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Business Intelligence (BI) - Overview

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ABSTRACT: Business intelligence (BI) is the use of technology, tools, and techniques to analyse and interpret data to support business decision-making. The goal of BI is to provide actionable insights that can help organizations improve their performance and achieve their goals. Business intelligence (BI) refers to the technologies, tools, and techniques that organizations use to collect, store, access, and analyse data to inform business decisions. BI enables organizations to gain insight into their operations, identify trends and patterns, and make data-driven decisions to improve performance and achieve strategic goals. It involves the use of reporting, data visualization, analytics, and other technologies to turn raw data into actionable information. BI can be used in a variety of industries, such as finance, healthcare, and retail, to help organizations make better decisions and stay competitive in their markets. The objective is to improve the timeliness and quality of inputs to the decision process. Business Intelligence is used to understand the capabilities available in the firm; the state of the art, trends, and future directions in the markets, the technologies, and the regulatory environment in which the firm competes; and the actions of competitors and the implications of these actions. The emergence of the data warehouse as a repository, advances in data cleansing, increased capabilities of hardware and software, and the emergence of the web architecture all combine to create a richer business intelligence environment than was available previously. Although business intelligence systems are widely used in industry, research about them is limited. In this research paper there is a thorough understanding of BI components and its application.

KEYWORDS: Business Intelligence (BI), Data Visualization, Analytics, Competitive Intelligence

I. INTRODUCTION

Business intelligence (BI) is a rapidly growing field that has become increasingly important for organizations in today's highly competitive business environment. BI is the process of using technology, tools, and techniques to analyse and interpret data to support decision-making and improve organizational performance. The use of BI has become increasingly prevalent in recent years as organizations have come to realize the value of data-driven decision-making. With the explosion of big data and the development of powerful analytical tools, it has become possible to process and analyse large amounts of data quickly and efficiently. This has led to a greater understanding of customer behaviour, market trends, and operational efficiency, which in turn has helped organizations to identify new business opportunities and make more informed decisions. Data warehousing involves collecting, storing, and managing large amounts of data from various sources. Data mining is the process of using algorithms and statistical models to discover patterns and insights in large datasets. Reporting and visualization help to make it easy for users to understand and interpret the data. Predictive analytics uses statistical models and machine learning algorithms to predict future outcomes based on historical data. One of the key advantages of BI is that it provides organizations with a better understanding of their data, which in turn can help to improve their performance and achieve their goals. Additionally, BI can provide a competitive advantage by allowing organizations to quickly identify new business opportunities and make more informed decisions.

In conclusion, Business Intelligence is a powerful tool that can help organizations improve their performance and achieve their goals. With the explosion of big data and the development of powerful analytical tools, it has become more important than ever for organizations to take advantage of the insights provided by BI. Research on BI is important to understand the potential benefits, limitations and ways to implement it in different industries and sector.

II. LITERATURE SURVEY

A literature survey of business intelligence (BI) would involve reviewing and analysing existing research on the topic. The survey would focus on identifying key trends, themes, and challenges in the field, as well as identifying gaps in the existing research. One of the key themes that would likely emerge from a literature survey of BI is the importance of data driven decision making. Many studies have shown that organizations that use BI to inform their decisions are more likely to achieve their goals and improve their performance. Additionally, research has shown that BI can provide a competitive advantage by allowing organizations to quickly identify new business opportunities and make more informed decisions. Another theme that would likely emerge is the importance of data warehousing and data mining. These techniques are critical for collecting, storing and analysing large amounts of data, and have been shown to be essential for providing actionable insights.

In their literature review, Alali, Nofal, and Alharafsheh (2019) examine the existing frameworks for measuring the success of business intelligence (BI) implementation. The authors begin by defining BI and its components, including data warehousing, data mining, and reporting and visualization. They then review the literature on BI implementation success and identify several key factors that have been found to influence the success of BI projects, which includes top management support, organizational culture, data quality, user involvement [1].

In their literature review, Wieder and Ossimitz (2015) examine the impact of Business Intelligence (BI) on the quality of decision making. The authors begin by defining BI, which they describe as the use of software and technologies to gather, store, access, and analyse data to inform business decisions. The authors propose a mediation model that illustrates the relationship between these factors and decision-making quality [2].

In their case study, Azeroual and Theel (2019) investigate the effects of using business intelligence (BI) systems on excellence management and decision-making processes in start-up companies. The authors begin by defining BI, which they describe as the use of software and technologies to gather, store, access, and analyse data to inform business decisions. They then conducted a case study on a start-up company that has implemented a BI system and analyse the effects of the system on the company's excellence management and decision-making processes. The authors found that the implementation of BI system has helped the start-up company to improve its management and decision-making processes by providing them with real-time, accurate and relevant information which facilitate the company to make better and faster decisions. The research gap identified by the authors is that although BI systems have been widely adopted by large and established companies, their implementation and effects in start-up companies have received less attention. The authors suggest that future research should investigate the implementation of BI systems in start-up companies and its effects on their management and decision-making processes [3].

In their book "Business Intelligence", Burstein and Negash (2008) provide an overview of the field of Business Intelligence (BI) and its applications in organizations. The authors begin by defining BI and its components, including data warehousing, data mining, and reporting and visualization. The authors found that BI can have a positive impact on organizations by providing them with the necessary information to make informed decisions and improve performance [4]. In their research, Ülker, Gülin and Coşkun (2021) investigate the use of Business Intelligence (BI) and analytics applications at Turkish universities. The authors begin by defining BI and its components, including data warehousing, data mining, and reporting and visualization. The authors also found that the main reason for the lack of adoption of BI and analytics applications is the lack of awareness and knowledge about these tools, as well as a lack of support from the top management. The authors suggest that future research should focus on identifying best practices for BI and analytics implementation in universities, as well as investigating the impact of these tools on the performance and decision-making processes of universities [8].

In conclusion, a literature survey of BI would reveal that it is a rapidly growing field that has become increasingly important for organizations in today's highly competitive business environment. Research has shown that BI can provide a competitive advantage by allowing organizations to quickly identify new business opportunities and make more informed decisions. However, there are still challenges and limitations that need to be addressed, such as the complexity of the data and the need for advanced analytical skills, lack of standardization, and potential ethical issues.

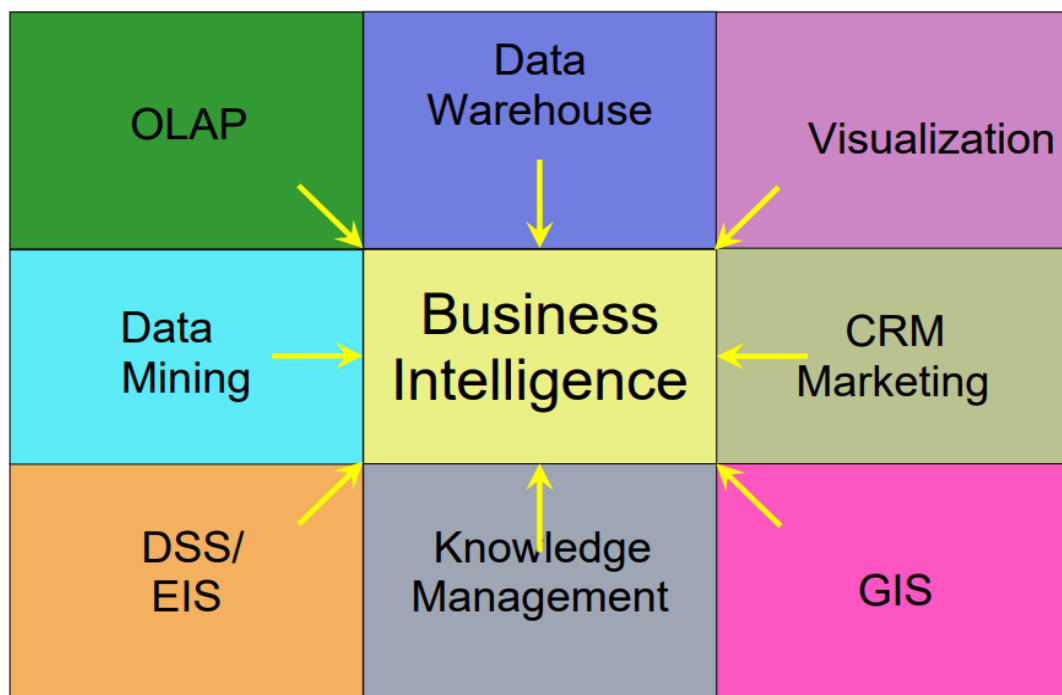
III. METHODOLOGY

BI assists in strategic and operational decision making. A survey ranked the strategic use of BI in the following order:

1. Corporate performance management
2. Optimizing customer relations, monitoring business activity, and traditional decision support
3. Packaged standalone BI applications for specific operations or strategies.

4. Management reporting of business intelligence

One implication of this ranking is that merely reporting the performance of a firm and its competitors, which is the strength of many existing software packages, is not enough. A second implication is that too many firms still view business intelligence (like DSS and EIS before it) as an inward-looking function. Business intelligence is a natural outgrowth of a series of previous systems designed to support decision making. The emergence of the data warehouse as a repository, the advances in data cleansing that lead to a single truth, the greater capabilities of hardware and software, and the boom of Internet technologies that provided the prevalent user interface all combine to create a richer business intelligence environment than was available previously. BI pulls information from many other systems. Figure 1 depicts some of the information systems that are used by BI.



where: OLAP = on-line data processing, CRM=customer relationship management, DSS= decision support systems, GIS = geographic information systems

Figure 1: BI relation to other information's systems

BI converts data into useful information and, through human analysis, into knowledge. Some of the tasks performed by BI are:

- Creating forecasts based on historical data, past and current performance, and estimates of the direction in which the future will go.
- “What if” analysis of the impacts of changes and alternative scenarios.
- Ad hoc access to the data to answer specific, non-routine questions.
- Strategic insight

IV. APPLICATIONS OF BI

Business Intelligence (BI) can be used in a variety of domains to support decision-making and strategic planning. Some examples include:

1. Finance: BI applications can be used to analyse financial data, such as budgets, expenses, and revenue, to identify trends and make predictions about future financial performance.

2. Sales: BI applications can be used to analyse sales data, such as customer demographics, product sales, and market trends, to identify opportunities for growth and improve sales strategies.
3. Marketing: BI applications can be used to analyse marketing data, such as customer behaviour, social media engagement, and website traffic, to optimize marketing campaigns and improve customer engagement.
4. Supply Chain: BI applications can be used to monitor and optimize supply chain operations, such as inventory levels, production schedules, and logistics.
5. Healthcare: BI applications can be used to analyse patient data, such as medical history, treatment outcomes, and cost data, to improve patient care and reduce costs.
6. Retail: BI applications can be used to analyse customer data, such as purchase history, demographics, and inventory levels, to improve customer service and optimize store operations.
7. Manufacturing: BI applications can be used to monitor production processes, such as machine performance, worker productivity, and defects, to improve efficiency and reduce costs.
8. Human Resources: BI applications can be used to analyse employee data, such as turnover, training, and performance, to identify areas for improvement and make data-driven decisions.

These are just a few examples of how BI applications can be used in various domains. The specific applications and use cases will vary depending on the industry and organization.

4.1 BUSINESS INTELLIGENCE FOR FINANCE

Business intelligence (BI) is becoming increasingly important in the financial services industry as it allows organizations to make data-driven decisions and improve their performance. Financial institutions such as banks, insurance companies, and investment firms have large amounts of data that can be used to identify trends, patterns, and opportunities. One of the main ways that BI is used in financial services is for risk management. Financial institutions use BI to analyse data on credit risk, market risk, and operational risk. This allows them to identify potential risks and take steps to mitigate them. Additionally, BI can be used to monitor and analyse fraud and compliance risks, which is becoming increasingly important due to the increasing regulatory requirements.

BI is also used in financial services to improve operational efficiency. Financial institutions use BI to analyse data on processes, systems, and infrastructure. This allows them to identify bottlenecks, optimize resource allocation, and improve automation. Additionally, BI can be used to monitor and analyse data on compliance and regulatory requirements, which is becoming increasingly important due to the increasing regulatory requirements.

A key advantage of BI in financial services is that it allows organizations to make more informed decisions. By analysing large amounts of data, financial institutions can identify trends and patterns that would otherwise be difficult to detect. Additionally, BI can provide insights into customer behaviour and preferences, which can help financial institutions to improve their products and services and increase customer satisfaction. However, there are also challenges associated with the use of BI in financial services. One of the main challenges is the complexity of the data, which can make it difficult to analyse and interpret.

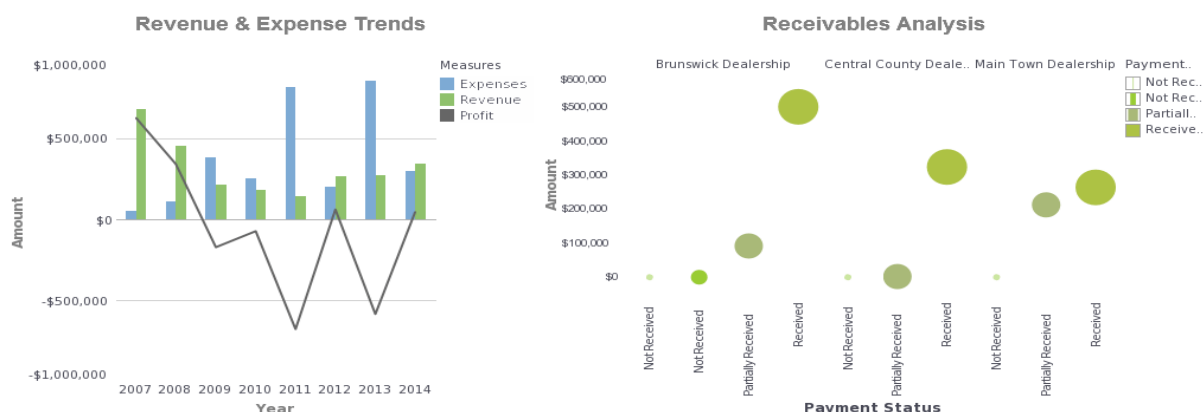


Figure 2: Analysis of BI

In conclusion, Business Intelligence is becoming increasingly important in the financial services industry. It allows organizations to make data-driven decisions and improve their performance by analysing large amounts of data to identify trends and patterns. Additionally, BI can be used to improve risk management, customer relationship management, and operational efficiency. However, there are also challenges associated with the use of BI in financial services, such as complexity of the data, handling large amounts of data in real-time, and concerns about data privacy and security.

4.2 BUSINESS INTELLIGENCE FOR HEALTHCARE

Business intelligence (BI) is becoming increasingly important in the healthcare industry as the Healthcare organizations such as hospitals, clinics, and insurance companies have large amounts of data that can be used to identify trends, patterns, and opportunities. One of the main ways that BI is used in healthcare is for clinical decision support. Healthcare organizations use BI to analyse data on patient outcomes, treatments, and medications. This allows them to identify best practices, improve patient outcomes, and reduce costs. Additionally, BI can be used to monitor and analyse data on patient safety, which is becoming increasingly important due to the increasing regulatory requirements. Another important use of BI in healthcare is for population health management. Healthcare organizations use BI to analyse data on patient demographics, behaviours, and health outcomes. This allows them to identify high-risk patient populations, target interventions, and improve population health. Additionally, BI can be used to analyse data on health disparities, which can help healthcare organizations to address health inequities.

BI is also used in healthcare to improve operational efficiency. Healthcare organizations use BI to analyse data on processes, systems, and infrastructure. This allows them to identify bottlenecks, optimize resource allocation, and improve automation. By analysing large amounts of data, healthcare organizations can identify trends and patterns that would otherwise be difficult to detect. Additionally, BI can provide insights into patient outcomes and behaviours, which can help healthcare organizations to improve their products and services and increase patient satisfaction.

However, there are also challenges associated with the use of BI in healthcare industry. One of the main challenges is the complexity of the data, which can make it difficult to analyse and interpret. Additionally, healthcare organizations need to be able to handle large amounts of data in real-time, which can be challenging. Additionally, there are also concerns about data privacy and security, as healthcare organizations handle sensitive and confidential data.

4.3 BUSINESS INTELLIGENCE FOR IT COMPANIES

Business Intelligence in IT companies such as software development companies, consulting firms, and IT service providers have large amounts of data that can be used to identify trends, patterns, and opportunities. One of the main ways that BI is used in IT companies is for project management. IT companies use BI to analyse data on project progress, timelines, and budgets. This allows them to identify potential delays, optimize resource allocation, and improve project management. Additionally, BI can be used to monitor and analyse data on team productivity, which can help IT companies to identify areas for improvement and increase efficiency.

Another important use of BI in IT companies is for product development. IT companies use BI to analyse data on customer feedback, market trends, and product usage. This allows them to identify product enhancements, target new markets, and improve product development. Additionally, BI can be used to analyse data on customer satisfaction, which can help IT companies to improve their products and services and increase customer loyalty.

BI is also used in IT companies to improve operational efficiency. IT companies use BI to analyse data on processes, systems, and infrastructure. This allows them to identify bottlenecks, optimize resource allocation, and improve automation. Additionally, BI can be used to monitor and analyse data on compliance and regulatory requirements, which is becoming increasingly important due to the increasing regulatory requirements.

4.4 BUSINESS INTELLIGENCE FOR RETAIL

Retail is one of the most data-driven industries globally, so using business intelligence tools to understand customer behaviour, estimate inventory needs, and build forecasts is the life's blood of any retailer. BI helps retailers organize, analyse, and contextualize business data from around the company. It also provides reports, performance measures, and company trends that help businesses make informed decisions in the present day. With the worldwide business intelligence and business analytics software market expected to reach 17.6 billion dollars in 2024, it goes without saying that BI can certainly benefit the retail industry specifically.

Business intelligence allows retailers to take advantage of new opportunities to predict sales and see the market potential and understand customers on a deeper level. While you might have got a brief idea about why BI in retail is necessary, in the following sections, let us discuss in detail the role of BI in the retail sector and its countless benefits for your business.

The retail industry is more competitive and fast-paced than ever, and when it comes to staying ahead of the competition, there's no such thing as having too much information. Business intelligence in the retail industry helps track how customers interact with e-commerce stores, and this information can be used to enhance the customers' shopping experience. For instance, a customer gets suggestions based on previously viewed items. With business intelligence, retailers can also make smart and efficient decisions based on customer behaviour. Data can be viewed in real-time, allowing businesses to make changes in merchandise offerings or adjust prices quickly. This information can be also used by brick-and-mortar stores. They can use BI to balance inventory between online and in-store stock and provide cost-effective shipping options such as picking up in-store or buying online.

Here are some ways in which retailers can enhance their BI capability by using the various solutions suited to their needs.

- Dashboards and visualization
- Data mining
- Predictive analytics
- Prescriptive analytics
- Text analytics

4.4.1 BENEFITS OF BUSINESS INTELLIGENCE IN THE RETAIL INDUSTRY

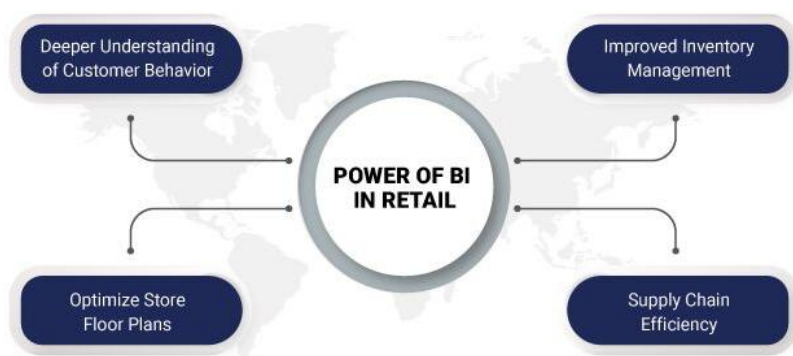


Figure 3: Power of BI in retail industry

The idea of BI in retail is to help businesses operate in a smarter & agile way. Here are some of the major benefits that retailers can exploit:

- **Deeper Understanding of Customer Behaviour:** With BI, retailers can discover who their customers are, how they behave & what they want. This information is crucial to boost CX & enhance marketing initiatives. For example, retailers can use customer analytics by utilizing a BI tool that helps in creating products or services to meet end user expectations. The analytics can even help marketers to craft data-driven customer journey maps by providing insights about how customers interact with products, websites, or businesses.
- **Optimize Store Floor Plans:** A BI software can help retailers to design a floor plan that allows customers to shop without hassle. This helps determine whether the selected floor plan is sufficient for the floor size and product types.
- **Improved Inventory Management:** Any retail company that holds stocks can encounter inventory challenges ranging from inefficient tracking to overstocking issues and more. Investing in a business intelligence solution

can simplify inventory management and solve most of the stock-related challenges. This system enables maintaining optimal stock levels, reduce inventory costs, and improving order management and order processing. It also helps predict overstocking scenarios before they become a significant problem.

- **Supply Chain Efficiency:** Today supply chains have become more complex as retailers engage with merchants and sell more of their products. This could lead to inefficiencies and an increase in underperforming departments with limited/no visibility into different distribution channels. However, the BI system can give key insights gained from day-to-day operations. This allows businesses to create a logical forecast model as well as identify & eliminate logistical bottlenecks that could be addressed by the supply team.

4.4.2 REALWORLD EXAMPLES OF BI IN RETAIL

Starbucks: The Seattle-based coffee chain leverages BI to a great deal. With the widely popular loyalty card program, it gains access to large volumes of data. By bringing the right system in place, the coffee giant can predict what individual customers would order next. This encourages offering more personalized experiences with every in-store visit, thus increasing overall sales.

Amazon: Based on the search & surfing trends, Amazon today can personalize product recommendations for a specific type of customer and market products effectively. They even leverage data to make accurate & logistical business decisions. An outcome of comprehensive data analysis enables the eCommerce giant to efficiently manage its huge supply chain.

Coca-Cola: Automating manual reporting processes by utilizing BI, the multinational beverage company saved 260 hours a year! Additionally, report automation offered sales teams utilize the right customer relationship management (CRM) data that helps with timely and actionable information.

V. CHALLENGES FACED IN BUSINESS INTELLIGENCE (BI)

There are several challenges that organizations may face when implementing business intelligence (BI) solutions. These challenges include:

1. **Data Quality:** Ensuring the quality and accuracy of the data used for BI is a major challenge. Data may be incomplete, inconsistent, or inaccurate, which can lead to incorrect conclusions and poor decision-making.
2. **Data Integration:** Integrating data from various sources is a complex and time-consuming task. This is especially true when integrating data from legacy systems or external sources.
3. **Data Governance:** Ensuring that data is secure and compliant with regulatory requirements is a major challenge. This includes ensuring that data is protected from unauthorized access and ensuring that data is being used ethically and legally.
4. **Technical Complexity:** Implementing BI solutions can be technically complex, particularly for organizations without a strong IT infrastructure. It requires specialized skills and knowledge, such as data warehousing and analytics.
5. **Limited Resources:** Organizations may face limited resources for BI projects, such as budget and personnel. This can make it difficult to acquire and implement the necessary technology, as well as to properly train employees.
6. **Maintenance and Support:** BI systems require ongoing maintenance and support to ensure that they continue to function properly and deliver accurate and timely information. This can be a significant challenge for organizations with limited resources or limited IT expertise.

Overall, implementing Business Intelligence can be complex and challenging, it requires a clear strategy, proper planning, and a strong team with the right skills to overcome these challenges and achieve success in the long term.

VI. CONCLUSION

Business intelligence is a management term that describes a collection of tools and technology that enable the collection, analysis, and access of information about an organization's operations. Organizations that have thorough understanding of aspects that affect their business, such as production standards, selling standards, and internal organizational processes, benefit from BI. The purpose of this paper was to give an insight into the current trend topic Business Intelligence. In this research paper, an effort has been made to explain business intelligence ideas and their application techniques.

Recently, the business market is realizing the actual potential of business intelligence and they are now ready to invest large amounts to hire such professionals. Factors such as increasing perceptive consumers, associated with strict government and industry restrictions and an explosive marketplace, have led to the adoption of Business Intelligence. This has, therefore, led to extreme improvements in operations and processes and increased competence. Today, Indian Companies like Housing.com and Eveready Industries are using BI to enhance customer interface and analyse sales data. BI as a function is finding a strong footing in the sectors of e-commerce and retail, finance (banking, insurance etc.), and surprisingly in the industries of gaming, food, fashion, public transport and governance. There is definitely going to be a strong dependence on Business Intelligence to advance user acquisition and growth in every sector.

As the dependence on data increases, almost any usage of data will require analytics and Business Intelligence to extract actionable insights in future. Experts predict that while the enterprise software solution giants like Cognizant and Wipro will continue to offer Business Intelligence solutions, younger companies are poised to offer most of the fun and exciting BI software products. It's a good time to be a data driven company when it is evident that data is the future.

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