Artificial Intelligence – the Informatic's Perspective

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Head of **Cognitive Social Simulation** Team, German Research Center for Artificial Intelligence (**DFKI**)

DFKI - German Research Center for Artificial Intelligence

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Bremen

- Cyber-Physical Systems
- Robotics Innovation Center

Kaiserslautern

- Augmented Vision
- Embedded Intelligence
- Innovative Factory Systems
- Intelligent Networks
- Smart Data & Knowledge Services

Saarbrücken

- Cognitive Assistants
- Language Technology
- Agents & Simulated Reality
- Smart Service Engineering
- Institute for Information Systems
- Algorithmic Business and Production

Berlin

- Educational Technologies
- Smart Textiles
- Intelligent Analytics & Mass Data

Oldenburg/Osnabrück

- Marine Perception
- Robot Planning
- Smart Enterprise Engineering

DFKI-Teams @ Trier Branch:

- **Cognitive Social Simulation (Prof. Timm)**
- Experience-based Learning Systems (Prof. Bergmann)


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DIGITAL TRANSFORMATION
Technology
Communication
Data
Internet of things
Automation
AI
Networking

Deep Learning ⊂ Machine Learning ⊂ AI

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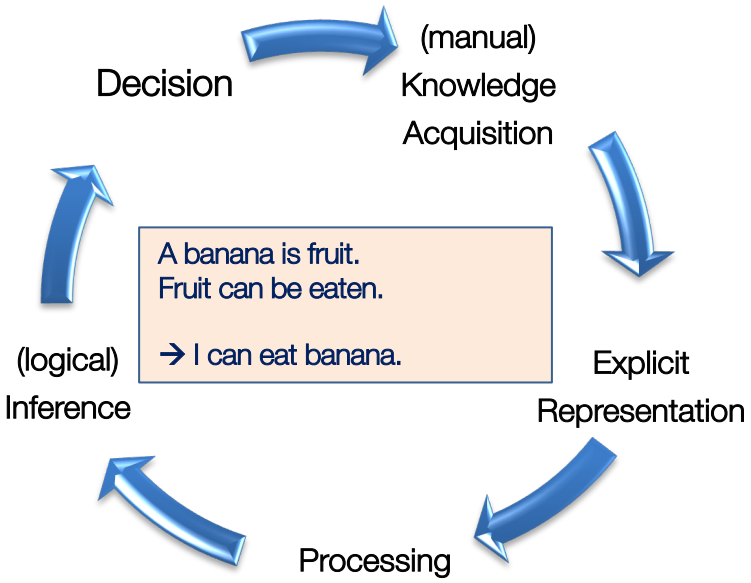
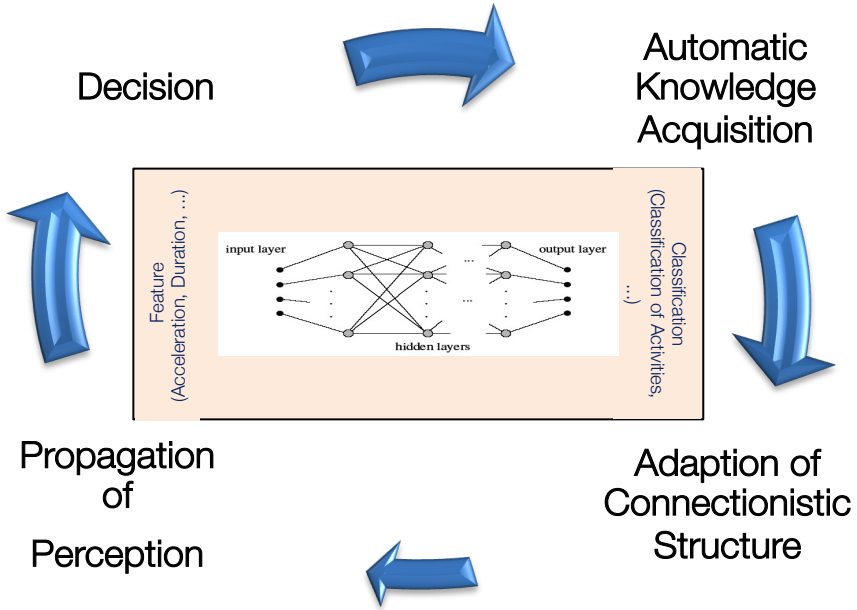


Symbolic AI (Explicit Knowledge)



Subsymbolic AI (Implicit Knowledge)

Paradigm Shift:
Practically Unsolvable Problems become **Solvable**

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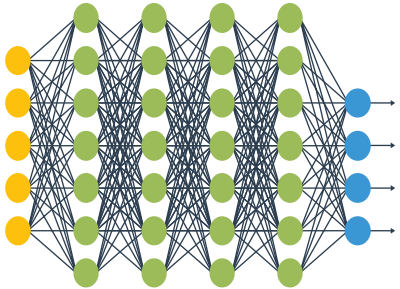

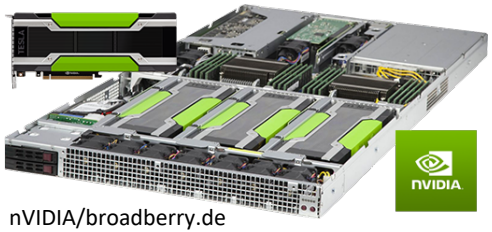

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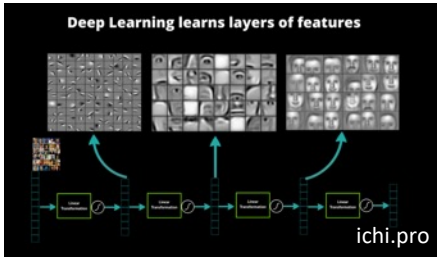


The AI Section of the German Society for Informatics

GI Fachbereich KÜNSTLICHE INTELLIGENZ

The **Section for AI (FBKI)** is **hosting all activities** within the German Informatics Society (GI e.V.) **that are related to Artificial Intelligence**:

- **In 10 Special Interest Groups**

  Computational Intelligence, Knowledge Representation and Reasoning, Deduction Systems, Declarative Languages, Knowledge Discovery and Machine Learning, Adaptivity and User Modelling, Cognition, Distributed AI, Knowledge Management, Planning and Configuration

- **Annual Conference Series on AI** and **Inter-Disciplinary Meetings**

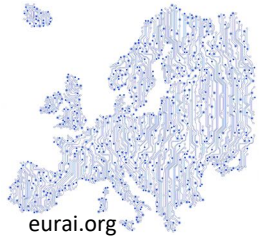
  → 44th German Conference on AI (KI 2021) in Berlin, 27.9.-1.10.2021

- **Quarterly AI Journal** (Künstliche Intelligenz, Springer)

The FBKI has **currently 1000 members** and is **member society of EurAI**

Web: http://www.kuenstliche-intelligenz.de/en

EurAi



Eine Initiative des Bundesministeriums für Bildung und Forschung

Wissenschaftsjahr 2019

KÜNSTLICHE INTELLIGENZ

#KI50

im Wissenschaftsjahr 2019

FACHBEREICH KÜNSTLICHE INTELLIGENZ

50 JAHRE GI

GESELLSCHAFT FÜR INFORMATIK

GEFÖRDERT VOM

Bundesministerium für Bildung und Forschung

https://gi.de/ethicalguidelines

GERMAN
INFORMATICS SOCIETY

ETHICAL GUIDELINES OF THE GERMAN INFORMATICS SOCIETY

Bonn, June 29, 2018

PREAMBLE

The German Informatics Society (GI) is a registered non-profit organization. With these guidelines, the GI seeks to establish that matters of professional ethics or moral conflicts become the subject of collaborative reflection and action. The guidelines are designed to offer a point of orientation not only to members of the GI association, but to all persons involved in the design, manufacture,

sphere come into conflict with these values, GI members must address the issue.

GI members conduct themselves in such a way as to advocate for the right to self-determination in information and communications technologies, and for the right to guarantee confidentiality and integrity of IT systems.

SECTION 1: PROFESSIONAL COMPETENCE

GI members stay abreast of the current state of science and technology in their respective areas of specialization; they take new developments into account and provide constructive criticism.
GI members are constantly working to

solutions, there must be a willingness to understand and take into account the rights, needs and interests of those parties who are impacted by them.

SECTION 3: LEGAL EXPERTISE

GI members are familiar with and observant of pertinent legal regulations concerning the design, manufacture, operation and use of IT systems. GI members, in conjunction with their expertise and professional competencies, participate actively in drafting legislative regulations.

SECTION 4: POWERS OF DISCERNMENT

GI members sharpen their powers of discernment to render themselves better equipped to contribute to design processes with individual and collective accountability. This presupposes not only a willingness to call into question and to make judgments about individual and collective actions in public discourse, but also the ability to acknowledge the limits of one's own powers of discernment.

SECTION 5: CONDITIONS OF EMPLOYMENT

GI members are active proponents of socially equitable contractual agreements concerning terms of employment, inclusive of opportunities for professional

SECTION 7: TEACHING AND LEARNING

GI members who are computer science instructors foster in their students the capacity for critical thinking; they prepare learners to accept their own individual and collective responsibility, and they act as role models in this regard.

SECTION 8: RESEARCH

GI members who conduct research in the field of computer science adhere to the rules of best practices in scientific research. Of particular importance in this regard is openness and transparency in dealing with criticism and conflicts of interest, the ability to express and to accept criticism as well as the willingness to allow the impact of one's own scientific work in the research process to become the subject of discussion. Scientific research breaches boundaries. These must be clearly articulated.

SECTION 9: COURAGE OF CONVICTIONS

GI members staunchly advocate for the pro… and safeguarding of human dignity, even when this is not exp… mandated by laws, contracts or other norms, or when these sta… opposition to the protection … of human dignity. … in situations in wh…

development of IT systems should contribu… acceptable and sustainable application of t… …es.

SECTION 11: FACILITATING SELF-DETERMINATION

GI members work toward ensuring that those people impacted by the usage and conditions of use of IT systems are granted adequate opportunity to participate in the design of these systems. This is especially pertinent with regard to systems whose application involves the exerting influence over, monitoring, or surveillance of said populations.

SECTION 12: THE GERMAN INFORMATICS SOCIETY

The German Informatics Society encourages its members to adhere to these guidelines at all times. The GI shall attempt to mediate between parties in situations in which conflicts arise.

1994: First Ethical Guidelines

2004: Revision of Ethical Guidelines

2018: Renewed Revision of Ethical Guidelines

Unsere Ethischen Leitlinien

Movies Shape the Public Idea of AI

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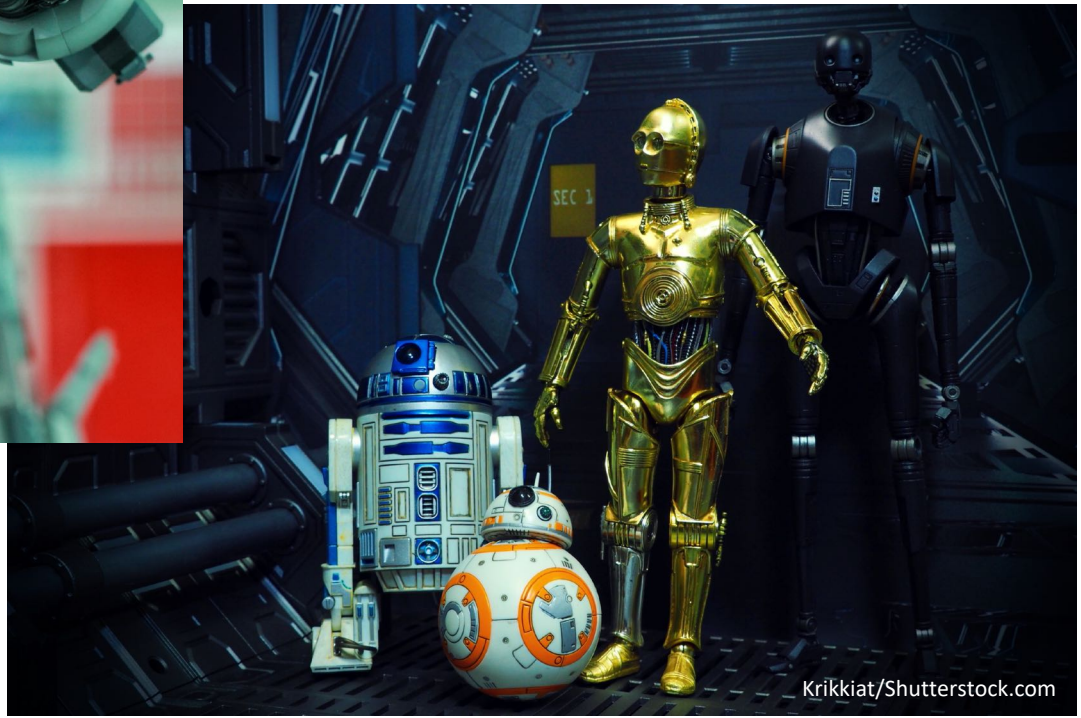
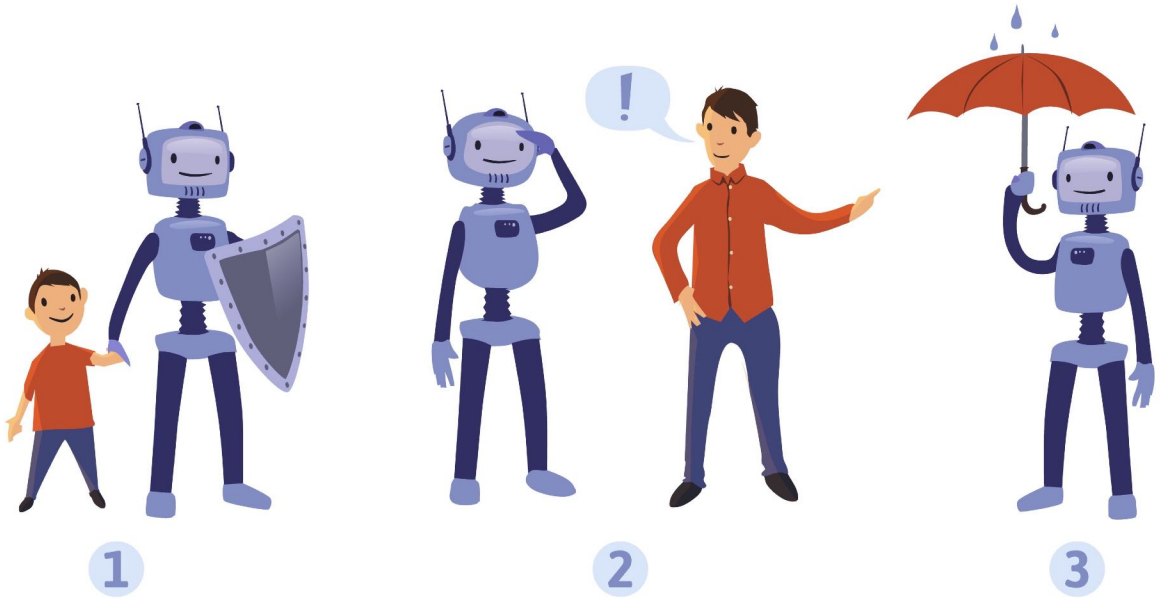


*by the GI commissioned study of the
Allensbach Institute
within the framework of #KI50-project

„Origins“ of AI Regulation: Asimov‘s Laws of Robotics



1

A robot may not injure a human being or, through inaction, allow a human being to come to harm.

2

A robot must obey the orders given it by human beings except where such orders would conflict with the First Law.

3

A robot must protect its own existence as long as such protection does not conflict with the First or Second Laws.

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Visible and Invisible AI

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Hambach Declaration on Artificial Intelligence

- AI must not turn **human beings into objects**
- AI may only be used for **constitutionally legitimate purposes** and may not abrogate the requirement of purpose limitation
- AI must be **transparent, comprehensible and explainable**
- AI must **avoid discrimination**
- The **principle of data minimisation** applies to AI
- AI needs **responsibility**
- AI requires **technical and organisational standards**
- AI **development requires regulation**

Resolution of the 97th Conference of the Independent Federal and State Data Protection Supervisory Authorities of Germany
Hambach Castle
April 3, 2019

https://www.datenschutz.rlp.de/fileadmin/lfdi/Konferenzdokumente/Datenschutz/DSK/Entschliessungen/097_Hambacher_Erklaerung_englisch.pdf

CLAIRE Confederation of Laboratories for Artificial Intelligence Research in Europe

> 390 AI Research Labs

> 22.000 Researcher in Europe

- **All of AI**, all of Europe, with a Human-Centred Focus
- Need for a **European AI Strategy**
- Complement push for **Regulation** with swift and substantial investment into AI research, including curiosity-driven, foundational research
- Adopt a **definition** of AI that captures what distinguishes AI approaches from other kinds of advanced computation

https://claire-ai.org

CLAIRE Confederation of Laboratories for Artificial Intelligence Research in Europe

Response to the European Commission White Paper – On Artificial Intelligence – A European Approach to Excellence and Trust

1. **Make sure to complement the push for AI** regulation with swift and substantial investment into AI research, including curiosity-driven, foundational research
2. Create streamlined allocation mechanisms of AI research support
3. Adopt a definition of AI that captures what distinguishes AI approaches from other kinds of advanced computation: they exhibit key aspects of behaviour considered as intelligent in humans.
4. Focus "AI made in Europe" on "AI for Good" and "AI for All".
5. Establish a clear strategy for coordinating and structuring an AI-based innovation ecosystem across Europe.

https://claire-ai.org/wp-content/uploads/2020/06/ec-wp-response.pdf

CLAIRE Confederation of Laboratories for Artificial Intelligence Research in Europe

Response to the European Commission White Paper – On Artificial Intelligence – A European Approach to Excellence and Trust

6. Establish policies to increase uptake of AI and investment in AI-driven product and market development
7. Invest in promoting broader awareness of AI in society
8. Build upon investments and tangible results of Horizon2020 programme in Responsible Research and Innovation (RRI)
9. Expand lessons learned in the areas of Privacy and Safety by Design in the last two decades and apply them to Ethics by Design for AI
10. Create the proposed lighthouse centre in a way that effectively achieves critical mass, synergy, and cohesion across the European AI ecosystem

https://claire-ai.org/wp-content/uploads/2020/06/ec-wp-response.pdf

Definition of AI

https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52021PC0206

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Definition of European Commission (Article 3, Definitions)

- AI system means software that is developed with **one or more** of the techniques and approaches listed in **Annex I AND**
- can, for a given set of human-defined objectives**, generate outputs such as content, predictions, recommendations, or decisions influencing the environments they interact with;**

Annex I

- (a) Machine learning approaches, including supervised, unsupervised and reinforcement learning, using a wide variety of methods including deep learning;
- (b) Logic- & knowledge-based approaches, including knowledge representation, inductive (logic) programming, knowledge bases, inference & deductive engines, (symbolic) reasoning & expert systems;
- (c) Statistical approaches, Bayesian estimation, search and optimization methods.

generate outputs

content

predictions

recommendations

decisions

Influencing the environment they interact with

Challenges in Defining and Regulating AI

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Some ideas on AI

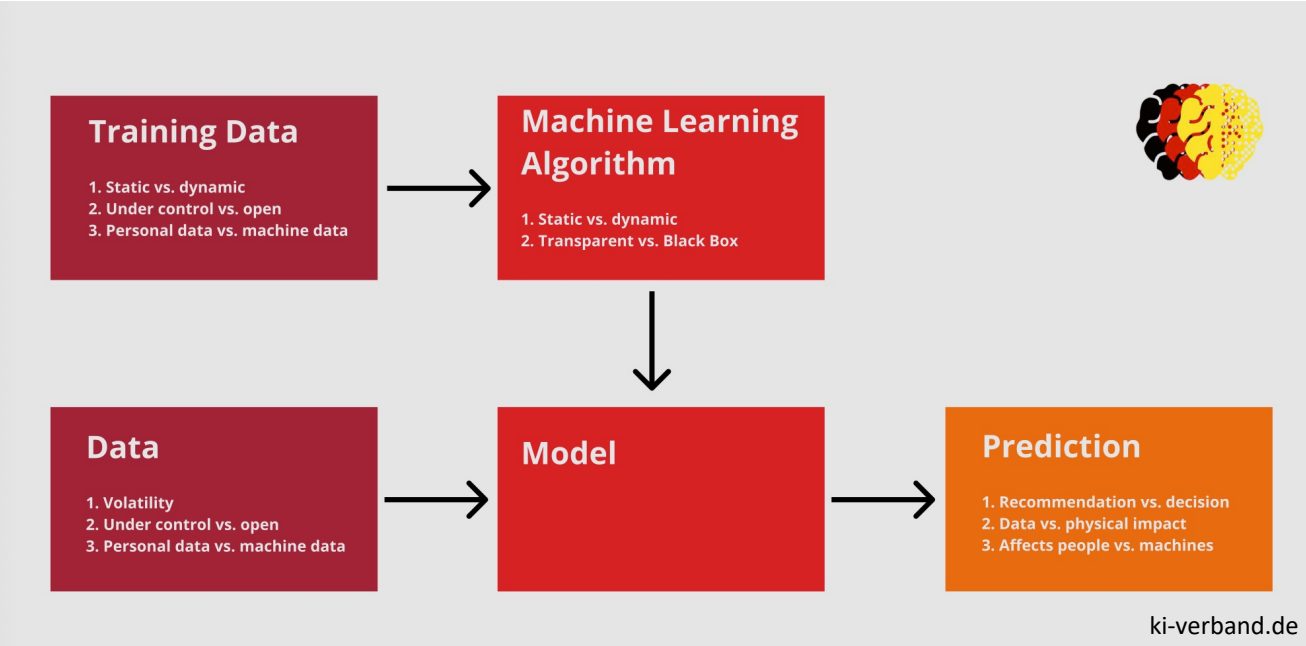
- If it‘s running – it‘s not AI
- Is it just software or AI?
- Continuum from well-designed and flexible software to intelligent software
- AI is claimed to be inside but missing vs. No AI is mentioned but contained
- Flexible AI is used in design but „compiled“ for application

Perspective from AI-start-ups (KI-Bundesverband):

- AI is “just another part“ of a huge IT-project/system
- Extend existing regulation in critical areas (automotive, healthcare, …)
- Decisions of AI come with certain, measurable accuracy but rarely reach 100%
- It is difficult to determine whether a software is using AI-algorithms and the concept of AI is complex and hard to define legally.

* https://ki-verband.de/wp-content/uploads/2021/03/Final_Regulierung_compressed-1.pdf

Criteria to evaluate the impact of an AI use case



(c) KI Bundesverband Fig. 1, p. 10: https://ki-verband.de/wp-content/uploads/2021/03/Final_Regulierung_compressed-1.pdf

Definition of AI

https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52021PC0206

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FBKI-Perspective: Fields of AI

- Knowledge Representation and Reasoning
- Automated Planning
- Machine Learning
- Natural Language Processing
- Perception/Computer Vision
- Human-Machine-Interaction/ Human-Agent-Interaction
- Multi-Agent Systems

AI Regulation - The Informatics‘ Perspective

- Strengthens trust in AI, improving acceptance
- Risk classification, regulate “high risk” technology
- Applications in focus: Are humans endangered? (physical, constitutional rights)
- Additionally, definition of minimal standards for AI: society has to define boundaries for AI
- Trust is not sufficiently specified and not sufficiently considered (Trust, Explainability, Comprehensibility)

Thanks for your Attention

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- Co-Speaker of Section on AI (FBKI) https://fbki.gi.de
  (together with **PD Dr. Matthias Klusch, DFKI)**,
  German Informatics Society (GI)
- Member of ThinkTank on Public Safety
  (Zukunftsforum öffentliche Sicherheit e.V., ZOES) https://zoes-bund.de/