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Evolution of Business Intelligence Tools

Vatsalya Vijay Solanki
Department of MCA, VESIT Mumbai

Abstract: Business Intelligence (BI) encompasses tools, technologies, and practices that help organizations collect, analyze, and transform data into valuable insights necessary for decision-making process. It involves data collection, warehousing, analysing, and visualization. BI enables companies to leverage their data for a competitive advantage, driving growth and innovation. Key trends include self-service BI, advanced analytics, and AI-driven insights. BI empowers organizations to unlock data value and make informed strategic decisions.

Keywords: Business Analytics, Business Intelligence, Tableau, PowerBI, QlikSense, QlikView

I. INTRODUCTION

In a world where most decisions are data driven corporations are bombarded with massive amounts of raw data making it a necessity for them to extract knowledge out of it in order to make enhanced decisions based on profound knowledge gained for the raw data. This is where Business Intelligence (BI) tools come into play. The introduction of BI tools has revolutionized the way businesses analyze and utilize their data, enabling them to harness the power of information for strategic decision-making. Eckerson (2005) identified critical success factors for enterprise business intelligence (BI). These factors encompass supporting all users through integrated BI suites, aligning BI tools with users' work methods, enabling integration with desktop and operational applications, delivering actionable information, facilitating rapid development of tools and reports to meet evolving user requirements, and establishing a robust and extensible BI platform. These factors emphasize the importance of comprehensive support, user-centric design, seamless integration, insightful outputs, agile development, and a strong foundation in driving successful BI initiatives within organizations. Properties of BI tools are :

A. Enhanced Data Collection and Integration

BI tools have transformed the process of data collection by providing efficient mechanisms for gathering and integrating data from multiple sources. These tools enable organizations to streamline data extraction, cleansing, and integration processes, making sure the data is consistent and accurate. The capability to assimilate data from varied sources makes it possible for organizations to avail a consolidated view of their customers, KPIs and market-trends.

B. Streamlined Data Analysis and Reporting

Traditionally, analyzing large volumes of data and generating reports was a time-consuming and complex task. BI tools have simplified this process by providing intuitive interfaces and drag-and-drop functionalities that enable users, even non-technical ones, to perform data analysis and generate reports easily. These tools offer features like data visualization, interactive dashboards, and self-service capabilities, allowing users to explore data, identify patterns, and create insightful reports quickly

C. Data Visualization and Communication

One of the significant contributions of BI tools is their ability to transform raw data into meaningful visual representations. Data visualization plays a pivotal role in facilitating effective communication and comprehension of complex information. BI tools offer a wide range of visualization options, including charts, graphs and geographic maps to help users understand trends, correlations and patterns at a glance. Visualizations aid in presenting data-driven insights to the stakeholders, promoting better understanding and informed decision-making.

D. Real-Time and Predictive Analytics

BI tools have advanced capabilities in real-time and predictive analytics, allowing businesses to monitor and respond to dynamic market conditions promptly. Real-time analytics provide up-to-the-minute insights, enabling organizations to identify emerging trends, detect anomalies, and respond swiftly to changing business environments. Predictive analytics make use of historical data and statistical algorithms to forecast future outcomes, empowering businesses to make proactive decisions, optimize processes, and mitigate risks.

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II. EVOLUTION OF BUSINESS INTELLIGENCE TOOLS

A. Executive Information Systems (EIS) (1980s-1990s)

EIS emerged as a specialized type of BI tool, primarily catering to the executives. EIS provided a summary-level information and key performance indicators (KPIs) on a dashboard, allowing decision-makers to quickly grasp the overall health of the organization. These systems offered a consolidated view of an organization's performance, enabling the executives to monitor critical metrics and make informed decisions. EIS emphasized simplicity, user-friendliness, and high-level insights, tailored for executive-level decision-making. While they lacked the advanced analytical capabilities of modern BI tools, EIS paved the way for the development of more comprehensive and interactive executive dashboards, shaping the evolution of Business Intelligence.

B. Online Analytical Processing (OLAP) (1990s)

Oscar. (2014) Describes OLAP as an approach to decision support that aims to extract knowledge from data warehouses or data marts. It enables non-expert users to interactively generate ad hoc queries and navigate through the data without needing assistance from IT professionals. The main idea behind OLAP is to provide user-friendly data navigation and analysis capabilities, allowing users to explore the data from different perspectives and gain insights. OLAP systems utilize a multidimensional data model, often called a cube, which organizes data into dimensions and measures. Through functionalities like slicing, dicing, drilling down, and rolling up, users can easily analyze the data and make informed decisions based on the derived insights. OLAP introduced multidimensional analysis, allowing users to slice and dice the data along various dimensions. It provided a more interactive and flexible approach to exploring data, enabling deeper insights into different aspects of business performance. OLAP allowed users to view data from different angles, facilitating trend analysis, hierarchical drilling, and advanced calculations. With OLAP, organizations gained the ability to navigate complex data sets, uncover patterns, and make data-driven decisions, setting the stage for the development of more advanced analytics tool

C. Dashboards and Scorecards (2000s)

BI tools expanded to include interactive dashboards and scorecards. These visual representations provided real-time snapshots of key metrics, fostering better monitoring of business performance and enabling timely decision-making. In 1993 Qlik launched its software Qlikview which provided the functionality of association making it possible for used to link data without increasing its complexity. Year 2003 saw the launch of PowerBI which provided drag and drop facility enabling users to create exasperating dashboards.

D. Self-Service BI (2010s)

The rise of self-service BI tools brought data analysis and visualization capabilities to non-technical users. These tools offered intuitive interfaces and drag-and-drop functionality, allowing users to explore data, create reports, and generate insights without extensive IT involvement. Analytical softwares like Qliksense emerged to provide advance analytical abilities like data drill down and dynamic visualizations etc. Softwares like tableau provided a easy to use interface which made business analysis accessbile to the non technical users.

E. Advanced Analytics (2010s)

BI tools started incorporating advanced analytics techniques, such as predictive modeling and machine learning. This allowed organizations to leverage their data for forecasting, trend analysis, customer segmentation, and other predictive and prescriptive analytics use cases. The primitive aim of predictive modeling is to create historical data based mathematical models that enable prediction of the future events. Predictive modeling can be used to forecast sales, anticipate customer churn, optimize pricing strategies, and identify potential risks or opportunities. This technology enables automated decision-making, anomaly detection, natural language processing, and recommendation systems. Many other techniques including social network analysis, text mining and sentiment analysis are included in advanced analytics. Organizations are empowered by advance analytics for taking data driven decisions. By leveraging the power of advance analytics corporations can fully incorporate their data into the decision making process .

F. Cloud-Based BI (Present)

Cloud-based BI platforms have gained significant traction as a result of their ability to provide scalability, flexibility, and cost-effectiveness. These platforms enable organizations to securely store and analyze large volumes of data in the cloud, thereby facilitating collaboration, data sharing, and ubiquitous accessibility.

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Leveraging cloud infrastructure, these tools offer scalable solutions that can effortlessly handle growing data volumes without requiring substantial investments in hardware. Moreover, cloud-based BI platforms offer unparalleled flexibility, allowing organizations to easily adjust their resources to meet their specific requirements.

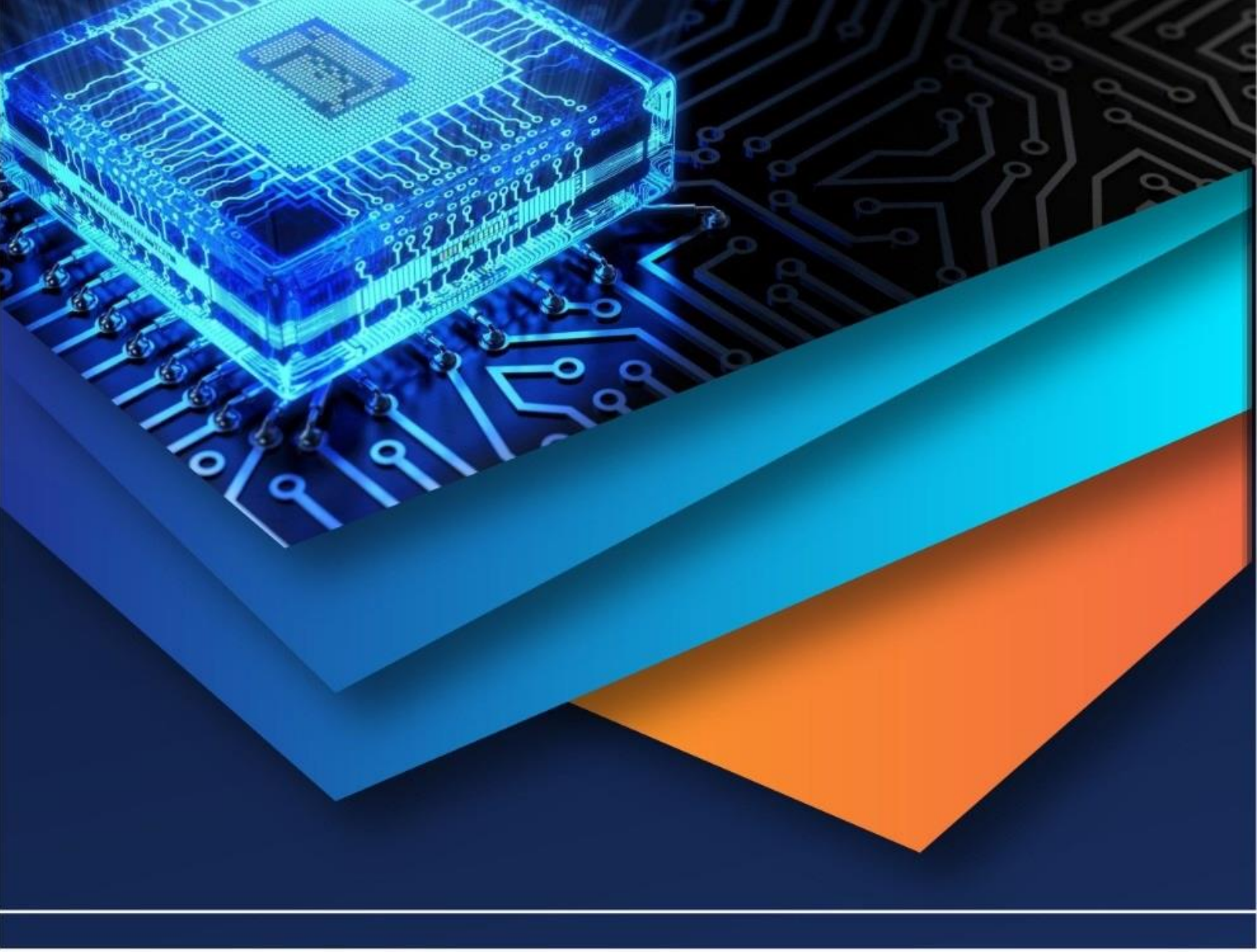
III. CONCLUSIONS

In conclusion, the evolution of Business Intelligence (BI) tools has transformed the way organizations gather, analyze, and utilize data for decision-making. From early reporting tools to the introduction of Executive Information Systems (EIS) and Online Analytical Processing (OLAP), BI tools have progressively become more sophisticated and user-friendly. The advent of advanced analytics and cloud-based BI has further revolutionized the field, enabling organizations to uncover hidden patterns, predict future outcomes, and leverage the power of the cloud for scalability and flexibility. With each stage of evolution, BI tools have become more accessible, adaptable, and integral to organizational success. As technology continues to advance, it is certain that the future of BI tools will bring even more advanced analytics, artificial intelligence-driven insights, and seamless integration with emerging technologies. The evolution of BI tools has proven to be a transformative journey, enabling organizations to harness the power of data and unlock new opportunities for growth and innovation.

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