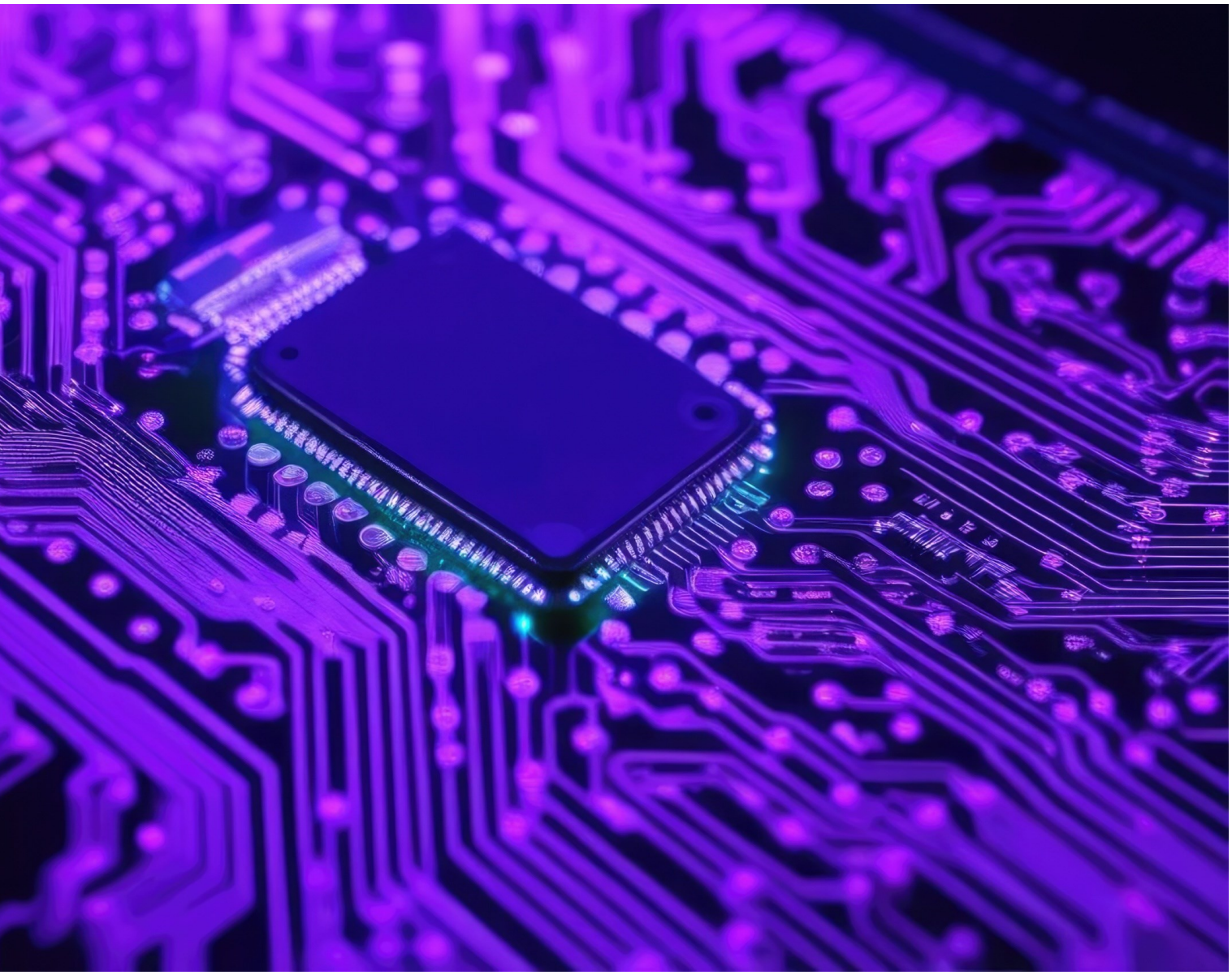
Spotlight on

Artificial Intelligence



Introduction to the Special Topic

Technological advancements and the availability and cost-effectiveness of higher computing power were key factors that led to the development of new artificial intelligence tools with higher accuracy and predictive power that were not imaginable before.

Especially since the introduction of ChatGPT, AI has been on everyone's lips, and its popularity and usage have increased substantially, not only by private users but also by companies. More and more, AI-based technologies are implemented to support work processes. For example, AI-driven chatbots handle customer requests automatically, and AI-based prediction models, e.g. customer demands, are quickly advancing.

Also, in the software industry, AI has found great interest and is expected to have great potential by positively influencing the work processes of software developers (Amershi et al., 2019). For example, with the implementation of generative AI systems, such as ChatGPT or Microsoft Copilot, the productivity and code quality of software developers may be enhanced (Golzadeh et al., 2022; Peng et al., 2023). To gain the benefits of AI, a structured implementation and governance of such applications is indispensable. With the special topic of this year's Swiss software industry report, the current situation of Swiss software companies is aimed to be captured in this regard. Timely, with the report being conducted 18 months after the publication of ChatGPT, the report measures the reaction of Swiss software companies to the AI hype.

The Structure of this Chapter

The following chapter is structured as follows. First, we examine to what extent organizations use AI and how it varies among different processes. Next, the usage is analyzed in further detail by investigating to what extent software companies use AI to support their work, whether AI tools are trained with individual data, and when organizations started implementing AI technologies in their firms. Afterward, we examine the benefits and compatibilities of AI and the readiness of employees and organizations. Since the inclusion of top management is crucial for benefitting from AI, the support and participation of the top management are assessed. Following this, the competitive pressures of using AI, as well as different governance implications, are analyzed. To finalize the thorough investigation of AI implementation in Swiss software firms, we conclude the chapter with the expected future outlook of the companies.

Sources:

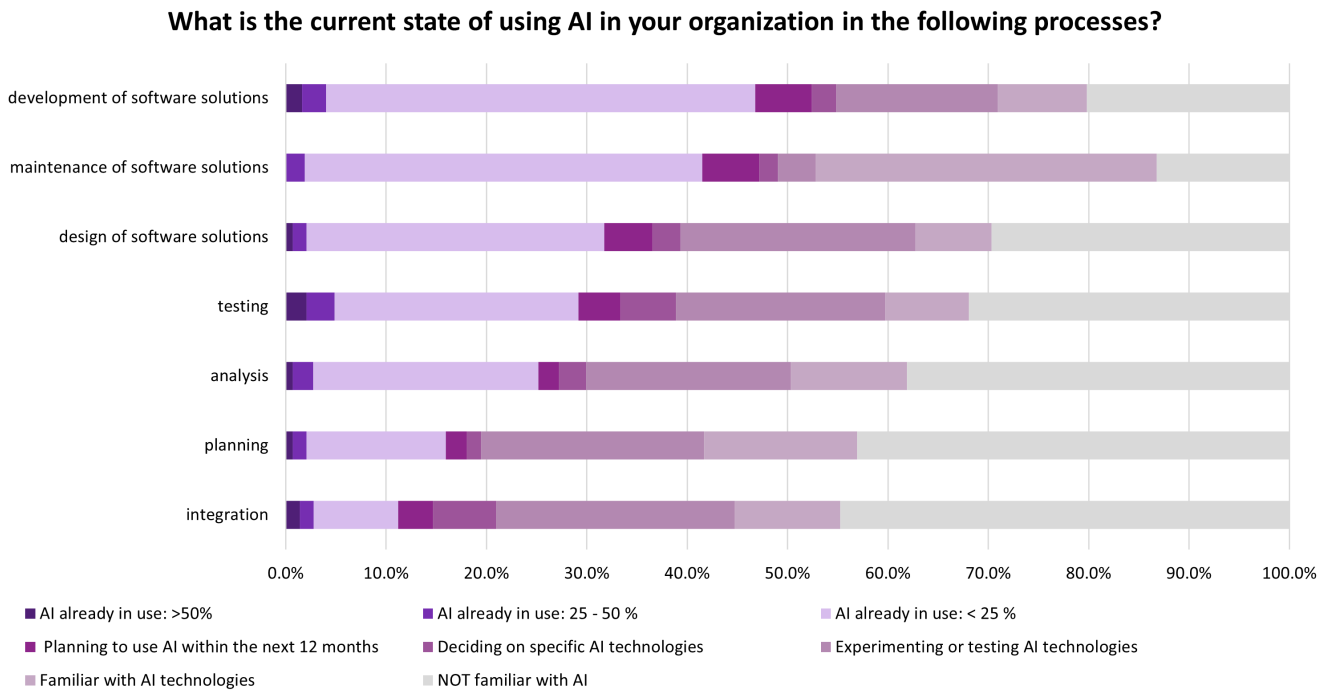
Amershi, S., Begel, A., Bird, C., DeLine, R., Gall, H., Kamar, E., ... & Zimmermann, T. (2019, May). Software engineering for machine learning: A case study. In *2019 IEEE/ACM 41st International Conference on Software Engineering: Software Engineering in Practice (ICSE-SEIP)* (pp. 291-300). IEEE.

Golzadeh, M., Mens, T., Decan, A., Constantinou, E., & Chidambaram, N. (2022). Recognizing bot activity in collaborative software development. *IEEE Software, 39* (5), 56-61.

Peng, S., Kalliamvakou, E., Cihon, P., & Demirer, M. (2023). The impact of ai on developer productivity: Evidence from github copilot. *arXiv preprint arXiv:2302.06590.*

Use of Artificial Intelligence

Figure 21: Current state of using AI



Source: SSIS 2024

N = 144

On average,

31.6%

are not familiar with AI technologies to support the different processes in software development

High AI Assimilation in Some of the Processes

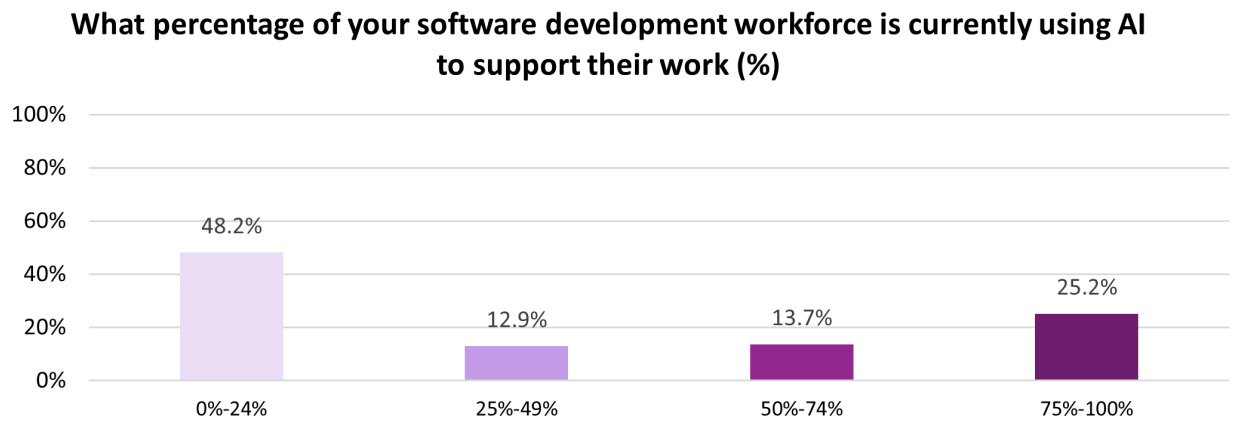
To capture the usage of AI in the Swiss software industry, we used the concept of assimilation. This describes the integration of new technologies into the routines, processes, and structures of a company. This goes beyond mere adoption and also captures the extent to which a technology is embedded and used in daily operations to create value. As a first step, we asked Swiss software companies whether they use AI in software development. This was followed by a second question that explored the extent of use in the particular sub-processes and, in the case of companies that do not yet use AI, what stage they are at in decision making.

Figure 21 summarizes the outcomes to these questions and describes the assimilation of AI technologies in the Swiss software industry, divided according to the sub-processes of the software development lifecycle.

AI is most widely used in software development, with 46.8% of software companies having productively integrated AI technology into their routines, processes, and structures. However, it is essential to note that for a large proportion of software companies (42.7%), AI supports less than 25% of the software development process. The use of AI in software maintenance is also widespread, with 41.5% of software companies using AI in less than 50% of the processes. Noticeably fewer software companies use AI in design (31.7%), testing (29.2%), and analysis (25.2%). It is least widespread in planning and integration. Here, 44.8% in integration and 43.1% in planning need to become more familiar with AI technologies supporting the process.

Employees using Artificial Intelligence

Figure 22: Usage of AI by the software development workforce



Source: SSIS 2024

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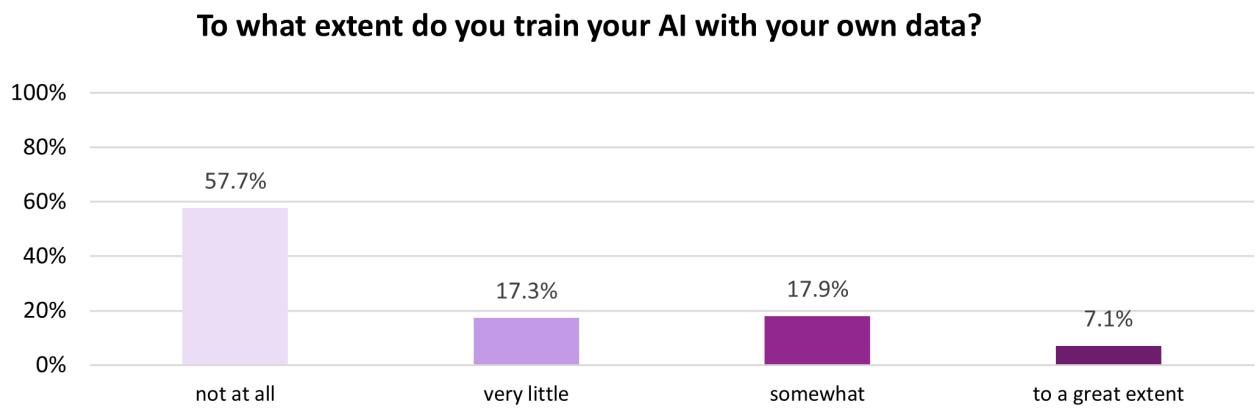
Use of Artificial Intelligence Among Employees Varies Across Companies

In addition to using AI in the various processes, we also assessed on estimate of the proportion of the software development workforce that use AI for their work (see Figure 22). 48.2% of software companies estimate that between 0% and 24% of their software development workforce uses AI to support their work. A large proportion, 25.2%, is estimated the workforce using AI to be more than 75%.

Training AI with a company's data aims to improve the use of the technology in a specific context. However, only a small proportion of Swiss software companies train AI with their own data (see Figure 23). Thus, 7.1% train AI with their own data to a large extent, 17.9% somewhat, and 17.3% very little. Most software companies (57.7%) do not train AI with their own data.

AI Training

Figure 23: AI training with own data



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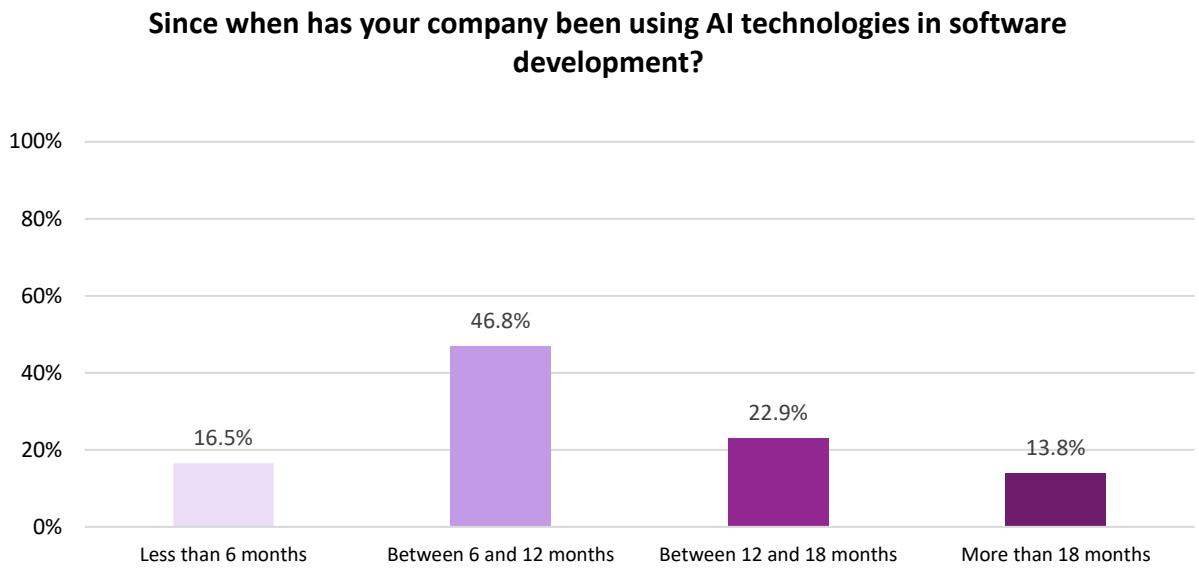
Time Since the Use of AI

Figure 24 : Time since the use of AI



Source: SSIS 2024

N = 109

More than,

86.2 %

of the companies are using AI since less than 18 months

Extensive Use Since ChatGPT Appearance

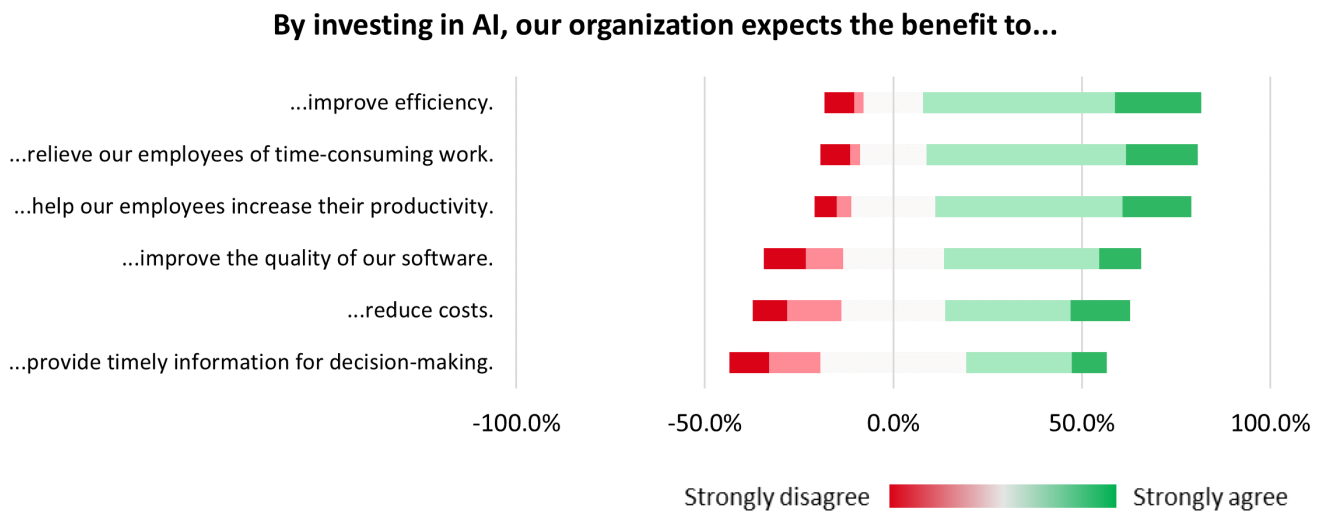
The survey results indicate that most Swiss software companies have only recently integrated AI into their development processes, reflecting the growing awareness and accessibility of AI technologies. This adoption trend suggests that many companies are still in the early stages of leveraging AI for their operations, with just 13.8% having used AI in software development for over 18 months. Most companies (86.2%) have been using AI for less than 18 months, with a noticeable distribution: 22.9% have integrated AI for 12 to 18 months, 46.8% for 6 to 12 months, and 16.5% for less than six months.

This relatively short adoption period is due to several factors. AI technologies have only recently become more accessible, thanks to advancements in user-friendly tools and cloud-based services, which allow even smaller companies to implement AI. Previously, AI required specialized expertise and significant resources, limiting its use.

Additionally, growing awareness of AI's potential benefits—such as automation and innovation—has driven companies to adopt it. However, the complexity of AI implementation and the need for specialized skills still pose challenges, keeping many firms in the early stages of AI integration.

Expected Benefits from Artificial Intelligence Investments

Figure 25: Expected benefits from investing in AI



Source: SSIS 2024

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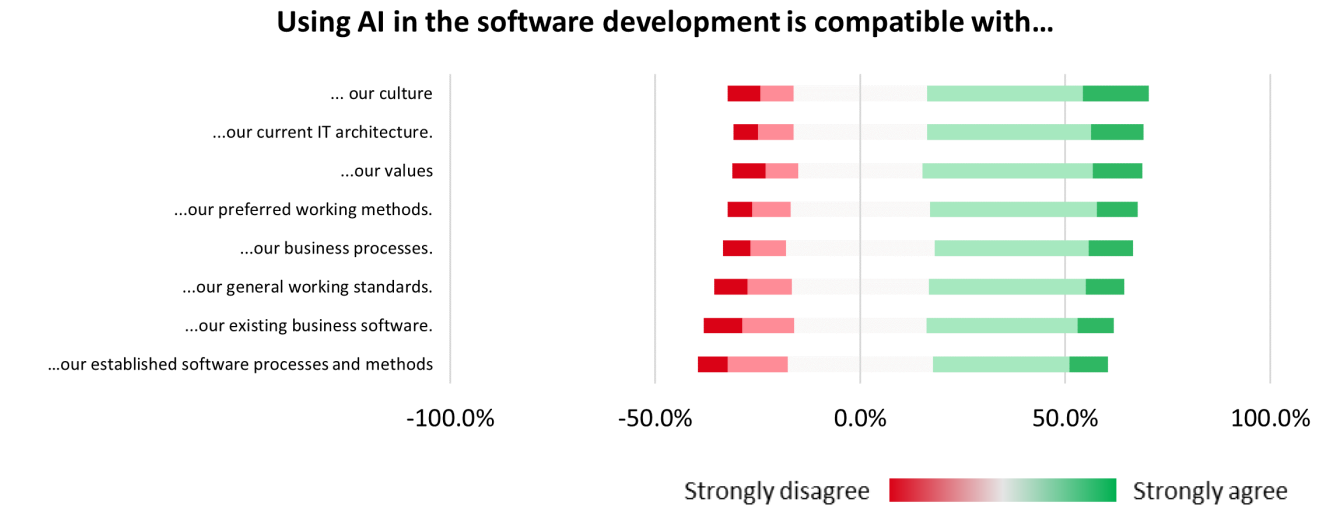
AI Investments with a Focus on Efficiency

The Swiss software industry's investments in AI are primarily intended to increase efficiency (73.9%), relieve employees of time-consuming tasks (71.9%) and improve employee productivity (68.0%). The objectives of improving software quality (52.3%), reducing costs (49.0%), and having timely information for decision-making (37.3%) are less critical (see Figure 25).

Software companies rate the compatibility of AI technologies with their company as very high (see Figure 26). In particular, they see high compatibility of AI with their culture (54.0%), IT architecture (52.7%), values (53.7%), and preferred working methods (50.7%). Some of the companies see less compatibility with their working standards (18.8%), existing company software (22.1%), and established processes (22.0%).

Compatibility of Artificial Intelligence

Figure 26: Compatibility of AI and software companies



Source: SSIS 2024

N = 153

Readiness of the Employees

Figure 27: The readiness of employees with regard to AI

Source: SSIS 2024

N = 150

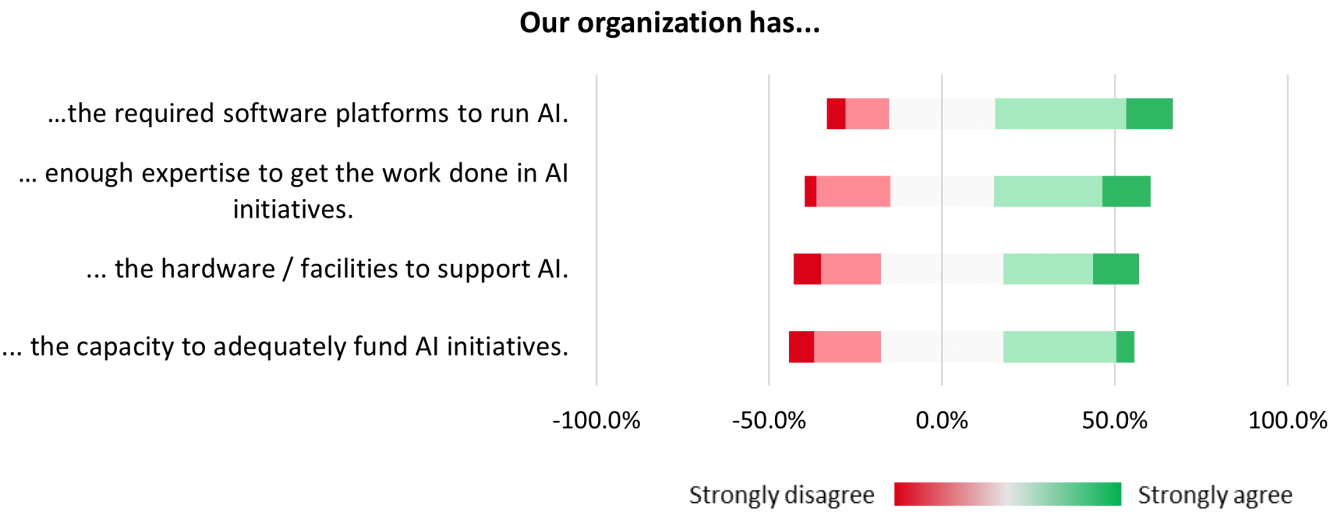
Organizations and Employees Well Equipped for the Use of AI

Figure 27 describes how employees deal with AI. 60.7% and 63.3% of software companies surveyed say it is generally easy for employees to acquire the necessary AI skills and learn how to use AI to support their work. Slightly fewer agree that it is easy for employees to integrate AI into their workflow (46.7%). An overall assessment of the results leads to the conclusion that employees are generally able to use the new AI tools well.

Figure 28 illustrates the prerequisites that companies have to meet to deal adequately with AI. The companies are generally well-equipped. A slight majority (51.3 %) have the software platforms to run AI. Furthermore, 45.3% indicate they have enough expertise to get the work done in AI initiatives. 39.3% of the surveyed companies have the hardware or facilities to support AI, and 38.0% have the capacity to fund AI initiatives adequately.

Organizational Readiness

Figure 28: The readiness of organizations with regard to AI



Source: SSIS 2024

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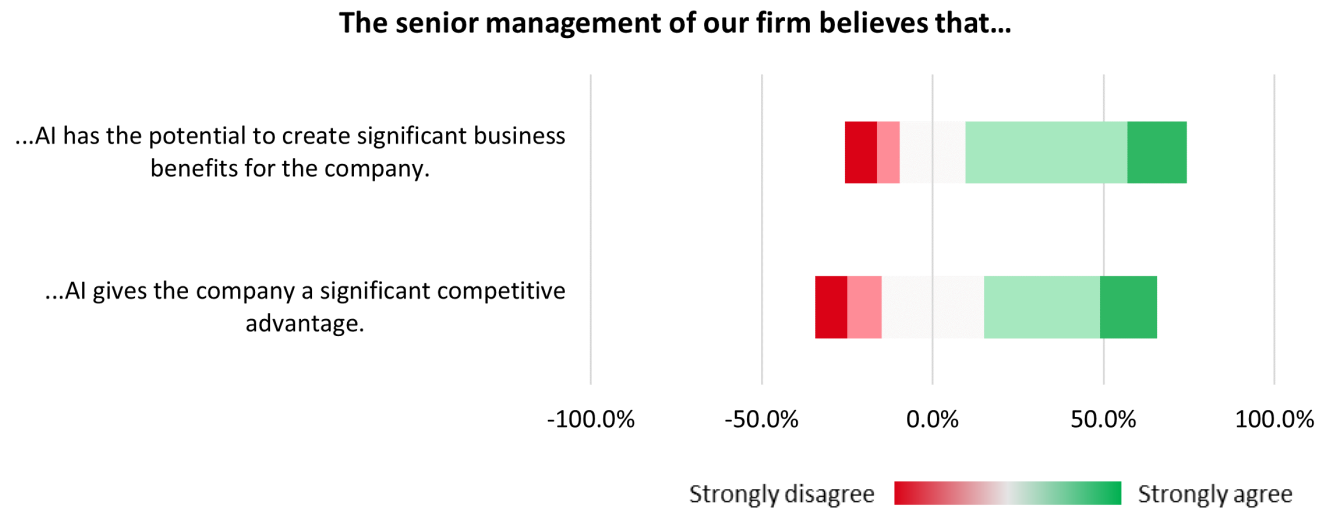
Beliefs of Top Management

Figure 29: Top management beliefs regarding AI



Source: SSIS 2024

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Strong Belief in the Potential of AI but Few Concrete Strategies and Goals

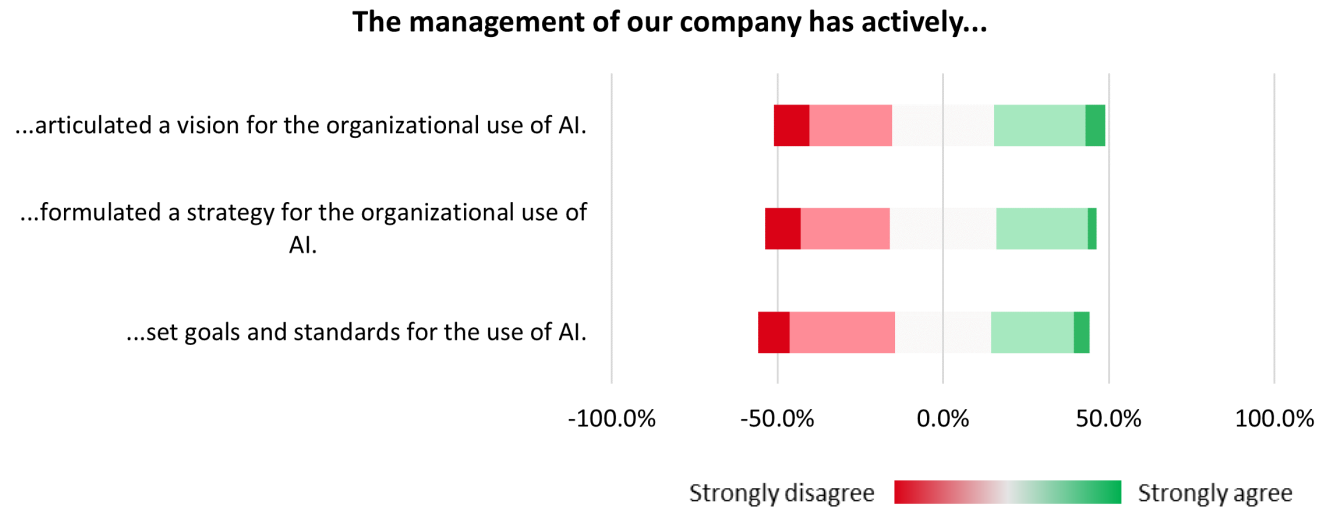
Figure 29 shows top management's beliefs about artificial intelligence. The potential of AI is generally recognized, and 64.7% find that AI has the potential to create significant business benefits for the company. In addition, 50.7% believe that AI gives the company a competitive advantage.

Figure 30 shows the activities of the management of the Swiss software companies surveyed with regard to AI.

Around a third have taken active measures, for example, articulated a vision for the organizational use of AI (33.6%), formulated a strategy for the organizational use of AI (30.2%), and set goals and standards for the use of AI (29.7%).

Top Management Actions

Figure 30: AI considerations in the strategic planning processes of Swiss software companies



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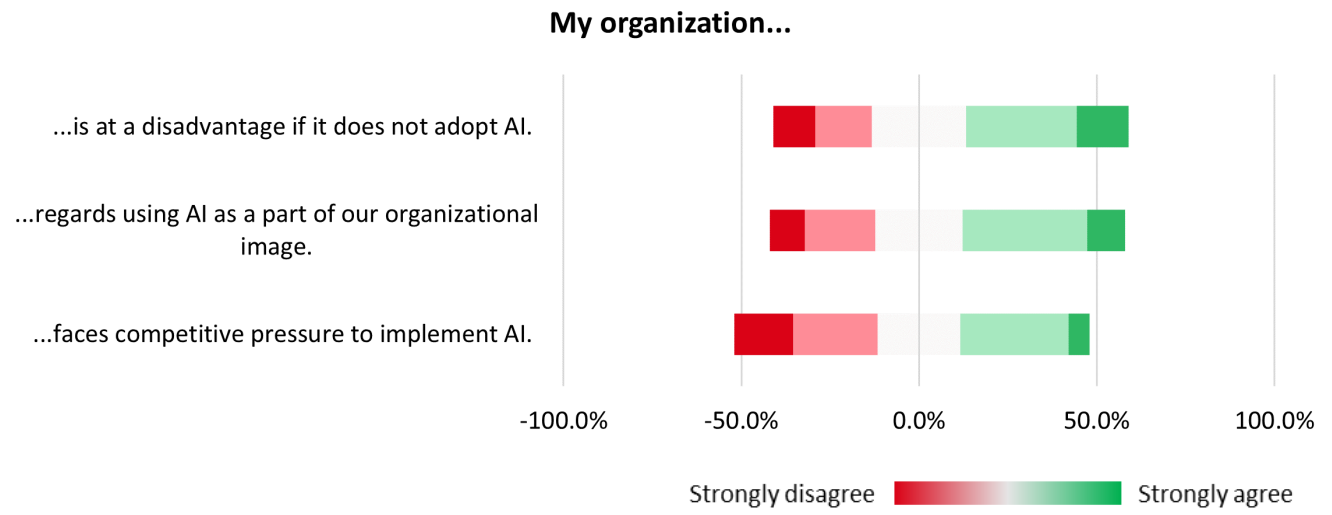
Competitive Pressure to Adopt AI

Figure 31: Perceived pressure to adapt AI among Swiss software companies



Source: SSIS 2024

N = 151

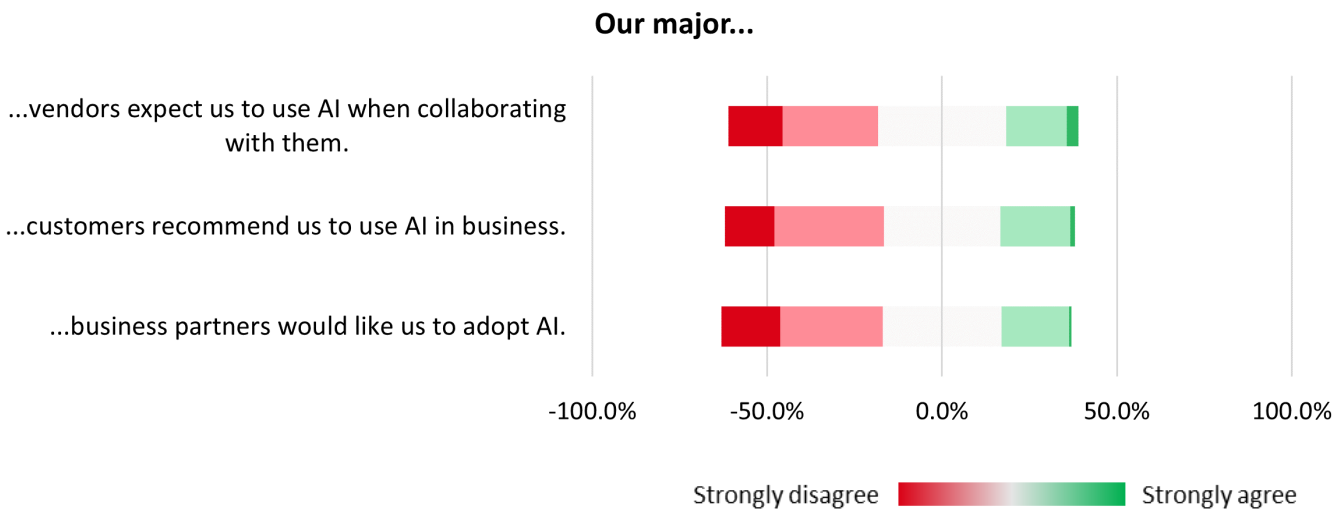
Little External Pressure to Adopt Artificial Intelligence

Figure 31 illustrates the competitive pressure perceived by Swiss software companies concerning AI. Over a third are experiencing competitive pressure to integrate AI into their operations (36.4%). Slightly less than half perceive the absence of AI as a disadvantage (45.7%) and view the adoption of AI as a reflection of their organizational image (45.7%).

The level of pressure from stakeholders to utilize AI technologies is not yet particularly pronounced. Indeed, only just under a fifth of respondents indicated that various stakeholders anticipate the deployment of AI. However, the majority of companies perceive no or very little pressure from vendors (45.3%), customers (46.0%), or business partners (42.7%). This is exemplified in Figure 32.

Competitive Pressure from Partners to Adopt AI

Figure 32: Perceived pressure by partners to adapt AI among Swiss software companies



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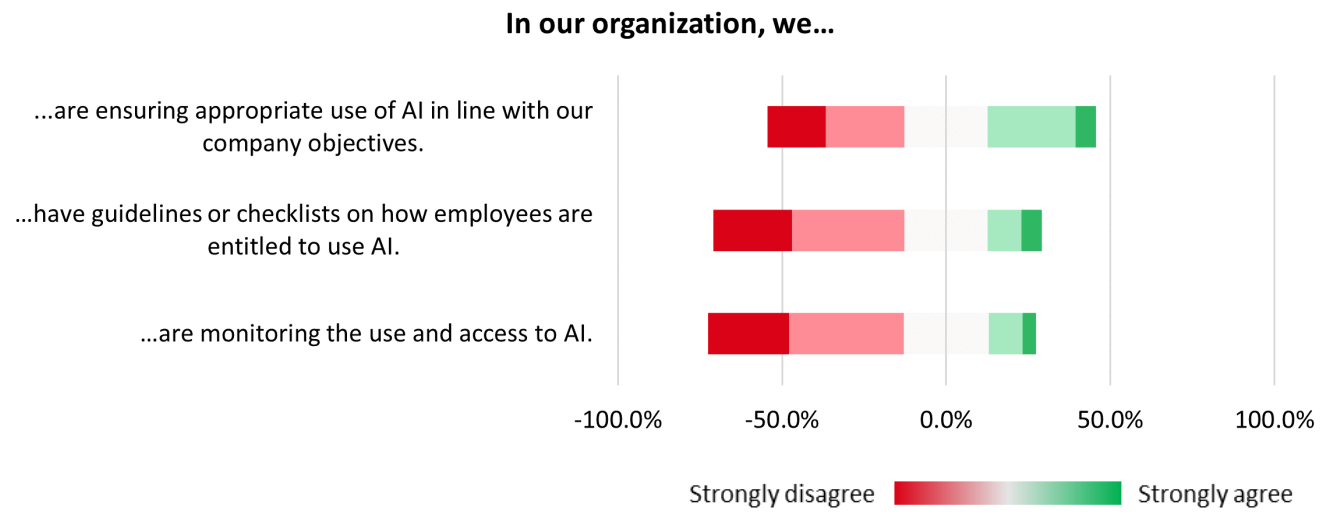
Governance: Procedural Practices

Figure 33: Procedural practices to govern AI



Source: SSIS 2024

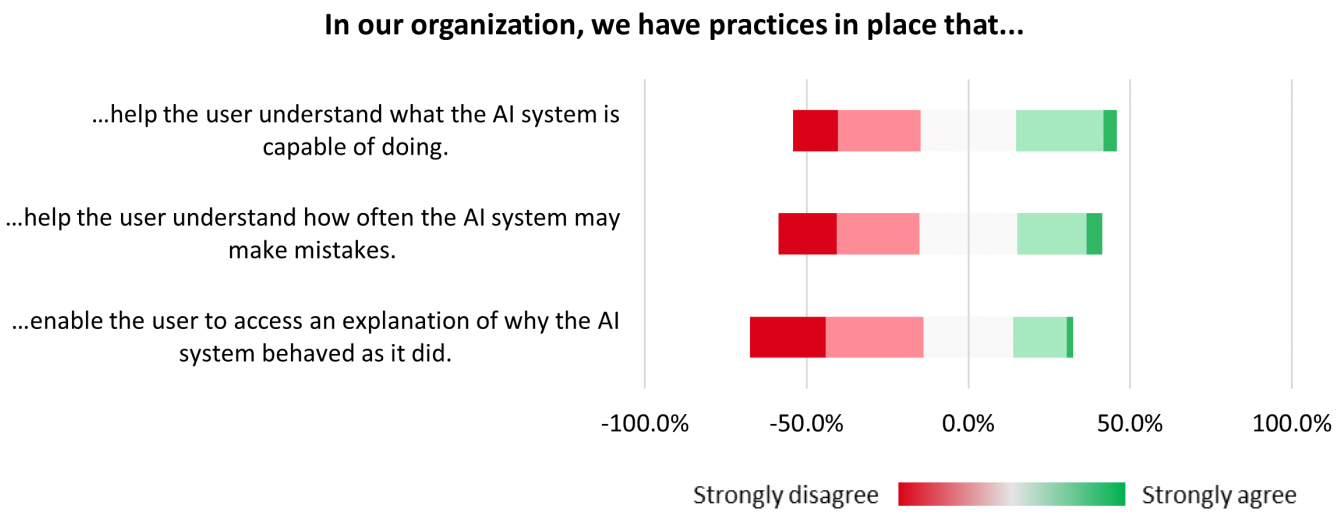
N = 146

Little AI Governance

In this context, it is interesting to see how companies govern AI. This is illustrated in Figures 33 and 34. About one-third (32.9%) of the surveyed companies ensure the appropriate use of AI that aligns with their company objectives. Only a few state that they have guidelines or checklists on how employees are entitled to use AI (16.4%). Monitoring has also not yet been carried out by many companies. Thus, 14.4% state that they are monitoring the use and access to AI. Furthermore, some companies have practices in place that help the users understand what the AI system is capable of doing (31.0%) and that AI systems may make mistakes (26.2%). A smaller proportion of companies state that they have practices in place that enable the user to access an explanation of why the AI system behaved as it did.

Governance: Guideline Practices

Figure 34: Guideline practices to govern AI



Source: SSIS 2024

N = 145

Structural and Relational AI Governance

Figure 35: Structural and relational AI governance practices

Source: SSIS 2024

N = 145

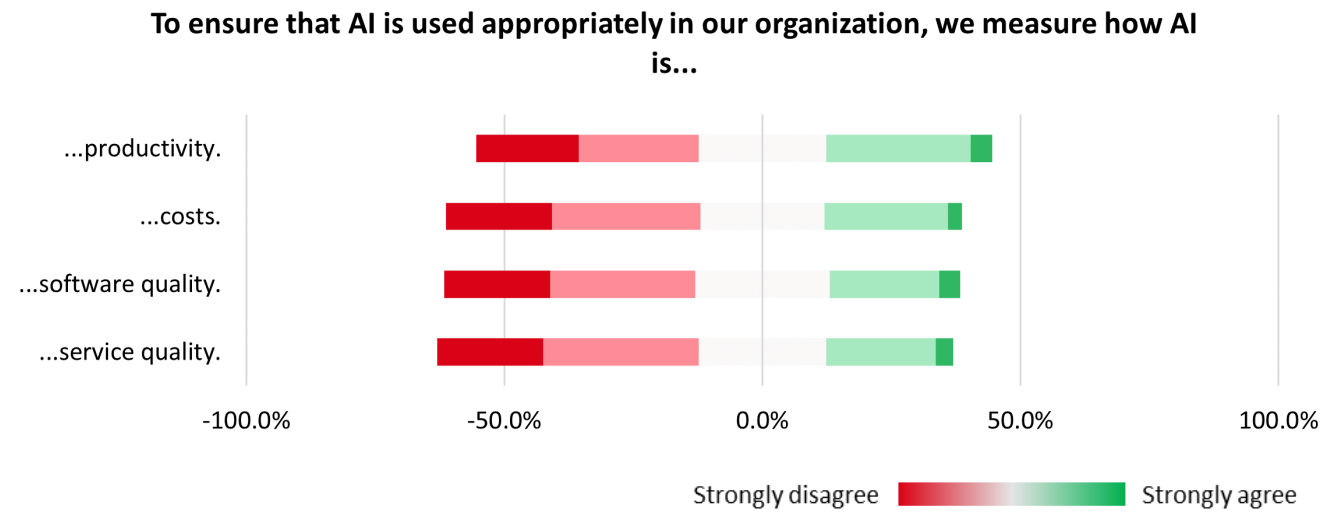
Hardly Anything is Measured in Terms of Artificial Intelligence

Relational practices are more common, such as communication within the organization (43.4%) and training of software developers (40.0%). Less common are structural practices, such as the introduction of a steering committee (12.4%), the precise definition of responsibilities and decision makers (31.0%), and cross-functional training (15.2%).

Figure 36 shows the measurement of AI use in the Swiss software industry. However, it should be noted that only a small proportion of Swiss software companies measure the impact on productivity (32.2%), costs (26.7%), software quality (25.3%) and service quality (24.7%).

AI Measurement

Figure 36: Measuring the use of AI in Swiss software companies



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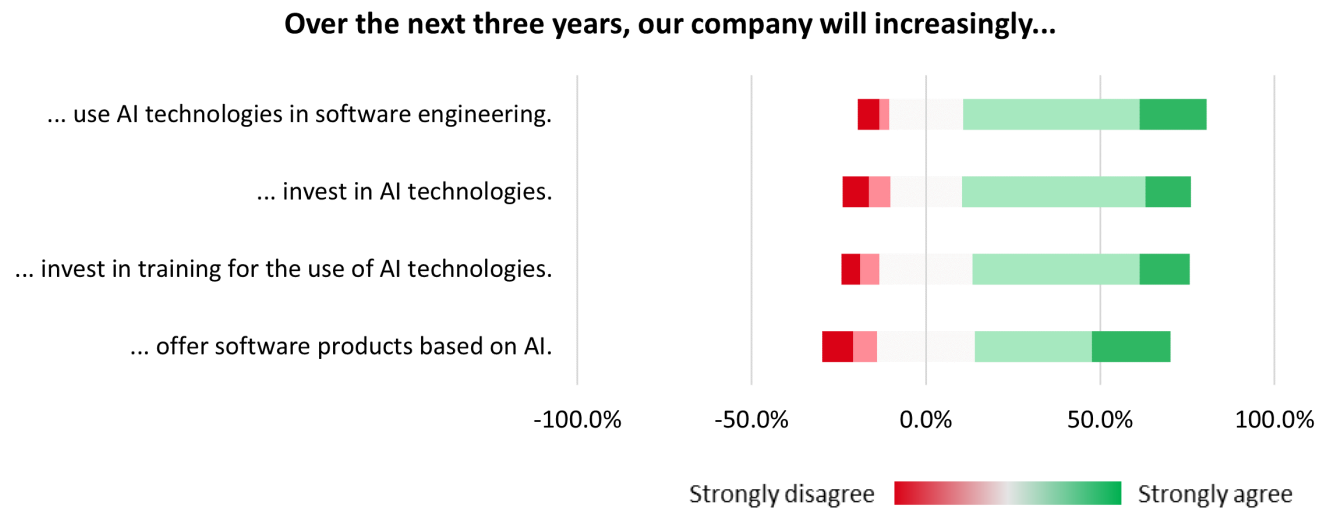
Artificial Intelligence Outlook

Figure 37: Intentions of the software development companies in the future



Source: SSIS 2024

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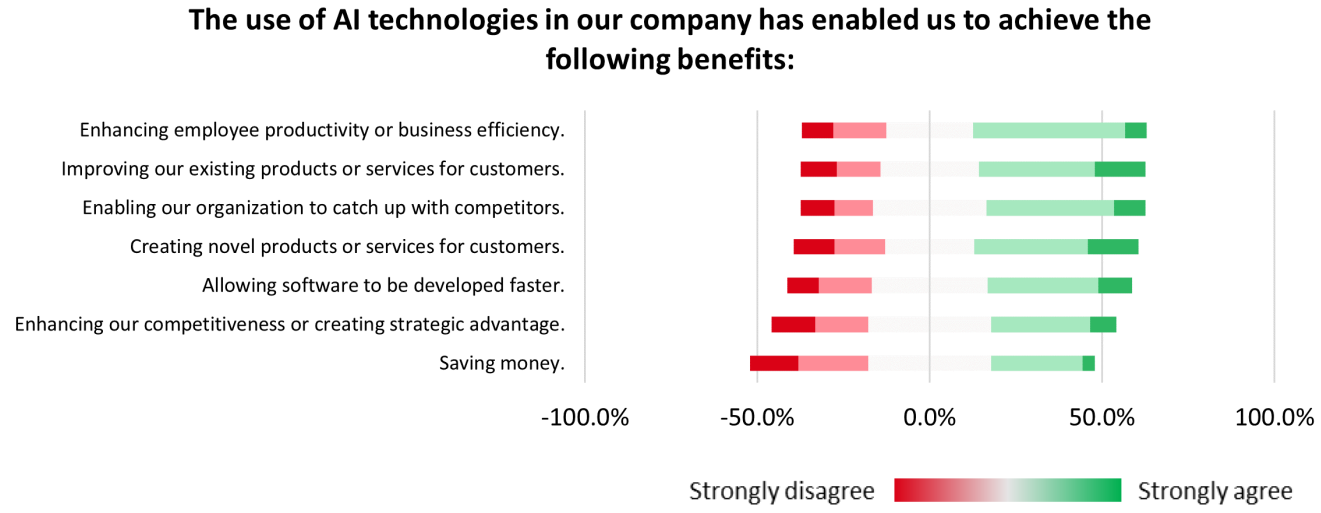
Future Outlook for the Use of Artificial Intelligence

While some companies have yet to use AI extensively, the outlook for its future application is promising. Figure 37 illustrates that the majority (69.9%) will utilize AI technologies to a greater extent in software engineering, with almost two third (65.8%) planning to invest in AI technologies. Software companies also intend to invest increasingly in training for the use of AI (62.3%). Software companies are least likely to offer software products based on AI (56.2%).

AI technologies are not currently anticipated to result in cost savings necessarily. Despite companies recognizing the potential for increased efficiency through AI, this does not necessarily result in reduced costs. This is likely due to the investment costs involved or the fact that AI cannot replace employees but makes their work more efficient and productive. The expected benefits are illustrated in Figure 38.

Benefits of Artificial Intelligence

Figure 38: Benefits through use of AI technologies



Source: SSIS 2024

N = 143