Proposal for a Common Classification of AI Systems based on Methods and Capabilities

DIN/DKE NA043-01-42 GA:
Contribution for CEN-CENELEC JTC 21 ‚Artificial Intelligence‘

Taras Holoyad
Bundesnetzagentur (Mainz)
taras.holoyad@bnetza.de

Content

- Main Focus
- **Methods** of Artificial Intelligence
- **Capabilities** of Artificial Intelligence
- Example of use
- Benefits

Main Focus

➔ **Basis** for **European** AI **Regulation**:
- **Europe-wide homogeneity** in describing AI applications
- **Trustworthiness** by ensuring **explainability** and **transparency**
- Unambiguity in **requirements** for **testing** and **certification**

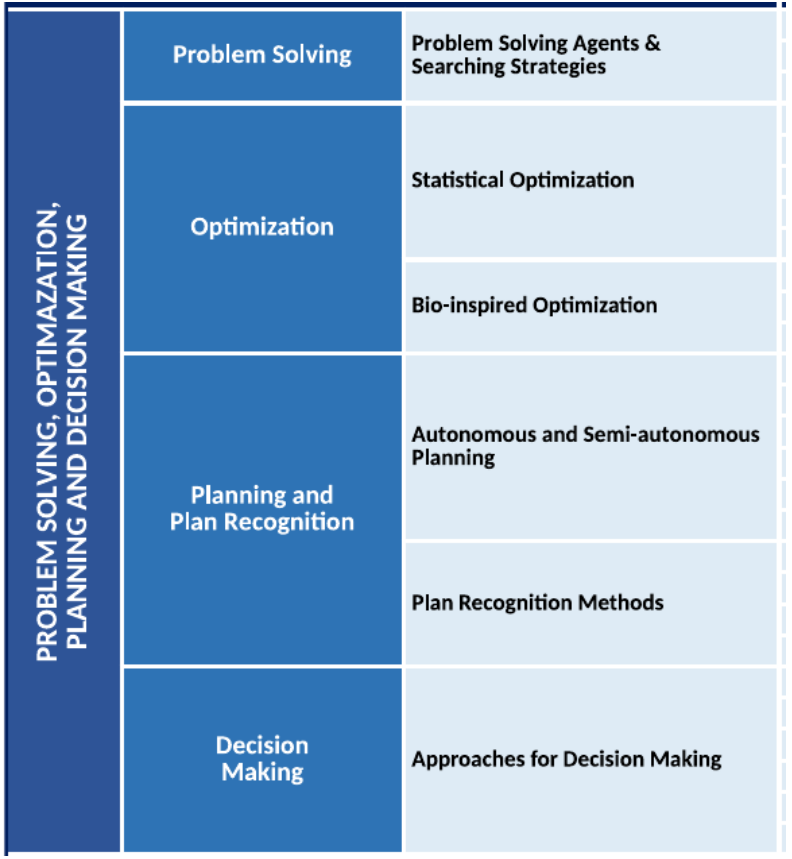
➔ Facilitated use of AI by **Public Authorities**, **SME**s and **Large Enterprises**
- Identification of **quality criteria** for **rule-based** as well as **data driven** AI
- Clear **basis** for **assessment** of **impacts** and **criticality**

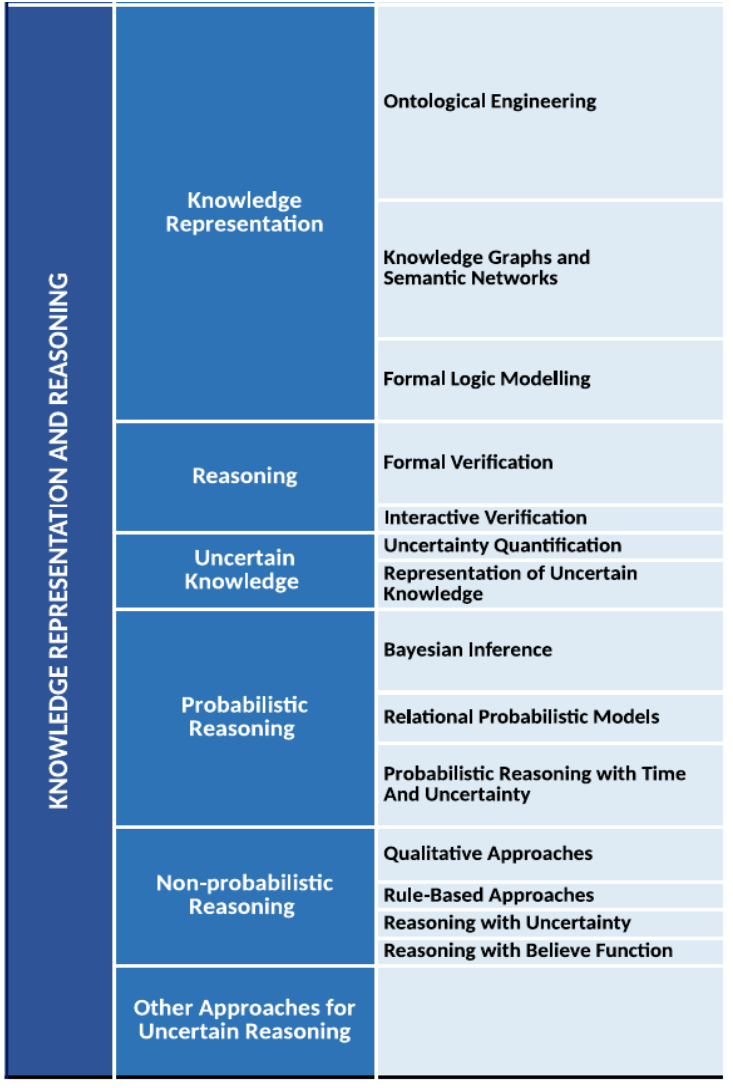
➔ **Common ground** for **ecosystem** participants in **Europe**
- Accelerated boost of AI-based business models
- Consistent enforcement of ethical values

Methods

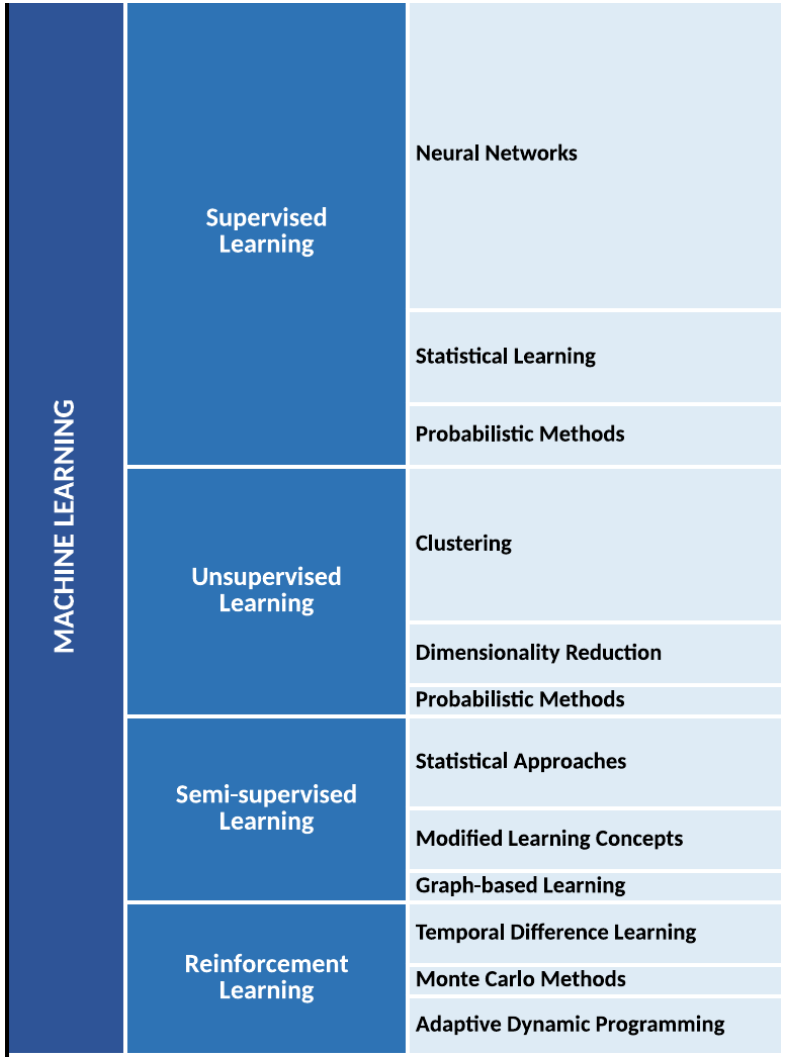
➔ Methods:
Representation from the perspective of mathematics, physics and computer science

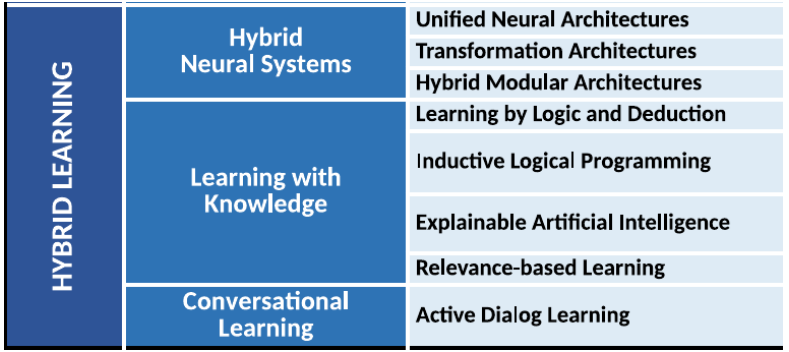
➔ Conceptualised on the basis of:
Stuart J. Russell and Peter Norvig -
Artificial Intelligence: A Modern Approach (2020), 4th Ed., Prentice Hall.





Scientific Article from Journal of "KI – Künstliche Intelligenz": https://link.springer.com/article/10.1007/s13218-021-00736-4





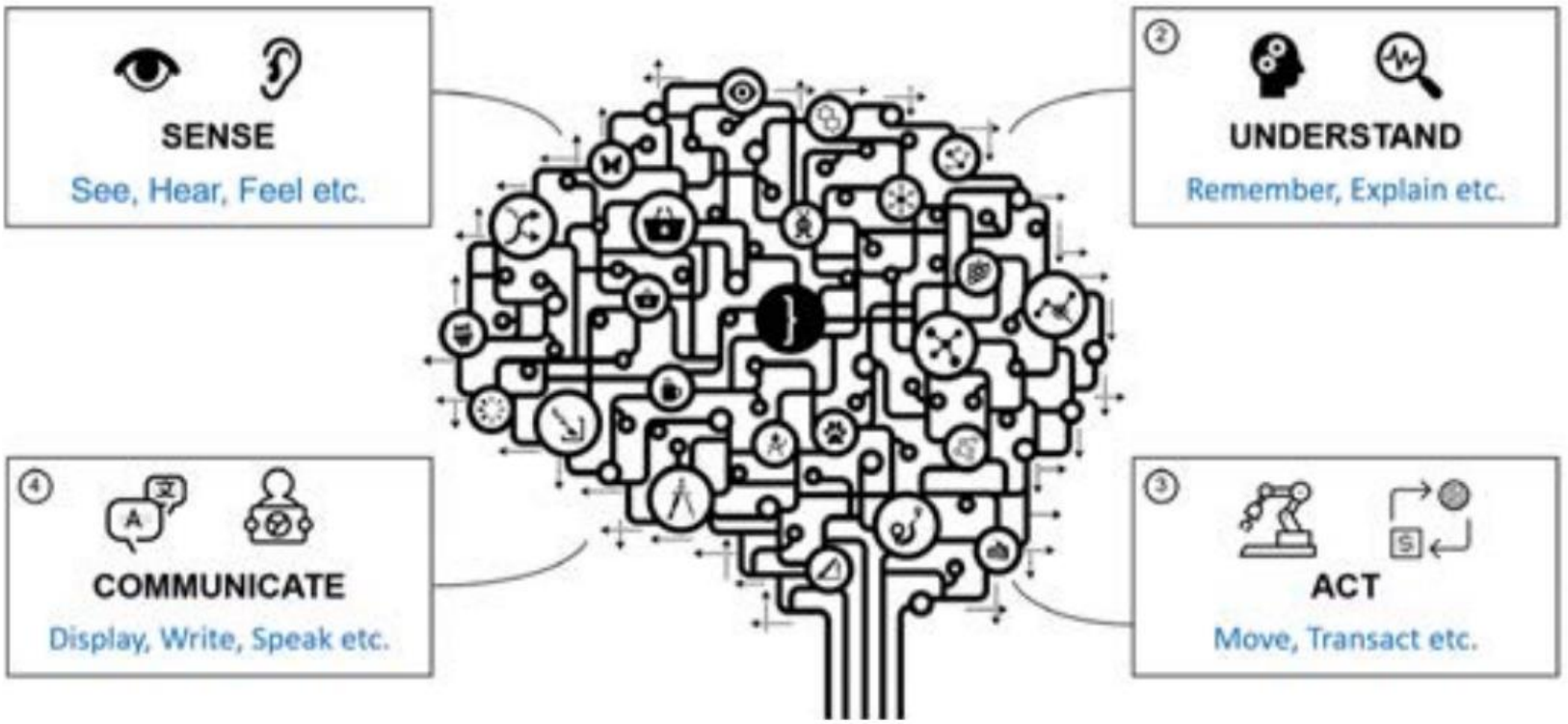
Scientific Article from Journal of "KI – Künstliche Intelligenz": https://link.springer.com/article/10.1007/s13218-021-00736-4

Capabilities

➔ Capabilities:

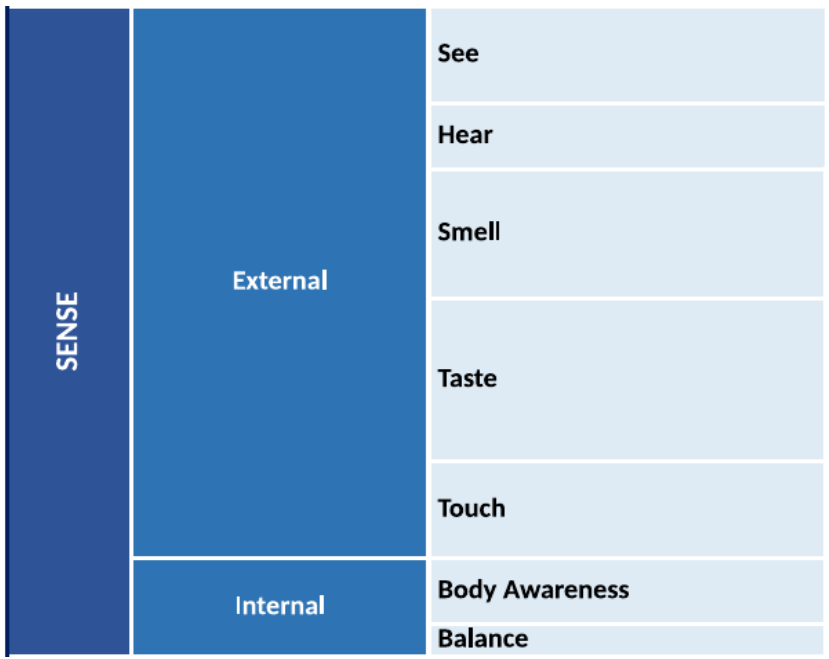
Representation from the perspective of psychology, biology and cognitive science

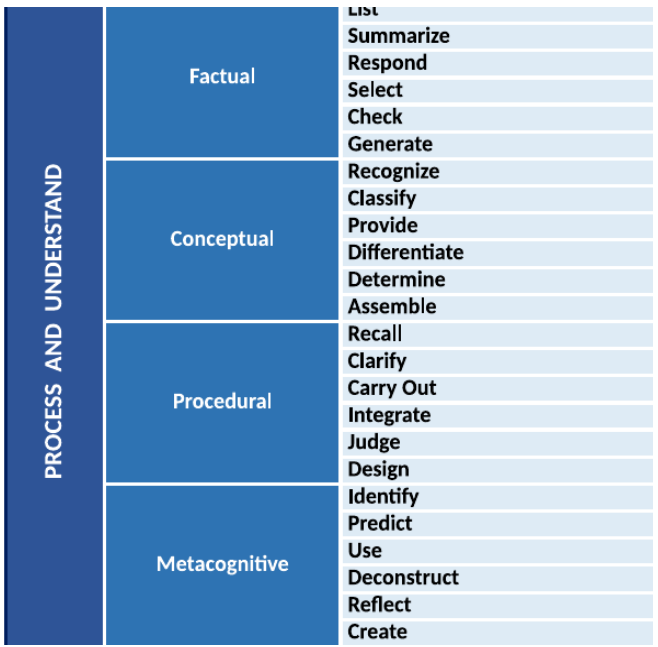
Capabilities



Schmid et al.: Managing and Understanding Artificial Intelligence Solutions (2020), Beuth Verlag

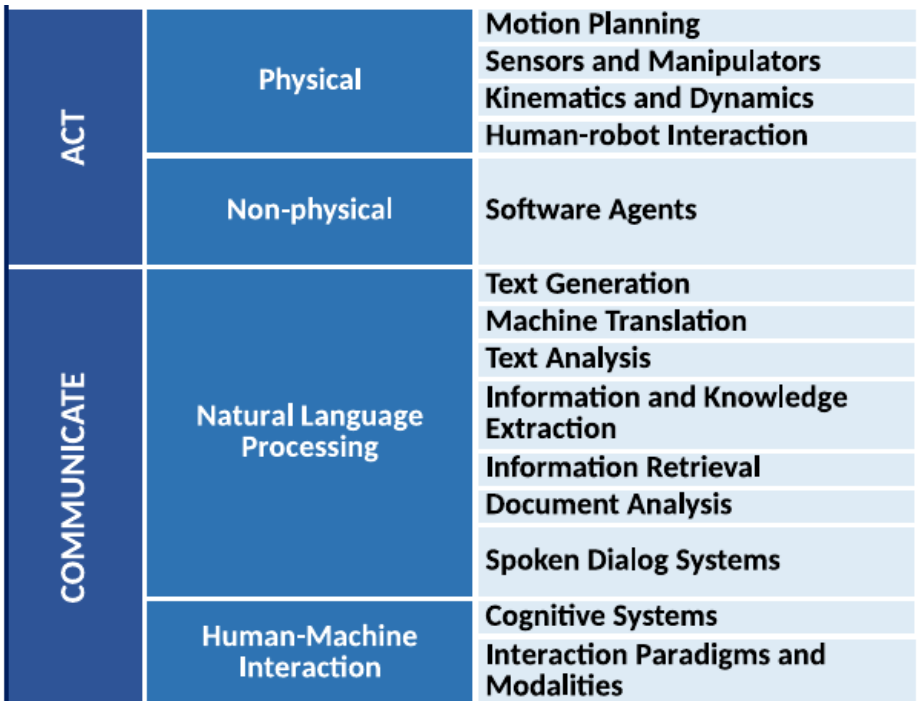
Sense / Process and Understand





Scientific Article from Journal of "KI – Künstliche Intelligenz": https://link.springer.com/article/10.1007/s13218-021-00736-4

Act / Communicate



Scientific Article from Journal of "KI – Künstliche Intelligenz": https://link.springer.com/article/10.1007/s13218-021-00736-4

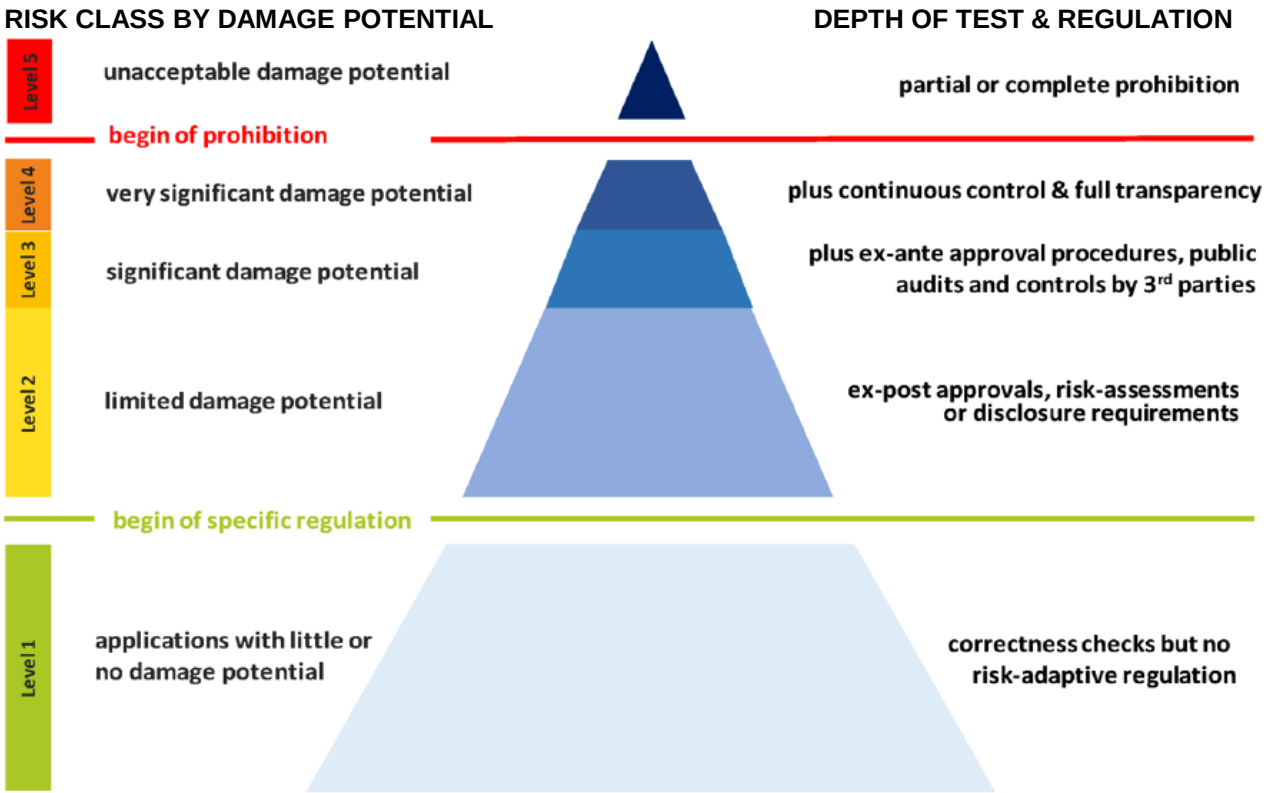
Example of Use: Risk description for using AI

➔ Description of AI system by involving **externally identified risk classes**:
Representation of the damage potential
for, e.g., **physical** as well as **mental well-being**, **finance**, **data** and **fairness**

➔ The classification approach targets **AI systems** that were **not created** to **harm humans**, e.g. by monitoring, sorting and killing

Example of Use: Risk description for using AI

German Data Ethics Commission:
Criticality pyramid and risk-adapted regulatory system for **describing externally identified risk**

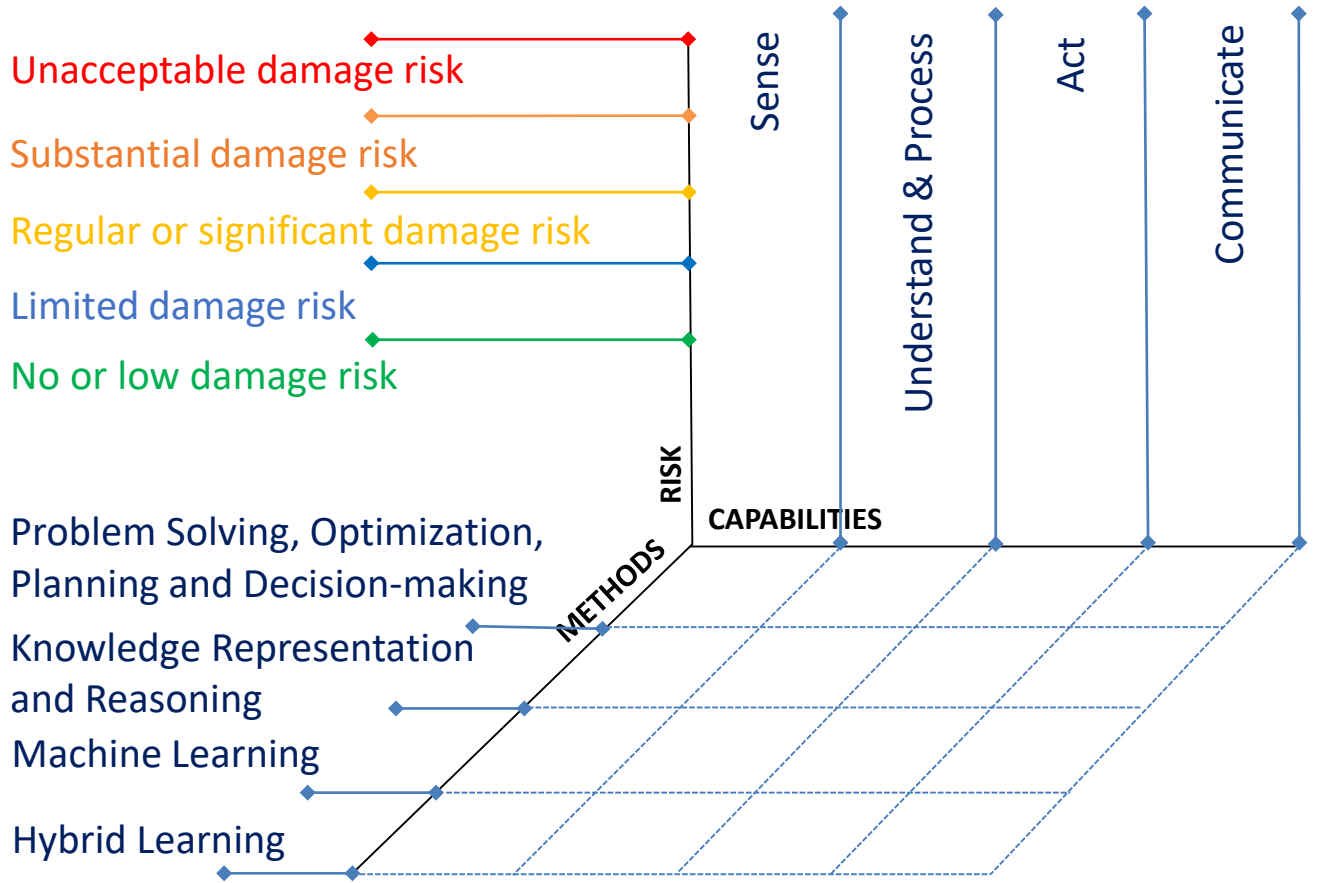


Scientific Article from Journal of "KI – Künstliche Intelligenz": https://link.springer.com/article/10.1007/s13218-021-00736-4

Example of Use: Risk description for using AI

Input parameters for a 3-space description of AI systems:

- AI **Methods**
- AI **Capabilities**
- **Risk** Classes



Scientific Article from Journal of "KI – Künstliche Intelligenz": https://link.springer.com/article/10.1007/s13218-021-00736-4

Benefits

- Business and politics:
  - **Classification** of AI applications to describe AI systems

- Of importance for **European AI Regulation**:
  - **Homogeneity** to **describe** AI applications (Annex 1)
  - The **European** AI **database** (Art. 60)
  - Technical **Documentation** (Art. 11)
  - **Transparency** (Art. 13)

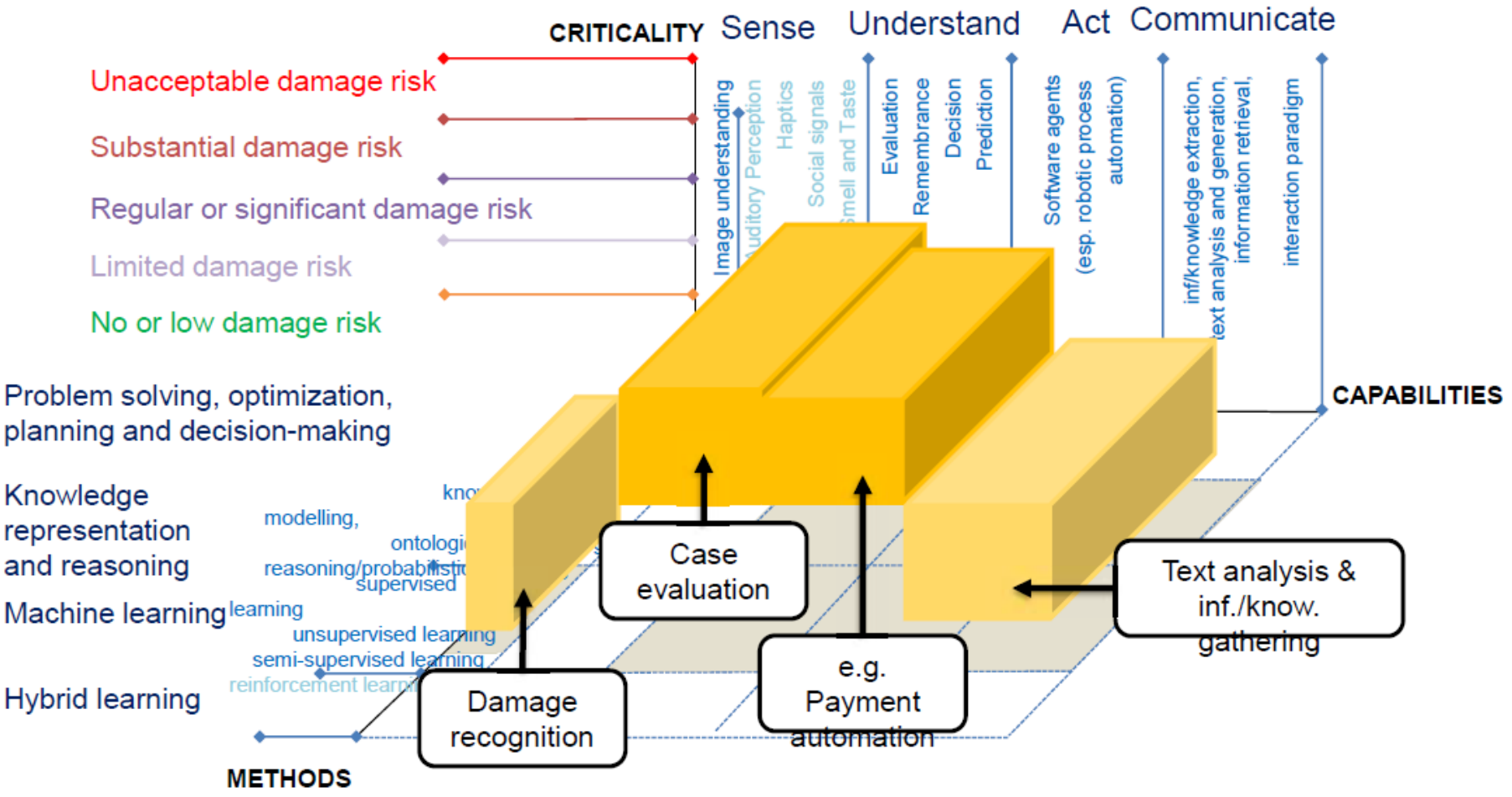
- The classification may serve as a basis for:
  - Harmonized **labeling** of **AI** applications
  - More **detailed description** of **requirements** for **all criticality levels** in the European legislative proposal
  - **Conformity assessment** procedures at **manufacturers** as well as third party bodies (including **laboratories** and **notified bodies**)

- Building on **Europe-wide harmonized taxonomy** for AI applications:
  - Identification of **quality** criteria

- **Requirements** for AI applications regarding:
  - **Conformity assessment** procedures
  - **Market surveillance**

Example: AI-based automation of claim management
“Take a photo & get directly the reimbursement from the insurance”

Example: AI-based automation of claim management
Homogeneous description based on Methods, Capabilities & Risks




HALTBARE
FETTARME MILCH
Homogenisiert, ultrahocherhitzt
1,5 % Fett
1 Liter
BIO
Packaging by
SIG
Durchschnittliche Nährwerte
Je 100 ml
1 Glas (250 ml)**
% (250 ml)*
Brennwert 198 kJ 47 kcal 495 kJ 118 kcal 6%
Fett 1,5 g 3,8 g 5%
- davon gesättigte Fettsäuren 1,1 g 2,8 g 14%
Kohlenhydrate 5,0 g 13 g 5%
- davon Zucker 5,0 g 13 g 14%
Eiweiß 1,4 g 8,5 g 17%
Salz 0,11 g 0,28 g 5%
Calcium 126 mg (15 %***) 300 mg (38 %***)
***NRV = Nährstoffbezugswert
*Referenzmenge für einen durchschnittlichen Erwachsenen (8.400 kJ / 2.000 kcal).
**1 Portion = 1 Glas (250 ml) Bio-Hi-Fettarme Milch. Die Packung enthält 4 Portionen.
75 % Karton aus nachwachsenden Rohstoffen
25 % pflanzenbasierte Kunststoffe mit Mengenausgleich¹
Verzicht auf Alu bei gleichbleibender Produktqualität
Im Rahmen der Verpackungsherstellung kommen Kunststoffe zum Einsatz, bei deren Produktion im Rahmen von zertifizierten Massenbilanzverfahren fossile Ressourcen durch pflanzliche Rohstoffe ersetzt wurden. Diese Maßnahme trägt maßgeblich zu einer verbesserten Ökobilanz (CB-100732C vom 31.10.2018) bei. Mehr unter: www.sig.biz/carton-pack.de
BARBECUE
SAUCE
RAUCHIG-SÜSS
Natürlich ohne Geschmacksverstärker & Konservierungsstoffe
Durchschnittliche Nährwerte
pro 100 ml
RM* pro 100 ml
Energie 547 kJ 129 kcal 7%
Fett 0,1 g <1%
- davon gesättigte Fettsäuren <0,1 g <1%
Kohlenhydrate 30 g 12%
- davon Zucker 25 g 28%
Ballaststoffe 1,0 g
Eiweiß 0,9 g 2%
Salz 2,6 g 43%
*RM Referenzmenge für einer durchschnittlichen Erwachsenen (8400 kJ / 2000 kcal)
LAKTOSE FREI
GLUTEN FREI

Proposal for a Common Classification of AI Systems based on Methods and Capabilities

DIN/DKE NA043-01-42 GA:
Contribution for CEN-CENELEC JTC 21 ‚Artificial Intelligence‘