

ABI RESEARCH COMPETITIVE RANKING

MANUFACTURING DATA ANALYTICS

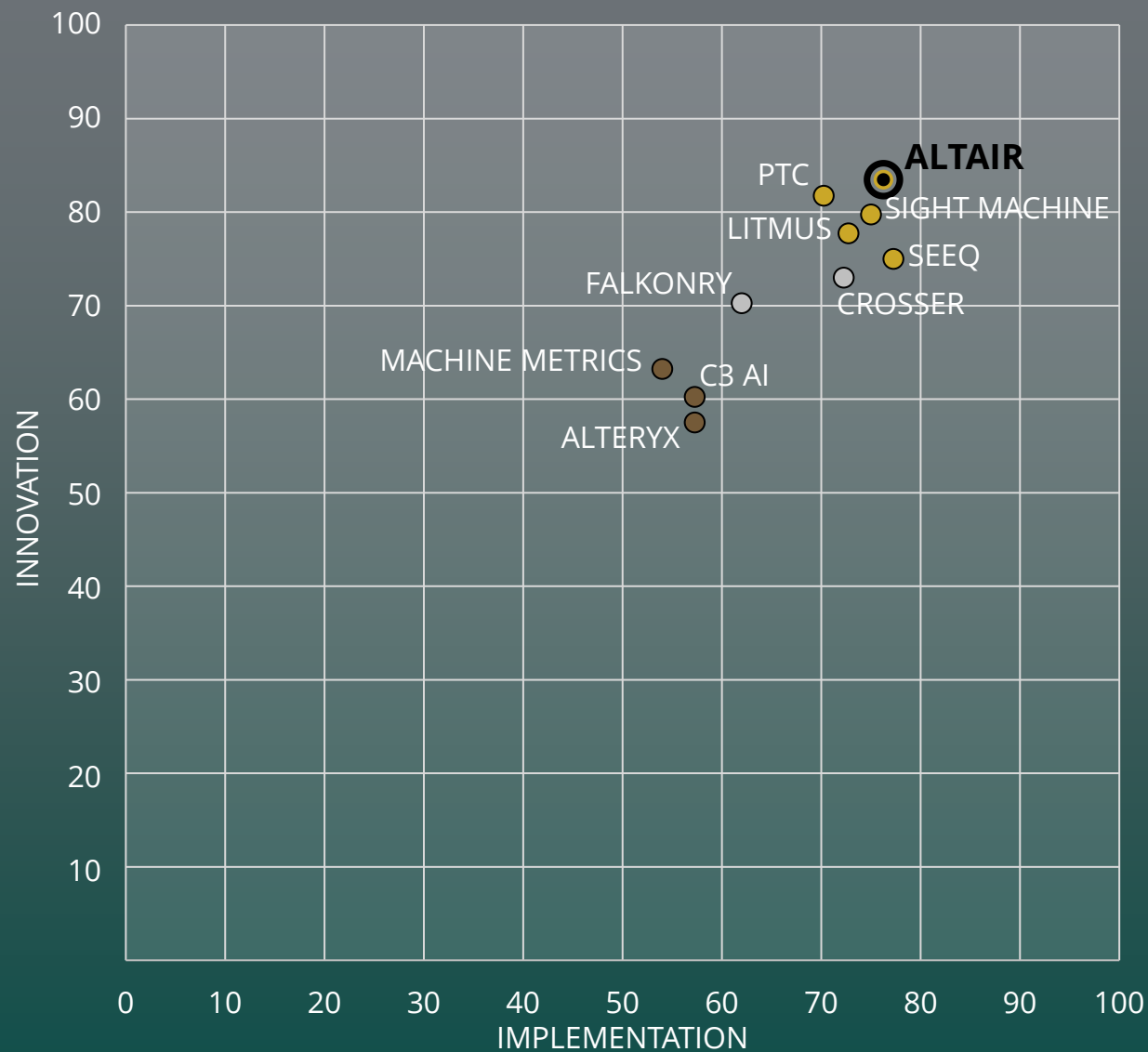


OVERALL: 80.0 | INNOVATION: 83.5 | IMPLEMENTATION: 76.3 | RANK: 1



ALTAIR
INNOVATION
VERSUS
IMPLEMENTATION
FOCUS

OVERALL: 80.0 | INNOVATION: 83.5 | IMPLEMENTATION: 76.3 | RANK: 1



INTRODUCTION



Altair has more than 30 years of experience collecting and working with manufacturers' data. Altair's capabilities encompass IoT projects, High-Performance Computing (HPC), data analytics, PLM software, and digital twins.

Altair is the overall leader because of its ability to collect and assimilate data from a wide range of sources and via numerous industry protocols. These breadths of input allied with a huge array of modeling techniques and mean that customers can fully understand their operations. Furthermore, the wide variety of options to display and share the data mean that Altair can entrench its solutions in helping customers resolve operational issues. Customers can obtain assistance from a wide network of partners and familiarize themselves with the Online Altair Academy.

INNOVATION



**INNOVATION
SCORE: 83.5**

Altair can collect data via a wide variety of methods, including industrial protocols (e.g., BACnet, OPC-UA, LoRaWAN, CANbus, Modbus), wireless networks (Wi-Fi/WLAN, BLE, LoRa, Sigfox), and via MQTT and REST.

The data (both structured and semi-structured data) can be sourced from, among others, sensors, IoT devices and gateways, Comma Separated Value (CSV) files, Parquet, SAS7BDATs, Excel, flat files, XML, JSON, SAS, SPSS, and relational databases, such as Oracle, Vertica, SAP Hana, KDB+, MySQL, Postgres, Snowflake, and BigQuery. Other data sources include MongoDB, DataStax, Cassandra, Elasticsearch, and Splunk, as well as data historians like OSI PI. Furthermore, Altair can extract data from flat files, PDFs, and Google Docs.

After collecting the data, Altair can perform, if required, data normalization functions, including data blending, cleansing, duplicate removal, and row filtering, as well as detect outlying data. Data preparation and translation procedures include merging, appending, and mapping techniques. In terms of business logic and rules, Altair offers the ability for these to be coded and operationalized as functions that are executed based on various system and user-defined triggers.

Customers can use Altair's stream-handling architecture, whereby duplicates are removed, streams can be joined together, and events aggregated and filtered. In addition, users can apply ML models and scoring on streamed events. Altair supports DL libraries, such as TensorFlow, H2O, Torch, DL4J, CNTK, and Keras, on both Central Processing Units (CPUs) and Graphics Processing Units (GPUs).

The core analytical capabilities are available out of the box from Altair and for any customer to make use of. Basic reporting capabilities include the ability to set active and passive alerts and notifications, for on-screen and offline alerting for an individual machine on the factory floor or to provide an overall process view of a plant. From a predictive perspective, Altair supports more than 250 predictive modeling techniques (tree-based modeling, rule-based learning, Bayesian modeling, instance-based learning, linear regression, and logistic regression) to perform what-if simulations. Altair's AI provides details on why a particular model is behaving in a certain fashion and how it can meet multiple business objectives and explore trade-offs.

INNOVATION



**INNOVATION
SCORE: 83.5**

While the desktop offering is generally updated on a one major yearly release cycle with quarterly point releases, the cloud offerings are on more frequent, continuous release cycles.

Altair has a dedicated user experience team that is charged with reviewing user workflows for different skill levels. Templates and building blocks encapsulate standards and best practices, these enable novice users and data scientists to perform analysis within the pre-configured constraints. Novice users can use drag & drop tools, and automated and guided analytics, without the need for a data scientist to be involved. Advanced users can get up and running inside an hour thanks to a low-code/no-code, visual point-and-click, and drag-and-drop interface to build dashboards or ML models. The company offers dedicated solutions to perform weight and cost analytics for a product's Bill of Materials (BOM) to track weight and cost KPIs of a product's BOM. The acquisition of RapidMiner in September 2022 will further enhance Altair's low-code platform and analytics capabilities.

There are many different methods for displaying the data, such as scatter plots, scatter matrix plots, scatter Three-Dimensional (3D) plots, bubble charts, heatmaps, sunburst charts, histogram, bell curves, pyramids, word clouds, geographical maps, and correlation matrices. Dashboards can be tailored to different audiences.

Results can be transferred to from third-party ERP, Customer Relationship Management (CRM), PLM and other enterprise systems. Depending on the target system, REST, JDBC, ODBC, or a custom connection is established for connectivity. To facilitate the data transfers, Altair supports REST API for operations, such as for report generation or downloading a dataset as well to an object store, a Kafka streaming topic, or a database. Furthermore, data can support customers' workflows by incorporating AR, such as helping control systems engineers to design and validate/predict mechanical loads more realistically.

Altair supports customer efforts to create both data-driven and physics-based digital twins. Multiple data streams can be into an inclusive digital model that can be leveraged by multiple groups to improve both the product and processes.

IMPLEMENTATION



**IMPLEMENTATION
SCORE: 76.3**

Founded in 1985, Altair has more than 13,000 customers globally. The company has 86 offices across 25 countries.

Altair data analytics can be rolled out globally either on-premises or in private/public/hybrid environments, and are available on a SaaS basis via a patented licensing model, [Altair Units](#).

Some solutions can be accessed via hyperscalers' marketplaces. The solutions are available in English, French, Italian, Spanish, Korean, and Japanese.

Altair has an extensive partnership and reseller network, and is also integrated into a number of solutions that are marketed by third parties under their own brand names. The [Altair Partner Alliance](#) (APA) offers Altair customers more than 65 third-party software products with applications specific to industry verticals, all of which are easily accessible via Altair Units. The company continues to work on building its partnerships with SIs, which now include Tech Mahindra, Experian Technologies, and OTSI, among others. While the list of Technology Partners now includes, among others, Amazon Web Services (AWS), AMD, Blue Prism, Dell Technologies, Fujitsu, HPE, Intel, Microsoft, and NVIDIA.

To support users, the Online Altair Academy provides detailed documentation that includes videos and written tutorials for its products and solutions. Users can leverage an online knowledge base of articles at their leisure, and access technical support teams for additional support and guidance. In addition, the company offers consulting services for custom solution development and implementation.

Altair has also created a community hub where members contribute sample processes for various and diverse use cases, such as templates for processing sensor data and doing predictive maintenance.

In terms of time to value, the company reports the following timelines for achieving ROI (this may vary based on data access and IT knowledge):

- If a customer allows HTTPs or MQTT communication protocols: 5 days to 10 days
- If a customer uses one of the following standard communication protocols (OPC-UA, Modbus, CANbus, LoRaWAN, BACnet): 10 days to 1 month
- Or other standard protocols that have strict security standards: 1 month to 2 months



CRITERIA AND METHODOLOGY

VENDOR MATRIX

Methodology: After individual scores are established for innovation and implementation, an overall company score is established using the Root Mean Square (RMS) method:

$$\text{Score} = \sqrt{\frac{\text{innovation}^2 + \text{implementation}^2}{2}}$$

The resulting overall scores are then ranked and used for percentile comparisons.

The RMS method, in comparison with a straight summation or average of individual innovation and implementation values, rewards companies for standout performances.

For example, using this method, a company with an innovation score of nine and an implementation score of one would score considerably higher than a company with a score of five in both areas, despite the mean score being the same. ABI Research believes that this is appropriate as the goal of these matrices is to highlight those companies that stand out from the others.

RANKING CRITERIA

Leader: A company that receives a score of **75 or above** for their overall ranking

Mainstream: A company that receives scores **between 60 and 75** for their overall ranking

Follower: A company that receives a score of **60 or below** for their overall ranking

Innovation Leader: A company that receives a score of **75 or above** for their innovation ranking.

Implementation Leader: A company that receives a score of **75 or above** for their implementation ranking.

INNOVATION CRITERIA

Data Collection:

Evaluates the solution's capability to collect data from a piece of equipment or from the production line via different industrial protocols (Modbus, MQTT, PROFIBUS, PROFINET, OPC-Unified Architecture (UA), REST API, etc.) and wireless network infrastructure (Wi-Fi/Wireless Local Area Network (WLAN), Bluetooth Low Energy (BLE), Sigfox, LoRa, etc.). Also considered are whether the solutions can accommodate both structured data (Excel files, data from historians, etc.) and unstructured data, such as from sensors and gateways.

Streaming Analytics:

Evaluates the solution's ability to perform analytics (e.g., pattern recognition) and incorporate contextualization (ML, DL) in real time as the data are collected.

Data Normalization:

Evaluates the solution's ability to clean the data collected for corrupt or inaccurate records, perform data translation, and add metadata and/or business rules.

Core Analytics:

The critical task for the applications is the processing of the data by an analytics engine and the subsequent delivery of insights and the support of use cases.

The core analytics criterion evaluates the solution's ability to perform the following:

- **Descriptive Reporting:** Includes alerts for remote monitoring, etc.
- **Predictive Analytics:** What-if analysis, and what does it mean for expenditures, production levels, supply chain, raw material usage, etc.
- **Prescriptive Analytics:** Outlines what is occurring and conducts analysis on the root cause of an event, making suggestions to rectify the situation.

INNOVATION CRITERIA

User Experience:

Evaluates how long it takes for novice and experienced users to start obtaining insights via the solution. The solution(s) is offered as a low-code/no-code platform to enable customers to tweak the solution for their unique circumstances without needing to involve the supplier, an SI, or internal specialists. The solution(s) includes templates that customers can use to work on Key Performance Indicators (KPIs) and is frequently updated.

Data Visualization:

Evaluating whether the solution(s) presents findings in a manner that is visually appealing and easy to digest, often via dashboards inside the facility (on HMIs or wall-mounted dashboards) or mobile devices (laptop, smartphone, tablet, smartwatch, mobile app, etc.).

Supporting Digital Threads:

This criterion evaluates the extent the solution(s) contributes to customers' efforts to create a comprehensive digital thread of their operations. For example, whether a solution(s) provides the capabilities to share insights with other industrial software applications (ERP, MES, PLM, Supply Chain Management (SCM), etc.). Also under consideration is whether the solution(s) can interface with other transformative technologies, such as blockchain, AR for providing context to users (e.g., remote monitoring), or digital twins for optimizing a piece of equipment or process.

IMPLEMENTATION CRITERIA

Commercial Success:

This criterion examines whether a supplier can point to a growing order book, increasing the customer base, and examples of high-profile firms using the solution(s).

Geographic Spread:

Evaluates whether a customer can roll out the solution globally without any regional restrictions.

Solution Accessibility:

Determines if the solution is available via the cloud (public, private, or hybrid) and via hyperscalers' marketplaces. In addition, this determines whether the solution is provided on a Software-as-a-Service (SaaS) basis with interfaces in both English and other spoken languages. Finally, this criterion evaluates whether the solution provides APIs so that Information Technology (IT) teams can introduce the solution at scale.

GTM Strategy:

This criterion evaluates the partnerships and channel strategy that support the GTM strategy for the solution, including partnerships with firms across different regions, verticals, OEMs, and technology specialists.

Scale on the Platform:

Evaluates the extent the supplier provides resources, tutorials, training (in person, online), and consulting services to enable users to get the most benefit from the solution.

Time to Value:

Evaluates whether a customer can use the full functionality of the solution out of the box and not require some customization. The time required for a customer to scale the solution across their facilities and start achieving and guaranteeing Return on Investment (ROI).

MARKET TRENDS

The ability to analyze production line equipment and the production line itself is the focal point for many Industry 4.0 initiatives. This Competitive Ranking evaluates suppliers that enable industrial and manufacturing firms to proactively monitor their equipment and optimize their operations with the use of data analytics. The types of use cases include predictive maintenance and understanding the underlying issues that cause the failures or rectifying operational bottlenecks.

Industrial equipment uses numerous communication protocols, and in order to provide customer value, suppliers must accommodate them in their solutions. Solutions need to be more than simply vessels for collecting data and customers need to make sense of the data by applying context (timestamp, batch numbers, shift numbers, etc.) to make sense of readings. In addition, customers do not want solutions that can only be used by data scientists; rather, the desire is to put the analytical tools in the hands of the technicians and operators on the production line.

To enable customers to gain the maximum value from the exercise, suppliers need to enable customers to easily understand the findings, often via charts and dashboards. Furthermore, the data cannot remain in data silos. Instead, the data needs to be shared with other staff members with solutions providing APIs so that the data can be integrated into other industrial applications (e.g., ERP systems, Product Lifecycle Management (PLM) applications), contributing to customers' efforts to create digital threads to fully understand their operations and/or digital twins, and plan for operational changes.

The world has changed since the previous *Data Analytics in Manufacturing Competitor Ranking* in 2020 and this report looks to provide an overview of suppliers' offerings to achieve many different objectives in a rapidly evolving internal and external environment. The combination of the innovation criteria (to evaluate the solution capabilities) and implementation criteria (evaluating a supplier's success, its Go-to-Market (GTM) strategy, and its ability to serve customer needs around the world) provides a comprehensive view of 10 suppliers.

ChatGPT is not included in this report due to its nascency. However, in the coming years, it will be important to monitor the extent that practitioners use ChatGPT to perform analytical tasks and suppliers incorporate it in their solutions. It may, however, prove to be a distraction and only time will tell.



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