

Executive Summary: New Business Models using Artificial Intelligence

Report by the Working Group
Business Modell Innovations of
Plattform Lernende Systeme



The Executive Summary of this publication is available at:
plattform-lernende-systeme.de/publications.html

About this report



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This report was written by the working group Business Model Innovations of Plattform Lernende Systeme. As one of seven different working groups, it identifies and analyses new business models on the basis of Artificial Intelligence (AI) as well as the economic potential of self-learning systems. It provides impetus in particular for the application-oriented working groups. It examines how self-learning systems change cost structures in companies and the economy and which revenue structures arise from new types of customer loyalty and value creation in smart products and services. The members of the working group discuss how AI-based business models can be developed successfully and for the benefit of society.

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Foreword: Changes of business models through AI

- Consequence of digitalization: Establishment of new business models in many sectors of the economy
- Chances of business models due to increasing use of self-learning systems and Artificial Intelligence (AI)
- **More effectiveness through Smart Service:** Products and services will be more effective in the future through AI-components. Smart Service can proactively take individual customer wishes into account, which requires the interpretation of data by AI applications. Thereby AI applications are closely linked to data management:

➔ **Development of new business models for collecting and learning from data:** companies are increasingly working together with partners which are specialized in exploitation of data and information.

➔ **External cooperation:** Increased cooperation with external partners, joint search for innovations. Changing cooperation between large and small companies in the digital economy.

➔ **Influence of AI applications on the economy:** In practice, the question arises how companies can systematically deal with the topic and how they can include business model innovations in their considerations.

Economy: changes through AI in key areas

New forms of networking	Smart products and services	Clear customer orientation
New forms of work organisation	New degrees of freedom for the design of business models	Changed business models through Artificial Intelligence
Business models across company boundaries	Platforms and ecosystems	Leadership

New forms of networking:

- New business models lead to new forms of networked cooperation between companies
- Companies: Offering products and services, using data and knowledge of other companies, refining own data as offer to other companies

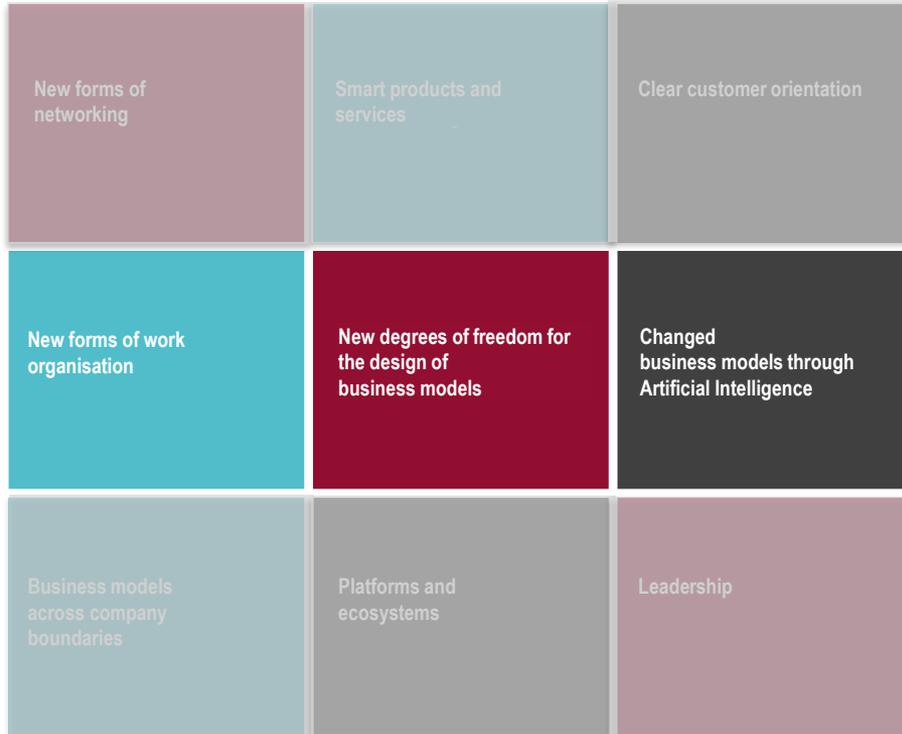
Smart products and services:

- Almost all objects (e.g. vehicle, fitness bracelet, wind turbine) are digitally connectable and continuously collect data during operation/use

Customer orientation:

- New business models are increasingly focusing on the users of products and services with their personal needs and preferences

Economy: changes through AI in key areas



New forms of work organisation:

- Innovation increasingly arises in flexible teams: employees change their employer more frequently, freelance work is increasing.
- AI sometimes requires changes in work organisation, but also provides benefits for employees.

New degrees of freedom for business model design:

- Economy of digital goods differs from ordinary economy of physical goods, which are limited due to their materiality.
- Companies often donate digital goods for free to certain groups in order to motivate them to use them in the long term, to generate data and/or to place advertising more effectively.

Changed business models through artificial intelligence:

- Basis of changed and innovative business models: Extraction of knowledge and generation of new insights from extensive and complex data by Learning Systems and AI methods.

Economy: changes through AI in key areas

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Cross-company business models:

- Example for cross-company business models: mobility apps for optimizing travel routes.
- Individual preferences for means and routes of transport are considered; calculation of the fastest and cheapest means of transport via different providers; Provision of tickets and cross-supplier billing.

Platforms and ecosystems:

- Extensive training data, on which AI-based business models are based, often originate from data platforms.
- In digital platforms companies of different industries and sizes work together (digital ecosystems).

Leadership – Challenges for corporate management:

- For the transformation towards AI, entrepreneurs need courage, willingness to take risks and power of endurance.
- AI algorithms need time and data before they can generate added value.
- AI business models sometimes also cause a disruption of the existing business.

Vision – AI in Germany 2030

The working group Business Model Innovations is convinced that digitalisation and Artificial Intelligence (AI) are fundamentally reshaping the economy and will only have positive impact on the economy and society if individuals also identify with these changes. Therefore, starting from the goal of an AI economy oriented towards human well-being, a vision of the future was developed, which sketches an ambitious but realistic vision for the year 2030:

- **Systematic examination** of questions concerning AI in sciences, economy politics and society
- **Guiding principle:** Anticipatory stimulation of the economy and prudent use of AI systems
- **Linking of technological progress, innovative business models and social development:** AI-driven German and European economic successes, employment balances, ethical principles and standards as good practice examples
- **The relevant framework conditions** European directives on data protection and security, liability issues have strengthened the confidence of industry and society in AI
- Worldwide recognition that Germany and Europe have succeeded in translating the principles of the social market economy for the requirements of the digital economy in dialogue, in order to meet the importance of **learning systems as an economic factor**
- AI is used in Germany to **improve existing business models and develop new ones** – across all industries and company sizes (start-ups, medium-sized companies, large enterprises)
- **Creation of more employment:** AI has relieved people from some activities, at the same time new fields of activity for people have been added

Vision – AI in Germany 2030



AI in application

- Business and technology are serving people, not the other way around
- Business models as an instrument to bring technological innovations to customers
- Sensible use of AI: Decision makers in companies have gone through an intensive learning process



Privacy and IT security

- Central guiding principles for dealing with AI: safeguarding people's sovereignty and privacy, ensuring data security
- Relativization of euphoria and fears of autonomous machines: consumers know how to deal with them on their own responsibility



Future of work

- Digital transformation as a major challenge for employers and employees
- Ongoing challenge in many industries: Involvement of trade unions and companies in the use of productivity gains generated by AI systems for the benefit of society as a whole
- Increasing the sovereignty of consumers and employees



Education and training

- Adaptation of the education system to the changed requirements with AI
- Continual adaptation of curricula in schools, universities and vocational training to better prepare young people for working in a digital society
- Undisputed public duty: providing a digital infrastructure and adapting learning content
- Public budgets plan the necessary education budgets



Political framework conditions

- Citizens have maintained and cultivated their sensitivity in dealing with Artificial Intelligence in 2030
- Productivity gains through AI have enabled the development of social security systems
- Many social groups are committed to the definition of stopping points so that self-learning systems do not become uncontrollable
- Germany implements an EU directive that makes the AI future vision until 2030 the guiding theme of economically and socially sustainable development

The picture of the future in a nutshell

- Research and application of Artificial Intelligence (AI) in Germany focuses on people
- AI contributes to the competitiveness, prosperity and improved quality of life of all citizens
- AI supports and enables exponential innovation leaps in health, work, education, equal opportunities and participation
- AI-based innovations in business and science are driven forward in a targeted manner and in partnership
- Business model innovations, application and transfer function smoothly
- Transformation in the key industries is being driven forward with entrepreneurial speed, willingness to experiment, risk and investment
- Political decision-makers, companies, civil society and citizens deal with the new technological possibilities as self-confident actors and know how to assess opportunities and risks
- Key for realizing the potential: ability to proactively manage the upcoming change in an ethical, responsible and sustainable way



Future vision – AI in Germany 2030

Realizing the future vision – what is already happening in the economy today

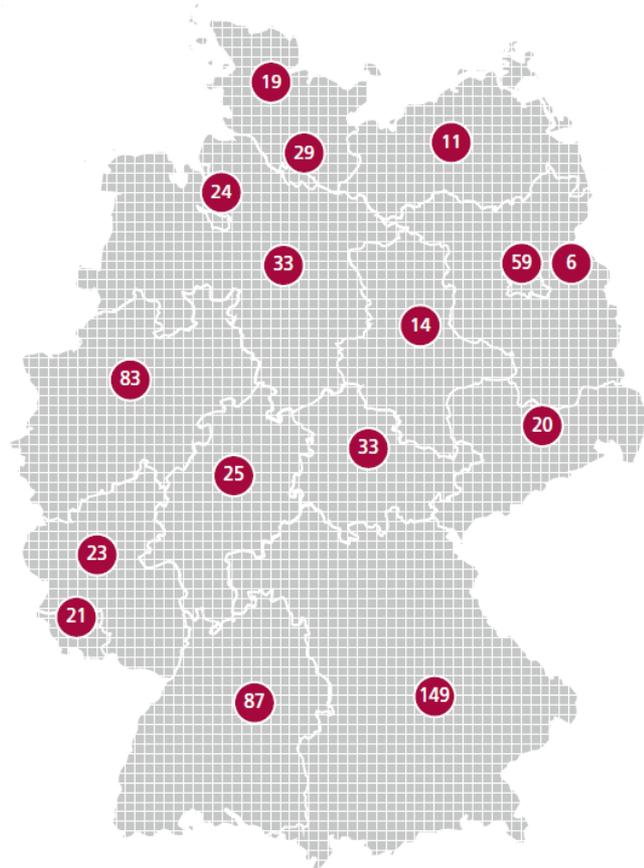
- Key technologies of AI in industrial applications (e.g. mobility, healthcare)
- Current market data point out: the next five years will be decisive in helping Germany achieve the hoped-for place in the front row
- Since March 2017, 20 countries have formulated AI strategies, allocated funds and established governance structures
- Different strategies: Focal points range from research and business development to education, employment and administrative modernization
- In many places committees have been set up on regulatory, ethical and trade policy issues
- Germany has the chance to "strengthen its strengths" and become an important player in a transforming global economy



Realizing the future vision – the next steps in economy

- Germany is excellently positioned in basic research, but we need to think further
- Decisive factors for the digital leadership of our leading industries: Application of AI; ability to process large data sets with AI in near real time, enabling new performance promises for end users
- Competitive edge: Access to large amounts of data through machine learning trained algorithms
- Germany can build up the world's largest data pool of machine and operating data in a short time
- German companies manufacture a variety of intelligent products and sell them all over the world: possibility of connecting products to data platforms to build a trusted-open-data ecosystem that is unique worldwide and generates new services
- Decisive prerequisite: verifiable, trustworthy data processing that can be controlled by the data provider – for example through International Data Space (IDS)

Map on AI of Plattform Lernende Systeme

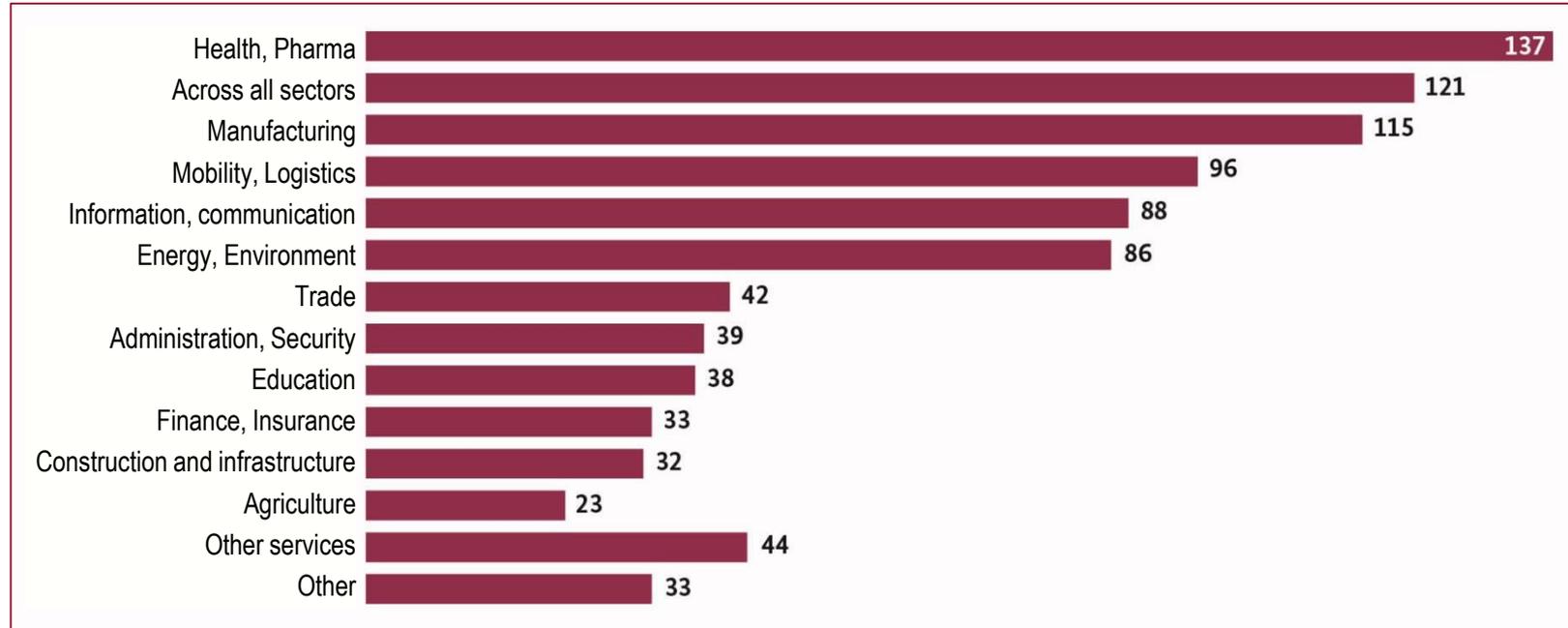


Plattform Lernende Systeme: AI applications and practical examples of scientific institutions and companies in Germany

Map on AI illustrates more than 600 examples "AI made in Germany" – across all industries, fields of application and company sizes (Status: September 2019)

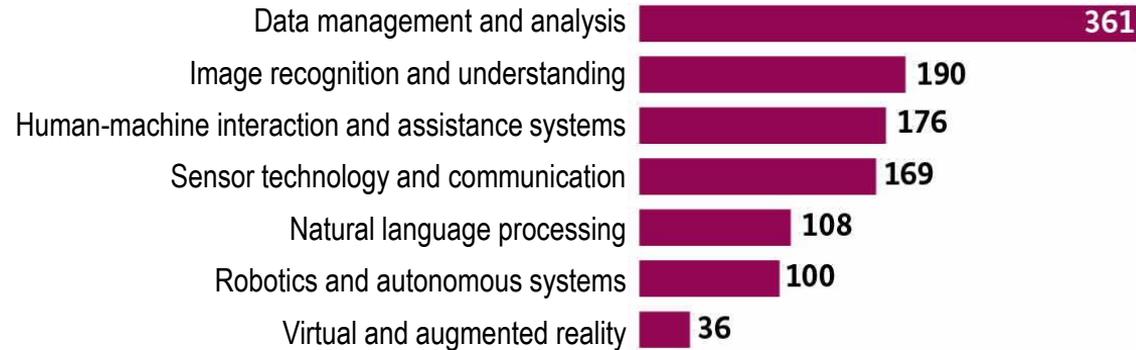
- **Examples:** From industrial robots to AI-based traffic sign recognition and intelligent assistance systems in health care
- Map visualizes how AI is transforming the economy and everyday life today and in the future
- Inspiration for companies to push the digitalization of their processes and to develop new business ideas
- Successive expansion of the AI map with application examples from research and practice
- Information on German research institutions and their focus as well as on AI strategies of the federal states

Map on AI: Overview of AI applications

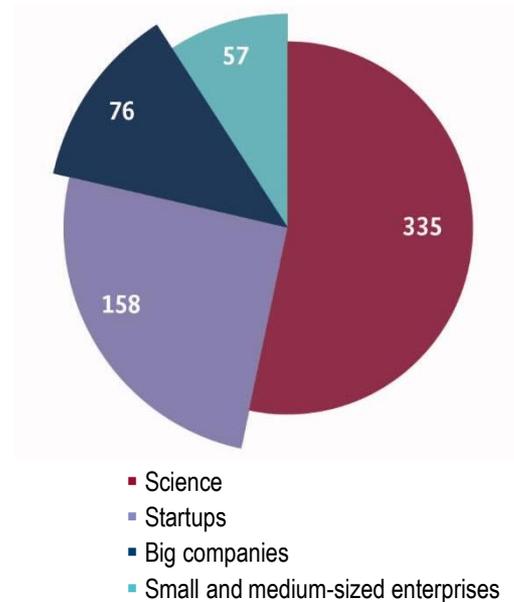


Map on AI: Overview of AI applications

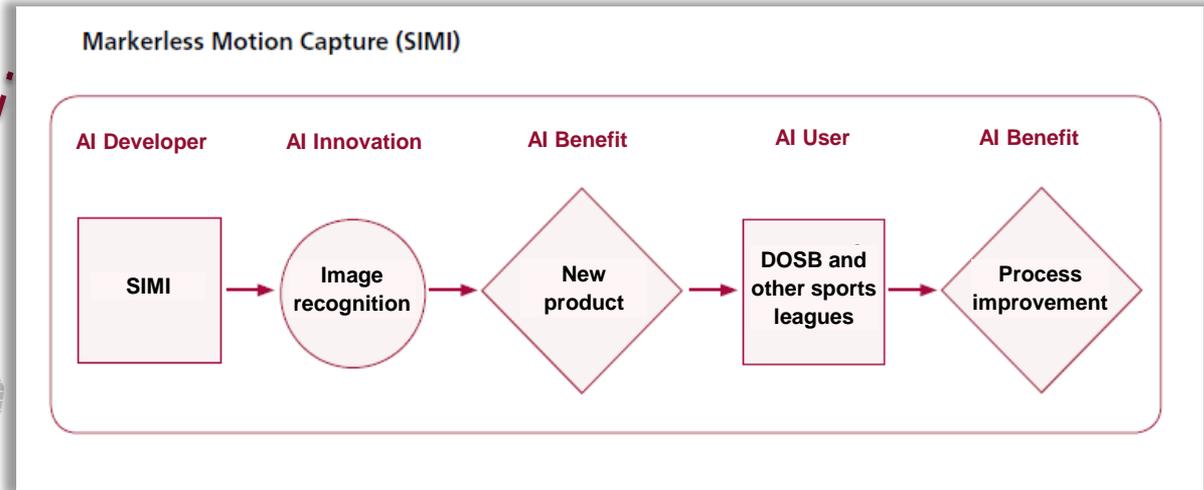
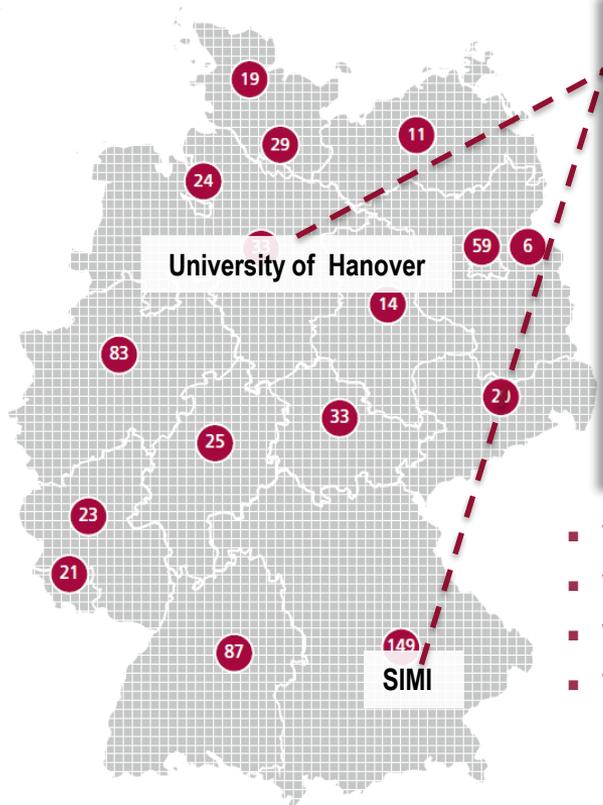
AI applications by technology field



AI applications by organisational form



Innovative AI-based business models: case studies



- **Value proposition:** understanding 3D movement of people based on camera images, e.g. in football
- **Value-added architecture:** Customers provide cameras, SIMI provides the algorithms
- **Value creation network:** Various partners, e.g. University of Hanover
- **Value-added finance:** cloud service contracts, sale of complete systems, development contracts

Innovative AI-based business models: case studies

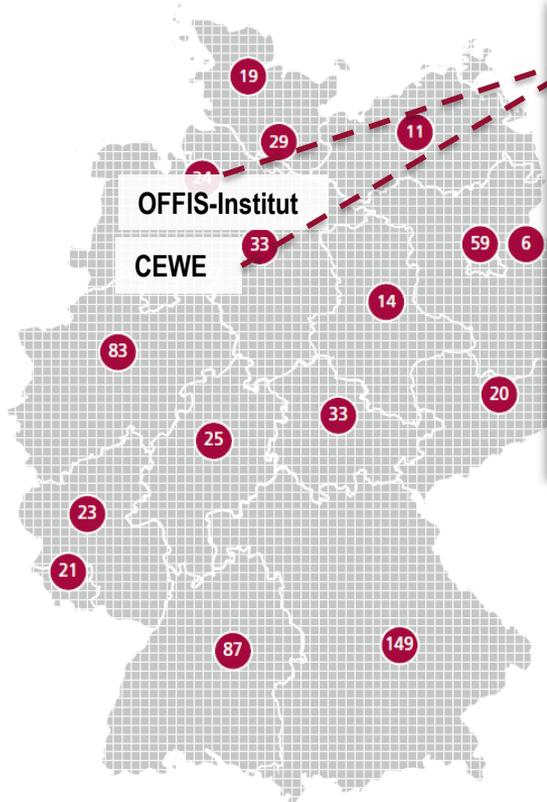
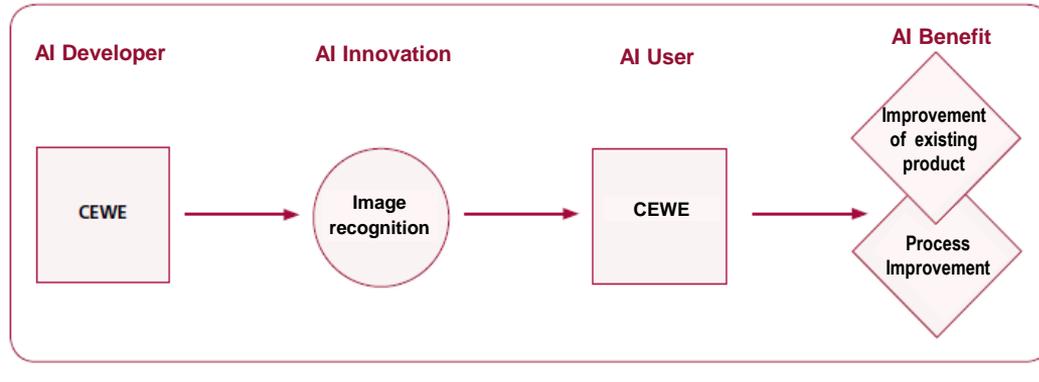


Image recognition and understanding with Deep Learning: Image selection and product creation (CEWE)



- **Value proposition:** AI-based image analysis simplifies image organization for customers, e.g. sorting according to "beach/mountains" in the CEWE photo book
- **Value-added architecture:** CEWE founded the Mobile Artificial Intelligence Campus (MAIC) for the implementation
- **Value network:** The MAIC is a link to important partners, including the OFFIS Institute
- **Value-added finance:** AI solutions make it possible to improve existing processes, services and products, and to offer new products in the long term

Business model – An overview

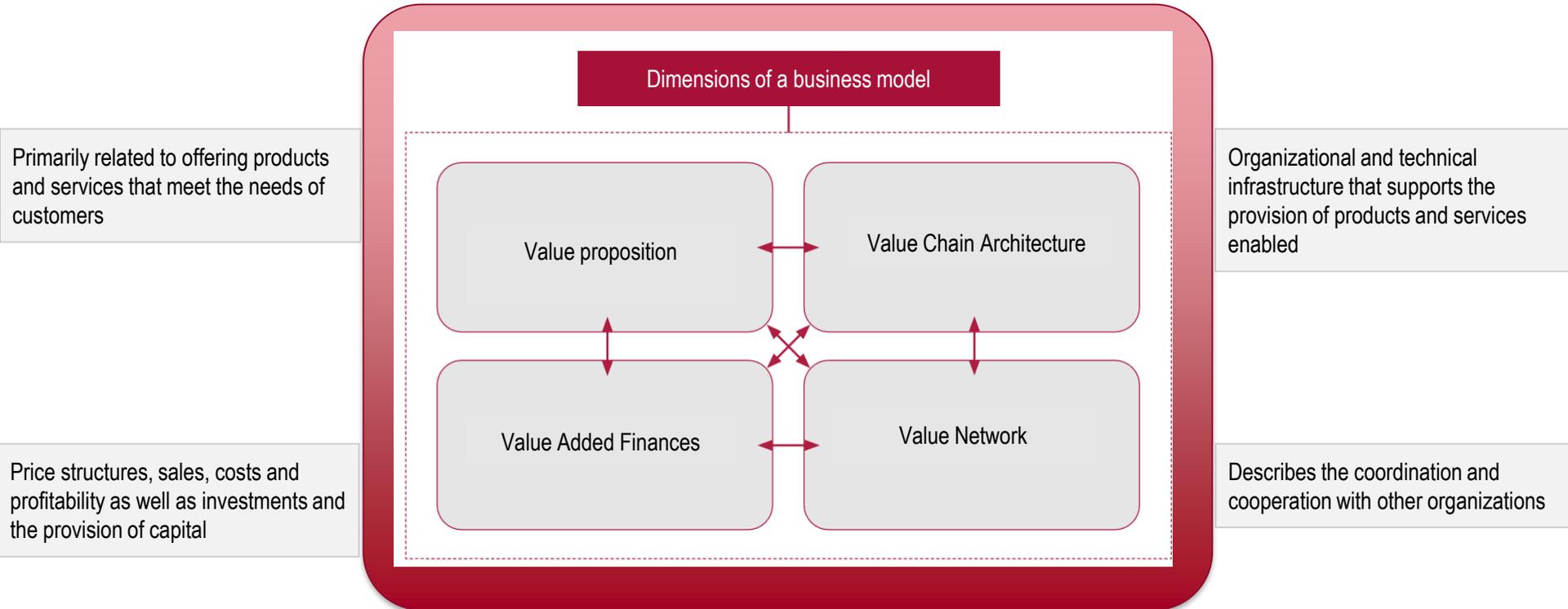


Figure.: V⁴ Model according to Al-Debei und Avison (2010)

Business model – An overview

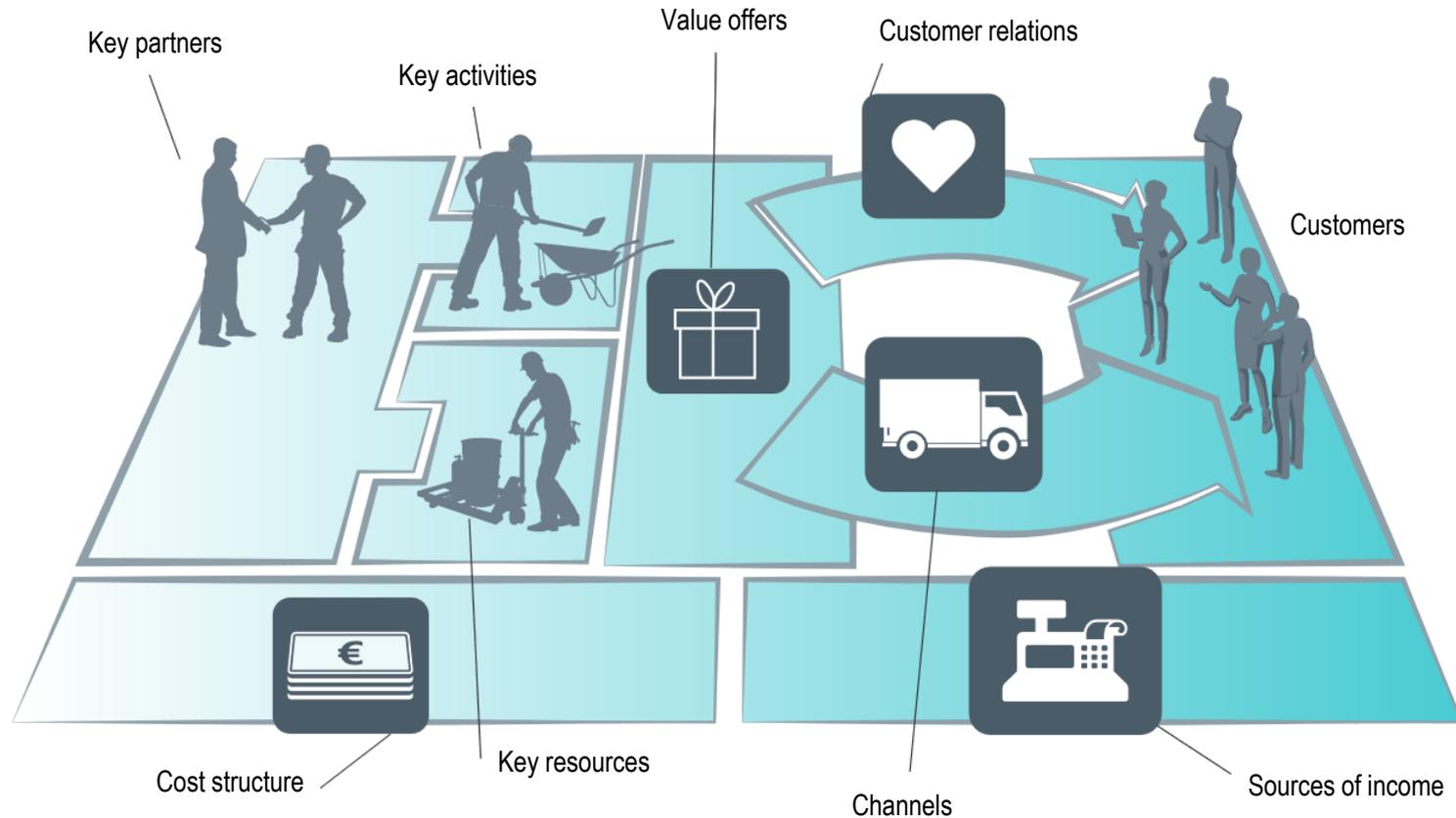


Figure.: Business Model Canvas according to Osterwalder and Pigneur (2011)

Systematically developing innovative AI business models

The development of innovative AI business models can be described using four dimensions:



Value proposition

- Idea generation process for possible applications: New possibilities are based on the generation and processing of data and use specific technologies



Value Chain Architecture

- Analyzes the organizational structure, value creation processes and resources necessary to realize the value proposition
- Data-driven and AI-based business models: acquisition, generation, curation, storage, evaluation and utilization of data
- Key element: technical resources and input from professionals



Value creation network

- AI-based solutions are based on various core competencies and system modules
- A company solely usually does not have all the necessary elements
- Provider of data-driven and AI-based solutions as part of digital ecosystems
- AI-based solutions must be continuously calibrated and developed



Value added Finances

- Analysis of the customers' appreciation and willingness to pay for AI innovations
- Fast scaling effects: data can be copied and used at no cost (=difference to physical products)

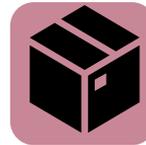
Digital business models and AI: platforms

- Increasing shift of value added shares from the production of material goods to data-based services
- Increased importance of data and services (smart services) in the value chain
- Companies must reflect on traditional business models and review their sustainability
- Competition between companies is increasingly carried out via innovative business models (Gassmann, Frankenberger & Czik, 2013)
- Simple platform business model: Companies from outside the industry shift between supply and demand, occupy the interface to customers and thereby establish themselves as monopolists or quasi-monopolists
- **2018:** 7 of the 10 most valuable companies by market capitalization were platform companies. Platforms and ecosystems are needed to create value through AI



AI in trade

- Increase in turnover (e.g. through improved machine learning system for translations on the eBay trading platform)
- Cost reduction through personalized customer approach, process optimization, decision support (AI Everythink 2019) (according to Capgemini Research Institute savings of **300 billion dollars** are possible)



AI in production

- Potential of AI: increasing future value added in production
- An additional gross value added of around **31,8 billion euros** is forecast by 2023
- At the core of industrial production, AI analyses and interprets sensor data

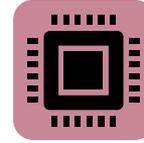


Data marketplaces

- Platform-based business models follow a different logic: a multitude of value-added networks instead of clearly identifiable monopolies
- As intermediaries between data providers and buyers, they enable secure data exchange and provide the basis for service design
- **Example:** One solution is the International Data Space, funded by the Federal Ministry of Education and Research

Implementing AI: technical and non-technical factors

- Implementation of AI: Focus of the companies mainly on technical issues
- Underestimation of non-technical factors causes slow AI adaptation
- Non-technical factors (=enabling factors) in four areas to be considered when implementing AI



Centre of Excellence (CoE)

- Organizes the implementation of AI
- Strategic control: e.g. company mergers and acquisitions, AI application in the business units
- Staff training
- Creation of cross-functional AI project teams (AI experts from CoE + domain experts) e.g. also responsible for business development, marketing and legal

Employees

- AI changes professional profiles: Implementation of AI business model innovations requires new roles, competence profiles and specific expertise in the companies
- Cultural change through AI in the company:
 - Building trust in AI systems
 - Close cooperation between specialist departments

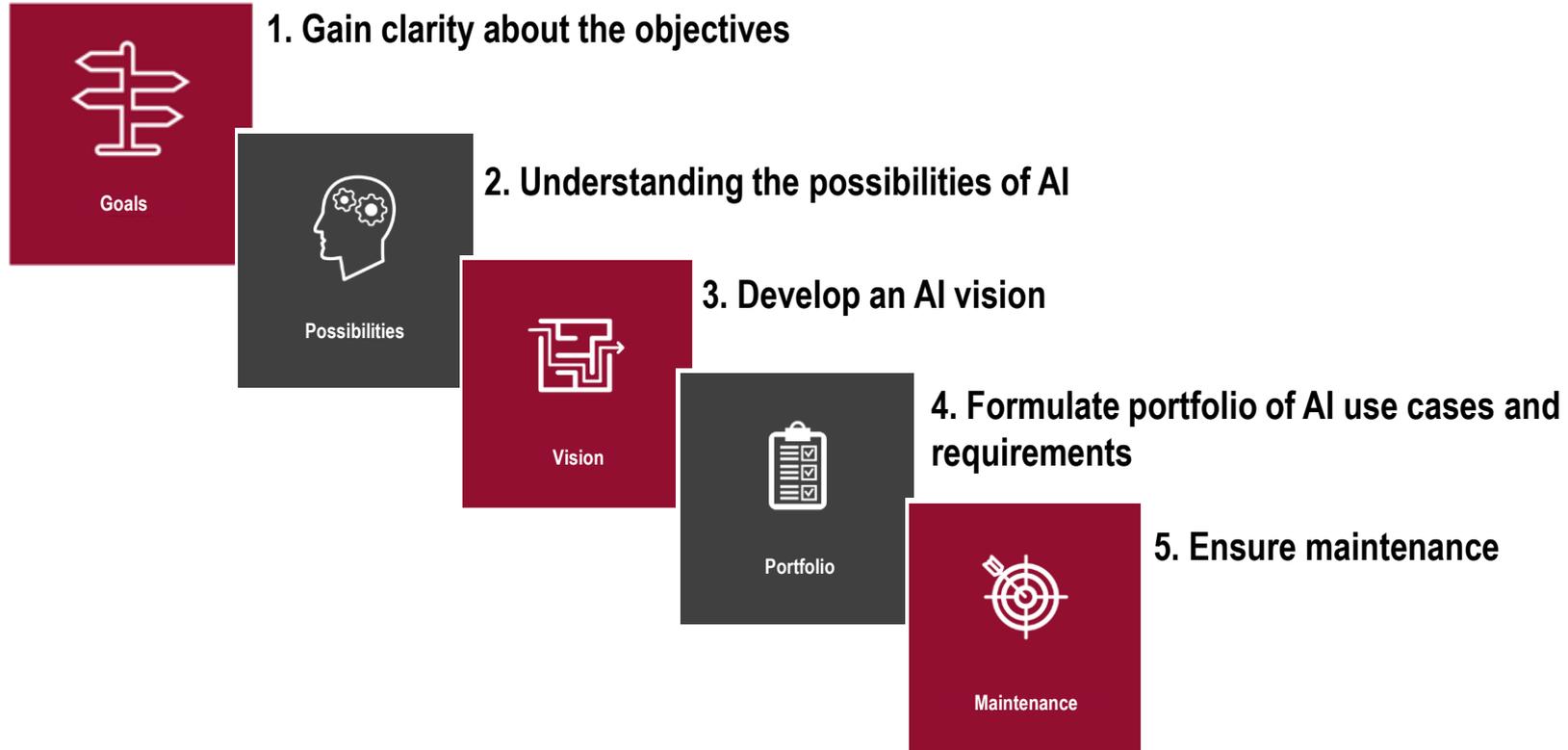
Technology

- Proof of Concept (PoC) is at the beginning of the development of AI systems
- Basic conditions for AI business model innovations: solid technical foundation, digitalized processes
- Foundations for value creation with AI: cultural change, trust in AI, data strategy (including data policies, security, quality and protection)

Ecosystem

- Implementation of AI in the company: Self-development of the product (internal), external solutions or cooperative approaches (e.g. AlaaS, academic cooperation, AI provider acquisition)

Guidelines: On the way to successful AI implementation



Digital technologies and AI: Obstacles in practice

1. Isolated AI use cases without added value: Many companies implement AI without reflecting use cases against the background of organizational goals

⇒ Important analysis of how AI solutions create added value or enable new business models

2. Non-scalable use cases: Successful scaling of AI pilot projects often fails due to data management, which is sometimes completely missing in the pilot phase

⇒ New AI-based business models must therefore be built on a solid digital infrastructure

3. Lack of resources and capacities: Companies often lack the talent and infrastructure necessary to develop use cases internally – and leverage potential for new business models

4. Lack of understanding of use cases: High investments in infrastructure are not a panacea

⇒ For successful implementation of AI business model innovation, the appropriate hardware must be coordinated with the associated organization and processes

5. Lack of maintenance strategy: Ongoing adjustments and updates of preliminary data sets and original models are necessary when the model is already in production – for example, because customer behavior changes

⇒ An AI-based business model must be continuously maintained and developed, as the quality of AI applications can degrade over time

Options

AI offers opportunities and challenges: It sets in motion a change that should be shaped for the benefit of all:

- Unlocking the economic potential of AI, in particular through innovative business models
- AI as a tool to successfully lead society and its social market economy pillar into the digital age

⇒ From the point of view of the working group Business Model Innovations, six areas are particularly important

⇒ Structuring options are impulses for debate within the Plattform Lernende Systeme as well as in the public:

1. **Advanced technology as a prerequisite**
2. **Provide funding**
3. **Using data responsibly**
4. **Demonstrating corporate responsibility and creating a legal framework**
5. **Establishing value networks**
6. **Build competence, ensure acceptance and participation**

Options



1. Advanced technology as a prerequisite

- Expand area-wide and demand-oriented gigabit infrastructures (5G expansion)
- Define company-wide cloud strategy that ensures speed, reliability, scalability, interfaces and data security (**multi-cloud strategy**); create a distributed European hyperscaler (**Project GAIA-X**)
- Strive for leadership in next generation cloud infrastructure (**quantum computing**)



2. Provide funding

- Create a regulatory framework to facilitate the participation of German / European capital accumulators (e.g. pension funds or insurance companies) in growth companies (**venture capital**)
- Expand cooperation of established companies with start-ups / growth companies incl. **corporate venture capital**
- **Public funding** of start-ups / growth companies vs. established companies



3. Using data responsibly

- Interpret the Basic Regulation on Data Protection sensibly in order not to endanger innovation in the AI sector or its business model (**GDPR Implementation Regulation**)
- Develop **standards** for responsible use of AI and include data at European level
- Support companies through recognised procedures for **anonymisation and pseudonymisation**



4. Demonstrating corporate responsibility and creating a legal framework

- Formulate and implement clear and binding **AI codes** in companies
- Shaping the **regulation** on transparency, liability and accountability
- Further develop **competition law** to meet the requirements of AI-based business models
- Reduce the **bureaucratic and tax burden** for start-ups



5. Establishing value networks

- Strengthen and expand **knowledge transfer** between universities, research institutions and companies
- Form **alliances** of established companies or organizations and AI start-ups that develop new technologies and disruptive business models
- **Bundling critical mass**, e.g. of data – also by accepting "**co-opetition**" with competitors



6. Build competence, ensure acceptance and participation

- **Strengthening university and school AI education and promoting human strengths**
- **Establish and expand operational qualification and training programmes** for AI (for data scientists, computer scientists, engineers and non-technical personnel)
- Develop **know-how communities** between companies and scientific partners (e.g. universities and research institutions, German research centre for artificial intelligence, Fraunhofer institutes)

Options for competitive enterprises

1. Advanced technology as a prerequisite:



Companies

- User companies should ensure data security, data sovereignty and control and avoid unfavorable lock-in effects with individual providers
- Ensure speed, reliability, scalability, interfaces and data security
- Making the range of services and price more competitive: enter into alliances in order to achieve economies of scale in design, construction and operation



Politics

- Ensuring the technical sovereignty of Germany
- Expand area-wide and demand-oriented gigabit infrastructures



Research

- Expand funding programmes for top-level research
- Promoting next generation leading edge technologies
- Strengthening the transfer from research to industry

Options for competitive enterprises

2. Provide funding:



Companies and politics:

- Creating incentives for additional growth financing in Germany and Europe by establishing a regulatory framework
- Investing equity capital more long-term in growth companies
- Expand cooperation between growth companies, established companies, universities and non-university research institutions



Options for competitive enterprises

3. Using data responsibly:



Companies

- Developing excellent data protection as a unique selling point in global competition
- Making the interaction between humans and AI transparent



Politics

- Promoting methods for anonymisation, pseudonymisation and simulation of data
- Reasonable interpretation of the basic data protection regulation
- Develop and expand trust structures and platforms



Communication

- Promoting dialogues
- Introduce labelling and information requirements

Options for competitive enterprises

4. Demonstrating corporate responsibility and creating a legal framework:



Companies

- Create trust
- Designing AI codes of conduct



Politics

- Designing transparency, liability and accountability obligations
- Differentiate between B2B and B2C platforms in regulation
- Update antitrust law
- Reduce bureaucratic and tax burdens for startups
- Constantly monitoring the social impact of AI
- Developing co-determination in companies and in the administration
- Improving existing regulations (better than entirely new regulations)

Options for competitive enterprises

5. Establishing value networks:



Companies

- Prepare for action in global and digitized value networks
- Positioning strategically in cross-company and cross-industry value creation networks
- Provide data for start-ups and growth companies from the AI environment
- Develop new technologies and disruptive business models together with start-ups
- Engaging in an internal AI debate



Politics

- Strengthening the rights of individuals and SMEs in a platform ecosystem
- Maintain knowledge transfer between universities, research institutions and companies

Options for competitive enterprises

6. Build competence, ensure acceptance and participation:



Politics and companies

- Develop and prepare usefulness scenarios
- Establish company qualification and training programs for AI
- Build know-how communities with partners such as universities and research institutions (German research center for artificial intelligence, Fraunhofer institutes etc.)
- Promoting competence development



Research

- Researching employment and qualification needs
- Testing new working models in research and transfer projects



Weblinks

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