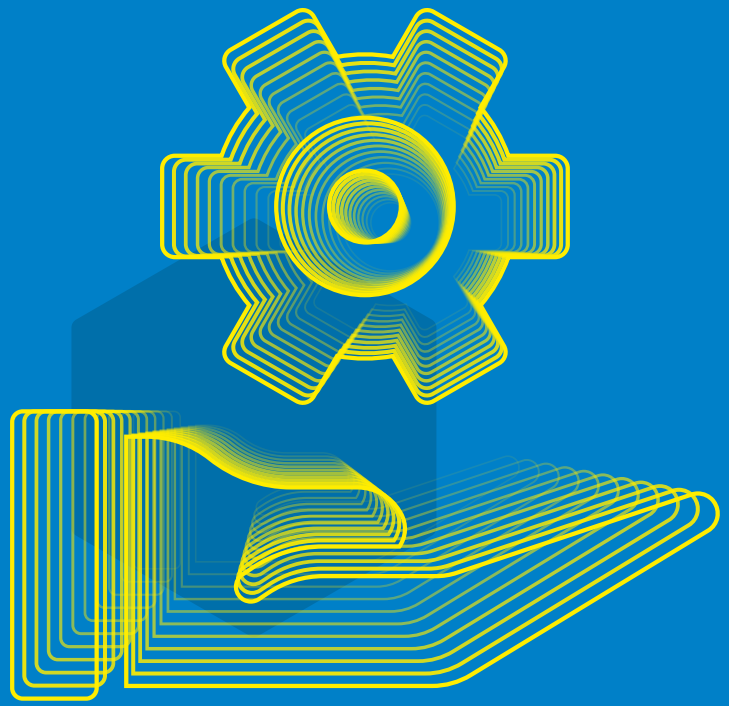
adesso business. people. technology.

REPORT

AI in the industry

Success is built from bits and atoms.



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RADAR
IT SUPPLIER ASSESSMENT FROM PAC
AI-related Services in Germany
- overall results -
Excellent
adesso
2020

START

Foreword

Success is built from ƨʇid and atoms.

Dear readers,

Visit ki.adesso.de for more information

The tangible shapes our thoughts in industrial companies. No one disputes the importance of services and processes. But at its core, it's about machines, equipment and workpieces. To invent and improve. These are topics that get the hearts of engineers beating faster. Bringing ideas to life is what this compact overview of artificial intelligence (AI) in industry is all about.
This is because discussions about AI in companies are often about what 'could be' and what 'should be'. AI does not yet appear to be sufficiently anchored in companies from top to bottom, apart from flagship projects or maybe grandiose and individual initiatives. This report aims to contribute to this. The use cases you will find here will give you an idea of the possibilities that AI solutions can also open up for your company. We did not select utopian scenarios for this, but rather real projects. We hope you will find approaches in it that you can apply to your tasks.

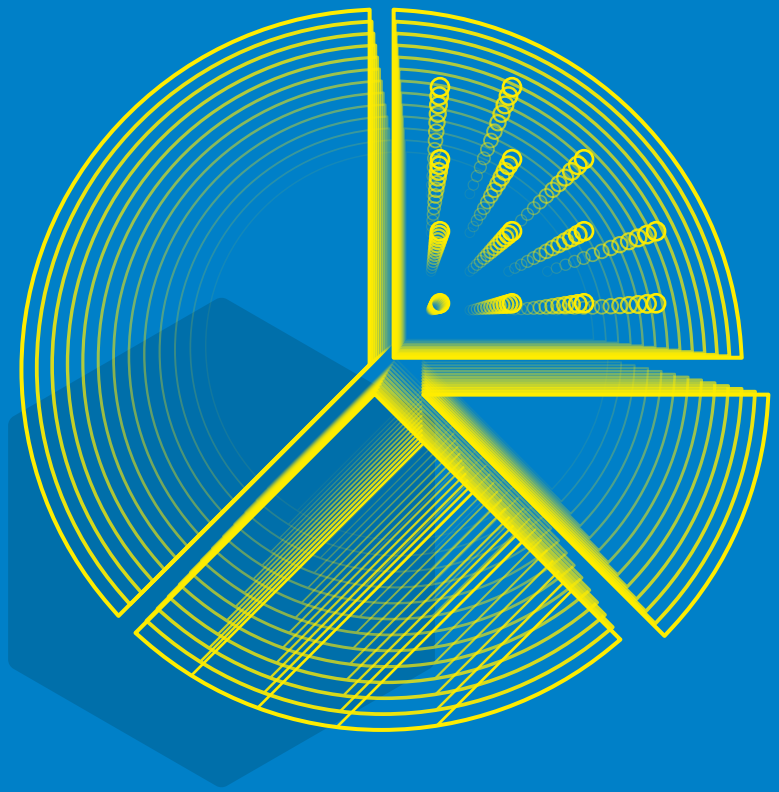
We will start by giving you a short overview over a couple of pages of the status quo of AI in manufacturing. Nearly 30 decision-makers gave us insight into their projects, plans and expectations as part of our AI survey. One insight is that 80 per cent of respondents believe that AI is only just starting to be implemented. But companies can still get a head start on the competition with AI.

Draw inspiration from the examples and figures. We are happy to work with you to set up and implement AI projects that fit your goals.

We love having one-to-one conversions without any AI acting as the messenger. Contact us at david.maerte@adesso.de.

Best regards,

David Märte | Head of Line of Business Manufacturing Industry | adesso SE



The complete industry report at ki.adesso.de

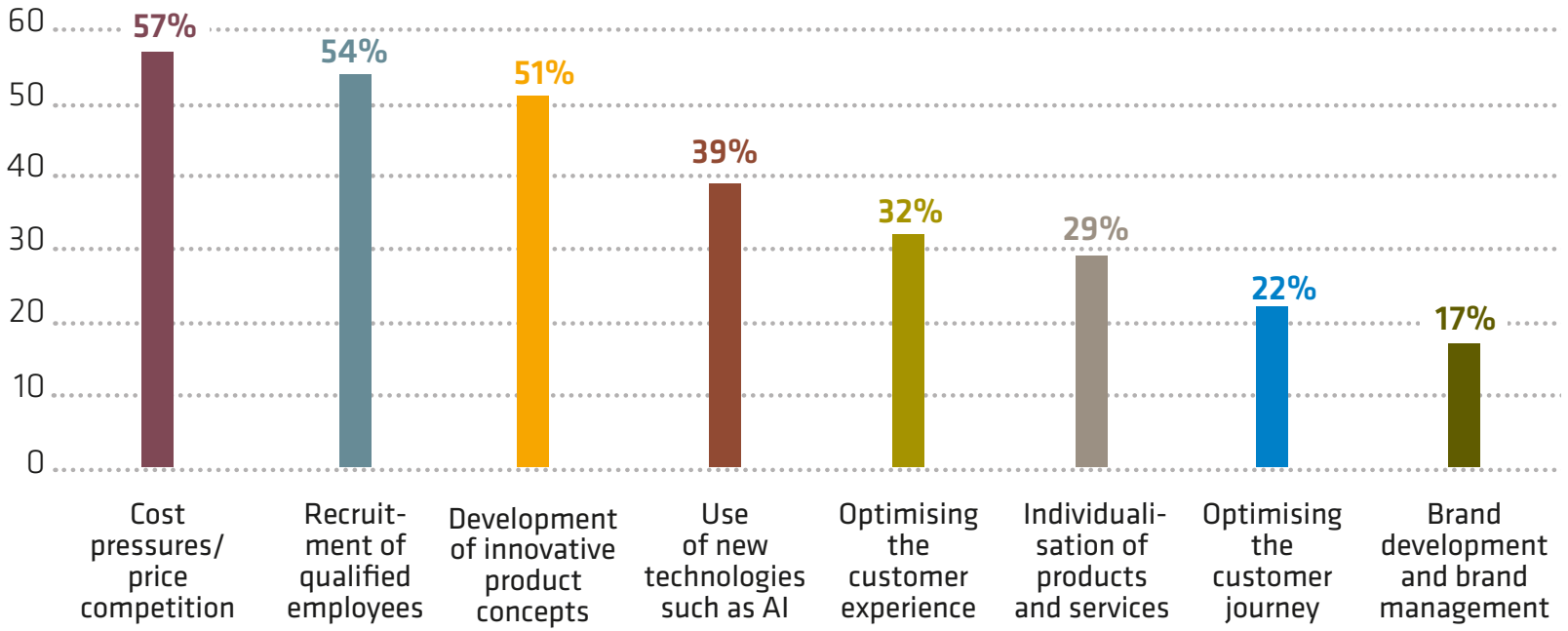
Survey

What motivates managers

What will the decision-makers in manufacturing be interested in tomorrow? What issues are at the top of corporate agendas? What is your focus when it comes to AI? What role does the cloud have to play in the planning stages? These are just some of the questions that 28 decision-makers answered for us. On the following pages, you will find excerpts from our report 'AI in manufacturing – taking stock'. If you are interested in all the figures, the complete report is available at **ki.adesso.de/industrie**.

DECISION-MAKERS

What are the key challenges in the coming three years?



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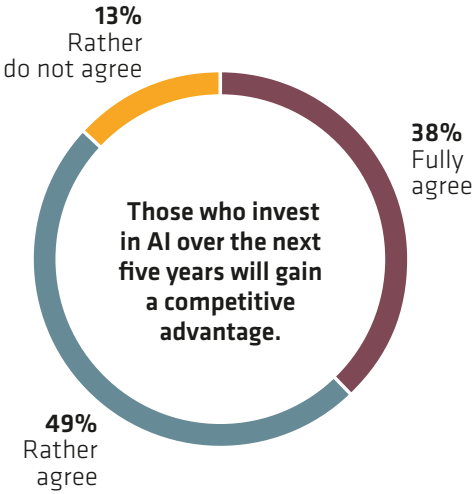
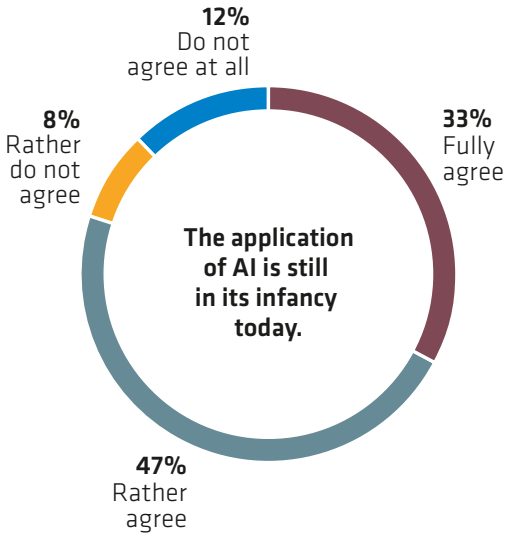
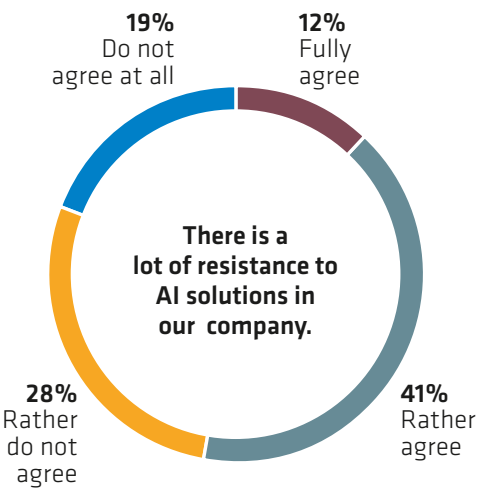
DECISION-MAKERS







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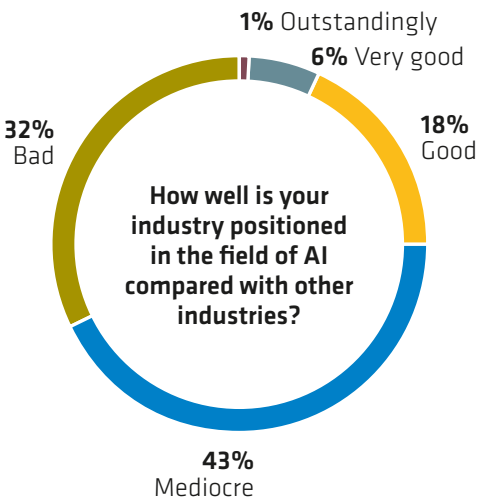
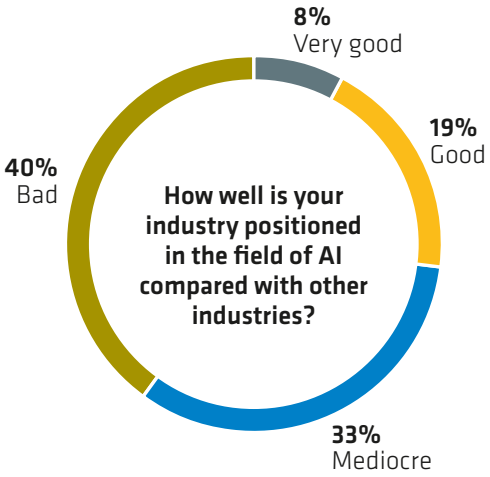
DECISION-MAKERS

COMPLETE SURVEY



MANUFACTURING



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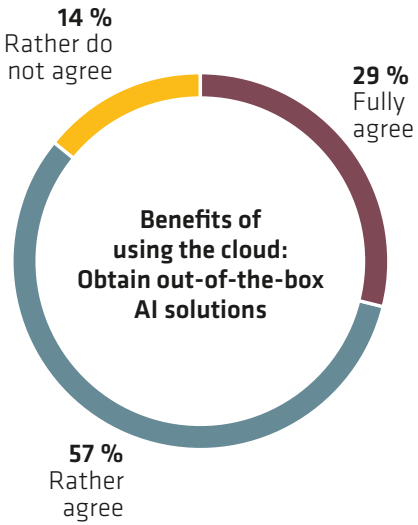
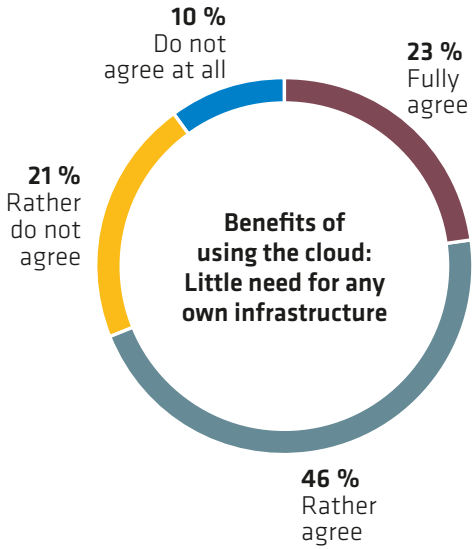
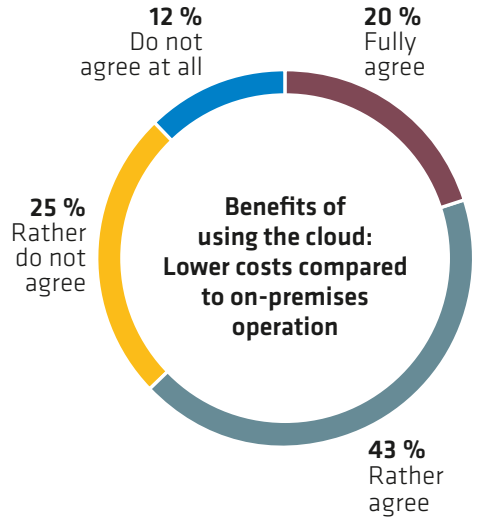
DECISION-MAKERS







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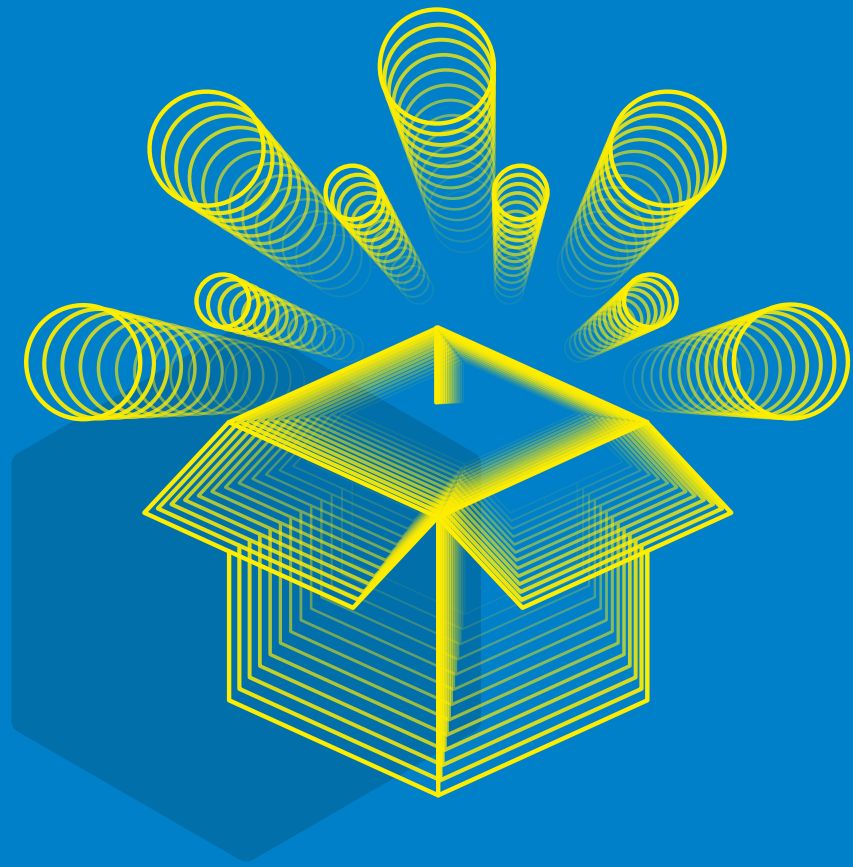
For more information, visit ki.adesso.de

AI in the industry

A feel for the practice

From purchasing to logistics, from research and development to sales, from start-ups to global players: AI applications have the potential to change processes across all job functions and businesses. The use cases on the following pages will give you an idea of how diverse it is. You can find more AI use cases at ki.adesso.de. If you are interested in talking to our AI experts about your individual situation: We would love to hear from you.



AI that makes it possible to use paper archives digitally

Written down in 1940 – digitalised today

How things used to be

OGE (Open Grid Europe GmbH) is one of the leading transmission system operators in Europe. A project to test the transmission network for its suitability for transporting hydrogen poses major challenges for managers. In order to be able to assess the suitability, the entire technical documentation of all installed materials needs to be analysed. The data is only available as scanned documents, some of which date back to 1940. This includes manufacturer information, component lists, material components as well as technical and chemical properties from test certificates. Reliably extracting relevant information and making it available is the prerequisite for being able to carry out the necessary upgrades for the infrastructure change in a cost-effective manner. The amount of data and the heterogeneity of the source material make manual evaluations impossible.

Then AI entered the picture

Despite the heterogeneous source material, AI applications make it possible to automate large parts of the document evaluation. The key functions are key value detection and table extraction. AI also adds a great deal of value when it comes to text recognition, especially in the case of poor quality scans or documents, or forms with handwritten entries.

Experts use key value detection, in particular, to extract of specific information in order to be able to transfer it to a database. For example, the matching value for a known key, such as a 'manufacturer' or 'test object', is searched for in the immediate vicinity of the document. Since some pages – or their type – occur more frequently in documents, an upstream page classification helps improve the results.

When extracting from tables, it is important to detect table structures – even without specific indicators of the presence of a table. Based on the detected table structure, the information from a cell is matched to an existing column and/or row label. The combination of column label and cell value results in another key value pair that is extracted.

The situation today

The AI processes used ensure that the data from the scanned PDF files is available in a structured format. Those responsible for the AI processes developed a data scheme for the information to be extracted and built a database. In addition, all documents are fully searchable via a search interface, which means that even information that was not extracted can be found easily.

Further information

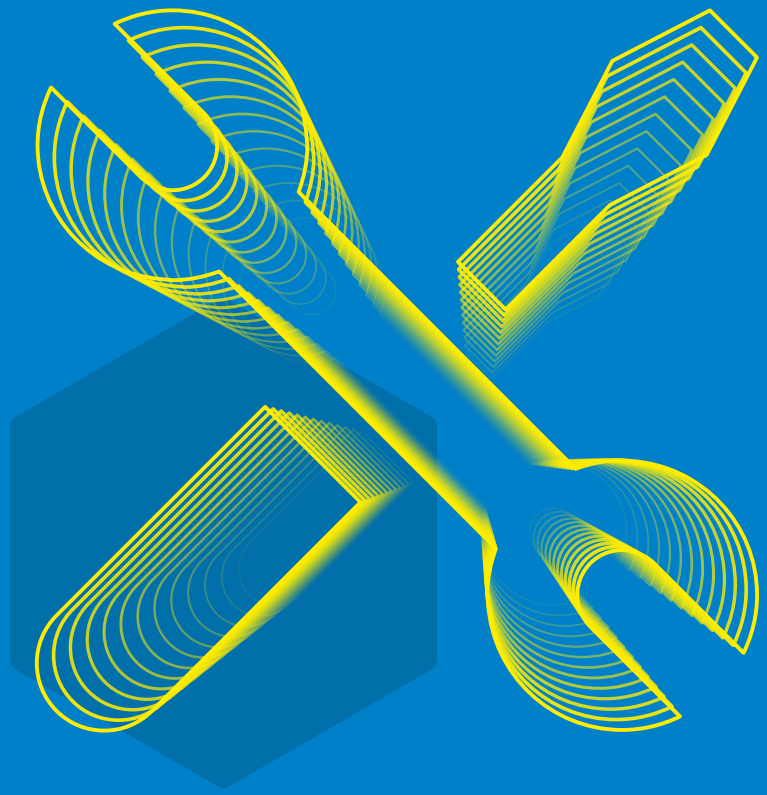
Which companies would benefit most from this approach?
Any company with stacks of paper documents, which have had limited digital use, if at all. For all companies that are constantly inputting documents. A specialised overall solution is available specifically for gas network operators, which is offered in the form of a cooperation between adesso and OGE.

Which decision-makers would find this approach interesting?
Any manager in whose area of responsibility paper archives play a role.

Background information for tech-oriented people:
Key value detection, natural language processing, table extraction

"The project demonstrates the role AI applications already play in everyday work. They transformed our information, some of it handwritten materials from one hundred years old, into datasets with which we could work. And they did so with a level of precision that continues to impress us on a daily basis."

Dr Daniel S. Bick |
Open Grid Europe GmbH



AI that your service technicians rely on

Every ʇiʞlooʇ should now also include AI

How things used to be

Our customer is a major provider of mobile and landline telephone services for private and business customers in Germany. The nationwide offer critically depends on a dense network of mobile phone masts. Each day, these masts issue approximately 100 error messages due to hardware problems. Fixing these quickly is crucial to maintaining a high service quality. In 15 per cent of all incidents, the technician tasked with carrying out the repair ordered the wrong spare part. As a result, they had to travel to the mast a second time. This strongly impacts the cost of and time spent on repairs.

Then AI entered the picture

The adesso experts developed an AI-based model to predict the defective hardware, together with the customer. The application predicts the error and issues recommendations to the service technician regarding the right spare parts and tools on the basis of automatic classifications.

The situation today

Technicians have a better insight into the fault situation at the radio mast before having even arrived there. The AI application helps them better prepare for on-site repairs. All the necessary information is integrated into the company's ticket system.

Further information

Which companies would benefit most from this approach?
Telecommunications, mechanical and plant engineering, energy industry, transportation companies

Which decision-makers would find this approach interesting?
Everyone

Background information for tech-oriented people:
machine learning, classification

"We developed a model based on historical data and machine learning processes that significantly improved the quality of the repair process. Our application supplements the error messages with information regarding the technical causes of the problem."

Sven Langhoff |
Team Lead Data Science
adesso SE

AI that simulates product and material properties

Research and development and AI

How things used to be

Companies regularly develop products or materials with specific properties, especially in the chemical industry. The aim is to satisfy defined criteria in terms of durability, resilience and reactions to environmental conditions. This development process is often associated with a high level of work. This is because, until now, research and development teams have combined possible basic elements in laboratory tests. They then check the final result for the desired property.

Then AI entered the picture

AI methods help replace R&D projects in the real world with simulations and reduce the amount of work required. It is possible because they work through possible combinations of substances virtually, notifying the researchers afterward which of them are particularly promising. The experts then focus on these combinations in their experiments.

This type of simulation is a classic example of AI applications. In addition to expert knowledge, the basis for data is real process and production data. However, implementing the use case is not a mindless endeavour for those involved. They need to integrate extensive expert knowledge into the underlying machine learningmodel. Numerous framework parameters and influencing factors have to be taken into account. For example, the behaviour of individual substances and mixtures made up of a few substances such as conductivity at a certain temperature is known. However, in the case of complex mixtures with many compounds, it becomes more difficult to rely on expertise.

The situation today

AI technologies support stakeholders by accelerating R&D projects. Entrepreneurs use resources in a more targeted manner and achieve desired results more quickly, reducing the research effort and shortening the time to market.

Further information

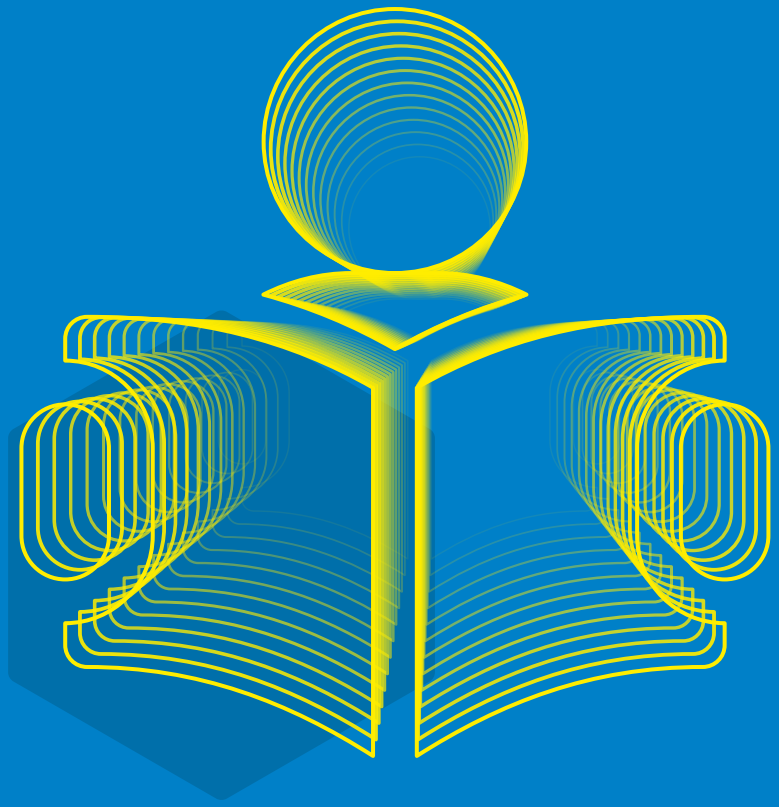
Which companies would benefit most from this approach?
Any company that conducts extensive research projects

Which decision-makers would find this approach interesting?
R&D managers

Background information for tech-oriented people:
machine learning processes

"When it comes to simulating product and material properties, AI applications and human experts work hand-in-hand. The former sifts quickly and effectively through large amounts of data and filters out interesting candidates. The latter uses these results as a basis for experiments."

Markus Merder |
Division Manager Manufacturing Industry
adesso SE



How things used to be

AI that takes a look into the future

The right maintenance at the right time in the right place

Maintaining machinery and equipment is a huge expense for many companies. For those involved in this work, challenges are posed by complex, interconnected production processes, in particular. Often, the maintenance process cycles used to be based on rigid specifications such as time or mileage. If these specifications were met, the service team would step in. This led to unnecessary maintenance, for example, on machines that would have continued to operate without problem. It resulted in downtimes that could have been avoided. However, AI applications open up the possibility of predicting the individual needs of a machine and adapting all steps accordingly.

Then AI entered the picture

Predictive maintenance is a typical AI application scenario. Two important factors come together here: data – historical and real-time – that paint a detailed picture of the condition of a machine or vehicle and a business case that quickly pays off for many companies.

The ability of AI systems to recognise patterns in large amounts of data also plays a decisive role in predictive maintenance. Sensors record relevant operating parameters such as vibrations, temperature and pressure. With the help of domain experts and users, experts train machine learning processes to identify combinations of factors in this database that indicate operational problems in the near future. If the prediction exceeds a defined threshold value, the system indicates the need for maintenance or even automatically triggers the corresponding processes. AI applications have the advantage that they can combine any number of factors and recognise patterns in them. This is how they are able to make sound predictions.

The situation today

The benefits of this data-driven, on-demand maintenance are obvious. It reduces downtime, ensures better utilisation of workshops and service technicians, and saves on costs in comparison to routine or scheduled processes.

Further information

Which companies would benefit most from this approach?
Any company with maintenance processes or services.

Which decision-makers would find this approach interesting?
Any manager who deals with the topic of maintenance.

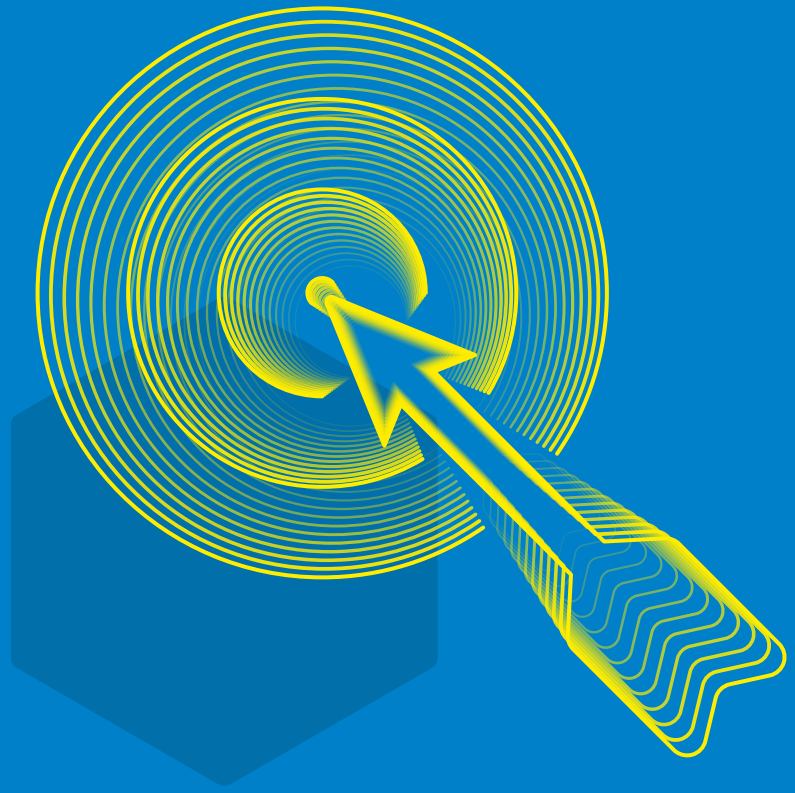
Background information for tech-oriented people:
pattern recognition, machine learning processes

"AI applications really shine when it comes to maintenance: recognising patterns that are impossible for humans to notice either because the correlations are too complex or the database is too large. This is where companies can quickly build and implement viable AI use cases."

Dr Martin Peters |
Managing Director
com2m GmbH

AI that detects outliers in master data

There's something wrong with the data



How things used to be

Product master data is the collective memory of a manufacturing company. Here, employees who curate this data enter all attributes and variants of a product. However, something intended to be a source of information often turns into a data swap that is barely manageable. Every individual product configuration for a customer and every adjustment to production born out of necessity is reflected in the master data. It results in a virtual explosion of data. In addition to a few hundred or thousand active products, there are ten thousand more products that employees enter once and then never use again depending on the company and industry. This makes it harder to find the right product, maintain stock and identify inconsistencies.

Then AI entered the picture

AI applications can help companies get this situation under control, thanks to their ability to spot patterns in big data. The existing master data is used as training data. It is relatively easy to find clusters of problematic master data based on a single data field: A four-digit postal code for a customer from Germany is a fairly obvious mistake. The situation becomes more complex when several parameters such as material properties, variants, tolerance ranges or similar are to be examined. In such analyses, AI solutions demonstrate what they can do. If the prerequisites are correct, AI applications reduce the effort of maintaining master data. This reduces the susceptibility to errors and facilitates the configuration of products, for example, in production preparation or planning.

The situation today

AI applications review the captured information and detect inconsistencies and incorrect entries. In some cases, the system revises the databases directly; for others it submits the conspicuous master data to the administrator to be checked. The end result is a data basis on which companies can build better production, sales and service processes.

Further information

Which companies would benefit most from this approach?
Any company that has extensive master data

Which decision-makers would find this approach interesting?
Any manager involved in production, sales and service

Background information for tech-oriented people:
pattern recognition, machine learning processes

"It is normal for many industrial companies to have an almost unmanageable number of product variants and adaptations. This unnecessary clutter of data carries with it hidden risks. AI applications that have been properly trained ensure that companies have and keep a better handle on their master data."

Andreas Liesche |
Head of Competence Centre
adesso SE

AI that separates the wheat from the chaff

Quality assurance in production with AI

How things used to be

Quality management is one of the central tasks for industrial companies. Detecting problems at an early stage in production plays an important role. The earlier a defect is detected, the more cost-effectively it can usually be remedied. Manufacturers often use visual and acoustic measurements to identify defects. In the automotive industry, this would be paint inclusions and conspicuous engine noises, for example. Manual work still plays an important role in quality assurance. It may be easy to implement in a small factory; however, limits are being reached more and more in the modern industrial landscape. In addition to high costs for manual testing, this is caused by more complex production processes and the trend towards a batch size of 1 product.

Then AI entered the picture

AI allows managers to automate visual and acoustic measurements. This is made possible by the ability of AI solutions to recognise patterns. The experts train the application by recording test procedures. They tell the AI system whether or not there is a defect based on photos, as well as video and audio recordings of the intermediate and final products. A trained algorithm is then able to identify problems. If the quality of the prediction corresponds to the defined objective, companies can use the application in the actual production process.

The situation today

The AI solution supports quality assurance throughout the entire production process. It evaluates results, points out deviations, helps with troubleshooting and independently sorts into 'test passed' and 'test failed' categories. This helps companies design their quality assurance more comprehensively and in greater detail. You reduce the manual effort – without increasing the costs.

Further information

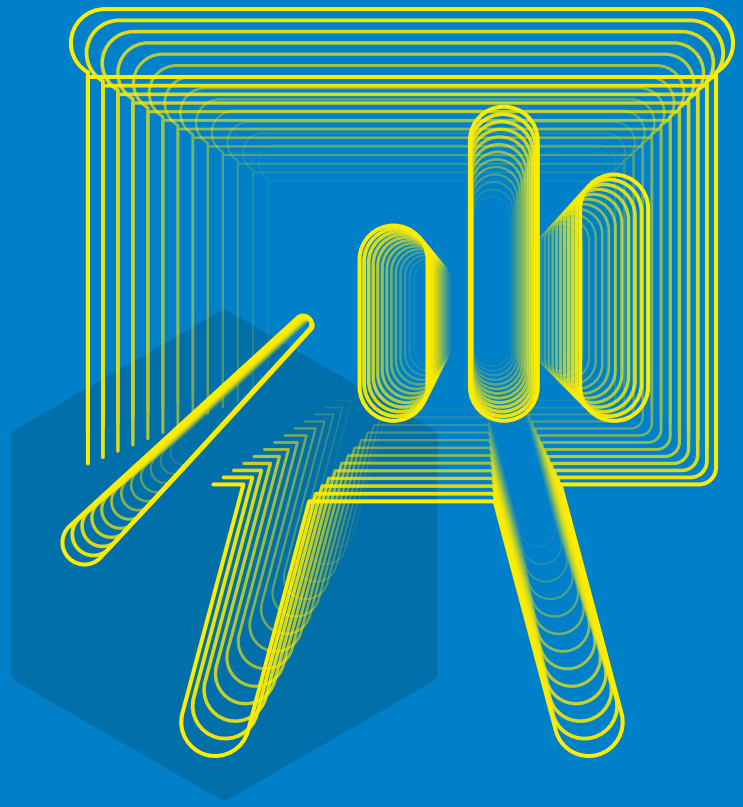
Which companies would benefit most from this approach?
Production companies and industry

Which decision-makers would find this approach interesting?
Any manager involved in quality management and in production

Background information for tech-oriented people:
Pattern recognition

"AI applications are paving the way for automation in quality inspection. It is precisely their ability to handle image, audio and video material that allows completely new use cases. This makes it possible to carry out tests at stages where it wasn't previously profitable or feasible."

Markus Merder |
Division Manager Manufacturing Industry
adesso SE



IR:AI – A workshop that uncovers the AI potential in your business

You should make the ʇzom of AI. Don’t just do the first thing that comes to mind.

How things used to be

Should we use predictive maintenance in service? Or would you rather develop an AI-supported predication for the development of sales markets? Would our customers impressed with new, data-driven billing models? Companies can use AI technologies in a variety of different application scenarios. Selecting the right approach and the right use case is crucial to the success of AI projects. The teams still lack the experience to be able to accurately evaluate individual application scenarios and technological potential. The danger is that decision-makers aren’t focussing on the right AI topics.

Then the IR came along

Workshops in the Interaction Room (IR) are the key to developing use cases for AI. The Interaction Room is a project method developed at the University of Duisburg-Essen. It helps project participants visualise interrelations and identify risks as well as cost and value drivers in projects.

We establish use cases tailored to your company and your goals together with our IR and AI experts. Thanks to our tried-and-tested workshop concept, it only takes us two days to guide you through the process, from initial brainstorming, to analysing existing data sources and designing and prioritising use cases. At the end of the two day workshop, you'll know what your company should focus on as it pursues AI.

The situation today

Project participants – independent of departments and training – meet on an equal footing and work together to find solutions in the IR. Once the workshop is over, the participants will have an understanding of what can be achieved with AI – from understanding its potential to integrating AI applications into existing processes and IT structures.

Further information

Which companies would benefit most from this approach?
All companies that are searching for AI use cases

Which decision-makers would find this approach interesting?
Anyone involved in AI projects, especially production, sales, marketing, customer service and IT.

"The Interaction Room helps our customers identify their AI potential, stay on top of complex AI projects and focus on the important things. Rarely has it been so easy to commit specialist departments and IT to one goal."

Benedikt Bonnmann |
Head of Line of Business
Data & Analytics

Methodology

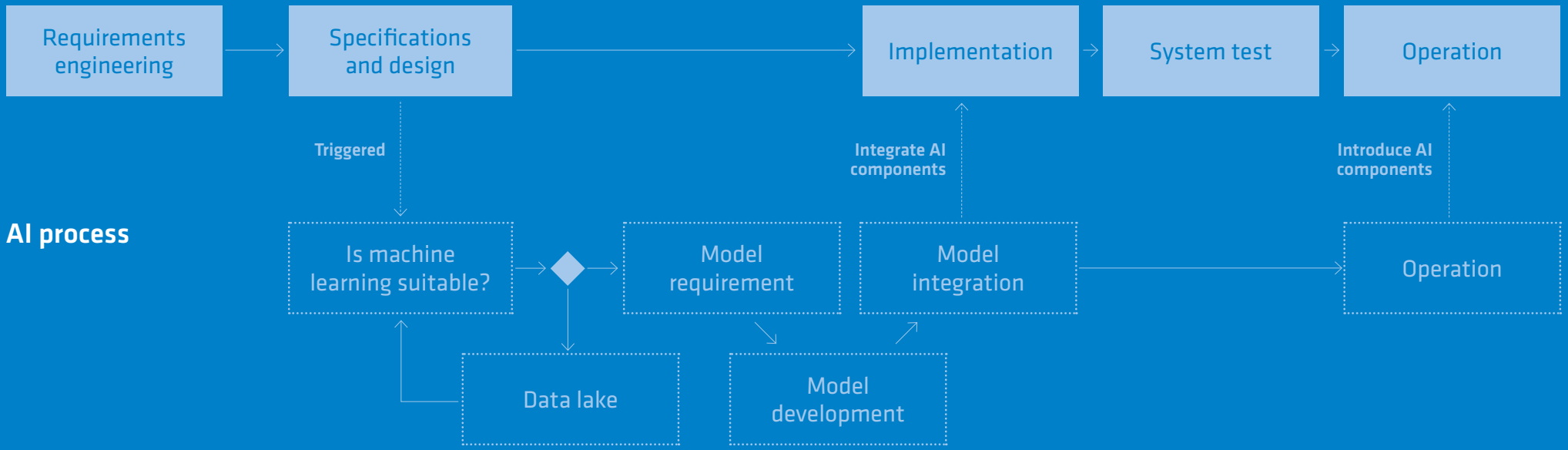
The blueprint for AI systems

The process of developing data-driven applications can be subdivided into up to six process steps, depending on the existing data basis. The linear sequence aids the visualisation and description process. Development teams do not choose the most straightforward approach, but rather opt for the strategy that best suits their project.

AI systems require structure

The six crucial steps:

Software engineering process



Four important roles:

DOMAIN EXPERT (DE)

Knows everything about the application domain and its business processes

DATA SCIENTIST (DS)

Knows all about ML/AI, data analytics and has mastered the basics of software engineering

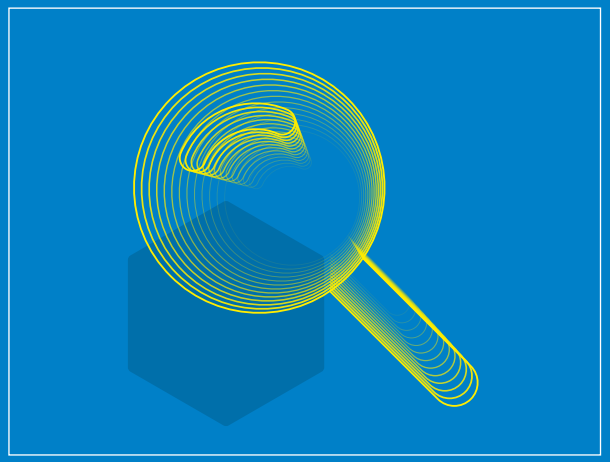
DATA DOMAIN EXPERT (DDE)

Knows everything about data structures in the application domain

SOFTWARE ENGINEER (SE)

Knows everything about software development and understands the basics of data science

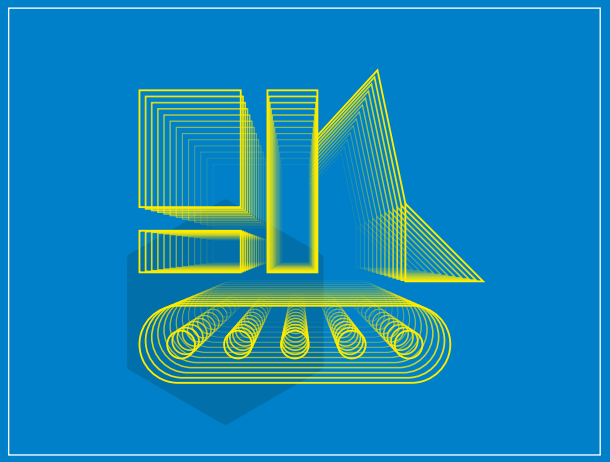
Seeing processes differently – building systems differently



Discovering use cases

Abstract mind games will not help you to see the potential of AI. But our use cases will – from chatbot to text analysis, from automated sales to automated communication processes. Take a look at what AI is changing in the here and now: in the world of football, in the car, in business – and before long, in your company.

www.ki.adesso.de



Building AI systems

AI applications are the result of flawlessly planned and implemented projects. However, these systems pose different challenges to developers than traditional information systems. This has an impact on the way projects are structured, and it impacts the level of expertise required of those involved. Our 'building AI-based systems' process model is our answer to these challenges.

www.ki.adesso.de

Team up with experts

We have over 20 years of experience as an IT service provider when it comes to artificial intelligence. We can draw on instruments, procedural models and processes that match your goals and meet your requirements. Our AI experts are familiar with current technologies and know in detail how to develop business models and applications based on these.

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Do you have any questions?

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