

Seminar Paper

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The Future of Business Intelligence at Bayer: Trends in Dashboard Technology and Their Implications.

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Acronyms

BI Business Intelligence

CRM Customer Relationship Management

ERP Enterprise Resource Planning

KPI Key Performance Indicator

R&D Research and Development

SaaS Software as a Service

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1 Introduction

Research questions:

1. *What key factors influenced Bayer's decision to transition from Tableau to Power BI, particularly in terms of cost, functionality, and organizational needs?*
2. *How has the transition to Power BI impacted the PCT Team within Research and Development (R&D) Finance, specifically regarding workflow efficiency and data accessibility?*
3. *What strategies and best practices can the PCT Team implement to successfully migrate dashboards from Tableau to Power BI, ensuring minimal disruption and enhanced performance?*

2 Understanding Business Intelligence and Dashboard Technology

Business Intelligence (BI) encompasses a complex interplay of processes and products that facilitate effective decision-making through the integration and analysis of an organization's data resources (Tavera Romero et al., 2021, p.1). This process involves various methodologies that organizations adopt to transform raw data into valuable information or insights, which is essential for success in today's competitive global landscape (Jourdan, Rainer, and Marshall, 2008, p.121). Moreover, BI empowers businesses to formulate critical questions by leveraging data derived from diverse operations, customer interactions, and competitive insights, both within their industry and beyond. This capability not only aids in identifying new growth opportunities but also enhances organizational resilience (A. Kumar, Mishra, and S. Kumar, 2024, p.308). When comparing these perspectives, it is clear that while Tavera Romero et al. emphasize the technical integration and analysis aspect, Jourdan, Rainer, and Marshall focus on the transformative process that converts data into actionable intelligence. A. Kumar, Mishra, and S. Kumar further expands on this by highlighting the proactive role of BI in strategic decision-making and identifying opportunities. Each perspective contributes to a comprehensive understanding of BI, illustrating its evolution from a data-centric tool ecosystem to a strategic asset that empowers organizations to navigate complex market dynamics effectively.

It continues to evolve as a strategic asset, offering diverse types of reports that enhance decision-making through the integration and analysis of data resources. As seen in Fig.1, these reports

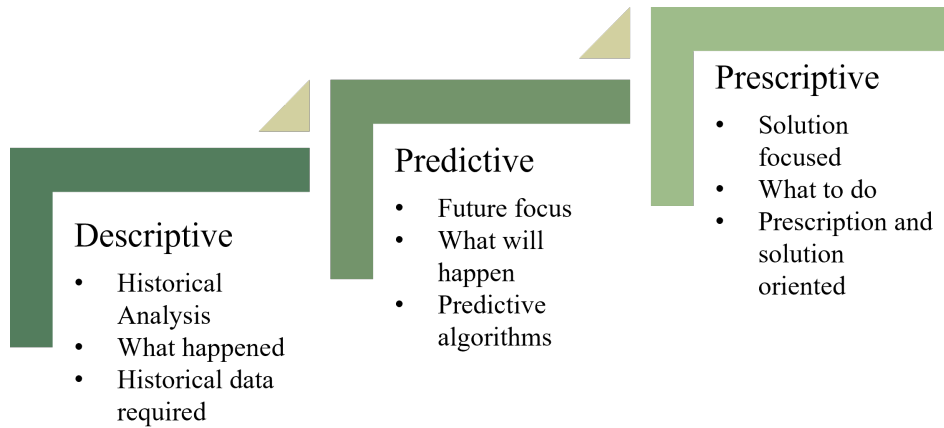


Figure 1: Types of BI Reports

Source: Own Creation

are categorized into descriptive, predictive, and prescriptive types, each representing an evolution of the usage of data resources. purposes within an organization. Descriptive reports focus on analyzing past events using Key Performance Indicator (KPI) and employ root cause analysis to evaluate reasons behind these events, exemplified by operational reporting. Predictive reports extend beyond historical data by utilizing algorithms such as neural networks, logistic regressions, and linear regressions to forecast near-future trends and option spaces. Meanwhile, prescriptive reports provide actionable recommendations, suggesting adjustments to specific factors within a business model. These factors are input into a model that can be refined, acknowledging the interdependence between them (A. Kumar, Mishra, and S. Kumar, 2024, pp. 308-310).

A central part of BI are Dashboards. They are visual representations of BI data that serve as an influential instrument for decision-makers by facilitating the monitoring of production processes to enhance performance (Belghith et al., 2023, p. 407). In a case study conducted by Katta (2025, p.68), the implementation of the BI Platform Power BI within a pharmaceutical company was evaluated, revealing significant financial savings through the use of dashboards. The study highlighted an average monthly cost savings of approximately \$40,000 post-implementation, alongside notable operational improvements. In this case it was through the integration of automated KPIs, that simplified the management's task of identifying areas needing improvement or exhibiting low performance. Comparing these findings with other industries, it becomes evident that dashboards not only enhance financial efficiency but also promote a proactive approach in operational management.

3 Emerging Trends in the Dashboard Industry

Dashboard technology is increasingly pivotal in transforming complex data into actionable insights for strategic decision-making. Modern dashboards emphasize interactivity and user-friendly designs, enabling dynamic data exploration and rapid comprehension. This chapter examines how innovations, such as the "Pathway Explorer," are advancing data visualization by offering intuitive interfaces and real-time processing, enhancing communication between analysts and decision-makers for more informed, sustainable outcomes.

The concept of interactivity in data exploration is increasingly recognized as a valuable feature, enabling users to dynamically engage with information. (Hanumanthaiah, 2025, p.5) highlights the benefits of interactivity, noting that it allows users to explore data dynamically, which enhances the overall user experience. This approach is exemplified by the "Pathway Explorer," a tool developed by the Institut de l'énergie Trottier (IET) and described by (Lévesque, Beaumier, and Hurtut, 2024). The "Pathway Explorer" is an innovative visualization tool that facilitates comparisons between various climate transition scenarios. It provides an interactive platform where users can select, view, and dissect multiple pathways towards sustainability, thereby enhancing the decision-making process (Lévesque, Beaumier, and Hurtut, 2024, p.32).

The findings from Levesque et al. (2024) further underscore the advantages of interactive exploration. The tool enables users to navigate through results with simple mouse clicks, eliminating the need to continuously generate and revise tables, thus streamlining data analysis (Lévesque, Beaumier, and Hurtut, 2024, p.32). Additionally, the ease of use and speed of the "Pathway Explorer" are significant benefits. Its rapid processing and visual interface allow users to quickly understand and navigate data with a minimal learning curve. Immediate result viewing is facilitated through tooltips that display data points upon hovering, enhancing the efficiency of data exploration .

Moreover, the tool supports quick access to comparative data measures, such as percentages, and facilitates easy toggling between different views and scenarios for more detailed analyses (Lévesque, Beaumier, and Hurtut, 2024, p.32). This feature is particularly useful for users seeking to perform comprehensive evaluations and draw meaningful insights from complex datasets.

In comparison, the study by Dalbah, Ali, and Al-Naymat (2022, p.1) emphasizes the importance of user-friendly interfaces in dashboards. These dashboards are designed to facilitate exploratory analysis of customer data and predictions of loyalty status. They serve as a communication bridge between data analysts and organization managers, providing actionable in-

sights that can drive strategic decisions (Dalbah, Ali, and Al-Naymat, 2022, p.1). While both the "Pathway Explorer" and dashboards aim to enhance data accessibility and usability, the former focuses on sustainability scenarios, whereas the latter centers on customer data analysis.

In evaluating these sources, it is clear that both emphasize the significance of interactivity and user-friendly design in data tools. However, the "Pathway Explorer" offers a specialized focus on climate transition scenarios, providing a unique platform for sustainability analysis, while dashboards, as discussed by Dalbah, Ali, and Al-Naymat, cater to a broader range of business applications. Both approaches demonstrate the evolving landscape of data visualization tools, where interactivity and ease of use are paramount for effective data exploration and decision-making.

The integration of cloud computing and machine learning into dashboard technology represents a significant advancement in how organizations manage and utilize data. Bussa (2023) emphasizes the transformative power of cloud computing, which allows for the storage, processing, and analysis of large data sets without the need for detailed on-premises infrastructures. This capability facilitates global collaboration, making it easier for organizations to work together across geographic boundaries (Bussa, 2023, p. 82).

Gurcan et al. (2023) provide a comprehensive evaluation of business intelligence strategies from 2003 to 2023, identifying "Organizational capability" as the fastest emerging trend. This trend underscores the importance of an organization's ability to assemble, integrate, and distribute resources effectively, turning organizational knowledge into tangible value (Gurcan et al., 2023, p. 14). This insight is crucial for understanding how BI solutions can shape the future path of organizations by facilitating resource management and strategic planning.

In contrast, the second fastest emerging trend identified by Gurcan et al. is the application of AI in business intelligence. AI's ability to analyze vast amounts of data and provide recommendations makes analytics accessible to both data scientists and average users, thus democratizing data insights across the organization. This trend highlights the growing importance of AI in making complex data understandable and actionable.

Hamzehi and Hosseini (2022), on the other hand, focus on the application of machine learning within the pharmaceutical industry, demonstrating how clustering algorithms can optimize product sales systems by segmenting customers based on purchasing behaviors (Hamzehi and Hosseini, 2022, p. 33233). Their study provides a detailed look at how machine learning can enhance business processes, offering a specific industry perspective on the broader trends identified by Gurcan et al.

The exploration in the reasearch of Dalbah, Ali, and Al-Naymat (2022) concentrates on machine learning algorithms in dashboards to predict customer attrition rates, using techniques such as Logistic Regression and Random Forest to enhance predictive capabilities (Dalbah, Ali, and Al-Naymat, 2022, p.1). This study complements other trends by illustrating how machine learning can be applied to improve customer loyalty insights, thereby enhancing business performance.

In evaluating these sources, Bussa's work provides a foundational understanding of cloud computing's role in facilitating global collaboration, while Gurcan et al. offer a longitudinal analysis of business intelligence trends, providing context for the technological advancements discussed. Hamzehi and Hosseini's study adds depth by focusing on industry-specific applications, and Dalbah, Ali, and Al-Naymat demonstrate practical implementations of machine learning in dashboards. Together, these sources paint a comprehensive picture of current trends in dashboard technology, highlighting the importance of integrating cloud computing and machine learning to drive strategic and sustainable business outcomes.

Following the exploration of current trends in dashboard technology, it is essential to delve into specific tools that exemplify these advancements. Tableau and Power BI are two leading platforms in the realm of data visualization and business intelligence, each offering distinct features and benefits that cater to different organizational needs.

Tableau is renowned for its sophisticated data visualization capabilities, providing users with a wide array of options, including bar charts, line charts, Gantt charts, and maps, which facilitate the creation of engaging visual representations (Beard and Aghassibake, 2021, p.159). The platform's drag-and-drop interface simplifies the process of building visualizations, making it accessible to users with varying technical expertise levels. Additionally, Tableau's "Ask Data" feature allows users to pose questions in natural language and receive instant visualizations as answers, enhancing interactive data exploration. The ability to connect multiple data sources through Tableau Relationships streamlines data integration, particularly beneficial in contexts like library work. Furthermore, accessibility improvements ensure that users with disabilities can effectively engage with visualizations, broadening the platform's usability.

In contrast, Power BI is distinguished by its user-friendly interface and seamless integration with other Microsoft products, making it accessible for beginners (Sahaya et al., 2024, p.1046). Power BI dashboards consolidate various data visualizations into a singular platform, simplifying the visualization of KPIs (Khatuwal and Puri, 2022, p.130). It offers visualizations such as benchmarks, tree charts, funnel charts, and fill charts, along with connectors for Software as a Service (SaaS) services like GitHub, Customer Relationship Management (CRM), Salesforce, Enterprise Resource Planning (ERP), Sendgrid, and Zendesk. Power BI's live connectivity to

SaaS services, without transferring data from Microsoft SQL Server to the cloud, enhances security and efficiency. The Power BI Designer allows users to import data, model it, and publish updates, providing flexibility in data management.

In evaluating these platforms, Tableau is optimal for larger data sets, offering advanced visualization tools that require tutorials and training to fully leverage their potential (Sahaya et al., 2024, p.1046). Conversely, Power BI is more suited for small to medium-sized data sets, emphasizing simplicity and integration, crucial for organizations seeking straightforward business intelligence solutions. Both tools demonstrate the importance of tailored solutions in the evolving landscape of data visualization, where user accessibility and integration capabilities are key factors in enhancing organizational decision-making and strategic planning.

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4 Methodology

5 Assessment of Bayer's Current Position

6 Impact of Industry Trends on Bayer

7 Future Implications for Bayer

8 Conclusion

9 Reference List

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10 Appendix

Appendix A:

Appendix B:

11 Statement of Academic Integrity

I solemnly declare that I have independently completed the present work in all its parts and have not used any sources or aids other than those specified in the work. Furthermore, this work has not been submitted in the same or similar form for any other examination. All verbatim or paraphrased quotations, as well as all sections that were designed, drafted, and/or edited with the help of AI-based tools, are clearly marked and documented. In the appendix of my work, I have listed all AI-based tools used, along with product names and formulated inputs (prompts) in an AI directory.

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