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empowering ideas

Data-driven sustainability

What companies can do

Zühlke March 2023



Developments such as climate change and growing social inequality have transformed society over the past few decades. For the majority of the global population – all of whom are potential customers or employees for companies – the topic of sustainability is more important than it was a year ago¹. More and more people are developing a sense for sustainability. Investors and creditors alike incorporate environment, social and governance (ESG) criteria into their evaluations. Companies select their suppliers on the basis of ESG standards. Regulators are introducing legislation governing reporting on sustainable issues, or tightening up existing rules. These developments impact companies, so it should come as no surprise that 87% of managers say they want to invest more in sustainability over the next

two years². They know that failure to take meaningful sustainability action could well result in enormous costs in the foreseeable future. But the business opportunities for realising new potential with sustainability can be even greater.

In this white paper, we use decision theory to demonstrate why it is essential that companies adopt a data-driven approach in uncertain decision-making environments such as sustainability. Here, we make a distinction between two data analysis classes, which we explain using case studies. We then apply a Zühlke solution approach to each analysis class to illustrate how companies can meet their ESG requirements and find new ways of driving sustainable innovation.

Sustainability as a decision-making problem

As companies deal with the topic of sustainability, they are constantly faced with new issues and problems. To successfully overcome these hurdles, they need to make decisions on a range of issues at all levels. Strategic, tactical or operational issues – the anatomy of decisions is the same in sustainability as it is in other business areas. Every decision-making process involves evaluating data,

which forms the basis for predictions for the various decision options. These predictions are then combined with the potential business success of the relevant option. So for each option, you evaluate the expectation of success: the judgement. The decision then comes down to the option with the best judgement and the corresponding action is executed³.

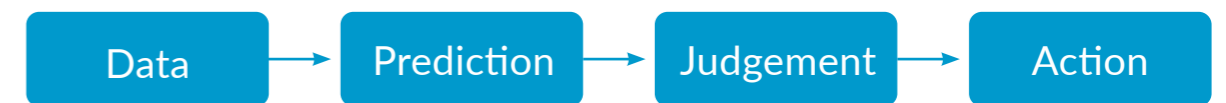


Figure 1: Anatomy of a decision³

Business decisions, especially in a relatively new and rapidly evolving area like corporate sustainability, are often taken in uncertain environments. The data is (too) often a blend of objective measurement data and personal experiences or convictions. Two-thirds of decision-makers still make decisions based on their gut feeling⁴. Predictions are riddled with uncertainty, particularly where they relate to complex subject matter. There is a lack of expected and empirical values for properly judging decision options in sustainability problems, and it is not always clear how exactly the interests of different stakeholders should be weighted. Finally, also the action following a decision is not always certain, as human error and unforeseen events can never be ruled out. Let's take an example: deciding whether or not to replace a production machine. To begin with, companies often have limited measurement data describing the condition of machines. That means any predictions on the remaining lifespan of the current machine are based on the personal assessments of experts. On top of that, it can be difficult

to determine the potential success of a new machine. This depends on factors such as the complexity of the new machine or how seamlessly it can be integrated into the current production process. And even when a company finally decides to replace the old machine and order the new one, something as simple as illness or supply shortage might scupper the entire plan of action.

For a variety of reasons, well-prepared measurement data can increase the quality of business decisions, especially in the field of sustainability. Data contains a wealth of relevant information, it does not come with personal values or opinions, it is always available, it can be processed electronically, and it is not impacted by employee turnover. These properties mean that data can remove a lot of the uncertainty from decisions and greatly accelerate the decision-making process. For this reason, A data-driven approach suggests itself to successfully deal with corporate sustainability and its numerous decision problems.

¹ IBM Global Consumer Study (IBM, 2022)

² 2022 Sustainability Survey (Gartner, 2022)

³ Prediction Machines (Agrawal et al., 2018)

⁴ The State of Data Culture Report (Alation, 2020)

Data-driven decision-making

The evaluation of data for the purpose of data-driven decision-making can be split into two different analysis classes: descriptive and interpretive (data) analysis. The descriptive analysis helps to understand the data, extract information and present it so that it is readily comprehensible. In the anatomy of a decision, the descriptive analysis mainly focuses on the data level. A descriptive analysis can help the decision-maker grasp a situation faster, evaluate the data more easily and derive predictions from the gained information to ultimately make data-based decisions.

The interpretive analysis incorporates the descriptive analysis, but goes one crucial step further. It not only helps you extracting information from data, it also provides evaluative predictions and describes how to maximise the likelihood of achieving a target event. In the anatomy of a decision, the interpretive analysis extends beyond the task of preparing and visualising data, and automates further parts of the decision. This makes the decision-making process much easier for decision-makers – or even fully takes the decision off their shoulders.

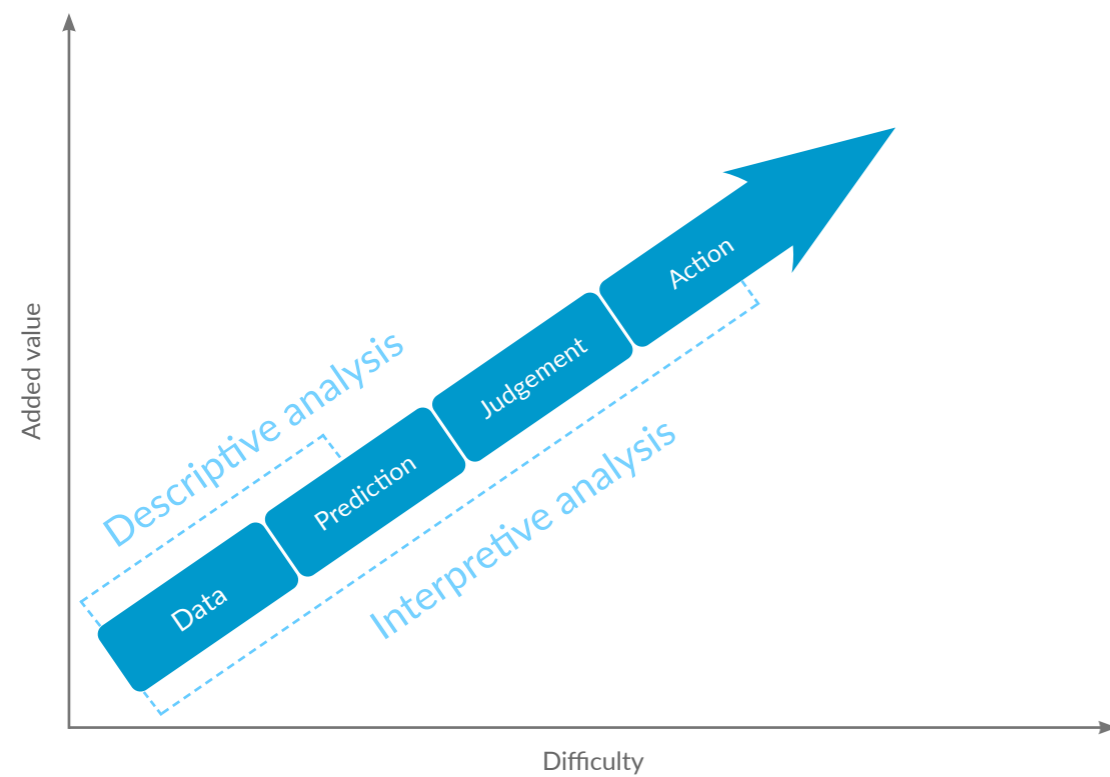


Figure 2: The two analysis classes and the parts of the decision-making process they can automate.





Example of a use case in a sustainability context

In the context of corporate sustainability, we can illustrate the two data analysis classes using the following example: Laura is the Sustainability Officer of a company. She wants to take the initial step of evaluating the greenhouse gas emissions of the Logistics department using a descriptive analysis in order to realise optimisation potential for the company-wide sustainability efforts. Thanks to a descriptive analysis of emissions data, she identifies road haulage as the main culprit for logistics emissions. Using the findings from the analysis and rail transport data from the internet, Laura makes a prediction to see which deliveries might be suitable for a switch to rail transport, and provides a cost-benefit assessment. She presents this information to the Logistics department along with a plan of action.

Discussions with the head of the Logistics department reveal that many of the routes that cannot be switched to rail transport are poorly planned. Depending on the delivery stock, these journeys are divided up every morning based on fixed postcodes. Recognising the potential, Laura takes the next step of incorporating the interpretive analysis for better, more dynamic evaluation of

the delivery stock data to make route planning more sustainable and efficient. The company's Data Science team supports her in developing an intelligent route planner, which evaluates current delivery stock data on demand, automatically calculates the best routes, and assigns the most urgent route to the next available driver. This allows the company to significantly reduce its greenhouse gas emissions and meet its sustainability targets.

This example shows how data-driven decision-making can effectively be applied in the context of sustainability. First, descriptive analysis helps Laura recognise the potential for optimisation in road haulage. If rail transport data were integrated into her data environment, Laura could further automate her decision-making process, perhaps adding interpretive analysis. Laura's second round of data analysis shows how interpretive analysis can be used to extensively or even – as in this example – fully automate the decision-making process. This analysis class of interpretive analyses is predominantly based on artificial intelligence (AI).

Descriptive analysis for corporate sustainability

Increasing requirements as an impetus for innovation

With the emergence of ESG standards and the introduction of compulsory reporting on sustainability issues in the EU and Switzerland, sustainability has become an increasingly relevant topic for companies. Where companies once reported on selected topics such as photovoltaic systems, work-related accidents or the consumption of certain fossil energy sources, they are now subject to new legal requirements requiring them to systematically record energy consumption figures, greenhouse gas emissions and occupational safety at all sites. Additionally, business partners increasingly expect companies to have positive ESG ratings from rating agencies and to comply with ESG standards, because now the business partners themselves have to systematically report on sustainability issues along their value chains. Meeting these increased requirements takes more than the old ad hoc reporting of arbitrary data using manual collection methods. Companies must now be in a position to collect their ESG key figures automatically and manage them systematically.

Particularly committed companies even go one step further by seeking new market potentials through innovative sustainability projects. They understand that they not only need to monitor their most important ESG key figures. This is the only way for agile companies to swiftly recognise unexpected developments in their sustainability projects and respond immediately.

Whether they are driven by legislators and ESG ratings or by the opportunity to exploit new market potential, today's companies require sustainability officers who have high-quality, systematically collected data at their fingertips at all times. For decision-making, measuring progress, passing audits, and ensuring legally-compliant reporting, this is essential. A scalable, flexible approach to data-driven sustainability has great potential for meeting precisely these requirements.

Sustainability data digitally pooled and visible at all times

Sustainability officers need a constant overview of their most important key figures and the ability to perform efficient, thorough analysis. This requires collecting the relevant data from multiple sources and compiling it into a consumable format.

Zühlke has developed a flexible solution blueprint that meets the specific requirements of data-driven sustainability. All of the necessary sources of sustainability data are connected to a data platform. Important data that is not yet digitally accessible is digitised. The data is then prepared on the data platform so that sustainability officers can retrieve it at any time in a simple, comprehensible form via a sustainability management suite.

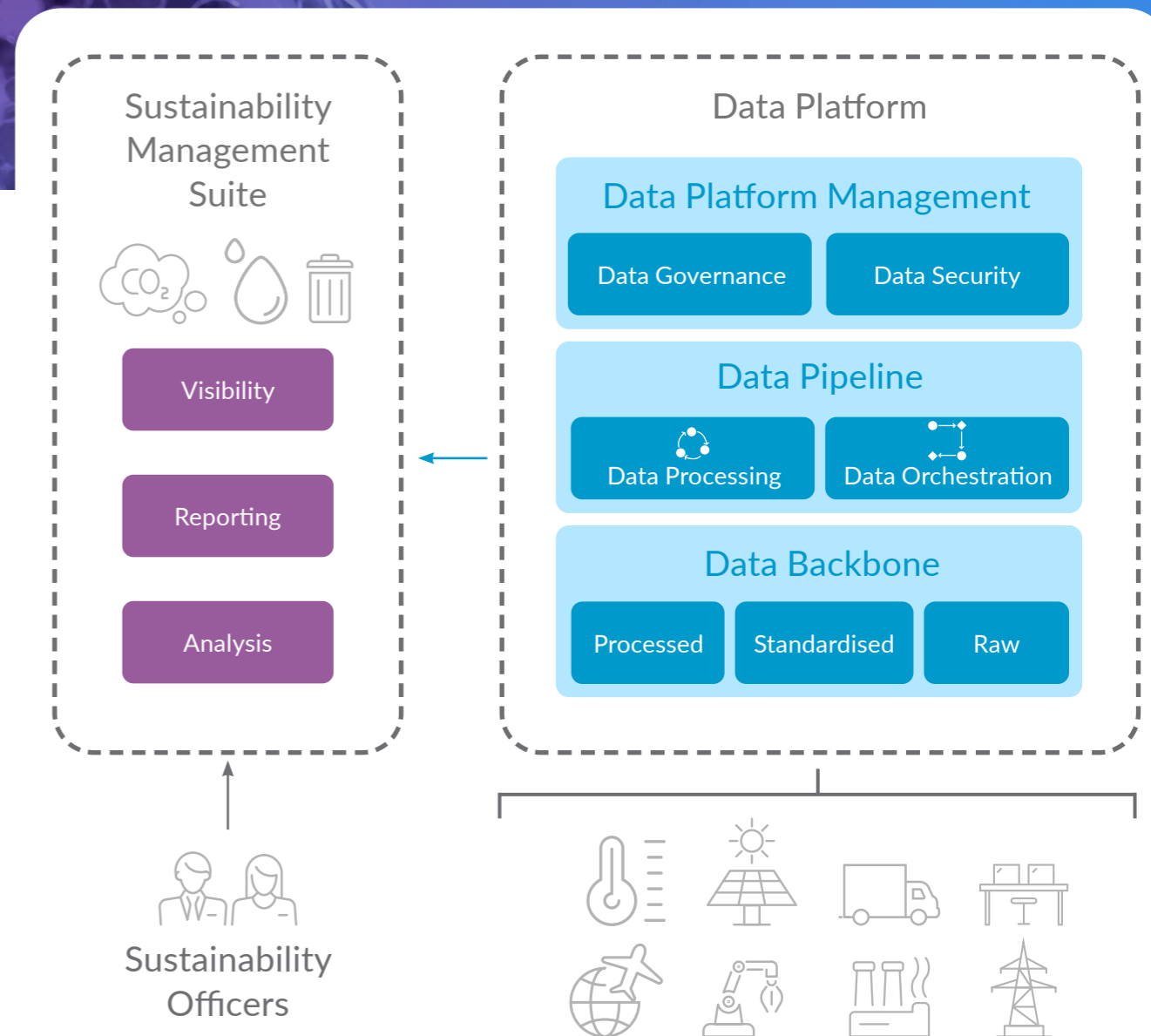


Figure 3: Zühlke's solution blueprint for data-driven sustainability

When developing a solution like this, the focus is on the goals and specific requirements of the company. This framework is highly flexible and – much like a toolkit – it can incorporate the right technologies, processes and responsibilities for successful operation depending on the requirements.

Real-world example

In cooperation with Zühlke, the Swiss utility and power distribution company EKZ (Elektrizitäts-

werke des Kantons Zürich) was able to modernise the sustainability and maintenance management of its over 1,000 heat pumps. Today, the data from all EKZ heat pumps is collected centrally in one data platform and automatically compiled into reports. Important indicators such as heat output and energy consumption are available to view at all times. In the past, each evaluation involved first manually exporting the data from various systems and then linking it together.



Interpretive analysis for corporate sustainability

Realising new potential with AI and sustainability

By applying interpretive analysis, companies can strengthen their sustainability performance beyond the capabilities of descriptive analysis. With the help of AI, interpretive analysis can largely automate selected decision chains in corporate sustainability. This can help free up resources and open up new business potential.

Two key difficulties here are identifying use cases for interpretive analysis in your own company, and then successfully implementing them. Ideas for AI use cases rarely come from the drawing board; instead, they require expertise from specific business areas. Generally, you need to involve operational decision-makers if you want a reliable estimate of optimisation potential. Once potential use cases have been identified, it is important to qualify them correctly and then prioritise them with a clear purpose in mind. Otherwise, you can easily find yourself in a project with little business relevance, or a promising sustainability project that turns into a bottomless pit because of an overly complex use case. These are two typical obstacles in AI initiatives.

The two phases of AI-driven sustainability

Zühlke has come up with a two-phase reference approach that companies can use to unlock the great potential associated with AI-driven corporate sustainability. In the planning phase, AI use cases are identified, qualified and compiled in a portfolio. For that purpose innovation workshops involving specialists from different business areas are conducted. The collected use cases are then prioritised along a project pipeline with particular emphasis on the first use case in the pipeline, which serves as the flagship project. The aim is to generate value as quickly as possible and inspire potential stakeholders to bring forward further use cases for their departments.

The subsequent realisation phase involves ensuring implementation of the defined sustainability projects with the help of the Data Science team, and developing the foundation for successful project operationalisation, including knowledge transfer and establishment of the necessary governance structure.

This methodological approach minimises the time-to-value of sustainability initiatives. In very little time, companies form a pipeline of AI-driven sustainability projects which are then systematically implemented with the right skills, processes and responsibilities.

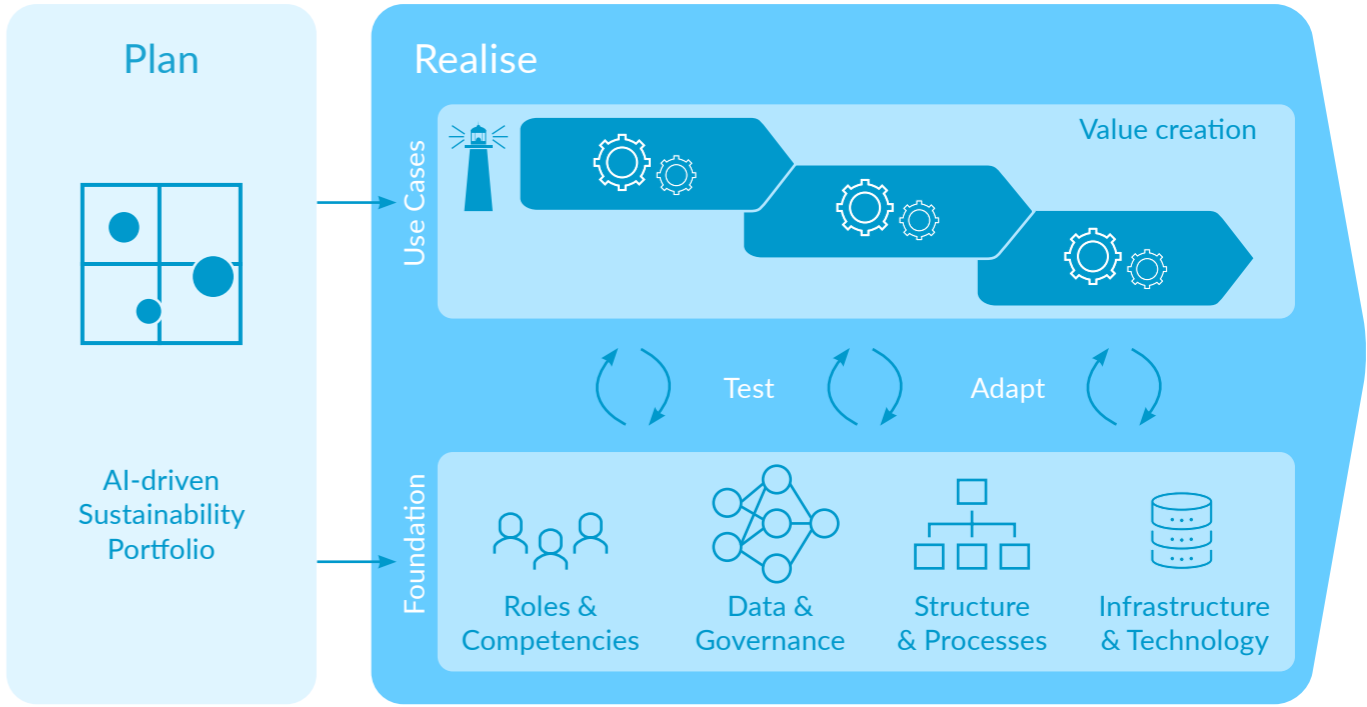


Figure 4: Zühlke's reference approach for AI-driven sustainability



Real-world example

A manufacturer of building materials successfully managed to reduce unnecessary transport emissions in cooperation with Zühlke. This initiative saw the development of an AI-based system capable of automatically detecting defective goods in brick production and categorising the specific defects. Over 90% of the defective bricks are now eliminated before they are even transported from the plant. The amassed data on defect classes also opens up new sustainability potential for minimising scrap in production.

Sustainability: a data-driven blueprint for the entire company

Companies need to recognise that well-prepared data is the indispensable cornerstone of modern sustainability initiatives. High-quality data not only reduces uncertainty in corporate sustainability decisions; if used correctly, it can also greatly simplify and accelerate decision-making processes. The main purpose of the descriptive analysis is to make data more transparent and comprehensible. The interpretive analysis, on the other hand, is more far-reaching and helps automate decision-making processes, either partially or in full. Both approaches are also relevant for improving decision-making processes in other business areas. When implemented properly, well-organised, data-driven sustainability initiatives can become a blueprint for data- and AI-driven value generation in both corporate sustainability and other business areas.

About Zühlke

As an experienced partner in the field of data and AI, Zühlke provides tried and tested solutions for pooling data sources, making sustainability data comprehensible, and efficiently identifying and executing sustainable AI use cases. This allows our customers to keep tabs on their progress and systematically find new ways of exploiting new potential through sustainability.

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Zühlke – Empowering Ideas.

We believe that innovation and technology are a positive force for change for business and society. We support our clients to envision and create a sustainable future. Zühlke is a global innovation service provider. We envisage ideas and create new business models for our clients by developing services and products based on new technologies – from the initial vision through development to deployment, production and operation. Zühlke draws on experience from more than 10,000 software and product development projects and supports customers in a wide range of industries.
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