Harnessing the full potential of data & AI

A phased approach to gaining a competitive edge illustrated through case studies

eraneos

Content

Introduction

In an era where data is more abundant and valuable than ever, the challenge for organizations lies in knowing what data to collect, how to store it effectively, and—most importantly—how to extract actionable value from it.A strong data foundation is no longer optional; it is the key to unlocking the transformative potential of advanced technologies like Artificial Intelligence (AI).

Digital transformation is a journey, one that begins with understanding and leveraging data to make smarter decisions. It continues with the creation of scalable data platforms capable of delivering real-time insights across an organization. Finally, it culminates in the integration of AI to drive innovation, automate complex processes, and empower more informed, dynamic decision-making.

This whitepaper explores the three key steps that guideorganizations on their transformation journey:

- **Data-driven decision-making:** Turning raw data into actionable insights to fuel strategic improvements.

- **Building scalable data platforms:** Laying the groundwork for robust, efficient, and real time data management.

- **Scaling with AI**: Harnessing advanced technologies to create a competitive edge and unlock new opportunities.

Each chapter offers real-world examples that illustrate how organizations have successfully navigated these steps with the help of Eraneos, proving that with the right foundation, the potential of data and AI can be fully realized.

Pillars of
Data & AI transformation

Data-driven
decision-making

Building scalable
data platforms

Scaling
with AI
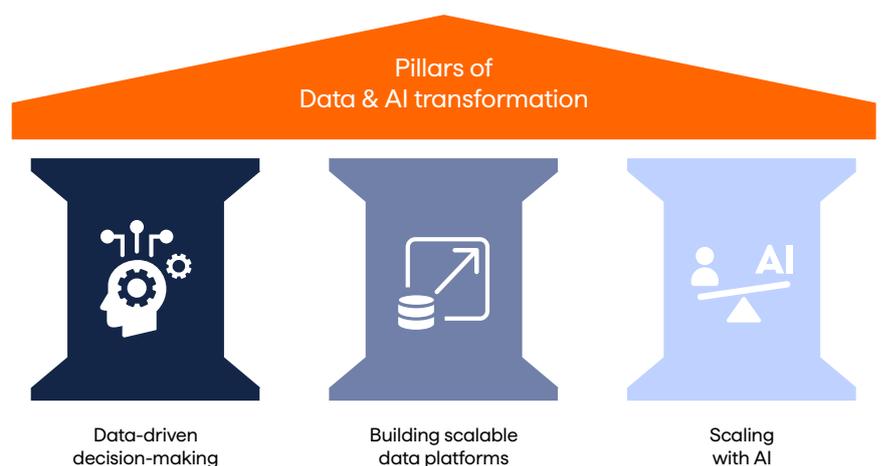
Data-driven decision making

Many organizations have access to vast amounts of data but lack the means to turn it into actionable insights. Even before advanced platforms or AI solutions are implemented, businesses can begin using historical and realtime data to guide their decision making. This chapter demonstrates how organizations can start their data-driven journey by giving as example a global FMCG company. They partnered with Eraneos to help them optimize their marketing budgets through predictive modelling, delivering tangible results while aligning stakeholders across teams.

Optimizing marketing budgets using predictive models

How do you use historical data and trends to optimize the allocation of marketing budgets? That was the key challenge faced by a global FMCG company, which engaged Eraneos to create a solution that would incorporate both internal data and external Nielsen data into their decision-making.

The client is a large international organization with multiple business units and departments. Our main point of contact was their Insights & Analytics department. They primarily wanted to understand where their marketing budgets would have the most impact, especially for new products.While they had data – both their own historical data and external sources like Nielsen – it wasn't yet integrated or structured in a way that could provide these insights. One of our first tasks was to set up a solid platform to efficiently process and analyze this data.

Although the organization had access to valuable datasets, these were not yet integrated or structured to offer actionable insights. The fragmented state of the data created inefficiencies, making it difficult to make informed decisions about resource allocation.

A scalable data platform

To address this challenge, the first step was to create a robust, scalable data platform that could integrate both internal and external datasets, such as Nielsen data. This platform became the foundation for analyzing the data and developing predictive models that informed marketing decisions, such as allocating marketing budgets per product category and region. This allowed the company to deploy targeted campaign for products that would likely see increases in demand, improving their marketing's efficiency.

The core elements of the solution included:

- **Data integration:** Creating a unified platform to bring together disparate data sources.

- **Scalable architecture:** Using a hybrid approach with Scala for data ingestion and PySpark for modeling allowed the team to process high volumes of data efficiently.

- **Automation:** Azure Data Factory automated the ingestion of new data, enabling real-time updates and ensuring scalability even as the volume of data grew.

We dealt with thousands of products and a huge amount of data. Parallelization was essential. Without it, results would have taken far too long. By processing the data in parallel, we accelerated predictions and enabled the model to generate real-time results.

The solution allowed the organization to better allocate marketing budgets by identifying high-potential products and regions where campaigns would be most effective. This not only improved marketing outcomes but also enhanced the overall agility of the company's decision-making processes.

Collaboration with stakeholders: from data to actionable insights

The success of any data-driven solution depends not only on the technology but also on how effectively it serves the needs of various stakeholders. For a large organization with diverse business units, it is critical to ensure the solution is flexible and broadly applicable. Every department, region and team have different needs and priorities, and that requires a flexible approach.

Developing predictive models is one thing, but making those models usable for all teams and departments is a completely different challenge. For this project, our team started by providing predictions at the product level, but we quickly learned that different stakeholders have different needs. Some teams, such as those in Brazil, wanted data broken down by region rather than by product. This meant we had to design the reports so they could be easily aggregated or customized based on the specific requirements of each team This kind of flexibility was crucial to the solution's success.

In addition, direct communication with stakeholders was incredibly important. Initially, we worked primarily with a single point of contact who relayed the needs of other departments. However, we found that some details got lost in translation. As the solution delivered strong results, more stakeholders became interested in using our tools and predictions, which opened up direct conversations with other teams. These new stakeholders brought fresh questions and wanted to use the data in different ways. Thanks to our flexible approach, we were able to better tailor the solution to their needs, making the models and reports significantly more effective and user friendly.

This project demonstrated how a scalable and flexible data platform can unlock the value of data for better decision-making. It also provided a blueprint for similar projects in other industries and markets.

From insights to scalability

While organizations can achieve significant benefits by using existing data to guide decisions, scaling these solutions to handle growing data volumes and diverse sources is often the next challenge. Building a robust, scalable data infrastructure becomes essential to support continued innovation and datadriven success. The next chapter explores how organizations can meet these challenges headon and ensure their data solutions remain agile and impactful.

Building cost efficient and scalable data platforms

"Looking at the Total Cost of Ownership, this is by far the most cost efficient IT solution I've ever developed. Every day, we process around 30 million events, amounting to about 15GB of raw data per day, and the system is already prepared for future growth as more smart energy meters are rolled out. I'm proud that the client has had to spend virtually no time on maintenance over the past year, which really demonstrates how robust and efficient our solution is."

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The journey to achieving remarkable scalability and efficiency begins with the ambitious goals of EKZ, the Swiss energy supplier serving the Zurich region. Tasked with managing complex, real-time data streams while balancing cost effectiveness and stringent regulatory demands, EKZ recognized the need for a robust data platform at the core of its operations. This foundational step would not only streamline their data management processes but also set a new benchmark for operational excellence in the energy sector

Managing vast, real-time data streams

EKZ faced three significant challenges that underscored the need for a new data platform:

Lack of network insights:
Anticipating issues like maintenance or outages was difficult due to limited visibility into the network.

Enhancing customer experience: Providing near real-time insights into energy consumption was a priority for improving customer interactions.

Regulatory compliance:
Customers needed access to five years of historica data, which required significant manual effort under the existing setup.

The scalability required for 450,000 smart meters, each generating data every 15 minutes, combined with peak loads from portals and queries from data scientists, made this a fascinating problem. It wasn't just about storing data but also keeping the solution cost-effective and scalable. On top of that, the ambition to provide EKZ's customers with easy and fast access to their energy consumption data really was really appealing.

Joint team: advantages and disadvantages

During the tendering process, EKZ had already hired several people who would ultimately be operationally responsible for the solution. It was, therefore, a logical step to make these people part of the project team. This approach allowed EKZ's employees to be directly involved in the technical decisions and implementations throughout the development process, which not only improved the quality of the solution but also ensured a smoother handover and faster adoption within the organization. By working together in an integrated team, knowledge and skills could be transferred directly, contributing to a more sustainable and manageable solution.

Having the client as an integral part of the project team proved to be a significant advantage, especially when collaborating with the smart meter supplier. Their presence streamlined processes and enhanced efficiency, enabling smoother coordination and faster progress. Involving the client so closely also fostered a unique dynamic, where openness and transparency were essential throughout the journey of finding the best solution. This approach strengthened trust and allowed challenges to be addressed collaboratively, leveraging the client's internal knowledge to refine and optimize the outcome. The result was a solution that not only met technical requirements but also seamlessly aligned with the client's operational needs – a key factor in delivering the project on time and nearly within budget.

Key challenges

The project team encountered two significant challenges during development. Firstly, the system that served as the primary source of data was undergoing a migration, requiring the team to delay certain activities until the new system was operational and its data structure fully established. This dependency introduced unavoidable delays to the timeline. Additionally, other ongoing IT upgrades within EKZ temporarily impacted data availability, further complicating the project's progress.

Despite these hurdles, Eraneos successfully streamlined the project by simplifying its architecture. Certain cloud components initially included in the design were removed after their added value was reassessed and deemed insufficient.This adjustment reduced complexity, enhanced clarity, and resulted in a solution that is both robust and low maintenance.

Today, the entire system is managed by a single individual, who has reported virtually no maintenance tasks over the past year. The platform is designed to scale automatically, handling peak loads with ease and minimal operational effort. For instance, when a temporary issue disrupted the flow of data from the smart meters, the system seamlessly processed an entire day's backlog within an hour once the issue was resolved—all without requiring manual intervention This resilience not only ensures cost efficiency but also allows EKZ's team to focus on delivering actionable insights rather than resolving technical disruptions.

Building on this solid foundation, EKZ is now advancing the platform to enrich its data landscape and enable more sophisticated analytics. Power BI dashboards are providing various departments with enhanced insights, and there are plans to incorporate historical data to uncover seasonal trends. These developments represent an exciting opportunity to further expand the platform's capabilities and drive even greater value for EKZ.

Lessons for the future

This project highlighted several key insights that can be applied to future endeavors. One important lesson was the value of starting with a clear and validated design. By focusing on an initial design phase, the project can gain momentum early on, reducing risks and shortening overall timelines. A solid foundation allows the team to move quickly and efficiently into implementation with greater confidence.

Another takeaway was the importance of working as an integrated team with the client. Close collaboration ensures alignment and fosters a shared sense of purpose. This approach not only enhances trust but also facilitates quicker problem resolution, as both sides work together toward a common goal.

The project also introduced the use of Azure Data Explorer, a technology particularly wellsuited for processing large volumes of real-time data. Its scalability, cost-effectiveness, and compatibility with IoT-like environments made it an ideal choice for this use case. This powerful tool proved instrumental in managing high data loads efficiently and is expected to play a significant role in future projects, such as those involving industrial production environments.

Unlocking potential with AI

With a scalable data platform in place, organizations are ready to take the next step: leveraging advanced AI solutions. The next chapter explores how AI enables predictive analytics and drives innovation in mission critical environments, unlocking even greater potential.

Scaling AI in mission-critical operations

Once a robust data foundation is in place, organizationscan take the next step: applying advanced AI to drive real-time decision-making in complex environments. This chapter illustrates how Eraneos collaborated with one of Europe's largest railway operators to implement stateof-the-art machine learning (ML) solutions in mission-critical operations. Balancing innovation with security and operational requirements, this project highlights how AI can optimize processes, ensure stability, and empower human oversight.

Applying AI in secure, mission critical environments

Rail operators face the challenge of maintaining punctuality and operational efficiency while managing vast and complex networks. Balancing the demands of passenger services and cargo transportation with the availability of staff and equipment requires significant resources and precise coordination. State ofthe-art AI, and specifically Machine Learning models, offer a transformative solution to these challenges. By leveraging these advanced technologies, rail operators can enhance their decision-making processes, optimize scheduling, and predict and mitigate potential disruptions before they occur. This proactive approach not only improves service reliability but also helps rail companies stay ahead in a competitive market. As operational efficiency becomes a critical differentiator, the adoption of AI and Machine Learning is increasingly seen as essential for maintaining a competitive edge in the rail industry.

The organization had previously run various proof-of-concept initiatives with thesis students, which effectively showcased the potential of emerging AI technologies. While these projects demonstrated promise, they were limited in scope and lacked the scalability and technical foundation required for industrialscale implementation.The challenge was to transition these academic level experiments into fully functional, robust solutions capable of integrating seamlessly into the rail network's daily operations.

Additionally, the company was cautious about adopting new technologies in mission-critical processes, such as planning, due to concerns about security and stability. Any disruption to planning systems posed a significant risk, with even minor outages potentially causing widespread delays across the network. The solution had to comply with the stringent rules and standards of the enterprise architecture, ensuring reliability and maintaining operational continuity while demonstrating the value of AI at scale.

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Adopting ML Ops to ensure solution quality

The adoption of ML Ops (Machine Learning Operations was a crucial aspect of the project's success and vital in ensuring the quality of the machine learning solution The tools and processes involved in ML Ops facilitated the integration of machine learning models into the existing operational framework of the rail network This was a critical step in moving from the academic and experimental phase to real world application Ultimately, implementing ML Ops also allowed for the creation of a robust infrastructure that could scale with the project's needs.

Following the completion of this project, the lasting impact was recently reaffirmed when one of the team members published a research paper. The paper builds on the approach and solutions developed during this project, enabling further optimization of the rail system

To handle the vast datasets and complex predictions required, the team utilized advanced algorithms such as reinforcement learning, which is well-suited for decision-making processes where outcomes are uncertain. In rail operations, factors such as sudden weather changes, unexpected equipment failures, or unplanned passenger surges can unpredictably impact schedules and require dynamic, realtime responses.

The system could learn from previous outcomes and adjust strategies in real-time, providing optimal responses to varying conditions. This adaptive approach was crucial for managing the dynamic nature of rail networks, where delays can have cascading effects.

Overcoming challenges: balancing technology with human oversight

Implementing these advanced solutions required navigating several significant challenges. One of the primary hurdles was the restriction on using certain cloud-based capabilities due to security and operational concerns. This led the team to opt for open source tools, such as MLflow, to manage ML models.

Given the constraints imposed by the enterprise architecture of these mission-critical operations, utilizing various cloud solutions was not feasible Security and operational stability were top priorities, leading to the selection of MLflow, an open-source alternative. This approach enabled the team to maintain full control over the technology while running the solution onpremises, ensuring it was precisely tailored to the company's specific requirements. This decision required innovative thinking, pushing the team to explore alternative methods to achieve the desired outcomes effectively and securely.

Another critical aspect was that despite the use of advanced AI, human involvement remains crucial, particularly in scenarios where decisionmaking directly impacts safety and operational reliability. This is described as a "human-in-theloop" approach, where humans oversee and validate the decisions made by AI systems. This ensures that AI recommendations align with safety standards and operational protocols.

Involving humans in the decision-making loop was not only a safeguard for reliability but also a means to build trust and acceptance among end-users and company leadership by transparently demonstrating the system's reliability and effectiveness.

One of the key strengths of Eraneos lies in its ability to design solutions that seamlessly integrate state of-the-art technology with human workflows. By automating routine tasks, the approach allows human operators to focus on more complex and critical decision-making, utilizing their expertise for higher value tasks that require ethical judgment and nuanced understanding – capabilities beyond the current scope of AI. Additionally, by demonstrating the transparency and effectiveness of the system, Eraneos fostered confidence among stakeholders, ensuring trust in automated decision-making while mitigating any potential reputational risks.

Building secure and scalable AI solutions

This project provided valuable insights into applying AI in mission-critical environments:

- **Leverage ML Ops for scalability:** A structured ML Ops framework ensures that experimental models are adapted to operational realities while meeting safety and quality requirements.

- **Utilize open-source tools for flexibility:** Tools like MLflow offer alternatives when cloud solutions are not viable, enabling onpremises deployment tailored to specific needs.

- **Maintain human oversight:** Balancing automation with human validation builds trust and ensures AI aligns with organizational priorities and ethical standards.

There is immense potential to apply this approach to other industries with missioncritical processes, such as banking, healthcare, and government operations. These sectors share the stringent security and operational requirements encountered in the rail industry. By utilizing advanced machine learning solutions, these industries can enhance operational efficiency, improve decision-making, and maintain a competitive edge.

Successfully implementing these solutions goes beyond deploying technology—it requires ensuring they are secure, scalable, and trusted by human operators. Achieving this demands a careful balance of innovation, compliance, and user acceptance, presenting both a challenge and an opportunity for transformative impact.

The strategic journey of transformation:

This project illustrates how AI can drive real time decisions in mission-critical contexts, completing the journey from data foundations to AI-enabled operations. However, achieving such transformations requires a strategic, phased approach—starting with robust data infrastructure and scaling progressively. The conclusion reflects on how organizations can unlock their full potential by embracing this journey.

The road to full transformation with Data and AI

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Transformation is not a one-time initiative but a journey requiring a clear roadmap and structured execution.This whitepaper has explored how data and AI can empower organizations to innovate and thrive, starting with foundational data strategies and evolving to AI-enabled operations.

Key takeaways from the transformation journey include:

- **Data-driven decision-making:** Organizations can realize immediate value by harnessing insights from their data to inform smarter strategies.

- **Scalable platforms:** Robust infrastructure enables real-time insights, operational efficiency, and scalability for future demands.

- **AI integration:** Advanced AI technologies unlock new opportunities for innovation, improving decision-making and creating competitive advantages.

These case studies demonstrate that successful transformation is achievable when approached step by step. By focusing on the foundations first ensuring data is accurate, accessible, and actionable—organizations are better positioned to build scalable platforms and ultimately, integrate AI for long-term impact.

The journey is clear: Start with data, scale with platforms, and unlock the future with AI. With a strategic roadmap in place, businesses can lead in an increasingly competitive and data-driven world.

Why Eraneos

Embarking on a digital transformation journey is essential for organizations aiming to maintain a competitive edge in today's datadriven landscape. At Eraneos, we specialize in guiding businesses through each phase of this evolution—from harnessing data-driven insights and building scalable data platforms to integrating advanced AI solutions.Our expertise ensures that your organization not only adapts to the digital age but thrives within it. We invite you to assess your current position in this journey and partner with us to invest in sustainable strategies that will drive innovation and operational excellence. Together, we can unlock the full potential of your data and tecnology assets, positioning your organization for long-term success.

Get in touch

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