



Enterprise BI & Analytics Platforms

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Abstract

This is the eighth edition of the BARC Score Enterprise Business Intelligence and Analytics Platforms vendor evaluation and ranking. This research compares enterprise BI & analytics platforms that fulfill a broad set of BI & analytics needs. The aim is to evaluate software that is not confined to a specific usage scenario or user type but is able to allow a large number of different users to gain insights from data by using a variety of analysis methods and presentation formats.

Based on countless data points from 'The BI & Analytics Survey' and many analyst interactions, vendors are rated on a variety of criteria, from portfolio capabilities and architecture to sales and marketing strategy, financial performance and customer feedback.

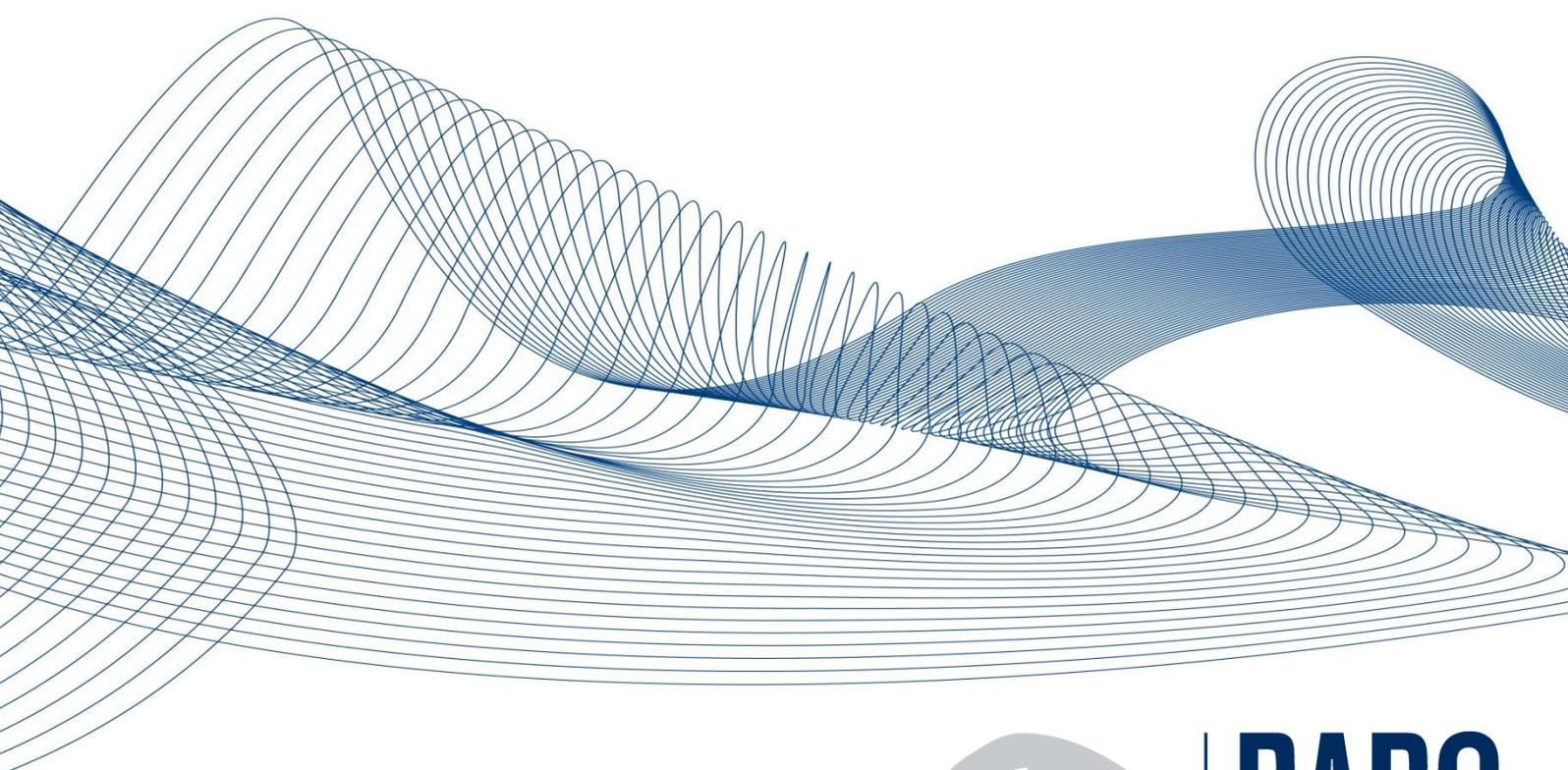


Table of contents

Overview.....	3
Inclusion criteria.....	5
Evaluation criteria	5
Portfolio capabilities	5
Market execution.....	10
Score	13
Score regions.....	14
Evaluated vendors and products	15
Vendor evaluations.....	17
Board International.....	18
Dimensional Insight.....	20
Domo.....	21
Dundas Data Visualization.....	23
IBM.....	25
Google.....	27
Microsoft.....	29
MicroStrategy.....	31
OpenText	33
Oracle.....	35
Pyramid Analytics	37
Qlik	39
SAP	41
SAS	43
Sisense	45
Tableau	47
TARGIT	49
TIBCO	50
ThoughtSpot.....	52
Yellowfin.....	54
Zoho	56
Other vendors.....	58
Related research documents	63

Overview

The market for enterprise business intelligence (BI) and analytics platforms is continuously evolving at pace. Business user empowerment through augmented analytics and ML is pursued by all relevant market players. Even established platform vendors with strong governance as their sweet spots are investing heavily in modernization for better business user orientation. On the other hand, BI & analytics specialists originally focused on business users have entered the market targeting buyers from line of business who were frustrated by IT-controlled and central BI environments.

Despite different approaches, the challenge of supplying end users and information consumers with needed insights to help them in their daily work remains. This is indicated by a low average percentage (a median of 15 percent in 2022) of employees using BI & analytics software¹. Users request functions to interact with data in a simple manner in any application they use. They need to analyze data thoroughly to detect outliers, understand clusters and run predictions to make the most out of their data treasures. Vendors typically want to provide this functionality via guided and interactive apps equipped with actions to monitor needed KPIs, personalize the provided content and even use preconfigured actions to execute tasks in operational systems to shorten the time from insight to action. Natural language query processing (NLQ) helps information consumers search for insights and is one of the approaches pursued to lower the barrier to analytics adoption. ML-based explanations in natural language (NLG) point users' attention to anomalies identified in data.

To further remove barriers and increase adoption, vendors aim to reach end users by enhancing BI & analytics directly connected to their business applications by integrating interactive content into this software. Many vendors enhance their embedding capabilities, enter OEM contracts or provide prebuilt BI & analytics for other solutions that they offer. Popular applications with recently improved integrations from multiple vendors include SAP, Salesforce, Slack, Microsoft Teams and Microsoft Office.

This BARC Score analyzes the strengths and challenges of the leading vendors that offer significant value to customers wanting to implement an enterprise BI & analytics platform to support elevated needs across the entire organization rather than merely at team level.

A modern enterprise BI & analytics platform spans traditional and explorative BI & analytics requirements both for standalone applications but also when embedded in operational applications. With the growing importance of data to support corporate decisions and boost the efficiency and effectiveness of operational processes, a modern enterprise BI & analytics platform is the indispensable backbone of any enterprise wanting to succeed in adapting to the digitalization of markets. For that, organizations need platforms that can fuel a growing number of data products, services and business models powered by data and analytics and are capable of serving a large number of users with different needs.

The increasing complexity of data analysis, growing data volumes and diversity of data have made data management and governance indispensable in the modern analytics landscape. The shift to the cloud has inevitably led to organizations storing valuable data in multiple clouds. Leading vendors have doubled down on their efforts to leverage that data by improving their live query, in-database analytics and multi-cloud capabilities to help companies provide access to all their data.

The technical backbone of an enterprise BI & analytics platform provides the capabilities to set up a governed and open semantic layer for all BI & analytics modules and third-party tools, integrate the required data and offers additional functionality such as data lineage, impact analysis and data catalog features.

As content creation at large has shifted to business users, most vendors have started to provide more data preparation and appropriate governance features that enable them to go beyond pure information consumption. A solid and innovative infrastructure as well as tightly integrated modules for different

¹ Source: The BI & Analytics Survey (www.bi-survey.com)

tasks are required as modern enterprise BI & analytics platforms must support a broad range of use cases.

Besides buying a modern enterprise BI & analytics platform, organizations should have a BI & analytics strategy that goes well beyond an architecture blueprint to include non-technical and emerging business-user-oriented requirements, alignment with corporate strategy, organizational models, outcome-based priority settings and a proper roadmap. The shift in data and analytics strategies towards data democratization, enhancing data culture and delivering self-service at enterprise scale is also reflected in the new features added to leading platforms.

When it comes to kicking off or expanding a business intelligence and analytics program, the initial focus almost always lies on the required toolsets. While this may not always be the best starting point, a platform decision has to be made at some stage. This document will help you when selecting software by providing evaluation results on the BI & analytics portfolios from all the leading vendors.

Inclusion criteria

There are two categories of inclusion criteria for this BARC Score: The first is associated with a vendor's products and the other is linked to the financial results relating to those products. To be evaluated in this BARC Score, a vendor must have a strong focus on providing BI & analytics functionality and supply four out of five technologies from the following functional portfolio:

- Formatted reports
- Dashboards
- Analysis and data discovery
- Advanced and predictive analytics
- Self-service BI & analytics

In addition, the vendor must generate a minimum of 15 million Euros in license revenue per year with the above product set, spread across at least two separate geographical regions. Furthermore, the product set must have a significant number of implementations and license revenues across different geographical regions to be considered as global.

We consider the following as individual geographical regions:

- Europe, Middle East and Africa
- North America
- Latin America
- Asia and Pacific

Evaluation criteria

Every vendor is evaluated on two dimensions, 'Portfolio capabilities' and 'Market execution', each of which represents an axis on the BARC Score chart and considers the sub-criteria described below.

Portfolio capabilities

In this BARC Score, vendors' portfolio capabilities were scored in several areas:

- Standardized content
- Data
- Infrastructure
- Analyses (including advanced and predictive analytics)
- Portfolio
- User support

The weightings for each of the categories and sub-categories are shown in Table 1. Each of the sub-categories also have detailed weightings and criteria.

Please note: Only vendor-distinct functionality is included in our vendor portfolio ratings. We do not consider OEM products or partner solutions.

Table 1: Portfolio capabilities - criteria and weighting

Category	Criteria	Criteria weighting	Category weighting
Standardized content	Dashboards and analytical applications	High	High
	Formatted reports (print-oriented)	High	
	Content distribution	Medium	
	Embedded BI & analytics	Low	
	Mobile BI & analytics	Low	
	Data stories	Low	
Data	Relational semantic model	High	High
	Dimensional semantic model	Medium	
	Data storage	Medium	
	Data preparation	Low	
	Connectivity	Low	
Infrastructure	Performance	High	Medium
	System architecture	Medium	
	Openness	Medium	
	Deployment	Low	
Analyses	Analyses (incl. OLAP analyses)	High	Medium
	Visual exploration (visual analysis)	Medium	
	Advanced and predictive analytics	Medium	
	Automated insights (ML)	Low	
Portfolio	Integration	High	Low
	Maturity	Medium	
User support	Ease of use	High	Low
	User guidance	Medium	
	Conversational UI	Low	

Standardized content

A modern BI & analytics platform must be able to serve users of all types with relevant and personalized information. Consumers consistently demand diverse content distribution formats served over a vast number of different channels to satisfy their diverse needs. Therefore, we assessed capabilities and support for the creation of various content formats and the information delivery capabilities of each platform.

- **Dashboards** (analytical applications): Provide a graphical overview of key performance indicators combined with the ability to intuitively drill down to details for consumption on all devices. Therefore, responsive design for all display types is vital. Modern BI & analytics platforms allow companies to build sophisticated guided apps to attract users of all skill levels in all business areas. Moreover, these apps can contain actions to execute tasks in operational systems.
- **Formatted reports**: Mostly page-oriented reports with a standardized format. They are run on regular schedules, triggered by alerts or on demand by user requests. Formatted reports include static (exported) as well as dynamic reports with filters and a predefined, reader-oriented layout.

Precise control over layout components such as pixel-perfect placement and numerous printing options (e.g., page optimizations, hiding components for printing).

- **Content distribution:** Content created in all application types must be readily available to feed all communication channels. Distribution must include bursting static and page-oriented PDF reports as well as exports to various formats, such as Excel files, often delivered via email. Triggers for data-driven alerts, scheduling and bursting are required to reach a broad number of users. Recently, integration with collaboration tools such as Microsoft Teams and Slack has grown in importance for customers and vendors alike.
- **Embedded BI & analytics:** Embedding BI & analytics in operational applications is steadily growing in popularity. From dashboards to prediction and optimization models, users get insights directly in their specific operational processes and can act on the findings – closing the classic management loop from information to action at operational level.
- **Mobile BI & analytics:** Prepare content from all application types such as reports, dashboards and data stories for mobile use without rebuilding or duplicating definitions. Responsive design with preview for mobile devices is required. Mobile consumption requires additional capabilities such as offline consumption, content push, extended security options and access to NLQ. Serving automated insights in a mobile-optimized way greatly enhances possibilities to analyze data on mobile devices.
- **Data stories:** Combine findings and visuals from analyses and reports into a compelling narrative presented in an interactive manner. Data stories help foster change grounded on evidence collected as they connect isolated findings with each other and provide valuable context for decision-making. Natural language generation (NLG) describes patterns in data and through it offers a valuable starting point for data storytelling.

Data

Modern BI & analytics platforms require sophisticated and integrated data handling capabilities ranging from connectivity to preparing data for use in analytics to storage and modeling.

- **Relational semantic model:** A shared and trusted description of master data and measures is key to governed data sources. It allows users to retrieve data from all sources quickly for analysis and report creation. The creation and support of relational semantic models is assessed in this category. Recently, providing live access to data residing in multiple clouds became an important area for improvement for relational semantic models. As most data sources used in BI & analytics are relational, we attribute high importance to this criterion.
- **Dimensional semantic model:** Dimensional models are easy to understand and use, allowing users of all skill levels to dig into data. They offer a huge advantage by organizing data in dimensions. Dimensional models can be implemented as an abstraction layer on top of a relational data source (ROLAP), as a distinct multidimensional, often in-memory, storage (MOLAP) or as a hybrid (HOLAP). As enterprises typically have requirements that benefit from both relational and dimensional types of models, a modern BI & analytics platform should be able to query both.
- **Data storage:** An integrated and performance-optimized data store helps to improve query performance (cached data). Many vendors leverage in-memory data sets or build on open source technology such as Apache Parquet to support this. Direct access to multiple data sources either on-premises or in one or multiple cloud environments should be available too. This increases the scope of possible use cases and helps leverage existing data governance measures.

- **Data preparation:** Allowing business users to shape, enrich and publish data for all analytical purposes must be supported to increase the flexibility and reach of a platform. Combining data from different sources is as important as combining cached and live data. Good data profiling speeds up data preparation significantly and helps to enhance data quality.
- **Connectivity:** Tools must effortlessly connect to all types of data source such as a data warehouse, a cloud data lake, business applications and unstructured data. Predefined connectors help to leverage data from the growing number of business applications in use. Good performance, traceability and monitoring help users to ingest data from everywhere.

Infrastructure

A modern enterprise BI & analytics platform must serve numerous usage scenarios and expanding user numbers as well as growing data sources and volumes. In terms of infrastructure, we evaluate a broad range of technical criteria including architecture and openness as well as other technical features such as performance optimization techniques and security settings.

- **Performance:** The time it takes to retrieve data and content after a user interaction (e.g., a query). Despite growing data volumes, users increasingly expect instant results from all operations. Even in mature markets, the differences between the tools available are huge. Performance plays an important role in user satisfaction, acceptance and perceived usability, and ultimately in the value created from data.
- **System architecture:** A sophisticated system architecture allows for efficient scaling if the data volume or the number of users increases without compromising performance or requiring huge hardware investments. Moreover, modern software is based on micro services and containers, making platforms easier to scale up with demand and simplifying maintenance and operation.
- **Openness:** The average number of BI & analytics tools in use is growing in most companies. With that comes the need to integrate these tools. The APIs available to support interaction with third-party products play an important role to open platforms and reach more users. Providing access to the semantic layer and data from the internal storage (cached data) is key for many companies when connecting multiple tools.
- **Deployment:** Customers expect a range of deployment options to support their individual needs driven by where data is generated and consumed as well as by data governance requirements. Typical deployment options for BI & analytics platforms are hosted cloud environments (SaaS) in the vendor's cloud or with other popular PaaS providers (e.g., AWS, Azure, Google). Public, shared, often multi-tenant deployments as well as private cloud deployments are offered by many vendors. On-premises deployments are still requested by many companies, often as part of hybrid scenarios, which are becoming increasingly popular.

Analyses

The continuously growing number of data sources to consider and the variety of analytics questions to answer based on them raises the demand for methods to analyze data in-depth quickly. Business users need a powerful toolkit of methods to analyze data as distinct questions and data structures require tailored approaches to reveal its hidden secrets with little effort.

- **Analyses:** Analyses allow business users to intuitively dig deep into the available data. OLAP provides dimensions and measures to structure data in a multidimensional format geared at business users. While not discussed much these days, dimensional analyses are still widely used and extremely valuable to many. Ad hoc analyses can also leverage relational semantic

models to quickly produce simple reports (often limited to a single query). Augmenting the experience of users when analyzing data through automated insights, NLG and NLQ are rated under the 'Conversational UI' criterion (described below).

- **Visual exploration** (visual analysis): Visual exploration allows users to quickly scan significant amounts of data for patterns, outliers and clusters, or even to quickly understand what is in a dataset in an engaging way. Interactive graphical representations facilitate gleaning insights by making use of the human ability to detect patterns. Visual analyses benefit from tight integration with data preparation and can deliver insights into data sets that do not fit the constraints of dimensional analyses.
- **Advanced and predictive analytics**: Enables users to analyze large amounts of data quickly and creates valuable predictions that can inform decisions on all levels – often powered by machine learning. Modern platforms must provide the facilities to integrate analytical models created in popular languages (e.g., Python, R) in the presentation as well as in the data loading stage. Jupyter Notebook integration allows users to leverage modeled and enriched data for advanced analytics and integrate the resulting visualizations into interactive dashboards.
- **Automated insights** (ML): Automated insights speed up time to insight by making use of machine learning to highlight the most important insights in data, guiding users through possible analysis steps and giving answers beyond questions asked explicitly. Patterns and outliers are detected in the background and are presented to users in a meaningful way – often supported by natural language generation (NLG). Leading vendors in this field provide ample feedback possibilities and usage tracking to optimize the insights created.

Portfolio

The perspective of power users and casual users is important when rating BI & analytics platforms. Therefore, we analyze the integration between the system components comprising the platform as well as the consistency of user interfaces and experience across all modules. The product's lifecycle and maturity are also assessed as this yields insight into quality and stability. Sometimes vendors offer mature products that are no longer being enhanced with innovative, new features. As a consequence, they may fail to fulfill new and emerging requirements.

- **Integration**: A state-of-the-art business intelligence and analytics platform must have consistent user interfaces for publishing, consuming and interacting with data and reports. Consistency should not only apply to user interfaces but also to objects used to present and interact with data (e.g., tables and graphs) at report level and to data access (e.g., common semantic layer, joint data access standards and security, reusable objects).
- **Maturity**: Maturity describes how long a tool has been on the market with a continuous development record or if significant changes to the front end or underlying architecture have been introduced recently. Mature products are typically more stable and offer a comprehensive set of functions under the hood that are important to facilitate daily use but are often not obvious at first glance.

User support

We assessed some overarching criteria related to the end-user experience, such as ease of use, guidance capabilities and the availability of a conversational UI to help content consumers to gain insights.

- **Usability** (ease of use): Unified interfaces with a clear and modern design are required to attract business users. Good integration between all components and reliable performance are vital for productivity in content creation – from reports to dashboards and beyond. In business-user-oriented modules, coding must be optional and guided navigation should be available rather

than expecting users to locate and open wizards and menus. Personalization of interfaces helps to present users with what they really need and lets them focus on what matters most.

- **User guidance:** Increases usability by active support throughout analysis, content creation and consumption. Suggestions for suitable visualizations based on selected data help users to make sense of data quickly. ML is increasingly used in data preparation and modeling for suggesting data transformation steps or highlighting data quality issues. Automated insights also guide users through their analyses by highlighting possible outliers and showing interesting patterns.
- **Conversational UI:** Allows users to interrogate data sets (search-based analytics) or interact with an analytics bot by typing in questions in natural language (NLQ) or even leveraging speech recognition, which comes in handy when using a mobile device. NLQ can also be used to quickly build basic reports or dashboards or can be integrated in collaboration software. NLQ makes BI & analytics accessible to even more users, which is important in democratizing data access. Natural language generation describes patterns of interest in data to help users understand the visualizations they are presented with and interesting findings and trends that lie below the surface of the visual.

Criteria weighting

We do not consider all categories and sub-categories to be equally important in this BARC Score. Our weightings are based on BARC's own view of current user focus and buying patterns.

Market execution

On the market execution axis, we rate the business intelligence vendors in this BARC Score using the following criteria and their corresponding weighting (see Table 2).

Table 2: Market execution - criteria and weighting

Criteria	Weighting
BI & analytics platform offering	High
Market distribution of product	High
Product strategy	High
Customer satisfaction	High
Financials	Medium
Development	Medium
Geographical coverage	Medium
Ecosystem	Medium
Sales strategy	Medium
Organizational strength	Low
Marketing strategy	Low

BI & analytics platform offering

The vendor’s strategy for helping companies to create a secure, governed, analytical decision-making system as the backbone to cover a broad scope of use cases and cater for a vast number of different users is rated. Additionally, the visibility of the vendor in the market for modern BI & analytics platforms and related uses is judged.

Market distribution of product

This criterion covers the estimation of BI & analytics revenues for each BI & analytics product evaluated in this BARC Score and aims to show the overall market distribution of a particular product. We weight this criterion more heavily than the company’s financial performance (see ‘Financials’ below).

Product strategy

Vendors are rated on the clarity and completeness of vision for their BI & analytics offering, product roadmap and innovation, as well as the alignment of the company portfolio with current market trends and demands.

Customer satisfaction

In this year's BARC Score, we have included the *Customer Satisfaction* KPI from The BI & Analytics Survey. This takes into account product satisfaction, vendor support and implementer support ratings reported by customers.

Financials

This criterion covers the financial position of the vendor, from market capitalization, cash position and EBITDA to profitability, burn rate and investment rounds. For vendors that are private companies or do not break out the numbers for individual product lines, estimated figures are used. This category includes a scaled overall assessment of the vendor's financial performance.

Development

We examine the development track record of the tool and whether it is still strategic in a vendor's portfolio for the market segment in question. The roadmap for development must show a clear vision and feasible path and significant new features must have been implemented in the course of a continued development effort by the vendor.

Geographical coverage

Vendors are evaluated on their global presence. We look at the various geographic regions and major countries in which the company conducts business with both a sales and marketing presence as well as development and support functions.

Ecosystem

In this category, we evaluate the extended ecosystem in which the vendor participates. This includes business partner networks, hardware or cloud infrastructure providers, consulting firms and systems integrators, and other technology alliances. We also evaluate whether each vendor has a dedicated team looking after and recruiting partners.

Sales strategy

To rate a vendor's sales strategy, we look at the various channels through which the company goes to market: with both direct and indirect sales teams, through distributors, value-added resellers (VARs), online channels as well as OEM relationships. We also evaluate the vendor's product pricing and its various sales models, such as perpetual licensing, support subscription, open source and freemium.

Organizational strength

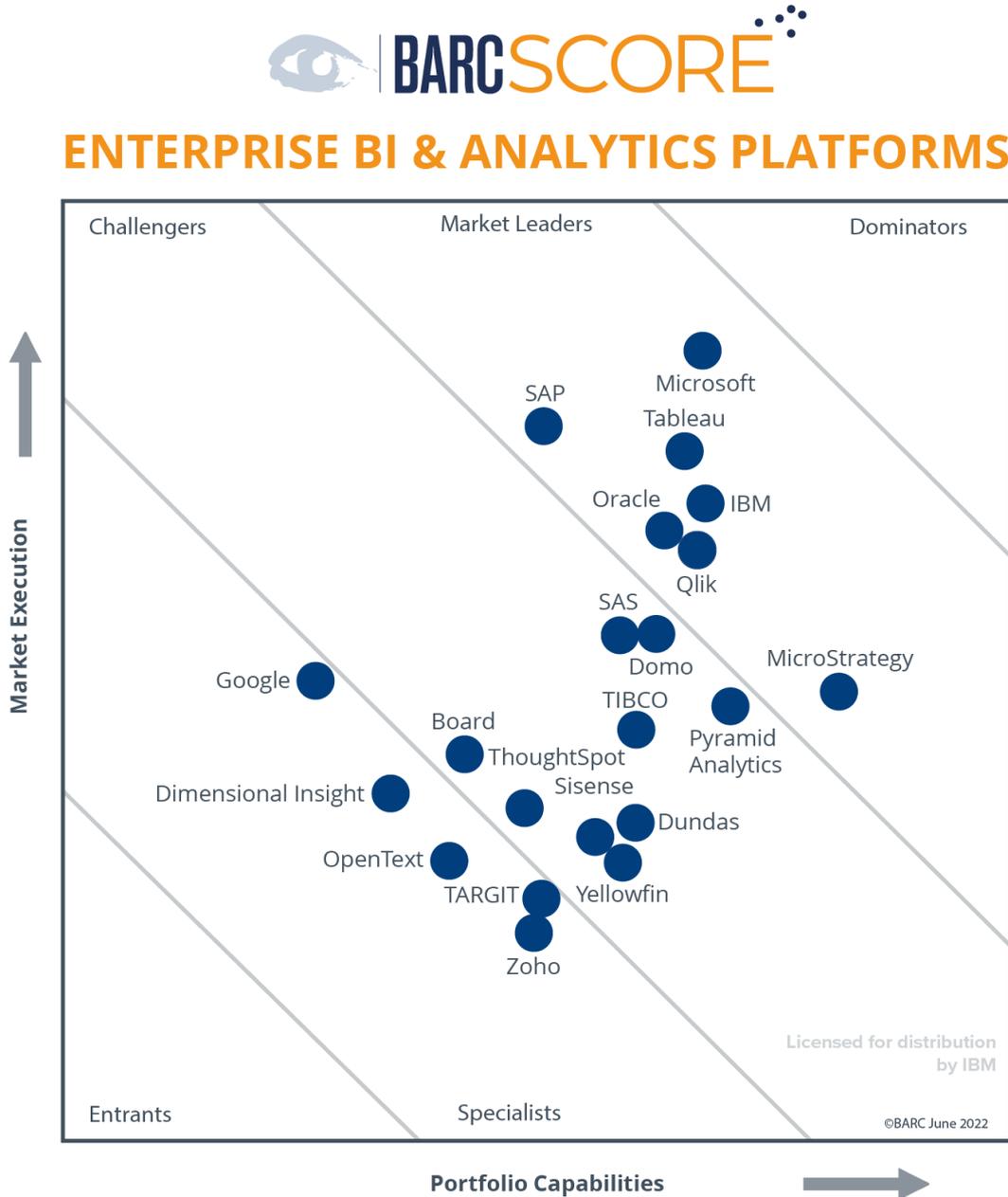
Vendors are rated on their organizational stability, which is influenced by consistency of corporate strategy, continuity of executive leadership, but also staff turnover, reorganization and layoffs.

Marketing strategy

A vendor's marketing strategy is evaluated by rating its corporate and product messaging, the company's presence in printed media, advertising and social networks, as well as its ability to run events, such as conferences, seminars, roadshows and webinars.

Score

Calculating the individual ratings for all criteria and all vendors produces two scores per company: the 'Portfolio capabilities' score and the 'Market execution' score, each being plotted on the corresponding axis, resulting in the vendor's dot on the following BARC Score chart (see Figure 1).



Disclaimer: BARC Score is published by BARC GmbH (BARC). This chart is part of a larger research document, which contains explanations of the methodology and criteria behind the chart, and should be viewed in the context of the full document. BARC does not endorse any of the vendors featured in its research documents, and does not advise readers to select only those vendors with the highest ratings. Vendors appearing in the bottom left corner of this chart are market entrants or specialists and should not be interpreted as inferior. Those vendors in the top right area are not necessarily superior, but have strong portfolio capabilities and market execution.

Figure 1: BARC Score Enterprise BI & Analytics Platforms, June 2022

Score regions

Vendors can be positioned in one of five regions, depending on their total score on each of the two axes.

Dominators

Dominators are vendors that drive both technology and market adoption in a highly influential manner. They possess both a broad portfolio of market-leading and dominating products with a strong brand as well as a robust commercial prowess through best-in-class sales and marketing programs, an extensive ecosystem of business partners and alliances, and a rock-solid financial position. Dominators are considered a contender in virtually every planned implementation.

Market Leaders

Market leaders are well established vendors that drive strong market adoption, supported by technology innovation and strategic acquisitions and by leveraging robust account management and a solid track record. Their portfolio enjoys high brand awareness in the market and covers an extensive range of technologies and services with only few gaps. Market leaders typically have a large market share, making them a viable contender in almost all implementation scenarios.

Challengers

Challengers come in various shapes and sizes. They can be large vendors tapping into a new market by acquisition and pushing their way in with force, small innovative companies with a promising portfolio but limited sales and marketing resources, or vendors that attempt to disrupt a market with a new technology approach or different business model.

Specialists

Specialists are often smaller vendors with a portfolio focused on a specific market segment. They can be either limited in their technical capabilities by concentrating on certain features and functions, or they may only focus on select geographic regions rather than the global marketplace.

Entrants

Entrants are usually startups with limited reach and visibility in the market. Their product capabilities are incomplete when compared to competitors, and their long-term market potential is still unproven.

Evaluated vendors and products

The latest versions of the following products are evaluated in this BARC Score:

Vendor	Product(s)
Board International	Board
Dimensional Insight	Diver Platform
Domo	Domo Business Cloud
Dundas Data Visualization	Dundas BI
Google	Cloud Platform Data Studio
IBM	IBM Cloud Pak for Data IBM Cognos Analytics IBM Planning Analytics with Watson IBM Watson Studio
Microsoft	Power BI Power BI Report Server SQL Server Reporting Services Analytics-related Azure Services such as Data Explorer and ML
MicroStrategy	Analytics Platform
OpenText	OpenText Analytics Suite OpenText Magellan
Oracle	Oracle Analytics Cloud Oracle Analytics Server OCI Data Science
Pyramid Analytics	Pyramid
Qlik	Qlik Active Intelligence Platform
SAP	SAP Analytics Cloud

Vendor	Product(s)
SAS	SAS Visual Analytics SAS Visual Statistics SAS Visual Data Mining and Machine Learning SAS Data Preparation SAS Visual Forecasting SAS Visual Text Analytics
Sisense	Sisense Fusion Platform
Tableau	Tableau Desktop Tableau Server Tableau Prep Tableau Data Management Tableau Server Management Tableau Mobile Tableau Cloud
TARGIT	TARGIT Decision Suite
TIBCO	TIBCO Connected Intelligence and Hyperconverged Analytics platform (WebFOCUS, Spotfire, Data Virtualization, Data Science, Jaspersoft)
ThoughtSpot	ThoughtSpot
Yellowfin	Yellowfin BI
Zoho	Zoho Analytics

Vendor evaluations

In the following section, we discuss each vendor in the BARC Score and highlight their strengths and weaknesses based on customer surveys and market research by the authors.

Each vendor description includes vendor-related information, products covered in the BARC Score and strengths and challenges.

Board International

Chiasso, Switzerland

www.board.com

Board was founded in 1994 and employs more than 500 people worldwide. Both its European head office and software development headquarters are in Chiasso, Switzerland. A second regional US headquarters is located in Boston, Massachusetts. Board has 25 offices worldwide and a global partner network. More than 2,000 cloud customers worldwide use Board to implement CPM and analytics projects. The company currently has a strong focus on internationalization, particularly by building up its presence in the United States. The majority share in Board International is owned by Nordic Capital.

Board aims to provide an all-in-one decision-making platform which unifies CPM with BI & analytics capabilities. The vendor focuses on providing end-to-end support to key decision-making processes in midsize to large enterprises. The goal is to deliver an easy-to-use and coding-free platform for business power users to build tailored CPM and analytics applications in a technically homogeneous environment. Board does not focus on specific industries, but the primary industries across its customer base are retail, manufacturing, professional services, banking and finance.

Board provides a combined product consisting of a front end and a proprietary multidimensional in-memory data storage technology, which also allows for business-user-friendly data modeling. Due to its tightly integrated front and back ends, the proprietary Board database permits only limited access for third-party front ends.

At its core, Board is a flexible web-based development environment for creating planning, dashboarding, reporting and analysis applications. It can also be used for financial consolidation and strategy management. Particularly for planning, forecasting and simulation use cases, Board offers strong and comprehensive functionality.

Board and its partners offer prebuilt business content via the Board Marketplace. Applications such as financial consolidation, lease accounting, human resources management, integrated business planning and sales performance management are available from the vendor itself. Additionally, Board and its partners offer solutions for specific departments (e.g., finance, supply chain) and industries (e.g., retail, automotive, consumer packaged goods). These can be adapted to customers' individual needs.

Strengths

- Flexible, fully web-based integrated CPM and analytics product with appealing look and feel
- Graphical, business-user-oriented development environment for creating complex and flexible CPM and analytics applications without technical programming skills
- Integrated advanced analytics algorithms as part of the solution, resulting from university cooperation and a native R connector to exchange Board data with an R server to execute AI/ML algorithms and to run R scripts from Board procedures
- Unified architecture consisting of proprietary multidimensional in-memory database and front ends with additional mobile and Microsoft Office clients to support a broad range of users within a company
- Strong focus on growth, internationalization and innovation

Challenges

- The product's flexibility can lead to quite complex handling for inexperienced users when implementing and building intricate applications
- Customers² consider Board to be more expensive than its competitors but invest in it to implement planning and forecasting alongside BI & analytics
- Board has limited capabilities in visual exploration, data preparation and ad hoc query compared to leading vendors

² Source: The BI & Analytics Survey (www.bi-survey.com)

Dimensional Insight

Burlington, MA, USA

www.dimins.com

Dimensional Insight is a privately held company based in Burlington, MA, which started in 1989. The software company aims to provide trusted analytics, KPIs and the industry expertise people need to make informed business decisions. The vendor targets and supports all markets, but has competencies in the healthcare, alcoholic beverages, cannabis, utilities and manufacturing sectors in the United States, as well as higher education, government, transportation and insurance in international markets.

Dimensional Insight provides its customers with vertical expertise as well as predefined industry applications. These are aimed at giving customers a trusted view of their enterprise data and supporting them in finding answers to their business-critical questions.

The predefined content is built using Diver Platform, which includes ETL, data modeling, administration, dashboard development, analysis and reporting, as well as columnar database technology for data storage. Although its engine is proprietary and is designed to ingest data, Dimensional Insight allows ODBC access to its data model.

Users can navigate data in any direction with performance boosted by a proprietary columnar in-memory engine. Although Diver Platform is built to support navigation and analysis of data, which the vendor calls 'information leaping' or 'diving', its visual exploration functionality is limited to predefined interactive dashboard applications. The product integrates predefined advanced analytics models in its applications and offers an R integration in its workbench (ETL client). The ETL client requires technical knowledge and lacks ML-based guidance for less-trained business users.

In its latest releases, the vendor has focused strongly on offering end users greater flexibility in content consumption. Besides the already available 'Stamps' (for preconfigured visualizations), the newly introduced 'My Library' acts as a central access point to information. Users can create and share shortcuts to content, thus speeding up access to information.

Strengths

- Industry expertise and packaged solutions designed to facilitate and accelerate access to data and its analysis
- In delivering content, ETL, in-memory data storage and front ends, Dimensional Insight focuses on providing an end-to-end solution to its customers
- Strong industry orientation for targeted marketing and business understanding
- 'Measure Factory' offers predefined, governed content for selected industries based on common business rules and logic, which can be customized
- Self-service creation of dashboards by assembling predefined content/measures incorporated into the solution

Challenges

- Front ends for data integration and analysis require rather technical, well-trained users
- Limited visibility and brand awareness outside core markets
- Vendor and its product set is focused on providing access to governed information and supporting information consumption for business users rather than addressing the needs of power users from business departments

Domo

American Fork, UT, USA

www.domo.com

Founded in 2010 in American Fork, Utah, Domo launched its first BI product in 2012 as a cloud-native, full-stack BI platform. After 2015, Domo quickly earned attention in the market and went public in June 2018. The vendor currently has over 800 employees that serve more than 2,000 customers.

Domo's Business Cloud platform aims to supply customers with modern, end-to-end capabilities such as data integration and management, BI & analytics, and intelligent apps.

From the beginning, Domo has focused on helping customers transform the way their business is managed by putting well governed and actionable data in the hands of everyone across the organization. Domo believes that access to all the relevant data is critical for business users to best understand what is going on in their domain, ask questions and take well-informed actions. Domo wants to provide business technology that is as easy-to-use and intuitive as mobile consumer applications, while offering enterprise-grade scalability, data governance and security features. Its Business Cloud platform aims to foster collaboration, efficient decision-making, increased productivity, and generate improved business results through faster and better leverage of data at scale.

The platform was designed to help IT and analytics experts as well as business users deliver value rapidly to the business by complementing their existing systems and infrastructure. Fragmented data silos and systems are connected in the unified Domo Data Warehouse to unlock value from data. One of Domo's primary goals is to get data into the hands of all employees by simplifying data acquisition, delivery and consumption. Domo enables customers to connect to all their data by loading it to the internal data warehouse powered by its Adrenaline engine as well as in-place queries through a federated approach to publish live data into applications. Recently, the vendor optimized its multi-cloud query capabilities to allow organizations to get more leverage from their data cloud platform investments through native integrations to popular cloud data warehouses like Snowflake and Redshift. To accelerate time-to-market for new analytics applications, Domo offers around 1,000 prebuilt connectors. Business users can also integrate data via file uploads or connect to cloud and on-premises databases, applications and services.

Domo is designed for cloud deployment and mobile consumption from the ground up. Low-code and no-code app development capabilities make it easy for customers to quickly build apps that are made available on the web and in the native app for a mobile experience.

A browser is used to access all functionality, although there is a Windows desktop tool called Workbench, which is used to transform and load on-premises data into the Domo cloud. Mobile users can access Domo through its iOS and Android apps. Domo is also investing in advanced analytics and natural language processing to provide greater value to more users in the future.

Strengths

- More than 1,000 standard connectors built and managed by Domo to various data sources speed up implementation. For a business-user-oriented tool, this is exceptional.
- Modern, cloud-based architecture for scale with appealing look and feel
- Scalable internal data store and federated data access in a modern, cloud-based architecture power various analytics use cases
- Central data governance features in the Domo Data Warehouse are the foundation for successful, governed and enterprise-wide self-service
- Ability to create intelligent apps that leverage the governance and security features of the platform, along with write-back capabilities and AI/ML to guide decision-making

- Sophisticated mobile delivery of highly interactive content helps to spread analytics to all employees instead of executives only

Challenges

- Limited capabilities for large-volume, print-oriented reports compared to leading vendors due to focus on dashboards and analytical apps
- Data modeling is geared at specialists and not as easy to use as competing products, it lacks proper guidance for business users to build their own models efficiently
- Visual exploration and analyses are mostly conducted through interactive dashboards with little support for augmented analytics, reducing the possibilities to find new insights quickly

Dundas Data Visualization

Toronto, ON, Canada

www.dundas.com

Founded in 1992, Dundas began building its reputation as an innovator in visualization software with its 'Chart' product, which it sold to Microsoft in 2007. Dundas BI was released in 2014 and launched the vendor into the market for all-in-one BI & analytics platforms. Today, Dundas is a privately held company headquartered in Ontario, Canada with approximately 100 employees catering for the needs of its 2,000 installations.

Dundas focuses on two main usage scenarios with its flagship product: enterprise BI & analytics with self-service and embedded BI & analytics. The Dundas BI platform is a modern and integrated full-stack BI & analytics platform with core strengths in data visualization, operational dashboards and embedded analytics. With its clean, modern and responsive graphical interface, business users can integrate, prepare, visualize and share data as well as navigate through prebuilt BI applications. Dundas BI offers the ability to store data in an integrated data warehouse to combine data from multiple sources, speed up queries and store data from input forms. The product supports live access to various sources as well as data acquisition into a proprietary in-memory engine (cached). Dundas can be easily embedded and extensively customized as customers can leverage all functions via APIs.

Dundas BI was conceived with an emphasis on ease of use. To shield business users from the complexity of the powerful dashboard creation environment, customers can individually control the functions and features presented to them. The solution allows business users to create dashboards and more advanced users to build pixel-perfect print-oriented reports. Further presentation options include a dedicated scorecard editor and small multiples for producing a series of visualizations for comparison. These components all offer rich functionality for building individual applications with custom triggers and actions.

Dundas BI offers good support for data discovery by business users. The steps for data preparation and visualization are tightly integrated, making it feasible to iteratively analyze and enhance data to gain as much insight as possible. Visualizations are automatically created upon adding data to the canvas and there is an option to automatically change visualization types as more data is added. Calculations can be created quickly and directly from within visualizations. Although some improvements have been made, advanced analytics with guidance as well as user advisory for analysts remains one of the areas in which Dundas BI scores lower than competing vendors.

Strengths

- An end-to-end analytics platform offering both tight governance for 'silver-service' as well as flexibility for self-service
- Dashboard development environment provides a high level of control over the look, feel and interactivity of applications, offering high flexibility to consumers
- Good connectivity, easy-to-use data preparation and multiple storage options (in-memory, live, data warehouse) power a broad scope of use cases
- Clean, modern, responsive graphical interfaces allow users to quickly become accustomed to the platform and leverage its extensive functionality in a productive manner
- Good capabilities for data discovery, especially for data preparation and visual exploration

Challenges

- Limited advanced analytics functions, which are mostly available through integrated statistical functions and external libraries
- While offering good visual analysis, Dundas lacks automated insights capabilities to help users find relevant signals quickly
- Guidance and automated recommendations are weak in data preparation, which is otherwise powerful and easy-to-use

IBM

Armonk, NY, USA

www.ibm.com

IBM® is one of the world's largest vendors of IT hardware, software and services. The company has a global workforce of approximately 282,000 employees and is active in over 170 countries. In 2007, IBM purchased the BI vendor Cognos and made their software the center of its BI & analytics product offerings.

IBM offers a broad portfolio of on-premises and cloud analytics, performance management and advanced analytics solutions. Major offerings include IBM Cognos Analytics with Watson (Cognos Analytics), IBM Planning Analytics with Watson, IBM Watson Studio and IBM Cloud Pak for Data. IBM supports a broad range of deployment requirements by offering both cloud and on-premises options as well as containerized applications and allows for transition from on-premises to cloud by providing agnostic licenses.

Cognos Analytics is IBM's BI & analytics platform. It combines ease of use with elaborate governance features in an end-to-end platform. The product can be used in large-scale scenarios supporting the needs of many concurrent users as well as large data volumes. Cognos Analytics provides functionality for dashboards, pixel-perfect reports, data stories, data modeling and analysis in a unified web-based interface. A new mobile app gives better access to created content.

IBM wants Cognos Analytics to be every user's analytics copilot when navigating data. The vendor has infused NLQ, automated insights and intent-driven modeling and has invested in automation and ML capabilities across data modeling, dashboards, data exploration ('Exploration') and an analytics chat assistant. The AI assistant allows users to explore data by asking natural language questions and by receiving insightful answers with a presentation-ready dashboard or report. Cognos' AI capabilities can also identify trends and forecast results, helping companies to identify relevant influencers and correlations and calculate quick predictions.

IBM also extends the advanced and predictive analytics capabilities of Cognos Analytics to bring business analyst and data scientist workloads together. For instance, Jupyter Notebooks has been incorporated in the user interface to provide greater flexibility in data preparation, statistical analysis and ML. The product also connects with IBM Watson Studio, the vendor's advanced analytics platform targeted at data scientists. Besides its widely known SPSS capabilities, Watson Studio includes data science modules based on Jupyter Notebooks for development in R and Python, AutoML and embedded decision management. Cognos Analytics can also be deployed as part of IBM Cloud Pak for Data to enable many types of analytics use cases.

IBM Planning Analytics with Watson is a core element in IBM's performance management portfolio. Planning Analytics is a mature but modernized high-performance, multidimensional in-memory database for planning and analysis. A modern web-interface integration with Cognos Analytics and a powerful Excel client make it a good fit not only for finance departments.

Strengths

- Cognos Analytics (CA) is a well-integrated end-to-end platform for governed analytics for business users that spans data preparation and modeling to analysis, reports and dashboards
- Reports can be quickly created by business users on the web, polished by professionals and distributed to a large audience (CA)
- Automated insights in 'Exploration' help to find relationships in large data sets, discover relevant drivers for a metric and create detailed forecasts (CA)

- IBM Planning Analytics offers comprehensive flexibility to create planning applications based on a high-performance OLAP database with planning and simulation capabilities
- Broad capabilities for advanced and predictive analytics with IBM Watson Studio as well as data discovery and cognitive BI & analytics with IBM Cognos Analytics

Challenges

- 'Exploration' and 'Dashboards' provide analysis capabilities and guidance for exploration but lack flexibility for visual analyses compared to leading vendors
- 'Reports' is not as intuitive as 'Exploration' and 'Dashboards', limiting the possibilities for business users to create highly formatted print-oriented reports
- Performance of live queries remains an issue, requiring customers to consistently optimize their dashboards, queries and databases

Google

Dublin, Ireland

www.cloud.google.com

Google is mostly known for its search engine and associated offerings. However, with its Google Cloud Platform, the vendor has entered the BI & analytics market with attractive data management and analytics products. To complement its self-developed data management and analytics solutions, the vendor acquired Looker in 2020. Looker was founded in 2012 in Santa Cruz, CA, and has grown quite quickly since then. About 2,000 companies now use Looker.

Looker is the main enterprise BI & analytics platform from Google. This web-based platform is focused on providing a governed, standardized and trusted view of business data. As a result, Looker has designed a product that relies strongly on a central semantic layer created using LookML, its proprietary data description language (abstraction layer on top of SQL). Business users connect to data via this semantic layer, allowing them to do ad hoc analyses via a point-and-click interface. To underline its core strength and emphasis on data, Google has started to position Looker as a unified platform that powers data experiences and delivers actionable insights to employees at the point of decision.

Looker is particularly strong in embedded BI and connecting interactive visualizations into dashboard applications. Google's goal for Looker is that it should help to integrate data into the daily workflows of users and allow organizations to extract greater value from it.

Google also offers Google Data Studio, a free cloud-based visualization product that focuses on querying 500+ data sources and presenting the insights revealed. Work on the integration of Data Studio and Looker to enhance its value proposition is ongoing. Access via Data Studio to Looker's semantic model to complement it for better self-service content creation is currently in beta.

Google Cloud Platform offers various options and services, amongst others for advanced analytics. Besides using incorporated functions and partner solutions in its BI & analytics products, users can leverage cloud services, for example, to process speech to text or for sentiment analysis.

Strengths

- Looker provides access to a huge number of sources through a central and governed semantic model to support business users with flexible analysis, dashboards and embedding
- Data Studio is a free data visualization product with connectivity to many business applications, especially within the vendor's extensive portfolio of marketing-related applications
- Growing cloud-based data management and analytics portfolio and partner network to implement a broad range of use cases
- Central and governed semantic layer to deliver consistent insights, KPIs and master data with versioning through Git (Looker)
- Integration with many (mostly cloud-based) business applications to get insights faster and act on data using Looker Actions
- Integration with other Google products such as Google Marketing Platform, Google Ads and Google BigQuery (Looker)

Challenges

- Limited breadth of the portfolio when it comes to certain BI & analytics use cases: limitations in formatted reporting and visual exploration
- Semantic layer is script-based and has to be created by developers or tech-savvy users rather than regular business users like in other self-service tools (Looker)
- Data preparation and upload of data by business users currently not supported in Looker but the planned integration with Data Studio should address this issue

Microsoft

Redmond, WA, USA

www.microsoft.com

Microsoft, the world's largest software company, was founded in 1975 and has become a household name primarily due to its Windows operating system and Office suite. The vendor has a broad enterprise offering too, ranging from cloud (Azure) to database to its ERP products.

Microsoft was among the first vendors to focus on providing cloud-based solutions for analytics, a path later followed by several competitors. Azure is used by numerous companies as a cloud computing platform and for storing large amounts of data, putting Microsoft in a comfortable position to offer integrated analytics front ends.

Microsoft concentrates its core BI & analytics capabilities in Power BI and brings in tools and capabilities from Microsoft Azure such as Azure Data Explorer and Azure ML for specific usage scenarios. Power BI is a cloud-based analytics product consisting of Power BI Desktop (a full client for data preparation, dashboards and analysis) and Power BI Service (a web application for content publishing and sharing). It is an interactive tool for data visualization geared at enabling business users to analyze data and share insights predominantly via dashboards. Power BI Premium offers dedicated capacity, which is especially useful in large deployments.

Data visualization in Power BI delivers rich visualizations but is limited in flexibility by its dashboard-oriented approach. NLQ makes it easy for users to retrieve relevant visualizations. Guided analytics is mostly covered by 'Quick Insights', a feature that automatically analyzes data sets for patterns and outliers and provides the user with suggestions about relevant findings. The 'Insight' feature can be used to receive information about interesting patterns in the data a specific visualization is based on. For advanced requirements, Microsoft has integrated AutoML features into Power BI Data Flows.

The vendor has also incorporated formatted reporting functionality from its on-premises product set Reporting Services as paginated reports into Power BI to provide a broader feature set and integrate analytics capabilities. Power BI Report Server delivers a subset of Power BI features to on-premises customers, mostly to facilitate their migration to the cloud.

Strengths

- Power BI, the business-user-oriented data discovery solution, is attractively priced, which makes it easy for organizations and individual users to get started with it
- Dashboards are easy to build for business users and can either display governed data or leverage additional data through powerful data preparation
- 'Quick Insights' and NLQ guide users when exploring new data sets with auto insights while data preparation offers ML-based productivity features too
- Governance and aligned KPIs and master data in Power BI models through tight integration with Azure Data Services and SQL Server
- Azure platform with extensive data management and analytics services, which enhance the core functionality of Power BI

Challenges

- Formatted (paginated) reports enhance the reach of Power BI, but building these reports is still a developer's task rather than one for typical business users
- Features for distributing static content to a large user base are rated below average in this BARC Score, curbing Power BI's value in classic BI & analytics scenarios
- The on-premises Power BI Report Server delivers only a subset of the functions of Power BI Service and should not be expected to achieve feature parity

MicroStrategy

McLean, VA, USA

www.microstrategy.com

MicroStrategy is one of the best-known vendors in the BI & analytics market worldwide. It was the first vendor to release a fully integrated product providing formatted reports, dashboards and interactive data discovery in a single solution using the same infrastructure, both on-premises and in the cloud (managed or customer-owned on, for example, AWS or Azure). With its library of statistical and advanced analytics functions, the vendor offers comprehensive analytics capabilities for a wide variety of use cases.

MicroStrategy is based on a tightly integrated architecture that can support hybrid or multi-cloud scenarios and was built from the ground up without acquisitions. The vendor focuses on providing the solutions a customer needs to become an 'Intelligent Enterprise'. The analytics and mobility suite offers different clients, which connect to an enterprise semantic layer (schema) to deliver common and governed business logic across multiple data sources. The vendor has invested much over the years in supporting 200+ connectors to data sources, as well as offering native support for cloud databases, data lakes and Hadoop. Besides direct connectivity to source systems, MicroStrategy offers an integrated in-memory engine to ensure fast query performance on large data sets.

Business users can use the enterprise semantic layer (schema), typically created by technically savvy users, or create their own data models (datasets). For additional governance, datasets can be combined with the enterprise semantic layer or certified.

MicroStrategy has always taken market trends seriously and often leads the way. The vendor provides a no-code development framework to build native mobile apps. Offline capabilities and write-back data entry for transactions and operational use cases are available too. The vendor introduced 'Dossiers' to provide a modern way to analyze, present and visualize data. Dossiers are interactive applications that organize dashboards or reports in a familiar book-oriented chapter-and-page format.

Increasingly, MicroStrategy is taking an open approach by allowing third-party tools such as Tableau, Qlik, Power BI, Jupyter and RStudio to access its governed datasets. To extend the adoption of analytics by business users, MicroStrategy introduced 'HyperIntelligence' to surface contextual information to users directly in web applications, on mobile devices and in selected productivity applications with zero clicks. This allows businesses to inject real-time, contextual insights and recommendations into users' browser-based or mobile workflows – bringing analytics closer to their work. Embedding analytics in business applications, in cooperation with service providers and often targeting distinct industries, is becoming increasingly important to vendors and offers further opportunities to differentiate its offering.

Strengths

- Single integrated platform for formatted reports, dashboards, analysis and analytics application building with good performance in large environments
- 'Dossiers' for visual analysis provides self-service analytics integrated in the platform with powerful, guided and business-user-friendly data preparation
- Connectivity and connectors for third-party analytics tools such as Tableau, Qlik and Power BI grant access to its semantic layer
- 'HyperIntelligence' to surface contextual information with zero clicks and sophisticated reporting and distribution deliver highly personalized information to all user types
- Visual analysis solution for self-service BI & analytics scenarios included in the platform, with web and desktop-based clients for ad hoc reporting, query creation and analysis

Challenges

- 'Documents' and 'Dossiers' are different content types: 'Documents' are highly formatted reports built by developers while 'Dossiers' are more lightweight, modern and aimed at business users
- Augmented analytics capabilities (e.g., automated insights) not as pervasive as the capabilities of leading vendors in this field
- Data models created by business users (datasets) cannot be automatically converted to the enterprise semantic layer (schema) as both data modeling environments are not fully integrated

OpenText

Waterloo, ON, Canada

www.opentext.com

OpenText sees itself as an information company that helps customers on their digitalization journey with its OpenText Cloud product set. Best known as a global provider of enterprise information management (EIM), especially for its enterprise content management (ECM) and business process management (BPM) solutions, the company has added analytics products with its Magellan family. Part of Magellan is based on the 2015 acquisition of Actuate, one of the earliest providers of business intelligence software. Actuate launched the open source Eclipse BIRT (Business Intelligence and Reporting Tools) project back in 2004.

OpenText Magellan is a product set for artificial intelligence (AI), machine learning (ML), advanced analytics, text mining and big data processing. Actuate adds business intelligence and analytics as well as data discovery capabilities. The core business intelligence and analytics product is called OpenText Magellan Analytics Suite and consists of OpenText Magellan BI & Reporting and OpenText Magellan Data Discovery.

OpenText Magellan BI & Reporting is a BI & analytics suite that connects to various data sources and consists of modules for formatted reporting, ad hoc reporting, dashboarding and analysis. Development of applications and reports, as well as access to data sources, takes place in both the web-based designer and the OpenText Magellan Analytics Designer. End users work with web-based modules for ad hoc reporting, simple data navigation, OLAP analysis and dashboarding. Due to the fact that OpenText Magellan BI & Reporting is equipped with open APIs, the solution is often seen in open source and embedding scenarios.

OpenText Magellan Data Discovery is a combination of in-memory and columnar-based data storage with a web-based front end for visual data mining and predictive analysis. Data required for data mining and analysis is integrated using a built-in ETL module. The solution is aimed at data scientists and analysts from business departments and offers predefined data mining algorithms and analysis methods such as forecasting, clustering, Venn diagrams, pivot tables, bubble charts and so on.

Together with the Magellan platform, which technically uses open source components such as Hadoop, Apache Spark and other software from OpenText, customers can implement sophisticated Advanced Analytics and Text Mining scenarios. One of the core strengths of the portfolio is its ability to process not only structured but also unstructured data using Magellan components.

Moreover, the vendor has incorporated BI & analytics into its operational software to augment business processes and let users receive information right where they are in their operational system.

Strengths

- Broad AI, ML and advanced analytics platform, which is able to process structured and non-structured data
- Good capabilities for developing pixel-perfect reports
- Ad hoc reporting and data navigation suitable for business users
- OpenText Magellan Data Discovery as a business-user-oriented solution for predictive analysis
- Strong orientation towards product integration/embedding and provision of a good set of APIs for implementation of individual needs

Challenges

- Limited reporting features for business users as Analytics Designer targets technical users and Studio (OpenText's ad hoc reporting component) has less functionality than some competitors
- Although the integration between OpenText Data Discovery and OpenText BI & Reporting has improved, users face different UIs for data analysis and visualization
- OpenText Analytics Suite's visibility and market traction outside the OpenText customer base has not grown significantly since the acquisition

Oracle

Austin, TX, USA

www.oracle.com

Oracle is a global provider of enterprise cloud computing, offering software, platform, infrastructure and even data as a service. With over 132,000 employees, Oracle is one of the giants in the market.

The Oracle Analytics offering (OA) rests on three major pillars: its flagship product for BI & analytics Oracle Analytics Cloud (OAC) running on Oracle Cloud, Oracle Analytics Server (OAS) for on-premises and multi-cloud deployments and Fusion Analytics for embedded analytics within the vendor's portfolio of business applications. Oracle Analytics utilizes the tried-and-tested but modernized foundation of Oracle BI (OBIEE) and incorporates some of its modules, such as Publisher for developer-oriented pixel-perfect reporting, to provide extended functionality and compatibility.

Oracle Analytics Cloud incorporates business-user-oriented capabilities for the complete analytics cycle. It offers modules for developing and deploying formatted reports, interactive dashboards and analytics suitable for business users. Its goal is to create an integrated data, AI and analytics platform in which OAC plays an important part. It is also used to embed analytics into every Oracle product.

Recently, Oracle has introduced many innovations into OAC, such as the new self-optimizing, in-memory analytics engine. The models created by the new semantic modeler can be consumed by third-party applications such as Power BI, enhancing the value of models maintained in Oracle Analytics.

Augmented data preparation for business users and custom data transformations via Data Flows are also provided by Oracle Analytics, as well as visual analysis in a comprehensive and integrated analytics platform. Furthermore, integration with Oracle Autonomous Data Warehouse (ADW) is constantly evolving to benefit from central and governed data models. Oracle Analytics Server, the on-premises version of OAC, brings the capabilities of the cloud platform to organizations requiring on-premises deployments or wanting to run it in other clouds.

With Automated Insights and 'Explain', users can leverage automated insights generation powered by ML and NLG. Relevant drivers, patterns and clusters are identified and visualized with little to no effort. Beyond that, forecasts leveraging weighting algorithms can be created based on the drivers identified with one click too. Natural language queries ('Ask') can be used to analyze data without deep technical know-how or to search across all data sets cataloged in many supported languages.

Complementing the portfolio, machine learning algorithms are embedded out of the box with Oracle Analytics Cloud. R and Python scripts can be embedded to leverage the results of advanced analytics models. Additionally, ML algorithms embedded in Oracle databases can be leveraged without shifting data, providing enhanced speed and flexibility for analytics.

Strengths

- Cloud and web-based platform for formatted and ad hoc reports, analysis, visualization, data preparation and dashboards
- Automated Insights based on ML and 'Ask' NLQ drive acceptance and lower the barrier for business users to use analytics by helping them to find relevant signals for decision-making
- Oracle offers the possibility to build independent self-service datasets for high flexibility as well as weaving semantic models together for a consistent enterprise-wide view
- Powerful and easy-to-use data preparation with good data profiling and user guidance through recommendations for transforming and enhancing data
- Action framework for triggering external events and navigation within dashboards and analytics applications (Oracle Analytics Server)

Challenges

- Integration between Publisher and Visualize is at data level only, reducing efficiency when creating content and making it difficult for business users to leverage complete functionality
- OAC is only available on Oracle cloud, customers seeking to deploy it on other services must resort to OAS, which receives functional updates only once per year and must be managed by the customer
- Data models created by business users cannot be easily deployed to the central semantic layer as the data modeling environments are not fully integrated

Pyramid Analytics

Amsterdam, Netherlands

www.pyramidanalytics.com

Founded in 2009, Pyramid Analytics is a privately held software company with more than 200 employees. Its first BI & analytics product, BI Office, was launched in 2012. The company is headquartered in the Netherlands and has offices in the United States, Israel and the United Kingdom. It continues to grow and now supports more than 750 enterprise customers.

Pyramid combines data preparation, data discovery, dashboards, machine learning, advanced analytics and formatted reports into a unified enterprise BI & analytics platform. It was designed from inception to bridge the gap between self-service and IT-driven BI & analytics, providing agility for decentralized business users while retaining centralized monitoring and control. This fosters enterprise-wide collaboration through the sharing of business logic and content. Recently, the company has invested heavily in enterprise-grade features and capabilities, including adaptive user experiences that accommodate all skill levels, enhanced data preparation, augmented analytics and certified SAP connectors.

The vendor puts an emphasis on Pyramid as an open and agnostic web-based platform. Its open architecture means the software can be deployed in different environments: cloud, hybrid or on-premises. Moreover, Pyramid is device and operating system agnostic with full gesture support on touchscreen and mobile devices. It also supports REST API to cater for scenarios such as embedding and automation. Pyramid's analytics engine, 'PYRANA', drives both querying and analytic calculations across different data sources using ANSI SQL or MDX – which enables fast in-place analytics on large data sets. This extends direct analysis to numerous relational, in-memory, big data and unstructured data sources natively – including Pyramid's own proprietary in-memory engine. Pyramid now extends certified support to various SAP data sources, making it a viable alternative to leverage data from, for example, BW/4HANA without duplicating it.

Pyramid offers improved data preparation and modeling features to support data integration and processing. For AI and machine learning, the vendor offers sophisticated R, Python, MLib, Weka and TensorFlow integrations. The vendor pursues its own approach when investing in NLQ capabilities with the goal of offering fast search-based analytics on all data sources without indexing all the data upfront. Automated insights ('Smart Insights') leverage NLG to explain basic facts, relationships, forecasts and other findings when applied to visuals or query results.

Strengths

- Well-integrated product for reporting, dashboards, data preparation and analysis – all in a single, enterprise-grade platform
- Good connectivity with in-database analytics to various data sources including business applications such as SAP leading to high performance perception by users
- Open architecture and provision of APIs suitable for various analytics use cases beyond classic BI such as embedding and analytics applications
- Provision of enterprise platform features such as governance, security, lineage, impact analysis, versioning and content distribution for large-scale deployments
- Well thought-out capabilities for dynamic text for storytelling

Challenges

- Visual data exploration for business users needs improvement to deliver intuitive analysis to find patterns and outliers
- Feature-rich environment potentially overwhelms creators from business departments, curbing use and value of analytics despite introduction of streamlined 'Smart' and 'Light' interfaces
- Active guidance features offer basic help but lack functionality to assist business users when preparing data or creating analytics content

Qlik

King of Prussia, PA, USA

www.qlik.com

Qlik, originally founded in 1993 in Lund, Sweden, moved its headquarters to the United States in 2005 after raising funds from several venture capital firms. Qlik is currently owned by the private equity company Thoma Bravo after its acquisition in 2016.

Qlik offers a compelling portfolio of end-to-end platform-based solutions for analytics and data management. In the area of data management, the vendor offers a number of services for data ingestion and transformation, catalog features and automation services.

'Active intelligence' and continuous intelligence from real-time, up-to-date information delivered through data pipelines, designed to trigger immediate actions, play an important role in achieving this. The portfolio as a whole, which was formed by substantial internal development and multiple acquisitions, is called Qlik Active Intelligence Platform. It aims to help customers to bridge the gaps between their data, insights and actions to better inform decisions and drive actions based on solid evidence that accelerate business value.

As centerpiece of the Active Intelligence Platform, Qlik Sense provides enterprise-level BI & analytics, supporting a broad spectrum of analytics use cases across organizations. It is powered by Qlik's associative in-memory engine and offers flexible and fast access to analyzed data. Qlik focuses on business users as its target audience for all product features from data preparation to the creation of interactive applications. Data preparation, traditionally script-based in Qlik, can be conducted in a visual interface for most data transformations but still generates code that can be changed directly or optimized by developers if required. These improvements make data preparation more accessible for business users and at the same time satisfy the needs of developers.

Augmenting the user experience with helpful and guiding functions is at the core of Qlik's vision to reach more users with well thought-out BI & analytics capabilities. During data preparation, joins and default aggregations are suggested for measures. Qlik Sense offers further guidance and automation for data visualization to benefit data consumers by actively recommending suitable visualizations to users based on fields selected and their metadata. Additionally, ML powers the suggestion of insights for consumers in 'Insight Advisor' and NLQ. 'Insight Advisor' works in conjunction with the associative engine to provide augmented analytics capabilities including search, conversational and natural language analytics. AutoML for advanced users and improved integration for Python and R open up Qlik's powerful analytics engine to data scientists. This should help customers to find more insights in their data assets.

Strengths

- A business-user-oriented platform for BI & analytics covering interactive dashboards, highly customizable and embeddable analytical applications, visual analyses and reports
- Dashboards, analytical apps and data stories are Qlik's clear hallmarks, all powered by fast and responsive queries and interactive, mobile-ready interfaces
- Data preparation is very powerful. Features such as join detection based on field content are not common among competitors and speed up data preparation.
- Strong features and APIs to customize and embed not only the analytics applications but parts of (or the whole) product if needed in any target application
- Qlik sets itself high expectations regarding query performance and hardly ever falls short of them thanks to its mature in-memory engine

Challenges

- Limited built-in functionality for data governance to align KPI definitions and ensure consistent use of master data across multiple applications
- Push down queries to remove the need to replicate data to Qlik to retain associative capabilities and high interactivity currently not released but expected in second half of 2022
- Advanced layout options for page-oriented reports in the cloud still limited compared to leading vendors despite enhanced capabilities of web UI

SAP

Walldorf, Germany

www.sap.com

SAP was founded in Germany in 1972 as a business applications company. The vendor now employs more than 107,000 people worldwide and has a turnover of €27.84 bn. SAP is one of the largest business software vendors in the world.

The vendor's data and analytics portfolio is based on the strategic SAP Business Technology Platform (BTP), which provides cloud-based data, analytics, application integration and extension services across all SAP products. The platform is technologically built on SAP HANA Cloud, a modernized cloud-based version of SAP HANA, the vendor's in-memory database.

Although the vendor focuses on cloud, its current front-end analytics portfolio encompasses cloud-based and on-premises solutions for business intelligence, augmented and predictive analytics, as well as planning. For BI & analytics, the cloud-based SAP Analytics Cloud and the on-premises SAP BusinessObjects BI are the core offerings. Predictive analytics functionality for business users is covered in SAP Analytics Cloud while more extensive functions for data science are made available in SAP BTP.

SAP Analytics Cloud is SAP's strategic cloud analytics offering. It combines analytics capabilities such as data discovery and visualization, enterprise planning and augmented analytics into an integrated all-in-one offering. SAP Analytics Cloud has a modern and mostly user-friendly front end that offers users guided insights in data through NLQ and NLG as well as automated insights via 'Smart Predict' and 'Smart Discovery'.

Analytics Designer is a module for building highly interactive and custom dashboards and web applications. While SAP Analytics Cloud in general is aimed at business users creating analytics content, Analytics Designer is clearly a developer tool for the implementation of sophisticated requirements in the area of web application building. For instance, JavaScript can be used to enhance the applications with the required behavior and level of interactivity.

In addition to using integrated data models in SAP Analytics Cloud, users can query selected SAP data sources (e.g., SAP HANA, SAP BW and BW/4HANA, SAP Data Warehouse Cloud and SAP Universes) live. Customers can take advantage of this to implement hybrid cloud scenarios without moving, caching or persisting the data into the cloud.

Strengths

- SAP Analytics Cloud is an integrated business-user-oriented solution for analytics and planning with embedded functionality for augmented analytics and application design
- 'Smart Predict', 'Smart Insights' and 'Smart Discovery' together with NLG functions help users to dig deep into data sets quickly by surfacing trends and outliers automatically
- Exclusive connectivity, live access, embedded analytics and prebuilt content available for SAP sources and applications speed up implementation and help to gain insights from these systems
- Integration of SAP Analytics Cloud with SAP BW/4HANA and SAP Data Warehouse Cloud offers capabilities to govern master data and align KPIs across an organization
- Analytics Designer offers broad capabilities to create custom applications tailored to end users' needs, which give additional interactivity when it comes to content consumption

Challenges

- Enterprise reporting is not fully supported in SAP Analytics Cloud due to a lack of advanced formatting options
- Data source connectors are focused on SAP data sources with a lower number of connectors available than leading competitors, especially to competing business applications
- Data preparation capabilities are below average compared to other vendors in this report, resulting in challenges for business users to leverage all the data sources required

SAS

Cary, NC, USA

www.sas.com

Founded in 1976, SAS is a privately held company and a well-known brand in the analytics and business intelligence market. The vendor's aim is to make analytics available everywhere and for everyone.

SAS Viya is an open and cloud-ready end-to-end platform for analytics, which extends the SAS Platform to serve all types of customers' analytical needs. Viya was designed as a massively parallel, distributed environment which connects to various data sources and can be run on premises or in the cloud. SAS has made a point of creating an open architecture which not only supports SAS code but also popular languages such as R, Python, Java and Lua directly or through APIs to enhance their scalability and serve the appetite of data scientists for these tools. SAS models can be called from Jupyter Notebooks, a very popular way to access the platform among data scientists. Viya consists of a set of micro services and an in-memory engine called SAS Cloud Analytics Services (CAS) for execution in a single-machine or distributed mode. The software is completely containerized and thus cloud agnostic. Nevertheless, a strong partnership with Microsoft adds additional integration with Azure.

Viya powers several different products and solutions. Business users typically access SAS Visual Analytics (VA) for self-service analytics. This product line focuses on visual analysis, dashboards and analytics apps. Content, such as interactive visualizations, can be embedded in custom web applications or other third-party apps. Results can also be embedded in Microsoft Office (e.g., Excel). Furthermore, Visual Analytics can be used to build and deploy sophisticated conversational interfaces and chatbots.

Also available with VA is the ability to build conversational interfaces and chatbots. Moreover, customers can use the Visual Analytics SDK to embed live, interactive VA visualizations into their custom web apps. In addition, a Microsoft 365 integration is included with VA, allowing VA insights to be embedded, for example, in Excel spreadsheets. The new Microsoft Teams integration helps to leverage analytics in collaboration tools.

SAS Data Preparation is also aimed at business users and was designed to load data into the internal Viya in-memory engine. Recent improvements in the data flow representation enhance usability and speed up implementation. Add-on products for advanced business users and data scientists such as SAS Visual Statistics and SAS Visual Data Mining and Machine Learning are also available. The integration with VA offers the opportunity to further extend analytics applications with advanced analytics models.

The vendor offers a variety of analytics applications to specifically address the needs of different industries, especially banking and insurance. SAS provides prebuilt content for these industries based on its Viya platform to help buying companies implement and operationalize challenging analytics use cases.

Strengths

- Business-user-oriented end-to-end analytics platform offering data preparation, visual analysis, analytical apps and dashboards that can be enhanced with advanced analytics models
- Strong guidance in analytics (auto insights) for detecting correlations, clusters and patterns or calculating decision trees and automated predictions supported by NLG
- Users get recommendations during data preparation to enhance and shape data for analytics requirements, speeding up the process
- Viya's in-memory engine CAS was designed as a scalable architecture for substantial amounts of data and large numbers of concurrent users

- Strong analytics and data mining capabilities through further modules such as SAS Visual Statistics, SAS Visual Data Mining and Machine Learning, SAS Visual Forecasting and SAS Visual Text Analytics

Challenges

- Page and print-oriented formatted reports lack some functions required by demanding users and designing them requires additional effort as VA favors on-screen information display
- Building dashboards and analytical applications is not as easy and comprehensive as it needs to be to engage many business users in creating content
- Active user guidance in content creation is weak, especially in data preparation, reducing the productivity of business users when building data assets

Sisense

New York, NY, USA

www.sisense.com

Established in 2004, Sisense is a well-known BI & analytics vendor headquartered in New York City. The company currently has more than 800 employees and customers in 170 countries. In 2019, Sisense acquired Periscope Data, a company founded in 2012 and strongly focused on advanced analytics and the creation of data pipelines.

Sisense aims to augment work by 'infusing' BI & analytics wherever people work. The Sisense Fusion Platform provides a flexible product for data preparation, analytics and dashboards that can be deployed on-premises or in cloud environments. Sisense Fusion Embed supports white-labeled analytics applications that can be embedded in various external solutions to infuse analytics everywhere and to break down what the vendor calls 'the adoption barrier'. Sisense Infusion Apps is a new offering that powers integration into popular collaboration software such as Teams and Slack to reach more users. It also brings Sisense apps closer to workers by integrating them with, for example, Salesforce CRM and Google Slides & Sheets. Sisense offers a Google Sheets integration as a better way to get data into spreadsheets than just exporting, thus embracing rather than fighting this disputed requirement.

Sisense is geared to data engineers who prepare data for analysis, analysts building insights and developers who embed and integrate analytics into purpose-built analytic apps which are consumed by end users. For mobile apps, Sisense offers responsive containers to bring all analytics applications to mobile devices without refactoring.

The platform was designed to leverage all data by either extracting it into its own columnar database or directly connecting to high performance databases. Tight governance features are woven into the platform based on the semantic layer and internal data storage. The platform follows an API-first approach, allowing the vendor to evolve it quickly and offer a developer-oriented, extensible and open solution with numerous options to integrate into third-party solutions. The advantages of this approach come at the expense of usability for business users when producing content to answer their own business questions or support their teams.

In recent years, the Sisense Fusion Platform has been rearchitected to become a modern containerized microservices architecture but still relies on its proven API-first approach. Moreover, NLQ and NLG have been integrated to further lower the entry barrier for users and 'Sisense AI' has been implemented to support developers in laborious tasks such as data deduplication. 'Sisense AI' brings automated insights and easy forecasts to business users to help them explore and understand data. A notebook integration helps data scientists to leverage the governed data in Sisense.

Strengths

- End-to-end analytics platform powering data ingestion and preparation to present information to users through multiple channels within a single integrated and governed environment
- Internal columnar data store with proprietary In-Chip technology for performance acceleration is fast, mature and open for access by third-party tools
- Highly interactive and flexible dashboards and analytics applications to support business users in pure analytics scenarios on mobile devices or embedded in source applications
- Availability of APIs for all platform features (API first) and JavaScript library for embedding BI & analytics to reach more users with insights
- Sisense Infusion Apps bring BI & analytics closer to the people by integrating apps into software such as Slack, Salesforce and Microsoft Teams

Challenges

- Limited capabilities for page-oriented reporting and content distribution compared to leading competitors in this area
- Data modeling offers a lot of flexibility for developers but is not as intuitive as competing tools and requires coding for certain simple transformations
- User guidance is made available via Sisense AI but offers limited help to consumers and producers during data preparation and analysis

Tableau

Seattle, WA, USA

www.tableau.com

Tableau Software emerged from scientific research at Stanford University and was founded in 2003. The company has achieved strong growth and is now among the best-known BI & analytics vendors worldwide. Tableau was acquired by Salesforce in 2019. However, it remains a mostly independent business unit focusing on its target audience. Recently, the vendor acquired Narrative Science, a specialist in the area of natural language generation to boost its ability to provide automated insights in a written-language format that people can easily understand.

Tableau offers a BI & analytics platform which aims to help customers build their data cultures to empower better decision-making. Self-service data analysis is combined with self-service data management to enable companies to harness the power of their data assets. The vendor is committed to developing software that requires little training and allows business users to interpret data, mostly by means of interactive visualization.

The intuitive user interface, built-in intelligence and option for in-memory data processing to optimize performance contribute to the popularity of this solution for visual analysis, dashboards and data discovery. Tableau's openness to a variety of data sources is one of its strengths, as it is not necessary to rehost data to use Tableau. The solution allows users to query data live from different data sources, to combine data from across these sources, or to move the data into its own 'Hyper' in-memory database for analysis.

Data preparation in Tableau can be quick as many manipulations can be made directly while analyzing data, enabling a truly iterative approach to data discovery. With Tableau Prep, data preparation has been enhanced with deeper functionality and a more visual approach with recommendations for data shaping, profiling and enhanced traceability. Tableau Prep transformation flows can be created either on the desktop or via Tableau Cloud and may be scheduled and orchestrated on the server to operationalize data preparation tasks.

Tableau also continues to focus on improving and growing its self-service analytics platform into a modern enterprise-wide analytics platform. Governance functions such as data source certification and ML-powered data source recommendations have been incorporated. Moreover, with 'Virtual Connections and Data Policies' the vendor has started to centralize connection information and security.

Tableau also provides features to help end users in data analysis. The vendor has expanded its platform with AI-driven explanations of data through a feature called 'Explain Data' and the ability to analyze data using natural language with the 'Ask Data' feature. Additionally, the auto-ML capabilities of Salesforce's Einstein Discovery have been integrated with Tableau to provide advanced predictions and recommended next best actions. The Salesforce integration does not stop there. Tableau now offers 20 accelerators, shared logins, data connectors, notifications and alerts in Slack as well as the Revenue Intelligence application to supply Salesforce customers with modern analytics. Data science scripts such as R and Python can be dynamically integrated into Tableau's data prep and analysis features.

The vendor also actively prioritizes the expansion of its community. Tableau Exchange is a platform for its partners to provide a growing catalog of offerings including dashboard extensions, connectors and accelerators (prebuilt dashboards). The vendor recently acquired a company that has built a huge number of additional accelerators.

Strengths

- Easy-to-use user interface combined with good user guidance leading to high acceptance by data literate business users and casual users alike

- Visual analysis with built-in user guidance and good interactivity enables business users to find answers to urgent business questions, even in cluttered data sets
- Data profiling and recommendations are part of data preparation that supports access to a broad number of data sources (live and cached) including cross-database joins
- Interactive, mobile-ready and appealing dashboards and data stories are built with little effort by compiling, combining and refining data visualizations
- Einstein Discovery extends Tableau's analytical capabilities with machine learning

Challenges

- Not all data prep functions can be leveraged when running live queries
- Although more and more functionality (and Prep Builder) is available on the web, Tableau Desktop is still needed for data management and certain data sources
- Formatted reporting lacks the formatting and distribution functions that set apart the leaders in this area

TARGIT

Aalborg, Denmark

www.targit.com

TARGIT is a privately-owned software provider founded in 1986 with its headquarters in Aalborg, Denmark. The company has close to 8,000 customers, most of whom are located in Europe and North America, while one-third are distributed across the rest of the world.

TARGIT aims to help businesses make impactful data-driven decisions by offering innovative software, industry insight and services focused on strong customer and partner relationships. TARGIT is positioned well for companies of all sizes requiring an all-integrated BI platform with vertical content.

TARGIT Decision Suite offers integrated self-service analysis, ad hoc reporting and dashboards with capabilities for batch reporting, mobility, slideshows and data mashups. Through a no-footprint web-client, TARGIT provides capabilities to embed dashboard applications or visuals into other applications and web portals. The Document Model is intended to reduce the effort required to design content and make it available across all devices and output types.

The company offers a multitude of vertical solutions. The most prominent are those for manufacturing and retail, while niche solutions for heavy machinery, waste management, fleet management, medical billing, fashion design and apparel are showing traction as well. Providing not only a BI solution but also knowledge in the software remains a strong focus of TARGIT. The vendor continues to add verticals (e.g., airports) and predefined content to its portfolio. Moreover, its partner network is expanding. Partners also provide vertical solutions for different industries.

For several years, TARGIT invested heavily in modernizing its solution. It began by reducing the solution's Microsoft dependency, enabling customers to access data sources other than Microsoft SQL Server. Now, an option to use its own in-memory database, as well as access to a number of further different data sources has been introduced. TARGIT continues to work on enhancing its enterprise features by improving the deployment process and optimizing the UI/UX experience to enable designers to create dashboards, analyses and reports that are ready for easy consumption on large enterprise portals with better support for an improved cross-platform experience.

Strengths

- Business-user-oriented BI platform for reporting, analysis and dashboards
- One document type for different output formats to ease content development
- Enterprise functionality for data governance, reporting, distribution, deployment and logging
- Agents for monitoring data and alerting
- Accelerators and predefined content for Microsoft Dynamics NAV, AX, CRM and GP and a growing list of CRM, ERP and DMS systems

Challenges

- Microsoft-centric approach with Windows dependencies, which makes TARGIT less interesting for organizations with a Linux platform focus
- Although especially OLAP analysis is particularly strong, the vendor does offer less support for visual data exploration and data preparation compared to many of its competitors
- The use of ML and AI to guide users through data preparation and analysis is behind the competition

TIBCO

Palo Alto, CA, USA

www.tibco.com

Having initially focused on infrastructure software, TIBCO now aims to help companies to gain better insights and faster actions. This is made possible by a product portfolio which is subsumed under connect, unify and predict. The first stands for application integration, API management, events & messaging as well as business process management products. 'Unify' represents master data management, metadata management and data virtualization offerings. The third focuses on visual analytics, data science and streaming analytics. In 2020, TIBCO acquired the BI & analytics company Information Builders with its data management and analytics portfolio (WebFOCUS). TIBCO offers its products via TIBCO Cloud, which gives customers greater flexibility for deployment and scale.

In WebFOCUS, TIBCO acquired an integrated platform for creating custom web-based applications and highly formatted reports. WebFOCUS is able to serve thousands of users and therefore fits TIBCO's existing customer base quite well. TIBCO Spotfire is the vendor's existing visual analytics platform. Offered in two clients (installed and web), Spotfire targets a range of user types from power users in business departments and even data scientists to end users who consume interactive content.

In past releases, TIBCO has strongly improved its explorative way of working with data by bringing data preparation closer to the visualization on the web. Besides its capabilities to support data discovery with data preparation and analysis functionality, Spotfire offers a notable feature set in the analytics area. The product unifies dashboards, visual analysis, location intelligence, streaming analytics and even modest multidimensional analysis capabilities. These are complemented by an integrated advanced analytics engine together with a strong feature set in this area. Moreover, TIBCO Data Science gives data scientists an additional offering for authoring data science pipelines as well as collaboration, scoring and management capabilities.

TIBCO does not focus on any one specific industry but has a strong footprint in the financial services, transportation, government, telecommunications, retail, hospitality, manufacturing, healthcare and energy industries. Lots of major global companies from these industries use TIBCO's products, which demonstrates its strength and emphasis on serving large organizations that face complex data and analytics challenges.

Strengths

- Spotfire is a scalable data discovery platform, offering end-to-end analytics for data at-rest and in-motion from dashboards to exploratory advanced analytics applications
- WebFOCUS is a very flexible enterprise platform for distributing highly formatted reports and dashboards to large user groups and delivering individual BI applications for operational BI
- Support for embedding BI & analytics across TIBCO's portfolio through multiple programming frameworks and a lightweight, native JavaScript framework for developing low-code extensions with Spotfire Mods
- Broad range of tools to analyze structured and unstructured data for business users: visual, spatial (geo), streaming and (statistical) advanced analytics
- Connectivity to many data sources with optimized caching as well as direct access supporting many analytics use cases

Challenges

- Overlapping portfolio built up by acquisition means customers should carefully review their requirements and map them to the vendor's strategy and appropriate tool(s)
- The integration of recently acquired products is ongoing; customers using multiple products will face overlapping functionality and multiple UIs
- Although Spotfire is particularly strong in advanced analytics, it is not as well equipped with auto insights powered by ML to help less advanced users prepare or analyze data as other leading tools

ThoughtSpot

Sunnyvale, CA, USA

www.thoughtspot.com

In 2012, ThoughtSpot embarked on a mission to make businesses more fact-driven by making data and insights easily accessible to business users. Bolstered by venture capital, it has been expanding rapidly ever since.

ThoughtSpot Analytics is a business-user-oriented search and ML-driven BI & analytics platform. Natural language queries enabled by a shared semantic model are at the heart of the solution. Users 'ask' questions in natural language and get results presented in meaningful visualizations. The aim of this approach is to make access to BI & analytics as easy as interacting with any consumer app to connect users of all levels of data literacy with corporate knowledge through any device.

SearchIQ is responsible for indexing data to make it digestible for searching and ranking results in a smart manner. Beyond providing answers to questions asked, SpotIQ produces automated insights based on ML. These insights along with NLG functionality can explain patterns behind data visualizations or can be used to find clusters and outliers in new data sets. Interactive dashboards (previously known as 'pinboards', now rebranded to 'Liveboards') and analytical applications are created by optimizing and combining visualizations. Support for embedding and delivering search-based analytics and analytics applications is available through ThoughtSpot Everywhere as it provides extensive APIs for embedding all content types and search in a low-code manner.

ThoughtSpot makes extensive use of in-memory technology to speed up queries at scale because NLQ in particular relies on instant answers. Data can be stored in ThoughtSpot's internal data storage engine (Falcon) to index metadata and data for fast response. It can be loaded using 'DataFlow', ThoughtSpot's internal data loading capability, or by making use of data preparation tools such as Talend or Alteryx if required. Live connect (in-database query) is available through 'Embrace' for a growing number of popular cloud data warehouses such as Snowflake, Redshift, BigQuery, Synapse and Databricks or selected relational databases such as HANA and Teradata. 'Embrace' is ThoughtSpot's answer to increasing customer demand to leverage existing cloud data warehouses and the associated investment. Indexing the content of the databases ensures efficient natural language search queries. Semantic models are defined directly via the modern browser interface by defining joins and data types.

ThoughtSpot has extended the reach of its analytics platform by increasing the number of deployment options in the cloud and on premises. Additionally, 'Everywhere' helps businesses to customize and embed ThoughtSpot's analytics capabilities, including its search, anywhere. It enhances a platform initially focused on business users to develop and deploy highly customized analytics applications.

Strengths

- Conversational UI for querying data with natural language sets ThoughtSpot apart as it provides greater flexibility and is more mature than competing offerings
- SpotIQ delivers insights and recommends steps for deeper analysis to business users, making analysis more efficient by uncovering hidden insights and automating repetitive tasks
- ThoughtSpot has a modern user interface that is easy to use and can be understood intuitively by users of all skill levels
- All functionality comes in a seamlessly integrated end-to-end analytics platform based on a self-containing architecture, guaranteeing productive use and quick set-up

Challenges

- ThoughtSpot clearly focuses on delivering quick results to ad hoc business questions while its functionality for creating and distributing standardized content such as formatted reports is weak
- Integrated data preparation lacks the versatile functionality found in solutions from competing vendors, limiting the flexibility of business users to ingest new data quickly
- Although enhanced recently, the options to customize interactive charts found in leading solutions are not available in ThoughtSpot's 'Liveboards'

Yellowfin

Austin, TX, USA

www.yellowfinbi.com

Yellowfin, founded in Melbourne in 2003, is a BI & analytics software company that set out to fundamentally change the approach towards BI because the founders felt that traditional BI had become more complicated and expensive than it needed to be. Yellowfin sells its solutions directly or via its strong network of more than 600 partners worldwide. In 2022, Yellowfin was acquired by Idera, a business-to-business (B2B) software provider targeted at developers and technical users. According to Idera, Yellowfin will join its developer tools business by delivering a critical component of application development with the necessary ease of use, quality and scalability.

Yellowfin believes that organizations are more successful when all their employees engage with data. Therefore, the vendor has always put an emphasis on business users consuming analytics instead of power users creating content. Yellowfin is a mature, user-friendly BI & analytics platform that has evolved from a successful reporting and dashboard product to support an emerging style of analytics characterized by governed data discovery and collaboration. Besides engaging visualizations, the company focuses on making BI content consumption as easy as possible.

To transfer insights to its audience, the platform offers interactive formats such as data stories and dashboards. Yellowfin includes 'Smart Analysis' and 'Auto Analyze' for comparing metrics and analyzing data sets behind the scenes and provides users with ranked and commented (NLG) highlights to speed up time to insight. The company continues to invest in machine learning following the introduction of 'Signals', an automated insights feature designed to show users significant changes in patterns and outliers. In contrast to threshold-based alerts, Signals uses different statistical methods to discover outliers and patterns in data. This feature is included in the recently released mobile app, which aims to provide relevant data and insights instead of predefined dashboards.

For advanced analytics use cases, Yellowfin integrates with libraries and products such as R, Python, TensorFlow, H2O, PMML, SPSS and SAS.

While promoting Yellowfin as a one-stop shop for analytics, a further focus lies in embedding white-labeled BI & analytics capabilities into other solutions, significantly expanding the brand's reach.

Strengths

- Automated insights in Signals actively guide consumers through analyses and provide context for reports
- A broad range of innovative features such as storyboarding and collaboration to get more action out of insights gleaned
- Data preparation offers good data profiling and allows business users to extend the semantic model or export data to a data warehouse
- Very easy to use for consumers. The clean user interface is optimized to focus user attention on what is important.
- Support of embedded BI usage scenarios

Challenges

- Focus on live access contributes to the perception of poor performance, which can often be attributed to the underlying database
- Visual analysis offers limited flexibility via the dashboard-oriented approach, which is often not sufficient for power users looking for patterns and outliers in data
- Page-oriented standard reporting lacks pixel-perfect orientation compared to the leading vendors in this BARC Score

Zoho

Chennai, India

www.zoho.com

Zoho Corporation began life in 1996 as a software company called Adventnet, Inc., which focused on building network management products. The company was renamed in 2009 and now operates three distinct divisions including Zoho, which develops and sells a suite of business applications. Zoho Corporation has never accepted venture capital investment and remains privately held.

Headquartered in Chennai, India, Zoho currently has two other offices in India as well as sites in the United States, China, Mexico, Australia, Netherlands, United Arab Emirates, Japan and Singapore. The company employs around 12,000 people.

Across its suite of over 45 business applications – which includes solutions for CRM, project management, accounting, human resource management, BI & analytics, marketing and support – Zoho claims to have more than 14,000 customers worldwide for its BI & analytics platform.

Zoho Analytics, first released in 2009, is the central BI & analytics platform in Zoho's portfolio. With Zoho Analytics, the vendor aims to provide unified business analytics to its customers. It supplies a large number of connectors to data sources which can be integrated in a central data model designed for use by business users. Business connectors (for Zoho and non-Zoho apps) are able to auto-identify and auto-map table relationships, create domain and cross-domain models, train the NLQ engine and create sample reports and dashboards to speed up implementations for analytics. Customers can access these models using APIs.

Zoho further serves business users with its natural language technology Zia. Users can ask questions using Ask Zia and analyze underlying data without the need to actively create new content. Moreover, with Zia Insights, the software offers natural language generation capabilities to provide additional information to displayed data and help business users interpreting it.

Zoho Analytics can be used as a self-service BI platform and be embedded in Zoho's own or third-party applications. It can be deployed on-premises, on Zoho cloud and on third-party cloud infrastructure such as Google Cloud, AWS and Microsoft Azure. Zoho's Data Prep solution provides business analysts with an appealing and intuitive user interface for data ingestion and wrangling combined with guidance for possible preparation steps. Sophisticated data profiling features add additional value for customers when preparing data, speeding up the identification and correction of issues in data decisively.

Strengths

- Completely web-based business-user-oriented BI & analytics platform with functionality for ad hoc analysis, dashboards and data preparation
- Many prepackaged BI & analytics applications for different data sources (Zoho and third party) with predefined data models and content to speed up implementation
- Competitively priced product with a compelling scope attractive for many companies that want to provide access to data to more users at an affordable price
- Conversational analytics with 'Ask Zia' supporting natural language queries in multiple languages against data from the semantic layer to help business users to search for insights
- Data storytelling through slideshows embedded in 'Zoho Show' to connect the 'last mile' of information presentation directly to the BI & analytics platform and get rid of error-prone copying

Challenges

- Visual data exploration capabilities are limited to interactive dashboard applications increasing the effort required to generate insights from new data sets or new combinations
- Limited advanced analytics capabilities and ML-based guidance for business users during analysis
- Formatting and layout of print-oriented reports not as feature-rich as leading products

Other vendors

There are many other established vendors in the business intelligence and analytics market that provide mature and very useful technology, which may be ideal for organizations looking for a BI solution. However, due to the inclusion criteria applied in this report, those vendors are not evaluated in detail. To provide a broader market overview, we have listed some of them here.

Alibaba Cloud

Hangzhou, China

www.alibabacloud.com

Alibaba Cloud provides several data visualization services for cloud users. DataV is an Alibaba Cloud data visualization service that enables the analysis and presentation of large and complex data sets as visual dashboards. Alibaba Cloud Quick BI is a next-generation intelligent business intelligence service platform.

Altair

Troy, MI, USA

www.altair.com

SmartSight is a business intelligence solution focused on data discovery and data visualization. Its acquired Datawatch portfolio extends functionality for streaming analytics (Panopticon) and data preparation (Monarch). Altair SmartSight is part of the Altair SmartWorks™ suite, which is an open-architecture solution enabling advanced edge-to-cloud IoT applications and augmented data analytics powered by machine learning to drive innovation.

Alteryx

Irvine, CA, USA

www.alteryx.com

Alteryx Platform automates data provision to analysts, data engineers, data scientists and business users with a workflow and spreadsheet-based approach to data integration, modeling and advanced analytics that leads to deeper insights into data. Its recently acquired and rebranded Auto Insights solution provides ML-generated data insights for business users.

Amazon Web Services

Seattle, WA, USA

www.aws.amazon.com

Cloud infrastructure and services provider with a number of different products for data storage, processing, analytics and visualization.

Bilander

Gdynia, Poland

www.bilandergroup.com

Integrated BI tool for ad hoc reporting, advanced analysis, planning, dashboarding and balanced scorecarding with comprehensive chart functionality.

Bissantz

Nuremberg, Germany

www.bissantz.de

Bissantz's DeltaMaster software enables users to create custom solutions for analysis, planning and reporting, featuring patented visualization capabilities.

Cubeware

Kalbenmoor, Germany

www.cubeware.com

BI offering consisting of a front end for reporting, analysis, dashboarding and planning with a data integration tool to create various multidimensional models.

Comma Soft

Bonn, Germany

www.comma-soft.com

In-memory based analytics solution targeted at business users. Includes advanced analytics and data science functionality as well as capabilities for dashboards, ad hoc analysis, reporting, set-oriented analysis and visual navigation in data.

Cyberscience

Centennial, CO, USA

www.cyberscience.com

An ad hoc query and production reporting system that allows users to create simple queries, business graphics and crosstab reports as well as production reports.

DigDash

Meyreuil, France

www.digdash.com

DigDash, a French vendor, offers a solution designed for business users to create interactive data applications. This dashboard functionality is complemented by a set of predefined statistical methods as well as R and Python integration; ad hoc query capabilities within dashboard applications; and functions to create PowerPoint, PDF and Excel documents based on dashboard content, text and video material.

Entrinsik

Raleigh, NC, USA

www.entrinsik.com

Entrinsik Informer includes a browser-based drag-and-drop, point-and-click interface designed to encourage self-service BI. It is heavily used by mid-sized organizations in specific industries.

GoodData

San Francisco, CA, USA

www.gooddata.com

GoodData offers a cloud analytics platform that helps companies to organize and distribute their data and information. The product offers analytics functionality such as embedding and data preparation as well as data visualization.

iDashboards

Troy, MI, USA

www.idashboards.com

Interactive dashboarding software that displays data from databases, data warehouses, spreadsheets, XML and other data sources in real time.

Incorta

San Mateo, CA, USA

www.incorta.com

Incorta provides an end-to-end platform with capabilities for data acquisition, storage, analysis, visualization and reporting.

InetSoft

Piscataway, NJ, USA

www.inetsoft.com

InetSoft offers a cloud-based visualization and reporting product focused on data visualization, pixel-perfect and embeddable reporting, and self-service.

Infor

New York, NY, USA

www.infor.com

Infor is a global US-based vendor of industry-focused business software solutions. It has two main solutions for analytics and performance management: Infor Birst and Infor Dynamic Enterprise Performance Management (d/EPM). Both are strongly focused on Infor's customer base and therefore did not meet the inclusion criteria this year.

insightsoftware

Raleigh, NC, USA

www.insightsoftware.com

insightsoftware is a US-based global provider of solutions for the office of the CFO. The vendor's rapid growth in recent years has been largely inorganic and driven by the acquisition of vendors such as Excel4apps, CXO Software, BizNet Software, Jet Global, Bizview Systems, Longview Solutions, Mekko Graphics, Event 1 Software, Viareport, IDL Group, Certent and Logi Analytics.

Knowage

Rome, Italy

www.knowage-suite.com

An open source business intelligence suite for ad hoc reporting, interactive cockpits, multidimensional (OLAP) analysis and data mining.

Lumenore

Madison Heights, MI, USA

www.lumenore.com

Lumenore offers a self-service no-code BI platform which aims to provide insights to all users in the organization. The product contains data ingestion and management as well as data visualization components. AI-driven recommendations for data and search-based analytics complement the feature set.

Phocas

Coventry, UK

www.phocassoftware.com

Phocas offers budgeting and forecasting as well as financial reporting products that enable users to perform their own analysis with IT support needed only for data provisioning. It has a good range of functionality to support ad hoc querying, reporting and dashboarding.

Report One

Paris, France

<https://www.report-one.fr>

Report One, a French vendor, offers a BI platform with two modules targeted at different user types: one is integrated in the familiar Microsoft Excel spreadsheet environment and the second comes with a web portal-based dashboarding solution for distributing dynamic data to multiple users.

Salient

Vancouver, BC, Canada

www.salientbi.com

Salient Software Suite offers analytics and data visualizations based on a proprietary technology designed to deliver speed and scale to customers. The vendor offers software and preconfigured solutions for midstream organizations. The product offers advanced visualizations and analysis capabilities on top of real-time data.

Tellius

Reston, VA, USA

AI-driven BI & analytics product which focuses on bridging the gap between BI and data science teams. Tellius offers data visualization and ML-based analysis capabilities, which provide business users with needed insights.

Workday (Adaptive Insights)

Pleasanton, CA, USA

www.adaptiveplanning.com

Workday Adaptive Planning is a cloud-based, business-user-oriented CPM solution with integrated functionality for planning, reporting, dashboarding, analysis and financial consolidation.

Related research documents

The following BARC documents complement this BARC Score report:

BARC Access

<http://barc-research.com/research/business-intelligence/>

Access to BARC's complete research portfolio, including product reviews with detailed insights into more than 40 BI & analytics solutions, covering all the major players in the market.

BARC Scores

<http://barc-research.com/barc-score/>

BARC Score Analytics for Business Users: The lowdown on the global market for governed self-service analytics platforms. We evaluate business user support for the entire analytical cycle: from data and its preparation to presentation and collaborative content editing.

BARC Score Integrated Planning & Analytics: A clear overview of the market for integrated planning and analytics software based on a combination of detailed end-user feedback and thorough analysis of products and vendors.

BARC Software Surveys

<https://bi-survey.com/>

The BI & Analytics Survey: BARC's major annual report on the global BI & analytics software market. It is based on the world's largest survey of BI users, with a sample of 2,500 survey responses – that is why so many companies trust the results of The BI & Analytics Survey and base their software purchasing decisions upon it.

The Planning Survey: The Planning Survey offers an in-depth comparison of up-to-date planning solutions to decision-makers looking for new planning software. Based on feedback from more than 1,300 users, the latest edition evaluates nineteen leading planning products.

The Data Management Survey: The voice of the data management community: The Data Management Survey is BARC's annual report on the data management software market. This BARC survey examines data management products in terms of their functionality, application areas and usability.

Other BARC Research

Free to download at: <http://barc-research.com/research/bi-trend-monitor/>

BARC Data, BI & Analytics Trend Monitor: BARC's Data, BI & Analytics Trend Monitor study gives practitioners a platform to have their say on the trends currently shaping the BI, analytics and data management market, supplemented by additional commentary and analysis from BARC analysts.

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