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AI ON THE RISE CHALLENGES AND OPPORTUNITIES FOR A DIGITAL EUROPE

A whitepaper in cooperation with **Lünendonk**

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THE RISE OF AI:
ADAPTATION OF AN EMERGING TECHNOLOGY

Artificial intelligence (AI) is probably the most exciting area of technology in recent years. With the breakthrough of ChatGPT in the fall of 2022 and the hype surrounding generative AI (GenAI), many companies have once again put the technology higher on their agenda.

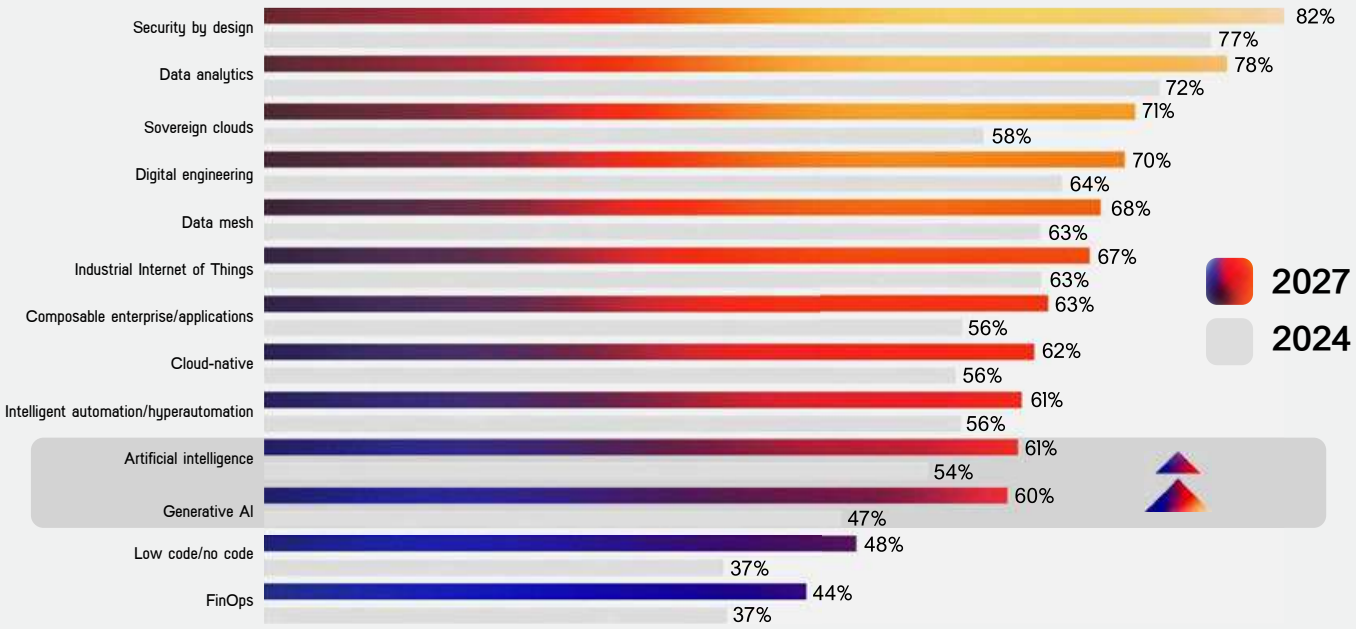
Although AI has been the subject of scientific research since the 1950s, the first application scenarios in companies only followed many years later. With increasing amounts of data and a more pronounced awareness of how to use it, AI is becoming more and more relevant.

Breakthrough of a disruptive technology

Artificial intelligence is an emerging technology – not only because of the hype about ChatGPT. Advances in other technologies such as the cloud and data analytics are creating synergy effects for AI. At the same time, AI is still a relatively unknown topic for many companies and most companies have only gained little experience in this area.

As more and more companies recognise the benefits, (generative) AI is one of the technologies gaining the most relevance for the next years.

Technology trends: AI and GenAI on the rise



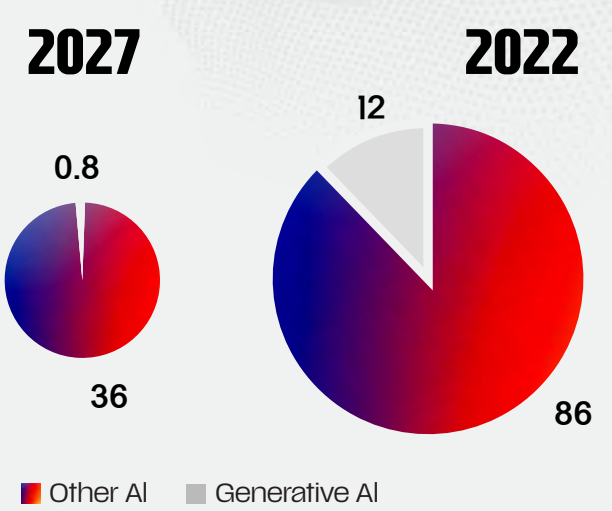
Question: How do you rate the relevance of the following technologies and approaches for your company?
Source: Lünendonk-survey 2024: The market for IT services in Germany

In today's business world, AI is far more than a passing hype – it has become a key technology that has the potential to fundamentally transform numerous industries. According to a PwC study, AI will account for around 10 percent of Europe's GDP in 2030 - which is roughly equivalent to 2.5 trillion US dollars. AI could contribute up to USD 15.7 trillion to the global economy in 2030, which is more than the current economic output of China and India combined. Of this, 6.6 trillion US dollars alone will be generated through productivity gains.

AI market forecasts a strong growth and strong economic advantages

Investments by the Big-6 (USA, China, UK, Germany, France, India) in AI, in billion euros

Source Reply



33%

Yearly growth of the AI market worldwide (CAGR) till 2030:
Source Statista

Potential of productivity gains by GenAI:
2.6 TO 4.4 TRILLION DOLLARS
Source: McKinsey & Company

GENERATIVE AI
A SUSTAINABLE INNOVATION

Generative AI in particular is set to experience a further upswing in the coming years. According to the data and analysis company GlobalData, sales of GenAI are set to increase by 80 percent annually between 2022 and 2027 - from USD 1.75 billion to USD 33 billion.

In contrast to AI, generative AI can independently generate new content such as text, images, audio files and more by accessing training data, analyzing it and then creating its own content. This ability, combined with a user-friendly interface that enables broad use of GenAI tools, are just some of the outstanding features of this technology.

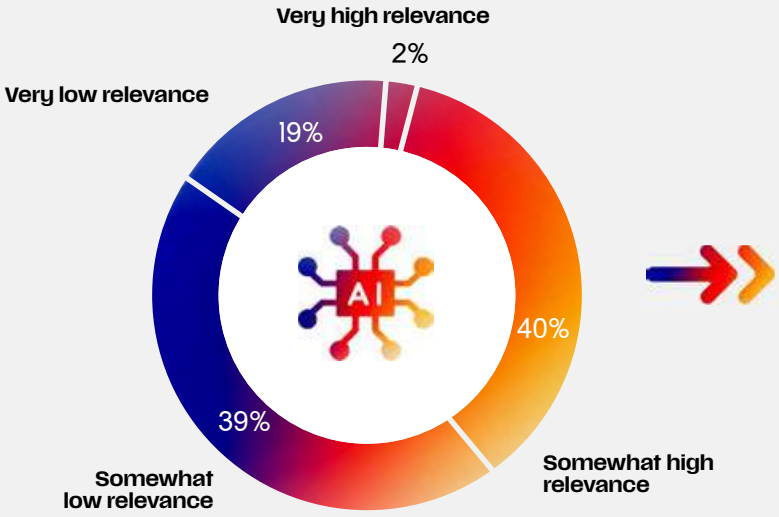
High-quality results can be achieved thanks to powerful chips, a more comprehensive database and the use of advanced neural networks. This is currently particularly evident in the best-known GenAI product: ChatGPT.

Even though GenAI is on the rise, the initial euphoria has now turned into a more realistic picture with a stronger focus on how GenAI can deliver real added value in companies.

According to the Lünendonk survey **"Generative AI - From innovation to market maturity",** only two percent of companies see GenAI as very relevant, but four out of ten companies (40%) see it as somewhat relevant.

GENAI IS STILL AT THE BEGINNING AT COMPANIES, BUT THEY SEE POTENTIALS

How do you rate the relevance of GenAI for your industry and your company?



Where does your company stand on the topic of generative AI?

Question: How do you rate the relevance of this technology for your industry and your company?
Question: Where does your company stand on the topic of generative AI?; Frequency distribution;
Source: Lünendonk survey 2024: Generative AI

Many companies are embarking on this journey but are still at the beginning: three percent of companies have an advanced status and are using their first GenAI applications in productive operation. 34 percent are in the testing phase and have already implemented their first proofs of concept (PoCs). PoCs have so far mainly been implemented in the insurance companies (55%), banks (50%), the automotive sector (45%) and the manufacturing industry (41%).

Half of the companies are still in the early stages of identifying use cases, while 13 percent even prohibit the use of GenAI tools – as they have no experience with it or are sceptical about it.

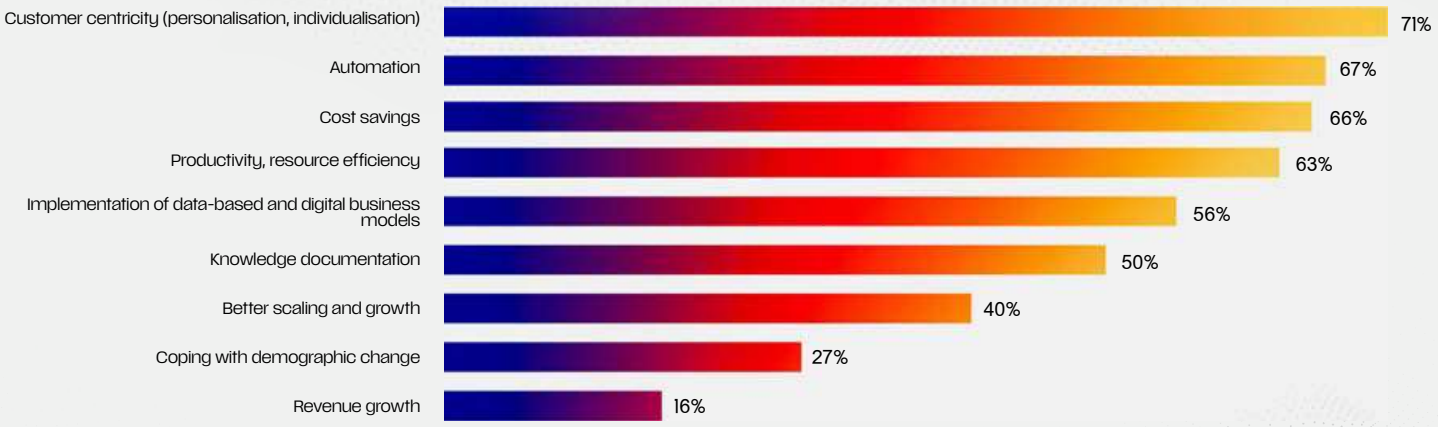
BENEFITS BY GENAI

For seven out of ten respondents (71%), one of the top benefits of using GenAI is the increase in customer centricity. This should enable more diverse and effective personalization and individualization measures to be taken.

GenAI not only offers support in terms of creativity, but also enables the acceleration and standardization of tasks and process steps that were originally carried out manually. The extremely dynamic development in demand that can currently be observed can only be managed with technology and tools that operate at the same dynamic level.

67 percent expect major automation potential from the use of generative AI. As a result, two thirds of the study participants want to benefit from cost savings. Automated processes also boost employee productivity and resource efficiency (63%). As AI primarily relieves them of standardizable routine tasks, employees can concentrate better on more demanding and value-adding activities. This in turn makes a positive contribution to employee satisfaction and increases productivity.

What benefits does your company expect from using generative AI?



Question: What benefits does your company expect from the use of generative AI?
Source: Lünendonk survey 2024: Generative AI

AI USE CASES AMONG DIFFERENT INDUSTRIES

AI has the potential to comprehensively transform virtually all industries. This can be achieved by optimizing processes, reducing costs and generating new business opportunities. While there are some cross-industry use cases, there are also specific use cases for individual industries.

Manufacturing
Predictive maintenance
Prototyping & modelling
Quality management

Financial services
Fraud detection
Risk management
Regulation & compliance

Energy
Productivity & resource efficiency
Predictive useage
Security

Retail
Customer centricity
Personalised marketing
Logistics & resource efficiency

Healthcare
Diagnistic
Drug research
Patent client support

Logistics & transport
Delivery routes and times
Efficient storage
Self-driving cars

IT
Software development
Knowledge management
AIOps

Tax & audit
Fraud detection
Efficiency & automation
Quality management

Source: Lünendonk & Hossenfelder GmbH

FINANCIAL SECTOR

AI offers several use cases in the financial sector. By analyzing large data sets, AI can be used for anomaly detection and fraud prevention. Atypical behavior is thus uncovered. AI also offers potential applications in risk management when assessing credit risks or modeling market movements.

As financial companies are subject to strict regulations and laws compared to other sectors, AI in the context of RegTech can help to avoid breaches and act compliant.

MANUFACTURING

Predictive maintenance enables the predictive maintenance of machines. AI models analyze sensor data to make predictions about the condition of machines and systems. This allows maintenance measures to be planned before breakdowns occur.

AI is also used for quality control and process optimization, for example through AI-supported image processing. AI is also proving increasingly capable of developing products and prototypes and accelerating the CAD (computer-aided design) process.

HEALTHCARE

In healthcare and medicine, AI is primarily used to support diagnostics - for example, to analyze medical images such as X-rays.

The technology is also used to evaluate patient data and create personalized treatment plans and drug dosages. In drug research, AI can also help to research drugs more quickly and identify interactions.

RETAIL

Artificial intelligence is used in retail to make targeted, personalized product suggestions to customers based on their purchasing behavior and to make prices more dynamic.

Personalized marketing and individual recommendation systems are therefore popular use cases and offer potential for cross-selling and up-selling. In addition, AI systems make it possible to optimize stock levels and optimize supply chains by developing predictive models, which also has a positive impact on the environment.

TRANSPORTATION & LOGISTICS

In the transport and logistics sector, AI algorithms are used to optimize delivery and transport routes, reduce costs and minimize delivery times.

AI-optimized warehouses also increase employee satisfaction. The development and use of self-driving cars and drones to deliver goods is also becoming increasingly popular.

ENERGY

The energy sector uses smart grids to determine energy requirements and uses AI to optimize energy distribution in order to balance supply and demand. In addition, AI is used to predict energy consumption patterns in order to make the operation of power plants more efficient. Incident monitoring also plays a major role here.

IT

According to the annual Lünendonk Study 2024 "The Market for IT Services in Germany", the majority of IT service providers surveyed (94%) state that AI will be used in software development in the coming years. The aim is not for AI to replace software developers, but to offer valuable support as an assistant and generate significant efficiency benefits - for example in continuous testing, monitoring or documentation.

Eighty percent of respondents also see great potential for AI in the area of management and administration. Routine tasks in particular can be fully or partially taken over by generative AI, thereby reducing the workload on employees. Seven out of ten companies also see potential uses for AI in IT operations. AIOps can be used to automate and standardize operating processes. Big data and machine learning are often used here.

TAX & AUDIT

AI can automatically read and process invoices and classify them into the right categories. This reduces manual work and minimizes errors. It can also be used in fraud detection and uncover data anomalies and cases of fraud. The comparison with data from other sources on the internet by the AI also increases the quality of checks.

FIELDS OF APPLICATION FOR GENERATIVE AI

Companies most frequently use generative AI for conceptual work. According to the Lünendonk Study 2024 "Generative AI - From Innovation to Market Maturity", 85% state that they use it internally to create business use cases, offers and strategies.

Eight out of ten companies (80%) use the technology to carry out data analyses, interpretations and forecasts. For the external implementation of digital services, 71% already use the support of GenAI. Even chatbots for customers and partners (68%) are already controlled by two thirds of advanced companies with the help of generative AI. 62% see a further area of application in quality assurance and error detection.

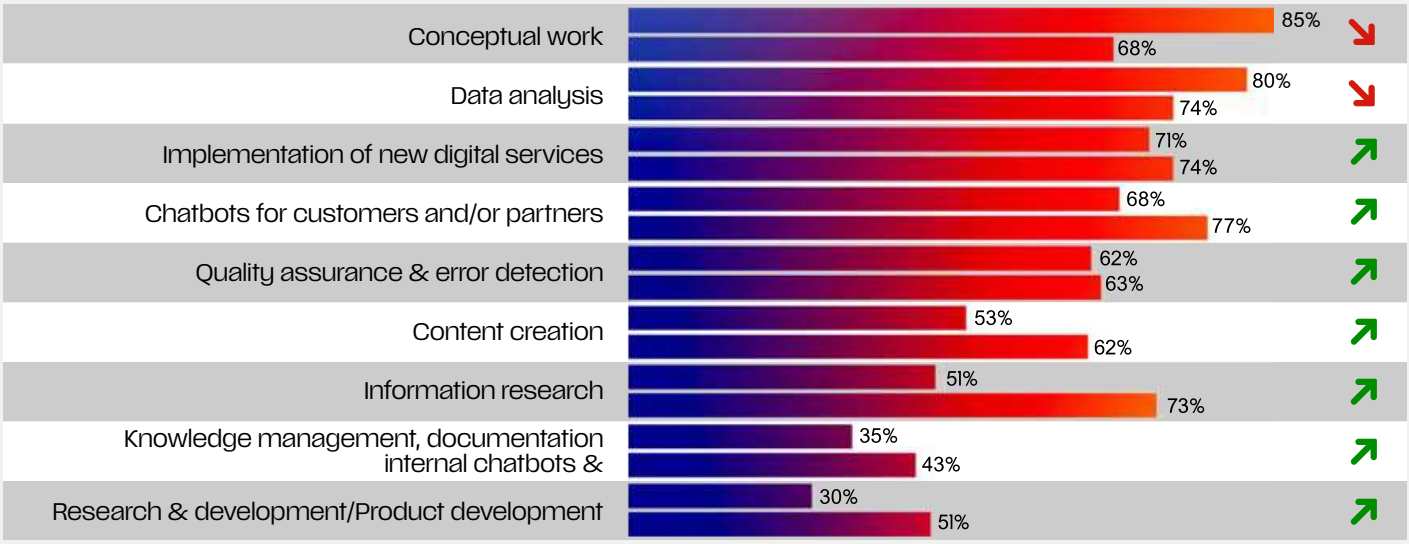
Half of the companies surveyed confirmed that generative AI is particularly suitable for content creation (53%), such as the automatic generation of texts, images and audio using prompts, and for external information research (51%).

This contrasts with the still low usage rate of 35% for internal knowledge management, for example for knowledge documentation and internal chatbots and knowledge databases.

Only three out of ten companies currently see sufficient potential in research and development and are using AI in this area.

COMPANIES SEE LOTS OF OPPORTUNITIES FOR THE IMPLEMENTATION OF GENAI

In which areas do you see potential for the use of GenAI in your company?



Question In which topics do you see potential in the use of GenAI in your company?;
Source: Lünendonk survey 2024: Generative AI

DEVELOPING A SKILLED WORKFORCE FOR THE AI ERA

The introduction of new technologies such as AI requires the corresponding skills and expertise. The lack of qualified personnel is a major bottleneck in the recruitment of suitable specialists, especially for smaller companies. According to a Lünendonk survey, 69 percent of companies see a lock of employees with AI and data skills within the next years.

As a consequency, according to a Deloitte study, every second company (51%) in Germany plans to recruit new employees with advanced AI expertise. Interestingly, further education and training of current employees is not given quite the same priority at first. According to an AWS study, companies in Germany are even willing to pay employees with advanced AI skills between 20 and 26 percent more in salary.

Nevertheless, companies are often unable to adequately fill vacancies due to demographic change and the resulting shortage of skilled workers. In order to optimize human resources, it is therefore necessary to implement targeted training measures to build up know-how and expertise within the company.

When introducing new AI tools in particular, companies rely on the support of external consultants to help them plan and implement the corresponding measures. Furthermore, companies often differentiate between power users and standard users in order to benefit from experience. The gradual rollout or implementation of pilot projects also proves to be helpful.

THE FUTURE OF WORK:
WHAT SKILLS ARE NEEDED IN THE AGE OF AI?

Communication, leadership, knowledge transfer, education and training are key areas of expertise. In addition, interpersonal relationships and empathy are also becoming increasingly important. The human factor plays a decisive role, especially when more and more activities are taken over by robots and machines.

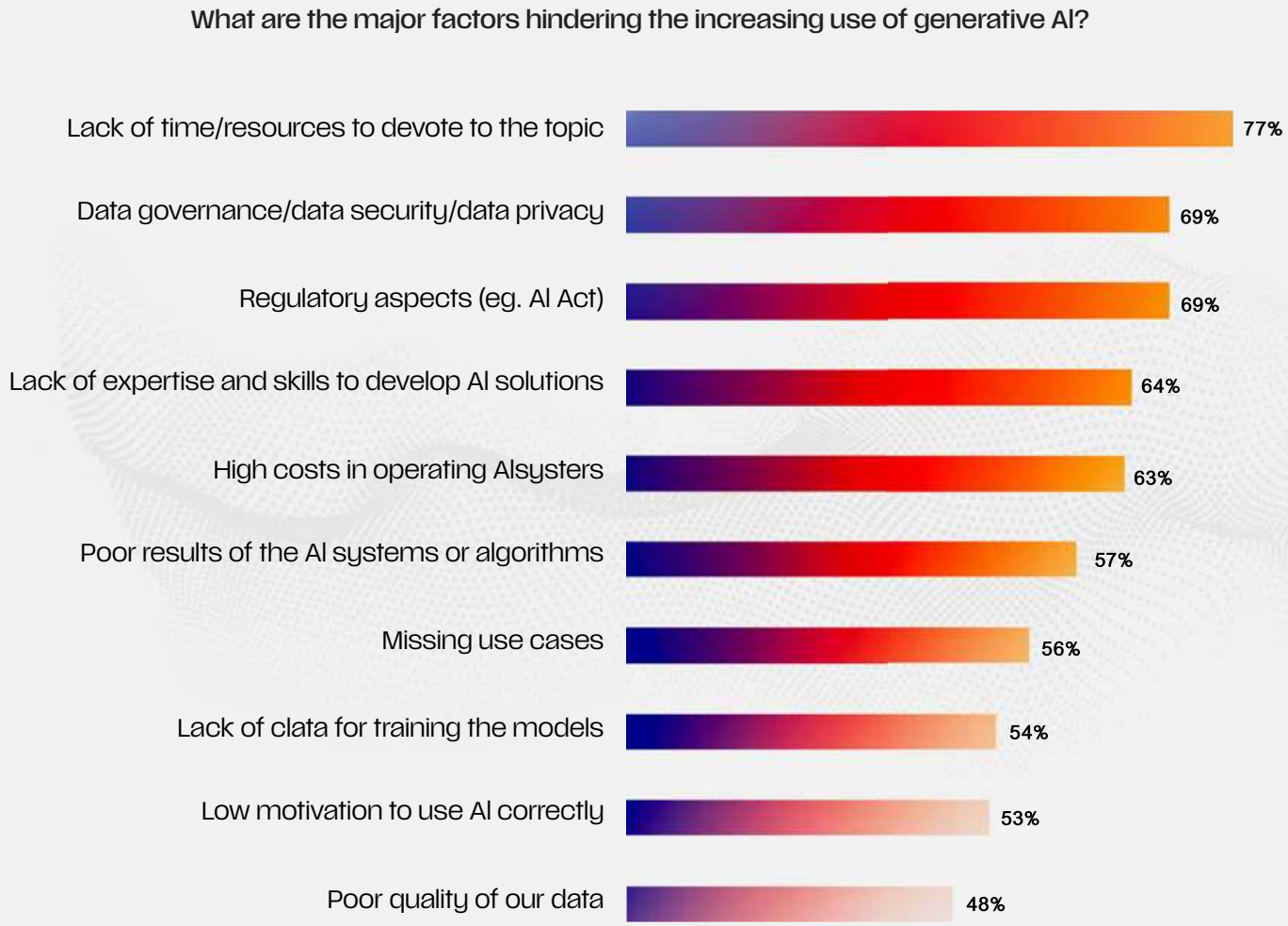
On the other hand, there are those skills and competencies whose relevance will stagnate in the coming years. In particular, data collection and analysis, statistics, monitoring and text creation are activities that are characterized by a high degree of routinization and are therefore likely to be gradually automated in the future. A worrying aspect of the current labor market is that there is a large mismatch between the skills considered relevant and the skills and knowledge available among employees and potential employees.

UNLOCKING POTENTIALS:
CHALLENGES FOR THE NEXT STEP TOWARDS AI

There is currently a divergent mood: on the one hand, enthusiasm for the new technology and the diverse areas of application of AI is driving efforts to make progress. On the other hand, there is also resentment and fear due to the potential threat of job losses. In the real world AI cannot yet replace employees – it is more about supporting them and give them space for other tasks. However, according to a Deloitte study, 52% of respondents in Germany are concerned that AI will replace jobs in the long term - worldwide, this figure is 38%.

CHALLENGES: IT'S ABOUT REGULATORY, RESOURCES, EXPERTISE AND DATA QUALITY

Companies struggle with several challenges when it comes to the introduction of GenAI



Question: What are the main factors preventing the greater use of (generative) AI?;
Source: Lünendonk survey 2024: Generative AI

The Lünendonk Study 2024 "The Market for IT Services in Germany" shows that there are various barriers to the further spread of AI. Regarding GenAI, the introduction is primarily difficult by a lack of time and a lack of expertise in the development and operation of AI solutions (77%). Insufficient data governance (69%) and regulatory requirements (69%) are also perceived as significant obstacles. Companies must comply with the EU AI Act introduced in August 2024 and consider the requirements specified therein.

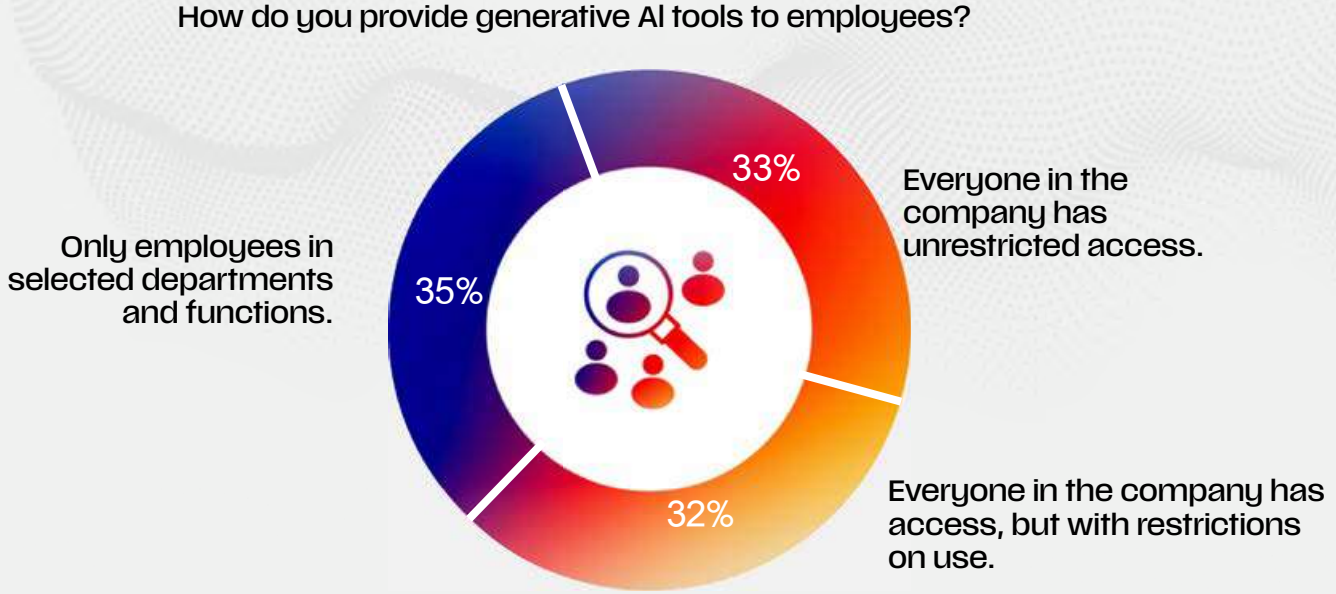
A lack of data quality is seen by 48% of IT decision-makers as an obstacle to the spread of GenAI. In this context, 57 percent of CIOs and IT managers see the lack of quality results as a challenge. In order to promote trust and acceptance, it is essential for companies to ensure that AI systems deliver reliable, comprehensible results and do not disseminate false information.

Technical features such as reliability, robustness and explainability are just as important as organizational frameworks and legal requirements. Related to this is the fact that every second company (53%) states that AI is often not used correctly or that there is a lack of motivation to engage with the technology.

CREATION OF A SHADOW AI

In order to make new technologies like AI as attractive as possible and promote acceptance within companies, easy access for as many employees as possible helps. At the same time, framework conditions are required to ensure controlled use and to guarantee regulatory requirements such as data protection. However, many companies have not yet defined guidelines for the use of AI tools. This harbors the risk of the development of a shadow AI that cannot be controlled by either the IT or the compliance department.

Companies follow different strategies to provide employees access to GenAI



Question: Question: How do you provide generative AI tools to employees?;
Source: Lünendonk survey 2024: Generative AI

According to the Lünendonk survey 2024 "Generative AI - From Innovation to Market Maturity", a third of companies (33%) provide all employees unrestricted access to GenAI tools, while 32% also allow access to all employees, but with usage restrictions. Only 35% of companies assign access rights individually, depending on department and function.

EU AI ACT - CHALLENGE OR OPPORTUNITY?

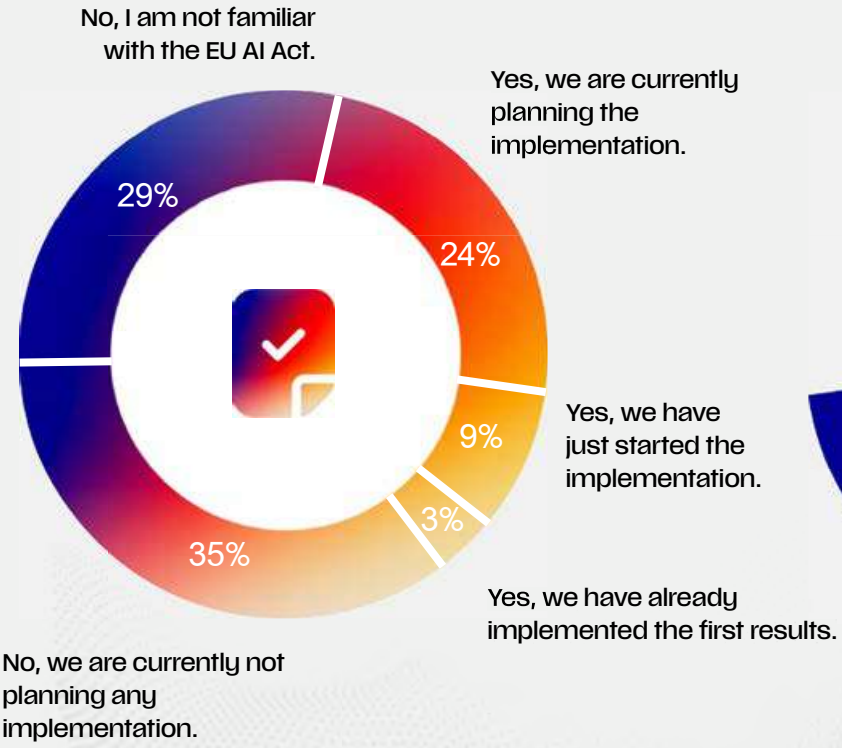
In view of the increasing use of AI and the resulting concerns about misuse, the EU AI Act came into force on August 1, 2024. The world's first set of rules on the use of AI contains Europe-wide guidelines designed to protect users and regulate providers of AI models/applications.

According to the mentioned Lünendonk survey from summer 2024 – shortly before the law came into force – 71% of the business and IT managers surveyed were aware of the law. As the EU AI Act came into force in August 2024 with staggered transition periods commencing January 2025, only three percent of companies have implemented concrete results or requirements so far to take the law into account to their companies' strategy.

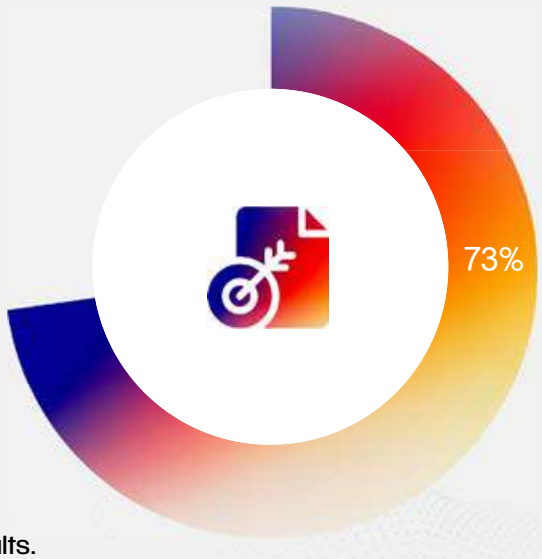
Further nine percent have started implementation, while 24 percent are planning to do so. 35 percent of companies are not currently planning any implementation as the impact of the law on their business activities is unclear. A large number of current AI use cases in companies are not subject to the Act as they are classified as low risk, which reduces the relevance of the Act for many companies at the moment.

EU AI ACT: CHALLENGE AND PROTECTIVE SHIELD AT THE SAME TIME

Is your company dealing with the implementation of the EU AI Act?



EU AI Act brings competitive advantages to European companies



Question: Is your company dealing with the implementation of the EU AI Act?;
Source: Lünendonk survey 2024: Generative AI

Question: Does the following statement apply: Clear AI rules can give European companies a competitive advantage;
Source: Bitkom research: Artificial intelligence - Where does the German economy stand?

According to Bitkom Research, 73% of the companies in Germany believe that clear AI regulations can offer a competitive advantage for European companies if implemented correctly. Although regulations involve a certain amount of effort, they also create security – for both AI providers and users. Due to the Europe-wide scope other countries look similar to the law.

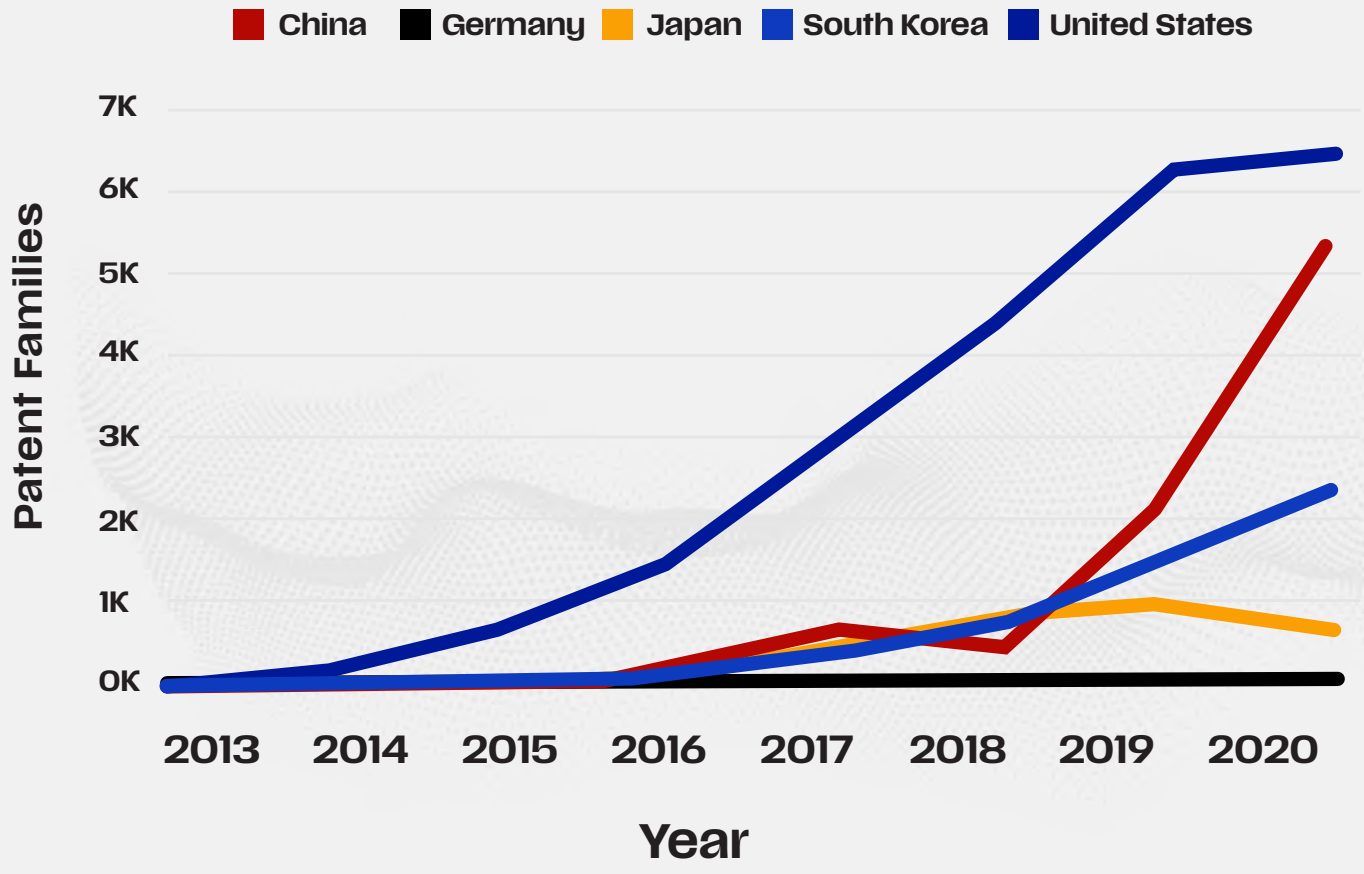
THE AI ECOSYSTEM: EUROPEAN COMPANIES ON THE RISE

The global race is on

The USA and China are considered as pioneers when it comes to artificial intelligence. Europe is strong in research, but the transfer to the economy is still too rare. Reducing the lead in AI to both nations is an important issue – and of national interest. The international competition is also reflected in the number of patents.

Within ten years, more than 38,000 patents in the field of generative AI were registered in China. In comparison: there were 6,300 in the USA. In Germany there are 708 and 714 in UK – rank 6 and 5 of the most patent applications worldwide. Overall, the USA is still in lead, but China makes great strides forward.

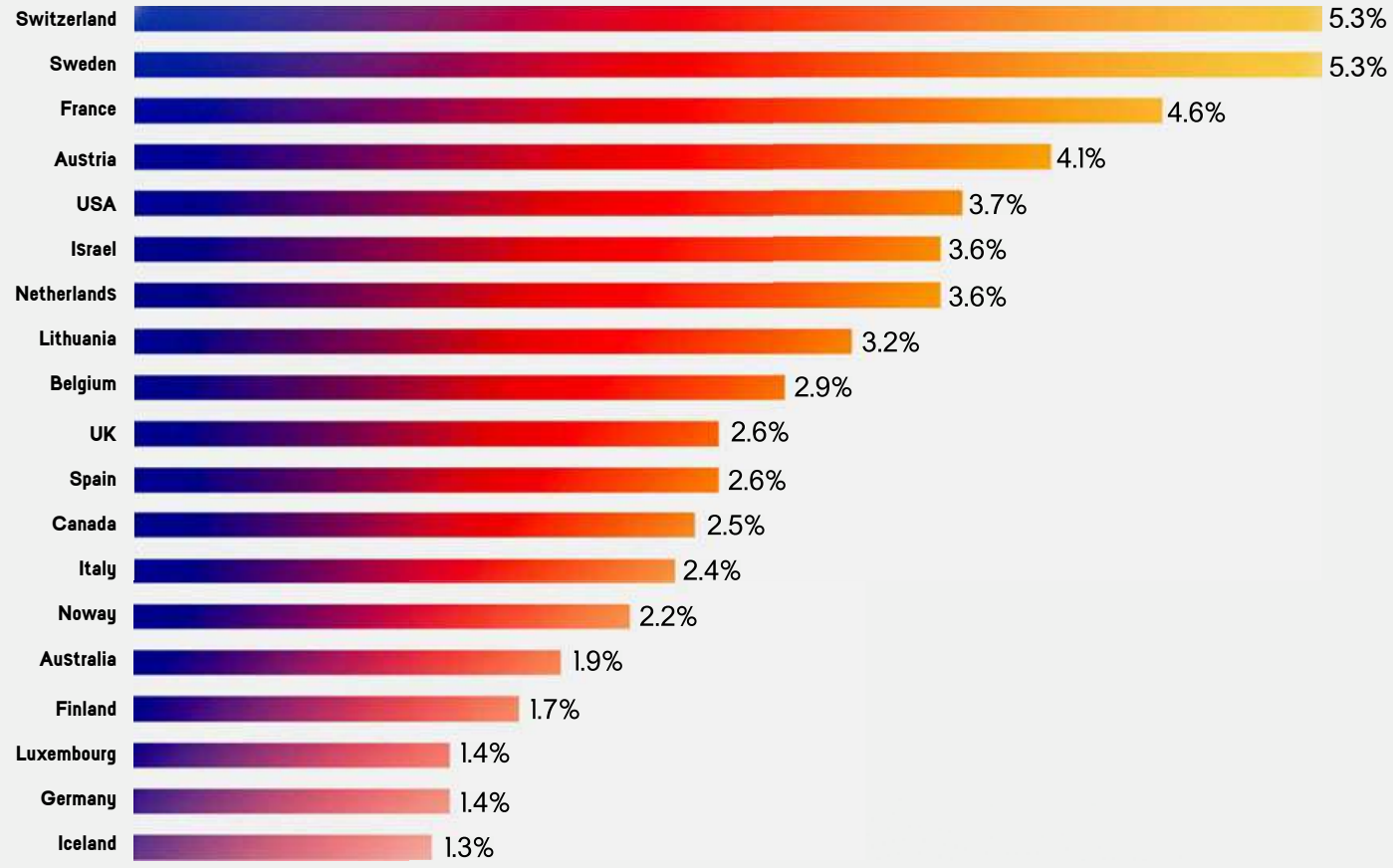
Number of patent families about AI by countries



It is not just in terms of AI that some European countries have to catch up, but also when it comes to digitalisation in general. Although Norway, Sweden, the Netherlands and Switzerland are global pioneers when it comes to digitalisation, economically strong countries such as Germany and Italy are not among the frontrunners.

In addition, some countries are not investing enough in IT. A comparison of IT investment with GDP reveals major differences: while the USA invests 3.6 percent, Germany only invests 1.4 percent. The digital leaders such as Sweden or Switzerland whereas invest more than 5 percent.

COMPARISON OF IT INVESTMENTS TO THE GDP



Source: OECD, KfW, saco

AI "MADE IN EUROPE"

A main reason for the backlog is the inadequate prioritization of goals for the expansion of AI and a lack of government coordination. Insufficient funding and support for AI start-ups is also a crucial factor. However, this could change in 2024: for the first time, European AI start-ups could grow faster than their US counterparts. Although there were around 186 AI unicorns at the end of 2023, 116 were located in the USA. European AI companies currently have momentum and are in a growing market.

According to the appliedAI Institute for Europe, there are around 6,300 AI start-ups in the European Union. Most of these companies (20%) are in Germany, around 18% in France and 11% in the Netherlands. Around 11% of the companies specialize in generative AI.

As of December 2023, these 670 start-ups have received a total of around 2.6 billion US dollars in venture capital. Including the UK, the island is in first place – both in terms of the number of AI start-ups and venture capital.

According to Crunchbase, start-ups in the AI sector were the largest recipients of capital for the first time. They received a total of 24 billion dollars between April and June 2024, twice as much as in the first quarter of 2024. However, due to the rise in interest rates, the proportion of investment for start-ups worldwide is lower than in the previous year. For comparison: Meta, the company behind Facebook, alone plans to invest up to 45 billion dollars in AI in 2024 and the three hyperscalers Amazon, Microsoft and Alphabet are estimated to have invested around 40 billion dollars in the first quarter of 2024 – primarily in data centers and hardware.

Renowned AI companies in the US, Europe and China

Alphabet
Amazon
Apple
IBM
Meta
Microsoft/OpenAI Nvidia
Nvidia

Aleph Alpha
Mistral AI

Alibaba
Baidu
Tencent

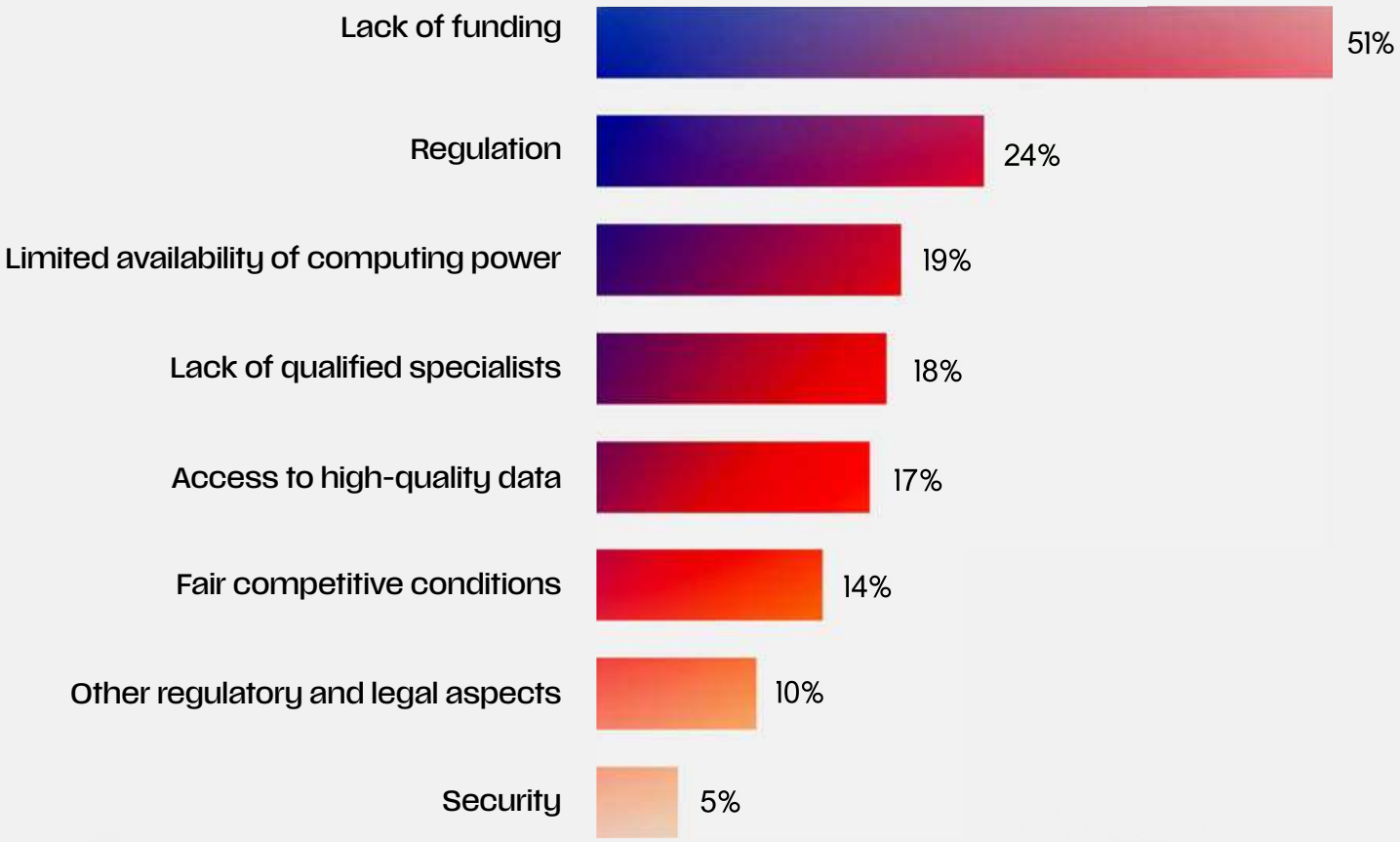
Source: Lünendonk & Hossenfelder GmbH

Aleph Alpha and Mistral AI are two well-known European start-ups that have already established themselves on the AI market. Both companies develop AI-based language models. Aleph Alpha focuses on the development of subject- and domain-specific language models, while the LLM developed by Mistral AI is implemented in the AI models of Google and Microsoft, among others. Both providers clearly stand out from their international competitors in terms of sovereignty and transparency.

EUROPEAN AI START-UPS STRUGGLE FOR FUNDING

Start-ups need to attract investors through financing rounds to invest in their AI models and company growth. Aleph Alpha, among others, achieved this at the end of 2023. In a second financing round, the German company received a further 500 million dollars from Bosch and Lidl, among others. However, a study has shown that European start-ups are not always that successful. 119 companies receive between one and ten million dollars, 81 receive more than ten million dollars and only a handful of start-ups can achieve over 100 million dollars. A lack of funding – whether from private companies or the state – is therefore seen as a challenge by 51% of AI start-ups.

Challenges for AI-start-ups



Source: appliedAI Institute for Europe

EUROPEAN INITIATIVES FOR AI START-UPS

In order to promote European start-ups, strong demand from the public sector is also considered crucial. This is not just about the financial aspect, but also about increasing the trustworthiness of AI. The European Commission is introducing financial instruments to support start-ups.

Targeted investment opportunities in the form of grants and participations are to be offered in order to promote start-ups and attract investors. In future, public and private investment in AI start-ups will be supported through venture capital or equity aid. InvestEU will also provide a special instrument for venture capital funds to support scale-ups and small and medium-sized enterprises (SMEs). Start-ups often do not have sufficient resources – either financial or in terms of personnel. As a countermeasure, the EU is planning to establish so-called "AI factories". These are open ecosystems that bring together all the necessary resources: computing capacities, data and experts – including data experts, AI start-ups, researchers and end users.

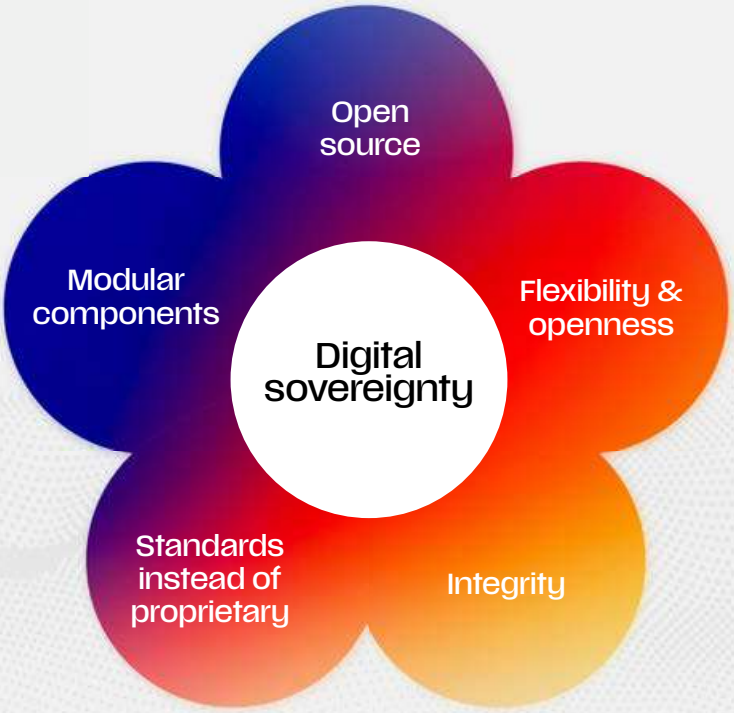
To make this possible, investments of up to eight billion euros will flow into HPC (High Performance Computing) data centers. A prerequisite for access to HPCs is the development of ethical and responsible AI systems. To attract talents, start-ups, researchers, developers and users, the AI Factories will promote partnerships with start-ups, universities and research institutions.

The EU is also launching the "GenAI4EU" initiative to accelerate the development of key AI applications. This pioneering initiative aims to promote the use of generative AI in the fourteen strategic industrial ecosystems of the Union, strengthening collaboration between AI start-ups and AI users in the industries to work on specific use cases.

With the EU's Digital Europe Program, a funding program has also been launched to accelerate the digital transformation of the European economy, industry and society. Around 8 billion euros in funding is to be made available by 2027, of which around 2 billion euros will go towards AI. Both large companies and research institutions as well as SMEs can apply for funding.

STRENGTHENING THE DIGITAL SOVEREIGNTY

As digitalization progresses, a concept is emerging as an essential component of the digital age - so-called "digital sovereignty". Sovereignty in general refers to the ability of a state, organization or individual to determine their own destiny. The term digital sovereignty therefore refers to the ability to develop and use digital systems in a self-determined manner. This includes the underlying infrastructure, the technologies and applications used, the processes running in the background and the storage and retrieval of data.



Source: Lünendonk & Hossenfelder GmbH

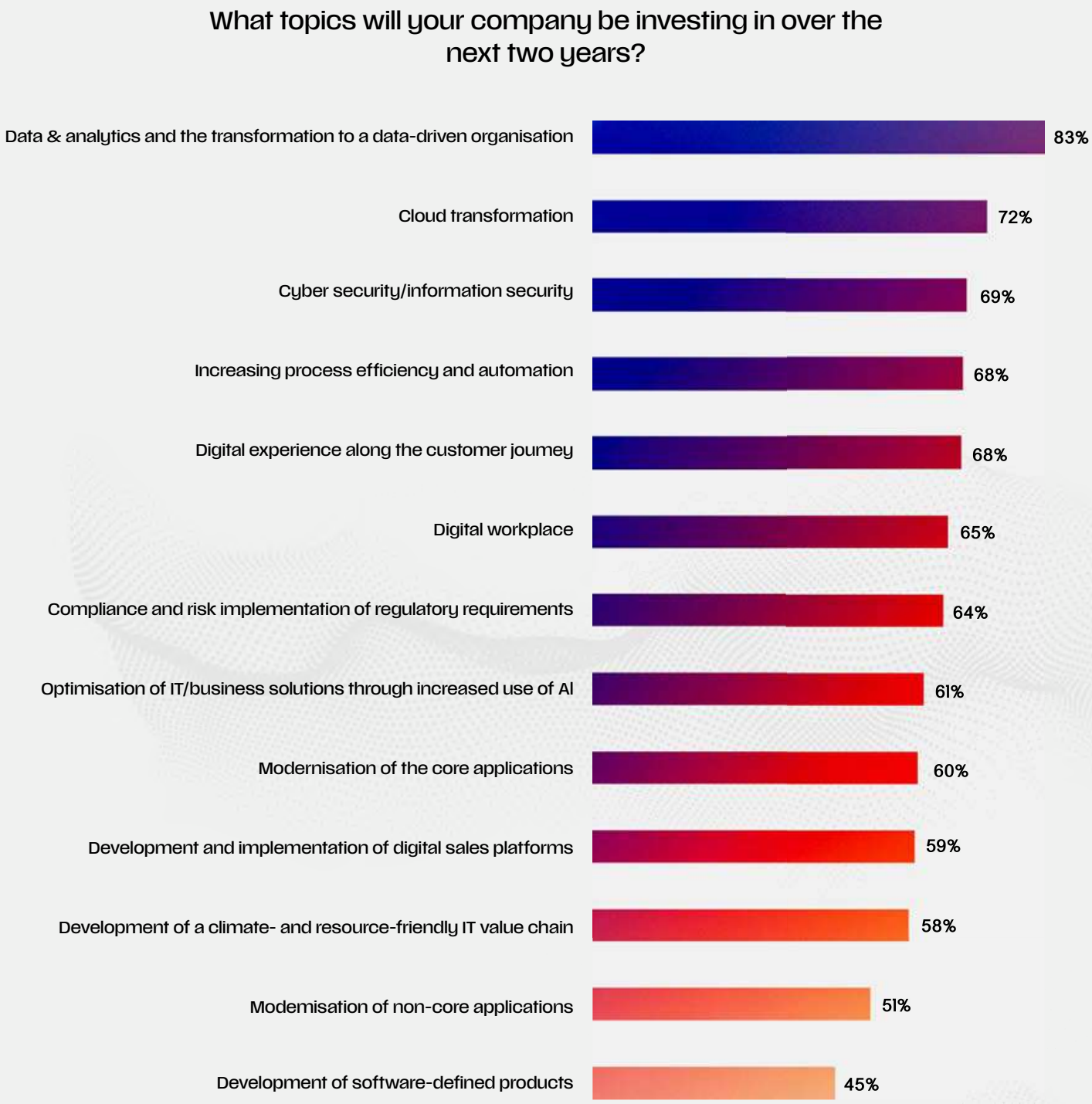
The European Union must advance its digital sovereignty in order to create trustworthy systems, prevent unauthorized data access by third countries and ensure its own digital independence from other states. In particular, the integration of AI into the world of work, but also into everyday life, offers Europe the opportunity to pursue the path of digital sovereignty while safeguarding European values and rights and also securing Europe's economic position. To what extent is AI the key technology for freeing ourselves from dependence on other countries, exploiting the scope for design and innovation and striving for our own European digital strategy and living it in the long term?

Europe's digital sovereignty means that components within the data architecture can be interchanged at will and existing IT landscapes can be flexibly integrated and expanded. In addition, data will only be made accessible to authorized persons and digital solutions can be acquired free of charge and under license within Europe. European providers and operators will also be supported and hardware will be sourced primarily from manufacturers within the EU.

THE BROADER VIEW:
RELATED TECHNOLOGIES FOR A DIGITAL EUROPE

Talking about AI also means to talk about related technologies, as technologies are interrelated or interdependent to each other. Especially the cloud and data analytics are therefore interesting. Without the cloud, AI would not be where it is today – the same applies to data analytics.

CIO agenda 2024/2025



Question: What topics will your company be investing in over the next two years?;
Source: Lünendonk-survey 2024: The market for IT services in Germany

THE CLOUD BECOMES STANDARD

Companies have been investing heavily in the cloud for years. The main reasons to shift into the Cloud are a high level of flexibility and scalability of infrastructure and workloads as well as to have access to innovative development environments for software engineers. Especially the hyperscalers (AWS, Microsoft Azure, Google) offer services to develop own AI models and run them on their infrastructure. But also for simpler fields such as the provision of computing capacity or development tools, the cloud becomes more and more relevant for companies.

According to a Lünendonk study, 72 percent of companies therefore consider cloud transformation to be one of the main topics of the CIO agenda. 60 percent of companies therefore want to increase their budget for 2025.

DATA & ANALYTICS AT THE TOP OF THE CIO AGENDA

There is only one topic, IT executives see even more relevant: data & analytics. Regardless of whether it is about digital business models, a better and more personalized customer approach or process optimization - decisions are increasingly being made on the basis of data and predictive models.

A further reason, why companies are now focusing more intensively on the use of data, is due to the breakthrough of generative AI and the resulting better recognition of the possibilities of artificial intelligence in general.

To develop own solutions, data quality is a crucial factor, as results on AI models depend on the training data. 83% of companies consider the transition to a data-driven company to be important for their business.

Talking about data analytics does not only mean to have a technical perspective and the implementation of new solutions, it is also about achieving a cultural shift to motivate employees to look at data like an everyday object and to enable them using the increasing amount of data. The main topics companies are focusing are therefore data governance, data culture, master data management and the development of cloud data platforms.

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