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IT Security Association Germany

German-American IT Security Forum

IT Security Association Germany (TeleTrusT) in cooperation with GACC – German American Chamber of Commerce

San Francisco, 28.04.2025

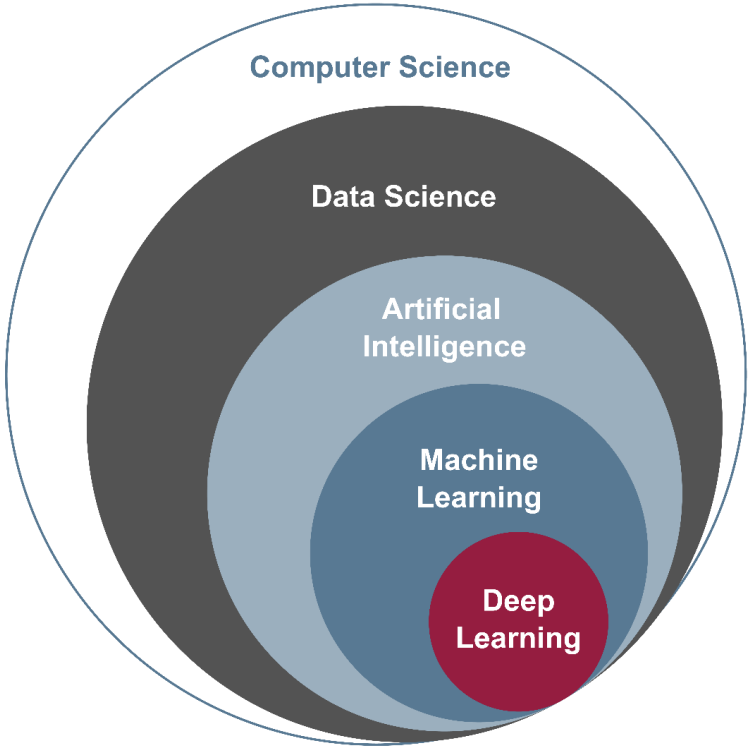
AI and IT security
→ more security, more threats

Prof. Dr. Norbert Pohlmann

Professor for Cyber Security
Director of the Institute for Internet Security – if(is)
Chairman of the board of the IT Security Association TeleTrusT
Member of the board of the Internet industry association eco.

Classification

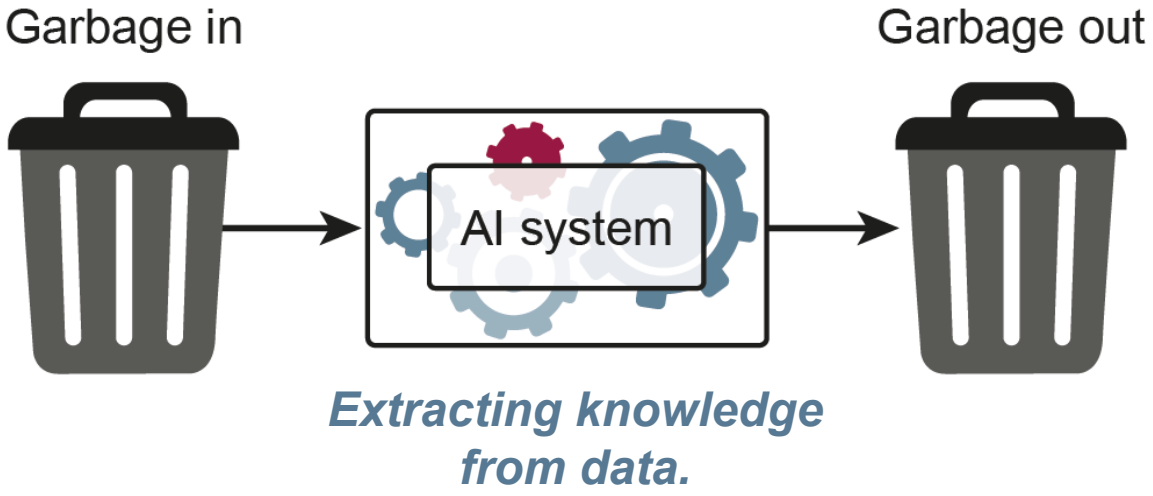
→ (Artificial intelligence) **Machine learning**



- **Data Science** generally refers to the **extraction of knowledge from data**.
- **Strong "Artificial Intelligence"** *(future)*
  is intended to automatically emulate **„human-like intelligence“**.
  Singularity, Artificial General Intelligence (AGI) - („machines“ improve themselves, are *„more intelligent“ than humans*)
- **Weak „artificial intelligence“** *(very successful today)*
  Machine learning (ML) is a term for the generation of knowledge from experience (in data) by computer.
- **Deep Learning** → Method of ML → **Improved results**
- **Large Language Modell (LLM)** Basic model for generative AI ***(stochastic parrot)***
- **Generative AI (GenAI)** *is a form of artificial intelligence that can produce text, images, code and various other content based on its training data*.

A principle of artificial intelligence
→ Garbage in – Garbage out

Paradigma



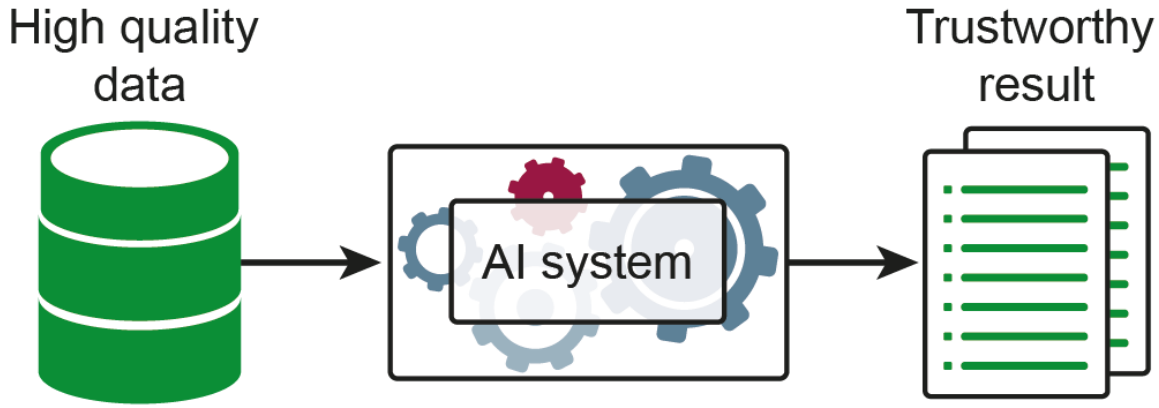
Standards for data quality:

→ **Content level** of the data and ***correctness***
→ **Traceability of data** (including data sources)
→ ***Completeness*** and **representativeness**
→ **Availability** and ***timeliness***

Motivate high-quality and secure **sensors**.

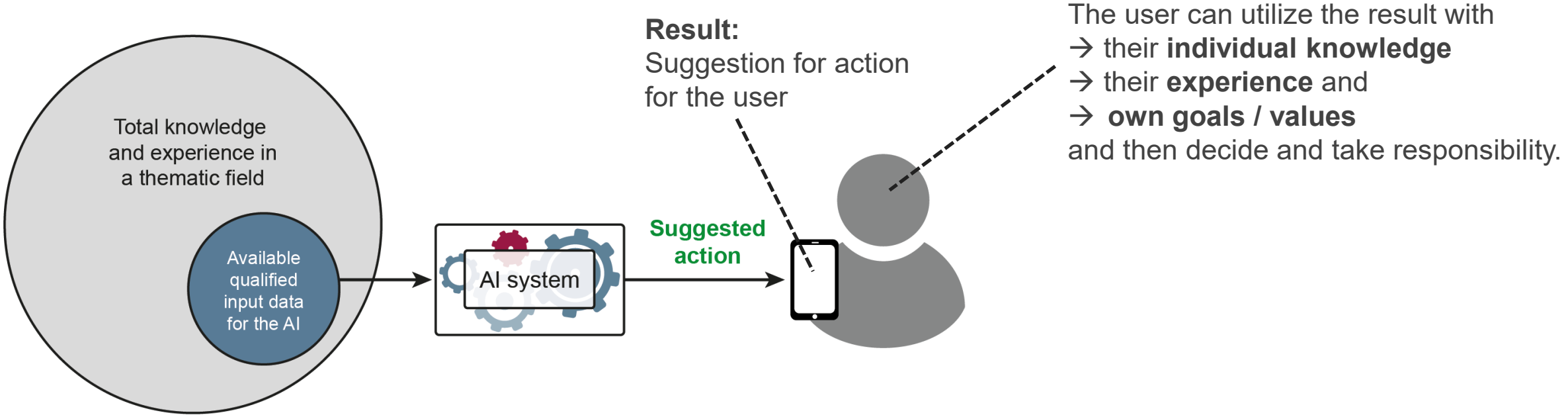
Further aspects for increasing quality:

→ Establish data pools
→ Promote the exchange of data
→ Create interoperability
→ Push open data strategy



Trustworthiness of result
→ Dealing with the AI result

- **„Keep the human in the loop“**
  - AI results are understood as a **suggestion for action** for the user.
  - *This concept promotes the user's **self-determination** and increases trust*

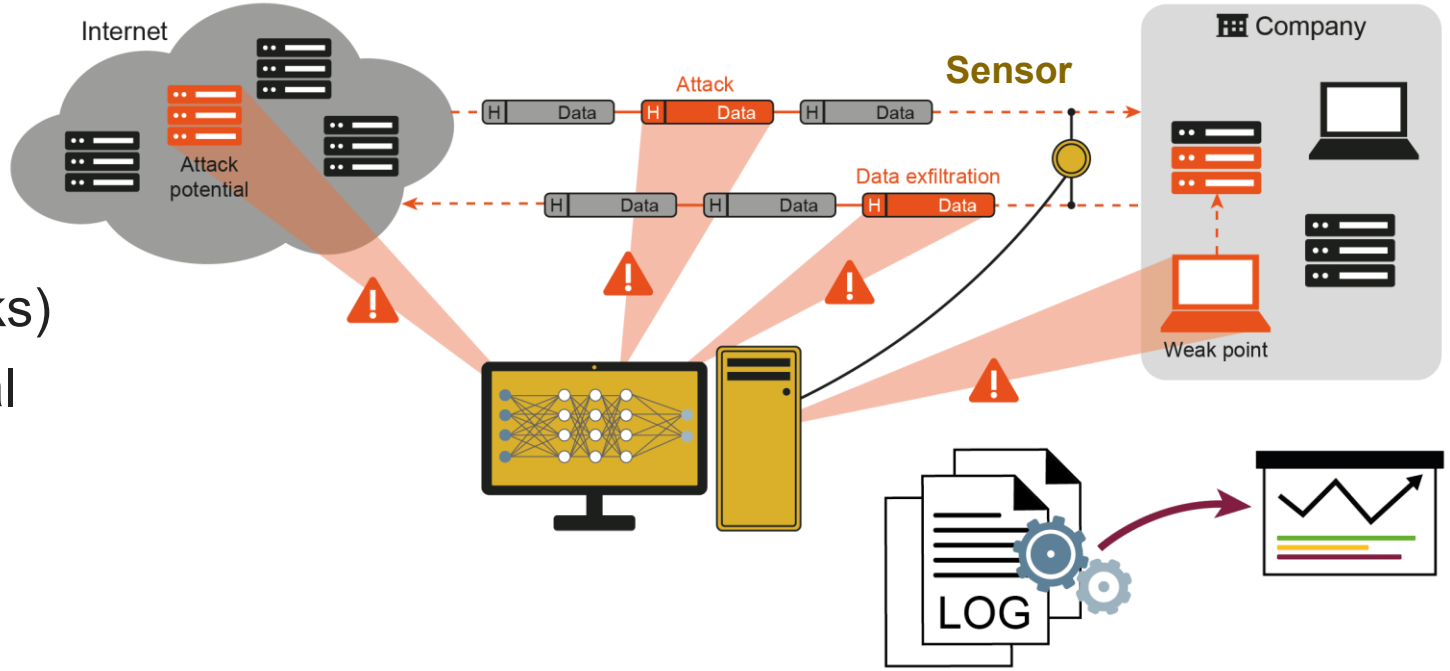


- **Automated applications such as autonomous driving**
  - ***High effort:*** *simulation, testing and validation*
  - ***Remaining risk:*** *responsibility, liability and insurance*

Artificial intelligence for IT security
→ Detecting attacks

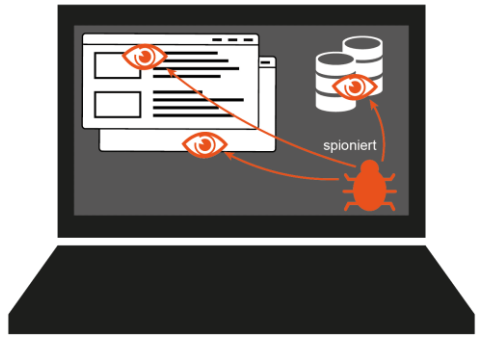
Increase the **detection rate** of **attacks**

- Network, IT end devices, servers, IoT devices, cloud applications ...
- Adaptive models (detect new attacks)
- Anomalies: normal versus abnormal



Other areas in which improved **detection** plays an important role:

- Networks / Internet
- *Malware*, spam …
- Fake news
- *Deepfake*
- ...



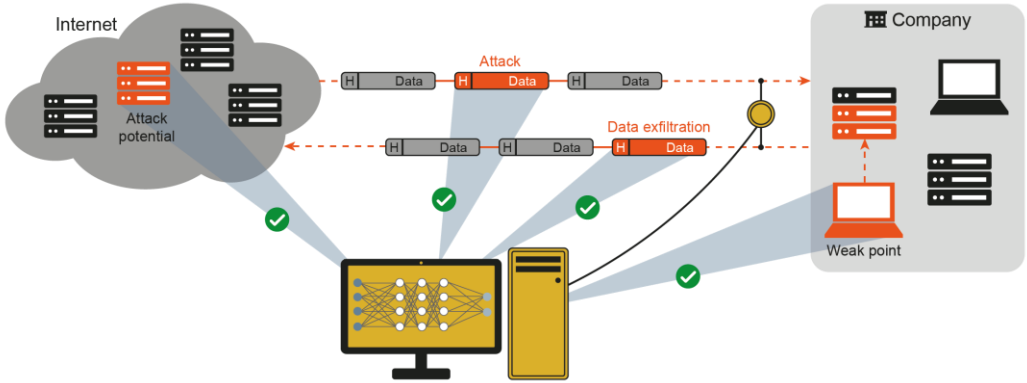
Attackers use artificial intelligence
→ Possible attacks

Identify attack vectors

- **Target**: Identify vulnerabilities / security gaps in the victim IT systems with the help of AI to assess **attack possibilities** / **potentials** and **carry out attacks**

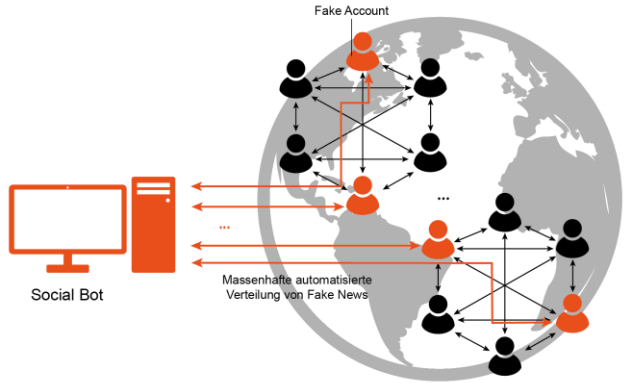
Overcoming IT security measures

- **Target:** “Light spots” (thresholds, sequences ...) of the anomaly detection system are **analyzed with the help of AI** to implement **undetected attacks**.



Automated attack

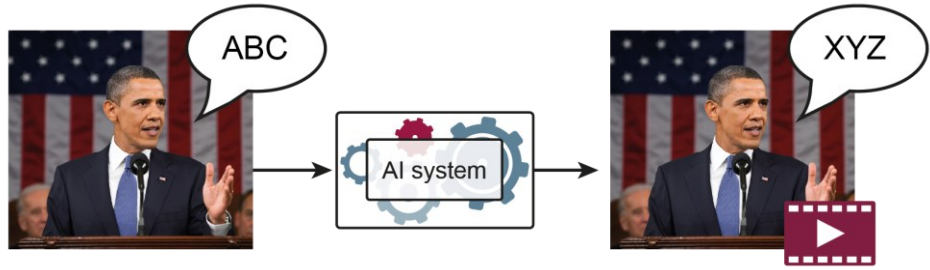
- **Target:** Social bots to **automatically generate fake accounts** and **fake news** to manipulate people.



Attackers use artificial intelligence
→ ChatBots like ChatGPT

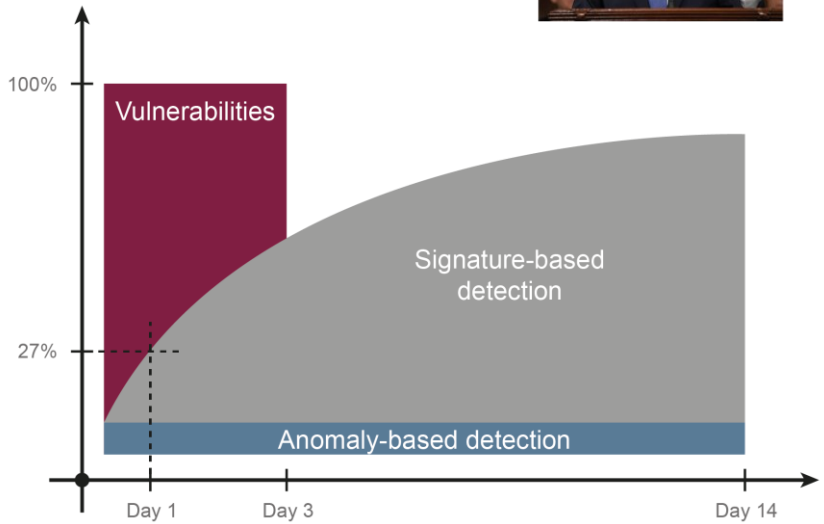
Social Engineering+++

- Spear phishing (first step for most attacks)
- Fake news (manipulation of people/societies)
- Deepfake (CEO fraud)



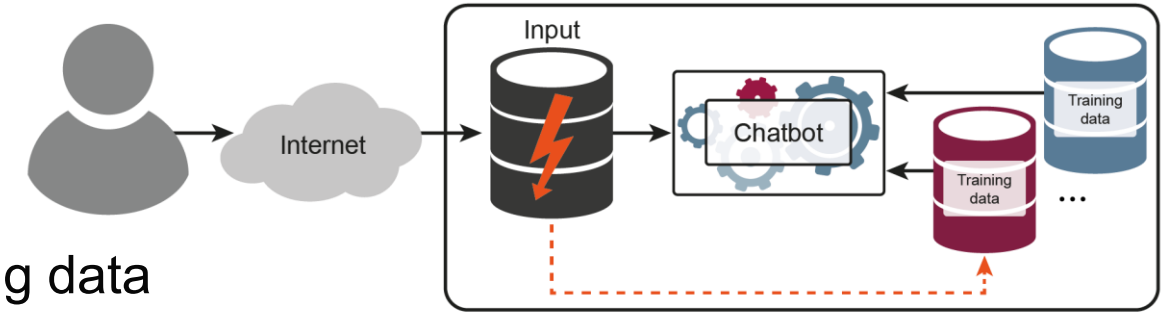
Faster development of attacks

- Polymorphic malware



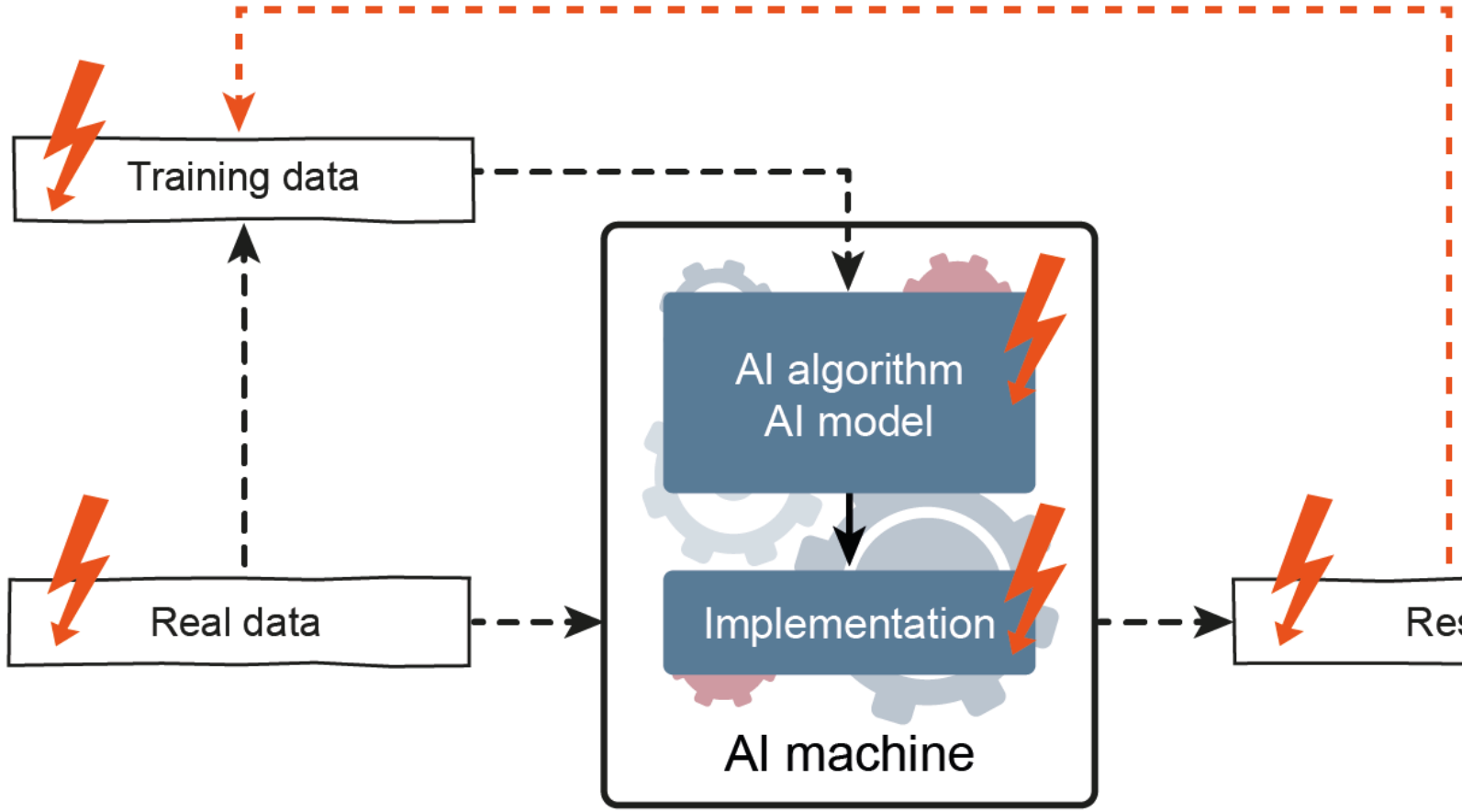
Confidential information as input to a central service

- Additional attack surface of confidential information
- Unwanted integration of confidential information into the training data



IT security for artificial intelligence

→ Attacks



Attacks on AI systems

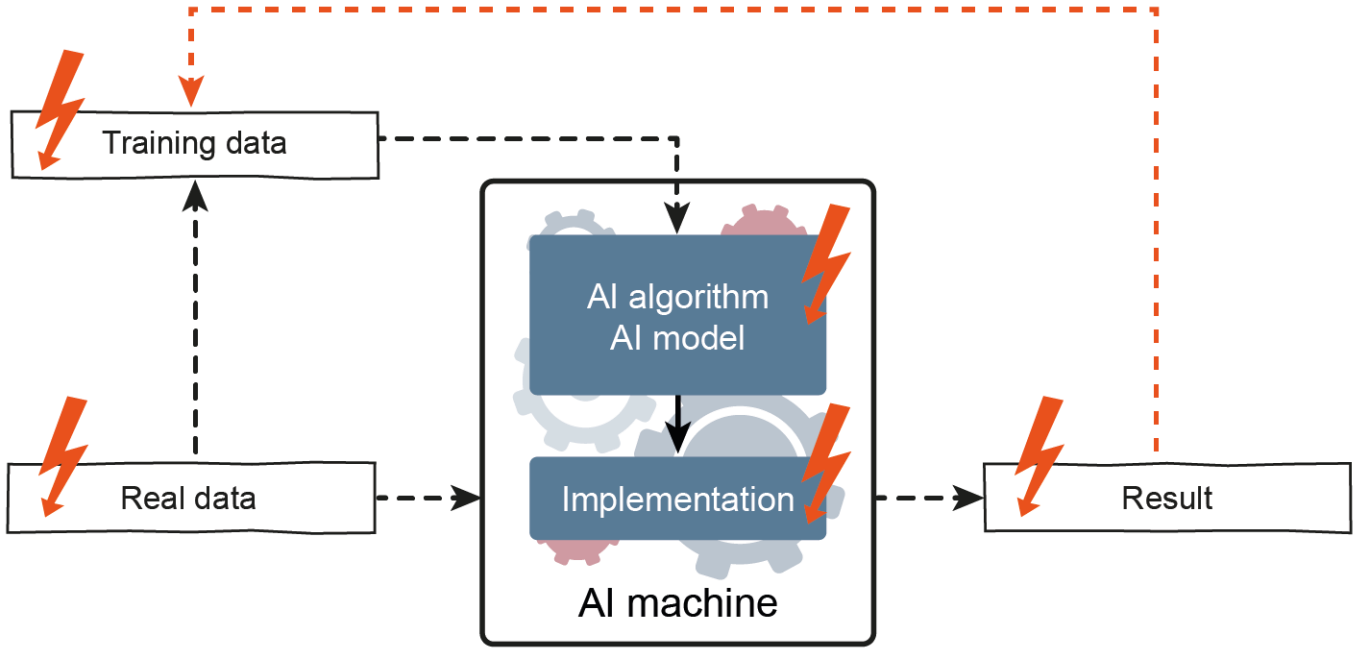
→ *Poisoning Attack*

→ *Evasion Attack*

→ *Exploratory Attack*

→ *…*

IT security for artificial intelligence
→ IT security measure



Use of high-quality AI technology

IT security goals:

→ ***Integrity***
(detection of data manipulation)

→ ***Confidentiality***
(protection of business secrets)

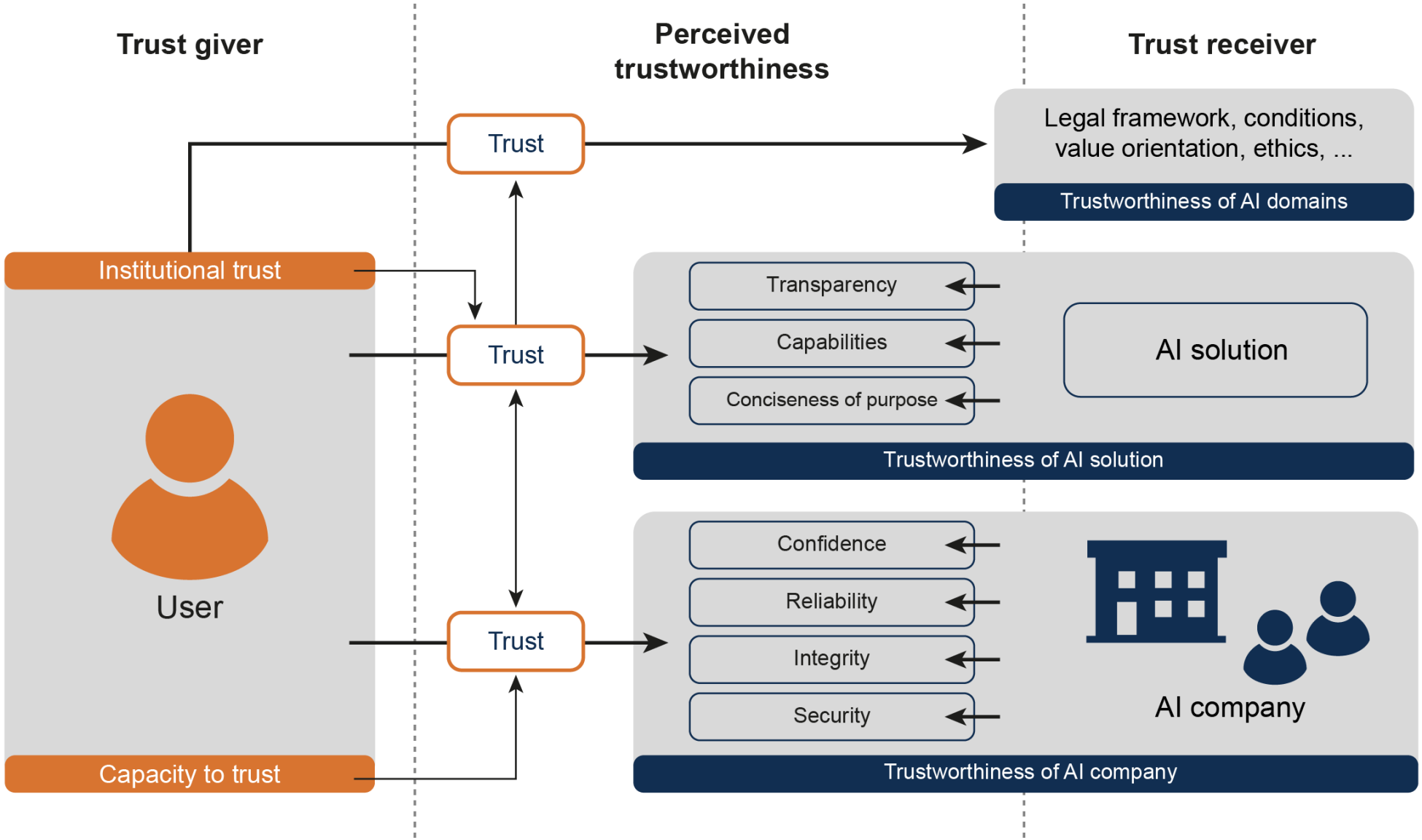
→ ***Data protection***
(protection of personal data)

→ ***Availability***
(of the application and results)

Use state-of-the-art technology for IT security measures

for protection of
→ the **data** (training data, real data/input data, results),
→ the **AI engine** (algorithms, models, implementation) and
→ the **application**

Artificial intelligence needs trust
→ Trustworthiness model



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We need AI in IT security,
but we also need to actively reduce the risks of AI!

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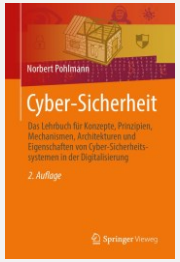
Anhang / Credits

Wir empfehlen

Cyber-Sicherheit

Das **Lehrbuch** für Konzepte, Mechanismen, Architekturen und Eigenschaften von Cyber-Sicherheitssystemen in der Digitalisierung“, Springer Vieweg Verlag, Wiesbaden 2022
https://norbert-pohlmann.com/cyber-sicherheit/



7. Sinn im Internet (Cyberschutzraum)

https://www.youtube.com/cyberschutzraum

CYBER SCHUTZRAUM

Master Internet-Sicherheit

https://it-sicherheit.de/master-studieren/

(M) MASTER internet-sicherheit.

Glossar Cyber-Sicherheit

https://norbert-pohlmann.com/category/glossar-cyber-sicherheit/

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It‘s all about Trust!

https://vertrauenswürdigkeit.com/

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https://norbert-pohlmann.com/

Der Marktplatz IT-Sicherheit

(IT-Sicherheits-) Anbieter, Lösungen, Jobs, Veranstaltungen und Hilfestellungen (Ratgeber, IT-Sicherheitstipps, Glossar, u.v.m.) leicht & einfach finden.
https://www.it-sicherheit.de/

Quellen Bildmaterial

Eingebettete Piktogramme: Institut für Internet-Sicherheit – if(is)

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