

# Critical Capabilities for Analytics and Business Intelligence Platforms

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A&BI platforms are evolving beyond data visualization and dashboards to encompass augmented and advanced analytics. Data and analytics leaders should enable a broader set of users with new expanded capabilities to increase the business impact of their investments.

## Key Findings

- Analytic and business intelligence (A&BI) platforms still show substantial differences in functional capabilities, particularly in their support for complexity of analysis and data models, as well as in scalability.
- As the market matures, the capabilities offered to build and deliver basic, user-friendly analytic dashboards and interactive visualizations are becoming less differentiated.
- The trend toward assisting users with augmented data discovery functionality continues, but no platform provides a complete capability as of yet.
- The functionality to support the more advanced analytic needs of the emerging citizen data scientist (CDS) group of users varies significantly by platform.
- When viewed across the whole span of capabilities, significant differences remain between competing platforms and, therefore, also between which are most appropriate for a given use case. In some cases, this is a reflection of strategies adopted by vendors to target particular use cases or differences in product maturity.

## Recommendations

To maximize value to business decision makers from their use of analytics and BI, data and analytics leaders should:

- Augment their technology portfolio to include self-service A&BI by evaluating the capabilities of incumbent traditional, enterprise-reporting vendors against modern competitors.

- Expand the scope of usage beyond dashboards and data visualization by deploying advanced and augmented capabilities to a subset of self-service users to increase the depth and breadth of analyses performed.
- Free their centralized A&BI team's resources to experiment and innovate by enabling business units to perform more of their own data preparation and analytics within a governed framework.

## Strategic Planning Assumptions

By 2020, augmented analytics — a paradigm that includes natural language query and narration, augmented data preparation, automated advanced analytics, and visual-based data discovery capabilities — will be a dominant driver of new purchases of A&BI, data science and machine learning platforms.

By 2020, the number of users of modern business intelligence and analytics platforms that are differentiated by augmented data discovery capabilities will grow at twice the rate — and deliver twice the business value — of those that are not.

By 2020, natural-language generation and artificial intelligence will be a standard feature of 90% of modern business intelligence platforms.

By 2020, 50% of analytical queries will be generated via search, natural-language processing or voice, or will be automatically generated.

By 2020, organizations that offer users access to a curated catalog of internal and external data will derive twice as much business value from analytics investments as those that do not.

Through 2020, the number of citizen data scientists will grow five times faster than the number of expert data scientists.

## What You Need to Know

This Critical Capabilities research is a companion to the 2018 "Magic Quadrant for Analytic and Business Intelligence Platforms."

Over the last decade or so, the BI platform market underwent a fundamental shift away from IT-centric solutions to business-user-driven solutions. Older IT-centric platforms were primarily focused on reporting. Although their ad hoc query tools allowed power users to author reports, they still required an upfront IT modeling effort, commonly in the form of a semantic layer and data warehouse. "Intelligence" was really a misnomer in that it didn't represent smarts, but rather the gathering of information into an intelligible and accessible set of outputs. From a business-user perspective, they were often slow and hard to use.

As a result, new tools arose (initially named data discovery tools by Gartner in 2008). These used a self-contained, in-memory engine with minimal to no upfront modeling requirements and strongly visual UIs. This architecture allowed a wider range of business users to perform interactive analysis,

without the need for advanced technical skills. Their sales models and intuitiveness also meant that they often self-seeded across organizations, with little thought for governance.

The last five years saw these disruptive tools evolve into enterprise-ready platforms, to the point that they became the dominant model. What started out as point solutions for individual analysts in decentralized use cases have evolved, adding capabilities to handle enterprise governance, usage at scale and varied use cases.

Today, decentralized analytics remains the most common use case for platforms, closely followed by agile, centralized BI provisioning and governed data discovery (see the Use Cases section below). Organizations may start with a decentralized analytics use case, and later look for governance and promotability. In other instances, they may start with a governed BI use case, essentially aiming to replace the former IT-centric reporting platform with a more agile, modern solution (see "Technology Insight for Modern Business Intelligence and Analytics Platforms").

Note that in some cases there is an evident mismatch between how a platform scores for a particular use case and what the surveyed references say they use it to do. (This is more notable for Looker regarding decentralized analytics — see its section below). Rankings should be viewed in the right context: Most platforms support a number of use cases at a rating of 3.0 or above, which denotes a good level of functional support. However, in some cases, it may be that the selected platform is not being used in its sweet spot, and so may not maximize the value of its functional scope.

For the small, but growing, group of data-minded users who want to go beyond visualizing data, modern A&BI platforms have begun to offer more sophisticated analytic techniques, but packaged for self-service use. (Note the shift in emphasis this year, with analytics given precedence.) This capability, called Advanced Analytics for Citizen Data Scientists, is becoming of increased importance as organizations become more data-centered.

However, self-service capabilities, no matter how intuitive, are reliant on the skills of the user if they are to deliver maximum value. Like it or not, the analytic skills (or data literacy) of most organizations is still low. To address this skills gap, vendors have begun to add augmented data discovery capabilities. Augmented (formerly smart) data discovery uses machine learning techniques to prepare and cleanse data more intelligently, automatically model and generate the most important insights, and interpret charts via natural-language generation.

In summary, A&BI platforms offer a wide range of functional capabilities to support a diverse set of use cases and analytic demands. The challenge for organizations is to ensure that their usage of these capabilities is matched with their organization's maturity level and readiness.

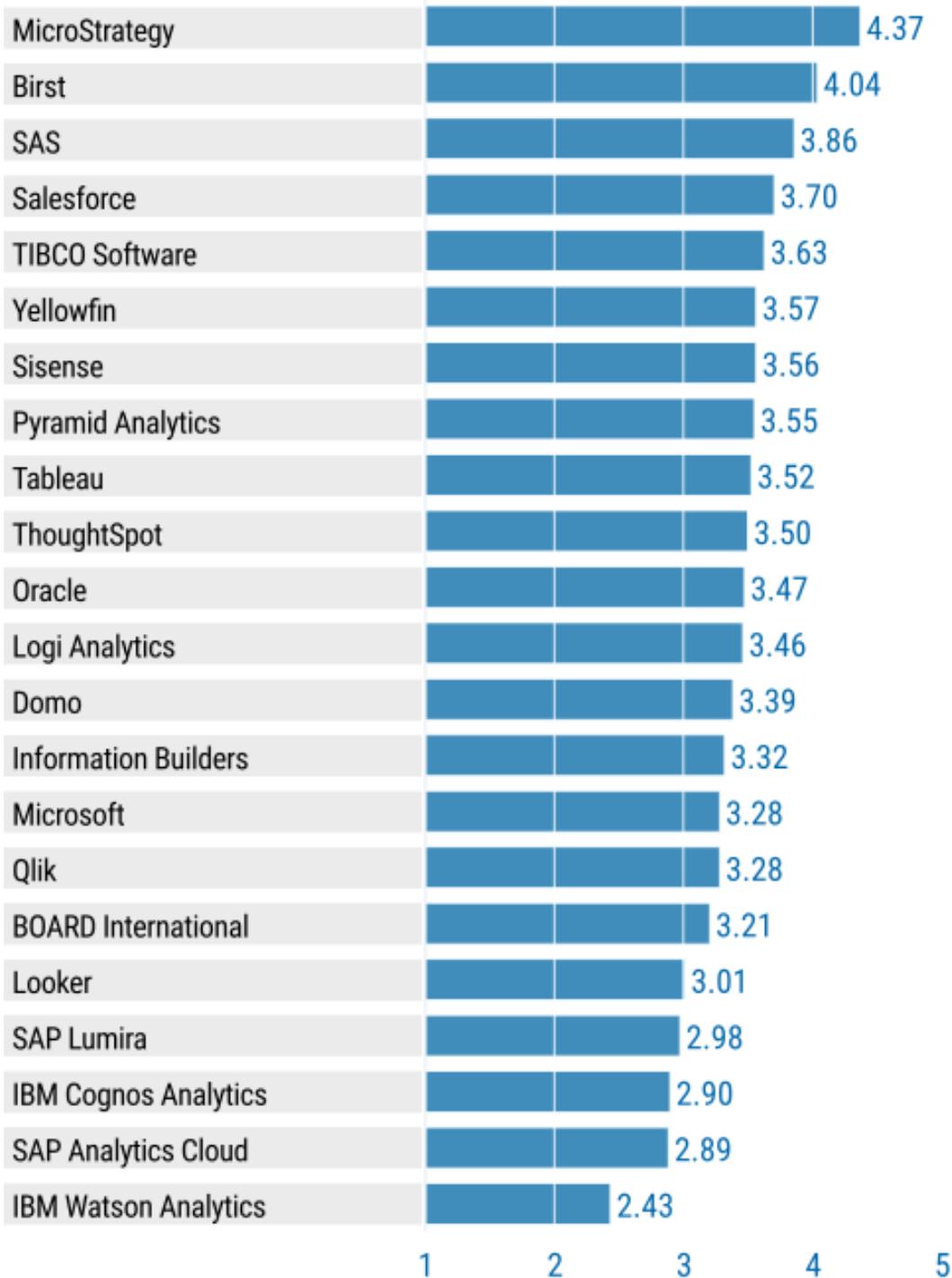
# Analysis

## Critical Capabilities Use-Case Graphics

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Figure 1. Vendors' Product Scores for the Agile, Centralized BI Provisioning Use Case

Product or Service Scores for Agile, Centralized BI Provisioning



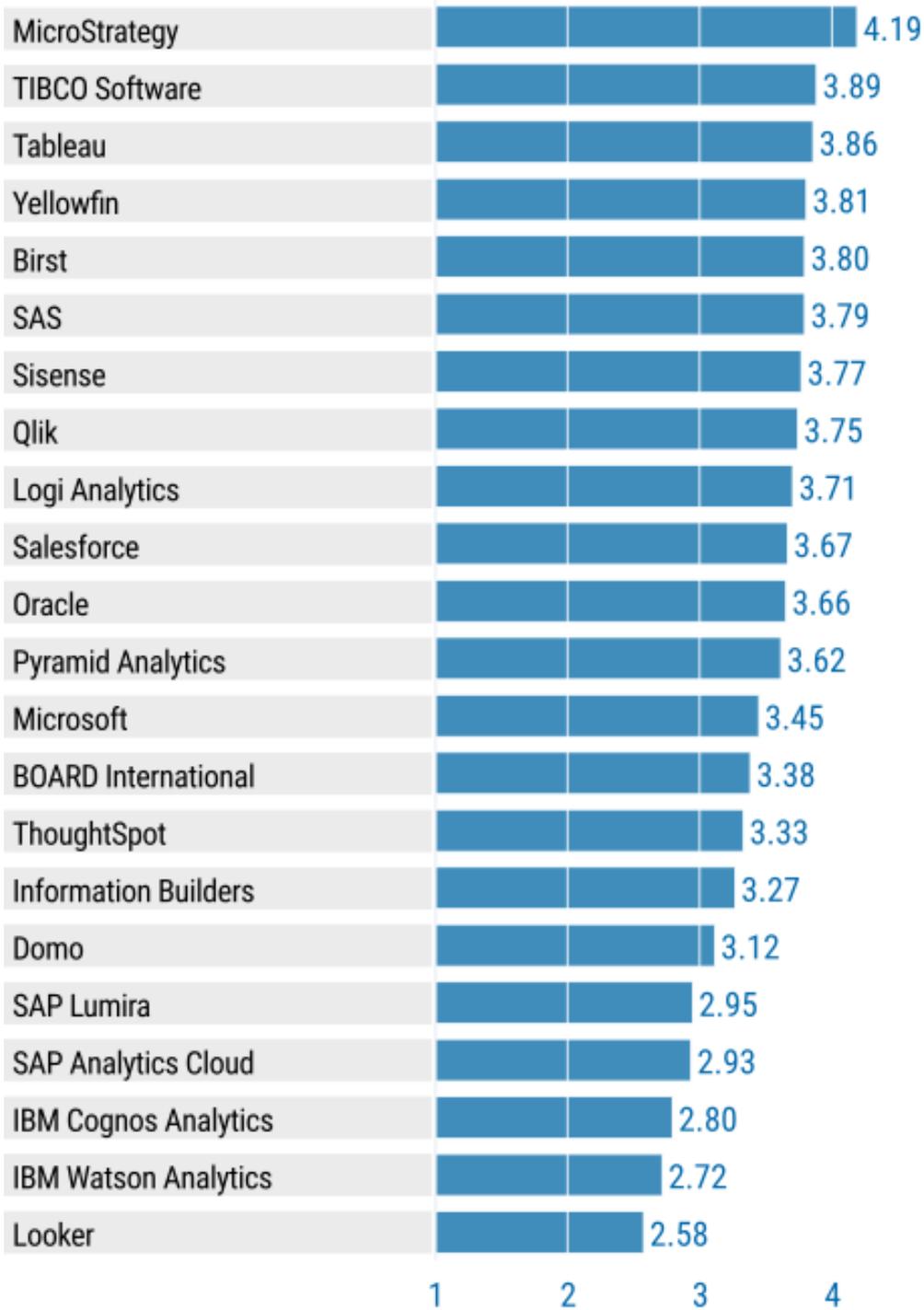
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Source: Gartner (May 2018)

Figure 2. Vendors' Product Scores for the Decentralized Analytics Use Case

Product or Service Scores for Decentralized Analytics



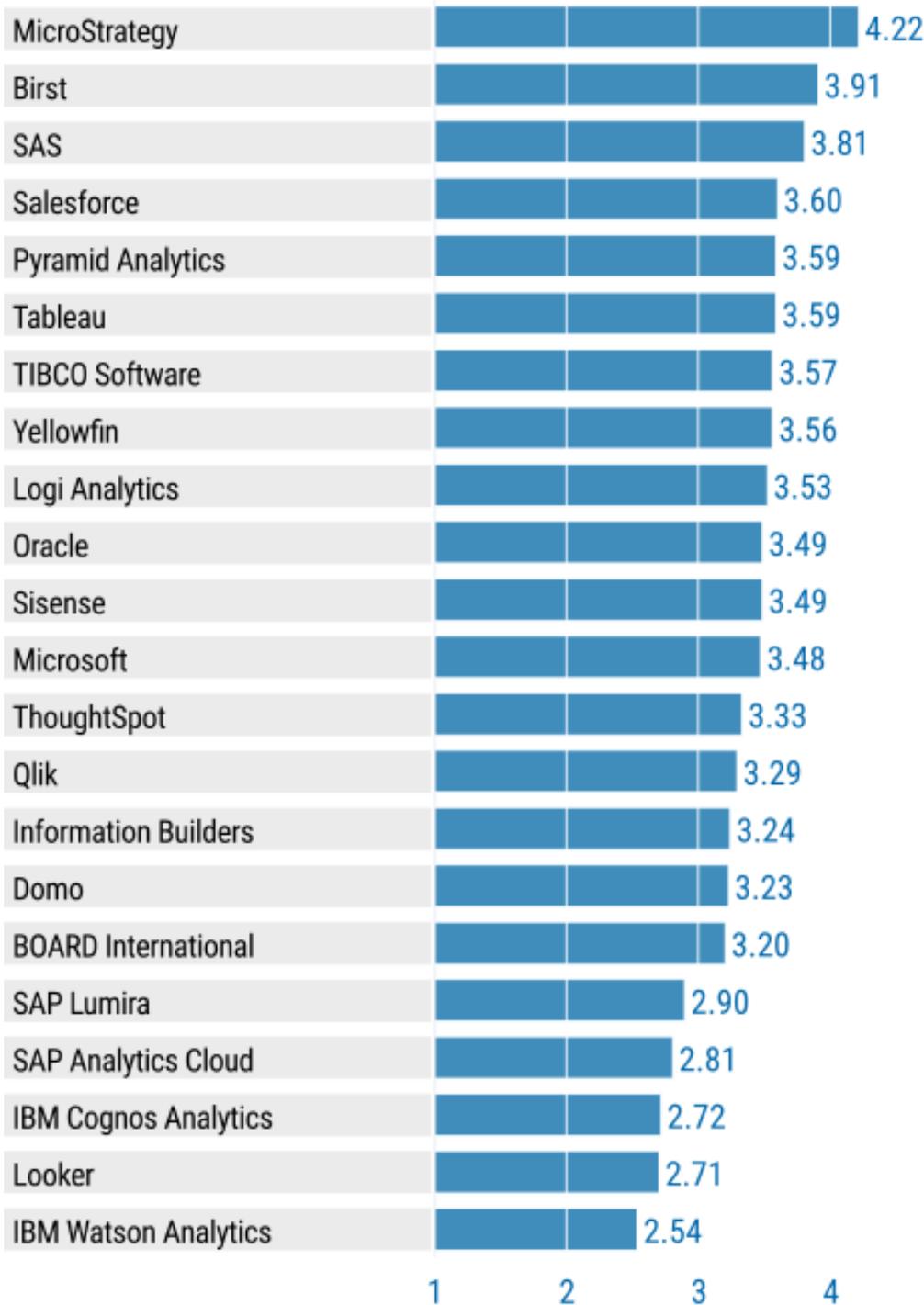
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Figure 3. Vendors' Product Scores for the Governed Data Discovery Use Case

Product or Service Scores for Governed Data Discovery



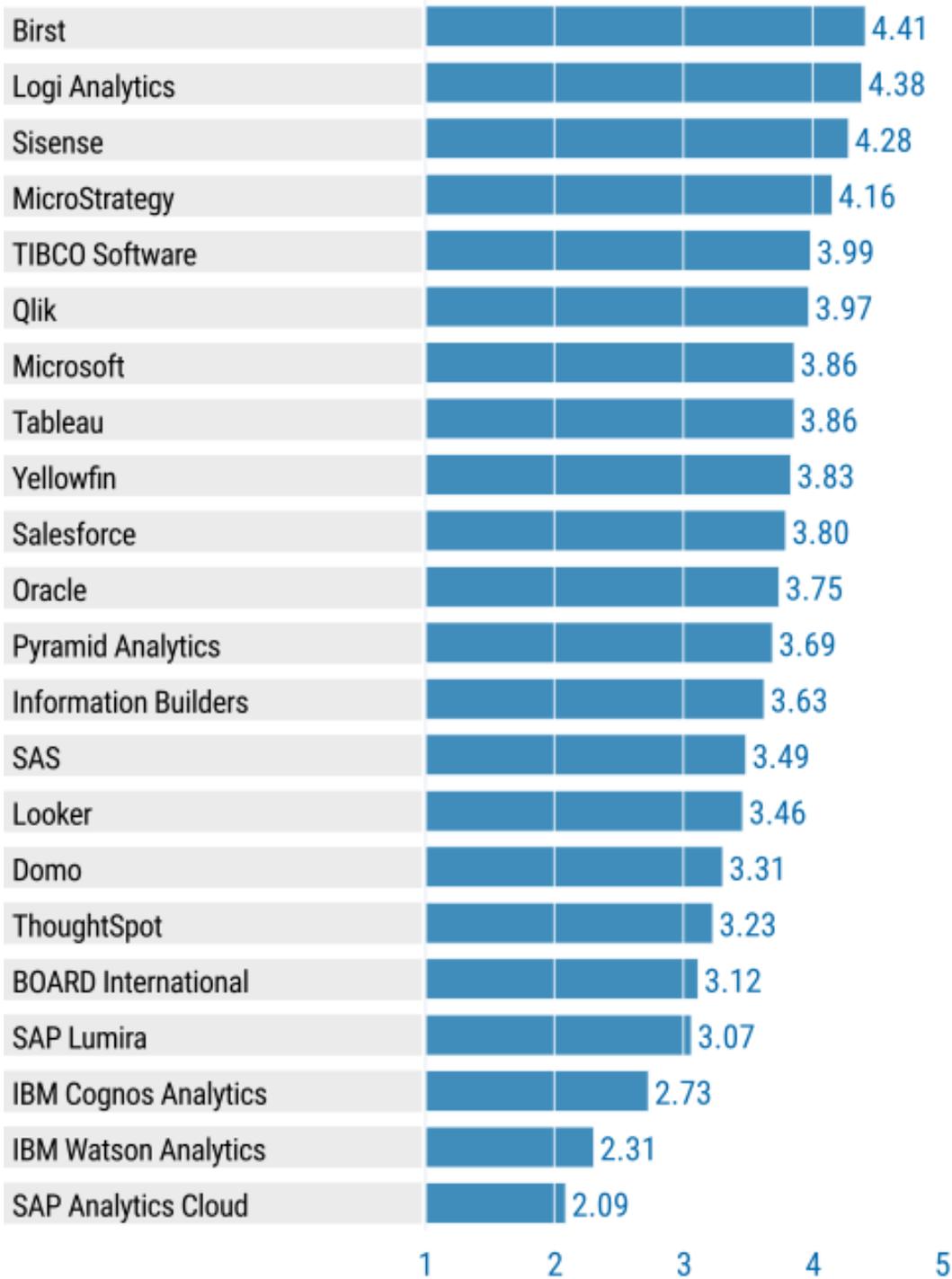
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Figure 4. Vendors' Product Scores for the OEM or Embedded BI Use Case

Product or Service Scores for OEM or Embedded BI



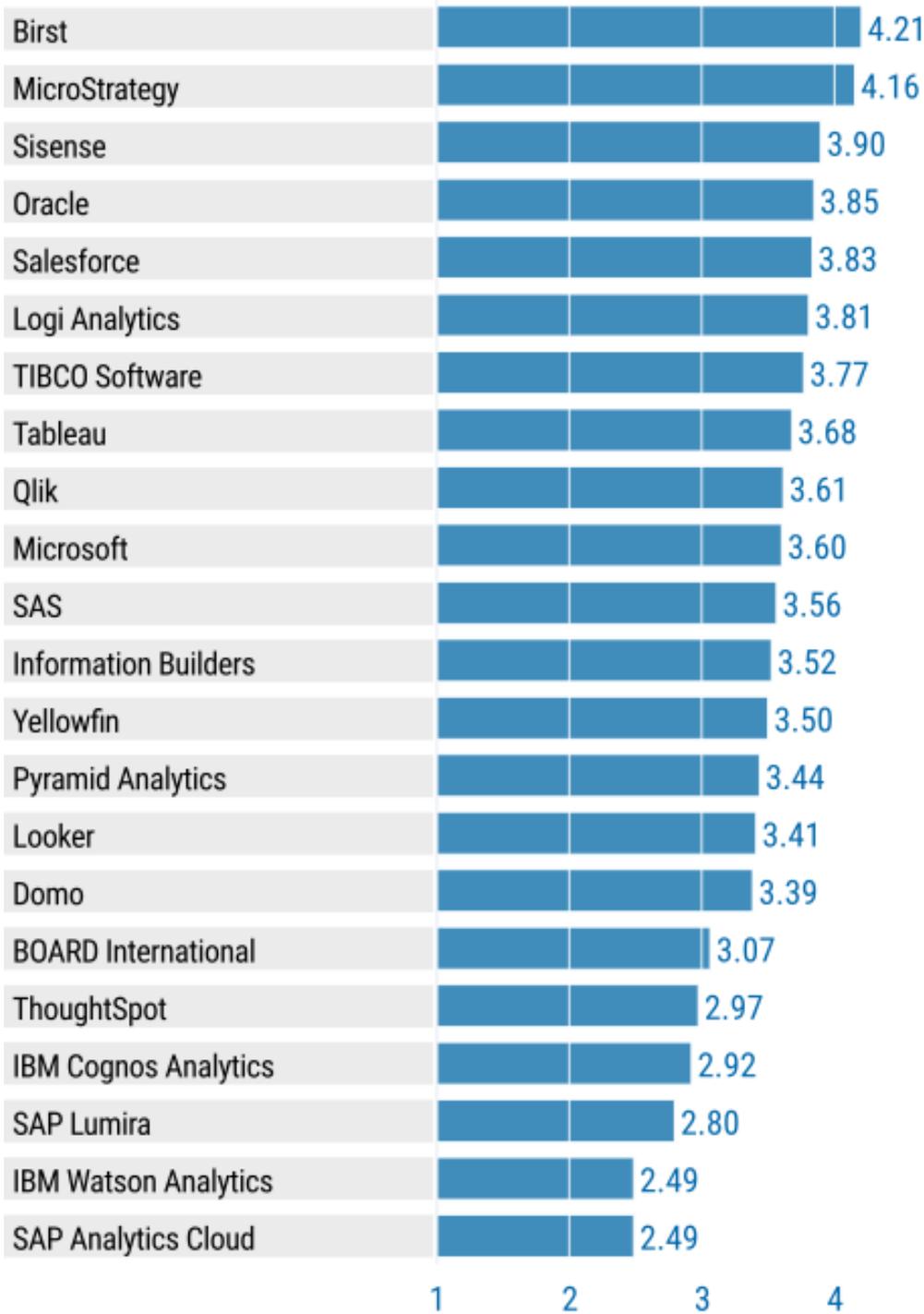
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Figure 5. Vendors' Product Scores for the Extranet Deployment Use Case

Product or Service Scores for Extranet Deployment



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Scores in Figure 6 reflect a combination of analyst opinion and customer opinion based on products released before 15 January 2018.

Figure 6. Product/Service Rating on Critical Capabilities

Product/Service Rating on Critical Capabilities															
Vendor	Infrastructure			Data Management				Analysis and Content Creation					Share Findings		Overall
	BI Platform Administration, Security and Architecture	Data Source Connectivity and Ingestion	Cloud BI	Scalability and Model Complexity	Self-Contained ETL and Data Storage	Self-Service Data Preparation	Metadata Management	Advanced Analytics for CDS	Augmented Data Discovery	Interactive Visual Exploration	Analytic Dashboards	Mobile Exploration and Authoring	Embed Analytic Content	Publish, Share and Collaborate	Ease of Use, Visual Appeal and Workflow
Birst	4.4	4.9	4.0	3.8	4.5	3.5	4.9	3.0	2.1	3.5	3.0	4.5	4.9	3.5	3.9
Board	4.4	3.5	3.0	3.3	3.5	3.0	2.5	3.5	1.6	3.0	3.0	2.5	2.5	3.0	3.9
Domo	4.5	3.6	3.6	3.7	2.6	2.1	3.0	2.1	1.1	3.1	3.1	3.0	3.0	3.5	4.1
IBM (Cognos Analytics)	3.0	2.1	3.0	2.8	2.1	2.1	3.0	1.6	1.1	3.0	4.0	2.0	2.6	2.1	3.7
IBM (Watson Analytics)	2.5	2.5	3.0	2.2	2.0	2.5	2.0	2.1	2.1	3.0	2.6	2.5	2.0	2.0	3.6
Information Builders	4.0	3.5	3.0	3.2	4.0	2.1	3.0	3.0	2.1	3.0	3.0	4.4	4.0	3.0	3.5
Logi Analytics	4.4	4.5	2.6	3.2	4.0	3.0	3.0	3.0	1.1	4.4	4.4	2.1	4.9	2.5	3.8
Looker	3.5	2.1	3.1	3.2	2.1	2.1	4.0	1.6	1.1	2.5	3.0	2.0	4.5	2.1	3.3
Microsoft	4.0	5.0	3.5	3.0	3.0	3.1	3.0	3.0	2.1	4.0	3.1	4.0	4.0	2.1	3.8
Microstrategy	5.0	5.0	4.0	4.5	4.9	4.0	4.5	4.0	1.1	4.0	4.0	5.0	3.5	3.5	4.2
Oracle	4.9	3.0	3.5	3.0	4.4	2.1	3.0	3.0	2.5	4.0	4.0	4.0	4.0	2.1	3.7
Pyramid Analytics	4.5	4.0	3.0	3.1	3.0	4.4	3.0	3.0	1.6	4.0	3.5	3.0	3.5	4.5	4.1
Qlik	3.0	3.1	2.6	4.0	4.9	4.0	2.5	2.1	2.1	3.5	4.0	3.0	4.4	3.0	3.9
Salesforce	4.5	2.5	3.1	3.0	4.4	3.0	4.4	4.0	3.5	3.5	3.1	4.4	4.5	3.0	3.8
SAP Analytics Cloud	3.5	2.1	3.1	2.3	2.5	3.0	3.0	2.5	2.1	2.6	3.0	2.5	1.1	2.6	3.6
SAP Lumira	3.0	2.6	1.1	3.2	2.5	3.0	2.5	2.1	1.6	3.0	4.0	4.4	3.0	2.5	3.7
SAS	4.0	3.5	3.0	3.3	3.5	3.5	3.5	4.9	1.6	4.5	4.9	4.4	3.0	3.5	3.8
Sisense	3.5	4.0	3.1	4.0	4.9	3.1	4.0	2.1	3.0	3.1	3.1	3.0	5.0	2.6	4.3
Tableau	4.0	4.0	3.0	2.7	4.4	3.0	3.0	3.0	1.1	4.5	4.0	4.0	4.0	3.0	4.3
ThoughtSpot	4.5	4.0	2.1	3.4	3.5	3.0	4.0	2.1	3.0	2.1	2.6	3.0	2.6	3.5	4.3
TIBCO Software	3.0	3.5	3.0	3.3	4.9	3.0	3.5	4.5	2.1	4.0	4.5	3.0	4.5	3.0	3.8
Yellowfin	4.5	3.0	2.1	3.1	4.4	4.9	3.0	2.5	2.1	3.5	3.5	4.4	4.0	4.5	4.1

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As of May 2018  
See Note 1 for scoring details.

Source: Gartner (May 2018)

Each of the products/services has been evaluated on the critical capabilities on a scale of 1 to 5; a score of 1 = Poor (most or all defined requirements are not achieved), while 5 = Outstanding (significantly exceeds requirements).

## Vendors

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### Birst

Birst provides an end-to-end cloud platform for A&BI and data management on a multitenant architecture. The Birst platform can be deployed on a public or private cloud, or on an appliance (Birst Virtual Appliance).

Birst is now an independent business unit of Infor. Birst will continue to focus on the stand-alone A&BI market. Infor's wider strategy is to focus on providing cloud offerings and niche applications to support microvertical markets. The ramp-up in cloud demonstrates the reason for Infor choosing Birst as a horizontal data and analytics layer to support its other solutions. The microvertical application focus shows the range of opportunities for embedded BI and add-on sales that the Infor acquisition should make available to Birst.

Birst delivers a major release every three months, with a minor release every two weeks. The focus of this evaluation is the Fall 2017 version.

Birst is most often deployed for the agile, centralized BI provisioning use case (46.3%), followed by traditional IT-centric reporting (39.0%).

According to the reference customers, the top three reasons for selecting Birst are cloud deployment, overall TCO, and data access and integration. Organizations selecting Birst most often considered Qlik and Tableau as alternatives.

### Strengths

- **Embedding analytic content:** Birst's API layer exposes a rich set of APIs that cover a wide range of needs when embedding analytic content. These include security, building connectors, building workflow, custom visualizations and data loading. The SDK for custom visualizations and analytic web applications allows business users to embed external content into a dashboard. The external content can be used as parameters for the Birst report, or the Birst filters and interactivity can be used to specify how the external content is rendered. This gives two-way interactivity between Birst and external content. Reports and dashboards can be embedded in a third-party portal. Users have create, copy, export, export data, delete and save abilities on reports via the API.
- **Metadata management:** Birst has extensive support for metadata management across the board, including common definitions for metadata objects, data governance, self-service data preparation and automatic generation of metadata models. Data lineage is exposed with every transformation, from source to resultant warehouse table, and can be viewed with Birst's visual discovery interface. Business logic and definitions are stored in Birst's automatically generated semantic layer. The semantic layer can be federated across individual spaces, so Birst users

can work in their own virtual area while still connected to the main semantic layer. Business users can import data and blend it with existing data, and the necessary data models and data integration routines are created automatically, without the need for specialist data warehousing or ETL skills.

### Areas of Improvement

- Augmented data discovery:** Birst scores were Fair for augmented data discovery. Birst can automatically generate advanced visualizations on a dataset (such as correlations, clusters and decision trees). The platform also automatically generates insights (such as forecasts and trends). However, it lacks the ability to automatically label outlying data points, although a benchmark reference band can be created to pick out the nonoutlying data. The natural language query interface is in development. Although Birst allows generation of written narratives, this is not fully automated.
- Advanced analytics for citizen data science and analytic dashboards:** Birst scored Good in these two categories. The platform gives users the ability to embed advanced analytics, including linear regression. User-defined algorithms are supported if built in R. Birst's SMART technology supports building analytical functions like time series and clustering. The platform offers a library of commonly used statistical functions like mean, min, max, median, standard deviation, variance and regression. It also supports variance statistics like F-test, R squared and t-test. For analytic dashboards, the platform lacks the following: options to increase the amount of data displayed for very large datasets, offline exploration (apart from mobile) and support for specialized geospatial algorithms like distance and route calculations, as well as geospatial data layering.

### BOARD International

BOARD delivers a single, integrated system supporting BI, analytics, and financial planning and analysis (FP&A). The company's stated aim is to provide an "end-to-end decision-making platform." BOARD is based in Switzerland, with its international headquarters in Boston, Massachusetts. Since late 2016, BOARD has been focusing more on the U.S. market, where it has seen significant growth in its customer base.

BOARD aims to have a major new release per year and a minor update each quarter. The focus of this evaluation is version 10.1.4. The last significant release of the product was 10.1, which added some new functionality for search-based interaction, natural-language generation and data storytelling.

BOARD is most often deployed for the decentralized analytics use case (72%), followed by agile centralized BI (61%).

According to reference customers, the top three reasons for selecting BOARD are ease of use for content consumers, ease of use for developers and superior functionality (see Note 2). Organizations selecting BOARD most often considered Qlik and IBM Cognos Analytics as alternatives.

## Strengths

- **Solid platform:** BOARD has always developed its own software (rather than acquire functionality piecemeal). This shows in platform fundamentals. Administration, security and architecture rated Excellent, while data source connectivity and ingestion, self-contained ETL, and data storage rated Good to Excellent. BOARD natively supports a broad range of relational and multidimensional data sources. Connectors are also offered for a variety of enterprise applications, either on-premises or in the cloud. Other web sources, such as Twitter or Facebook, are supported through an OData connector. BOARD also supports Hadoop and NoSQL sources.
- **Ease of use and advanced analytics:** BOARD has created software that users find easy despite the breadth of the task it supports, which range from planning and budgeting processes, through data visualization to advanced analytics. BOARD offers a comprehensive set of advanced analytics for citizen data scientists' functions through its proprietary library, BOARD Enterprise Analytics Modeling (BEAM). Supported statistical and mathematical functions include linear regression, multiple regression, Holt-Winters, ARIMA and a set of proprietary autoregressive exogenous models named IdsiARX. The BEAM user interface is designed for citizen data scientists, who only need to set the observed time series (the historical set) and a set of parameters (such as forecasting horizon, confidence interval and forecasting method). Its ease of use and visual appeal are rated Good to Excellent.

## Areas of Improvement

- **Dimensional model:** BOARD's core cube architecture is based on multidimensional online analytical processing (MOLAP) or relational online analytical processing (ROLAP), organized by facts and dimensions. Unlike most other products evaluated in this research, a more-flexible data model is not supported. The dimensionally modeled approach originates from BOARD's financial analytic application roots, where requirements are clearly defined in advance, much more so than is usual in modern A&BI deployments. To enable flexibility, the BOARD platform includes its Data Fast Track tool, with which users can build the metadata objects for the required cubes. Metadata management is rated Fair to Good.
- **Embedded analytics:** The ability to embed analytic content in other systems is an important, growing use case for A&BI platforms. BOARD is relatively weak here, lacking full API support for administration tasks (such as create, copy and delete objects), security management and chart customization. API support is available to monitor (view) metadata, users and tasks, but not to update or edit these attributes. BOARD is HTML5 and supports iFrames and WebParts for portal integration.

## Domo

Domo is a cloud-based analytic and BI platform most often aimed at senior executives and line-of-business users who need intuitive analytic content. Domo is commonly deployed in the line of business with little or no support from IT.

Domo is a cloud-based SaaS platform and deploys updates regularly. Major releases/updates are on about a six-month cycle. Significant additions delivered in 2017 included enhanced support for embedded analytics and extended content for prebuilt role-based dashboards (which the vendor calls Domo Business-in-a-Box). The focus of this assessment is the January 2018 version of Domo.

Domo is most often deployed for the decentralized analytics use case (90%), followed by agile, centralized BI (55%).

According to reference customers, the top three reasons for selecting Domo are ease of use for content consumers, ease of use for developers, and data access and integration. Organizations selecting Domo most often considered Microsoft Power BI and Tableau as alternatives.

## Strengths

- **Collaborative dashboard development:** Domo offers business people an intuitive interface to build interactive "cards" (views) and store them either in "collections" (Domo's term for organized grouping of cards) or "pages" (Domo's term for dashboards). Domo's reference customers rate it highly for its user experience. It ranks in the top quartile for ease of use, visual appeal and workflow, with an overall Excellent rating for this capability. Additionally, Domo has Good to Excellent functionality in the publish, share and collaborate capability. Domo enables collaborative and iterative development between content authors and content consumers. To drive collaborative engagement with data, Domo users can participate in discussion threads or groups, follow other users, and are presented with recommendations on content rated or used by others or via extensive alerting capabilities.
- **Data source connectivity and ingestion:** Domo's platform includes a library of over 450+ prebuilt connectors, including 250 self-service connectors that allow nontechnical users to connect to data sources. Through the Data Center or the Domo Appstore, users have access to connectors, including XML, JSON, Google Sheets, and enterprise application sources like Microsoft Dynamics, Salesforce and NetSuite. Domo also provides an on-premises tool for connecting and establishing scheduled update loads from enterprise-installed software like Oracle, Teradata, SQL Server and ODBC database servers. Customers report that Domo's API-driven connectors to source systems are effective when dealing with dynamic data sources, as changes are propagated automatically from changes in the source-side schema.

## Areas of Improvement

- **Embedded advanced and augmented analytics:** Although announcing plans for supporting more complex analytics with Mr. Roboto, the Domo platform is currently only rated Fair for advanced analytics for CDS capabilities. The Domo platform supports clustering, classification, estimation, affinity analysis, attribute importance and JavaScript-based libraries (such as math.js) but only via its R plug-in and Magic ETL. It does not offer menu-driven means for users to build decision trees. Similarly for augmented analytics, Domo does not offer NLG, NLQ and conversational analytics, nor does it automate the generation of analytics visualizations or models.

- **Self-service data preparation:** Domo's data inference and profiling capabilities are rated as Fair. Users can promote, collaborate and reuse a dataset, but it can't reuse individual metadata objects. At the time of evaluating, Domo lacked the ability to watermark datasets and content based on whether or not sanctioned data sources are used, relying on tagging cards and datasets as a manual alternative. Finally, Workbench — Domo's desktop tool for administrators to load on-premises data into its cloud — doesn't have the same ease of use and visual appeal as its web-based dashboards and data-loading process. Workbench supports manual data mashups, the creation of additional calculations and some data transformations. It lacks a point-and-click graphical user interface to build a query or extract data.

## IBM Cognos Analytics

IBM Cognos Analytics version 11 onward represents the rebranding of the former Cognos Business Intelligence product line (version 10.2.2 and earlier), combining production reporting capabilities with self-service dashboards and ad hoc analysis within one modern A&BI platform. An improved user experience makes it easier to use and more visually appealing. IBM Cognos Analytics is available both on-premises or as a hosted solution on the IBM cloud.

IBM has continued to deliver product releases on a regular cadence. The product is on a continuous release cycle and averages a release per quarter. The basis of this evaluation is IBM Cognos Analytics 11.0.9 (released in December 2017), which focused on adding enhancements to reporting and dashboards, as well as on improved integrations with IBM Planning Analytics and third parties.

IBM Cognos Analytics is most often deployed for the decentralized analytics use case (60%) and agile, centralized BI provisioning use case (54%).

Reference customers indicated that the top reasons for selecting Cognos Analytics are superior functionality, ease of use for content consumers, ease of use for content authors/developers, and product roadmap and future vision.

Organizations selecting Cognos Analytics most often considered Tableau and Microsoft Power BI as alternatives.

## Strengths

- **Leverage existing content with improved visual appeal and ease of use:** IBM Cognos Analytics continues to cross-pollinate design from Watson Analytics, integrating both Mode 1 (IT-authored content and reporting) and Mode 2 (business-user-authored interactive analysis) into a single, more intuitive, easier-to-use environment. In addition, it enables users to leverage existing Framework Manager models easily within the Cognos Analytics environment. Basic augmented analytic capabilities (including smart search and join, automatic representation of time and location data, and recommended tasks and visualizations) further improve the usability and appeal of the platform. It rated Good to Excellent for ease of use, visual appeal and workflow.
- **Robust analytic dashboards:** The IBM Cognos Analytics capability for analytic dashboards is rated Excellent. The extensive chart library leverages IBM's Rapidly Adaptive Visualization

Engine (RAVE) technology and includes many standard and advanced chart types, including tree maps, packed bubble charts, geographic maps and more. Additional charts added in version 11.0.7 include network charts, 100% stacked bar charts, radial bar charts and crosstabs. Charts can be animated and are automatically interactive. Filtering and mapping capabilities also continue to mature. In addition, the ability to create and leverage reusable dashboard templates encourages reuse and helps jump-start new users in autonomously building their own dashboards.

## Areas of Improvement

- Lacking data source connectivity and self-service data preparation:** IBM Cognos Analytics rated Fair for data source connectivity and self-service data preparation. Access to unstructured/semistructured and NoSQL data sources is limited, as is connectivity to enterprise applications. Capabilities for preparing and transforming the data prior to analysis is also limited. No data profiling is available, and the ability to watermark or mask/encrypt data is not supported. In addition, individual metadata objects (such as dimensions, measures, calculations and parameters) cannot be shared across applications, reports and dashboards.
- Room for improved augmented data discovery:** Augmented analytics is a recent trend in the A&BI space and has the potential to be a differentiator. Where IBM Cognos Analytics incorporates some augmented features (such as natural-language Q&A) and some basic automated visualization generation, it does not automatically generate advanced visualizations, trends, clustering or correlations. It also currently does not support smart labeling, natural-language generation or chatbots, and conversational language. These items are under development and were previewed at the IBM THINK 2018 user conference.

## IBM Watson Analytics

IBM Watson Analytics appeals primarily to individual users and workgroups who have a need to perform augmented data discovery. It provides augmented analytic capabilities, including automated pattern detection, support for natural language query and advanced analytics for CDS via a cloud-only solution available only on the IBM Cloud platform. IBM Watson Analytics is distinct from the Watson cognitive solutions offered by IBM (such as Watson for Oncology and Watson Discovery Advisor). There is no integration between Watson Analytics and these other Watson-branded systems.

According to Magic Quadrant survey respondents, IBM Watson Analytics is most often used for decentralized analytics (33%) and governed data discovery (33%).

According to the Magic Quadrant reference customers, license cost was the primary reason for selecting IBM Watson Analytics. Ease of use for content authors/developers, data access and integration, superior functionality, cloud deployment, and service provider availability are also top reasons for selection. Organizations selecting IBM Watson Analytics most often considered Microsoft Power BI and IBM Cognos Analytics.

## Strengths

- **Easy and appealing:** IBM Watson Analytics provides the ability to easily flow through the complete analytic pipeline, including easily accessing, exploring, dashboarding and analyzing data in a visually appealing, integrated way. This approach leads to a Good to Excellent rating for ease of use and visual appeal. The modern interface, incorporation of natural-language dialogue and templates for reuse bolster getting started and facilitate continued intuitive interactions, often resulting in fast time to insight. Watson Analytics cloud-based deployment also enables rapid implementation of the platform, although it is available only on an IBM Cloud platform.
- **Cloud-based augmented data discovery:** IBM Watson Analytics takes an augmented data discovery approach, which Gartner defines as enabling business people and citizen data scientists to use machine learning to automatically find, visualize and narrate relevant findings (such as correlations, exceptions, clusters and links) without having to build models or write algorithms. Watson Analytics provides recommended starting points for analysis and targets for driver analysis by autodetecting patterns in the data as it is loaded based on strong correlations and associations. The platform also provides some augmented data preparation capabilities, including scoring the data on readiness for analysis, providing semantic recognition of concepts (such as time, place and revenue) and highlighting potential data issues. While augmentation is IBM Watson Analytics' strong suit, it lacks some key functionality, particularly NLG and conversational analytics.

## Areas of Improvement

- **Lack of ability to collaborate and share:** As analytics continue to proliferate throughout the organization, it is more important than ever to be able to collaborate and share analytic content. Analytic "silos" not only increase the potential for incorrect and invalid analyses, but also limit the potential to leverage the full impact of analytics throughout the organization. IBM Watson Analytics rated Fair for its ability to publish, share and collaborate. It does not provide scheduling of analytic content nor alerts for defining thresholds of notifying users in various formats when specific thresholds are met. In addition, the platform does not provide discussion threads, real-time collaboration, or the ability to rate/recommend content or follow specific users. Printing capabilities are also limited, providing some capability to print via output to PDF.
- **Minimal metadata management:** IBM Watson Analytics' Fair score for metadata management was the lowest rating across all the products included in this Critical Capabilities. As more data sources and increasingly complex data and interactions are incorporated into the analytical process, it is imperative that technology supports not only creating the analyses, but also understanding the data. Watson Analytics does not provide data lineage capabilities, nor does it support impact analysis to highlight changes in source data that will have an impact in analyses downstream. Easy accessibility to common definitions of metadata objects from within an analysis is also not supported.

## Information Builders

Information Builders sells multiple components of its integrated WebFOCUS A&BI platform. For this research, Gartner has evaluated InfoAssist+, which comprises a number of components from the WebFOCUS stack, as the foundation of its modern A&BI offering. While Information Builders is known for delivering analytic applications to large numbers of mainstream users in more operational or customer-facing roles, with WebFOCUS, InfoAssist+ is intended to satisfy modern, self-service A&BI needs.

The InfoAssist+ October 2017 release strengthened the natural language query and search functionality for both metadata and existing content to deliver recommendations based on machine-learned patterns to the user. More importantly, the latest version is intended to improve the overall user friendliness of InfoAssist+ via UX improvements aimed at enabling business developers. These capabilities were too new to be widely used by the customers surveyed for this report. The vendor added natural-language generation to its offering via an OEM arrangement.

Information Builders has one major release annually with maintenance releases monthly. The focus of this evaluation is version 8.2.0.2.

Information Builders is most often deployed for the decentralized analytics use case (70%), followed by agile, centralized BI (53%).

According to the reference customers, the top three reasons for selecting InfoAssist+ are data access and integration, ease of use for content consumer, and superior functionality. Organizations selecting Information Builders most often considered Tableau and Microsoft as alternatives.

## Strengths

- **Platform underpinnings:** Information Builders rated Excellent for BI platform administration, security and architecture. WebFOCUS runs on Linux, UNIX, IBM (iSeries and System Z) and VMS. For the self-contained ETL and data storage critical capability, it is rated Excellent. InfoAssist+ has its own columnar, in-memory data store, which is included in the product. Data source connectivity is rated Good to Excellent. Connectivity to a range of relational data sources, enterprise applications, big data sources and personal data sources is a core strength. The product supports XML, RSS, SOA, REST, JSON, flat files and Excel. It has native adapters for Facebook, Twitter and Salesforce to consume data for social/sentiment analysis.
- **Delivery options:** For organizations that want to deliver BI content embedded in operational apps or via mobile platforms, Information Builders rates as Excellent. In addition to responsive rendering on mobile browsers, InfoAssist+'s native iOS and Android native app support tap to launch, store credentials, save, email, print and open-in abilities. Offline viewing and analytics for sort, filter and column hide are supported via Information Builder's "In Document Analytics" feature. This patented capability packages a dataset, images, analytical engine and UI for mobile consumption. For embedding analytic content, its web services REST API allows developers to call a broad range of functionality from another application. Reports and dashboards can be embedded within other portals, including Microsoft SharePoint via Web Parts, JSR 168 portlets and iframes.

## Areas of Improvement

- User assistance:** InfoAssist+ currently has less capability in more modern user-centric A&BI platform areas. While it gained Good ratings for the important interactive visual exploration and analytic dashboards capabilities, it rated only Fair in the self-service data preparation and augmented analytics categories. For self-service data preparation, the platform supports automatic generation of metadata and sample outputs (visualizations, reports, dashboards) from users' data. The new Page Designer tool extends InfoAssist+'s mashup capability. In the augmented data discovery capability, InfoAssist+ lacks automatic generation of visualizations and analytic models. Gaps are being filled. Information Builders partnered with natural-language specialist Yseop in 2017 to deliver automated commentaries on data visualizations via OEM, and is redeveloping its search/NLQ functions, in which it has a long history with its Magnify WebFOCUS module.
- Less easy to use:** For ease of use, InfoAssist+ is rated as Good to Excellent overall, reflecting an improvement over prior years. This improvement has come about due to a redesigned user experience in the 8.2.0.2 release used by Gartner to evaluate InfoAssist+, which impacts some user interactions. However, these changes have yet to impact customer perception, and InfoAssist+ sits in the bottom quartile relative to the rest of the products rated at the time of surveying.

## Logi Analytics

Logi Analytics ("Logi") is best-known for its ability to embed analytic content in websites and applications, and to enable end-user organizations to extend their BI access externally to customers, partners and suppliers. Its Logi Platform is composed of Logi Info and DataHub. Logi Info itself is composed of two parts: a set of capabilities for software product managers and developers to build embeddable analytic apps; and a self-service module for end users to create and interact with dashboards and data visualization. Logi's DataHub is a data preparation and columnar data store that enables users to ingest, blend and enrich data from multiple sources.

Logi's development direction in 2017 was to better serve core customers in development roles. As such, while it delivered performance upgrades and improved self-service (data discovery), its primary effort was to help product owners build compelling analytical applications. To do so, it focused on introducing a modernized microservices architecture, and decoupling the front end (UX/UI) from the back end (data) development using RESTful APIs. In addition, it added capability to allow an application team to embed customer retrainable, predictive capabilities into their applications. It should be noted that Logi no longer sells its Logi Vision module, and has not moved all of its supported functions into Logi Info, impacting its rating in the publish, share and collaborate capability.

Logi delivers two major and two minor releases per year. The focus of this evaluation is version 12.5.

Logi is most often deployed for the OEM or embedded BI use case (50%), followed by traditional, IT-centric reporting (42%).

According to the reference customers, the top three reasons for selecting Logi are license cost, ease of use for content authors/developers, and data access and integration. Organizations selecting Logi most often considered Tableau and Microsoft as alternatives.

## Strengths

- **Embedded BI:** Logi is commonly deployed for the OEM/embedded use. From a product perspective, Logi rates as Excellent to Outstanding for the embed analytic content critical capability. It offers a full set of APIs for developers to build analytic apps. Logi provides a variety of capabilities for updating, accessing, and editing metadata, connections and users through Logi Elements (an XML-based API edited using Logi Studio). In addition, Logi provides a REST endpoint for the Logi metadata, allowing it to be accessed, edited and dynamically generated. This is useful for Logi's OEM customers who embed Logi in their software and need to support different schema requirements among their customers. Logi also provides a plug-in API that can be used to update, access, and edit metadata, data connections and users through the use of Java or .NET native code. Data connection and ingestion is also rated Excellent to Outstanding.
- **Data visualization:** Logi's Analytic Dashboard and Interactive Visual Exploration are rated Excellent. Both support a wide range of standard and complex chart types. Data visualizations are fully interactive, supporting zooming, brushing, panning, filtering and drilling. Geographic mapping capabilities automatically interpret location based on names, and data does not need to be geocoded in advance by latitude and longitude. Data manipulation (such as binning and display as percentage variances) is intuitively supported. When embedded, individual visualizations and/or dashboards are fully interactive within the third-party application.

## Areas of Improvement

- **Mobile usage:** Logi has made a decision that all mobile access is via browser-based HTML5, using responsive design to facilitate a "build once, deploy anywhere" approach (responsive design allows content to be smartly re-rendered depending on the screen dimensions). The benefit of this approach is that content can be authored, consumed and interacted with from any tablet or smartphone. While this stance fits well with the embedded use case Logi is now targeting as its core go-to-market approach, it means a less rich mobile experience that is offered by other vendors, including some of those also targeting this use case. In particular, mobile exploration and authoring could be improved with the better touchscreen experience associated with native mobile device support. Support for offline exploration is similarly unsupported.
- **Collaboration and sharing.** Logi rates Fair to Good in the publish, share and collaborate capability. A number of the collaboration capabilities available in the former Logi Vision module are not yet supported in the re-engineered Logi Suite. Many functions that were in Logi Vision are not available to new customers. These include discussion threads, real-time user collaboration, time-line tagged comments, automatic usage-based content recommendations, and functionality to allow users to rate (like/dislike) content and favorite/follow specific users. Logi Suite provides integration with Twitter, but not for the more widely used collaboration tools (such as Yammer).

## Looker

Looker is a modern A&BI platform that enables users to integrate, explore and visualize data. Looker is primarily deployed in the cloud, but can also be deployed on-premises. Core to its approach is its data-modeling language, LookML, in which data analysts write code to define business metrics and manipulate data. The platform supports a wide range of data sources and visualizations, and can be embedded in websites, portals and applications.

Looker positions itself as a "data platform," although it is not a database storage platform and does not offer its own in-memory engine. It supports a range of user types along with applications, including marketing, sales, web and product analytics. Key elements of the platform introduced in 2017 are Viz Blocks, which are predefined visualizations, and Data Blocks, which are data sources combined with data models. Looker also supports "actions" by integrating with a range of applications to take action within them.

Looker delivers a major release every month, with more frequent minor releases in between. The focus of this evaluation is version 5.4, released December 2017.

Looker is most often deployed for the decentralized analytics use case (92.5%), followed by agile, centralized BI provisioning (75%). The vast majority of customers say they use Looker for decentralized analytics, but which rates low in this research for that use case. This may be due to the maturity of the platform in question (Looker is a young vendor) or, more importantly, to the weightings applied to calculate the score by use case. Looker scores low for the self-contained ETL and data storage capability, which has the heaviest weight for that use case. In this instance, Looker takes a fundamentally different approach, choosing to query directly rather than move data as other platforms do.

According to the reference customers, the top three reasons for selecting Looker are ease of use for content authors/developers, ease of use for content consumers, and data access and integration. Organizations selecting Looker most often considered Tableau and Qlik as alternatives.

## Strengths

- **Embedded usage:** Looker's score for embedding analytic content was Excellent to Outstanding. Looker's APIs cover needs like managing database connections, configuration, content (data rows and pages to display), "datagroups" (saved caching policies for complex queries), dashboards, LookML models, user administration and groups. Looker supports white labeling and integration with third-party portals. The only area lacking is the ability to update metadata via an API. Looker supports the addition of workflow via its Segment integration, where instructions can be sent to the Segment customer data platform.
- **Metadata management:** The agile modeling and in-database capabilities for new databases are key reasons why buyers choose Looker. Data lineage is supported so that the user can see the original source of the data in Looker. Users can search within the metadata, which is version-controlled via Git. A feature called Content Validation shows "looks" and dashboards that use metadata objects (models, explores, views or fields) that do not exist or cannot be found, so the metadata can be corrected. Looker rated excellent for metadata management.

## Areas of Improvement

- Augmented and advanced analytics:** Looker scores Poor and Poor to Fair in these categories. The platform has minimal support for augmented data discovery. Looker's roadmap does not focus on augmented data discovery, rather it is focused on supporting broader data access, improving visualization and reporting for analytics, and taking actions in Looker to respond to insights. For advanced analytics for CDS, the platform includes a library of mathematical and statistical functions known as Looker Expressions. The platform integrates with Python, and clustering functions can be built in Python. Data can be sent and received from advanced analytical models using webhooks (HTTP callbacks that post to a URL in response to a specified event). Looker focuses on meeting the needs of a range of business users but not on data scientists.
- Mobile authoring and exploration:** Looker scores Fair in this category. Looker lacks device-based security, the ability to do offline exploration, the ability to create content on the mobile and GPS integration. There is no support to use GPS to filter reports by location, and no mobile-specific application development kit. However, collaboration features are supported on mobile, and existing desktop-based reports can be displayed without needing modification for the mobile screen via responsive design. Looker's approach to mobile A&BI usage is centered on giving users the ability to analyze data from mobile devices rather than on building and using content on the device.

## Microsoft

Microsoft Power BI offers data preparation, data discovery, interactive dashboards and augmented analytics via a single product. It is available as a SaaS option running in the Azure cloud or, new in 2017, as the on-premises option, Power BI Report Server. Power BI Report Server allows users to share reports (but not dashboards). The on-premises version of Power BI initially supported only Microsoft Analysis Services cubes, but additional data sources were added in December 2017. Power BI Desktop can be used as a stand-alone, free personal analysis tool and is also required when power users are authoring complex data mashups involving on-premises data sources.

Microsoft has a monthly release cadence for Power BI Desktop with continuous releases for the Power BI Service (the cloud-based "server" portions). This evaluation includes updates through 15 January 2018.

According to the reference customers, the top two reasons for selecting Microsoft Power BI are ease of use for content authors/developers and license cost.

Microsoft Power BI is used most often for decentralized analytics (73%), and agile, centralized BI provisioning (62%). It is most often evaluated along with Tableau, QlikView and Qlik Sense.

## Strengths

- Ease of use and visual appeal:** There are a number of specific capabilities that contribute to its ease of use, including that Power BI is a cloud-based product in which Microsoft takes care of

the infrastructure for the data storage, processing and sharing environment. In addition, the product has particular features (such as a Q&A module) that has a searchlike interface for users to generate visualizations. In addition, Quick Insights is a basic form of augmented data discovery that will automatically generate the most meaningful charts. Excellent interactive visual exploration capabilities with outstanding data source connectivity are differentiators. Note that while Microsoft's ease of use ranked in the top quartile, its final capability score was significantly tempered by a lower workflow integration subcriteria score.

- In-memory engine with data preparation:** The Power BI in-memory engine has its origins in Microsoft SQL Server Analysis Services tabular data models. These provide both a flexible and high-performance analytic tier in the cloud. Microsoft limits the model size at 1GB and storage to 10GB per user in Power BI Pro. However, Power BI Premium is based on a "virtual server" model that supports different levels of storage per virtual machine (for example, up to 100TB for P1, with the maximum individual model size increased in 3Q17 to 10GB). Power BI also supports DirectQuery mode for the most popular data sources, in which data is not replicated into the in-memory engine for greater data scalability. A robust self-contained in-memory engine allows users to mash multiple data sources together in a reusable dataset, with support for complex data models. The data preparation capabilities, which rate Good overall, allow data modelers to clean and transform the data as they load it.

### Areas of Improvement

- Product gaps and disjointed platform components and workflow:** Robust table displays with subtotals and break levels are not supported. The product also lacks a number of formatting options, particularly in the dashboard layout. Email subscriptions for both reports and dashboards were supported and improved in 2017, but there is no support for distributing and bursting reports in a variety of output formats, which are capabilities found in Reporting Services. Alerting is supported only via certain visualization types within dashboards. The scale-up options for more data storage and processing — whether to HD Insight or SQL Azure Analysis Services — are not straightforward or clear. Collaboration in the form of threaded discussions is not native to Power BI in the cloud. Linking insights to actions is also via another product, Microsoft Flow.
- Advanced analytics for citizen data scientists:** These features may also be spread across Excel, Azure Machine Learning and R. Microsoft gives users the ability to install a local R instance with Power BI Desktop, and to call and embed an R script directly from within Power BI Desktop. More advanced visualizations and analytics (such as decision trees) are not natively supported, but could be possible via extensions in the marketplace. Some augmented data discovery capabilities are available, but natural-language generation is not supported.

### MicroStrategy

MicroStrategy Version 10 combines self-service data preparation, visual-based data discovery and exploration, and native big data connectivity (for example, Hadoop and Spark) with enterprise A&BI.

Point releases during the past year delivered a redesigned visual-based exploration and a new desktop version with quick-start user tutorials for a fast time to insight for new users. MicroStrategy

also introduced the concept of a dossier in Version 10, for a new dashboard experience that makes it easier to create, share, find and navigate analytics content. Workstation capabilities also introduced in version 10 streamline the configuration and administration of enterprise deployments, including dynamic scaling of MicroStrategy Cloud on AWS. In 10.9, an expanded set of APIs and new SDK data connectivity capabilities are intended to make the platform more attractive for embedded and OEM use cases.

MicroStrategy releases new feature point release versions every quarter and new platform releases every year. Version 10.10 is the focus of this research.

MicroStrategy is most often deployed for an agile, centralized BI provisioning use case (69%), followed by traditional IT-centric reporting 59% and governed data discovery 56%.

According to the reference customers, the top three reasons for selecting MicroStrategy are superior functionality, mobile capabilities (almost twice the percentage of any other vendor in this Critical Capabilities), followed by product vision. Organizations selecting MicroStrategy most often considered Tableau, IBM Cognos Analytics and Qlik as alternatives.

## Strengths

- **Strong integrated product for all use cases:** MicroStrategy has among the highest product ratings of any vendor in this Critical Capabilities, both overall and for all the evaluated use cases. It earned Excellent to Outstanding scores for BI administration, architecture and security, data source connectivity, scalability and model complexity, metadata management, mobile, ease of use, visual appeal, and platform workflow integration. For mobile BI in particular, MicroStrategy has been an early innovator, with some of the most comprehensive (including transactional), highly rated and widely adopted capabilities. It supports advanced and less-common features (such as disconnected analysis, write-back, multifactor authentication, biosecurity, GPS and camera integration), although authoring from a mobile device is not supported.
- **Agile yet governed large-scale enterprise deployments:** MicroStrategy 10 earned the highest score of any vendor in this research for scalability. It supports a seamless workflow for promoting business-user-generated data models and content to enterprise sources while leveraging enterprise features to enable large-scale trusted self-service. When user data models are promoted to the enterprise, common dimensions are automatically remapped to inherit row-level security. These dashboards and datasets can then leverage other enterprise administration, scalability and distribution features in MicroStrategy Server. Advanced data manipulation supports multisource self-service data preparation that recognizes geographical and time data, and is able to automatically generate the hierarchical elements not available in the source. Extensive geospatial capabilities are available in the platform (via an OEM version of Esri for free), although specialized geospatial algorithms are not supported. Enterprise-grade security, native Hadoop access and in-memory columnar data store (PRIME) give business users a highly interactive and comprehensive data exploration experience for large and complex datasets and models that natively span modeled and unmodeled relational, personal and Hadoop sources.

## Areas of Improvement

- IT involvement for enterprise deployments:** Streamlining the configuration, administration and migration of enterprise deployments to help MicroStrategy's core IT users are ongoing investment areas for MicroStrategy. However, while reference customers report improvements across most areas of ease of use, the same is not true for implementation services, ongoing administration and content development, which require more significant IT involvement. Reference customers for MicroStrategy report a longer time to develop simple, moderate and complex analytics content than for most other platforms evaluated.
- Gaps in cloud, social concepts and augmented analytics:** During the past year, MicroStrategy released third-party integrations with Automated Insights and Narrative Science for natural-language generation, and has made some investments in chatbot integration. However, augmented data discovery features (such as automated insight generation and natural language query) are still lacking in the current product (though there is some evidence of them, particularly natural language query, on the product roadmap). MicroStrategy's single-tenant cloud solution lacks packaged domain and vertical content, and a robust content marketplace for customers and partners. Regarding social and collaboration features, while discussion threads were added in 10.9, gaps remain in storytelling, content ratings and recommendations, and integration with social platforms for collaboration.

## Oracle

Oracle offers a broad range of A&BI capabilities, both on-premises and in the Oracle Cloud. During the past year, Oracle has rebranded its cloud offerings, Oracle Analytics Cloud (OAC), with new edition-based pricing and packaging, creating one access point for all analytics components. OAC offers integrated data preparation, data discovery (with advanced exploration) and interactive dashboards via a single design tool supporting both desktop and web-based authoring. Data Visualization for Desktop is available as a free download for personal use or as part of departmental and enterprise OAC offerings. It is also available as an optional component to Oracle Business Intelligence 12c, deployed on-premises. (Oracle BI 12c is not covered here.)

OAC releases new versions three to four times per year, while Data Visualization for Desktop, which is part of Oracle BI 12c on-premises, is updated annually. Over the past year, Oracle closed many feature gaps in data preparation, interactive visualization and dashboarding. In terms of innovation, Oracle introduced natural-language search via text, voice and chat bot as well as natural-language generation (via an OEM) to explain insights in dashboards. Oracle also expanded the augmented analytics capabilities in OAC, both within the data preparation environment, as well as in the unified dashboard and interactive visualization and analysis workflow. On the mobile front, Oracle released Day by Day as part of OAC, and Synopsis — a freely available mobile analysis application for consumers. Day by Day learns users' behaviors and presents them with the most important insights with the user's context. Synopsis introduced augmented reality to capture data for analysis, using the mobile device camera as input.

Oracle's modern A&BI capabilities are most often deployed for a decentralized use case (59%), followed by agile, centralized BI provisioning (50%).

According to the reference customers, the top three reasons for selecting OAC are ease of use for content consumers, integration with enterprise applications and data access, and cloud deployment. Organizations selecting Oracle most often considered Microsoft Power BI, Tableau and Qlik as alternatives.

## Strengths

- Interactive exploration, dashboards, augmented analytics and mobile:** OAC offers an integrated design experience for interactive analysis, reports and dashboards. In addition to offering core visual exploration features for light analysis, OAC supports advanced exploration, including custom groups and drag-and-drop advanced analytic functions (such as forecasting, clustering, trending, outliers and so on). Moreover, Oracle has delivered augmented analytics capabilities at a faster pace than most other vendors in the market. Text and voice for NLP as well as chat bot integrations are surfaced across data preparation to understand value distribution of data and correlations. Within the exploration environment, insights can be autogenerated to identify significant segments, clusters, drivers, outliers and anomalies with an explanation of findings in natural language. These augmented analytics capabilities are also made available in Oracle's mobile application, Day by Day.
- Enterprise features with Oracle optimizations:** OAC's integrated end-to-end hybrid and global cloud approach, its "Excellent to Outstanding" security and administration capabilities, the ability to function ship queries to underlying databases and integration with the Oracle 12c semantic layer appeals to IT departments that have implemented Oracle's traditional BI platform. OAC's growing set of domain-specific Oracle E-business Suite content packs, which are available for free, and Oracle optimizations (such as smart connectors that inherit Oracle security and semantic layer access to Oracle 12c and Oracle SaaS applications) make OAC attractive to Oracle customers. Users are also able to conduct "what if" and scenario analysis within OAC via Oracle Essbase, which is now natively supported as part of OAC's data preparation capabilities and included with both OAC departmental and enterprise editions.

## Areas of Improvement

- Ease of use and workflow:** Although customer references buy OAC for its ease of use for content authors, and the user experience and workflow is improving with each release, customer references rate OAC below the survey average for all aspects of ease of use (including for content authors, for deployment and for visual appeal). Given that aspects of publishing and sharing options for data visualization are a subset of what is available in the full OAC suite, product workflow needs further integration. This may impact adoption of OAC both inside and outside of the Oracle customer base.
- Publishing and sharing limited without full OAC suite:** A range of output formats are supported, as well as printing for parts or all of a dashboard, but scheduling, alerting and pixel-perfect formatting are not available without having OAC Enterprise Edition. Storytelling, including narration (NLG), is well-integrated into the workflow. However, collaboration features (such as discussion threads, ratings and recommendations) and social concepts for finding

relevant users are not supported. As a result, it is rated as Fair for the publish, share and collaborate capability.

## Pyramid Analytics

In late 2017, Pyramid Analytics introduced Pyramid 2018, offering a refreshed user experience, better platform integration, a new query and analytics engine, and broadened analytics capabilities. The company's main goals are to become independent of its longtime partner Microsoft and modernize the platform to better support self-service analytics.

The new version preserves its previous strengths, and is well-suited to the governed data discovery use case through features like BI content reusability and sharing of datasets, metadata management and data lineage.

Governed data discovery (at 64%), agile, centralized provisioning (at 62%) and traditional IT-centric reporting (51%) are the main use cases reported by customers, and align well with the capabilities offered by the platform.

According to the reference customers, the top three reasons for selecting Pyramid Analytics are ease of use for content consumers, ease of use for content developers, and implementation cost and effort. Organizations selecting Pyramid Analytics most often considered Microsoft Power BI and Tableau as alternatives.

## Strengths

- **Tightly integrated data and analytics workflow:** Pyramid 2018 is designed around six primary activities — model, formulate, discover, illustrate, present and publish — that represent an integrated workflow with a focus on self-service and user empowerment. The key steps of an analytics exploration process are strengths of the product. Data source connectivity and ingestion, self-service data preparation, and interactive visualization are rated as Excellent. In addition, publish, share and collaborate receives a score of Excellent to Outstanding. This is an area where many modern platforms struggle to compete. The enhanced user experience and empowerment is visible in areas like self-service data preparation, where analysts can visually design light ETL processes to assemble the datasets required for analysis. These are capabilities that are only now starting to appear on some competitor's products.
- **Balanced integration between user empowerment and centralized governance:** While delivering a renewed business-user experience and better self-service data preparation and analytics capabilities, Pyramid 2018 continues to offer core strengths that appeal to a centralized data and analytics team. Watermarking capabilities for content, data lineage and good metadata management capabilities help support a governed environment that information consumers can rely on. It's an example of bimodal analytics, where user-built content can be validated by the centralized team and promoted to the corporate environment to be consumed by a broad range of business users. In the opposite direction, centralized content that is published and shared across the organization can be analyzed by individual users and receive feedback through a robust collaboration environment. BI platform administration, security and

architecture, rated Excellent to Outstanding, provides an additional layer of assurance to IT system administrators supporting the platform.

### Areas of Improvement

- Platform rebuild underway:** Pyramid Analytics has been on a journey to rebuild its solution and become platform agnostic. The reason for this is the fact that the company used to rely heavily on its partner, Microsoft, and offered capabilities that would often complement, rather than compete with, Power BI. Functionalities like self-service data preparation and interactive visualization are critical for the success of a modern A&BI platform but would not be the top priorities or strengths of Pyramid Analytics, due to this symbiotic partnership. This has now changed, and Pyramid is investing heavily on the capabilities that drive success for an independent analytics platform.
- Focus on rebuild slows down innovation:** The investment on platform rebuild slowed the innovation cycle. A capability like augmented data discovery, which will drive the market in coming years, is on Pyramid's roadmap and made its first appearance in Pyramid 2018. However, it needs time to evolve. Functionalities including natural language querying and generation are not near-term development priorities. Other areas, although offered by the tool, lag behind the market and user demand. These include a lack of a public cloud offering (although supporting private cloud instances) and advanced analytics for citizen data scientists, which is an important goal for Pyramid but is still gaining core capabilities with the new product releases. Organizations looking to modernize their analytics environment may rightly consider Pyramid as a viable option for mainstream analytics activities but, at this stage, not a leading edge solution to drive differentiation with analytics. This scenario could change, though, if Pyramid Analytics is able to transition to an innovation cycle in 2018, now that most of the platform rebuild is complete.

### Qlik

Qlik offers governed data discovery and analytics either as a stand-alone application or embedded in other applications. Qlik Sense is the vendor's lead product and is sold to most new customers, while QlikView continues to be enhanced and makes up a larger portion of the company's installed customer base. The Qlik Analytics Platform is the product that developers can use for embedded BI and is the platform on which Qlik Sense has been developed.

The in-memory engine and associative analytics allow customers to build robust, interactive applications and to visualize patterns in data in ways that are not readily achievable with straight SQL. NPrinting, which provides report scheduling and distribution, was added to Qlik Sense in 2016 (previously only available for QlikView), enabling Qlik to provide interactive visual discovery and Mode 1 BI in an agile way.

The integration of NPrinting with Qlik Sense gives Qlik the ability to provide scheduled, formatted report distribution as well as visual exploration in a cohesive product. In this way, Qlik supports both Mode 1 and Mode 2 styles of analytics. However, Qlik Sense customers have continued to report product stability issues with NPrinting on Qlik Sense.

Qlik has now moved from three releases a year to five per year. Qlik Sense November 2017 is the focus of this evaluation.

Qlik Sense is used primarily for agile, centralized BI provisioning, with 57% of customers deploying this way, followed by decentralized analytics (50%) and governed data discovery (50%). Reference customers most often considered Tableau and Microsoft Power BI as alternatives.

The top reasons for choosing Qlik Sense, according to reference customers, were ease of use for content consumers, data access and integration, and ease of use for content authors/developers.

## Strengths

- **Robust applications:** Qlik Associative Engine allows customers to use Qlik Sense as a datamart supporting multiple data sources, complex calculations and robust applications. Qlik's On-Demand App Generation (ODAG) allows for big data exploration in database and extraction of data slices into the in-memory engine. The in-memory, associative engine supports complex data models like multiple fact tables. It also provides data scalability and in-memory compression, with Qlik being one of the few vendors in this Critical Capabilities scored Excellent for scalability and model complexity.
- **Ease of use and visual appeal:** Ease of use is a key buying requirement in the modern A&BI market, which includes ease of implementation as well as ease of building and consuming content. Qlik Sense scores in the top quartile for overall ease of use. Qlik's "smart search" contributes to the ease and power of the application for consumers. A user can enter a search term and Qlik Sense will automatically present a list of dimensions and measures to filter the current dashboard by these keywords. Values with no association to the currently displayed dataset are grayed out. In this way, a user can see, for example, which products are not selling in a particular region.

## Areas of Improvement

- **Self-service gaps:** There are some cumbersome workflows in designing a dashboard, and complicated data mashups require scripting, thus making it less ideal for self-service authoring. While Qlik scores well at the capability level for visual exploration and publishing, it lacks specific features in these categories. For example, there is no out-of-the-box support for trellis charts, toggling to show values as percentage of whole, or binning while visualizing. Collaboration in the form of discussion threads is also not supported. Some capabilities (such as report scheduling and distribution [through NPrinting]) as well as GeoAnalytics were acquired through partners, leading to a less seamless workflow.
- **No out of the box predictive analytics:** Qlik scores only Fair for its advanced analytics for citizen data scientists. Increasingly, business users expect the menu-driven ability to do simple forecasting and clustering within an A&BI tool, neither of which are supported in Qlik Sense. Qlik Sense supports calling R and Python scripts. However, these are not exposed as native functions in the dashboard design process. Likewise, advanced chart types (such as decision trees) are not natively supported but could be added via an extension. Augmented data

discovery, in which users want insights generated automatically from the software, is not supported but is on the vendor's roadmap.

## Salesforce

Salesforce Analytics includes basic operational reports and dashboards for Salesforce data, the Einstein Analytics Platform (formerly Wave), Einstein Analytics-based packaged applications and Einstein Discovery. The Einstein Analytics Platform is for creating point-and-click interactive visualizations, dashboards and analysis with integrated self-service data preparation for Salesforce and non-Salesforce data. Einstein Discovery is an augmented analytics platform based on Salesforce's acquisition of BeyondCore in 2016.

During the past year, Salesforce continued to improve the integration, workflow and embedding of Einstein Discovery with the Einstein Analytics Platform and within its packaged applications. It has also introduced the beginnings of a natural language query capability within a dashboard, with analytic functions (such as "rank"). In November 2017, Salesforce previewed a new product in pilot, Einstein Data Insights, which delivers automated insights based on Einstein Discovery for Salesforce basic operational reports.

Salesforce Analytics has three major releases per year. It is most often deployed for a decentralized use case (43%), followed by agile, centralized BI provisioning (37%).

According to the reference customers, ease of use for content consumers (for which it also rates above average) and data access and integration are cited as the top two reasons why they select Einstein Analytics. Cloud deployment and product roadmap and vision are tied for third.

Organizations selecting Einstein Analytics most often considered Tableau and Microsoft Power BI as alternatives.

## Strengths

- **Leading in augmented analytics, and strong in many enterprise features and mobile:** Salesforce's acquisition and integration of Einstein Discovery (augmented analytics) is driving disruptive innovation in the market. Einstein Discovery leverages machine learning to generate smart suggestions for how to prepare data, and then automatically finds, visualizes and narrates important insights in a story for each user, without requiring them to build models or write algorithms. The user explores data via autogenerated visualizations and a natural-language generated narrative that explains the drivers of autogenerated insights along with predictions and prescriptions. To facilitate trust in autogenerated models, Einstein Discovery exposes the key drivers of insights to users and makes the underlying model and R code available for data scientists to further validate, export and extend. Einstein Analytics earned Excellent to Outstanding marks for enterprise features, including BI platform administration, security and architecture, self-contained ETL and data storage, and embedded analytics content. It also earned Excellent scores for its metadata management and mobile capabilities.
- **Optimized for Salesforce:** Einstein Analytics is natively integrated with Salesforce security, collaboration and metadata, including simplified access to Salesforce application tables through

an intuitive wizard, although it can support non-Salesforce data. Einstein Analytics also supports extensive usage monitoring across Salesforce products as well as auto-geocoding and custom maps for Salesforce data. Users can invoke Salesforce actions from within Einstein Analytics and can collaborate using Chatter. Einstein Discovery can be used to access, model and generate insights, visualizations and narratives from Salesforce and non-Salesforce data that can be further modified and embedded in Einstein Analytics dashboards and packaged applications. While the workflow of the integration across the Salesforce Analytics portfolio is a work in progress, it continues to improve at a rapid pace with each new release.

## Areas of Improvement

- Data source connectivity and data preparation gaps remain:** Data source connectivity, including newly introduced hybrid connectivity to on-premises data, is improved with Einstein Discovery, but the capabilities and workflow are inconsistent across Einstein Analytics and Einstein Discovery. Native connectivity to enterprise applications other than Salesforce and Microsoft Dynamics CRM continues to require partners' ETL tools. Data preparation in Salesforce Analytics has improved significantly over the past year. Histograms show the distribution and anomalies in the data to assist with prescriptive data shaping and cleaning. Salesforce Analytics creates data recipes that show a history of actions in the data designer. Users can also view underlying calculations, filters and groups within a lens (visualization widget) in a dashboard. However, some basic features are on the roadmap. These include the ability to create hierarchies within data preparation and the visualization and analysis environment, the full range of personal data source connectors, and the full range of joins (only left outer join and union are currently supported).
- Analytic dashboards and ease of use:** Advanced data manipulation, such as creating custom groups, can be done in the data preparation interface (data designer), but not in a dashboard during analysis and exploration. Disconnected analysis (outside a mobile device) is also not supported, but is on this year's roadmap. Auto-geocoding is supported at the zip code level for Salesforce data only, and there are no out of the box algorithms available for geospatial analysis. Moreover, while ease of use for consumers is placed in the top quartile, according to Salesforce reference customer scores, ease of administration, content development and deployment are placed in the bottom quartile.

## SAP Analytics Cloud

SAP is represented by two distinct A&BI platforms in this report: SAP Analytics Cloud (formerly SAP BusinessObjects Cloud) and SAP Lumira (part of SAP BusinessObjects Enterprise).

SAP Analytics Cloud is a purely cloud-based deployment running on SAP HANA within the wide SAP Cloud Platform as the underlying architecture. SAP Analytics Cloud combines data discovery, predictive analytics, and planning and budgeting in an integrated package. SAP's Digital Boardroom solution is built on the SAP Analytics Cloud platform. The Digital Boardroom module surfaces SAP Analytics Cloud content (dashboards and data stories) across large touchscreen displays. SAP Analytics Hub runs on SAP Analytics Cloud and provides a catalog for analytics content, whether created on-premises or in the cloud, supporting SAP as well as third-party analytics content.

SAP Analytics Cloud has a wave release every two weeks, which includes updates in functionality and bug fixes.

The focus of this evaluation is version 2017.23.

SAP Analytics Cloud is most often used for the decentralized analytics use case (73%), followed by agile, centralized BI (58%).

According to the reference customers, the top three reasons for selecting SAP Analytics Cloud are ease of use for content consumers, cloud deployment and superior functionality. Organizations selecting SAP Analytics Cloud most often considered Microsoft and Tableau as alternatives, with SAP Lumira third.

## Strengths

- **SAP ecosystem and cloud centricity:** SAP Analytics Cloud is a SaaS solution, and customers can select deployment in a dedicated system or a shared multitenant environment. As a pure cloud product, all data modeling, administration and authoring of content are done via a browser. Cloud security is certified to ISO 27001:2013. The product supports connectivity to SAP S/4HANA (on-premises and cloud), SAP HANA, SAP BW, SAP SuccessFactors, Concur, SAP Hybris Cloud for Customer, SAP Hybris Marketing (on-premises and cloud) and SAP Fieldglass. SAP Analytics Cloud has live connectivity to SAP S/4HANA, SAP BW and BusinessObjects Universes. On-premises data is not brought into the cloud as a security measure. For SAP data sources, a range of predefined content (such as data models, charts and visualizations, and digital boardroom agendas) is available.
- **Self-service capabilities:** Modern A&BI adoption is driven through an intuitive user experience. SAP Analytics Cloud rated Good to Excellent for the ease of use, visual appeal and workflow capability, and Good for analytic dashboards. Surveyed customers rated ease of use for content consumption as its strongest capability, followed by ease of use, visual appeal and workflow. Furthermore, reflecting the maturation of self-service usage, SAP Analytics Cloud achieved a Good rating for the self-service data preparation critical capability. Several subcriteria in this critical capability are fully supported (such as enabling business user joins, data mashup, data modeling and data enrichment).

## Areas of Improvement

- **Augmented data discovery:** SAP Analytics Cloud's "Smart Discovery" feature enables business users to gain insights automatically using ML, including the identification of key influencers, classification and regressions. The insights are visualized with automatically selected graphs and explain the most important drivers of a particular metric. SAP has also added support for automated outlier detection. However, SAP Analytics Cloud lacks key functions in this area, including sophisticated natural-language descriptions of charts and models, chatbots to support conversational analytics, and natural-language Q&A. The latter has been planned as part of the SAP Co-Pilot for 2018 and was in beta at the time of writing.

- **Embedding support:** The ability to embed analytic content is relatively underdeveloped, with a Poor rating for SAP Analytics Cloud in this critical capability. Software development kits for printing, creation, deletion, copying and white labeling, among others, are currently not available. While SAP Analytics Cloud does not support portal integration standards, it does offer embedding content via its URL API into any third-party web application's iframe. For administration, a RESTful API-enabled management of metadata and data is now available. Although not the main use case for modern A&BI, platforms embedding is of growing importance, especially for operational analytics, where seamless workflow is required.

## SAP Lumira

SAP is represented by two distinct A&BI platforms in this report: SAP Analytics Cloud (formerly SAP BusinessObjects Cloud) and SAP Lumira (part of SAP BusinessObjects Enterprise).

The most significant change to SAP Lumira in 2017 was the launch of the 2.0 version, merging two products, SAP BusinessObjects Lumira and SAP BusinessObjects Design Studio. This provided an improved user experience. With 2.0, SAP combined self-service data discovery for business users with analytic applications. Lumira Discovery supports data discovery capabilities like data preparation, visualization, analysis, exploration and story building in one canvas, instead of the multiple screens of previous versions. Users can take a Lumira Discovery story and turn it into an analytic application using Lumira Designer.

In early 2018, SAP announced that SAP Analytics Cloud is now the strategic product for modern A&BI. SAP Lumira will continue to be supported through 2024, with enhancements planned in 2018, but with minimal investment thereafter. The focus of this evaluation is version 2.1.

SAP Lumira is equally deployed for the agile, centralized BI and decentralized analytics use cases (59%).

According to the reference customers, the top three reasons for selecting SAP Lumira are data access and integration, and that it integrates with SAP Enterprise Applications. Organizations selecting SAP Lumira most often considered Tableau and Qlik as alternatives.

## Strengths

- **Dashboards and mobility:** SAP Lumira is rated as Excellent for mobile exploration and authoring. While Lumira does not have native apps for iOS or Android smartphones, the capabilities offered via the SAP BusinessObjects Mobile iPad app are broad. These include native remote device management and wiping via SAP Afaria, multitouch support (pinch to zoom, swipe to sort, long tap to exclude, and other native gestures), mobile collaboration, and offline support (although only for the most frequently used chart types). For the analytic dashboard capability, SAP Lumira is rated as Excellent. User workflow, the key flaw in the 1.x versions is now seamless. Visual exploration and dashboard design are an integrated workflow with Lumira 2.0 Discovery, with which users can build dashboards and create visualizations simultaneously, using a common set of chart types.

- SAP integration and scalability:** A key driver of SAP Lumira selection is its integration with BW and the BusinessObjects universe semantic models. SAP Lumira runs on a SAP HANA back end, and benefits from its data scaling and performance capabilities. In the conducted user survey, the maximum deployment size was 15,000 users. This is in line with SAP's published benchmarks, which show SAP Lumira running on the SAP BusinessObjects BI Platform to support over 15,000 simultaneous users, querying a 300-million-row records set from HANA on a two-server cluster. For SAP enterprise application customers, Lumira has a set of optimization functions and access to BW and HANA via proprietary BICS and HTTP connectors. When used with BusinessObjects Enterprise, the Universe semantic layer generates optimized SQL for data sources.

### Areas of Improvement

- Augmented and advanced analytics:** SAP Lumira offers less features in the critical capabilities of advanced analytics for CDS and augmented data discovery. It only achieved a Fair rating for advanced analytics for CDS, and a Poor to Fair rating for augmented data discovery. For advanced analytics for CDS, some features are not available (such as advanced analytics visualizations or advanced predictive analysis). Menu-driven options for influence analysis and forecasting are supported. However, clustering is not natively supported, nor is integration with third-party statistical languages (such as R), with only limited built-in statistical functions. For augmented data discovery, the guided machine discovery features are not available, nor are chatbots, natural-language Q&A or natural-language generation.
- Data access and handling:** While SAP Lumira offers strong connectivity to SAP sources, it is only rated as Fair to Good for the data connectivity and ingestion capability. It lacks direct support for OLAP sources, and for personal and web data (JSON, XML, RSS). It has limited connectivity to non-SAP cloud apps, and for unstructured and NoSQL sources it requires the use of either its Data Access Extension (DAE) framework or the Free Hand SQL tool for Big Data (if not connecting via Hive). The packaged in-memory engine used in the free-standing version of Lumira (known as the Velocity Engine) relies on other SAP BW and HANA for incremental data loading. Lumira can leverage the processing power of HANA, BW, BW4HANA or the BOBJ Universes rather than loading into its own storage and processing layer. However, it cannot leverage non-SAP Data Management Solutions for Analytics (data warehouse, third-party in-memory engines) if available. As such, Lumira is rated as Fair to Good for the self-contained ETL and data storage capability.

### SAS

SAS Visual Analytics brings interactive discovery, dashboards, and reporting and scheduling for mainstream business users. The advanced analytics capabilities within SAS Visual Analytics are geared toward citizen data scientists, with no need for coding or specialist statistical skills.

SAS Visual Analytics is available either in an on-premises deployment or through the cloud in SAS's own data centers or through third parties like AWS. In 2017, SAS released a major new version of the product running on a new architecture: SAS Visual Analytics on SAS Viya. SAS Viya is based on an in-memory, microservices architecture that allows for greater flexibility in navigating on-premises

and cloud data stores and deployment models. In addition to running on a new platform, SAS Visual Analytics on SAS Viya includes a refreshed user interface based on HTML (earlier versions relied on Adobe Flash) and a streamlined workflow.

SAS Office Analytics includes SAS Enterprise Guide and Microsoft Office integration with Excel, PowerPoint, Word and Outlook. SAS Enterprise Guide is a desktop product that allows power users to perform self-service data preparation and advanced analytics that can then be published to the SAS Visual Analytics server.

SAS has two major releases per year. The focus of this evaluation is SAS Visual Analytics 8.2 on SAS Viya, released in November 2017, and SAS Office Analytics 7.4.

Reference customers most often choose SAS Visual Analytics for its superior functionality, ability to support large amounts of data and ease of use for content authors/developers. Reference customers choose Office Analytics for similar reasons, but also because of data access and integration.

SAS Visual Analytics is most often used for decentralized analytics (72%), with 38% using it for agile, centralized BI provisioning. Reference customers most often considered Tableau and IBM Cognos Analytics as alternatives.

## Strengths

- **Advanced analytics for citizen data scientists:** With the company's origins in advanced analytics, it is not surprising that SAS rates Excellent to Outstanding for its advanced analytics for citizen data scientists capabilities. SAS supports multiple forecasting models via a point-and-click interface. "What if" analysis and goal optimization is supported natively. Clustering and decision trees are also differentiators, as well as a number of advanced visualizations, including the Sankey diagram, network analysis and correlation matrix. SAS Visual Analytics also includes integrated text analytics.
- **Interactive visual exploration:** SAS Visual Analytics rates Excellent for interactive visual exploration. As users drag and drop elements onto a canvas, Visual Analytics automatically renders the data using the optimal chart display and color settings. Users can choose to redisplay measures as percentages, time-period variances or period growth, all via menu options, and without needing to create specific expressions. Users can create custom categories for new groups of dimension values.

## Areas of Improvement

- **Cloud:** The focus of SAS Visual Analytics on SAS Viya is a cloud-first platform enabled by a microservices architecture. However, administration capabilities for hybrid cloud/on-premises deployments and for elastic scaling of workloads (from both a technical and licensing perspective) are a work in progress. SAS Visual Analytics currently lacks hybrid connectivity to on-premises data sources. Data must be stored in the cloud. Cloud is primarily run in SAS's own data centers, although Amazon Web Services is used in some world regions. Moreover, it

lacks packaged content, including connectors and dashboards for common cloud data sources (such as Salesforce or Marketo) and a marketplace for SAS and partner content.

- Publishing and storytelling:** The ability to schedule and distribute reports was a strength of earlier versions of SAS Visual Analytics. However, this was not initially supported in SAS Visual Analytics on SAS Viya. While it was added in 8.2, distributions can only be controlled by administrators, not directly by users. PDF is the only format supported. The process to define alert notifications on business events is cumbersome and notifications are limited to email, without support for mobile text messages. SAS's approach to storytelling is via Office Analytics in PowerPoint. While customers like this approach as an option, the product lacks native storytelling within Visual Analytics alone. Ease of use for authoring and consumption has been a weakness in earlier versions of SAS, which seems to largely have been improved in this latest release. Gartner cannot fully assess ease of deployment and administration, and there are too few production customer references to determine how much this has improved.

## Sisense

Sisense offers an A&BI platform with an in-chip, columnar database engine with self-contained ETL and data storage (ElastiCube) that supports visual exploration of web-based dashboards.

Sisense 7 was released in October 2017 with significant enhancements to the platform. The update furthered the platform's single-stack approach, with an entirely browser-based interface and more integrated workflow. The new web-based ElastiCube manager is designed to be easier to use to help analysts assemble and build complex data models into analytics-ready datasets. To complement this, enhanced data ingestion and mashup capabilities deliver improvements on data preparation.

Sisense released three major updates in 2017, with the latest (7.0), released in October, being the focus of this evaluation. Minor releases were added roughly on a monthly cadence.

Sisense is most often deployed for the OEM or embedded BI use case (53%) — the highest percentage of any vendor on this evaluation — followed by decentralized analytics (38%).

Sisense is more often considered against Microsoft Power BI and Qlik. Top reasons given for selecting Sisense were ease of use for developers, implementation cost and effort and ease of use for content consumers.

## Strengths

- Easy to build complex data models:** Sisense's ElastiCube technology — a proprietary in-memory and columnar storage engine — coupled with the in-chip processing capabilities of the product, help deliver a strong set of data-related capabilities in the platform. Data source connectivity and ingestion is rated Excellent, while self-contained ETL and data storage (highly driven by ElastiCube) is considered Excellent to Outstanding. Self-service data preparation, although improved with this latest release, is only rated Good, but this is still an above-average result when compared with the other vendors on this evaluation. Metadata management and

scalability and model complexity, rated Excellent, deliver an overall excellent set of data-related set capabilities, capable of addressing complex problems. Sisense version 7 adds to this through an innovative and easy-to-use web-based interface to author and manage ElastiCubes. Data modeling workflows have also been improved with search capabilities, a more advanced SQL editor, table relationships preview, and schema undo and redo functionality.

- **Outstanding embed analytic content drives the OEM use case:** Sisense drives a large share of its revenue from its OEM business, with 53% of the customer base claiming OEM and embedding as the first use case. This is a direct consequence of a strong commitment to offer an embeddable product. Sisense offers a broad SDK capable of exposing the platform's capabilities from the ElastiCube, accessible with a REST API, to visualization extended with D3 libraries. The embed analytic content capability is rated as Outstanding, supporting the company's strategy in this area, and it is the highest-rated platform for this capability.

### Areas of Improvement

- **Limited advanced analytics for citizen data scientists:** Sisense's support for advanced analytics remains limited, without significant breakthroughs since the addition of R support in 2015. Use of the analytics scripting language is delivered through plug-ins that can be developed by Sisense or the community, leading to a potentially broad range of libraries and functions available for use in the platform. Although meant to be used on more complex use cases, the chosen approach doesn't lead to an easy-to-master experience, reducing its potential adoption. Instead of making significant investments to bring more data science to the product, Sisense is allocating effort to support augmented analytics capabilities. According to the product roadmap, data science will run behind the scenes to help ingest and blend data, spot and explain trends or suggest insights worthy of attention. Some limited capabilities (such as field suggestions for dashboards) are already available, but others will follow.
- **Interactive visualization and collaboration:** Although scoring as Good on this criterion, Sisense delivers modest results compared with competitors. In particular, when creating groups or applying advanced filters, which requires scripting, Sisense is less capable. The lack of some advanced charts and the limitations on the visual exploration and analysis of data impact the evaluation and customer perception. Given the high impact of this capability on user satisfaction and the deployment of a successful self-service analytics environment, it is an area that customers should assess when considering Sisense. The delivery of augmented analytics capabilities in the future could be a way to overcome the issue, but it will take time to deliver results. Publish, share and collaboration are also user-focused capabilities that are underserved by Sisense and may impact customers' ability to support broad information consumption with the product.

### Tableau

Tableau offers an intuitive, interactive visual-based exploration experience that allows business users and any content author to access, prepare, analyze and present findings in their data without technical skills or coding. Tableau offers three primary products: Tableau Desktop, Tableau Server and Tableau Online.

Tableau Online is the cloud-based option, which is hosted in Tableau's data center and is also running on AWS. Additionally, Tableau Server can be hosted on any of the major public cloud platforms: AWS, Microsoft Azure and Google Cloud Platform. In both deployment models, data model authoring and full-formatting options are available within Tableau Desktop and then published to the server or the cloud. From within a browser-based environment, users can interact with published dashboards, create new dashboards, stories and sheets, and do some editing in dashboards and stories.

Tableau is currently on a quarterly release cycle. As part of Tableau's 10.5 release, the focus of this evaluation, the new Hyper in-memory database replaces Tableau data extracts to materially improve the speed of data ingest, refresh and performance of large in-memory data extracts. Support for Linux was also added.

Tableau is most often deployed for a decentralized use case (64%), followed by agile, centralized BI provisioning (55%).

According to the reference customers, the top three reasons for selecting Tableau are for ease use for content authors, its functionality and ease of use for content consumers. Organizations selecting Tableau most often considered Qlik and Microsoft as alternatives.

## Strengths

- **Intuitive, interactive visual exploration and dashboards:** Tableau's core product strengths continue to be its intuitive interactive visualization and exploration and analytic dashboard capabilities for almost any data source, as confirmed by its Excellent to Outstanding rating for these capabilities. Tableau enables rapid, advanced exploration and content creation by automating routine tasks (such as geocoding and the creation of time hierarchies — month, quarter or year, for example) on data fields and adding type ahead for formula building. Users can also create and analyze data by custom geographic territories by lassoing or clicking on marks on a map. Drag-and-drop clustering and forecasting trends are available to business users from simple menus. R, Python and newly added Matlab integration are also supported for incorporating additional algorithms into Tableau calculations.
- **Breadth of accessible data sources:** Tableau allows business users to interact with a broad range of data sources by using an extensive set of data connectors with both in-memory and direct-query access. Data source connectivity is a strength of Tableau, and it continues to expand to new sources with each release. It natively supports a broad range of enterprise sources, relational databases, Hadoop distributions, NoSQL sources, personal data sources, and files and statistical package output formats (including IBM SPSS, SAS and R data files). Moreover, to support improved governance and connect users with the best data source for their context, a machine-learning-based recommendation engine surfaces suggestions for already-built centralized and certified data models, tables and joins.

## Areas of Improvement

- Model complexity and multiple fact tables:** Multiple fact tables within the same physical data source are not supported and must be created elsewhere when needed. Each data source is constrained to a single star schema. As a result, Tableau's scalability and model complexity capability is rated Fair to Good. In addition, Tableau's metadata management rating is impacted by limitations in its ability to reuse data-source-specific metadata objects (such as calculated measures, custom groups, hierarchies) across workbooks and underlying data extracts. It is not well-suited to more-difficult data mashups with inconsistent codes in join fields. (Tableau 10.2 added join calculations as a way of dealing with this issue.) This also affects Tableau's ability to offer support for data lineage and impact analysis. When preparing data, Data Interpreter will make its best guess at unpivoting cross-tabs and removing empty cells to create a tabular dataset from spreadsheet data. Users can do some data cleansing tasks through formulas as they load data, but extensive, point-and-click or automated data profiling and transformations are not supported. Tableau has announced its plans to release a stand-alone, self-service data preparation tool, code-named Project Maestro, in 2018 to address its customers' challenges with large and complex data.
- Reporting and collaboration:** Mode 1 reporting features relevant to modern A&BI (such as pixel-perfect formatting and printing to PDF and PowerPoint) are on the roadmap. While scheduling, subscriptions and collaboration continue to improve in Tableau, there is no integration with third-party collaboration platforms.

## ThoughtSpot

ThoughtSpot differentiates itself on its search-based interface for visual exploration at scale. Users can readily pin visualizations created by searching to a dashboard that can then be scheduled and distributed, thus supporting both Mode 1 and Mode 2. The product has evolved beyond simple search to support more complex data models and augmented data discovery capabilities. SpotIQ is the augmented data discovery capability released in 3Q17. SpotIQ runs various machine learning algorithms to explain elements in a dashboard (for example, what contributed to a particular spike in sales).

The product is most often deployed as an on-premises appliance on commodity hardware, with data loaded in-memory and indexed for fast query performance.

ThoughtSpot has a major release annually and minor releases each quarter. ThoughtSpot 4.4 is the focus of this evaluation.

Reference customers most often choose ThoughtSpot for its ease of use for content consumers, ability to support large data volumes, and natural-language processing/search capabilities. A higher portion of reference customers chose ThoughtSpot for ease of use for content consumers than for any other vendor in this Critical Capabilities.

ThoughtSpot is most often deployed for decentralized analytics (77%), followed by agile, centralized BI provisioning (50%). It is most often considered along with Microsoft Power BI and Tableau.

However, Answer Rocket is most comparable. As Answer Rocket did not qualify for a dot placement in the Magic Quadrant, it is not included in this Critical Capabilities.

## Strengths

- **Ease of use via search:** ThoughtSpot uses a search-based interface that allows users to explore and visualize data, with an overall Excellent rating for the ease of use, visual appeal and workflow capability. Machine learning algorithms provide a type-ahead ability to make it easier for business users to find the most relevant search term. Rather than having to drag and drop data elements onto a page, users simply type in words (such as "sales by state" or "sales by product if color is red"). New visual icons distinguish between measure, attribute, date and filter elements. After a visualization is automatically generated from the search-based query, a user can pin it to create a dashboard. A query visualizer capability shows the steps used to generate the query either in text or via an entity relationship diagram. Users can schedule a dashboard to be distributed via PDF or CSV.
- **Complex data models and in-memory engine:** ThoughtSpot's scalability and model complexity rates Good overall. The product uses a columnar, in-memory engine that indexes all of the searchable data to ensure fast performance on large datasets. The engine is deployed as an appliance on commodity hardware. Of customers surveyed, 27% are analyzing 1TB or more of data in a single application, ranking ThoughtSpot as above average for this metric. The in-memory engine supports loading of data from multiple data sources. The product supports data models with multiple fact tables, chasm traps and fan traps.

## Areas of Improvement

- **Lack of core exploration and advanced analytics:** ThoughtSpot presents data in the most popular chart formats but lacks many of the advanced charts and data manipulation capabilities that power users and citizen data scientists want. For example, trellis charts and candlestick charts are not supported, and geographic mapping is limited, with automatic geocoding only for U.S.-based maps. Features like visual grouping, display as percentages and binning would have to be created via a formula rather than a menu or visual point-and-click approach. Drill-down is essentially a drill-anywhere option, as hierarchies are not supported. Menu-driven forecasting and clustering is not supported out of the box.
- **Data replication and cloud:** ThoughtSpot achieves high performance by replicating data into its in-memory engine. However, customers who have already made investments in a high-performance analytic engine (such as SAP HANA or Amazon Redshift) would prefer not to move data, thus limiting the range of data for which ThoughtSpot is ideally suited. ThoughtSpot can be deployed by customers in the cloud in a bring-your-own-license approach, but there is not a genuine SaaS option. This is on the 2018 roadmap. Other cloud features (such as live connect to on-premises data sources, prebuilt content and a marketplace) are not available.

## TIBCO Software

TIBCO Spotfire offers extensive capabilities for analytics dashboards, interactive visualization and data preparation in a single design tool and workflow, while offering flexible processing options either in-memory or in-database. TIBCO has continued to expand its feature set to include data science, as well as machine learning, streaming analytics, location intelligence, data cataloging and, most recently, data virtualization. It has either acquired these capabilities through acquisition or OEM relationships that also include integration of many of these capabilities with TIBCO middleware.

During the past year, TIBCO has continued to invest in sales and marketing and land-and-expand initiatives to generate renewed market awareness as well as in expansion in its installed base. It also has delivered product enhancements in advanced analytics for citizen data scientists, automated insight recommendations and augmented data preparation.

TIBCO makes updates to Spotfire three to four times per year. The focus of this evaluation is version 7.11.

TIBCO Spotfire is most often deployed by its reference customers for a decentralized use case (73%), followed by agile, centralized BI provisioning (37%).

According to reference customers, the top three reasons for selecting TIBCO Spotfire are functionality, data access and integration, and ease of use for content authors. Organizations selecting TIBCO Spotfire most often considered Tableau and Microsoft Power BI as alternatives.

### Strengths

- **Well-suited for advanced data exploration:** The platform features an integrated, and increasingly machine-learning-based, automated self-service data preparation capability for building complex data models within a unified design environment for interactive visualization and for building analytic dashboards. As part of that environment, analysts and citizen data scientists have access to an extensive library of embedded advanced analytic functions. This library of functions includes geospatial algorithms and geocoded data. Many are drag-and-drop, with some newly added automated insight features and recommended visualizations for selected variables. Spotfire reference customers select and use the platform for conducting advanced and complex analysis and score it in the top quartile for this metric, although it can be used for a range of use cases.
- **Integrated data science and machine learning and streaming analytics:** A higher percentage of TIBCO Spotfire's reference customers said they selected Spotfire for its advanced analytics/data science integration than for almost any other vendor in this Critical Capabilities. TIBCO's advanced data exploration is extended by integrated access to its data science runtime engine for the R analytic language, TIBCO Enterprise Runtime for R (TERR). TIBCO's recent acquisitions of Statistica and Alpine Labs further deepens the options to extend the Spotfire platform with advanced analytics. It has invested early in augmented data preparation and discovery, and in agile data cataloging via an OEM relationship with Attivio. This enables users to publish and share harmonized datasets in an optional access data catalog that is searchable by other users, although seamless workflow between the two products is a work

in process. TIBCO is also relatively early in delivering streaming, operational and IoT analytics through integrations with TIBCO middleware and other acquisitions (StreamBase and LogLogic).

### Areas of Improvement

- Self-service data preparation, cloud and ease of use:** TIBCO's overall product score across the use cases places it in the top quartile, but a few gaps exist. Self-service data preparation offers limited impact analysis and certification of data sources, and has some gaps in advanced data inference and profiling. While TIBCO's cloud capabilities are rated as Good, with limited packaged content for cloud applications and other data sources, a separate administration environment is used for on-premises versus the cloud deployments, and there is no marketplace for partner content. While selected often for ease of content authoring, Spotfire is less intuitive than some competing products for new users and for casual business users who simply want to assemble lightweight dashboards and analysis. Ease of use of administration, deployment, content authoring and visual appeal are also rated below average by reference customers.
- Mobile; publish, share and collaboration features; and integrated workflow:** These capabilities are scored Good overall. However, regarding mobile, responsive design is not fully automated, and there is no support for offline exploration. The publish, share and collaborate features lack storytelling outside of the ability to create annotated bookmarks, while there is no user content ratings and recommendations or integration with social platforms other than TIBCO's tibbr, which serves as Spotfire's collaboration environment. Overall, while the workflow within Spotfire is rated Excellent, TIBCO may face integration challenges from its many acquisitions during the past year, which can divert resources away from investments in innovation.

### Yellowfin

Yellowfin delivers a single, web-based A&BI platform that supports both Mode 1-style analytics and BI with scheduled reports and alerting, as well as Mode 2 for agile, visual exploration. The platform includes innovative features (such as collaboration, workflow and emerging augmented analytics capabilities).

Yellowfin 7.4, the focus of this evaluation, was released in October 2017 and introduces Assisted Insights, the ability to automatically generate insights using machine learning with natural-language generation output. There is also a new lightweight data preparation capability that can be used as an ETL tool with output to database tables. It can also integrate with external data and inputs (such as R scripts and Python).

Reference customers choose Yellowfin primarily for ease of use for content consumers, license cost and ease of use for content authors/developers.

Yellowfin has a major release every nine months, with minor releases monthly.

Agile, centralized BI provisioning is the most popular use case in this survey (36% of customers), followed by decentralized analytics (35%), governed data discovery (30%) and OEM/embedded (30%). Tableau and Microsoft Power BI are most often considered as alternatives by reference customers.

## Strengths

- **Publishing, collaboration and mobile:** Yellowfin achieved Excellent to Outstanding scores for the publish, share and collaborate critical capability, the highest of only two vendors in this Critical Capabilities. Reports and dashboards can be scheduled via email or FTP with output to popular formats (such as PDF, XLS and DOCX, but not PowerPoint). Dashboards can be woven into a slidelike storyboard. Discussion threads, comments and annotations can be seen in a timeline. Users can add reports, dashboards and storyboards as favorites and like or dislike them. Users can mark comments as insightful, and can "follow" other users in Yellowfin's timeline and see what they are working on. They can also create and share tasks with other users, supporting workflows. Content can be interacted with on mobile devices with native device support for iOS, Android and Windows.
- **Easy self-service data preparation:** Yellowfin is rated Outstanding for its self-service data preparation capabilities. Data inference, data lineage, data modeling and enrichment are all natively supported in an easy-to-use interface. Data profiling with recommendations on how to transform the data is also supported. Although these are product strengths, only a small portion of reference customers are using these capabilities (10%), suggesting that the product is most often used on well-modeled data sources. The newly released data transformation capabilities also support the preparing and blending of data to create reusable outputs to different targets. Ease of use, visual appeal and single platform/workflow was also rated Excellent.

## Areas of Improvement

- **Performance and scalability:** Yellowfin primarily connects directly to a data source or data warehouse. There is a caching mechanism that supports caching on queries and for data models. However, Yellowfin is primarily appealing to customers that have already invested in a high-performing analytic database. Poor performance was reported as a barrier to adoption by 9% of reference customers, slightly more than the survey average. It's unclear if these customers are using the integrated caching. Nine percent of reference customers also cited the inability to handle required data volumes as a barrier to adoption.
- **Visual exploration, advanced analytics and cloud:** While Yellowfin is strong in reporting and ad hoc query, mainstream buying requirements are more geared toward advanced data manipulation in interactive visual exploration. Here, Yellowfin rates Good to Excellent with gaps in visual grouping, binning and complex, multilevel filters and calculations. The product does support set analysis and binning during data profiling, but neither of these is single-step and during the visualize process. Advanced analytics for citizen data scientists is rated only as Fair to Good. Menu-driven decision trees and clustering is not supported. Support for models developed externally in R and other data science platforms is newly supported in the latest release, along with Predictive Model Markup Language (PMML) and Portable Format for Analytics (PFA). Some features and aspects of the cloud BI critical capability are not available

(such as security certification for software, terms and conditions regarding data ownership, and hybrid connectivity to on-premises data sources).

## Context

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This Critical Capabilities research evaluates products included in the 2018 "Magic Quadrant for Analytics and Business Intelligence Platforms" on 15 critical capabilities in support of the five main use cases for A&BI platforms.

## Product/Service Class Definition

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A modern A&BI platform supports IT-enabled analytic content development. It is defined by a self-contained architecture that enables nontechnical users to autonomously execute full-spectrum analytic workflows from data access, ingestion and preparation to interactive analysis and the collaborative sharing of insights. The 15 critical capabilities defined in this research represent mainstream buying requirements for customers to modernize their A&BI platforms.

## Critical Capabilities Definition

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Vendors are assessed according to the following 15 critical capabilities. Changes, additions and deletions from last year's Critical Capabilities are listed in Note 3.

### Admin, Security and Architecture

Capabilities that enable platform security, administering users, auditing platform access and utilization, optimizing performance, and ensuring high availability and disaster recovery.

### Data Source Connectivity

Capabilities that allow users to connect to and ingest structured and unstructured data contained within various types of storage platforms both on-premises and in the cloud.

### Cloud BI

Platform-as-a-service and analytic-application-as-a-service capabilities for building, deploying and managing analytics and analytic applications in the cloud, based on data both in the cloud and on-premises.

### Scalability and Model Complexity

The degree to which the in-memory engine or in-database architecture handles high volumes of data, complex data models and large user deployments.

### Self-Contained ETL and Data Storage

Platform capabilities for accessing, integrating, transforming and loading data into a self-contained storage layer with the ability to index data, manage data loads and refresh scheduling.

### Self-Service Data Preparation

Drag-and-drop, user-driven data combination of different sources and the creation of analytic models (such as user-defined measures, sets, groups and hierarchies).

Advanced capabilities include semantic autodiscovery, intelligent joins, intelligent profiling, hierarchy generation, data lineage and data blending on varied data sources, including multistructured data.

### Metadata Management

Tools for enabling users to leverage the same systems of record semantic model and metadata.

Capabilities to provide a robust and centralized way for administrators to search, capture, store, reuse and publish metadata objects (such as dimensions, hierarchies, measures and performance metrics/key performance indicators [KPIs]), and to report layout objects, parameters and so on.

Administrators should have the ability to promote a business-user-defined data mashup and metadata to the systems of record metadata.

### Advanced Analytics for CDS

Enables users to easily access advanced analytics capabilities that are self-contained within the platform itself or through the import and integration of externally developed models.

### Augmented Data Discovery

Automatically finds, visualizes and narrates important findings (such as correlations, exceptions, clusters, links and predictions) in data that are relevant to users without requiring them to build models or write algorithms.

Users explore data via visualizations, natural-language-generated narration, search and natural language query technologies.

### Interactive Visual Exploration

Enables the exploration of data via the manipulation of chart images, with the color, brightness, size, shape and motion of visual objects representing aspects of the dataset being analyzed.

Includes an array of visualization options that go beyond those of pie, bar and line charts, including heat and tree maps, geographic maps, scatter plots, and other special-purpose visuals. These tools enable users to analyze the data by interacting directly with a visual representation of it.

### Analytic Dashboards

The ability to create highly interactive dashboards and content with visual exploration and embedded, advanced and geospatial analytics to be consumed by others.

### Mobile Exploration and Authoring

Enables organizations to develop and deliver content to mobile devices in a publishing and/or interactive mode, and takes advantage of mobile devices' native capabilities (such as touchscreen, camera and location awareness).

### Embed Analytic Content

Capabilities include a software developer's kit with APIs and support for open standards for creating and modifying analytic content, visualizations and applications, embedding them into a business process and/or an application or portal.

These capabilities can reside outside the application, reusing the analytic infrastructure, but must be easily and seamlessly accessible from inside the application, without forcing users to switch between systems. The capabilities for integrating A&BI with the application architecture will enable users to choose where in the business process the analytics should be embedded.

### Publish, Share and Collaborate

Capabilities that allow users to publish, deploy and operationalize analytic content through various output types and distribution methods with support for content search, scheduling and alerts.

This enables users to share and discuss information, analysis, analytic content and decisions via discussion threads, chat and annotations.

### Ease of Use/Visual Appeal/Workflow

Overall platform ease of use to install, administer and manage the platform, to and create and consume analytic content, in addition the degree that the product is visually appealing.

This considers how many products are needed to deliver the critical capabilities and the degree of seamless integration and workflow between capabilities/components.

## Use Cases

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### Agile, Centralized BI Provisioning

Supports an agile IT-enabled workflow from data to centrally delivered and managed analytic content using the self-contained data management capabilities of the platform.

Agile, centralized BI provisioning enables an information consumer to access their KPIs from an information portal — whether on a mobile device or embedded in an analytic application — to

monitor and measure the performance of the business. In a modern A&BI platform, interactivity is often supported out of the box and automatically. This is in contrast to traditional reporting-based platforms in which interactivity is limited to what is designed in by the content author, and in which a data warehouse must first be built.

The highest-weighted capabilities in this use case include:

- Admin, security and architecture
- Self-contained ETL and data storage
- Metadata management
- Analytic dashboards
- Mobile exploration and authoring
- Publish, share and collaborate
- Ease of use and visual appeal

### Decentralized Analytics

Supports a workflow from data to self-service analytics for individual business units and users.

On the analytics spectrum, users of platforms that excel at the decentralized analytics use case can explore data using highly interactive descriptive analytics ("What happened?" or "What is happening?") or diagnostic analytics ("Why did something happen?" "What are areas of opportunity or risk?" or "What if?").

Increasingly, because of the advanced analytics for citizen data scientists offered by many vendors, users can extend their analysis to some advanced descriptive analysis (for example, clustering, segmenting and correlations) and to a basic level of predictive analytics (for example, forecasting and trends). They can also prepare their own data for analysis, reducing their reliance on IT and time to insight. As decentralized analytics becomes more pervasive, the risk of multiple sources of the truth becomes a concern, and decentralized analytics may evolve to governed data discovery over time and as a deployment grows.

The highest-weighted capabilities in this use case include:

- Data source connectivity
- Self-contained ETL and data storage
- Self-service data preparation
- Advanced analytics for citizen data scientists
- Interactive visual exploration
- Analytic dashboards

- Ease of use and visual appeal

### Governed Data Discovery

Supports a workflow from data to self-service analytics, systems of record, IT-managed content with governance, reusability and promotability of user-generated content.

Capabilities that govern, promote and widely share content are what most differentiate governed data discovery from decentralized analytics. With the success of data discovery tools in driving business value, many organizations would increasingly like to use data discovery capabilities for a broader range of analysis and an expanded set of users than was previously addressed by IT-centric enterprise reporting platforms. Governed data discovery enables users to access, blend and prepare data, then visually explore, find and share patterns with minimal IT support, or technical and statistical skills. At the same time, it must also satisfy enterprise IT requirements for business-user-generated model promotability, data reuse and governance. In particular, users should be able to reuse sanctioned business-user-created data or datasets, derived relationships, derived business models, derived KPIs, and metrics that support analyses.

Governed data discovery enables pervasive deployment of data discovery in the enterprise at scale without proliferating data discovery sprawl. The expanded adoption of data discovery also requires A&BI leaders to redesign A&BI deployment models and practices, moving from an IT-centric to an agile and decentralized (yet governed and managed) approach. This would include putting in place a "prototype, pilot and production" process in which user-generated content is created as a preliminary model. Some of these would need to be recurring analysis and are promoted to a pilot phase, and others are promoted to production and operationalized for regular analysis as part of the system of record. Alternately, governance can be implemented after broad sharing of content, as centralized experts proactively monitor usage.

The highest-weighted features in this use case include:

- Admin, security and architecture
- Data source connectivity
- Self-contained ETL and data storage
- Metadata management
- Interactive visual exploration
- Ease of use and visual appeal

### OEM or Embedded BI

These capabilities are used to create and modify analytic content, visualizations and applications and embed them into a business process, and/or an application or portal.

They support a workflow from data to embedded BI content in a process or application, as well as extending out of the box capabilities. They can reside outside the application, reusing the analytic infrastructure, but must be easily and seamlessly accessible from inside the application, without forcing users to switch between systems. The ability to integrate A&BI with the application architecture will enable users to choose where in the business process the analytics should be embedded.

The highest-weighted capabilities in this use case include:

- Admin, security and architecture
- Data source connectivity
- Analytic dashboards
- Embed analytic content
- Publish, share and collaborate

### Extranet Deployment

Supports a workflow similar to agile, centralized BI provisioning for the external customer or, in the public sector, citizen access to analytic content.

In addition, capabilities for embedding and cloud deployment are typically required for extranet deployments.

The highest-weighted capabilities in this use case include:

- Admin, security and architecture
- Cloud BI
- Metadata management
- Analytic dashboards
- Embed analytic content

### Vendors Added and Dropped

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#### Added

Looker was added to the Magic Quadrant and this Critical Capabilities this year, as it met all of the inclusion criteria based on an evaluation of its modern BI product offerings against the current set of critical capabilities and other inclusion metrics defined for the Magic Quadrant.

## Dropped

- Alteryx was excluded based on Gartner analyst opinion formed in inquiries, customer reference checks, reference surveys and industry events that it primarily complements rather than competes with other vendors in this Magic Quadrant. Alteryx is included in the "Magic Quadrant for Data Science and Machine-Learning Platforms," as well as in the "Market Guide for Self-Service Data Preparation."
- ClearStory Data and Zoomdata were excluded because they did not meet one or more of the inclusion criteria for this year's Magic Quadrant.
- Datameer and Pentaho were excluded because they shifted their market emphasis.

## Inclusion Criteria

Vendors included in this research also appear in the 2018 "Magic Quadrant for Analytics and Business Intelligence Platforms."

We ranked vendors that met all the inclusion criteria below, which were shared with the Magic Quadrant.

### Modern A&BI Platform Assessment

This was evaluated by Gartner analysts and was determined by the extent of IT involvement that is considered to be mandatory before the platform can be used by a business analyst/information worker to analyze data, without IT assistance. Products that did not meet the criteria of a modern analytics and BI platform are those requiring significant IT involvement — either internal or external to the platform — to load and model data, create a semantic layer, or build data structures as a prerequisite to using the BI platform. IT developer-centric platforms focused on custom coding analytic applications were, likewise, not evaluated for inclusion. Products that met the modern criteria were evaluated for inclusion in the Magic Quadrant based on a funnel methodology where the requirements for each tier must be met to progress to the next tier. Tiers 1 through 3 are evaluated at the vendor level, and Tiers 4 and 5 are evaluated at the product level.

### Vendor-Level Criteria

Tier 1. Market Presence — A composite metric assessing both the interest of Gartner's client base and that of the broader market was conducted for each vendor through internet search volume, job postings and trend analysis, and social media presence. Note: Vendors were considered for inclusion based on data as of August 2017. Vendors that are considered complementary to A&BI platforms are also excluded.

Tier 2. Revenue\* — For those vendors meeting the market presence criteria (Tier 1), A&BI revenue for each vendor was assessed and evaluated. For this assessment, two common license models were assessed, and revenue from each was combined (if applicable) and evaluated against the three revenue inclusion levels (shown below) for qualification:

1. Perpetual License Model — Software license, maintenance and upgrade revenue (excluding hardware and services) for calendar years 2015, 2016 and 2017 (estimated).
2. SaaS Subscription Model — Annual contract value (ACV) for year-ends 2015, 2016 and projected ACV for year-end 2017, excluding any services included in annual contract. For multiyear contracts, only the contract value for the first 12 months were used for this calculation.

Revenue inclusion levels are one of the following:

- \$25 million 2017 (estimated) combined perpetual license revenue + 2017 (estimated) ACV
- \$15 million 2017 (estimated) combined perpetual license revenue + 2017 (estimated) ACV with 50% year-over-year growth
- \$10 million 2017 (estimated) combined perpetual license revenue + 2017 (estimated) ACV with 100% year-over-year growth

*\* Gartner defines total software revenue as revenue that is generated from appliances, new licenses, updates, subscriptions and hosting, technical support, and maintenance. Professional services revenue and hardware revenue are not included in total software revenue (see "Market Share Analysis: Analytics and BI Software, 2016").*

Tier 3. Magic Quadrant Evaluation Inputs — Full participation in the Magic Quadrant process requires the following input:

- Completing and providing documentation for an RFP-style questionnaire of detailed critical capabilities.
- Completing an online questionnaire around market presence, growth, go-to-market strategy and differentiation.
- Submission of a video up to one-hour long that demonstrates how included products deliver on the predefined analytic scenarios defined by Gartner (we only look at the first hour; anything beyond that is not considered).
- Verification of final A&BI revenue for 2015, 2016 and 2017 (estimated).
- Providing references for an online customer and OEM survey.
- Providing a vendor briefing to the Magic Quadrant authors.
- Providing access to evaluation software.
- Providing factual review of sections in the Magic Quadrant research.

If a vendor declines to participate and does not respond to requests for supplemental information, Gartner's analysis is based on other credible sources, including previous vendor briefings, customer inquiries, Peer Insight reviews and other publicly available information.

**Product-Level Criteria**

Tier 4. Breadth of Coverage — The vendor must demonstrate breadth across vertical industries and geographic regions, as specified by Gartner.

Tier 5. Product Assessment — Products that progressed to this final tier were assessed by Gartner analysts using the information provided by each vendor in the data collection exercise outlined above. The final step involved narrowing down the field to 20 vendors for inclusion in the Magic Quadrant and this Critical Capabilities research.

Table 1. Weighting for Critical Capabilities in Use Cases

Critical Capabilities	Agile, Centralized BI Provisioning	Decentralized Analytics	Governed Data Discovery	OEM or Embedded BI	Extranet Deployment
Admin, Security and Architecture	10%	5%	10%	10%	10%
Data Source Connectivity	5%	5%	10%	15%	0%
Cloud BI	5%	5%	5%	0%	20%
Scalability and Model Complexity	10%	0%	5%	10%	10%
Self-Contained ETL and Data Storage	5%	20%	5%	5%	5%
Self-Service Data Preparation	0%	10%	5%	5%	0%
Metadata Management	20%	0%	10%	0%	5%
Advanced Analytics for CDS	5%	5%	5%	0%	0%
Augmented Data Discovery	0%	5%	5%	0%	0%
Interactive Visual Exploration	0%	10%	10%	0%	5%
Analytic Dashboards	15%	10%	10%	10%	10%
Mobile Exploration and Authoring	5%	0%	5%	0%	5%
Embed Analytic Content	0%	0%	0%	40%	25%
Publish, Share and Collaborate	10%	0%	5%	0%	0%
Ease of Use/Visual Appeal/Workflow	10%	25%	10%	5%	5%
<b>Total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>
As of May 2018					

Source: Gartner (May 2018)

This methodology requires analysts to identify the critical capabilities for a class of products/services. Each capability is then weighed in terms of its relative importance for specific product/service use cases.

### Critical Capabilities Rating

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For the product/service rating on Critical Capabilities, see the Figure 6 heat map.

Table 2 shows the product/service scores for each use case. The scores, which are generated by multiplying the use-case weightings by the product/service ratings, summarize how well the critical capabilities are met for each use case.

Table 2. Product Score in Use Cases

Use Cases	Birst	BOARD International	Domo	IBM Cognos Analytics	IBM Watson Analytics	Information Builders	Logi Analytics	Looker	Microsoft	MicroStrategy	Oracle	Pyramid Analytics	Qlik	Salesforce	SAP Analytics Cloud	SAP Lumira	SAS	Sisense	Tableau	ThoughtSpot	TIBCO Software	Yellowfin
Agile, Centralized BI Provisioning	4.04	3.21	3.39	2.90	2.43	3.32	3.46	3.01	3.28	4.37	3.47	3.55	3.28	3.70	2.89	2.98	3.86	3.56	3.52	3.50	3.63	3.57
Decentralized Analytics	3.80	3.38	3.12	2.80	2.72	3.27	3.71	2.58	3.45	4.19	3.66	3.62	3.75	3.67	2.93	2.95	3.79	3.77	3.86	3.33	3.89	3.81
Governed Data Discovery	3.91	3.20	3.23	2.72	2.54	3.24	3.53	2.71	3.48	4.22	3.49	3.59	3.29	3.60	2.81	2.90	3.81	3.49	3.59	3.33	3.57	3.56
OEM or Embed-	4.41	3.12	3.31	2.73	2.31	3.63	4.38	3.46	3.86	4.16	3.75	3.69	3.97	3.80	2.09	3.07	3.49	4.28	3.86	3.23	3.99	3.83

Use Cases	Birst	BOARD International	Domo	IBM Cognos Analytics	IBM Watson Analytics	Information Builders	Logi Analytics	Looker	Microsoft	MicroStrategy	Oracle	Pyramid Analytics	Qlik	Salesforce	SAP Analytics Cloud	SAP Lumira	SAS	Sisense	Tableau	ThoughtSpot	TIBCO Software	Yellowfin
ded BI																						
Ex-tranet Deployment	4.21	3.07	3.39	2.92	2.49	3.52	3.81	3.41	3.60	4.16	3.85	3.44	3.61	3.83	2.49	2.80	3.56	3.90	3.68	2.97	3.77	3.50
As of May 2018																						

Source: Gartner (May 2018)

## Gartner Recommended Reading

*Some documents may not be available as part of your current Gartner subscription.*

"Magic Quadrant for Analytics and Business Intelligence Platforms"

"Toolkit: BI and Analytics Platform RFP"

"Select the Right Business Intelligence and Analytics Tool for the Right User"

"How Products and Services Are Evaluated in Gartner Critical Capabilities"

### Evidence

#### **Total Software Revenue**

Gartner defines total software revenue as revenue that is generated from appliances, new licenses, updates, subscriptions and hosting, technical support, and maintenance. Professional services are not included in total software revenue (see "Market Share Analysis: Analytics and BI Software, 2016"). Gartner's analysis and the ratings and commentary in this report are based on a number of sources:

- Customers' perceptions of each vendor's strengths and challenges, as gleaned from their analytics and BI-related inquiries to Gartner
- An online survey of vendors' reference customers
- A questionnaire completed by the vendors
- Vendors' briefings, including product demonstrations, strategy and operations
- An extensive RFP questionnaire inquiring about how each vendor delivers the specific features that make up our 15 critical capabilities (see "Toolkit: BI and Analytics Platform RFP")
- A prepared video demonstration of how well vendor BI platforms address specific functionality requirements across the 15 critical capabilities
- Access to evaluation software from each vendor

#### **Online Survey for This Magic Quadrant**

An online survey was developed and hosted by Gartner as part of its research. Vendor-provided reference customers (end-user customers and OEMs) and respondents from last year's survey provided data. The survey was conducted from 8 September 2017 through 5 October 2017.

The survey results used in this document derive from 1,526 responses as follows:

- Vendor-identified reference customers (1,219) or 80%

- References from the previous year's survey that also participated in this year's survey (147) or 10%
- OEM reference customers (160) or 10%

Although this is a substantive pool of responses for directional inference, vendor reference data is not representative of the total A&BI market, but rather of the customers that elected to participate (see Table 3, which gives a breakdown of qualified respondents per vendor).

Table 3. Qualified Responses by Vendor

Vendor	Qualified Respondents
Birst	41
BOARD International	46
Domo	31
IBM	41
Information Builders	40
Logi Analytics	24
Looker	40
Microsoft	63
MicroStrategy	78
Oracle	92
Pyramid Analytics	45
Qlik	262
Salesforce	65
SAP	79
SAS	102
Sisense	53
Tableau	58
ThoughtSpot	34
TIBCO Software	63
Yellowfin	69
Where a vendor has fewer than 25 reference customers responding to the Magic Quadrant reference survey, comments should be taken as directional.	

Source: Gartner (May 2018)

### Note 1 Scoring Detail

Given the level of product maturity in the market, the decision was taken to increase the precision of the scoring shown in Figure 6, rather than using increments at 0.5 as in 2017.

The critical capability scores themselves are a blend of analyst opinion and customer reference survey responses.

Ratings for 13 of the criteria are more heavily weighted toward Gartner analyst opinion. This is based on the logic that while the analyst team can compare across multiple products, customer references generally only know the product they are surveyed on.

The remaining two criteria (ease of use, visual appeal and workflow, and scalability and model complexity) scores are a more even balance of Gartner analyst opinion and customer survey references, as these capabilities are more subjective or opinion-based.

## Note 2 Most Common Primary Reason for Selecting A&BI Platforms

Table 4. Reasons for Selecting A&BI Platforms

Reason for Selecting	Percentage
Ease of use for content consumers	13.61%
Ease of use for content authors/developers	11.48%
Superior functionality	9.79%
Data access and integration	9.67%
Ability to support large amounts data	5.86%
Overall TCO	5.29%
Product roadmap and future vision	5.21%
Implementation cost and effort	5.00%
License cost	4.47%
Cloud deployment	3.73%
Integrates with information infrastructure (database, middleware)	3.73%
Integrates with enterprise applications	3.40%
Integration with my advanced analytics/data science platforms and tools	3.08%
Service provider availability and capabilities	2.63%
Availability of skills	2.43%
Superior mobile BI capabilities	2.22%
Ability to support large number of concurrent users	2.04%
Corporate standard	1.77%
Enterprise-grade security	1.75%
Robust SDK or APIs to embed or extend the platform	1.51%
Integration with my corporate performance management platform	0.89%
Integrates with or has natural language query and/or generation/narration	0.47%

Source: Gartner (May 2018)

### Note 3 Change in Critical Capabilities From Last Year

A number of changes were made to the functional evaluation framework used, which means that the platform scores and ranks shown in this report cannot be usefully compared to that published in 2017.

At a summary level:

The names of two critical capabilities were changed to align them with current Gartner nomenclature or disambiguate them from other critical capabilities:

- Renamed "embedded advanced analytics" to "advanced analytics for citizen data scientists."
- Renamed "smart data discovery" to "augmented data discovery."

Two new capabilities were added:

- "Ease of use, visual appeal and workflow" is a combination of two pre-existing capabilities: "platform and workflow integration" and "ease of use, visual appeal and workflow integration."
- "Scalability and data model complexity" combines new subcriteria with some that previously existed within "metadata management" and "BI platform administration, security and architecture."

At a detailed level, changes were made throughout the RFP subcriteria used to evaluate products. The RFP comprises 173 subcriteria items. Nine subcriteria were removed from the 2017 model, and 26 were either added or revised for this research, impacting nine of the 15 critical capabilities.

#### Critical Capabilities Methodology

This methodology requires analysts to identify the critical capabilities for a class of products or services. Each capability is then weighted in terms of its relative importance for specific product or service use cases. Next, products/services are rated in terms of how well they achieve each of the critical capabilities. A score that summarizes how well they meet the critical capabilities for each use case is then calculated for each product/service.

"Critical capabilities" are attributes that differentiate products/services in a class in terms of their quality and performance. Gartner recommends that users consider the set of critical capabilities as some of the most important criteria for acquisition decisions.

In defining the product/service category for evaluation, the analyst first identifies the leading uses for the products/services in this market. What needs are end-users looking to fulfill, when considering products/services in this market? Use cases should match common client deployment scenarios. These distinct client scenarios define the Use Cases.

The analyst then identifies the critical capabilities. These capabilities are generalized groups of features commonly required by this class of products/services. Each capability is assigned a level of importance in fulfilling that particular need; some sets of features are more important than others, depending on the use case being evaluated.

Each vendor's product or service is evaluated in terms of how well it delivers each capability, on a five-point scale. These ratings are displayed side-by-side for all vendors, allowing easy comparisons between the different sets of features.

Ratings and summary scores range from 1.0 to 5.0:

1 = Poor or Absent: most or all defined requirements for a capability are not achieved

2 = Fair: some requirements are not achieved

3 = Good: meets requirements

4 = Excellent: meets or exceeds some requirements

5 = Outstanding: significantly exceeds requirements

To determine an overall score for each product in the use cases, the product ratings are multiplied by the weightings to come up with the product score in use cases.

The critical capabilities Gartner has selected do not represent all capabilities for any product; therefore, may not represent those most important for a specific use situation or business objective. Clients should use a critical capabilities analysis as one of several sources of input about a product before making a product/service decision.

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