

BARC Score

Enterprise BI & Analytics Platforms

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Abstract

This is the ninth edition of the BARC Score Enterprise Business Intelligence & 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 various BARC surveys and numerous 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.

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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.

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

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 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 ad hoc query
- 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 and ad hoc query	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 a range of 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 describes patterns in data, which in turn 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 has become an important area for improvement. 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 and ad hoc query:** 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 data set 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. 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. Consequently, 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 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 considers 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 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 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.

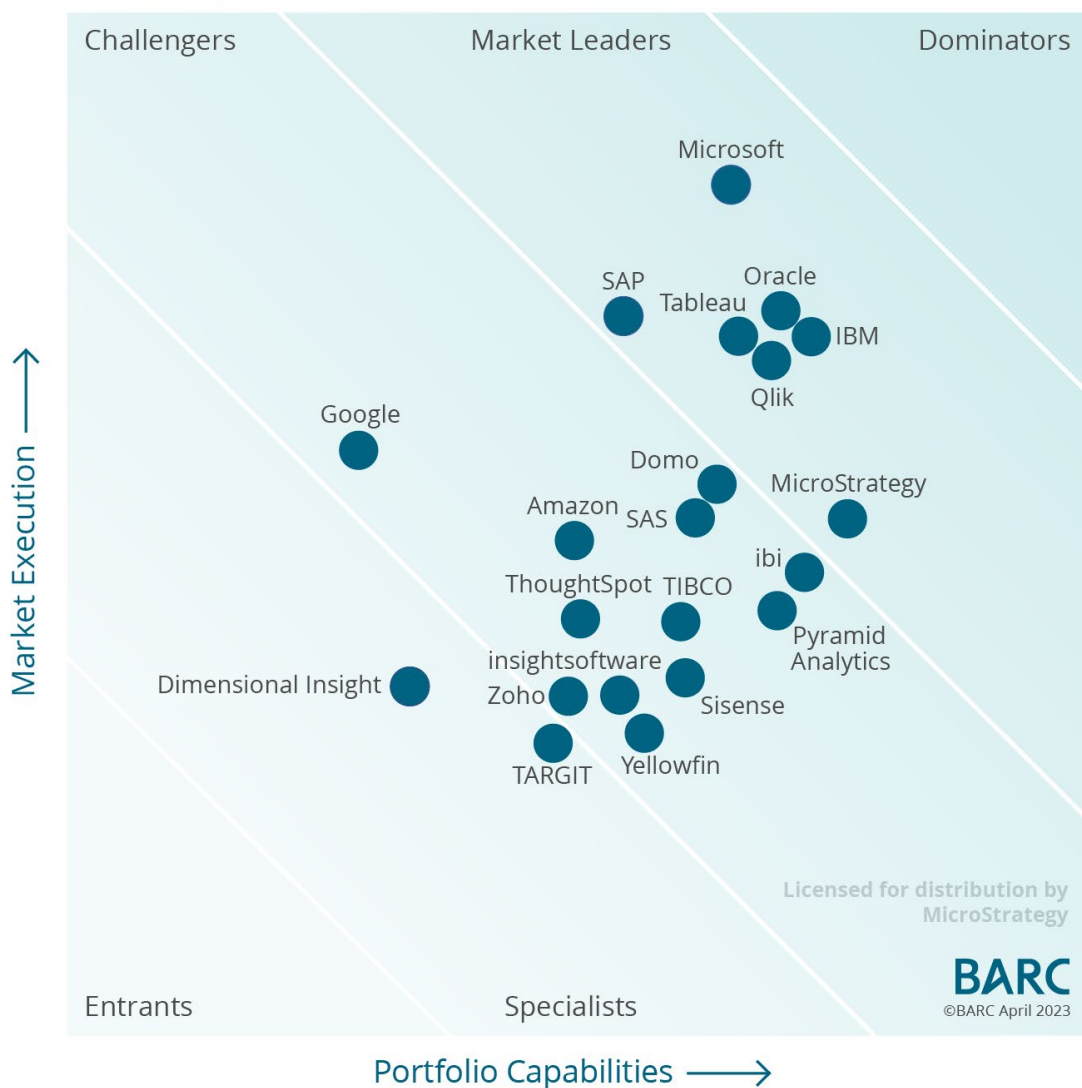
Marketing strategy

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.

BARC Score Enterprise BI & Analytics Platforms



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.

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 geographical 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

In this BARC Score we have evaluated the latest versions of the following products (see Table 3).

Table 3: Evaluated vendors and products

Vendor	Product(s)
Amazon Web Services (AWS)	Amazon QuickSight AWS Glue DataBrew Analytics-related services such as SageMaker
Dimensional Insight	Diver Platform
Domo	Domo Data Experience Platform
Google Cloud Platform (Google)	Looker Looker Studio Analytics-related services such as Vertex AI
ibi	WebFOCUS
IBM	IBM Cloud Pak for Data IBM Cognos Analytics IBM Watson Studio
insightsoftware	Dundas BI Logi Analytics Atlas CXO Hubble Jet Reports Spreadsheet Server Wands Angles

Vendor	Product(s)
Microsoft	Power BI Power BI paginated Reports Analytics-related services such as Data Explorer and Machine Learning
MicroStrategy	Analytics Platform
Oracle	Oracle Analytics Cloud Oracle Analytics Server OCI Data Science
Pyramid Analytics	Pyramid
Qlik	Qlik Active Intelligence Platform
SAP	SAP Analytics Cloud SAP BusinessObjects BI Platform
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

Vendor	Product(s)
TIBCO	TIBCO Spotfire TIBCO Data Science
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.

Amazon Web Services (AWS)

Seattle, WA, USA

www.aws.amazon.com

Amazon Web Services (AWS) is a subsidiary of Amazon, best known for its e-commerce platform. It is a provider of cloud infrastructure and services offering hundreds of services for data & analytics that are aimed to meet diverse needs and to enable customers to charge their business with data. These services range from databases, data integration, data storage, data lakes, big data analytics, log analytics, streaming analytics and BI to machine learning (ML) and artificial intelligence (AI).

The most important BI, analytics and ML services on AWS are Amazon QuickSight and SageMaker (for business analysts, SageMaker is primarily used for generating ML predictions). Launched in 2016, Amazon QuickSight is a fully managed SaaS platform hosted in the AWS cloud, targeted at customers who want to empower every member of their organization with insights. QuickSight's BI capabilities span from dashboards, ad hoc query and reporting to analysis features. All content is created using the web-based authoring interface and can be consumed on a web browser via the Amazon QuickSight portal, as an embedded dashboard in a third-party app, in email reports or on a mobile app. Its dashboard and authoring interfaces can be embedded in external apps as well. Moreover, QuickSight content can be created programmatically using APIs.

Besides interactive dashboards, QuickSight supports highly formatted, regularly scheduled paginated reports. Moreover, alerts can be used to prompt users to take immediate actions and make decisions based on insights generated by forecasting and anomaly detection ML algorithms. Ad hoc users can use a point-and-click interface to analyze data or QuickSight Q to ask questions in natural language (NLQ) and retrieve information.

Amazon QuickSight is a serverless BI service with usage-based pricing that leverages a cloud-native architecture to scale to hundreds of thousands of users without the need for infrastructure management and capacity planning. It supports different data sources through services in AWS as well as through native QuickSight connectivity. Besides storing data in its in-memory engine (SPICE), it also supports a direct query option to connect and visualize data from data sources in AWS, third-party clouds or on-premises without replicating it.

Amazon SageMaker is a service targeted at companies that want to implement advanced machine learning and analytics using AWS. QuickSight can connect with ML models from Amazon SageMaker, analyze augmented data and use it in dashboards. Using Amazon SageMaker notebook with pre-installed kernels, customers can use Python and R natively.

Strengths

- Consumption-based pricing allows cost-effective use of BI & analytics and encourages greater BI & analytics usage
- Modern, serverless architecture which eases the roll out to further users and offers room for implementation of additional usage scenarios such as embedding
- High number of data & analytics services on AWS which can also be used for different purposes such as storing IoT data, integration of further data sources or implementing advanced analytics scenarios
- ML-generated insights are designed to help business users uncover anomalies and trends in data
- QuickSight Q uses natural language processing to support non-technical business users in data exploration without overwhelming them with complex data structures

Challenges

- Amazon QuickSight only runs on the vendor's own AWS cloud infrastructure. Deploying it on-premises or on other popular clouds is not possible. However, customers can get insights from all of their data, wherever it is stored.
- Although the breadth of the product has grown in recent years, QuickSight lacks certain code-free complex functions, for example, in the area of application and dashboard building
- Data preparation guidance in QuickSight could be improved to help business analysts with functions such as data profiling and recommendations for joins or transformation steps. However, for more advanced data preparation needs, other AWS services such as AWS Glue and AWS Glue DataBrew can be used.

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 capabilities, as well as a columnar database technology for data storage. In the latest release, the list of file input types has been extended to include Excel, JSON, Datagen and PostgreSQL. Although its engine is proprietary and 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 recent releases, end users have been given greater flexibility in terms of content consumption. Besides the already available and constantly extended 'Stamps' (for preconfigured visualizations), '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
- Data exploration ('diving') targeted at business users is not as visual as competing products and offers limited guidance (e.g., recommendations for transformation, analysis steps and so on)

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 950 employees and serves more than 2,500 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. The product seeks to help IT and business experts deliver value to the business by complementing their existing systems and infrastructure. Domo Data Warehouse was designed to connect and unify fragmented data silos and systems to help customers 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 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. Its 'Cloud Amplifier' allows organizations to leverage their data cloud platform investments through native integrations to popular cloud data warehouses such as Snowflake and Amazon Redshift. To accelerate time-to-market for new analytics applications, Domo offers over 1,200 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. All functionality can be accessed through a browser, besides transforming and loading on-premises data into the Domo cloud, which is achieved through 'Workbench', a Windows desktop tool. Mobile users can access Domo through its dedicated iOS and Android apps. New Microsoft Office Add-ins allow users to connect directly to Domo within Word, Excel, PowerPoint and Outlook.

The vendor also offers a low-code and no-code app development environment (Domo App Framework) for customers wanting to build custom apps and make them available on the web and mobile devices. The no-code approach is intended to help developers with faster and easier app creation to connect real-time data insights to business process workflows.

Domo has also recently invested in advanced analytics and natural language processing to provide greater value to more users in the future. Besides providing an NLQ bot and NLG capabilities in its 'Cards' (visualizations), the vendor has gone into partnership with Pramana Labs to embed their 'SHIFT' app into Domo as a third-party app selected from the Appstore. In the area of advanced analytics, the vendor has introduced Jupyter Workspaces. This integrated notebook environment provides business analysts with further possibilities to analyze data. It allows data scientists to easily access all governed data in Domo and helps developers productionize and deploy created data models into apps and other content.

Strengths

- More than 1,200 standard connectors built and managed by Domo to various data sources speed up implementation
- 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 and Microsoft Office delivery of content helps to spread analytics to all employees, not just executives

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.
- The platform is more focused on the creation of interactive applications and dashboards and less on supporting business analysts with visual exploration and ad hoc analysis functionality. However, data preparation has recently been improved in terms of features available and ease of use for business users.

Google

Dublin, Ireland

<https://cloud.google.com>

Google is mostly known for its search engine and associated offerings. However, with its Google Cloud Platform (GCP), the vendor has entered the BI & analytics market with data management and analytics products. To complement its self-developed solutions, the vendor acquired Looker in 2020. Looker was founded in 2012 in Santa Cruz, CA, and has grown quite quickly since then. According to the vendor, more than 10 million users now use Looker.

Looker is the main enterprise BI & analytics platform from Google. 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. To provide customers with familiar usage and management capabilities of the GCP and foster Looker's integration with other GCP services, the vendor has announced Looker's forthcoming general availability as a Google Cloud service.

Looker is a web-based platform for providing a governed, standardized and trusted view of business data. It relies strongly on a central semantic layer created using LookML, its proprietary data description language (abstraction layer on top of SQL). Through its code-based nature, LookML models can easily leverage Git software development workflows and therefore can be easily deployed, maintained and version-controlled. The semantic layer built with LookML layer does not store data but processes it on the fly, pushing down workload to the source where possible, for example, to modern (cloud) data warehouses. Looker supports over 60 unique SQL dialects and especially leverages Google BigQuery functionality such as BigQuery ML. The vendor has also recently announced Looker Blocks for selected Google (e.g., Cloud AI and Google Workplace) and non-Google products. These are prebuilt pieces of code which help to accelerate the development of LookML models.

Business users connect to data using the LookML semantic layer, allowing them to do ad hoc analyses via a point-and-click interface. Looker is particularly strong in embedded BI and connecting interactive visualizations into dashboard applications.

Google recently started the integration of the Looker platform with the former Google Data Studio, a free cloud-based visualization product. It was rebranded as Looker Studio and as one of the first integration steps, now offers access to Looker's semantic layer, LookML. Besides connecting to LookML, Studio is capable of querying 500+ data sources and visualizing the insights using dashboards. The vendor has also announced Looker's integration with other GCP services such as Cloud SQL, Analytics Hub, Vertex AI, Google Workspace and Google Maps.

The Google Cloud Platform offers diverse options and services for advanced analytics. Besides using incorporated functions and partner solutions in its BI & analytics products, users can leverage cloud services such as Vertex AI.

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
- Looker Studio is a 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
- 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

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, unlike in many competing tools, has to be created by developers or tech-savvy users rather than regular business users
- Data preparation and upload of data by business users is currently not supported in Looker's web-based environment and is limited in Looker Studio

ibi (a business unit of the Cloud Software Group)

Fort Lauderdale, FL, USA

www.ibi.com

ibi is a business unit of the Cloud Software Group, Inc (CSG). CSG was established in 2022 to facilitate the merger of Citrix and TIBCO. ibi's history goes far beyond these recent changes. Information Builders (ibi) was founded back in 1975 and acquired by TIBCO in 2020.

ibi has always been dedicated to providing outstanding software for BI and data management. Its flagship BI & analytics offering, WebFOCUS, was introduced in 1997 as the first web-based BI suite on the market. With its product portfolio consisting of data integration, data quality and BI front-end products, ibi aims to help organizations thrive through the pervasive use of trusted data and analytics at scale. Although ibi focuses on data processing, it does not provide any self-developed data storage components, incorporating OEM in-memory technology instead.

The WebFOCUS data and analytics platform is ibi's flagship web-based BI front end for formatted reporting, ad hoc reporting, dashboards and analysis, and a custom application development environment. With WebFOCUS, BI applications can be centrally administered and published to a large group of internal and external recipients.

In recent years, the vendor has been concentrating on developing interfaces that are easier to use and configure for business decision-makers. One of the solution's main clients for business users is WebFOCUS Designer. This tool can be used for data preparation and to build interactive web applications for non-technical consumers, for instance, to be used in operational BI scenarios.

Supporting operational analytics has always been a key strength of WebFOCUS. The solution delivers insights from data coming directly out of production systems. These capabilities have been extended across enterprises to enable analysis across systems that are engaged, including today's cloud-based infrastructures.

The vendor is continuing the modernization of the overall platform by investing not only in the architecture (e.g., cloud deployments) but also in updates to the overall user experience. Moreover, further investments in trending topics such as NLQ and advanced analytics are on ibi's short-term roadmap for future releases.

Strengths

- Very flexible front end for highly formatted reports, infographics, dashboards and (ad hoc) analyses
- Capabilities for developing predefined interactive BI & analytics applications for business users (e.g., to be used in operational, tactical and strategic scenarios)
- Scalable platform proven in demanding scenarios for large user groups
- Support for a wide range of data sources
- NLQ and NLG capabilities aim to support business users in data exploration and interpretation

Challenges

- ibi has to improve its overall brand perception as well as awareness for its modernized data and analytics platform. Many customers and prospects are not aware of recent developments, both on the business and product fronts.
- Support for data preparation and visual exploration for business analysts is limited compared to competitors, for instance, in the area of guidance (recommendations for transformation, analysis steps and so on)
- Compared to other vendors on the market, the expertise in WebFOCUS available from partners, job seekers and web sources (e.g., user communities) is rather limited

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 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 wide 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 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 incorporated 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.

Strengths

- Cognos Analytics 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
- Cognos Analytics supports report creation by business users on the web which can then be polished by professionals and distributed to a large audience
- Automated insights in 'Explorations' help to find relationships in large data sets, discover relevant drivers for a metric and create detailed forecasts
- Broad capabilities for advanced and predictive analytics with IBM Watson Studio as well as data discovery and cognitive BI & analytics with Cognos Analytics
- Versatile use of the platform through more deployment options and improved openness (APIs)

Challenges

- 'Reports' requires better-trained users than 'Explorations' and 'Dashboards', limiting the possibilities for business analysts to create highly formatted print-oriented reports
- The number of different and varying visualization engines, and therefore possibilities, can cause confusion, especially between the 'Reports' and 'Dashboards' modules
- Low customer satisfaction and the performance of live queries, requiring customers to consistently optimize their dashboards, queries and databases, remain an issue

insightsoftware

Raleigh, NC, USA

www.insightsoftware.com

insightsoftware is a US-based global provider of solutions for the office of the CFO backed by private equity investors Hg, TA Associates and Genstar Capital. The company employs more than 2,000 people in over 40 locations worldwide and serves 32,000 customers with more than 500,000 active users in 150 countries.

insightsoftware was formed in 2018 out of the merger of Hubble by insightsoftware.com and Global Software, Inc. The vendor's rapid growth in recent years has been driven by the acquisition of vendors such as Bizview, Calumo, Certent, Clausion, Cubeware, CXO Software, Dundas, IDL, Jet Global, Legerity, Logi Analytics, Longview, Spreadsheet Server, Tidemark and Viareport. This strategy has resulted in a broad portfolio of more than 80 software solutions.

The product portfolio includes solutions for all key processes of today's finance organizations: BI & analytics, financial reporting, operational reporting, ESG reporting, disclosure management, planning and budgeting, financial consolidation and close, tax, treasury and data management. These solutions can be used independently or in combination and are offered based on customer requirements and strategic direction (e.g., global or local orientation of an organization, company size, connectivity to source systems, etc.). The overall objective is to enable the office of the CFO to connect to and make sense of existing enterprise data to drive greater financial intelligence across the organization.

In the area of BI & analytics, the vendor offers various well established and niche products including Dundas, Logi Analytics, Atlas, CXO, Hubble, Jet Reports, Spreadsheet Server, Wands and Angles. In terms of feature breadth and the usage scenarios that can be covered, Dundas and Logi Analytics are the most prominent. Both are offered by insightsoftware as Logi Symphony.

Dundas focuses on two main usage scenarios: 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. It supports live access to various sources as well as data acquisition into a proprietary in-memory engine (cached).

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. 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 can be easily embedded and extensively customized as customers can leverage all functions via APIs.

The Logi Analytics product suite supports even more demanding embedding use cases. Its modern web-based client Composer supports the creation of interactive and custom applications which offer self-service navigation and customization possibilities for business users on top of predefined applications. Logi Composer's strengths lie in its query engine that uses patented micro-queries and data sharpening capabilities to enable business users to perform real-time analytics and visual discovery on modern data sources and data lakes. Logi also offers a client for creating pixel-perfect reports which can be used for tailored embedding needs.

Strengths

- Strong individual solutions with comprehensive functionality for supporting finance processes that can be used independently or in combination, processing data from various source systems
- Dundas BI is an end-to-end analytics platform offering both tight governance for 'silver-service' as well as flexibility for self-service. Its dashboard development environment provides a high level of control over the look, feel and interactivity of applications, offering a high degree of flexibility to consumers.
- Dundas BI brings a rich set of APIs to allow embedded customers to integrate its dashboard and reporting capabilities directly into custom applications
- Modern and interactive Composer client to provide end users in embedding scenarios with greater self-service data discovery features, especially for modern data sources
- Numerous options with Dundas BI or Logi Analytics for the creation of pixel-perfect reports and their distribution to different users on regular schedules

Challenges

- Significant functional overlaps in insightsoftware's product portfolio (especially for reporting, planning and budgeting, and financial consolidation and close) with the challenge to reasonably position these products for potential customers
- A number of solutions in the portfolio currently have a rather local market spread and customer base. Enterprise customers with global implementation requirements should evaluate similar references for the use of insightsoftware's individual products.
- Limited advanced analytics functions, which are mostly available through integrated statistical functions and external libraries

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 substantial 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 additional features such as 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.

Microsoft continues to invest in the integration of Power BI with other Azure services. For instance, by using Power Automate, Power BI reports can be exported and distributed in different formats and scenarios. Power BI also now integrates with Microsoft PowerPoint to provide better data storytelling capabilities as well as to increase the use of insights gained in Power BI for a larger number of users.

Recently, Microsoft also introduced datamarts, which should bridge the gap between business users and IT. Datamarts leverage the optional no-code experience of Power Query to ingest and transform data from different data sources and then load it into an Azure SQL database. Business users can use datamarts as data sources for creating dashboards and visualizations.

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
- Different clients with varying functionality in place: Besides the two possible clients for creating paginated reports, Power BI consists of a desktop and a web client
- Power BI and additional services are available on the Azure infrastructure only

MicroStrategy

McLean, VA, USA

www.microstrategy.com

Founded in 1989, MicroStrategy is one of the best-known vendors in the BI & analytics market worldwide. In 2003, the vendor first released its fully integrated platform providing formatted reports, dashboards and interactive data discovery capabilities in a unified product using the same infrastructure and a consistent interface.

MicroStrategy focuses on providing a platform to fulfill all customer needs and capable of serving all types of users. The suite is based on a tightly integrated architecture which was built from the ground up without acquisitions. It offers functionality for dashboards, reporting and analysis and can be used to implement additional use cases such as operational, embedded or mobile analytics. Together with its library of statistical and advanced analytics functions, the vendor offers comprehensive analytics capabilities for a wide variety of use cases.

The suite offers different clients, which connect to an enterprise semantic layer (schema) to deliver common and governed business logic across multiple data sources with strong calculation and caching features. Business users can use the enterprise semantic layer (schema), typically created by technically savvy users, or create their own data models (data sets). For additional governance, data sets can be combined with the enterprise semantic layer or certified. MicroStrategy is taking an open approach by allowing third-party tools such as Tableau, Qlik, Power BI, Jupyter and RStudio to access its semantic layer.

MicroStrategy offers 200+ connectors to data sources, as well as native support for cloud databases and data lakes. Besides direct connectivity to source systems, the product offers an integrated in-memory engine to ensure fast query performance on large data sets. MicroStrategy supports hybrid and multi-cloud scenarios and can be deployed on premises or in the cloud (managed or customer-owned, for instance, on AWS or Azure).

MicroStrategy has always taken market trends seriously. 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. Compared to the existing 'Documents' format MicroStrategy, 'Dossiers' are intended to be built faster.

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.

The company continues to modernize its platform and offer further functionality in its web-based modules Workstation, Library, Dossier and HyperIntelligence.

Strengths

- Single integrated platform for formatted reports, dashboards, analysis and analytics application building with good performance in large environments
- Connectivity and connectors for third-party analytics tools such as Tableau, Qlik and Power BI grant access to its semantic layer
- Development framework for creation of native mobile apps
- HyperIntelligence enables users to access contextual information with zero clicks and sophisticated reporting and distribution deliver highly personalized information to all user types
- 'Dossiers' as modern and interactive applications that organize dashboards or reports in a familiar book-oriented chapter-and-page format

Challenges

- 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 (data sets) cannot be automatically converted to the enterprise semantic layer (schema) as both data modeling environments are not fully integrated
- Customers who want to modernize their existing 'Documents' content by migrating it to the newer 'Dossier' applications format will have to invest extra effort as fully automated migration is not available

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 170,000 employees, Oracle is one of the giants in the market.

The Oracle Analytics offering rests on three major pillars: Oracle Analytics Cloud (OAC), Oracle Analytics Server (OAS) as well as predefined content and embedded analytics created using OAC. OAC is Oracle's flagship product for BI & analytics. It runs on Oracle Cloud Infrastructure (OCI) and is able to leverage OCI services such as Autonomous Data Warehouse. Oracle Analytics Server, the on-premises version of OAC, brings the capabilities of the cloud platform annually to organizations requiring on-premises deployments or wanting to run it in other clouds. For Oracle's business application customers, the vendor offers a number of predefined solutions and embedded analytics with its Fusion Analytics, NetSuite Analytics and Industry Apps.

Oracle Analytics Cloud is a platform for dashboards, formatted reports, ad hoc reports, analysis, data preparation and machine learning. It offers different clients for different user types. Business users work typically with the modern web-based environment, which offers augmented data preparation and custom data transformations via Data Flows as well as visual analysis features. The clients known from the past, such as Answers (ad hoc reporting) and Publisher (for developer-oriented pixel-perfect reporting), still exist and were equipped with the same visualization engine. Mobile clients are also available.

All the clients can connect to Oracle's enterprise semantic layer, which offers strong calculation and caching features and a common and governed business logic. The suite typically connects directly to underlying data using native connectors, OEM software, REST APIs or standards such as OData and JDBC/ODBC without replicating data. Oracle continues to invest in the modernization of this layer. Recently, the vendor introduced a new semantic modeler, a web-based environment for creating SMML-based models. SMML is a JSON-based Semantic Modeler Markup Language that describes the semantic model's objects. The model has also been integrated with Git to support software development and facilitate deployment, maintenance and version control. Moreover, Oracle has opened up its semantic layer to be consumed by third-party applications such as Power BI.

Business users can use the semantic layer, which is typically created by technically savvy users, or create their own data models (data sets). Recently, Oracle has introduced a self-optimizing, in-memory analytics engine which should speed-up consuming and creating BI & analytics content. It is used to ingest and cache data instead of connecting live to sources, making it a compelling option to boost performance and productivity without leaving the governance delivered by the platform.

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. Beyond that, forecasts leveraging weighting algorithms can be created based on the drivers identified. Natural language queries ('Ask') can be used to analyze data without deep technical expertise or having 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.

Recently, the vendor announced new REST APIs for Oracle Analytics to provide developers with access to functionality in OAC. The appearance of the home page for end users can now be customized and

'Watchlists' enable them to subscribe to relevant data visualizations and see the most important KPIs as soon as they log in.

Strengths

- Cloud and web-based platform for reports, analyses, visualization, data preparation and dashboards
- SMML-based semantic layer which provides a governed and trusted view of data (for third-party tools such as Power BI as well) and facilitates modern software development workflows through its integration with Git
- Oracle offers the possibility to build independent self-service data sets for high flexibility as well as weaving semantic models together for a consistent enterprise-wide view
- 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
- Powerful and easy-to-use data preparation with good data profiling and user guidance through recommendations for transforming and enhancing data

Challenges

- OAC is only available on Oracle cloud. Customers seeking to deploy it on other cloud services must use 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 only partially integrated
- Integration between Publisher and Visualize is at data level only, reducing efficiency when creating content and making it harder for business users to leverage complete functionality

Pyramid Analytics

Amsterdam, Netherlands

www.pyramidanalytics.com

Founded in 2009, Pyramid Analytics is a privately held software company with more than 200 employees. 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 1,000 customers.

Pyramid Analytics launched its first BI product, BI Office, back in 2012. In 2017, the company introduced Pyramid Decision Intelligence Platform (Pyramid), a newly architected and revamped product to help customers make faster and more intelligent business decisions by automating the decision-making process.

Pyramid combines components for data preparation, reporting, dashboards, machine learning and advanced analytics 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.

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. Through this versatility, customers can use the product to transform their existing and traditional on-premises businesses to modern cloud-based deployments.

Pyramid also supports REST API to cater for scenarios such as embedding and automation. Its 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, cloud data warehouses and unstructured data sources natively – including Pyramid's own proprietary in-memory engine. Pyramid also offers certified support to various SAP data sources, making it a viable alternative to leverage data from, for example, BW/4HANA without duplicating it. Data preparation and modeling features to support data integration and processing are incorporated into the product. For ML and AI, the vendor relies on R, Python, MLib, Weka and TensorFlow integrations. Besides connecting and querying data, the vendor also supports write-back to selected relational data sources.

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.

Recent developments include the new Tabulate and Solve modules. Tabulate is a browser-based spreadsheet environment which resembles Microsoft Excel. It offers business analysts well-known Excel formulas and granular formatting options. The module stores its objects, similar to other Pyramid objects, centrally and does not produce single file structures as its prominent competitor does. Solve is an optimization engine, incorporated into the Tabulate environment, which can be used for decision modeling and to solve optimization problems. The insights users gain in Tabulate can be published to other users using the Publish module.

Strengths

- Well-integrated platform for reporting, dashboards, data preparation and analysis – all in a single, enterprise-grade environment
- 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, spreadsheet-like calculations and formatting as well as topics in the area of advanced and prescriptive analytics

Challenges

- Visual data exploration for business users is not as intuitive as some competitors' products (for instance, it follows a 'visualization first' principle and lacks visualization recommendations)
- Feature-rich environment potentially overwhelms creators from business departments, curbing use and value of analytics despite the introduction of streamlined 'Smart' and 'Light' interfaces
- Active guidance features offer basic help but lack functionality to assist business users, especially in the area of data preparation (for instance, through join or transformation step recommendations)

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. Since then, the vendor has made a number of acquisitions to create a robust cloud platform that delivers the data integration and analytics organizations need to transform raw data into informed action. Most recently, Qlik announced its intention to acquire Talend, a data integration specialist, to strengthen its offering in the data management area.

Qlik Cloud offers a compelling portfolio of data integration and analytics services. In the area of data integration, the vendor offers a number of services for data ingestion and transformation, catalog features and automation services. Qlik Cloud includes Qlik Sense, which provides enterprise-level BI & analytics capabilities, supporting a broad spectrum of analytics use cases across organizations. Qlik Cloud is a full SaaS platform, and customers can also deploy a hybrid cloud by combining Qlik Cloud with a client-managed Windows-based deployment.

Qlik Sense is powered by Qlik's associative engine and offers flexible and fast access to analyzed data. In 2022, the vendor started to provide direct query capabilities to query live data from cloud databases, including Snowflake, Google BigQuery and DataBricks. Qlik Sense includes product features that support business users 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.

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 visualizations to benefit data consumers by actively recommending suitable visualizations to users based on fields selected and their metadata.

AI and ML power the suggestion of insights for consumers in 'Insight Advisor' and NLQ. Insight Advisor is an AI assistant that auto-generates insights with advanced analytics, assists with analytics creation and data preparation, and supports natural language interaction including search-based discovery and conversational analytics. Qlik AutoML supports the automated creation of machine learning models, predictive analytics and scenario analysis, specifically designed for analytics users and teams that want to apply ML to a broad set of use cases. In addition, third-party data science and ML platforms can be integrated to allow decision-makers to explore calculations in real time through visual dashboards.

A further component of Qlik Cloud is Qlik Application Automation®, a visual, no-code facility to automate tasks and workflows within Qlik Cloud and in conjunction with third-party applications. For example, Qlik Application Automation can be used to create custom publishing routines for reports or to send notifications and insights to chat applications.

Recently, the vendor has optimized its dashboard development environment, integrated AutoML and enhanced Insight Advisor within Qlik Sense, as well as introducing publishing capabilities to Microsoft PowerPoint as part of its cloud reporting capabilities.

Strengths

- Comprehensive portfolio of data management and analytics products offered in Qlik Cloud to help customers gain insights from data and act upon them
- Qlik Sense as a business-user-oriented platform for BI & analytics covering interactive dashboards, highly customizable and embeddable analytical applications, visual analyses and reports
- 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
- Data preparation is very powerful. Features such as join detection based on field content are not common among competitors and speed up data preparation decisively.
- Qlik sets itself high expectations in terms of query performance and hardly ever falls short of them thanks to its mature in-memory engine

Challenges

- Although the portfolio is broad and feature-rich, we regularly see customers becoming overwhelmed with the increasing number of functions and modules offered
- Limited built-in functionality for data governance to align KPI definitions and ensure consistent use of master data across multiple applications (copying tasks with Qlik Application Automation are used for this purpose)
- Advanced layout options for page-oriented reports in the cloud are still limited compared to leading vendors despite the enhanced capabilities of the 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 110,000 people worldwide and has a turnover of €30.87 billion. SAP is one of the largest business software vendors in the world.

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

Although SAP focuses on cloud, its BI & analytics front-end portfolio encompasses on-premises solutions too. The vendor offers classic BI & analytics enhanced with augmented and predictive analytics, as well as corporate 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, SAP's strategic offering, brings BI, augmented and predictive analytics, and planning into one integrated platform. The product is continuously becoming richer in features such as application and dashboard design, planning and predictive functionality as well as prebuilt business content (e.g., solutions for finance, sales and marketing, HR and various industries). The product is fully web-based with a modern web client and a Microsoft Office 365 Excel add-in. SAP Analytics Cloud has a modern and 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.

SAP Analytics Cloud can be used with its own data sets or to query selected SAP data sources directly (e.g., SAP HANA, SAP BW/4HANA, SAP Datasphere, SAP BusinessObjects Universes). Customers can take advantage of this live connection to implement hybrid cloud scenarios without moving, caching or persisting the data into the cloud. In recent versions SAC's integration and connectivity with SAP and non-SAP sources has been strengthened. Its planning, predictive and workflow functionality as well as its reporting and dashboarding capabilities have also been improved through a new optimized 'Story' experience. The latter can be used for building highly interactive and custom dashboards and analytics applications. While SAP Analytics Cloud is aimed at business users creating analytics content, it also incorporates JavaScript capabilities to enhance the level of interactivity and customization of applications.

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 Datasphere offers capabilities to govern master data and align KPIs across an organization
- For those requiring an on-premises platform for formatted and ad hoc reporting, analysis, dashboarding and custom application design, suitable for medium and large deployments, a new and continuously supported version of SAP BusinessObjects BI has been announced for 2024.

Challenges

- Strong focus on cloud products such as SAP Analytics Cloud is leading to less innovation and fewer updates for the on-premises analytics portfolio (SAP BusinessObjects BI)
- 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 weaker than 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 end-to-end platform for analytics intended 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. In addition, a Microsoft 365 integration is included with VA, allowing VA insights to be embedded, for example, in Excel spreadsheets and Microsoft Teams. Visual Analytics can also be used to build and deploy sophisticated conversational interfaces and chatbots.

SAS Data Preparation is also aimed at business users and was designed to load data into the internal Viya in-memory engine. 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
- Required data has to be ingested to the in-memory engine CAS for use in analytics as live access to external data sources is limited
- Partner network and expertise in new SAS products is not as broad as for some competitors in the analytics area

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 600 employees.

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. In recent years, the Sisense Fusion Platform has been rearchitected to become a modern containerized microservice architecture but still relies on its proven API-first approach. Sisense has also integrated Git into the platform so everything can be exposed as JSON and incorporated into modern software development workflows.

Sisense Fusion offers especially strong support for the creation of 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 power 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, Slack, Microsoft Office 365 and Teams, as well as 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 to be 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 directly connecting to live, high performance databases or extracting it into its own in-memory cache. Tight governance features are woven into the platform based on the semantic layer and internal data storage. The platform typically runs in Sisense Cloud, which was built on AWS but can be run natively on all major public clouds or on-premises as well.

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 Jupyter, R and Python Notebooks integration helps data scientists to leverage the governed data in Sisense.

Strengths

- Highly interactive and flexible dashboards and analytics applications to support business users in pure analytics scenarios on mobile devices or embedded in source applications
- Internal columnar data store with proprietary In-Chip technology for performance acceleration is fast, mature and open for access by third-party tools
- Sisense Infusion Apps bring BI & analytics closer to the people by integrating apps into software such as Slack, Salesforce and Microsoft Teams
- Availability of APIs for all platform features (API first) and JavaScript library for embedding BI & analytics to reach more users with insights
- Strong Git integration to support efficient software development

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 from Salesforce

Seattle, WA, USA

www.tableau.com

Tableau 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 brands worldwide. Tableau was acquired by Salesforce in 2019. However, it largely acts as an 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 natural language (NLG).

The Salesforce BI & analytics portfolio consists of two pillars: Tableau and CRM Analytics. Tableau is a BI & analytics platform to provide better insights in data and empower better decision-making in all industries. CRM Analytics is based on the Tableau platform but was purpose-built for Salesforce users. The vendor recently announced Genie to provide Salesforce customers with a governed single source of truth through the use of technical components such as Tableau together with prebuilt data models and dashboards.

Tableau 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 all 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. Data science scripts such as R and Python can be dynamically integrated into Tableau's data prep and analysis features.

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 'Virtual Connections and Data Policies', centralized connection information and security, have been incorporated.

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 offers accelerators, shared logins, data connectors and notifications as well as alerts in Slack.

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 preparation 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 (including OEM) primarily located in Europe and North America.

TARGIT aims to help businesses realize the full value of data by leveraging decades of analytics expertise and experience in key verticals. The vendor is strongly focused on customer and partner relationships and is well positioned for companies of all sizes requiring an all-integrated BI platform with vertical content.

With its TARGIT Decision Suite BI & analytics platform, the objective is to deliver detailed insights and make relevant data accessible to every employee by supporting the unique goals and processes that power its customers' daily operations.

Providing industry knowledge in its BI & analytics platform remains a strong focus for TARGIT. The vendor especially focuses on certain verticals including heavy equipment, truck & trailer and automotive dealerships, C-stores, the public sector (esp. in Nordics) and airport operators. Extensive prebuilt content for automotive was recently added to this list with the acquisition of TARGIT's partner CalmCo. Besides adding verticals and content to its portfolio, the vendor is expanding its partner network and OEM usage of the software. Business partners provide additional vertical solutions for further industries.

TARGIT Decision Suite offers integrated self-service analysis, ad hoc reporting and dashboards with features for batch reporting, mobility, slideshows and data mashups. Through a no-footprint web-client, TARGIT provides capabilities to embed dashboard applications and 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.

TARGIT is currently completing the modernization and optimization of its platform for the cloud while ensuring continued support for on-premises using the same codebase. TARGIT Cloud Analytics DB, an integrated in-memory database, has been introduced recently, as well as access to additional data sources. TARGIT continues to enhance 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.

Strengths

- Accelerators, predefined content and industry knowledge for different verticals and topics
- Business-user-oriented BI platform for reporting, analysis and dashboards
- One document type for different output formats to ease content development
- Well defined ad hoc query and reporting functionality compared to some competitors
- Enterprise functionality for data governance, reporting, distribution, deployment and logging

Challenges

- Currently TARGIT only offers cloud deployment in Azure, making it less interesting for organizations that want to use other cloud infrastructures for BI & analytics
- Weaker support for visual data exploration and data preparation compared to many of its competitors, but strong OLAP analysis goes some way to compensate for this
- The use of ML and AI to guide users through data preparation and analysis (augmented analytics) is behind the competition

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 results are presented in meaningful visualizations. To further facilitate its features in this area, the vendor recently announced the launch of ThoughtSpot Sage, a new search experience that combines GPT-3 with ThoughtSpot's patented search technology. Sage, currently available in preview, is intended to empower users, regardless of their skill level, to use ML-powered analytics to ask and answer business questions, find accurate insights and act.

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 data.

Interactive dashboards ('Liveboards') 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 Fivetran, Matillio or Stitch if required.

Besides integrating data into its own storage, ThoughtSpot also offers live connections (in-database query) to a growing number of popular cloud data warehouses such as Snowflake, Amazon Redshift, Google BigQuery and Databricks as well as selected relational databases such as HANA and Teradata. The vendor recently announced a partnership with dbt whereby ThoughtSpot not only connects to dbt models but also automatically generates worksheets to speed up analysis. Moreover, for other selected data sources such as Google Analytics, Hubspot, Salesforce and Facebook, the vendor offers predefined Liveboards. Write-back functionality enables customers to insert insights into popular applications such as Google Sheets, Zendesk and Hubspot.

ThoughtSpot has extended the reach of its analytics platform by increasing the number of deployment options in the cloud and on premises. To further facilitate usage, the vendor recently announced a free version of ThoughtSpot for Google Sheets.

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
- Write-back functionality and extended partnerships facilitate usage and integration into customers' heterogenous environments

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

TIBCO (a business unit of the Cloud Software Group)

Fort Lauderdale, FL, USA

www.tibco.com

A software brand best known for its infrastructure and analytics offerings, TIBCO is a business unit of the Cloud Software Group, Inc (CSG), a company established in 2022 upon the merger of TIBCO and Citrix. From APIs and systems to devices and people, TIBCO helps companies to become digital enterprises through its three foundational pillars: connect, unify and predict. 'Connect' refers to application integration, API management, events and messaging as well as business process management. 'Unify' characterizes master data management, metadata management and data virtualization. 'Predict' focuses on visual analytics, data science and streaming analytics. TIBCO offers its products via TIBCO Cloud, giving customers greater flexibility for deployment and scale.

TIBCO's extensive BI & analytics portfolio supports a wide range of usage scenarios. The vendor began its analytics journey back in 2007 with the acquisition of Spotfire, a company specializing in leading interactive visual analysis. TIBCO Spotfire is a comprehensive BI software strongly focused on visual and advanced statistical analysis, the design of interactive dashboard applications and streaming. 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.

TIBCO has vastly improved its capabilities to explore and navigate data by bringing data preparation closer to the visualization on the web. Spotfire offers a notable feature set for BI & analytics extended by powerful data preparation making it a versatile tool for data discovery. The product unifies dashboards, visual analysis, location intelligence, streaming analytics and multidimensional analysis capabilities. These are complemented by an integrated advanced analytics engine together with a strong feature set in this area. TIBCO Data Science is an additional offering for data scientists supporting data pipelines as well as collaboration, scoring and management capabilities.

TIBCO does not focus on specific industries but does have a strong footprint in financial services, transportation, government, telecommunications, retail, hospitality, manufacturing, healthcare and energy. 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 analytics platform, offering end-to-end analytics for data at rest and in motion from dashboards to exploratory advanced analytics applications
- Spotfire is designed to support business users with different types of analysis: visual, geo, streaming and advanced statistical analytics
- 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
- Connectivity to many data sources with optimized caching as well as direct access supporting many analytics use cases
- Comprehensive additional data management offering with products from its 'connect' and 'unify' pillars

Challenges

- Traditional BI use cases such as formatted reporting are not a priority
- Although Spotfire is particularly strong in advanced analytics, it is not as well equipped with auto insights powered by ML to help casual users prepare or analyze data compared to leading tools
- Partner network and global knowledge of TIBCO products is not as broad as for some competitors in the analytics area

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. The company 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. Its BI & analytics platform is mature and user-friendly, having 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 Yellowfin is promoted 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

- 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
- Brand is less prominent than that of some competitors, even in the area of embedded BI & analytics

Zoho

Chennai, India

www.zoho.com

Zoho Corporation began life in 1996 as 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 remains privately held.

Headquartered in Chennai, India, Zoho currently has further 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.

Its business application suite covers BI & analytics, CRM, project management, accounting, human resource management, marketing and support. Zoho currently serves more than 14,000 customers worldwide with 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 provides unified data management and 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 can automatically identify and map table relationships, create domain and cross-domain models, train the NLQ engine and create sample reports and dashboards to speed up implementation of BI & analytics. Customers can access these models using APIs.

Zoho further serves business users with its natural language assistant Zia. Users can ask questions using 'Ask Zia' and analyze the underlying data without the need to create new content. Moreover, with Zia Insights, the software offers natural language generation (NLG) to provide in-depth information about displayed data and help business users to interpret it.

Zoho Analytics can be used as a self-service BI & analytics platform and can be embedded in Zoho's own or third-party applications. It can be deployed on-premises, on Zoho cloud and on third-party cloud infrastructures such as GCP, AWS or 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 value for customers when preparing data, decisively speeding up the identification and correction of issues in data.

In recent releases, the vendor has delivered features such as watermarking and tagging of data sets as well as its pluggable micro services architecture for public cloud deployments, which offers the flexibility to use third-party components such as AWS caching instead of those offered by Zoho. Zoho Analytics has also been integrated with Zoho Cliq to provide chat-like collaboration capabilities.

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 companies that want to provide access to data to more users at an affordable price
- Conversational analytics with 'Ask Zia' supports natural language queries in multiple languages against data from the semantic layer to help business users 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

Further relevant BI & analytics 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

Panopticon is a business intelligence solution focused on data visualization and streaming analytics. With its acquisition of Datawatch, Altair also absorbed a data preparation product (Monarch) into its portfolio. Its analytics products are 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 Analytics Cloud 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 Auto Insights solution provides ML-generated data insights and data storytelling capabilities for business users.

Bilander

Gdynia, Poland

www.bilandergroup.com

Integrated BI tool for reporting, advanced analysis, planning, dashboarding and strategy management (management by objectives) 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.

Board

Chiasso, Switzerland

www.board.com

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.

Comma Soft

Bonn, Germany

www.comma-soft.com

The in-memory based analytics solution INFONEA is targeted at business users. It 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.

Incorta

San Mateo, CA, USA

www.incorta.com

Incorta provides a unified end-to-end data and analytics 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.

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.

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 added analytics with the 2015 acquisition of Actuate, one of the earliest providers of business intelligence software.

Phocas

Sydney, New South Wales, Australia

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 query, reporting and dashboards.

Report One

Paris, France

www.report-one.fr/

The MyReport BI platform has two modules targeted at different user types: one is integrated in the familiar Microsoft Excel spreadsheet environment and the other comes with a web-portal-based dashboarding solution for distributing dynamic data to multiple users.

Suadeo

Ivry sur Seine, France

<https://suadeo.fr>

Suadeo calls its offering a Self Data Services Platform. It is effectively an end-to-end data and analytics product consisting of several modules for data management and data visualization.

Tellius

Reston, VA, USA

www.tellius.com

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

Workday

Pleasanton, CA, USA

www.adaptiveplanning.com

Formerly known as Adaptive Insights, 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 research complements this BARC Score report:

BARC+

<https://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 and data management solutions, covering all the major players in the market.

BARC Scores

<https://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 around 2,000 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: <https://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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