FAPS

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# Internet of Values – Sustainable Global Value Creation

Fabian Hartner, 08.03.2023

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# In the last decades, a continuous economic growth has led to wealth in industrialized countries.

More than **450** million people are employed in global value chains

The global gross domestic product has grown by an average of **3.54%** per year over the past 20 years

The total global gross domestic product was around **101.56 trillion** US-$ in 2022

Sources: Federal Ministry of Labor and Social Affairs, Deloitte, Ifo Institute,Federal Ministry for Economic Cooperation and Development, Federal Environment Agency

# By a collective continuous increase of our individual prosperity, we have improved our economic system.

**Current Situation - everything is as perfect as it goes, isn't it?**

- The aggregation of global demand creates economies of scale, increases productivity and thus makes the consumption of physical products cheaper
- Society in high-income countries can easily afford everyday products (e.g. food, clothing)
- The reduction of import restrictions and tariffs accelerates the global exchange of goods
- The low primary energy costs, low labor costs and high competition in international areas reduce transportation costs to a minimum
- Decisions to outsource production capacities are made primarily on the basis of cost calculations to optimize total costs and return on investments


- **All stakeholders (consumers, companies, shareholders, states, ...) act according to the rules of the global world economic system**

# In a destroyed world, it is also impossible to do business successfully.
# - Dalai Lama (2004) -

***We must learn to redefine the definition of growth for the 21st century.***

Angela Merkel (2010)

# The importance of ethical, environmental and economic global supply chains is significantly increasing worldwide.

Humans have consumed the resources that nature can restore in one year in just under **8** months in 2020.

The costs of the consequences of climate change (e.g., heat, drought, flooding) could be worth up to **€910 billion** until 2050 in Germany.

**4.2 billion** people have been affected by natural disasters in the last 20 years.

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**73,000,000** boys and girls are currently affected by exploitative child labor.

A t-shirt purchased in Germany has usually made a trip of **18,000** km.

**2/3** of the companies have limited or no information about their entire supply chain.

Sources: Federal Ministry of Labor and Social Affairs, Deloitte, Ifo Institute,Federal Ministry for Economic Cooperation and Development, Federal Environment Agency

# Consumers, companies, employees and financiers increasingly paying attention to sustainable, fair and social actions.

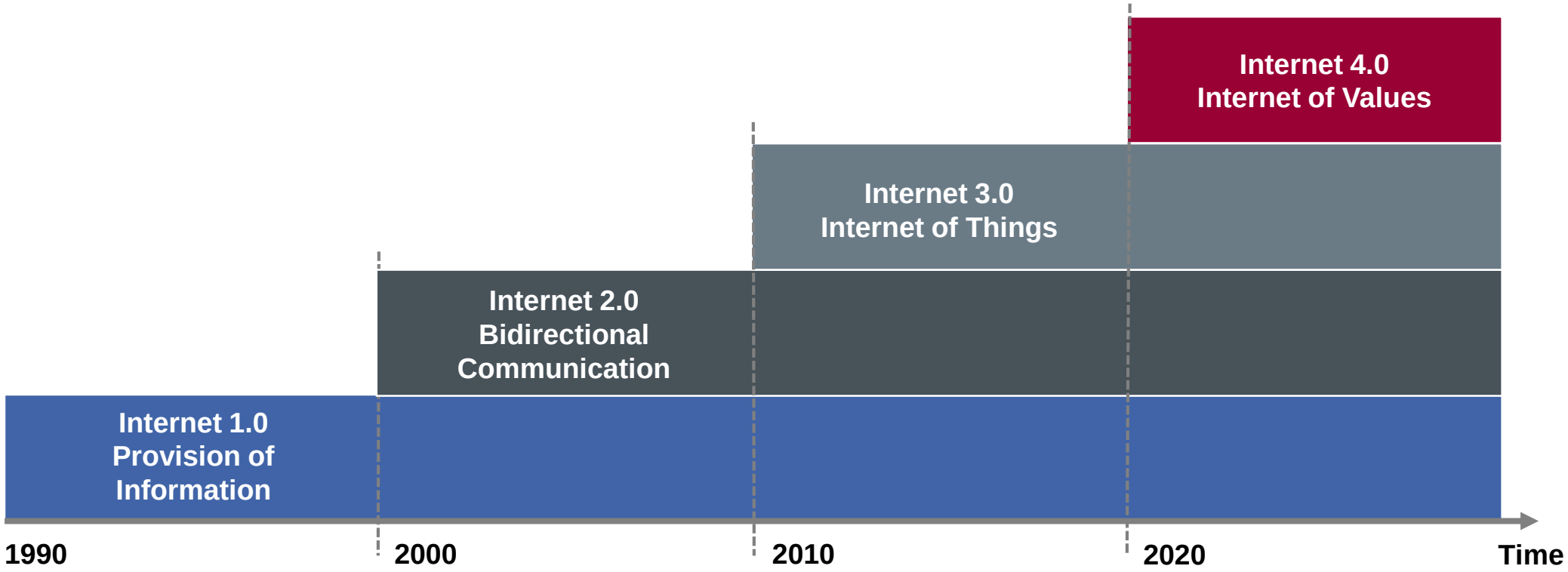
**Need for action - We cannot go on like this!**

- The reckless overexploitation of raw materials and fossil fuels is leading to an irreversible, complete consumption of valuable resources
- The worldwide transport of goods wastes valuable resources, requires immense infrastructures and places an extraordinary burden on the environment
- Due to low costs and high availability, the emotional value of consumer products is mostly very low and leads to a throwaway mentality with increasing consumption of resources
- Production is outsourced to low-wage countries with lower social, ethical and environmental standards, so critical problems were shifted to other countries

- **Consumers, companies, employees and investors increasingly want to act in a consciously sustainable, fair and social way**

**How can technology support a future economic system based on social, economic and ecological criteria?**

# The vision of an Internet of Values focuses on the exchange of values based on sustainable criteria by using new digital technologies.




- First global information network
- Email Provider (i.e. yahoo)
- Data Exchange

- Social Networks (i.e. Facebook etc.)
- Digital Marketplaces (i.e. Amazon etc.)
- Blogs

- Machine to machine communication
- Connection of devices to the Internet
- Autonomous mobile systems

- Decentral organized transparency of sustainable impacts
- Use of technology for supply chain traceability for social, economic and ecological data (e.g. Blockchain)

# The Internet of Values addresses the challenges of the trustworthy sharing of sustainable criteria in the supply chain with a technologically supported, decentrally managed system.

**Current Situation:** Bilateral contracts in the supply chain

**Challenge:** Who ensures and controls sustainable criteria? (central institution as in the global banking system is doubtful)

**Current Situation:** Key figures from suppliers are difficult to verify (especially from suppliers of suppliers (etc.))

**Challenge:** Key indicators can be changed in the supply chain

**Current Situation:** Each company calculates it's sustainable criteria (e.g. Carbon Footprint) on different ways

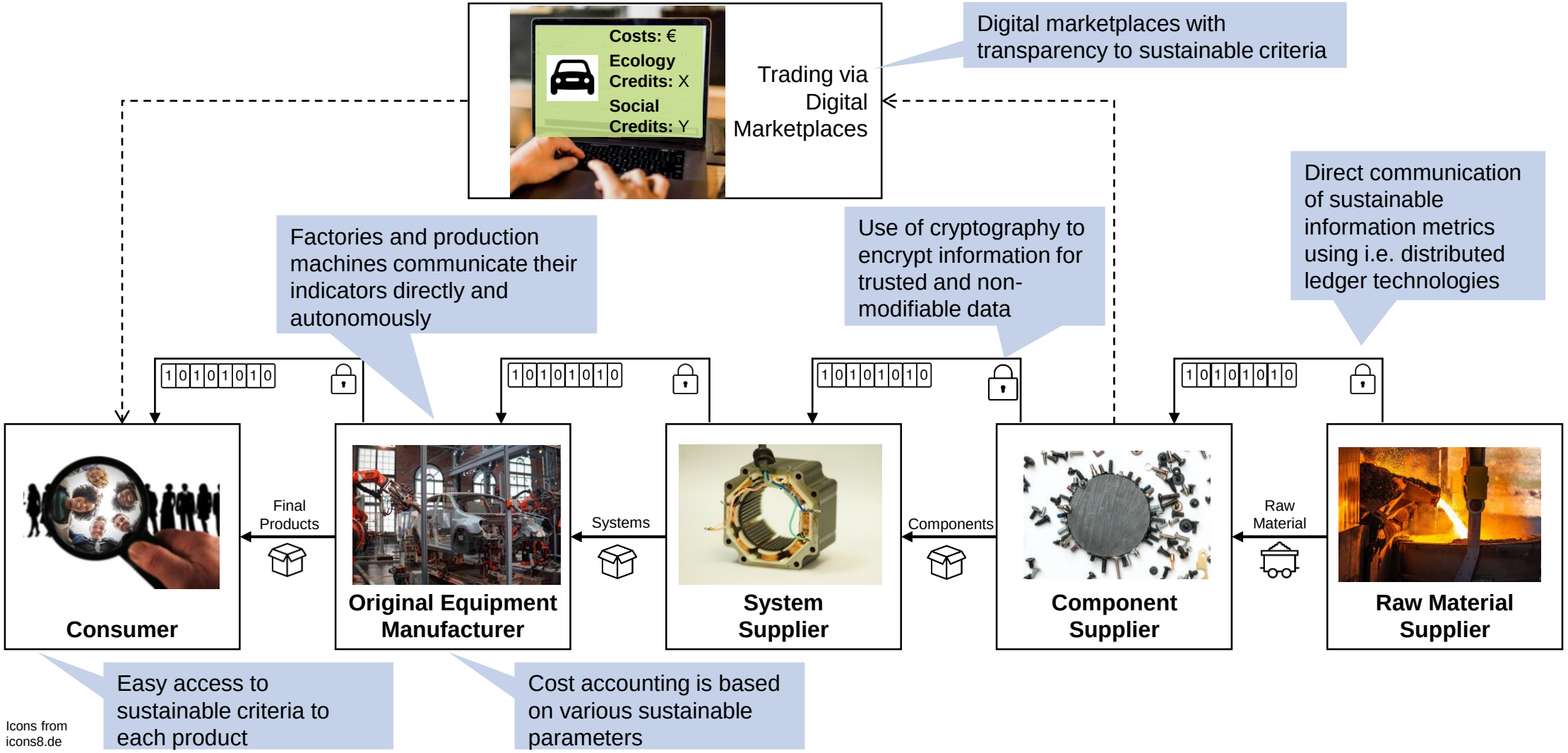
**Challenge:** Establishment of globally accepted calculation approaches

**Current Situation:** Labels are used to show sustainability to consumers (But what does "Fair Trade" mean?)

**Challenge:** Transparency of all key sustainability figures to the end consumer

## The Internet of Values

# In the Internet of Values, each participant in the value chain has a precise transparency of social, ecological and economic impacts of purchased products.



# The Institute for Factory Automation and Production Systems (FAPS) is addressing aspects of the Internet of Values in the different research areas.

| Electronics Production | Electro-mechanical Engineering | Signal and Power Networking | Home Automation | Medical Technology | Robotics | Automation Technology | Engineering Systems |
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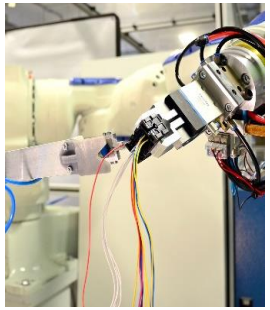
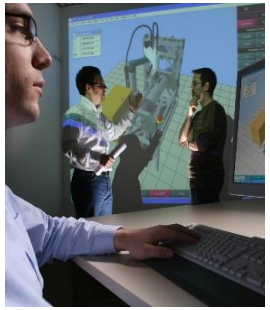
|  |  |  |  |  |  |  |  |


Auf AEG Nuremberg

Technical Faculty Erlangen

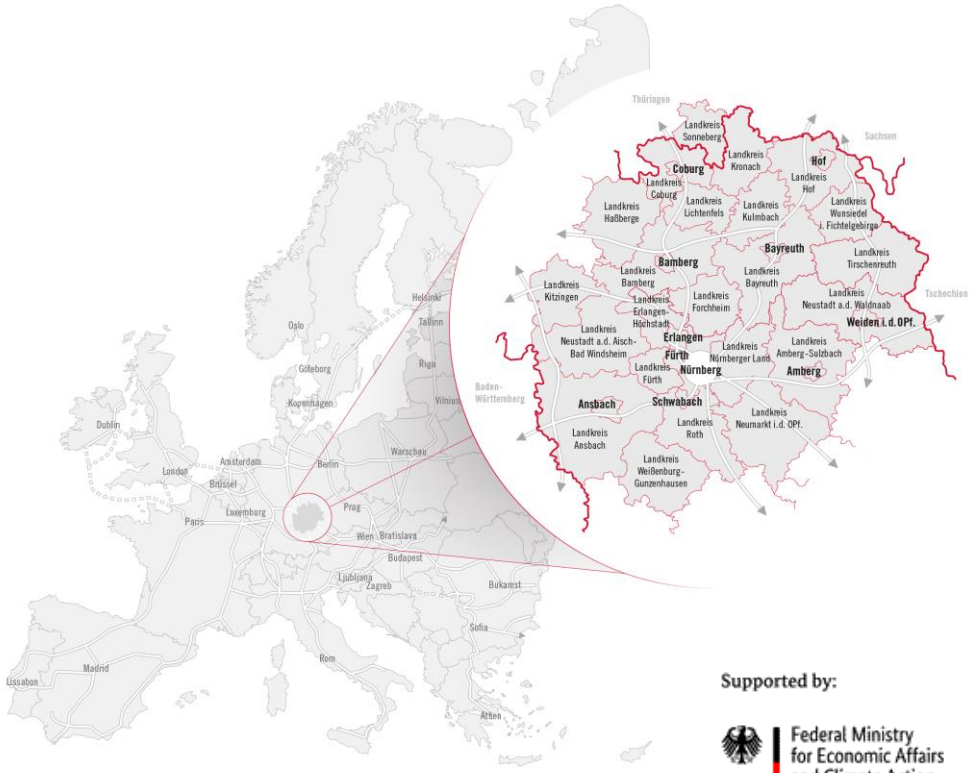
# Together with partners from the metropolitan region of Nuremberg, FAPS is creating a network for the transformation of the automotive industry towards a sustainable and digital production.

## Transformation of the automotive industry

- Establishment of a network for the transformation of the automotive industry
- Development of measures for a future digital as well as resource- and energy-efficient production in the metropolitan region of Nuremberg
- Interviewing companies on challenges in digitalization and energy-efficient production (e.g. integration of renewable energies in the production process)
- Demonstrating possibilities for significant energy savings (e.g. a DC-powered production)

metropolregion nürnberg
KOMMEN. STAUNEN. BLEIBEN.

TRANSFORM.EMN




**Research and Development together with strong partners:**

Fraunhofer IISB

NÜRNBERG Wirtschaftsförderung

IHK Nuremberg Chamber of Commerce and Industry

IMU Institut

MEDICAL VALLEY Europäische Metropolregion Nürnberg

metropol region nürnberg
KOMMEN. STAUNEN. BLEIBEN.

Supported by:

Federal Ministry for Economic Affairs and Climate Action

on the basis of a decision by the German Bundestag

# The Institute FAPS is engaged in the non-profit organization ESTAINIUM to research and develop technologies for a trustworthy assessment and reduction of climate-negative impacts.

## Establishment of a industry network for sustainability

ESTAINIUM Association

The non-profit ESTAINIUM Association demonstrate and advise individuals and companies on how climate-negative effects can be systematically reduced and compensated. Digital technologies will be developed to demonstrate ways of identifying, reporting, continuously documenting, and compensating climate-negative impacts.

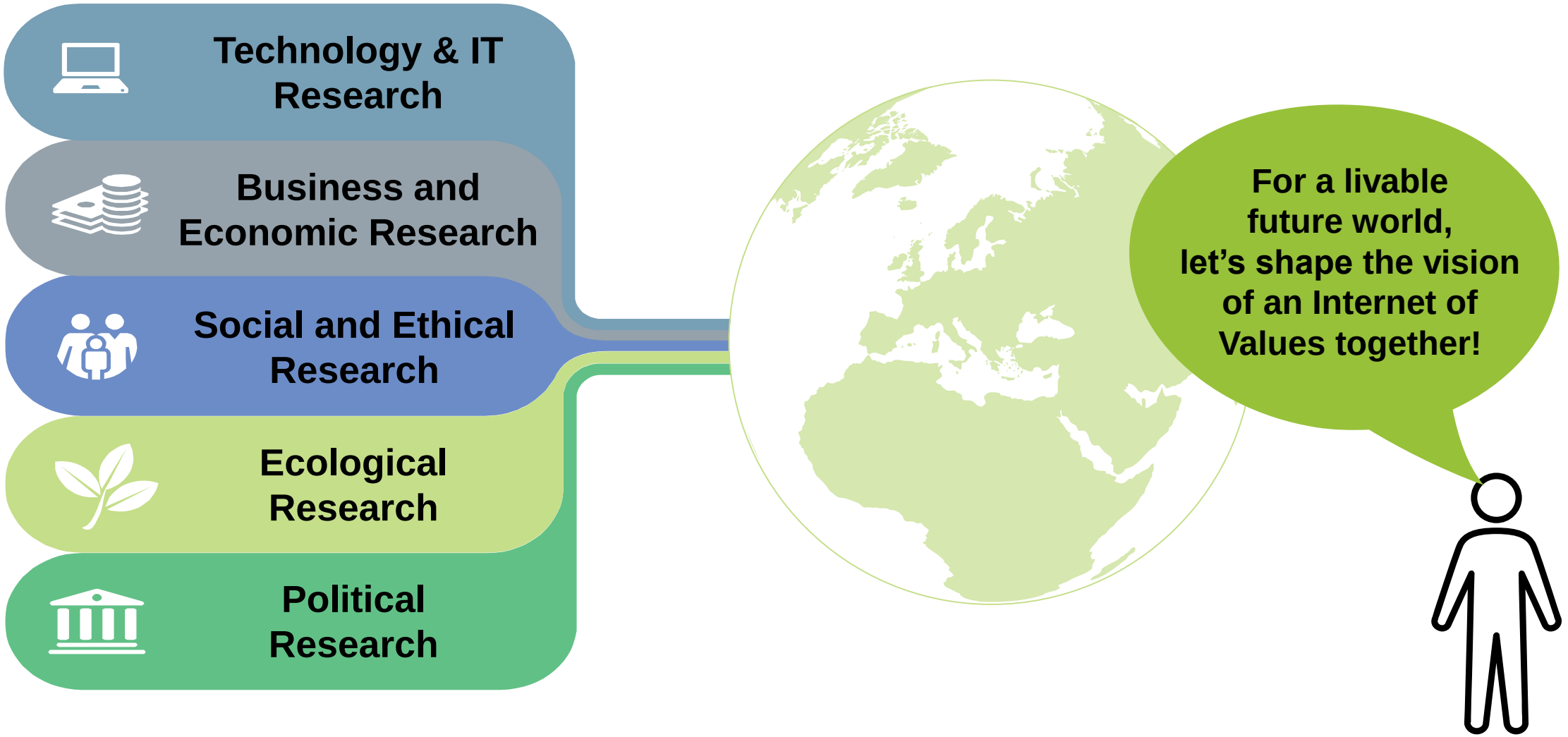
**The activity of the ESTAINIUM Association is structured into four activities:**

- Technology and Infrastructure
- Standards and Norms
- Carbon Capture, Use, Storage & Compensation
- Education and Communication

**Current members of the ESTAINIUM Association**

https://www.estainium.eco/de/

# For an Internet of Values, a wide variety of research disciplines need to collaborate and interact.

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# THANK YOU

# The Institute for Factory Automation and Production Systems (FAPS) is researching the production and assembly of mechatronic products.

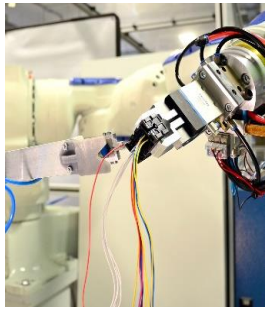
## Electronics Production


- Flexible printed circuits
- 3-D MID
- SMT-assembly
- Optoelectronic AVT
- Power electronics
- Quality assurance/ Reliability tests
- Structuring
- Printed electronics
- Additive manufacturing of mechatronics

## Electro-mechanical Engineering

- Laser cutting
- Joining laminated core
- Magnet manufacturing, assembly, testing
- Winding technologies
- Impregnating
- Grouting
- Circuitry
- Test technologies
- Additive Manufacturing

## Wiring Systems



- New topologies in Wiring systems
- Wire harness CAD
- Assembly and interconnection technologies
- 3D-MID antennas
- Automated assembly of wire harness
- Testing systems
- Assembly of control enclosures

## Home Automation

- Home automation
- Energy-management
- Comfort & safety
- Communication and Infotainment
- Decentralized energy production /storage
- Intelligent, efficient heating systems
- Synergy of mobility and smart home

## Medical Technology

- (Partly) autonomous assistance systems
- Mechatronic implants
- Automation of medical diagnostics
- Digitalization in medical technology
- Compatible sensors and actuators
- Individualized manufacturing

## Robotics

- Sensors for detecting the environment and for interaction
- New kinematics and drives
- Safe control architectures
- Learning systems for control, navigation and interaction
- Industrial and service robots
- Personal robots
- Mobile Robots

## Automated Production Systems

- Industrial Smart Services
- Service-oriented architectures
- Condition and process monitoring
- Semantic technologies for machine interaction
- Cloud-based platform solutions
- Communication technologies
- Data Analytics and Machine Learning

## Engineering Systems

- Integrated Engineering
- Planning of production systems and intralogistics
- Development of digital process chains
- Process automation in engineering
- Engineering of resource-efficient production systems
- Human-Machine-Interaction (VR, AR)