

AI – Made in Germany

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# STANDARDIZATION ROADMAP ARTIFICIAL INTELLIGENCE

## RECOMMENDATIONS FOR AI STANDARDIZATION

A summary



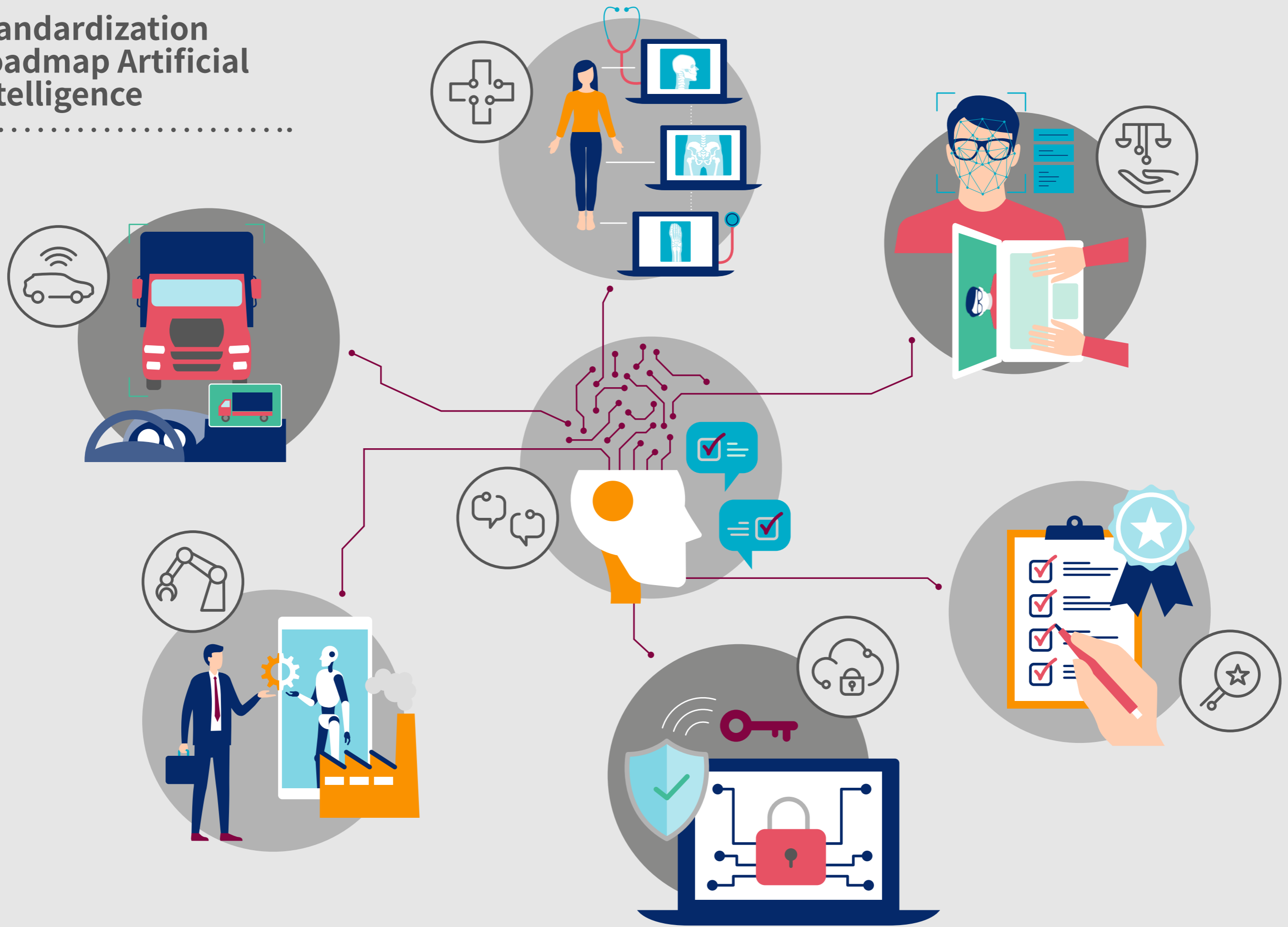
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# Standardization Roadmap Artificial Intelligence

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# GERMANY AS A STRONG AI LOCATION

Artificial intelligence (AI) changes the way our society works, learns, communicates and consumes. The EU expects its economy to grow strongly over the next ten years with the help of AI. For this to succeed, and for artificial intelligence to work safely and reliably, standards and specifications are indispensable.

## Standards and specifications for AI

- enhance confidence in this technology and increase the acceptance of AI in industry and society as a whole,
- promote technology transfer – especially small and medium-sized enterprises gain access to the global market with their innovations thanks to open interfaces,
- describe technical requirements and thus contribute to the robustness and reliability of AI systems, while supporting compliance with European values when using AI systems.

## The Standardization Roadmap AI shows the way

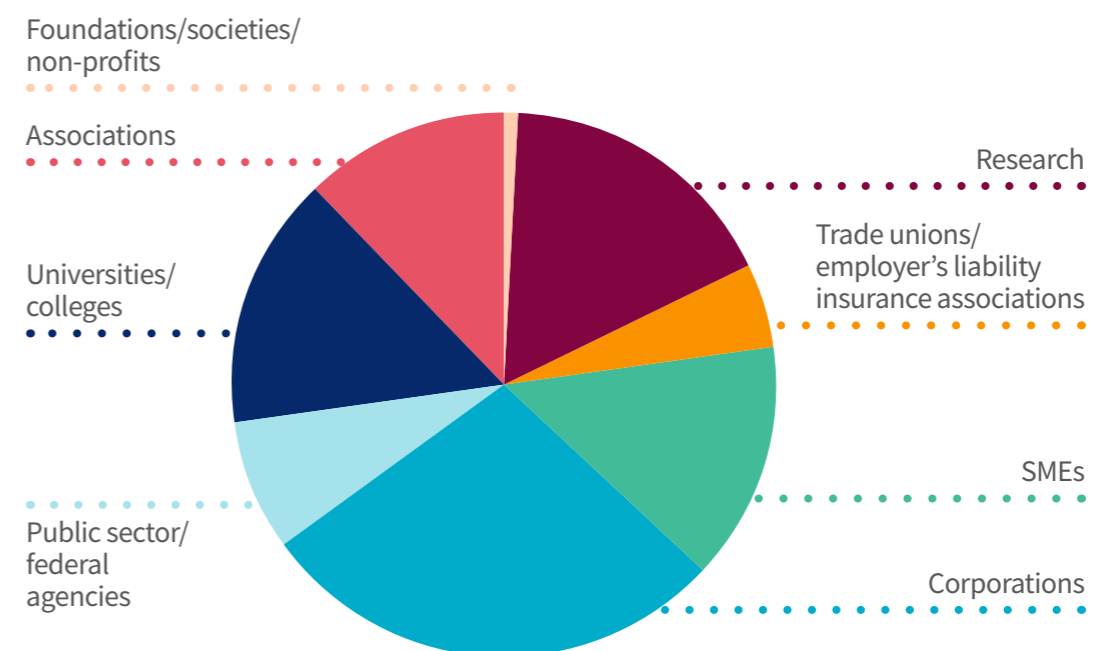
The German Standardization Roadmap AI shows which AI standards and specifications already exist and in which areas there is still an urgent need for action. DIN and DKE have developed these recommendations for action together with the Federal Ministry of Economic Affairs and Energy (BMWi) and with 300 experts from industry, science, politics and civil society. A high-level steering

group chaired by Prof. Wolfgang Wahlster coordinated and accompanied this work.

The Standardization Roadmap AI is divided into seven main topics:

- Basic topics
- Ethics/Responsible AI
- Quality, conformity assessment and certification
- IT Security (and safety) in AI systems
- Industrial automation
- Mobility and logistics
- AI in medicine

## Composition of the working groups





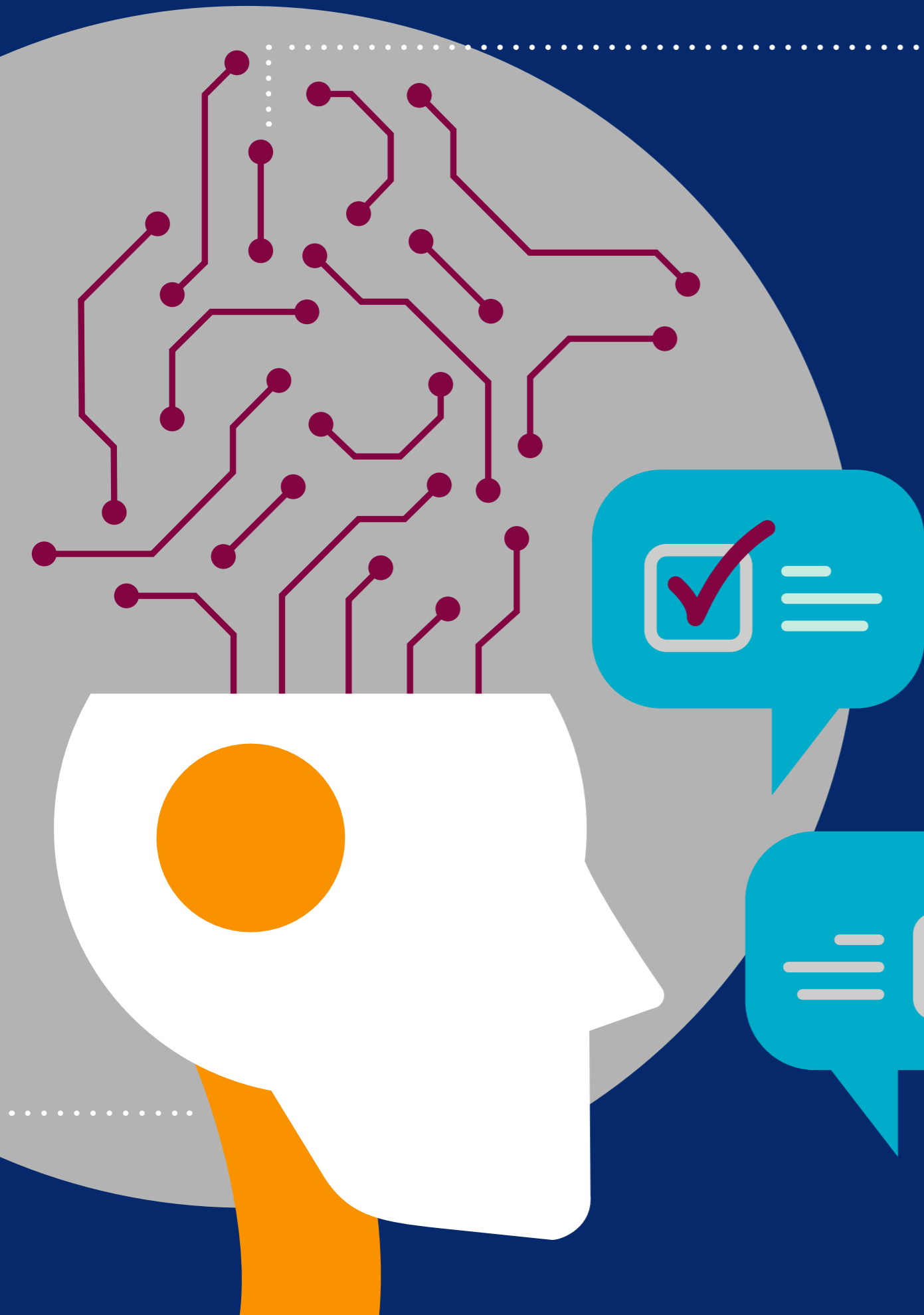
Basic topics

# TALKING ABOUT THE SAME THING

What is artificial intelligence? How can AI applications be assessed in the first place – and what defines the basis of ethical, legal and technical criteria? Before discussing AI, the basics need to be clarified first.

## Basics of AI

- Terminologies (e. g. of AI methods, capabilities, applications ...)
- Data (data analyses, data formats, data quality ...)



Ethics / Responsible AI

# WHAT IS ARTIFICIAL INTELLIGENCE ALLOWED TO DO?

Whether AI systems are ethical or lead to discrimination, injustice and other risks through unintentional distortions is one of the greatest public discourses on this topic. Especially where critical AI applications have an impact on life and limb or financial damage can occur, these risks must be minimized. However, it is also important not to slow down the further development of the technology. Standards and specifications can be used to describe minimum ethical requirements for AI applications and thus create trust and acceptance.





Quality, conformity  
assessment and certification

## MAKING HIGH QUALITY AI RECOGNIZABLE

Artificial intelligence only develops its full potential if it is of high quality. It must be reliable, robust and efficient, and needs functional safety to inspire confidence. Quality criteria and test methods are necessary to ensure this. Standards and specifications describe requirements for these criteria and methods, thus forming the basis for the certification and conformity assessment of AI systems.

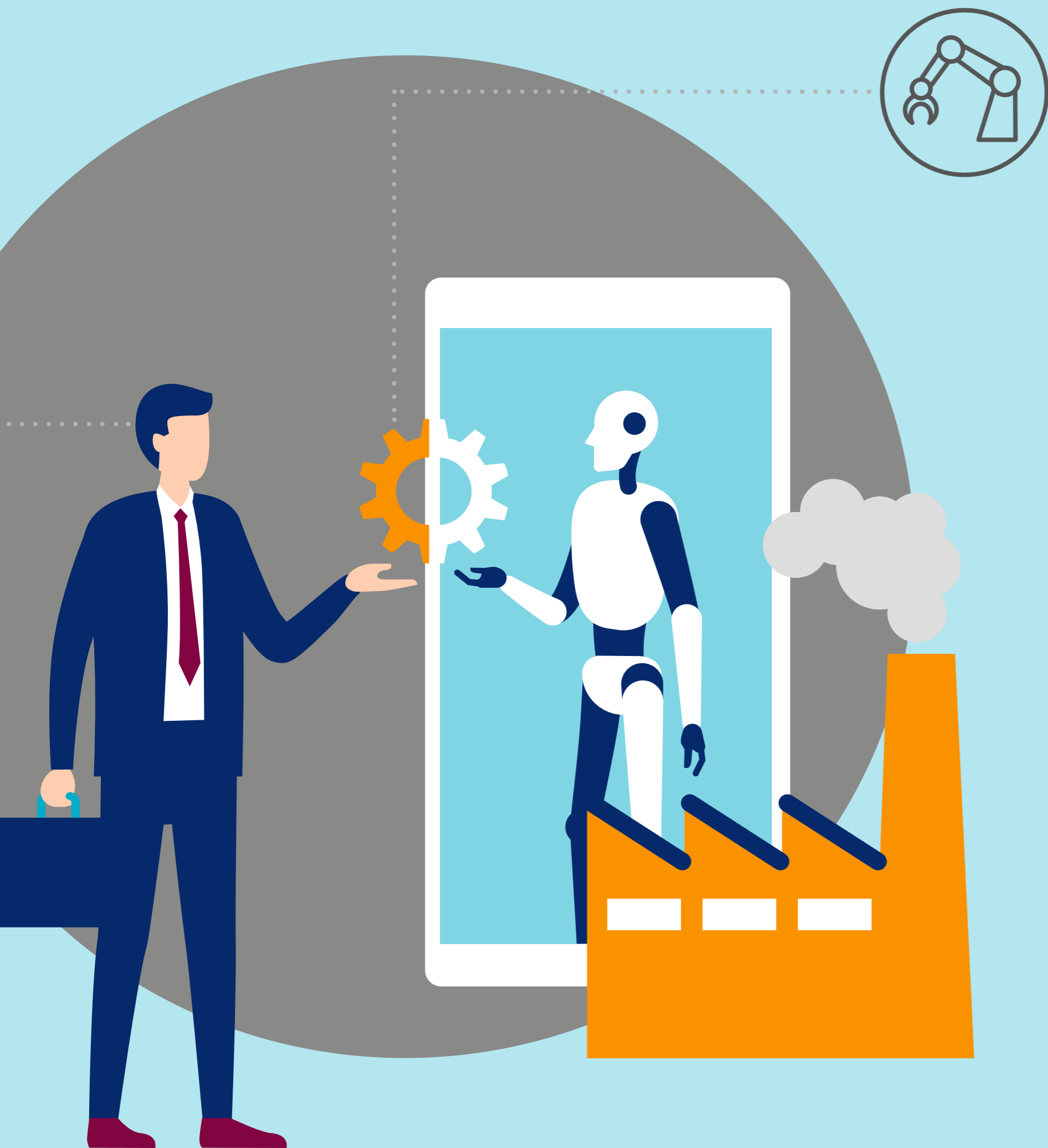


IT security / safety in AI systems

# PROTECTING SYSTEMS

Without comprehensive security/safety and risk minimization no car will drive, no plane will fly, no operation will be performed and no house will be built. Innovations only become economically viable when safety and security in use is ensured. This also applies to AI. Probably the greatest challenge for the use of AI systems by industry is to prevent manipulation and thus establish trust in (IT) security and in the AI system. Standards and specifications describe clear requirements for facing this challenge.





Industrial automation

# THE GREAT POTENTIAL FOR INDUSTRY 4.0

Germany is a leader in Industry 4.0. AI can expand this position and thus further strengthen Germany's economic performance. In particular, it can make the procedures and processes in the manufacturing industry more dynamic and flexible and thus increase the added value. However, these opportunities must also be seized – standards and specifications can help here, for example by defining interfaces for interoperability and ensuring data quality in the selection of appropriate data for AI systems' learning processes.





Mobility and logistics

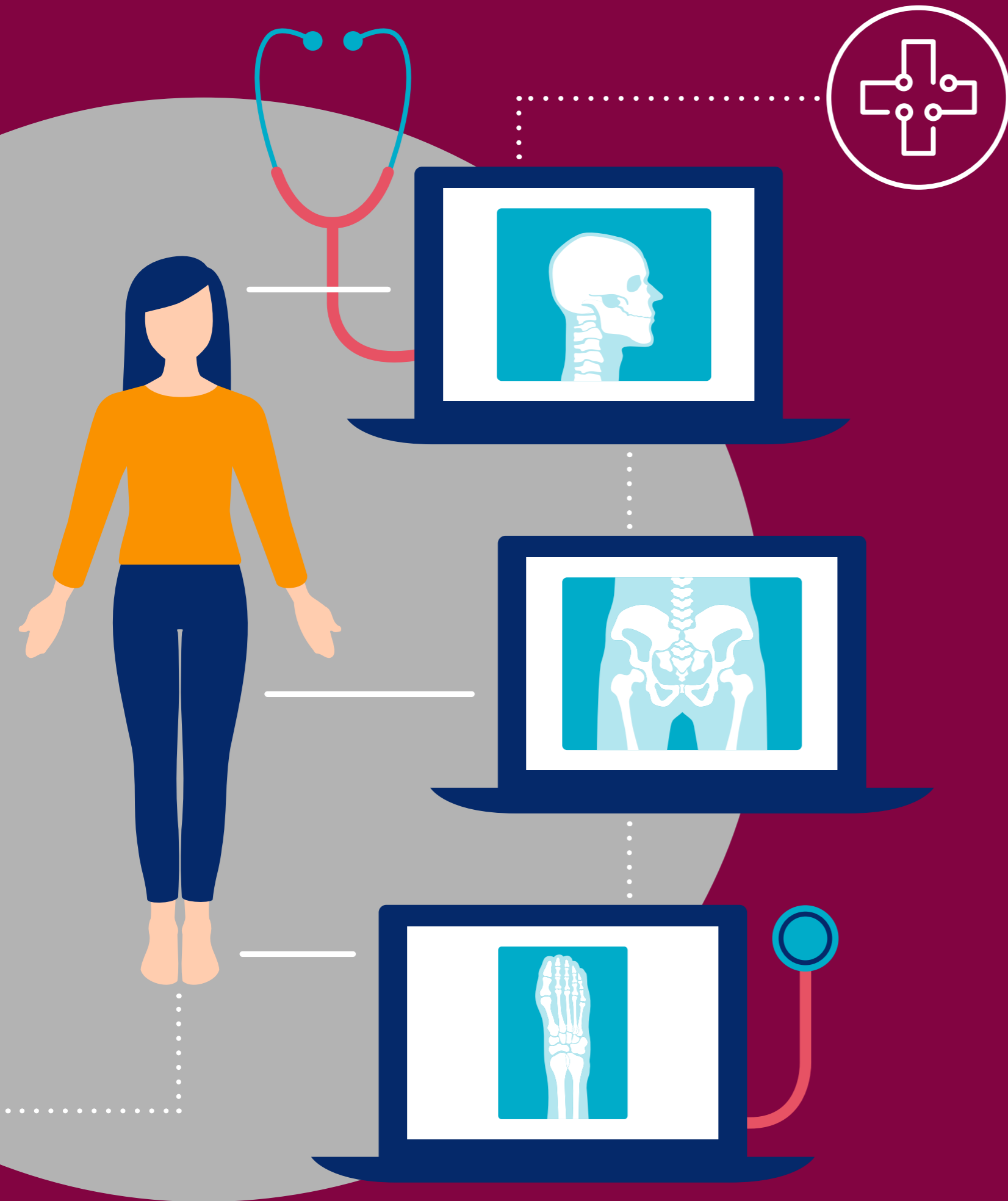
# GAIN MOMENTUM WITH AI STANDARDS

AI holds massive innovation potential for mobility and logistics – it is the basis for making new mobility solutions such as autonomous driving a reality. But how do you make sure that AI is safe on the roads and does not pose a danger to other road users?

## **Standards and specifications promote safe AI-controlled mobility:**

- On a technical level, standards and specifications help to ensure the safety of autonomously running vehicles during their commissioning, for example by describing clear requirements for test methods.
- AI systems for mobility and logistics must be capable of explanation and validation. This is the only way to understand how they make decisions in road traffic. Standards and specifications can help in this.
- AI-controlled cars, trucks or trams – all have to interact with each other in traffic situations. For this to work, they need systems that can work together. Uniform standardized data models form the basis for their interoperability.





## AI in medicine

# FROM PREVENTION TO THERAPY

AI brings new possibilities for medicine in prevention, diagnostics and therapy – from early detection via apps to the treatment of cancer. In order to take advantage of such opportunities, secure framework conditions are necessary. Challenges still need to be overcome, especially in the areas of ethics, legal frameworks, economics, technical aspects, but also acceptance and empathy. What rules are necessary so that technology always serves people and not the other way around?

### **The success of AI in medicine depends mainly on the following points:**

- How can the availability and quality of health data for AI development be ensured – and at the same time, how can these data be protected?
- Legal framework: Who is liable for misdiagnoses or damage? How can self-learning AI be brought in line with the highly regulated approval procedure?
- Ethical questions: To what extent are machines involved in medical decisions or even make these decisions themselves?

## Recommendations for action of the Standardization Roadmap AI

# FIVE STEPS TO “AI MADE IN GERMANY”

Standards and specifications can contribute to a safe, high-quality, reliable and explainable AI: They create the basis for technical sovereignty, promote transparency and provide orientation. In order to exploit this potential, five cross-cutting, key recommendations for action should be implemented.

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**1.**

### **Implement data reference models for the interoperability of AI systems**

Many different actors come together in value chains. For the various AI systems of these actors to be able to work together automatically, a data reference model is needed to exchange data securely, reliably, flexibly and compatibly. Standards for data reference models from different areas create the basis for a comprehensive data exchange and thus ensure the interoperability of AI systems worldwide.

**2.**

### **Develop a horizontal AI basic security standard**

AI systems are essentially IT systems – for the latter there are already many standards and specifications from a wide range of application areas. To enable a uniform approach to the IT security of AI applications, an overarching „umbrella standard“ that bundles existing standards and test procedures for IT systems, and supplements them with AI aspects would be expedient. This basic security standard can then be supplemented by subordinate standards on other topics.

**3.**

### **Design practical initial criticality checking of AI systems**

When self-learning AI systems decide about people, their possessions or access to scarce resources, unplanned problems in AI can endanger individual fundamental rights or democratic values. So that AI systems in ethically uncritical fields of application can still be freely developed, an initial criticality test should be designed through standards and specifications – this can quickly and legally clarify whether an AI system can even trigger such conflicts.

The complete recommendations for action  
can be found in the German Standardization Roadmap AI  
[www.din.de/go/ai](http://www.din.de/go/ai)

4.

**National implementation program  
“Trusted AI” to strengthen the European  
quality infrastructure**

So far, there is a lack of reliable quality criteria and test procedures for AI systems – this endangers the economic growth and competitiveness of this future technology. A national implementation programme “Trusted AI” is needed, which lays the foundation for reproducible and standardized test procedures in order to test the characteristics of AI systems such as reliability, robustness, performance and functional safety and to make statements about trustworthiness. Standards and specifications describe requirements for these properties and thus form the basis for the certification and conformity assessment of AI systems. With such an initiative, Germany has the opportunity to develop a certification programme that will be the first of its kind in the world and will be internationally recognized.

5.

**Analyse and evaluate use cases  
for standardization needs**

AI research and the industrial development and application of AI systems are highly dynamic. Already today there are many applications in the different fields of AI. Standardization needs for AI applications ready for industrial use can be derived from application-typical and industry-relevant use cases. In order to shape standards and specifications, it is important to integrate mutual impulses from research, industry, society and regulation. At the centre of this approach, the developed standards should be tested and further developed on the basis of use cases. In this way, application-specific requirements can be identified at an early stage and marketable AI standards realized.

# CONTACT US!



Do you have any questions or suggestions concerning standardization in the field of artificial intelligence or do you want to become active in AI standardization yourself?

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**[www.dke.de/standardization-roadmap-ai](http://www.dke.de/standardization-roadmap-ai)**



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