
Strategic Guideline: Leveraging Scalable AI Solutions for Competitive Business Models

Antonela Germek*

INC Innovation Center GmbH, Rosenthaler Str. 72A, 10119 Berlin,
Germany

E-Mail: antonela.germek@innovation-center.com

Anne Loos

INC Innovation Center GmbH, Bautzner Str. 120, 01099 Dresden,
Germany

E-Mail: anne.loos@innovation-center.com

Toni Drescher

INC Innovation Center GmbH, Campus-Boulevard 30, 52074 Aachen,
Germany

E-Mail: toni.drescher@innovation-center.com

* Corresponding author

Abstract: This paper examines the challenge industrial companies face in transforming pilot AI projects into successful, scalable new businesses models. An evaluation of international industrial firms has revealed common difficulties in maintaining the objectives of AI business models and achieving alignment between AI initiatives and overarching strategic goals. These misalignments result in significant challenges, including scalability issues, unclear return on investment (ROI), and a general misalignment with business objectives. To address these challenges, a comprehensive methodical framework is introduced that guides companies through the complexity of scalable AI implementation in industrial domain. This framework not only provides use-case-specific guidelines, but also defines AI-specific strategies and addresses critical cultural and organizational considerations necessary for successful AI integration.

Keywords: AI; artificial intelligence; Scalability; Strategy; AI Navigator; Framework; Guideline; Business Model

1 Introduction

While the availability of AI-based solutions in B2B markets is rapidly increasing, more and more companies have actively piloted numerous AI projects. Yet, the transition from these initial pilots to the scaling up and commercialization of those solutions has emerged as a formidable and intricate challenge. Our recent evaluations of various international

industrial companies have shown a common struggle in sustaining their business model objectives by using AI. The effective, but also successful AI implementation has shown to be highly dependent on not only an effective technological implementation, but also the alignment between the project's objective with the company's AI strategy and overall strategic goals. Unfortunately, a very common struggle has been inadequately defined or entirely absent AI strategy which often led to challenges such as misalignment with business objectives, scalability issues, underestimation of integration complexity and unclear ROI and value proposition.

To be able to implement truly successful, scalable and in the end profitable AI solutions requires a strategic and carefully structured approach that includes a deep understanding of AI technology and the specific industrial context and market in which it is being applied as well as the consideration of the people who are to use the solution in future.

The goal of this paper is the introduction of a systematic comprehensive guide for companies looking to navigate the complexities of new technology integration in the industrial domain – using AI as an example. The framework includes corporate and AI-specific strategy considerations, industry standards, internal and external policies, and effective change management. The framework extends to the selection, implementation, and scaling of AI use cases.

2 AI Dilemma: Exploring pitfalls of sustaining initial AI pilot projects successful

The year 2023 has seen an acceleration in emerging AI technologies, such as Generative AI and Edge AI, which have disrupted consumer applications and are also increasingly finding their way into industrial applications. Already in 2019, before the explosion of GenAI, it has been predicted that more than 85% AI projects will fail to deliver results (van der Meulen and McCall, 2024). This high failure rate can be allocated to technical factors, such as data management, and business factors, such as unrealistic expectations.

Successful AI projects, apart from the right technical knowledge and data access, need to be part of a strategic plan, obtain executive sponsorship, have cross functional team set-ups as well as business metrics and milestones in place, act agile and, in the worst case, fail fast. Industrial companies often struggle with at least one of the mentioned factors, which leads to important issues that hinder successful implementation of AI.

Technical knowledge & data access

One common pitfall is the lack of sufficient technical expertise within an organization. AI projects require a deep understanding of machine learning models and data science. Without in-house experts or adequate training, companies might struggle to design, deploy, and maintain effective AI systems.

Data access also presents substantial hurdles. AI systems rely on large volumes of high-quality data to train and refine their algorithms. However, organizations often face issues with data scarcity, inconsistency in data formatting, or challenges in integrating data from disparate sources. Moreover, data privacy regulations, such as GDPR, can complicate access to or use of data, imposing strict guidelines on how data must be collected, stored, and used. This can restrict the ability to leverage personal or sensitive

information, which might be critical for the AI's functioning, thereby impacting the effectiveness of AI solutions.

Strategy & long-term vision

The constantly changing economic situation in many countries confronts industrial companies with many challenges, including shortage of skilled workforce, supply chain disruptions, and sustainability concerns, just to name a few. This has motivated the experts to consider how AI can be leveraged to deal better with these issues. Still, a well-known study (Streim and Beerlink, 2024) has shown that 52% of companies in Germany do not even consider using AI in their companies yet. One reason for this is that many companies are afraid of using AI or lack the knowledge in which areas AI can bring significant added value to their company. Knowledge about this is essential to recognize how AI can support your own strategic goals.

There are also ongoing studies that support the mentioned fears. For example, one study found that 70% of companies report minimal or no impact from AI (Ranshbotham et al. 2019). One of the reasons, we identified in our many discussions and projects with industrial companies, is the missing of an AI strategy.

The lack of an AI strategy, as well as a clear mandate can often be seen in the following AI implementation results:

- Failing to meet expectations – e.g. inefficient use of resources
- Building of silo solutions – no end-to-end approach
- Missing acceptance among users – no adoption and scalability
- No standardized infrastructure
- Purely technical team formation
- Lack of management buy-in

As soon as these warning signs are recognized, appropriate project restructuring should be carried out and a strategy defined.

Misleading business case & rigidity to pivot

Unfortunately, the calculation of business cases for new technologies is still used in too many companies purely to give management a good feeling to approve an investment. This usually leads to significantly overstated target images, sales potential, or savings opportunities as well as the hiding of follow-up costs, which are usually unavoidable and high, especially in the case of AI applications. It is often underestimated how the costs for AI use cases develop over time. Even after a specific use case is implemented, the job is not done. Long-term investments are necessary for computing power, maintenance, training and keeping the solutions up to date.

In addition, AI implementation projects are often made without the scalability of the use case in mind. The simplest form of scaling is the multiple use of a solution, for example with different machines in the same plant or almost identical machines in different production plants. If this is not considered when developing the solution, this often leads to enormous development effort being required to make the solution applicable for the previous mentioned cases, as other interfaces or similar may be required and have to be adapted.

Organization & mindset

The acceptance and positive mindset for AI use cases in industrial companies present significant challenges due to a variety of factors.

Industrial companies often have established organisational workflows and processes, that are in some extent disrupted through introduction of new AI-supported technologies. This leads to resistance and scepticism towards the implementation of AI, since the benefits are often not clearly communicated or understood. This lack of understanding is a critical issue, that includes the topics such as misconceptions about the capabilities, the investment needed and the timeline for seeing tangible benefits. To address these challenges, companies should focus on providing education and clear communication about the potential and limitations of AI, involve key stakeholders early on and “walk-the-talk” top down to ensure effective change management from the ground up.

There are also organizational aspects that need to be considered during the AI implementation project itself. As with all new technology projects, there are always unforeseeable events in AI projects which, in the worst-case scenario, can jeopardize the overall project or the business case behind it, and therefore require a project stopping or a different focus, involvement of other partners or business units, etc. This is why project implementation in the sense of agile project management with short-cycle sprints and stakeholder alignments is highly recommended.

Failure Culture

A company culture that fails to recognize the value of mistakes creates a range of cultural issues that stifle innovation and progress. This type of culture results in following characteristics:

- Fear of taking initiative
- Lower employee morale and engagement
- Reduced adaptability
- Missed learning opportunities
- Unnecessarily investing in keeping unsuitable projects alive

Creating a positive failure culture enables the necessary freedom, not only to become more opportunistic, increase engagement and adaptability, but also quicker decision-making, for example, in recognizing that certain projects should not be pursued anymore. This kind of a mindset change requires strong leadership support, clear communication, and establishment of mechanisms for constructive reflection and feedback on failures.

3 Comprehensive Framework: Navigating multidimensional challenges of AI implementation

The importance of the alignment and correlation between the strategy, culture and successful development and implementation of not only AI, but technologies in general, was a motivator to extend our systematic AI toolbox beyond the use case level to provide a full picture for successful implementation and scale up of technology-based use cases.

Our Technology Diffusion Framework extends to a two-sided approach (top down and bottom up) resulting in a targeted, but diffused use case specific considerations (shown in Figure 1).

Top-down approach: Vision & strategy

The alignment with strategic goals is one of the first considerations that needs to be evaluated when developing or implementing technology-based use cases. A clear definition of a vision, mission and corporate strategy is a must for many companies. But extending the strategy to functional areas holds a significant importance to keeping a focus on the future orientation of the organization. On the example of AI, an AI strategy needs to be defined, which focuses on setting the clear goals through defining the company-specific standards, infrastructure, identification of relevant use cases for the technology roadmap and their prioritization. This creates a baseline for decision-making about make or buy depending on the short-term and long-term strategic goals. In principle, AI use cases can also be implemented without the existence of an explicit AI strategy. However, this has the risks described at the beginning of the paper, such as the implementation of non-scalable solutions. A clearly defined AI strategy is essential to ensure the reusability of solutions, efficient use of resources, establishment of necessary infrastructures that enable further scalability or more efficient solution implementations.

In addition to that, especially in the AI, compliance with regulatory requirements need to be considered and what are their effects on the planned projects and with what kind of effort and costs is it connected. Finally, as with other emerging technologies, change management has a big impact whether a newly developed or implemented solution will be used and how much it will be used. Dealing with the acceptance of employees and providing regular trainings often requires careful preparation to maintain the planned timeline and objectives of the use case implementation.

Bottom-up approach: Market & technology

Typically, the use case identification comes from a pure technology-push perspective. Unfortunately, in such rapidly changing times, there is often insufficient focus on customer requirements. It is not about using the latest technologies, but about eliminating internal inefficiencies or being able to better address customer requirements. This only works by combining the top-down with a bottom-up approach. This is where the most relevant challenges of the own target groups are identified. However, addressing these issues requires careful consideration of several factors, such as whether there's actual demand for the solution or if it's being pushed by new technologies, as well as a thorough analysis of what competitors are doing. It's crucial to clearly identify the major challenges and understand the potential benefits of any solutions being considered.

Once these initial steps are completed, a detailed assessment of the use case is necessary to check which use cases are best suited for AI implementation. The assessment should look into 4 important dimensions: process, data, resources & talent and infrastructure (Loos, Sisejkovic and Drescher, 2022). This in-depth analysis helps to measure how ready the organization is to implement the proposed solution and what steps need to be taken to prepare better. By understanding where you currently stand and what needs improvement, you can effectively plan to successfully implement the AI use case. This structured approach not only clarifies the preparatory work needed but also ensures that the implementation process is well-planned and likely to succeed.

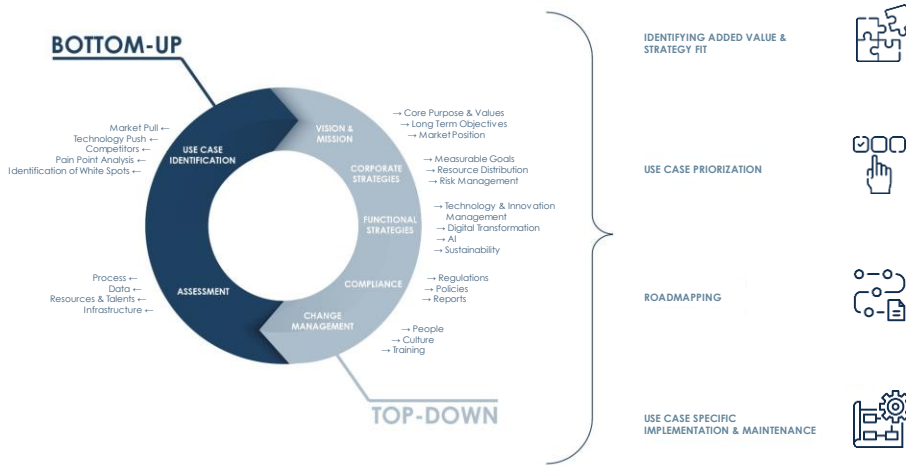


Figure 1 Technology Diffusion Framework

Certain standards must be defined to ensure that the top-down and bottom-up approaches (Figure 1) are also linked in the operational project business. The alignment between the strategic views and technical & market view enables a realistic identification of added value and fit of specific use case, which in result can then be prioritized and selected based on their business, technology and legal feasibility. After the selection and prioritization, a future-driven roadmap with a defined project pipeline can be derived. In order to define which projects are to be tackled, it is necessary to consider which projects are already running and where there are white spots. The implementation of an AI use case is particularly important in these white spot areas. The logical next step is the use case implementation and maintenance.

Therefore, it is crucial to ensure stakeholders are on the same page with the “who”, “what”, “where”, “when”, “why” and “how”. The Technology Diffusion Framework paves the way to ensure all the important factors are considered when starting to implement new technologies in the organization.

4 Extracting industry-specific insights: scaling AI pilots into new business

Based on the previously shown learnings, we have identified 6 main successful practices for a successful AI implementation and scale-up (Figure 2).

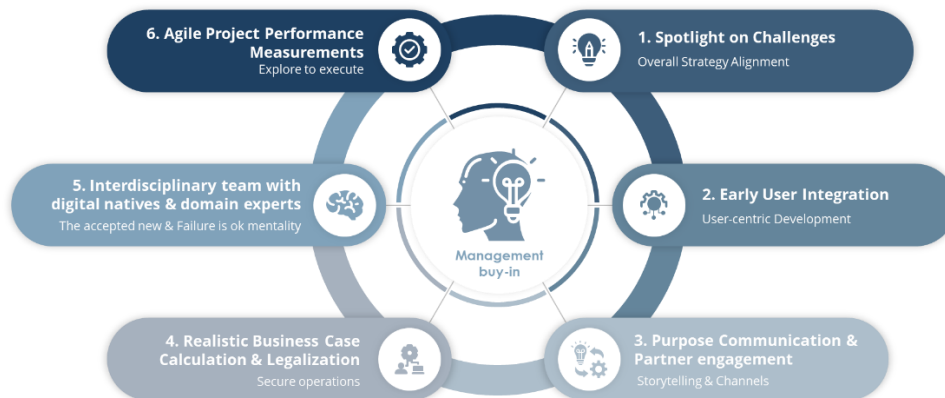


Figure 2: Successful practices to scale AI pilots into new business

Spotlight on challenges

One of the biggest reasons for failure is often right at the start of an AI project: the selection of use cases. This is usually not very structured, for example because managers or employees have heard about a successful implementation in another company and believe that this will have the same effect in their company - but this is far from the truth. As can be seen from the framework in Figure 1, particular attention must be paid to company-specific pain points and those of the market or the target customer when selecting use cases. The circumstances and framework conditions are generally too different for transferability to lead to identical results. Furthermore, the alignment with the strategic goals of a company needs to be part of the use case selection process.

Early user integration

To develop new business or optimize internal processes, the actual end user is often involved far too late in the development process of AI projects. However, now more than ever, it is crucial to involve the intended user early. Just because it is possible to develop an AI application for a specific use case does not mean it will be meaningful or applicable for the intended user later. Several factors come into play here: for example, the tools the user typically works with, access rights, available hardware to run the AI application, waiting times, language challenges, etc. To create acceptance for an AI solution, early user involvement is indispensable – ideally, already in the requirements analysis phase at the beginning of an AI project.

Purpose communication & partner engagement

To ensure management commitment and the subsequent management buy-in, targeted communication and the involvement of opinion leaders are essential. Stakeholder

management in this context does not mean communicating to each stakeholder group what they wish to hear, but rather providing a realistic image with the risks and opportunities arising from the implementation of a corresponding AI use case.

Realistic business case calculation & legalization

The satisfaction with a project outcome is particularly dependent on the degree of meeting expectations. Especially in AI projects, there is a very high probability of significant deviations from the original plan during a project. This typically also affects the underlying business case. It is even more important from the beginning not to disregard foreseeable costs, such as for retraining phases of the AI or maintenance, and furthermore, to consider scalability at the outset of a use case implementation. Often, this leads to additional requirements that can be easily integrated into an initial development project and avoid high costs for transferability to, for example, another machine. Positive business cases can be demonstrated particularly through the scaling of AI solutions. This should be the focus from the beginning.

Interdisciplinary team with digital natives & domain experts

The core team for AI projects typically consists of data and IT experts. To make numerous decisions regarding KPIs, that are not purely technical, and to ensure a significant contribution to the overall project success, the team should be set up in an interdisciplinary manner. For the successful implementation of AI projects, in addition to the previous mentioned data and IT experts, business experts, product managers, legal, and communication professionals should be involved. Furthermore, regular involvement of management is an absolutely must.

Agile Project Performance Measurements

As evident from the previous explanations, AI projects have a high degree of uncertainty, which comes with significant costs and potentially enormous business impact. Therefore, traditional project planning should be avoided. Agile methods, as commonly practiced in software development, have proven to be very successful in the implementation of AI projects. It should be noted that not only technical changes should be discussed and adapted in agile cycles, but particularly the resulting business and legal impact.

5 Conclusion

The complexities in scaling AI pilot projects into fully operational and commercially viable new businesses necessitate a comprehensive, strategic approach, as detailed throughout this paper. The variety of challenges, ranging from technical hurdles and strategic misalignments to cultural and organizational resistances, underscore the necessity for a robust framework that addresses these concerns at every level of implementation.

The proposed Technology Diffusion Framework aims to bridge the gap between strategic goals, technological potential and customer-centric, scalable applications within industrial settings. It emphasizes a dual approach, integrating both top-down strategic considerations and bottom-up customer, market and technological insights. This ensures that AI projects are not only technically feasible but also aligned with broader corporate goals and market needs in terms of business and legal feasibility.

Moreover, the critical role of early user integration, purposeful communication, realistic business case calculations, and interdisciplinary team structures in the successful scale-up of AI initiatives were highlighted. In practice, the transition from pilot to production, and ultimately to a profitable new business, requires more than just technological innovation. It requires a focused effort to align strategic objectives with operational capabilities, alongside a willingness to engage with and adapt to the evolving market dynamics and regulatory landscapes.

As AI continues to evolve and affect various industries, the lessons drawn from this comprehensive analysis and the subsequent framework should serve as a guideline for organizations looking to not only implement AI solutions but do so in a way that is sustainable, effective, and transformational for their business operations. The journey of AI integration is complex, but with a structured, informed approach, it can lead to significant competitive advantages and market success.

References and Notes

Rammer et. al “Artificial intelligence and industrial innovation: Evidence from German firm-level data” (Volume 51, Issue 7), September 2022, available on: <https://doi.org/10.1016/j.respol.2022.104555>, accessed April 2024

van der Meulen and McCall “Nearly Half of CIOs Are Planning to Deploy Artificial Intelligence”, Press Release Gartner. Available at: <https://www.gartner.com/en/newsroom/press-releases/2018-02-13-gartner-says-nearly-half-of-cios-are-planning-to-deploy-artificial-intelligence>, accessed April, 2024

Streim and Beerlink “Deutsche Wirtschaft drückt bei Künstlicher Intelligenz aufs Tempo” Presseinformation Bitkom. Available at: <https://www.bitkom.org/Presse/Presseinformation/Deutsche-Wirtschaft-drueckt-bei-Kuenstlicher-Intelligenz-aufs-Tempo>, accessed April, 2024

Ransbotham et. Al (2024) “Winning with AI”, MIT Sloan Management Review. Available at: <https://sloanreview.mit.edu/projects/winning-with-ai/>, accessed April 2024)

Loos, Sisejkovic and Drescher “Humans at the heart of AI”, June 2022, ISPIM Conference, available on ProQuest Website: <https://www.proquest.com/openview/3a5f1a4c1af4a23f221f79148aa0b32d/1?pq-origsite=gscholar&cbl=1796422>, accessed April 2024