Practical guide

Navigating AI:
Challenges and opportunities for Swiss SMEs

This practical guide offers Swiss SMEs practical guidance on AI adoption, covering opportunities, challenges, and actionable steps with case studies and recommendations for a successful AI journey.

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March 2025

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1 Introduction: motive and goal of this practical guide

Artificial Intelligence (AI) is revolutionising industries globally, and Swiss small and medium-sized enterprises (SMEs) have much to gain[i,ii,iii,iv,v,vi,vii,viii] . AI offers transformative opportunities for SMEs, such as driving innovation, increasing productivity and efficiency or gaining new insights from the increasing amount of data being collected. However, adopting AI presents specific challenges. This practical guide aims to inform Swiss SMEs about relevant use cases, the obstacles to implementing them and potential approaches to overcoming these challenges. It offers practical advice on leveraging AI effectively, provides actionable insights and points Swiss SMEs towards resources to help them navigate their AI journey successfully.

The content of this practical guide has been compiled by various SAIROP partners. SAIROP[ix] – the Swiss Artificial Intelligence Research Overview Platform – is an initiative coordinated by the Swiss Academy of Engineering Sciences SATW[x], which brings together numerous organisations to promote and foster collaboration between the various stakeholders in AI in Switzerland.

1.1 Embracing a positive perspective

SMEs often face a dilemma with AI tools like ChatGPT, DeepL and others. Despite restrictions, these tools are widely used[xi], and the risk of banning them might be greater than allowing controlled use. Implementing governance can mitigate risk and unlock AI's potential. By starting small, staying informed and collaborating effectively, Swiss SMEs can overcome challenges and harness AI to drive growth, increase productivity or simply remain competitive. Whether you are just getting started with AI or looking to expand your AI capabilities, the following steps can help you succeed in the changing AI environment.

1.2 Steps to successful AI roll-out in business processes

1. Assess requirements and infrastructure: Evaluate your business needs and technological capabilities to identify where AI can add value.
2. Start with pilot projects: Launch small-scale projects to test AI applications. This approach minimises risks and helps you understand AI's practical benefits.
3. Seek expert guidance: Partner with Swiss technology providers, academic institutions and consultants to access cutting-edge AI solutions and training.
4. Implement governance: Establish clear policies on data privacy, data lifecycle and the ethical use of AI to assure clear accountability and responsible implementation.

2 Use cases of interest to many Swiss SME

Below we describe a selection of AI use cases as currently implemented by many companies. The authors rated the complexity of implementing these use cases on a scale ranging from straightforward, through moderate, to difficult. The scale is qualitative and reflects the work an SME must invest to implement an AI use case – either in collaboration with a solution provider or by harnessing in-house knowledge. It goes without saying that the complexity will depend on the boundary conditions of the specific case.

2.1 Large language models in combination with external sources of knowledge

Retrieval-augmented generation (RAG)[xii] can connect large language models (LLM) to external sources of knowledge, e. g. specific company data. Combining LLMs with such search algorithms and information retrieval techniques may improve the quality of the answers delivered.

Example: A company's product information may be combined with the text generated by LLMs. First, information relevant to the user's prompt is retrieved from the knowledge base, then an answer is generated based on that information and the company's specific data. Such methods help reduce hallucinations and can reference the sources an answer is based on.

Complexity: Moderate to difficult

2.2 LLMs as tools for assisted content creation and writing

LLM-based tools such as Microsoft Copilot can be used to obtain suggestions and additional opinions on how to create text documents. They help by improving formulations, adapting texts to specific style conventions or translating from and to various languages.

Example: Such tools are used in many different applications, such as marketing, project reporting, human resources management and customer service. The time needed to create content can be reduced by up to 50%[xiii].

Complexity: Straightforward

2.3 Data science and machine learning for improved decision making

Data science and machine learning (ML) algorithms detect patterns in data and can be used to improve or automate human decision making. Typical application areas include customer churn, customer-targeted marketing or recommender systems.

Example[xiv]: In electricity supply networks, a midsize, internationally operating company has developed a machine learning model to predict delivery positions for products and personnel requirements in logistics to better address the high variability in customer orders. It achieved an improvement of 15 % in its personnel planning using an ML ensemble model implemented on top of Microsoft's Power BI.

Complexity: Straightforward to difficult

2.4 AI decision science and optimisation in production and logistics

AI algorithms that use ML, reinforcement learning or constraint optimisation streamline supplier networks, facilitate real-time forecasting and planning and steer dynamic pricing approaches.

Example[xiv]: A midsize, nationwide retailer specialising in beverages automates ordering across its 600 stores based on more accurate ML predictions and AI optimisation. More precise forecasting increases order accuracy, which in turn significantly reduces overstock and out-of-stock situations.

Complexity: Moderate to difficult

2.5 ML in security

With ML turning into a powerful tool for attackers, the fake information that can be used to facilitate identify theft is becoming more sophisticated. At the same time, the advanced statistical patterns detected and monitored by ML algorithms help prevent fraud in areas such as online shopping or banking.

Example: Splunk[xv] (recently acquired by Cisco) uses ML for anomaly detection and predictive analytics that decrease IT system downtime. Customers can tailor ML models to their individual security information and event management (SIEM) needs.

Complexity: Moderate to difficult

2.6 AI in software development[xvi]

AI-based assistants such as Gemini in Android Studio are increasingly being used to analyse and write code, detect and fix bugs and automatically create software documentation. These features streamline the software development workflow and greatly enhance the skills and productivity of software developers by promising to write better code in less time.

Example: JetBrains[xvii] IntelliJ Development Platform offers a new AI assistant to support code developers. It increases developer productivity because it completes code in a much smarter way than earlier local code completion techniques. It proposes code refactoring and facilitates test case generation to increase code quality.

Complexity: Straightforward to moderate

2.7 AI in image and video interpretation & generation

Image and video scene analysis is used in various application scenarios, such as the supervision of human and technical systems, quality assurance in supply chains or automated document processing. Existing generative AI tools can enrich user experience and generate multimodal content by automatically creating visual information from text inputs.

Example: A large international company providing catering and canteen services to enterprises uses AI to further automate the handling of the 30,000-plus invoices it receives from more than 5,000 different suppliers each month. Enhancing traditional OCR text recognition using ML-based image recognition by Azure AI Document Intelligence improves accuracy by several percent.

Complexity: Straightforward to moderate

2.8 AI in education and training

Off-the-shelf AI solutions combined with virtual reality/augmented reality techniques facilitate training and customer support in cyber-physical systems. ML can monitor and predict student performance and tailor learning materials to individual skill levels.

Example: AI-enhanced VR can be used to train staff in tasks such as conducting service calls[xviii]. AI-powered virtual assistants can simulate responses based on the answers given by the human trainee. The combination of more realistic training environment and personalised learning paths help employees learn to perform professionally even in emotionally challenging situations and to develop empathy.

Complexity: Straightforward

2.9 Computer vision for quality control

While classical algorithms for analysing images of produced parts are hard to develop and maintain, deep learning (DL) models can learn to find specific or previously unknown defects directly from the data. Neural networks are well suited for customised, low-volume production of high-precision parts as a steppingstone towards full on-line quality control and zero-defect manufacturing.

Example: A Swiss manufacturer specialising in precision cutting tools uses AI-driven machinery for precision manufacturing. AI helps optimise tool design, select the best-suited materials and improve performance by conducting real-time analysis during the manufacturing process. As a result, the company has increased production efficiency and achieves the highest tool quality standards in the industry.

Complexity: Moderate to difficult

2.10 Predictive maintenance for machines

AI methods can be used to build models to detect and anticipate potential machine problems for the purpose of predicting remaining useful life. This approach can be used to replace standard scheduled and reactive maintenance regimens, in turn allowing machines to run longer without unexpected interruptions and reducing costs.

Example: In the rail industry, trains are monitored for unexpected behaviour. On verification by human operators, alerts trigger proactive maintenance, which avoids delays and secondary damage to the vehicle. Benefits include the option of a quantitative overview of machinery health, which reduces unexpected breakdowns and repair costs.

Complexity: Difficult

2.11 Process optimisation with changing values

In industrial manufacturing, parameters have to be adjusted to optimise processes, e. g. as new products are introduced or machine components are replaced. Production stops during this ramp-up and machine configuration phase, resulting in a direct loss of earnings for the company. Process optimisation techniques aim to reduce the number of experiments required, automatically determine parameter values and even adapt parameters dynamically during the manufacturing process to ensure consistently high product quality.

Example: It is common in the machining industry to reconfigure machines individually for parts with new geometries or made from different materials. Companies who adopt AI technology can reduce ramp-up times for new products and increase machine availability.

Complexity: Difficult

3 Challenges for Swiss SMEs when introducing AI systems and possible approaches to overcoming them

The hype surrounding AI has led to “pressure to adopt”. Many SMEs who integrate AI into their products and services do so not primarily to keep up with their competitors, but rather for promotional reasons[xix]. But AI applications do not sell themselves. As with any software project, requirements analysis is key. What do customers expect from a product to keep it attractive? The costs and benefits of solutions based on AI should be compared with traditional approaches to ensure the right choice is made.

Rolling out AI systems such as large language or multimodal models comes with challenges that may need to be considered as part of risk management activities, depending on the use case [xx]. Some of the following risks are general in nature and not exclusive to AI systems[xxi]:

3.1 Limited knowledge and unknown costs

Challenge: Many SMEs do not fully understand the potential of AI for their specific industry. Thus, they may find it difficult to assess the resources required to implement AI use cases. This may lead to a dependence on providers and overpriced solutions, ineffective implementation or results that fall below expectations.

Approach: An internal or external assessment of current infrastructure and data quantity and quality helps gauge the potential and associated costs of developing data-driven AI. Courses on the basic usage of AI can improve the overall understanding of such technologies.

3.2 Personal concerns and organisational adaptation

Challenge: Employees and managers may have concerns about the introduction of AI systems. They might fear losing their jobs or worry about data privacy.

Approach: Management should establish clear rules on the use of such systems. Proactive engagement, e. g. team events to explore AI tools in a fun way, as well as an open discussion about how work routines may change when AI is introduced[xxii], help people understand the associated opportunities and risks.

3.3 Lack of explainability, transparency and trust[xxiii]

Challenge: Recent AI models are highly complex and opaque. It is difficult to understand how results are produced and the outcomes cannot be fully explained. Commercial AI applications are often delivered as a black box, which makes it difficult to assess the risk associated with using them and impedes trust.

Approach: Limitations need to be considered when defining use cases and estimating the potential impact on outcomes. Risks need to be managed appropriately while buying, developing and using AI applications.

3.4 Automation bias[xxiv]

Challenge: Humans may interpret incorrect results produced by AI systems differently. Present-day chatbots, for example, can formulate information in such an eloquent and well written way that operators are persuaded by the information, even though it is wrong.

Approach: Define use cases and the processes surrounding the AI tool carefully to ensure the technology is used responsibly within the company. Ensuring sufficient training in the basic functionalities and limitations of the AI tools is crucial.

3.5 Collecting sufficient and appropriate training data

Challenge: In industry, productive systems typically operate to high standards and rarely fail. This lack of negative examples presents a substantial obstacle to the development of data-driven algorithms since the training data has to be representative of the problem to be solved.

Approach: If possible, SMEs should start with simpler use cases that have lower demands on data quantity. Alternative approaches include digital twins to simulate failure scenarios, deliberate experimentation during downtimes and collaboration with organisations that have expertise in data collection and AI.

3.6 Societal stereotypes and representation bias[xxv]

Challenge: Foundation models, i.e. basic AI models that can be used as is for language or image generation, for example, or refined for more specific needs, are trained on large volumes of real-world data. Consequently, societal stereotypes present in the data – including gender, nationality, age or other attribute-related stereotypes – are encoded in these models. This may impact downstream applications, too.

Approach: Companies need to pay attention to this challenge when defining the use case. The people involved need to be aware of these limitations and be sufficiently AI-literate that they can adequately estimate the impacts of these potential risks.

3.7 Regulatory compliance and security

Challenge: Data protection laws make data processing more burdensome, and compliance with other regulations like the EU AI Act can be a challenge for SMEs. Data needs to be processed in a standardised and secure way, which in turn means defining appropriate policies and designating competent people.

Approach: SMEs should understand existing regulations and implement comprehensive data governance. They should consider existing industry-specific guidelines and establish a secure, scalable infrastructure for data processing. Training, collaboration and partnerships will further enhance compliance and security measures.

4 Services provided by academic institutions, funding bodies, service providers and others

Innovation projects and funding opportunities for Swiss SMEs

Collaboration in **joint innovation projects** with Swiss research partners can benefit Swiss SMEs in multiple ways, e. g. access to cutting-edge AI research and expertise; talent acquisition; specialised IT infrastructure; data; pilot projects and real-world testing. A typical workflow to help SMEs navigate the various options for collaboration can be found here[xxvi].

SMEs can **access funding** for innovation projects through Innosuisse[xxvii]. The Innosuisse Guide[xxviii] provides a full list of support programmes, from classic innovation projects to international cooperation programs[xxix,xxx] and personal help from Innosuisse mentors[xxxi]. Local funding may also be available from interregional clusters or Cantons. Foundations may also provide funding if the application is a fit for their funding strategy.

4.1 Continuous education, coaching and consulting

Swiss research institutions offer continuous education programmes in AI. These comprehensive programmes provide customisable learning paths that are tailored to the specific needs of SMEs (link to list of programmes[xxxii]). By participating in these programmes, SMEs can stay up to date on developments in AI and foster a culture of innovation, which will in turn generate competitive advantages.

A variety of stakeholders – consultants, academic institutions or organisations such as chambers of commerce – offer coaching or advisory services, training sessions and workshops. They provide platforms for exploring AI applications and improving staff skills – ranging from ideation to rapid prototyping and proof of concept.

4.2 IT services, including data sources and databases

IT service providers offer the tailored infrastructure solutions that are essential for AI workloads. Data management services ensure SMEs can efficiently collect, store and process the large data sets required for AI applications. AI integration services help SMEs seamlessly integrate AI tools into their existing systems. Academic institutions may help SMEs enhance and consolidate both structured and unstructured data. They may, for example, develop conversational agents such as chatbots for customer service or assist with trend prediction for informed decision-making.

4.3 Networking and knowledge sharing

Sharing knowledge and identifying the right experts in the field are key when it comes to AI adoption. AI events take place regularly. Innosuisse supports various collaboration and networking forums[xxxiii], including the "Innovation Booster" programmes. Regional business federations may facilitate networking, connecting SMEs with AI experts and promoting knowledge sharing.

SAIROP – the partnership behind this practical guide, which brings together a number of organisations and research institutions – is an initiative that aims to encourage collaboration and knowledge sharing in AI across various stakeholders in Switzerland.

5 References

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[xiv] VOICE Best Data Project Award: https://voice-entscheiderforum.org/vef/#award
[xv] https://www.splunk.com/en_us/blog/platform/what-is-splunk-doing-with-ai.html
[xvi] https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/unleashing-developer-productivity-with-generative-ai
[xvii] https://www.jetbrains.com/help/idea/ai-assistant.html
[xviii] https://immerse.io/how-ai-is-powering-up-vr-training/
[xix] This is an observation made by an Innosuisse mentor who advises SMEs on potential innovation projects at an early stage. Accordingly, “AI is often seen as a special ingredient that can be added to turn a good project into an excellent one”. Nonetheless, as with all software projects, it is essential to take a close look at the expected added value and, above all, to pay close attention to customer feedback.
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[xxvii] https://www.innosuisse.admin.ch/
[xxviii] https://innosuisse.guide/#/
[xxix] There are good opportunities for SMEs to participate in international programmes, particularly in Eurostars projects. A list of funding sources for international projects can be found here: https://www.innosuisse.admin.ch/en/funding-for-international-projects
[xxx] https://interreg.eu/
[xxxi] https://www.innosuisse.admin.ch/en/innovation-mentoring
[xxxii] www.sairop.swiss/services
[xxxiii] Innosuisse offers support via knowledge and technology transfer: https://www.innosuisse.admin.ch/en/project-set-up-assistance-and-networking. The Innosuisse Mentoring Programme is the simplest resource for specific questions: https://www.innosuisse.admin.ch/en/innovation-mentoring

SATW – Technology for Society

The Swiss Academy of Engineering Sciences SATW is the most important network of experts in the field of engineering sciences in Switzerland and is in contact with the highest Swiss bodies for science, politics and industry. The network consists of elected individual members, member organisations and experts. The SATW identifies industrially relevant technological developments on behalf of the Swiss Confederation and informs politics and society about their significance and consequences. As a unique specialist organisation with a high level of credibility, it provides independent, objective and comprehensive information on technology - as a basis for forming well-founded opinions. The SATW also promotes interest in and understanding of technology among the general public, especially young people. It is politically independent and non-commercial.

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