice

Initiatives / Programmes

- 20 new professorships (10+10)
- Funding of 10 research groups
- Establishment of the state-wide Graduate School Digital.Bavaria

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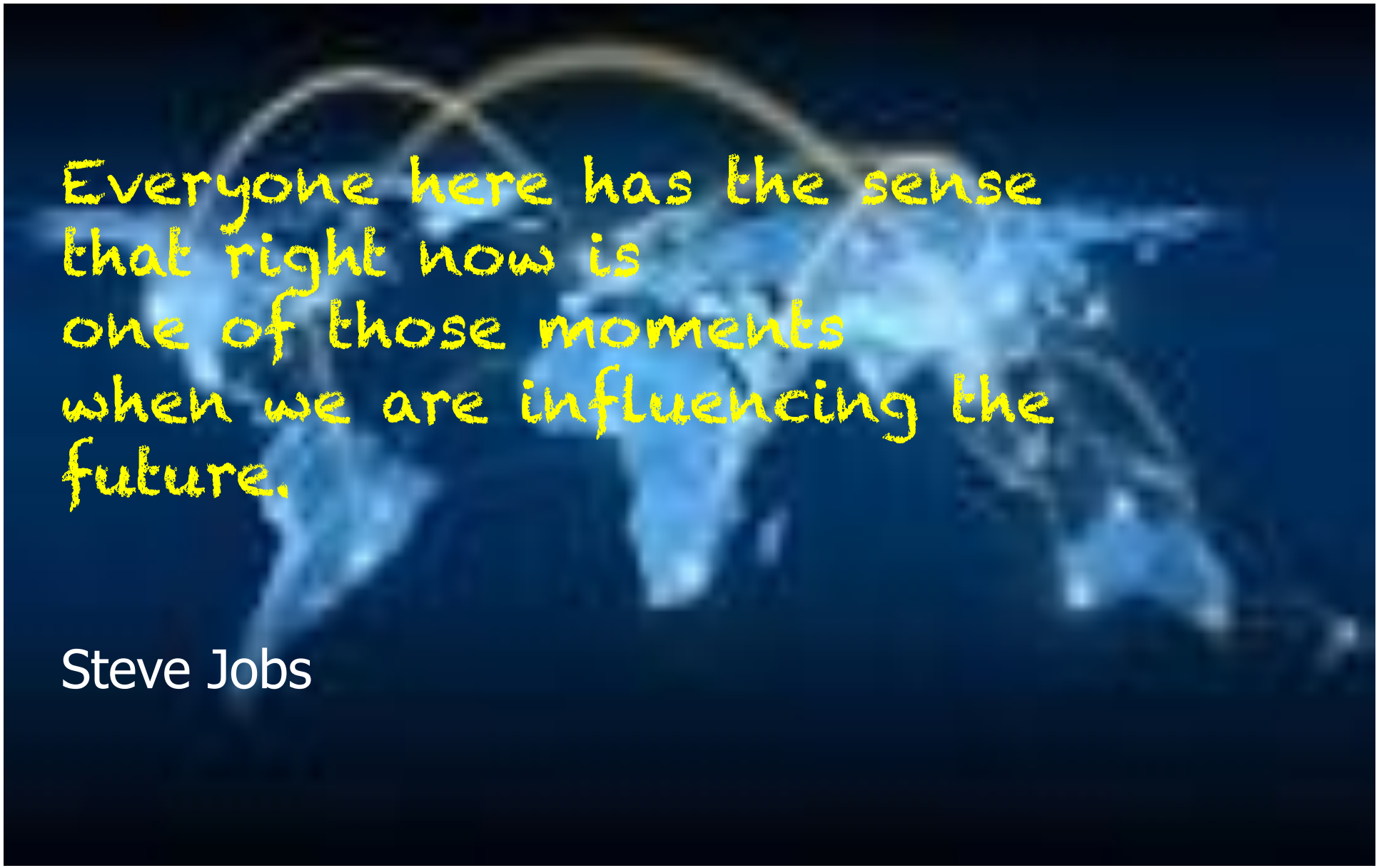
Everyone here has the sense
that right now is
one of those moments
when we are influencing the
future.
Steve Jobs