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# Business intelligence applications for agile decision-making processes in HR

*An analysis of modern BI methods for data-driven and agile decision-making processes in human resources.*

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see. GitHub: https://github.com/Elli55

see. Kaggle: https://www.kaggle.com/lrhmanelliverdiyev

# 1. Introduction

## 1.1. Description of BI

Business Intelligence (BI) can be explained using a simple and familiar comparison: the human brain. In this analogy, data plays a role similar to neurons. Each neuron carries specific information and sends clear signals. In the same way, data used in BI must be clearly defined and unambiguous. Every data attribute should have a clear meaning so that it can be correctly understood and interpreted.

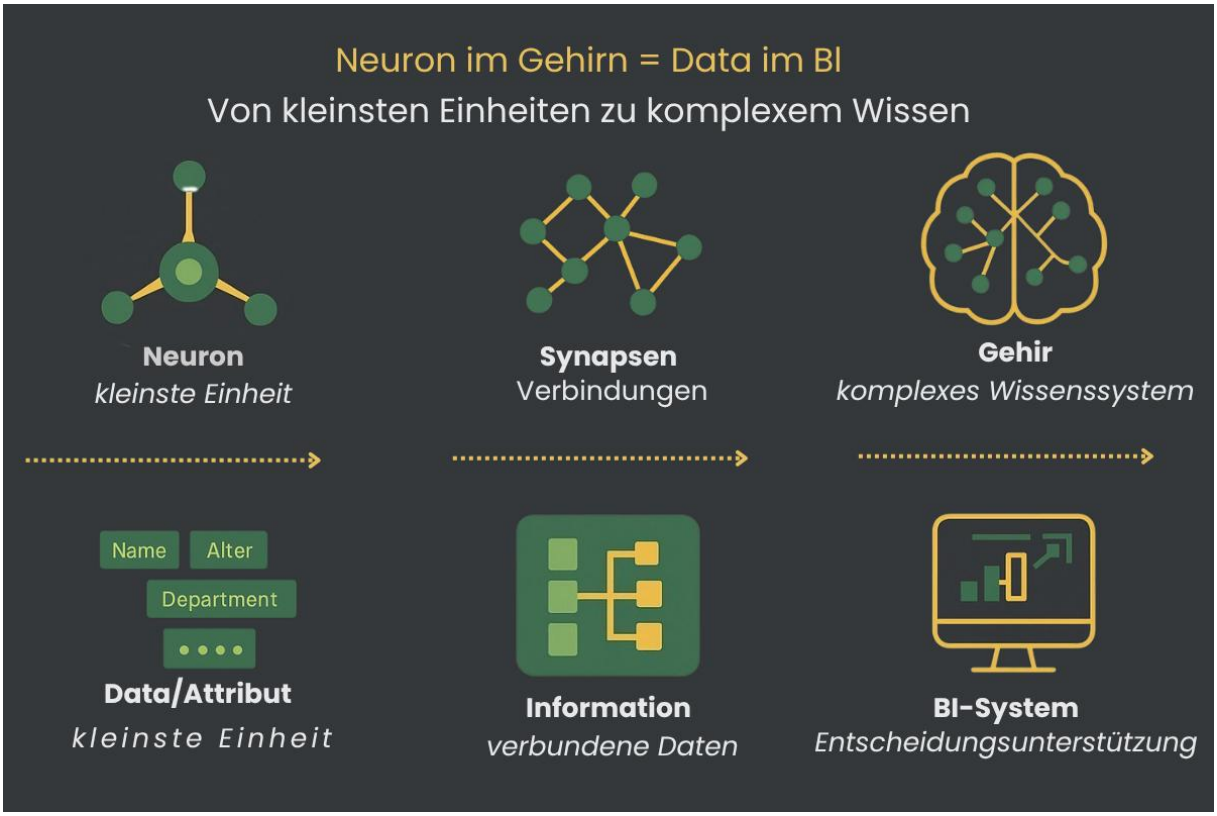


*Figure 1. illustrates the parallel between neural structures and data-based BI structures.*

A data warehouse can be compared to a neural network, as it stores many individual pieces of information that only become meaningful when they are connected. Through these connections, more complex insights emerge, just as thoughts are formed in the human brain. Of course, this comparison has its limits, as human cognitive processes are far more complex. Nevertheless, the metaphor helps to illustrate the basic idea behind BI systems.

One of the main advantages of BI is that it supports decisions based on data rather than intuition alone. For example, if sales figures in April decline by 70 percent compared to March, BI systems make it possible to analyze the underlying reasons for this development and to derive appropriate measures. A typical BI architecture consists of several components, including data sources, a staging area, a data warehouse, data marts, and analytical tools.

The data is first extracted from different sources and processed through an ETL process (Extract, Transform, Load). In the staging area, the data is cleaned and checked for quality before it is transferred to the data warehouse and data marts. These components serve different purposes. The staging area ensures data consistency and harmonization, while data marts allow targeted analyses for specific business units. Finally, the prepared data is used in reports, dashboards, and analytical applications to support decision-making.

## 1.2. Difference Between HR Analytics and E-HRM

For many years, Electronic Human Resource Management (E-HRM) was considered the main digital solution in human resource management. Its primary goal was the digitalization of traditional administrative HR processes. Activities such as employee appraisals, performance evaluations, and training documentation were no longer handled on paper but stored digitally in centralized systems. This made HR processes more structured and transparent and allowed managers to access relevant information at any time.

In addition, E-HRM helped reduce administrative errors by ensuring consistent and traceable documentation. Many organizations also used E-HRM systems to meet legal and regulatory requirements, for example in the documentation of working hours or training certifications. In this sense, E-HRM represented an important step toward the digital transformation of HR and laid the foundation for further developments.

Human Resource Analytics (HR-A), however, goes far beyond the functionality of E-HRM. While E-HRM mainly focuses on the digital storage and management of data, HR-A emphasizes the analytical use of this data for strategic and operational decision-making. The data already collected in E-HRM systems is analyzed more deeply in HR-A to identify patterns and relationships. This includes analyses of employee turnover, sick leave, or the effectiveness of training programs.

A key characteristic of HR-A is its future-oriented perspective. In addition to retrospective analyses, predictive models are used to forecast developments such as employee attrition or potential skill shortages. Furthermore, prescriptive analyses can provide concrete recommendations for action, for example by suggesting targeted retention measures or supporting succession planning.

Another important difference lies in data integration. HR-A combines HR data with information from other organizational areas such as finance or sales. This creates a more

holistic view of the organization and makes it possible to assess how HR decisions influence costs, revenue, or customer satisfaction. Reporting has also evolved: instead of static PDF reports typical of E-HRM, HR-A relies on interactive dashboards that can be adapted to different roles and information needs, often in real time.

"Research describes HR analytics as a methodology that uses statistical tools to evaluate employee data and performance in order to support informed decision-making and assess HR effectiveness in achieving organizational goals. Over time, HR analytics has developed from simple instruments such as HR scorecards into a more scientific approach that helps organizations better understand employee behavior and identify relevant intervention points (Nayak et al., 2024)." [1]

"Although the terms HR analytics, people analytics, and workforce analytics are often used interchangeably, they generally refer to the same concept of data-driven HR decision-making, with only minor differences depending on the author (Wirges, 2021, p. 226)."[2]

In summary, E-HRM focuses primarily on administrative efficiency and documentation, whereas HR-A transforms HR data into actionable insights. HR Analytics therefore represents a shift from operational support toward strategic, data-driven, and agile HR management.

## 1.3. From Data to Knowledge with Business Intelligence

The question of what constitutes knowledge has been discussed since ancient times. In his dialogue *Theaetetus*, Plato explains that knowledge is not merely opinion but rather justified true belief. This means that only when an opinion has been verified and is well-founded can it be called knowledge. This concept remains highly relevant to business intelligence. In BI, raw data and numerous opinions only become knowledge when verified, substantiated, and correctly interpreted.

Modern organizations possess vast amounts of data. Digital systems in HR departments alone generate data on salaries, absences, training, and job applications. However, data alone does not constitute knowledge, it represents raw numbers without context. Information emerges when data is merged, compared, and correlated. For example, if one department experiences 20% more sick leave than others, the data becomes information. Knowledge is created when this information is interpreted and used for action, such as concluding: "We need a health program for this department."

This is precisely where business intelligence (BI) enters. BI describes the entire process of collecting data from various sources, cleaning it, integrating it, and presenting it in reports or dashboards. The goal is to prepare information in such a way that it becomes actionable knowledge for management and employees.

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[1] Vidya Nayak u. a., *Eine Studie zu analytischen Instrumenten und Techniken im Personalwesen*, 2024.
[2] Felix Wirges, „Datenbasiertes Personalmanagement: Der Einstieg in die datengestützte Entscheidungsfindung.", *Zeitschrift Führung und Organisation* 90, Nr. 4 (2021): 226–31, 151730296.

While knowledge management is broadly defined and includes implicit knowledge of employees (such as their experience or expertise), BI focuses more narrowly on data-driven analysis. BI can therefore be understood as an important component of knowledge management. It provides methods for visualizing data, identifying trends, and developing forecasts.

BI is particularly beneficial in the HR sector. Typical applications include:

- **Descriptive analyses:** Retrospective evaluations, such as employee turnover over the past three years.
- **Predictive analyses:** Forecasts, such as which employees are most likely to resign.
- **Prescriptive analyses:** Recommendations for action on how to strengthen employee retention.

BI thus does much more than data management. It is a tool for making the complex reality of HR visible and placing decisions on a solid foundation.

However, traditional BI approaches have one weakness: they are often too rigid. Projects take considerable time, and dashboards, once developed, are rarely modified. Yet in HR, requirements change rapidly due to new working models, evolving employee needs, increasing turnover, or sudden crises such as pandemics. In such situations, rigid BI systems prove insufficient.

This is where agile business intelligence comes into play. Agile methods such as Scrum or Kanban introduce flexibility and speed into BI processes. Instead of planning dashboards months in advance, teams work in short cycles ("sprints"). They develop an initial version, present it to users, collect feedback, and immediately improve the solution. This creates an iterative process in which dashboards are continuously adapted. Agile HR BI means that data is not only collected and presented statically but is constantly reinterpreted and adapted in a dynamic process. This enables HR departments to react quickly and flexibly adapt decisions to new situations.

The considerations above demonstrate that business intelligence in HR is only effective when it is both data-driven and agile. Against this background, the research question is formulated as follows:

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***Research Question:***

*Which BI applications are used for agile decision-making processes in HR?*

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# 2. Theoretical Foundations

## 2.1. Agile BI Methods and Approaches

When discussing data-driven decisions, most people initially think of IT or technology-oriented domains. Human resources is rarely the first association. However, studies demonstrate that HR holds significant untapped potential in this area. A study by Falletta (2013) found that only 15% of 220 surveyed companies placed strategic focus on HR analytics. In most cases, analytics remained limited to simple reporting, while predictive analytics were hardly utilized. The study by Wirges, Neyer, and Kunisch (2020) confirms that HR analytics predominantly remains descriptive and is rarely developed further.

Similar to the human brain, which maintains stable structures while simultaneously responding flexibly to new stimuli, BI projects can be managed using different methodological approaches. Traditional methods such as the waterfall or V-model operate with fixed phases, schedules, and documentation. Agile methods such as Scrum or Kanban, by contrast, rely on short iterations, close collaboration, and rapid adjustments. Traditional approaches offer security and clear structure, while agile methods are particularly suitable when requirements change frequently. The choice of method depends largely on project context and the dynamics of change within the organization.

A well-known principle states: "The only constant is change" (attributed to Heraclitus). This aptly describes the core of agility. Agile BI methods respond quickly to new requirements and help organizations identify optimal paths forward. This is why they are becoming increasingly important in corporate management.

Economic and social developments are making organizations increasingly dependent on acting flexibly and adaptively BI projects are no exception.

These varying requirements have led to the development of various agile methods, such as Kanban, Scrum, and Extreme Programming (XP). Each method has distinct characteristics, but they share a common philosophy: agility. The following sections briefly describe these methods and explain their structure.

### 2.1.1. eXpressProgramming (XP)

Extreme Programming (XP) was developed between 1996 and 1999 by Kent Beck, Ron Jeffries and Ward Cunningham. “This process model is based on five values: communication, simplicity, feedback, courage, and respect.”[3] Regular meetings are integral to the structure. In XP management, a well-known principle exists: the KISS principle - "Keep it small and simple". This means keeping tasks as concise and straightforward as possible. It quickly becomes apparent that time is not a minor issue in the XP approach but often determines success or failure.

XP is frequently used in software development projects. The team develops small increments of an application in short timeframes and tests them immediately. This dynamic process gives the model its name, "Extreme Programming."

The XP model can also be effectively applied in business intelligence projects, especially when requirements and data sources change frequently. A typical feature of XP is that results are developed in very short cycles ("iterations"), tested immediately, and improved based on feedback. Applied to an HR analytics dashboard, this means first creating a minimal version with the most important metrics, such as turnover rate. In subsequent iterations, new functions, such as predictive analyses, are added and immediately reviewed with users. This keeps the BI system flexible and adaptive, consistent with the fundamental idea of extreme programming.

### 2.1.2. SCRUM

Scrum is a process model for agile project management. It was developed between 1995 and 1999 by Jeff Sutherland, Ken Schwaber, and Mike Beedle. This model is frequently used in IT and software projects. The basic framework of Scrum is referred to as "3×3": „The main framework of Scrum is largely formed by three roles, three artifacts, and three meetings (3×3)” [4]

**The Three Roles:**

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[3] Nelli Weiß, *Agile Business Intelligence: Begriffe, Methoden, Analysen* (Igel Verlag RWS, 2018), 59.
[4] Stephan Trahasch und Michael Zimmer, Hrsg., *Agile Business Intelligence: Theorie und Praxis*, 1. Auflage, Edition TDWI (dpunkt.verlag, 2016), 18.

- **Product Owner:** Responsible for customer requirements. Collects and prioritizes user stories in the product backlog and ensures the team works on the most important tasks.
- **Scrum Master:** Ensures compliance with Scrum rules, organizes meetings, and removes obstacles so the team can work efficiently.
- **Development Team:** A small, interdisciplinary group (usually 4–9 people) that implements requirements and delivers a finished increment at the end of each sprint.

**The Three Artifacts:**

- **Product Backlog:** An organized list of all requirements, ideas, and requests for the product.
- **Sprint Backlog:** Contains tasks the team intends to complete in the current sprint.
- **Increment:** The result of each sprint a functional version of the product that can potentially be delivered.

**Die drei Meetings:**

- **Daily Scrum:** A short meeting (maximum 15 minutes) every day**.** Each team member briefly answers three questions:

  "What have I accomplished since the last Daily Scrum?

  What do I plan to achieve by the next Daily Scrum?

  What obstacles have I encountered since the last Daily Scrum?"[5]

- **Sprint Review:** At the end of a sprint, the team presents results to stakeholders and collects feedback.
- **Sprint Retrospective:** After the review, the team reflects on what went well and what needs improvement.

[5] Trahasch und Zimmer, *Agile Business Intelligence*, 22.

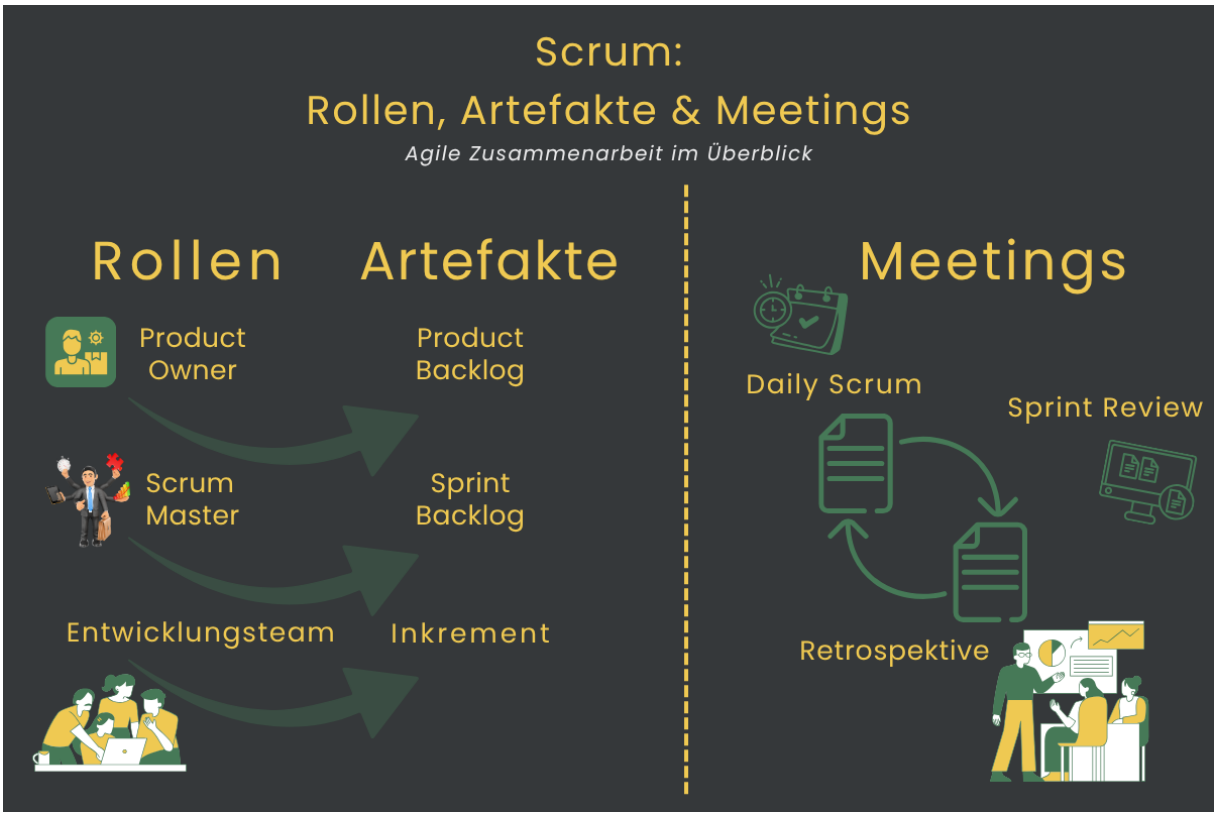


*Figure 2. illustrates the relationship between roles, artifacts, and meetings in an agile BI context.*

Scrum aims to implement complex projects in manageable steps and obtain genuine feedback from practice at an early stage. This enables teams to respond more quickly to changes and create real value for stakeholders. Scrum can also be effectively applied in business intelligence projects. Short sprints allow BI teams to first develop simple dashboards or data models and test them directly with specialist departments. In later sprints, new elements are added, such as predictive analyses or visualizations based on IBCS standards. This keeps the BI system flexible and adapts it to users' actual needs.

Scrum can be useful in HR when planning new projects, such as reporting or talent management systems. Short sprints quickly produce initial prototypes that can be tested with HR staff. This is practical because feedback arrives early and errors are corrected more quickly. However, challenges exist: many HR departments operate traditionally and are unfamiliar with roles such as "Scrum Master" or "Product Owner." Additionally, the fixed sprint rhythm does not always align with ongoing tasks in daily HR operations. Therefore, Scrum demonstrates its strengths primarily in clearly defined projects rather than in routine HR work.

### 2.1.3. Kanban

Kanban is another agile management method that originated in the Japanese automotive industry, specifically at Toyota Motor Corporation. Toyota began using this system to optimize production as early as the late 1940s. In Japanese, "Kan" (看) means "to look" and "Ban" (板) means "board." The name describes the fundamental concept: a visual board that creates transparency in work processes.

As the name suggests, the Kanban model uses a board, similar to Scrum. Each task or requirement is displayed in the first column. Team members independently select tasks and move them to the right as they progress or complete them. Typical columns are "To Do," "In Progress," and "Done." A central rule is that tasks may not be moved back to the left—tasks that have been started must be completed before new ones are undertaken. This creates a continuous workflow (flow).

Kanban differs from Scrum primarily in that it functions as a fluid process without fixed roles or clearly defined iterations. Scrum, by contrast, operates with clearly defined roles (Product Owner, Scrum Master, Development Team) and time-limited sprints. Scrum demonstrates its strengths primarily in project planning and implementation, while Kanban is better suited for ongoing processes requiring greater flexibility. Kanban shows practical advantages in the HR sector: dashboards for employee turnover or satisfaction can be continuously maintained and spontaneously adjusted. Scrum, conversely, is helpful when implementing larger HR analytics projects (such as introducing a new reporting system) in multiple phases. Thus, both methods complement each other and contribute to agile decision support in HR management. A direct comparison shows that Scrum is better suited to time-limited and complex HR projects, such as introducing a new BI platform. Kanban, however, is better suited to daily HR workflows, such as ongoing analysis of employee turnover or satisfaction. In practice, both approaches can be effectively combined: Scrum provides framework and direction, while Kanban keeps daily work flowing.

In many companies, HR BI remains limited to simple reports. Agile methods such as Scrum or Kanban are rare. One reason is that many HR employees have limited data expertise and often lack necessary resources. Additionally, corporate culture in the HR sector tends to be cautious and traditional. Only with increasing pressure in the labor market and new digital tools is willingness growing to genuinely utilize agile BI methods.

### 2.1.4 Summary and Reference to HR-BI

Traditional methods such as the waterfall or V-model primarily offer planning security and clear structures. These approaches are suitable when requirements remain stable and long-term projects with fixed goals are to be implemented. In the HR sector, this can be relevant when introducing a new personnel management system planned, implemented, and tested over several months. Precise documentation and structured phases help comply with compliance requirements and meet legal obligations.

Agile methods such as Scrum, Kanban, or Extreme Programming, by contrast, focus on flexibility, short iterations, and close cooperation with specialist departments. They are particularly advantageous in dynamic environments where requirements constantly change. This is precisely the case in many companies' HR departments: fluctuation rates, satisfaction levels, or recruiting metrics can change at short notice and require quick responses. Agile BI approaches enable flexible expansion of dashboards and reports, incorporation of new metrics, and real-time decision support.

In HR business intelligence, this creates a dual advantage: traditional methods establish reliable foundations through clear data models, stable warehouse structures,

and well-documented processes. Agile methods build upon this foundation, making HR dashboards more adaptable and facilitating integration of new data sources. This creates balance between stability and agility. Long-term HR strategies can be planned with necessary calm while simultaneously leaving room to react to short-term labor market changes. Agile BI thus becomes the key to making human resource management data-driven, flexible, and competitive.

## 2.2. Decision Models: Descriptive, Predictive, Prescriptive

The foundation of any business intelligence application is the ability to extract knowledge from data and translate this knowledge into targeted decisions. This transformation plays a particularly crucial role in human resources management, where numerous operational and strategic decisions must be made daily, from selecting new employees to developing training measures. Whereas gut feeling often dominated in the past, data and analysis now determine decision-making processes. This changes not only the speed but also the quality of HR decisions.

This shift is clearly described in the literature: HR analytics establishes the connection between data, analysis, and decisions. According to Nayak et al. (2024), „HR analytics transforms raw data into comprehensive reports that save time and money, assess employee job satisfaction, identify trends, and increase engagement“ [6]. This data-driven perspective helps reveal patterns in HR processes and better understand the causes of developments. It thus provides an objective basis for strategic decisions rather than relying solely on experience or intuition.

Ontrup et al. (2023) also emphasize that modern HR departments increasingly need to function as data-based decision-making units. They argue that data literacy and analytical thinking are core competencies in human resource management. Only in this way can metrics such as employee turnover, time-to-hire, or employee satisfaction not only be measured but also explained and specifically improved.[7] Against this backdrop, three central levels of analysis have become established in practice: descriptive, predictive, and prescriptive. These decision models build upon each other and broaden the view from pure description of the past to actively shaping the future. Together, they form the foundation of a modern, agile business intelligence strategy in the HR sector.

### 2.2.1 Descriptive Analysis - "What happened?"

Descriptive analytics typically forms the starting point of a BI process. Its goal is to make the current state understandable by revealing past events and decisions. In HR, this means examining data that has shaped the current state, such as turnover rates, absenteeism, departments with high employee attrition, or the impact of training programs.

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[6] Nayak u. a., *Eine Studie zu analytischen Instrumenten und Techniken im Personalwesen*, 773.
[7] Greta Ontrup u. a., *HR-Analytics: Eine Einführung in ganzheitliches, datengestütztes Personalmanagement*, 1. Aufl. (Hogrefe Verlag, 2023), https://doi.org/10.1026/03112-000.

This often reveals that organizations are still experiencing consequences of past decisions today. For example, if a particular department has high resignation rates, descriptive analytics can help explain this trend. The goal is not to evaluate individual metrics in isolation but to examine the complete picture. Which data is truly important depends heavily on context, and an overly narrow selection would be risky because valuable information could be lost.

In fact, descriptive analytics extends far beyond simply collecting numbers. It can also be understood as a reflective mechanism—a process through which organizations learn to critically question their own actions. In many cases, it becomes apparent that a current situation is the direct result of earlier decisions—decisions that may have seemed logical at the time but have now led to new problems. Descriptive analysis compels organizations to take responsibility and learn from their own patterns. Simultaneously, it serves as a reflection of organizational awareness. It answers not only the question of what happened but also why it happened and how these insights can affect future actions. When organizations are honest with their own data, they recognize not only strengths and weaknesses but also behavioral patterns in leadership, communication, or corporate culture.

The greatest challenge is identifying the right connections from vast amounts of data. Numerous metrics exist, but not all lead to knowledge. Therefore, practitioners often refer to a "data-rich, information-poor" situation. The key is creating structures that transform data into meaningful information. Every analyst finds their own approach to this, and it is precisely this diversity that makes descriptive BI work dynamic and individualized.

This makes clear that descriptive analyses are not only a technical process but also a human one. They require patience, curiosity, and willingness to face uncomfortable truths. Only when organizations understand what truly happened can they take the next step of asking what might happen and learning from this to shape the future more consciously.

### 2.2.2 Predictive Analysis - "What could happen?"

Predictive analytics broadens the scope of HR work and transforms it into an early warning system for possible developments. While descriptive analysis describes the past, predictive analysis focuses on the future. It searches for patterns and correlations to forecast possible developments and identify risks in advance. For organizations, this means the opportunity not only to react but to prevent problems before they arise.

In an HR context, this can mean identifying rising employee turnover, declining motivation, or overworked teams at an early stage. Modern systems combine data from various sources, such as performance reports, satisfaction surveys, communication frequencies, and absence days. These patterns can identify trends indicating potential conflicts, stress, or dissatisfaction.

The advent of AI technologies opens completely new possibilities. In the future, predictive analyses could also include physical or emotional states, for example through wearable devices or biometric sensors. This concept can be illustrated through emerging technologies

such as "smart toilets" equipped with biometric sensors. These systems can use molecular analyses to detect certain health indicators, such as stress levels, hormonal changes, or general energy levels. Studies show that such devices are capable of passively recording health data such as temperature, heart rate, and oxygen levels (Ge, Zhang & Wang, 2023, p. 52). The Stanford prototype also demonstrated in 2020 that RGB analysis, uroflowmetry, and deep learning models can accurately identify users and record biometric parameters (Stanford Prototype, 2020). Such technologies illustrate the potential of data-based analyses in theory and where their limits lie. Simultaneously, however, they raise key ethical questions: How far should data collection extend when it involves people? Who decides what information may be used, and who protects employee privacy? Responsibility here lies not with the technology but with the organization's attitude.

Predictive analyses can bring substantial benefits, such as better prevention, more targeted support, and more efficient personnel planning. However, they must never become instruments of control. Data must serve to support people, not the reverse. Only when HR analyses are conducted with ethical awareness can they retain their true value: improving work quality, health, and satisfaction.

### 2.2.3 Prescriptive Analysis - "What measures are recommended?"

Prescriptive analytics represents perhaps the most significant stage in this entire process. It doesn’t stop at observation but proceeds further toward concrete action. It is no longer merely about understanding forecasts but about acting upon them. What can be done to bring about change? This is precisely what this level of analysis addresses.

In the HR sector, this has very practical significance. If data shows that a department has struggled with high employee turnover for months, it is no longer sufficient to simply know the reasons. Decisions must be made; action must be taken. Perhaps implementing a mentoring program is appropriate. Perhaps small adjustments to work rhythm will help more than major restructuring. Or sometimes all that is needed is an honest conversation between the manager and the team. Prescriptive analyses help make such interventions visible in the first place.

The true value lies elsewhere. Prescriptive analyses make organizations more agile in thinking, not just in action. Recommendations are never final, and hardly anything remains valid indefinitely. A measure that works today may be obsolete in three months. In an agile environment, this is normal. Organizations learn to test hypotheses, accept mistakes, and begin anew. This is not a weakness; it represents an effective learning process. A key advantage of this approach is that it integrates human judgment into BI processes. It is not about making perfect decisions but about willingness to self-correct. Every adjustment represents progress, as it is grounded in empirical evidence. Data shows directions, but it does not dictate what is right. That responsibility remains with humans, and that is beneficial.

Ultimately, BI systems should not prescribe actions but rather provide insights that enable more informed decision-making. Prescriptive analytics does not provide definitive answers, but it creates space for more intelligent questions. Perhaps this is its greatest contribution: reinforcing that decision-making is inherently an iterative learning process.

### 2.2.4 To Agile BI

When examining the three levels of analysis together, it quickly becomes apparent that they do not exist separately in agile environments. In reality, they operate in parallel, overlap, and constantly change. This is precisely what makes them so valuable for agile organizations. Agile BI does not mean building a dashboard once and leaving it unchanged. It means continuously observing, questioning, and rethinking. A descriptive analysis may emerge in one sprint, a predictive one in the next, and when the two combine, the prescriptive level develops naturally. This is not a linear process but a cycle that constantly renews itself.. Das ist kein linearer Prozess, sondern ein Kreislauf, der sich selbst ständig erneuert.

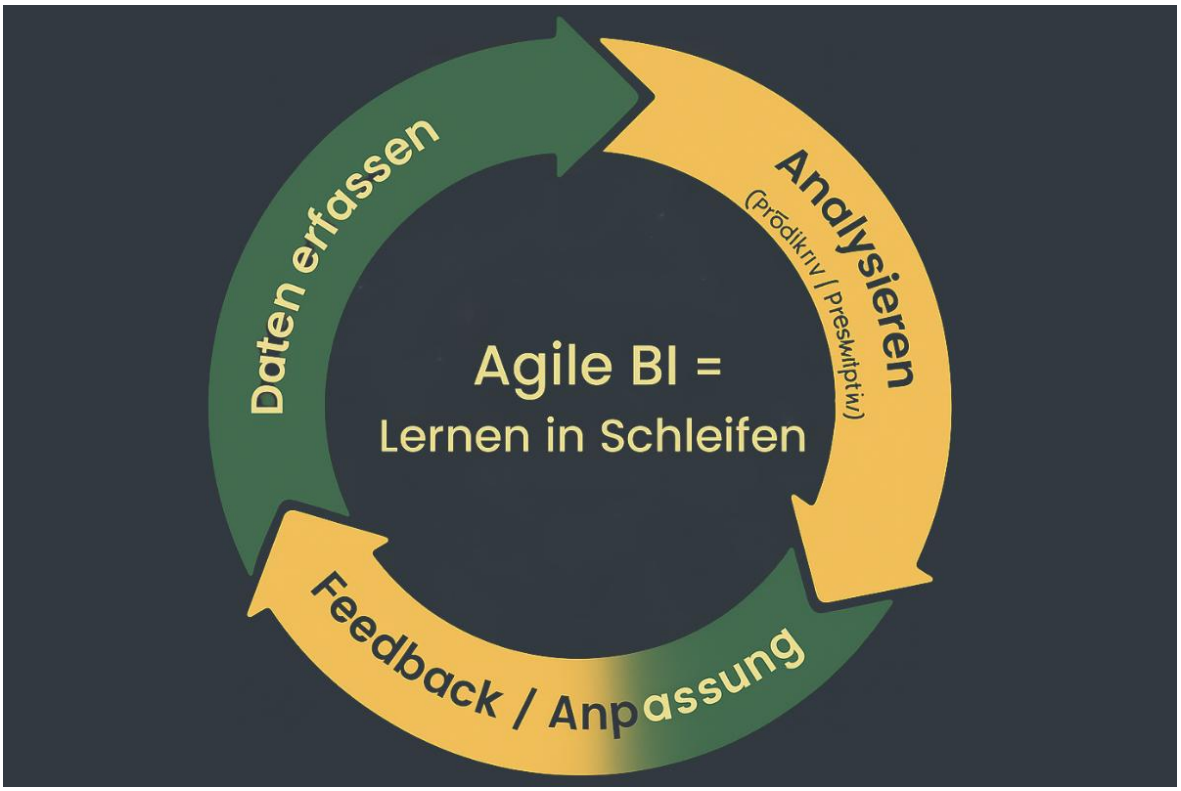


*Figure 3. illustrates the cyclical nature of agile BI analyses in an HR context.*

This approach demonstrates a more adaptable framework for analysis. In the agile world, an analysis can be incomplete, and a result can be surprising. What matters less is whether everything is perfect than whether it helps move forward. Data becomes narratives that are continuously written. Each iteration is like a new page that is read, understood, and improved. The beauty is that data and people come together here. Agility brings the human element back into analysis. Instead of rigid plans, there are feedback loops; instead of control reports, there are open questions. BI thus becomes a dialogue between system and human, a collaboration in which both learn from each other. In the end, there is no definitive truth but rather an attitude: remain curious, be adaptable, view decisions as part of a process. Agile BI is exactly that a system that moves when the world moves. Perhaps that is the most honest form of intelligence,  not only knowing but also understanding that everything is in flux.

## 2.3 Dashboard Design and Visualization Principles (IBCS, Hichert SUCCESS Formula)

Dashboards are key tools in the field of business intelligence. They enable complex data to be presented in a comprehensible and condensed form. Dashboards are particularly important for HR, as they help decision-makers quickly identify trends such as employee numbers, turnover, and satisfaction levels.

A dashboard can be compared to an aircraft cockpit. The pilot sees many instruments: speed, altitude, fuel, weather radar. Without this information, safe decisions would be impossible. Simultaneously, the instruments are clear, standardized, and logically arranged. For example, altitude is always displayed in meters or feet, never in percentages.

An HR dashboard operates similarly. It displays important metrics such as headcount, turnover, satisfaction, and sick leave rates. Managers need this data to "steer the company" like a pilot. For this to succeed, information must be visualized uniformly, understandably, and accurately.

"Human resource analytics, or HR analytics, aims to collect, analyze, and process employee-related data so that it can serve as a basis for decision-making on strategic corporate issues (Marler & Boudreau, 2017). The term HR analytics is not always used; other terms such as people analytics and workforce analytics are also employed (Tursunbayeva, Di Lauro & Pagliari, 2018)."[8]

### 2.3.1 The SUCCESS Formula

A proven concept for designing dashboards is Hichert's SUCCESS formula. It consists of seven principles: SAY, UNIFY, CONDENSE, CHECK, EXPRESS, SIMPLIFY, STRUCTURE.

- **SAY (Say what you mean):** Dashboards should convey a clear message and not merely present data. Example: "Employee turnover increased in the last quarter" is more meaningful than a single figure.
- **UNIFY (Uniform language):** The same content is always presented in the same way. This creates a uniform visual language that improves comprehensibility.
- **CONDENSE:** Substantial information should be presented in limited space. An HR dashboard can simultaneously display multiple metrics such as headcount, satisfaction, and sick leave.
- **CHECK (Present correctly):** Visualizations must not be manipulative. Scales and axes must remain consistent to ensure trust in the data.
- **EXPRESS (Choose the right representation):** The type of visualization must match the content. Time series are shown as line graphs, department comparisons as bar charts.
- **SIMPLIFY (Keep it simple):** Complexity should be reduced. Simple representations without 3D effects or unnecessary colors increase comprehensibility.

[8] Ontrup u. a., *HR-Analytics*.

- **STRUCTURE:** Information should be arranged logically, e.g., past on the left, present in the middle, future on the right. This facilitates navigation.

Applying these principles helps ensure that dashboards remain clear, consistent, and easy to understand, similar to instruments in a cockpit.

### 2.3.2 IBCS-Standards for Dashboards

The International Business Communication Standards (IBCS®) also provide specific rules for uniform design of reports and dashboards. These standards can be divided into four categories:

1. **Semantics:** Identical content must be presented identically. In HR, this means redundancies are always shown in red and new hires in green.
2. **Conceptual:** Dashboards should convey a clear message and be logically structured. Example: "Turnover rate rising → Cause: Dissatisfaction → Recommendation: Employee appraisals."
3. **Perceptual:** Visualizations must be easy for the eye to grasp. Lines for trends, bars for comparisons, and tables for detailed information are appropriate means. Complex effects should be avoided.
4. **Notation:** Uniform scales, axes, fonts, and symbols facilitate understanding. In HR dashboards, for example, time series are always displayed from left to right.

Consistent application of IBCS standards creates a type of visual language understood across departments in companies.

### 2.3.3 Agile BI Dashboards

Agile business intelligence refers to BI systems that can quickly adapt to new requirements while remaining flexible. Dashboards play a central role here, as they make changes immediately visible. It is particularly important that new metrics can be integrated without significant effort. In agile projects, priorities change regularly. If, for example, a company wants to place greater emphasis on employee satisfaction, corresponding visualizations can be added consistently and seamlessly by applying IBCS standards.

Another advantage is transparency for interdisciplinary teams. In agile projects, HR experts, IT specialists, and managers work together. Uniform visualizations function as a common language and prevent misunderstandings.

Additionally, standardized dashboards accelerate feedback loops. Since agile methods work with iterations and sprints, making results visible quickly is crucial. A dashboard shows at a glance whether a new HR measure, such as introducing remote work, is actually effective and reducing employee turnover. Standardized visualizations also support predictive and prescriptive analyses. In addition to descriptive data, forecasts and recommendations for action can be integrated. An HR dashboard could display, for example: "If the turnover rate exceeds 10%, conducting an employee survey is recommended."

Finally, Agile BI also has a cultural dimension. An agile mindset means being open to change and identifying errors early. Dashboards designed according to IBCS and SUCCESS principles promote a transparent data culture and strengthen data literacy within

organizations. The combination of the SUCCESS formula and IBCS standards with agile BI methods enables clear, fast, and flexible decision support. Dashboards in HR departments thus make significant contributions to successfully implementing agile decision-making processes.

## 2.4 Data Literacy and Agile Mindset in Organizations

Digital transformation is dramatically changing HR departments. Decisions can no longer be based solely on gut feeling. Today, data forms the foundation of effective HR work. However, data alone is useless without knowing how to work with it. Therefore, data literacy and an agile mindset are two fundamental building blocks for agile BI applications in HR.

### 2.4.1 Datenkompetenz als Grundlage

Data literacy refers to the ability to collect, cleanse, evaluate, and prepare data in such a way that it enables informed decision-making. “Data literacy describes the ability to handle data competently, efficiently, and productively. It encompasses various individual skills for collecting, adapting, modifying, interpreting, and presenting data”[9]

This skill is particularly important in the HR context. When employees resign, for example, it is insufficient to know how many have left (quantitative data). Understanding why they left (qualitative data) is equally important. The literature explains clearly: „ Quantitative data is often based on precise measurements... Qualitative data, on the other hand, is descriptive and based on observations “[10]. This is exactly what occurs in HR: the number of resignations is measurable, but the reasons are found in interviews or open-ended responses.

The literature also emphasizes a typical risk: "It is absolutely taboo to equate correlation and causality in any way." For HR, this means that if substantial overtime is associated with dissatisfaction, one cannot immediately conclude that overtime alone is the cause. Factors such as leadership behavior or unbalanced work-life balance often play decisive roles.

### 2.4.2 Individual and Organizational Dimensions

Data literacy is not just a task for individual analysts. Two levels always exist:

„On the one hand, there is individual data competence and, on the other, the data literacy of companies“[11].

- **Individual** means that an HR manager can work with Excel or Power BI and understands how to calculate metrics.
- **Organizational** means that the entire company develops a data culture. This means that both managers and interns understand how data is used.

[9] „Big Data İnsiderdata-literacy-datenkompetenz “, o. J. 3
[10] „Big Data İnsiderdata-literacy-datenkompetenz“.o. J 10
[11] „Big Data İnsiderdata-literacy-datenkompetenz“.o. J. 6

If only HR understands the data, but management still makes decisions based on gut feeling, then a disconnect exists within the organization. Agile BI processes can only be truly effective when all levels use data.

### 2.4.3. Data Literacy Enhances HR Analytics

Recent studies clearly demonstrate how data literacy enhances the impact of HR analytics. „ The practical application of business data analytics in HR is still limited... The primary reason... is the requirement for more analytical skills, which can be acquired through data literacy “ [12] This means that HR analytics utilization remains very limited because many employees lack sufficient analytical skills. This gap can be closed through data literacy. The same study states: „ Data literacy increases this correlation positively“. [13] This means that data literacy strengthens the positive correlation between HR analytics and employee innovative behavior.

For example, if HR data shows that young employees are more likely to resign in their first year, possessing the metric alone is insufficient. Competence to correctly interpret this metric and initiate appropriate measures such as mentoring or better onboarding is also required.

### 2.4.4. Das agile Mindset

Data alone is insufficient. The right attitude toward working with it is also necessary. This is called an agile mindset. Eilers, Peters, and Leimeister (2022) researched this and defined four dimensions: „ learning spirit, collaborative exchange, empowered self-guidance, customer co-creation “.[14] This means that an agile mindset manifests in willingness to learn, collaboration, personal responsibility, and joint creation with "customers" in this case, employees. "AM [Agile Mindset] affects organizational performance mediated by strategic agility."

Interplay Between Data Literacy and Agile Mindset:

Both concepts belong together:

- Data literacy provides clean data and ensures HR analyses are reliable.
- An agile mindset ensures this data is handled flexibly and new measures are implemented quickly.

Without data literacy, facts are lacking. Without an agile mindset, knowledge remains unused. Together, they make HR decisions faster, more flexible, and better. A turnover dashboard serves as a good example: data literacy ensures accurate metrics, while an agile

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[12] Ahmad Nasser Abuzaid, „Examining the moderating role of data literacy in the relationship between human resource analytics and employee innovative behavior“, *International Journal of Data and Network Science* 8, Nr. 3 (2024): 1415–28, https://doi.org/10.5267/j.ijdns.2024.4.001.

[13] Abuzaid, „Examining the moderating role of data literacy in the relationship between human resource analytics and employee innovative behavior“.

[14] Karen Eilers u. a., „Why the Agile Mindset Matters“, *Technological Forecasting and Social Change* 179 (Juni 2022): 121650, https://doi.org/10.1016/j.techfore.2022.121650.

mindset ensures HR responds immediately with mentoring or onboarding. The result: lower turnover and better employee retention.

# 3. Practice-Oriented Case Studies of Agile HR Dashboards

In this chapter, the previously described foundations of agile BI methods, analytical levels, and visualization principles are illustrated using two compact practical examples. The goal is not a “perfect” solution, but rather fast, easily adaptable prototypes as they emerge in short iterations. Both examples follow a clear structure: they begin with a small, open dataset, go through lean ETL steps in Python, are transferred into a simple star schema in Power BI, and conclude with a clearly structured dashboard including deep-dive and drillthrough functions. The analyses are deliberately kept descriptive and form the basis for decisions; possible predictive extensions are discussed in Chapter 4.

Case Study 3.1 presents the analysis of employee turnover: Which departments, roles, or profiles show higher exit rates, and how do characteristics such as age, tenure, or overtime behave? Case Study 3.2 focuses on the Recruiting Kanban & Experiment Dashboard: Here, process metrics such as Work-in-Process, Cycle Time, and Time-to-Hire are central in order to make bottlenecks visible and to steer scenarios in an agile way. Both dashboards are deliberately lean, visualized close to IBCS standards, and quickly filterable via slicers so that they can be used directly in HR meetings and extended in further sprints.

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## 3.1 Method and Implementation: Turnover Dashboard (Kaggle, Power BI)

The practical implementation of the first dashboard (Overview) aimed to make employee turnover visible while simultaneously integrating agile elements. The intention was to demonstrate how a functional HR dashboard can be developed with manageable effort. The process consisted of three parts: data preparation (ETL) in Python, the construction of a clear data model in Power BI, and the visualization of the most important key figures. In addition, I incorporated agile functions: a What-If parameter (“Target Attrition %”), the metric Gap-to-Target, a simple Risk Score, and a status card with warning indicators. As a result, the dashboard was iteratively extended and corresponds to the first sprint.

### 3.1.1 Data Preparation in Kaggle

As a data basis, I used an open HR dataset from Kaggle. This contained employee information such as age, income, department, or attrition status. In a Kaggle notebook, I performed basic data cleansing steps using Python (Pandas and NumPy).

https://www.kaggle.com/code/lrhmanelliverdiyev/turnover-seminararbeit-u-akademei

This included:

- Standardizing column names for easier further processing,
- Converting relevant variables into categories,
- Creating age, tenure, and income bands,
- As well as creating flags, for example for attrition (0/1) and overtime (0/1).

The result was a cleaned file hr_clean.csv, which served as the basis for Power BI. It is important to note that Kaggle was used exclusively for data cleansing; the visualization was carried out later in Power BI.

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### 3.1.2 ETL Process (Practical Procedure)

For my work, I prepared the HR data using a simple ETL process in Power BI. First, I imported the raw data from an Excel or CSV file into Power BI. Then I renamed the column names so that they were clear and consistent, for example “EmpID,” “Attrition,” or “OvertimeHours.” After that, I adjusted the data types, meaning whether they were numbers, text, or date values.

In the next step, I cleaned the data. This means that I removed or corrected missing or incorrect values. Afterwards, I created new variables, for example a flag “Attrition = 1,” to clearly see which employees had left the company. In addition, I grouped certain attributes, for example salary classes or age groups. This makes the data easier to compare.

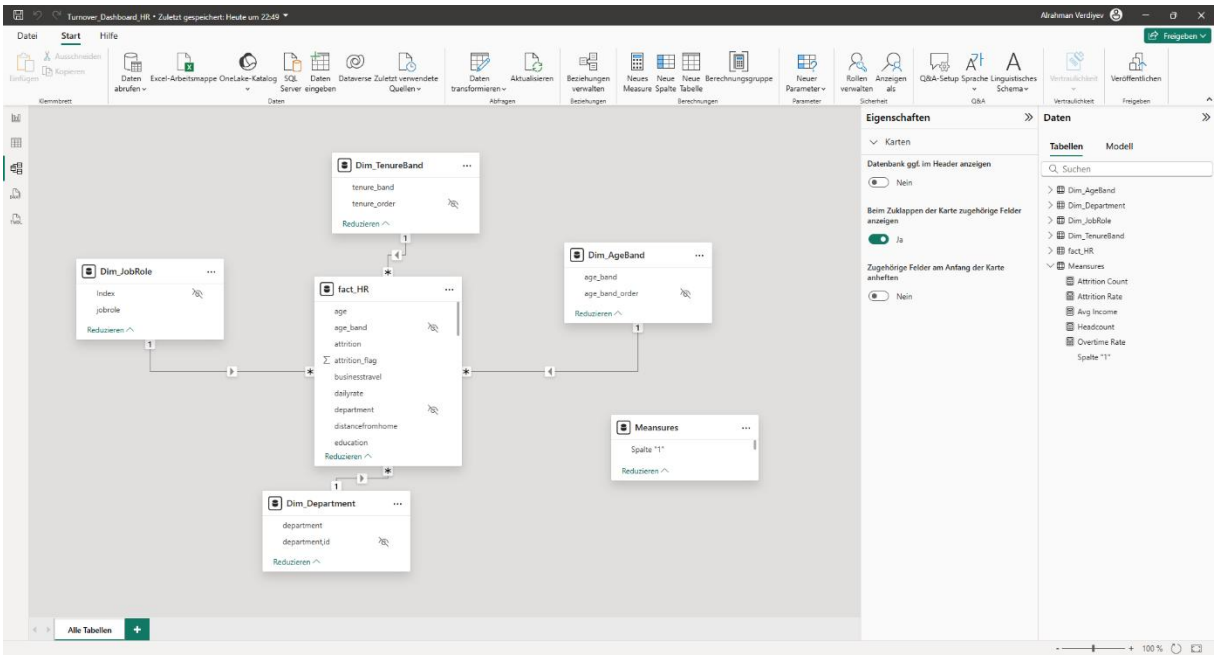
The data model was also very important. For this purpose, I built a star schema that shows the connection between fact and dimension tables. Finally, I loaded the data into the model and was then able to create the visualizations and analyses in the dashboards.

### 3.1.3 Data Model in Power BI

After importing the cleaned CSV file into Power BI, I built a star schema. The central fact table (Fact_HR) contains all employee data. In addition, I created dimension tables, for example *Dim_Department, Dim_JobRole, Dim_AgeBand, Dim_TenureBand*, and *Dim_IncomeBand.*

The relationships were created as (1: n). For the age and tenure bands, I inserted helper columns for sorting, whereby the order had to be adjusted manually in some visualizations. This approach makes the model clear and at the same time flexible.

There is also a small table _Measures. It is deliberately created without relationships and serves only as a container for all DAX measures. The placeholder column is hidden; only the measures are visible in the report. This keeps the model clear and still flexible.




*Figur 1. Star schema of the HR data model in Power BI (own representation, cf. GitHub 2025).).*

### 3.1.4 Key Figures (DAX)

For the analysis, I calculated central key figures using DAX. These include:

- **Headcount** = Total number of employees
- **Attrition Count** = Number of employees who have left
- **Attrition Rate** = Ratio of employees who have left to total employees
- **Overtime Rate** = Proportion of employees with overtime
- **Avg Income** = Average monthly income.

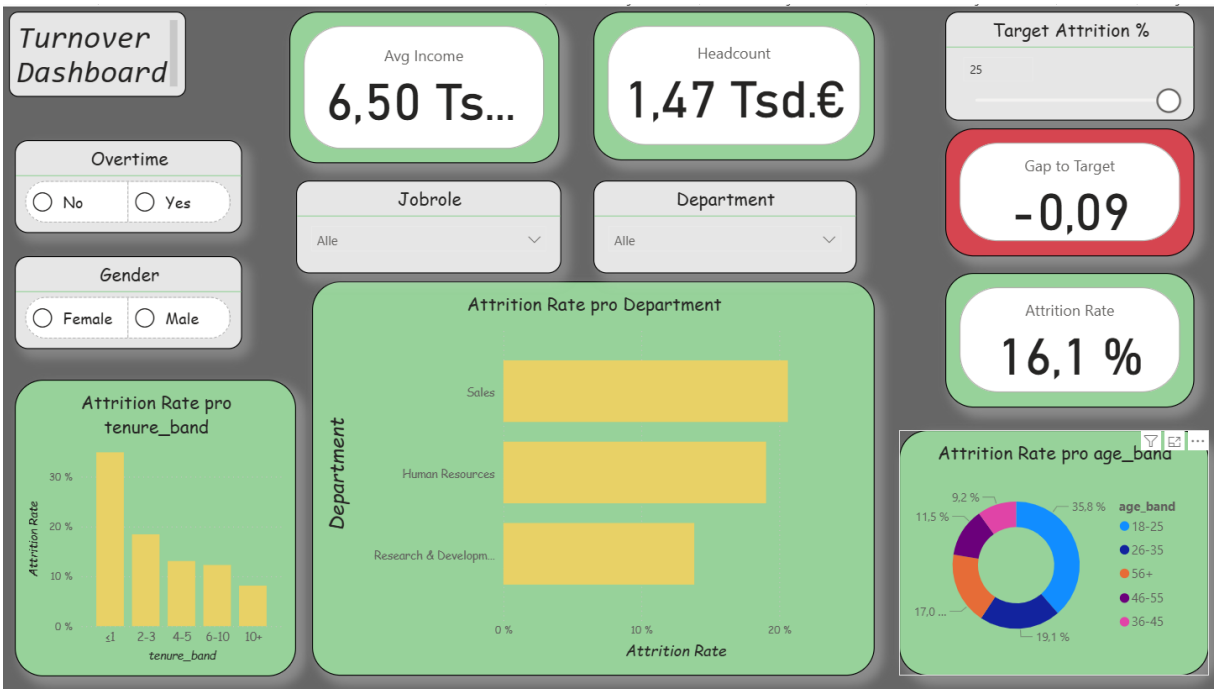
These key figures enable both an overall overview and detailed analyses by departments, roles, or employee groups.

### 3.1.5 Report Pages in Power BI

Das Dashboard besteht aus drei Seiten:

1. **Overview:** In addition to the central key figures (Headcount, Attrition Rate, Overtime Rate, Avg Income), agile extensions were integrated. These include a What-If parameter for the attrition target, the key figure Gap-to-Target, a

simple Risk Score, and a status card. In this way, turnover is not only described but also compared with target values and linked to risk indicators.




*Figur 2. Report page 1: Overview / Source: Own representation in Power BI (cf. GitHub 2025).*

2. **Deep-Dive (Decomposition Tree):**
   Here, the attrition rate could be broken down step by step according to various influencing factors (e.g., department, overtime, income, tenure). Slicers were deliberately reduced in order to keep the analysis freely exploratory. In addition, two small KPIs (Attrition Rate and Gap-to-Target) remained visible

to that the target values were not lost. This clearly reflects the agile idea of interactive exploration.


*Figure 6. Report page 2: Deep dive (breakdown tree). / Source: Own representation in Power BI (cf. GitHub 2025).*

3. **Decision Support (Extended Drillthrough):**
   The third page was expanded into an agile decision dashboard. In addition to detailed analyses per department, it contains three scenario buttons (Status Quo, Overtime-Cap, Onboarding-Boost) that simulate different situations. A recommendation card automatically provides suggestions (e.g., limit overtime, strengthen onboarding). A table shows the top 5 risk roles based on the new measure “Risk Score.” Demographic visualizations (age, tenure) immediately adapt to the selected scenario. This makes this page the clearest example of Agile BI.

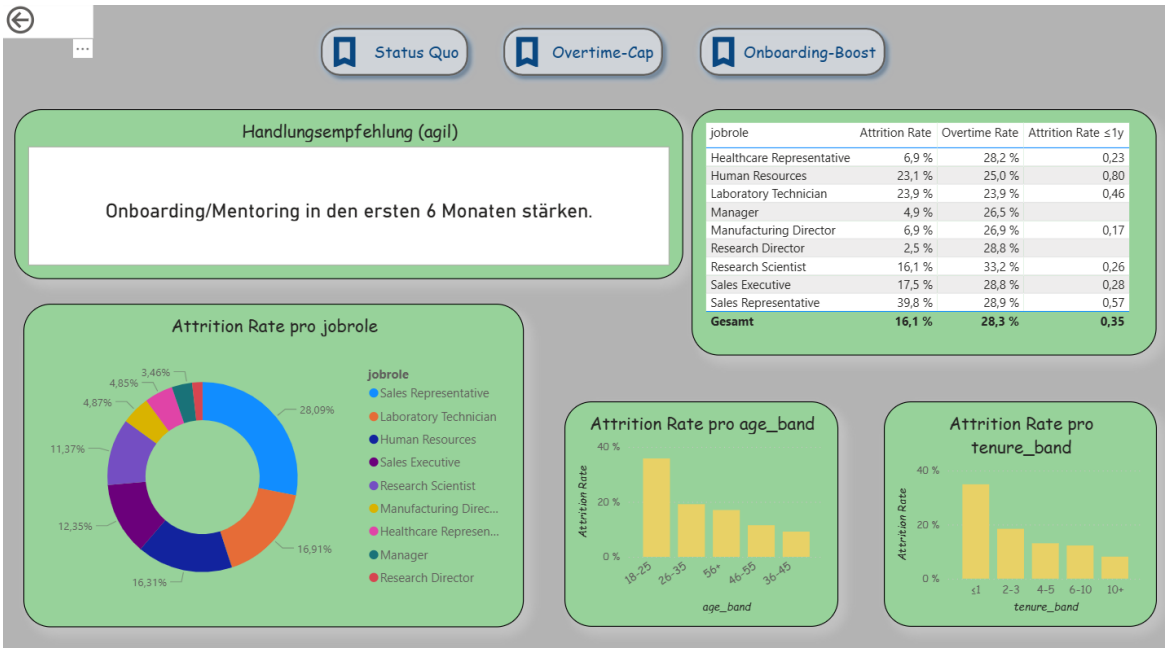



*Abbildung 3. Berichtseite 3: Drillthrough – Department Detail. / Quelle: Eigene Darstellung in Power BI (vgl. GitHub 2025).*

### 3.1.6. Descriptive Results

The dashboard shows typical patterns of employee turnover that are also described in the literature. Younger employees (e.g., in the age band 18–25 years) and persons with short tenure (≤ 1 year) have a significantly higher exit rate. The risk also increases when overtime is regularly performed. Job roles in the Sales area are particularly affected.

What was new here was that the results were not only descriptively visible but also linked with agile elements. With the What-If parameter, a target value for turnover could be set, and the key figure Gap-to-Target immediately showed the deviation between actual and target values. The simple Risk Score combined factors such as overtime, tenure, and income and thereby made risk segments clearly recognizable. This transformed a purely descriptive analysis into an agile instrument that not only reveals patterns but also opens up room for action in decision-making.

## 3.2 Recruiting-Kanban & Experiment Dashboard (ATS Pipeline, Power BI)

The dashboard represents the recruiting process in Kanban logic. Important key figures such as Work-in-Process (WIP), Cycle Time, Throughput, Conversion, and Time-to-Hire change daily or weekly. Therefore, this case is well suited to make agile control visible. The report

layout follows the ideas of IBCS/SUCCESS: a clear statement in the title, uniform colors, and a reduced design so that HR, IT, and hiring managers use a common data language.

### 3.2.1 Data Basis and ETL

The solution uses three synthetic CSV files. **ats_pipeline_events** contains the event log per candidate and stage (Applied, Screen, Interview, Offer, Hired/Rejected) with stage_start_date and stage_end_date as well as contextual fields such as Department, Role, Seniority, Location, Source, Recruiter, and Variation (A/B). **ats_candidates** provides master data on the candidate (e.g., applied_date, recruiter, variation). **ats_requisitions** describes the vacancy (req_id, department, role, location, seniority). In Power BI, the files are imported, data types are set (especially the date fields), empty strings are treated as null, and identifiers are standardized. This event log is the appropriate foundation for Kanban because start and end timestamps per stage later directly enable calculations for CFD, Cycle Time, Aging, and Throughput.

### 3.2.2 Data Model (Star Schema)

The model follows a star schema. The fact table **ats_pipeline_events** lies at the center. The dimensions **ats_candidates**, **ats_requisitions**, **Dim_Date**, and **Dim_Stage** provide the axes of analysis. Between **Dim_Date[Date]** and **events[stage_start_date]** there is an active 1:n relationship for “Flow-in.” Additionally, an inactive relationship from **Dim_Date[Date]** to **events[stage_end_date]** is stored. This inactive connection is deliberately activated in measures using USERELATIONSHIP() in order to correctly control “Flow-out” (e.g., hires per week). Attributes that appear twice in the fact table (e.g., department) are hidden in the report; for analyses, the columns from the dimensions are used. The model is lean and can easily be extended in sprints.

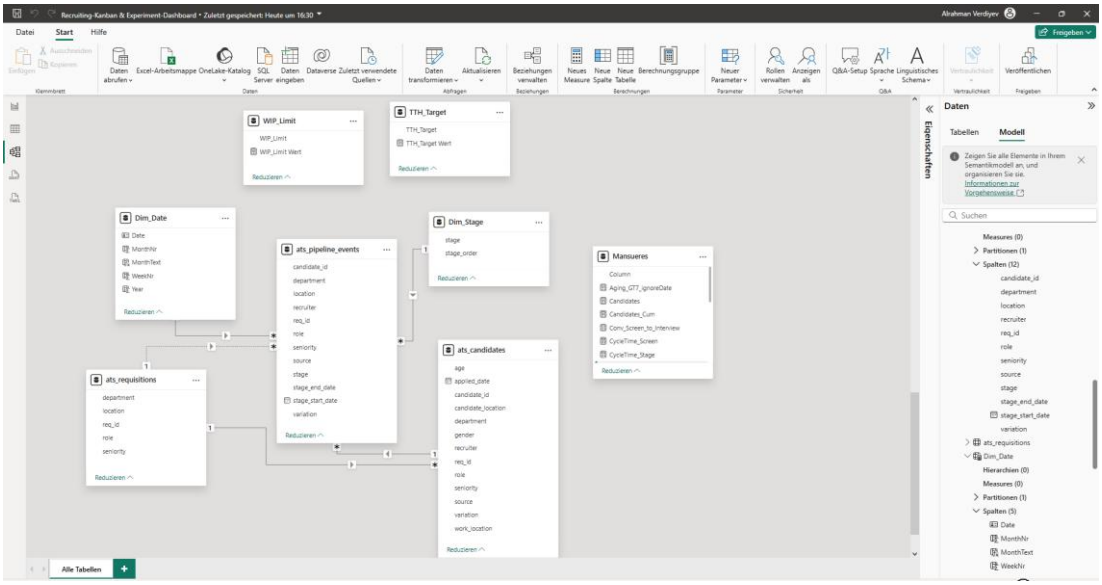



*Figure 8. Star diagram of the recruiting Kanban in Power BI (own representation, cf. GitHub 2025).*

### 3.2.3 Dimensions and Sorting

Dim_Date is generated from the minimum of the start date and the maximum of the end date and is extended by Year, MonthNr, MonthText, and WeekNr. MonthText is sorted by MonthNr, and the table is marked as a date table. Dim_Stage defines the order of stages via stage_order (Applied … Rejected), so that diagrams sort consistently. These two tables ensure a clean time and process logic throughout the entire report.

### 3.2.4 Key Figures and Analytical Logic (DAX)

The key figures combine descriptive transparency with simple prescriptive signals. Three central measures are presented as examples.

**Time-to-Hire (average in days) and Gap-to-Target.**
First, the average duration between “Applied” and “Hired” is calculated. Afterwards, it is compared with a target value set via a What-If parameter.

```
TTH :=

VAR AppliedDate =

CALCULATE(

MIN(ats_pipeline_events[stage_start_date]),

ALLEXCEPT(ats_pipeline_events, ats_pipeline_events[candidate_id]),

ats_pipeline_events[stage] = "Applied"

)

VAR HiredDate :=

CALCULATE(

MAX(ats_pipeline_events[stage_end_date]),

ALLEXCEPT(ats_pipeline_events, ats_pipeline_events[candidate_id]),

ats_pipeline_events[stage] = "Hired"

)

RETURN

AVERAGEX(

VALUES(ats_pipeline_events[candidate_id]),
```

```
DATEDIFF(AppliedDate, HiredDate, DAY)

)
```

The target value is created as a What-If parameter TTH_Target; the gap results as Gap_TTH = [TTH] − [TTH_Target Value]. A positive gap indicates an SLA deviation and provides a clear impulse for action.

**WIP Limit and Over-Limit.**

Kanban actively controls the number of parallel cases. WIP counts candidates in the active stages. With a second What-If parameter WIP_Limit, the limit is set; Over-Limit immediately signals bottlenecks.

```
WIP :=

CALCULATE(

    DISTINCTCOUNT(ats_pipeline_events[candidate_id]),

    ats_pipeline_events[stage] IN {"Applied","Screen","Interview","Offer"}

)
```

```
WIP_Over_Limit :=

VAR Over = [WIP] - [WIP_Limit Wert]

RETURN IF(Over > 0, Over, 0)
```

If Over-Limit > 0, overload is present. In practice, this leads to a measure, for example lowering the limit or increasing capacity.

**Throughput per Week (Flow-out).**

For Hires and Rejections, the report counts cases by end date. For this purpose, the inactive date relationship is deliberately activated per measure.

```
Hires_Woche :=

CALCULATE(

    DISTINCTCOUNT(ats_pipeline_events[candidate_id]),

    ats_pipeline_events[stage] = "Hired",

    USERELATIONSHIP(Dim_Date[Date], ats_pipeline_events[stage_end_date])

)
```

```
Rejected_Woche :=

CALCULATE(

    DISTINCTCOUNT(ats_pipeline_events[candidate_id]),

    ats_pipeline_events[stage] = "Rejected",

    USERELATIONSHIP(Dim_Date[Date], ats_pipeline_events[stage_end_date])

)
```

The time series makes the outflow visible and shows whether the process delivers steadily or fluctuates. Together with the Screen-Interview conversion and the Cycle Time per stage, clear indications of bottlenecks emerge.

### 3.2.5 Report Design and Visualization

1. The first report page provides a compact overview: five KPI cards (Candidates, Hires, WIP, TTH, Gap_TTH) show status and target achievement. A gauge compares WIP with the limit and marks overload. The Cumulative Flow Diagram (stacked area chart) represents the flow across months; in-process stages are shown in shades of blue, Hired in green, Rejected in red. A SAY title names the core message, for example "TTH above target due to backlog in Screen (Engineering)."

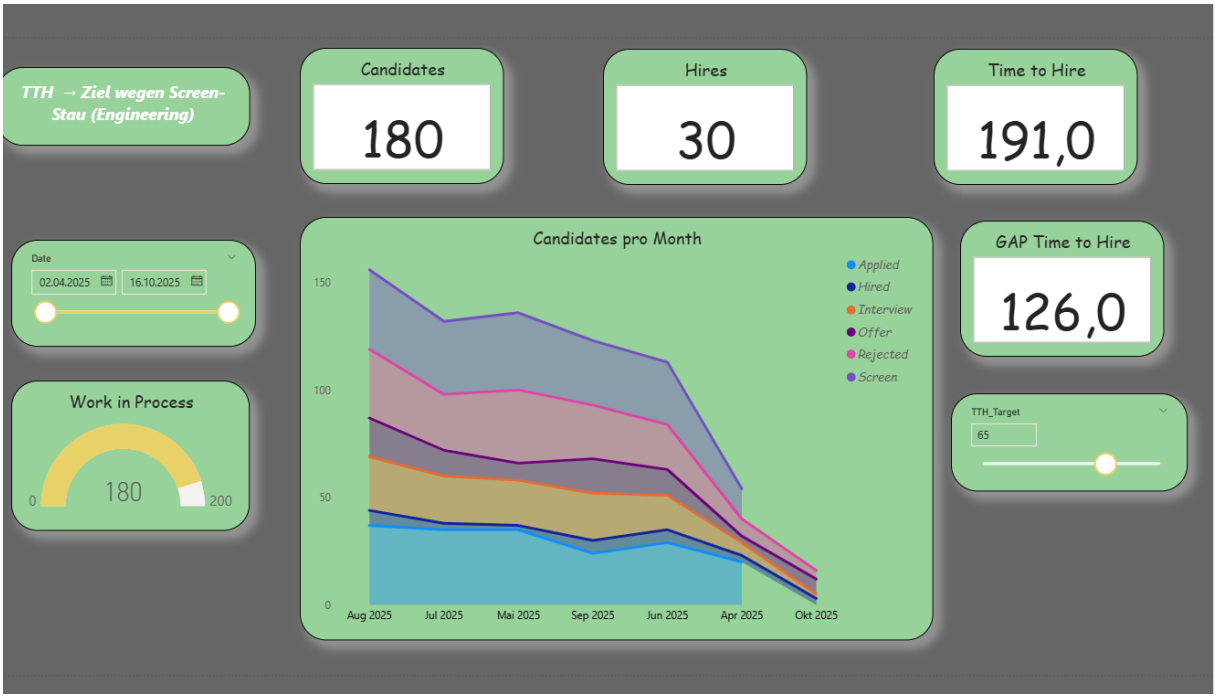



*Figure 9. Report page 1: Recruiting Overview (Kanban KPIs). / Source: Own representation in Power BI (cf. GitHub 2025).*

2. The second report page serves root cause analysis. The Cycle Time per stage shows where most time is lost. A matrix with Department × Stage highlights the distribution of starts per stage; this count based on the start date is robust and responds cleanly to date filters. In addition, Hires_Week and Rejected_Week are displayed as lines to examine the outflow over the weeks.

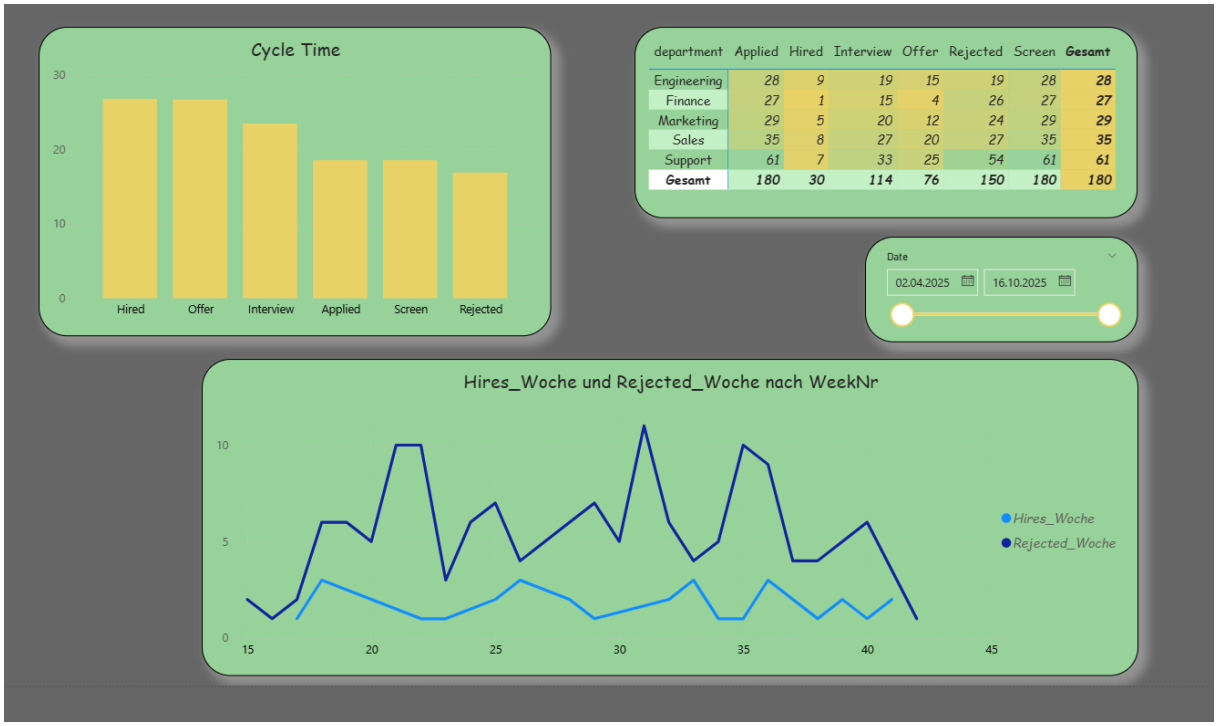



*Figure 10. Report page 2: Root cause analysis (cycle time & stage analysis). / Source: Own representation in Power BI (cf. GitHub 2025).*

3. The third report page supports decisions through scenarios. What-If parameters (WIP_Limit, TTH_Target, optional Recruiter_Add) and bookmarks (Status Quo, Plus Recruiter, WIP Limit −20%, JD Text B) change the view with one click. The KPI cards, the gauge, and a small "Over-Limit" card respond immediately. Optionally, a simple rule can output a recommendation, for example: If Over-Limit > 0 and Cycle Time in "Screen" is high, then lower the limit or deploy +1 recruiter; if conversion is low, test variation B.


*Figure 11. Report page 3: Scenario views (what-if & limitation). / Source: Own representation in Power BI (cf. GitHub 2025).*

### 3.2.6 Agile Value and Types of Analysis

The solution combines descriptive transparency with prescriptive indications. Descriptively, KPI cards, CFD, Cycle Time, and Throughput provide a clear picture of the current state and bottlenecks. Simple predictive indications arise from trends in Throughput and Conversion. Prescriptively, Gap-to-Target, WIP Limit, and the scenarios take effect: they directly lead to concrete measures within the process. Through the IBCS-oriented design, communication across departments remains consistent and understandable.

# 4. Agile HR Analytics in Transition – Trends and Future Developments

The previous chapters have shown how business intelligence applications can be used in HR for analysis, visualization, and decision support. While these examples reflect a current state of practice, the field of HR analytics is in constant transformation. New technologies, especially artificial intelligence (AI) and automated predictive models, are changing the way data is collected, interpreted, and used. At the same time, awareness is growing that successful data-driven decisions do not depend solely on software solutions, but on the people who apply them and on the culture in which they work.

In the following chapter, future developments and trends are presented that are of particular importance for agile HR analytics. The focus lies on how AI and predictive models can be integrated into HR processes and what role data literacy and an agile mindset play in the future of data-driven HR work. The aim is to show how technological innovation and human competence complement each other and together enable a learning, adaptable and sustainable HR analytics approach..

## 4.1 Integration of AI and Predictive Models in HR

The use of artificial intelligence (AI) is currently changing the way HR departments operate. Many companies are attempting not only to digitalize HR processes but also to make them more agile through intelligent algorithms and automated learning systems. AI-supported models can analyze large volumes of data within seconds, recognize patterns, and generate forecasts about personnel developments. This creates the opportunity to identify problems such as turnover or performance decline at an early stage, before they actually occur. Especially in recruiting, AI can help identify suitable candidates and accelerate the selection process. As HR Grapevine (2024) emphasizes „AI can help create an agile HR operating model that bases decisions on real-time data and empowers teams to act more flexibly and responsively.“[15]

Agile HR models benefit from this technology because they are based on continuous learning and rapid feedback. While traditional HR structures are often rigid and hierarchical, AI enables an iterative, data-driven approach. In agile teams, hypotheses are tested, data is analyzed, and processes are regularly adjusted – fully in line with the “Inspect-and-Adapt” principle. AI provides the necessary real-time information, so that decisions are no longer based on intuition but on objective analyses. This allows HR management to act proactively instead of merely reacting to past events. An example is the use of predictive analytics in employee retention. When data on working hours, performance metrics, or satisfaction surveys are combined, algorithms can identify risks of potential resignations. Managers then have the opportunity to take countermeasures at an early stage, for example through training opportunities, flexible working models, or targeted feedback. Such data-based decisions increase not only effectiveness but also fairness, since they are grounded in objective patterns.

However, with every new technology come new challenges. Particularly critical is the handling of the data generated. Many employees do not possess sufficient competence to correctly interpret or critically question AI results. Ghodoosi et al. (2023) show in their systematic analysis that, „data literacy in organizations does not keep pace with the growing technological complexity “[16]. This means that although AI creates many new possibilities, these can only be meaningfully utilized if employees possess a fundamental understanding of data, algorithms, and their limitations.

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[15] HR Grapevine USA, „How to use AI to power an agile HR operating model“, zugegriffen 18. Juli 2025, https://www.hrgrapevine.com/us/content/article/2024-08-19-how-to-use-ai-to-power-an-agile-hr-operating-model.

[16] Bahareh Ghodoosi u. a., „A Systematic Literature Review of Data Literacy Education“, *Journal of Business & Finance Librarianship* 28, Nr. 2 (2023): 112–27, https://doi.org/10.1080/08963568.2023.2171552.

Furthermore, the integration of AI into HR processes must always be ethically reflected. When algorithms make decisions about people, questions of transparency and responsibility arise. An agile approach helps here, as it provides small, controlled steps and consciously involves humans in the learning process. AI should not replace thinking but expand it as a tool that supports HR teams in making better, faster, and fairer decisions.

Overall, the integration of AI into agile HR analytics offers significant opportunities for more efficient and forward-looking decision processes. It enables a new form of collaboration between humans and machines, in which data is understood as a source of learning. Yet technological innovation alone is not sufficient: only when it is combined with an agile mindset and strong data literacy can it build long-term trust and foster cultural change within organizations.


*Figure 12. The future of agile HR analytics – The interplay of artificial intelligence, data literacy and an agile mindset leads to human-centred and learning HR analytics.*

## 4.2 Role of Data Literacy and Agile Mindset in Future HR Analyses

The future development of HR analytics will not be determined solely by technological advances, but above all by the skills and attitudes of employees. Data literacy and an agile mindset are considered the two key factors that determine the success of data-based HR decisions. While artificial intelligence and analytical tools are becoming increasingly powerful, their actual value depends on how people handle data, understand it, and learn from it. Data literacy therefore means far more than simply reading charts – it encompasses understanding, interpreting, and critically reflecting on data. As Ghodoosi et al. (2023)

emphasize, „organizations must understand data literacy as a fundamental cultural competence that connects technical knowledge, critical thinking, and ethical awareness.“[17] However, in many companies, there is still no systematic approach to building data competence within HR. Employees may know how to operate tools, but they often cannot correctly classify or critically question the results. This creates risks such as misinterpretations or excessive trust in algorithms. This is precisely where the agile mindset comes into play. An agile approach to data means testing hypotheses, integrating feedback and improving decisions iteratively. According to Science Direct (2022), „agility is the bridge between technology and culture – it creates the framework in which data-based learning becomes possible. “[18] An agile HR team does not use data to establish rigid rules, but to continuously learn from experience and make better decisions.

Another important aspect is the connection between data literacy and innovative behavior. A recent empirical study by Abuzaid (2024) shows that HR professionals with high data competence develop innovative solutions significantly more frequently. The author concludes that “data literacy forms the bridge between human resource analytics and innovative work behavior.” This means: the better professionals understand and interpret data, the more likely they are to develop new ideas based on objective insights. In agile teams, this effect is particularly strong, because mistakes are seen as learning opportunities and dealing with uncertainty is part of the organizational culture.

In practice, it becomes clear that data literacy and an agile mindset reinforce each other. Employees who are competent in data can work more agilely because they can process complex information more quickly and translate it into decisions. Conversely, an agile environment creates the openness to constantly test new data sources and further develop analytical methods. In this way, a learning loop emerges in which data, people, and processes grow together. Companies that connect both dimensions competence and attitude are more resilient in the long term to change and technological transformation.

For the future of HR analytics, this indicates a clear direction: the focus shifts from pure technology to the people who apply it. Data literacy programs should not only provide technical training, but also include questions of ethics, interpretation, and communication of data. At the same time, the agile mindset must be anchored in corporate culture – through transparent communication, cross-functional teams, and open learning spaces. Only in this way can real knowledge emerge from data. In summary, the future of HR analytics does not depend solely on the quality of data or the power of algorithms, but on how well people are able to handle this data responsibly, creatively, and flexibly. A combination of data literacy and agile thinking forms the foundation for HR management that does not merely react, but shapes proactively. In this way, HR analytics becomes a genuine learning system – a system that continuously evolves, adapts, and becomes wiser through experience.

[17] Ghodoosi u. a., „A Systematic Literature Review of Data Literacy Education“.
[18] Eilers u. a., „Why the Agile Mindset Matters“.

# 5. Conclusion and Recommendations for Action

## 5.1 Summary of Key Findings

At the end of this work, it can be clearly stated that agile BI applications in the HR field make a significant difference. They bring flexibility and transparency, two elements that are becoming increasingly important in modern organizations. In traditional BI systems, it often takes a long time to integrate new data or adjust dashboards. Agile BI, on the other hand, responds quickly because it operates in short cycles and directly incorporates feedback. The practical examples, the turnover dashboard and the recruiting Kanban dashboard, demonstrate how agile decision-making processes can be designed using simple means. In particular, prescriptive analysis has shown how concrete actions can be derived from data. It is therefore no longer sufficient to know only what has happened or what could happen. Much more important is the question of what should be done now.

Even linguistically, the term agile fits very well. If one considers its original meaning from Latin – *agilis* means movable or adaptable it describes exactly what modern HR dashboards achieve: they are not rigid systems but living processes that continuously adapt to new situations. Agile BI in the HR context therefore does not mean technology alone, but a new way of thinking. Data becomes a kind of dialogue between humans and systems. It helps ensure that decisions are not made based on gut feeling, but on real insights and at the same time it provides space to change quickly when reality demands it.

## 5.2 Recommendations for Practice

In order for companies to truly use agile BI, they must first establish a solid data foundation. This means that data should be collected correctly, cleanly, and ethically. Only then can trust in analyses emerge. If the foundation is not reliable, even the best dashboard cannot provide clear answers.

A second important point is the agile mindset. Without the right attitude, BI remains only a technical tool. Agile thinking means being open, accepting mistakes, learning from them, and improving step by step. In my work, it became clear that this mindset is crucial if dashboards are to become truly useful.

From this, three simple but effective recommendations emerge:

1. Targeted selection of key performance indicators (KPIs): It is not enough to have many numbers. What matters is that they are meaningfully selected and reflect the company's goals..
2. Agile collaboration within the team: Short feedback cycles, open communication, and flexible task allocation make BI work dynamic..
3. Technical further development: The use of small scripts or automations can help make data processes faster and more precise..

Companies that consider these points create an environment in which BI solutions are not only developed, but actually used. In this way, HR analytics can become part of daily decision-making processes rather than remaining a pure reporting tool.

## 5.3 Outlook on Future Developments

The future of HR analytics will be strongly influenced by artificial intelligence and automation. These technologies can simplify many processes: data analyses become faster, forecasts more precise, and decisions more transparent. At the same time, they raise new questions, particularly regarding ethics, data protection, and responsibility. Even today, it is evident that many companies use modern tools but still lack a clear strategy for handling sensitive data.

Therefore, the human being remains at the center. No algorithm can replace human judgment or emotional intelligence. Humans – like in a labyrinth – are always searching for the shortest path to a solution. It is precisely this striving for efficiency that will give rise to new forms of project management that are even more agile and adaptable. Perhaps these approaches are already emerging today, and we will only truly understand them in the coming years.

For me, one thing is certain: the future of HR analytics does not depend solely on new technologies, but on the connection between technical competence and human attitude. Only when data literacy, ethics, and agile thinking work together can real knowledge emerge from data – knowledge that helps people make better decisions and shape organizations that are truly capable of learning.