KISSKI
KI-Servicezentrum für sensible und kritische Infrastrukturen

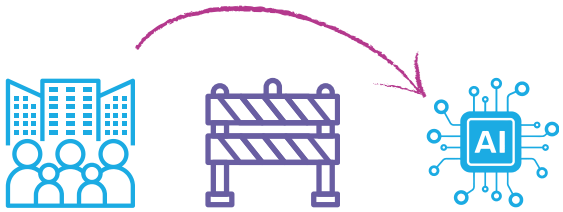
Barriers to AI adoption

When introducing AI systems into a working environment, the following types of barriers may arise that must be considered during the development, deployment and use of the AI system:

Technical barriers

- Lack of explainability and transparency
- Poorly performing and biased algorithms
- Data related issues
- Healthcare sector related data issues
- Challenging deployment process

Organizational barriers



- Costs
- Privacy and security concerns
- Strategic alignment
- Perceived benefits
- Team issues
- Lack of AI expertise among the executives
- Professional over-reliance and loss of expert oversight

Customer barriers

- Human nature
- Fears and lack of trust
- Customer needs and education
- Healthcare sector related customer barriers

External barriers

- Government support and policy framework
- Legal issues

Barriers to AI adoption

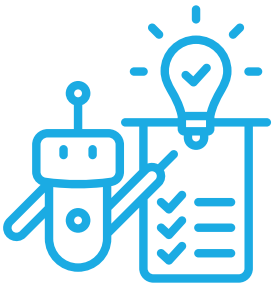
Technical Barriers

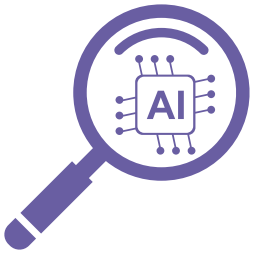
Lack of Explainability and Transparency [2], [4], [5], [14], [16], [18], [22], [25]

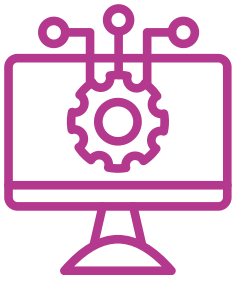
Explaining AI becomes more difficult the larger the model is. However, smaller models tend to perform worse. Explainability and the need for Explainable AI is still being researched. In the context of critical infrastructure this will be a relevant problem which is hard to solve. Lack of transparency can also affect people's trust in the AI system.

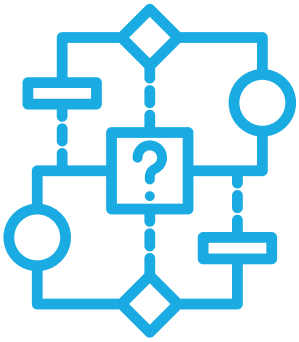
Challenging Deployment Process [7], [15], [18], [20], [21], [22], [25]

The deployment of an AI system into existing information systems or workflows can be complex and time-consuming as older technologies might not be designed to support or work with AI systems.









Poorly Performing and Biased Algorithms [2], [4], [7], [10], [12], [13], [14], [16], [21]

High accuracy and performance are crucial for critical infrastructures. Errors can have major consequences. However, a compromise must be found between accuracy and interpretability. Some algorithms may also be biased due to the data set used. Biased algorithms may have serious consequences in the healthcare sector. Depending on the country of origin, age or gender, for example, different symptoms can have different causes. If the data set is too homogeneous, deviating patients can be misdiagnosed. In the energy sector the effect is probably not as strong. Also, the accountability in such cases can be unclear.

Barriers to AI adoption

Technical Barriers

Data Related Issues [2], [3], [4], [7], [9], [11], [15], [16], [18], [22], [25]

A large volume of quality data is needed (e.g., well-described patient level health data, complete tracking of the patient pathway) while the generality and specifity of the training data should be given. Also, the data interoperability across systems in the organization and across stakeholders can be difficult depending on the data sources and -bases. Therefore, a good data management is required.

Healthcare Sector Related Data Issues [22]

A lack of access to patient-level databases due to data protection regulations may occur. Also, text mining and natural language processing algorithms are hard to apply due to the lack of standardized medical terms in the local language. Furthermore, the complexity of diseases and co-morbidities can make the model learning difficult.

Barriers to AI adoption

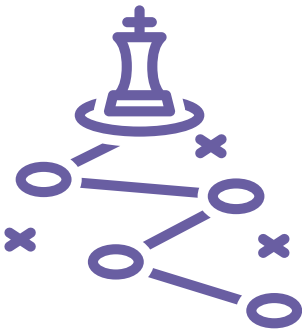
Organizational Barriers

Privacy and Security Concerns[1], [2], [3], [4], [5], [9], [15], [18], [19]

Privacy and security concerns may hinder organizations and customers to use the AI system. This includes data governance issues.

Strategic Alignment[1], [3], [9], [11], [15], [20]

A clear and strategic vision is required as to why an AI system should be developed and/or introduced, as well as a clear business case for implementation to ensure stakeholder acceptance and top management support.



Costs [1], [2], [3], [4], [9], [11], [15], [16], [18], [20], [21], [22]

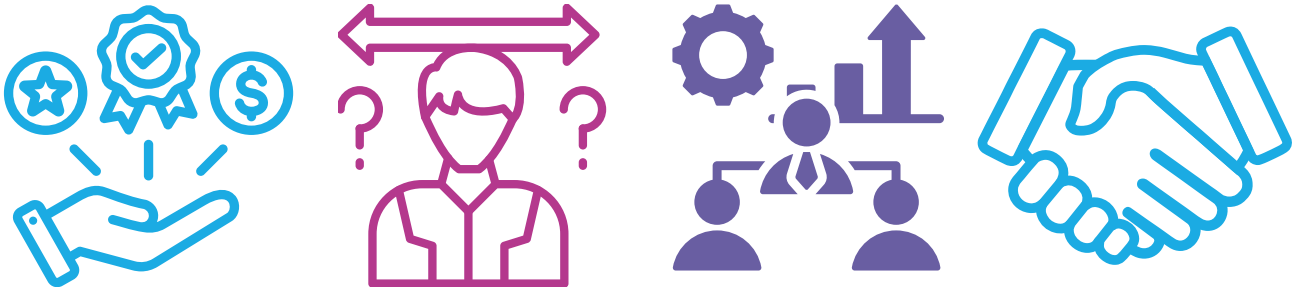
Estimating the total costs and ROI for the development and integration of new AI systems can be quite difficult due to the uncertainties associated with AI. There are also high costs associated with securing and storing data and improving data validity. However, looking beyond the initial start-up costs to the future benefits and funding the change and not just the technology may prove beneficial in the future. However, the development of AI systems requires a good IT infrastructure, which comes at an additional cost.

Barriers to AI adoption

Organizational Barriers

Perceived benefits[1], [2], [3], [11], [18], [20]

The perceived direct and indirect benefits of stakeholders and employees can influence their willingness to change. The benefits and value generated by the AI system may initially be uncertain or perceived as uncertain. Missing proof of concepts can also affect whether members of an organization are convinced of the benefits of the technology.



Team issues[2], [3], [4], [11], [14], [15], [19], [20], [23], [24], [25]

The implementation of fundamental changes in the organization is directly influenced by the team and the stakeholders. Organizational readiness and innovation capability, including the availability, skills and motivation of employees to adopt new technologies within the organization, can have a significant impact on the success of the project. Lack of trust in the AI system can affect organizational readiness. Therefore, good change management, including a good communication process within the organization, is required to ensure that all employees are on board. However, the perceived risk of losing their jobs can inhibit employees' motivation. Therefore, proving that implementing AI systems can improve workflows and support employees rather than replace them could be helpful in overcoming this barrier.

Barriers to AI adoption

Organizational Barriers

Professional Over-reliance and Loss of Expert Oversight [14]

Professional overreliance on the AI system can lead to deskilling of employees and to the loss of expert oversight. This can have critical consequences. It is therefore necessary to identify the cases in which the AI system needs to be monitored.

Lack of AI Expertise Among the Executives [2], [3], [4], [11], [13], [16], [17], [20], [22], [23], [25]

Everyone affected needs to be educated to use the new system properly. During the development process AI experts could be needed. Employees and executives may have trust issues and their effort expectancy (time and workload, transparency and adaptability of the system, system's characteristics (is the system perceived as intuitive, easy to understand, and simple), and training to use the system) can affect their readiness to educate themselves in this area.

Barriers to AI adoption

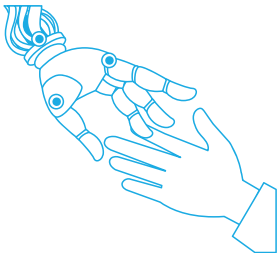
Consumer Barriers

Human Nature[2], [13], [14], [19]

By replacing humans with AI systems, reduced human connections can lead to dehumanization or the fear of it, e.g. by delegating certain caregiving tasks to AI. Also, AI systems can lead to loss of humanness (e.g., loss of common sense, empathy, and autonomy or over-reliance on AI) may cause problems in the future. Especially in the case of over-reliance on the AI if unpredictable performance issues occur.

Lack of Trust and Fears [2], [4], [5], [9], [14], [15], [16], [18], [19]

A lack of trust in the AI system can occur including the fear of unkown effects and misunderstandings. The fear of mass surveillance could also increase, e.g. customers in the energy sector could feel that their behavior is being monitored. In addition, customers may have concerns about data protection, including a perceived risk of privacy breach.



Customer Needs and Education [11], [13], [16]

Customer acceptance as well as their perceived easiness of use of the new system are important factors to consider, therefore, customers' requirements on the system need to be identified beforehand. A lack of customer education can also lead to over-reliance or non-reliance on the system.

Healthcare Sector Related Customer Barriers [12]

There is a so-called Medical AI Resistance Bias where people prefer to continue using current, human-led healthcare services which result in the lack of customer acceptance. This can be caused by the relationship between patient and doctors and may also affect the acceptance of AI systems.

Barriers to AI adoption

External Barriers

Legal Issues [3], [7], [16], [22]

The immaturity of the legal environment and legal liability in the event of a performance failure can affect the AI system in practice and the company. When managing large amounts of sensitive information, compliance with legal regulations, which can change quickly, must also be taken into account.

Government Support and Policy Framework [1], [2], [4], [11], [16], [21], [24]

Regulatory uncertainty, acceptance and barriers need to be considered. Regulations on data protection can hinder technological innovativeness and the lack of political commitment, e.g. the absence of a health digitization strategy in the country to establish relevant databases.

Barriers to AI adoption

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