

STRIVING TOWARD SELF-DRIVING SUPPLY CHAINS

AERA TECHNOLOGY

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TEC SPOTLIGHT REPORT

TEC Spotlight Reports give you an in-depth look at leading vendors' products, initiatives, and market position from an analyst's point of view.

Striving Toward Self-Driving Supply Chains

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Evolving Supply Chain Challenges (and Appropriate Responses to Them)

Today’s supply chain is no longer your father’s supply chain, to put it bluntly. Empowered and fickle consumers expect to buy everything anywhere, have it delivered anywhere, and return it anywhere—no questions asked. Compounding these high expectations are increased global competition, volatile market demand and geopolitical situations, ever-shorter product life cycles, fast fashion-quick manufacturing trends, and consumer expectations for responsibly sourced materials.

Decades ago, companies could do well with silos of raw data, inside-out processes, limited visibility, inaccurate forecasts, and other inadequate assumptions and subpar practices. Such retrospective management practices with descriptive analytics at best, which can only tell you what happened well after the fact, are a losing proposition these days.

Meeting the challenge of managing a modern supply chain, for any complex organization, requires near real-time analysis of customer orders, tracking of complex and diverse pools of inventory, and up-to-date knowledge of suppliers, and any other issues around the world. As much of this information still lives across data silos in legacy enterprise systems, it is extremely difficult for any large enterprise to dynamically assess its production stocks, deliver products on schedule, and respond to customer demands with agility.

These days, large enterprises with complex business operations and processes need to be able to react to and handle the outside-in processes within holistic value networks rather than in-departmental silos (with inside-out processes only). They must also be able to handle both the traditional structured data (i.e., traditional numerical and textual data tables) and unstructured data (i.e., weather info, social signals and sentiments, etc.) to be able to sense events and promptly produce an intelligent response. Also, these businesses need astute autonomous and localized responses, as the one-size-fits-all standardized global policies no longer satisfy the needs of the differing markets.

Some forward-thinking and innovative manufacturing companies have taken steps to achieve harmonized end-to-end real-time visibility and enriched external data. Essentially, they need to build a cognitive data model. A cognitive time series model for demand sensing uses machine learning and other artificial intelligence (AI) tools and methods to produce two types of forward-looking analytics. One is predictive analytics to provide answers to questions such as “What will happen?” and the other is prescriptive analytics to answer the question “What should we do about it?” and other similar questions.

Over the longer term, the goal is to achieve a closed-loop and continuous (autonomous and/or self-driving, if you will) supply chain. In that ideal (nirvana) scenario, machines can make some operationalized decisions, perhaps with some minor human supervision and input.

About Aera Technology

Aera Technology, which provides the cognitive technology that enables the self-driving enterprise, alongside its namesake Aera product offering, officially launched on June 19, 2017. The company has close to 150 employees and 30 customers. Aera is built on the technology that Shariq Mansoor, founder of the former FusionOps, has developed for the past decade or so. Fred Laluyaux, former Anaplan chief executive officer (CEO), joined the team as president and CEO in early 2017, launching the new vision of the self-driving enterprise. The company recently raised \$50 million in new funding led by New Enterprise Associates (NEA).

Aera continues to improve on what its progenitor, FusionOps, provided—a cloud software solution that provides a comprehensive and actionable view of a global organization’s supply chain. This cognitive layer that sits on top of existing legacy enterprise software aims to enable companies with complex supply networks to make (and fulfill) products faster. The goal is to move from mere transactional automation to cognitive automation.

The company claims lots of experience in mapping existing database tables from underlying enterprise systems such as supply chain management (SCM) and enterprise resource planning (ERP) from Oracle, SAP, Infor, JDA, and other vendors. The system painstakingly indexes and harmonizes those 18,000 or so mapped data and tables to create an enterprise context-sensitive AI layer on top, so that it could come up with pertinent predictions and recommendations in near real time.

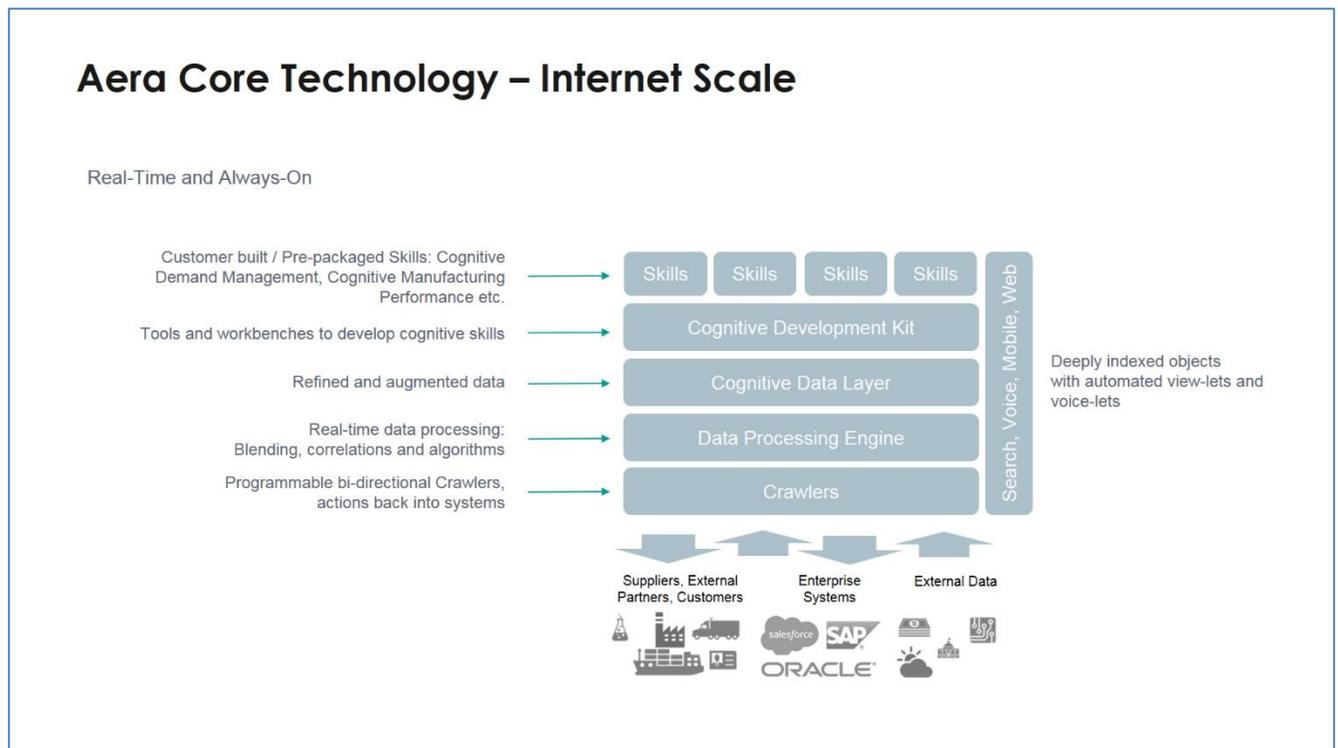


Figure 1. Aera Technology architecture

As figure 1 shows, Aera’s patented real-time crawling technology continuously collects, indexes, normalizes, and harmonizes billions of transactions from complex enterprise systems and external data sources. While Aera continually extracts input data for real-time analytics, it does so with minimal impact to the underlying systems. Data are encrypted and transferred securely to the cloud.

Aera’s internal data tables are optimized and tuned to retrieve only the required data from source systems, using as little resources as possible. The solution tackles the so-called “hairball issue,” which results from companies using

multiple, disparate, on-premise and/or cloud enterprise applications (in some cases even multiple instances of the same ERP software system). Aera unifies the data across a variety of legacy systems, providing one single version of the truth—and displays real-time measures of supply chain performance, down to the stock-keeping unit (SKU).

What Aera Customers Get

Aera's Cognitive Data Layer represents the real-time state of the business, or the intimate understanding of the business. It includes functional business models and an algorithmic library of key metrics, trends, and metadata—not usually available in legacy enterprise transactional systems or business applications. It is intelligent, has memory (i.e., internet-scale data management and processing), and is searchable, with no data loss.

Aera is not just taking data from the existing enterprise systems. It also has its own data model in the cognitive data layers. SAP and other major enterprise software players do not often change their existing data models. While they may add more data elements and layers over time, the existing ERP data models themselves do not change much.

Ultimately, what is important to a business is the value that any software delivers. Aera customers get the following two core components:

1. The first is the Aera platform, which the vendor calls “Aera Cognitive Operating System (Aera COS)”. This is a fully built-out product that enables companies to understand, recommend, predict, and act. When deployed at scale, the cognitive platform delivers full-scale decision automation.
2. The second component is a set of cognitive applications—AI solvers and algorithms—that the company refers to as “Aera Skills” that end users consume. Several skills, such as demand management and delivery optimization, come out of the box and can easily be configured and bolted on (see figure 2). In addition, customers and prospects might direct Aera toward the difficult use cases that eluded resolution. To that end, the company develops co-innovation “skills” by addressing customers’ difficult-to-solve problems.

Aera Cognitive Skills

Cognitive Applications for Multiple Industries and LOBs



Figure 2. Some Available Aera “Skills” for Multiple Industries and LOBs

The company even has its own natural language processing (NLP) capabilities, whereby users can ask Aera verbal questions like they do with Siri, Cortana, or Alexa in English. Aera also provides partners’ external NLP translations services in Spanish, Chinese, and other languages. Think of the following examples:

Q: Aera, what’s my forecast?

A: On track at \$1.2 billion with an additional \$134 million revenue opportunity. Do you want the regional breakdown?

Q: Aera, how can I reduce my working capital?

A: Transferring excess inventory from Santiago to Sao Paulo will reduce working capital by \$22 million.

Aera’s Cognitive “Secret Sauce”

Aera leverages open source AI algorithms and libraries—including R, Python, TensorFlow, and others—and fine-tunes them for specific domains such as demand forecasting and price predictions. It can also operationalize customer-developed algorithms (“skills”) within Aera.

By appropriately deploying AI, an organization gains an endless number of business opportunities—and can easily gain overall efficiency throughout its entire business. For example, AI in supply chain can drastically reduce the

time to market innovations, improve operational efficiency, reduce working capital, reduce waste, and manage speed and quality of service much better.

AI-enabled improvements can have a direct and measurable impact on financial metrics (see figure 3). Typical results include improved service level, reduced working capital, improved margins, and faster time to market new products.

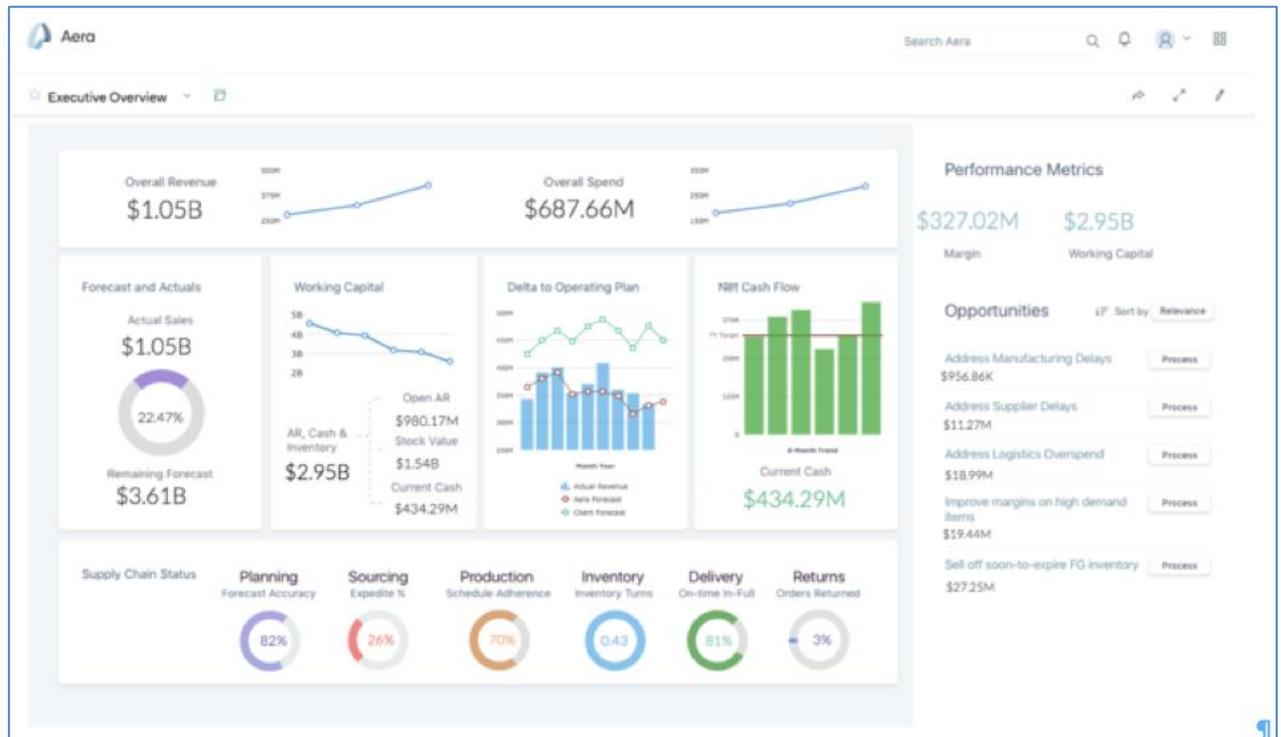


Figure 3. Aera Supply Chain 360 dashboard

Aera uses machine learning and data science algorithms that are based largely on open source algorithms. However, the vendor features engineering on top of those algorithms (based on its industry and domain expertise) to best fit the needs of the specific use cases and unique customer requirements. For example, demand forecasting for one industry might include different grains of seasonality compared to that for another industry.

Based on the opportunity and risk analytics at any granularity, Aera can suggest ways to improve the customer's financial and operational performance. For example, it can suggest ways to reroute raw material accordingly to respond faster to changing conditions.

Aera boasts that its embedded machine learning algorithms, with data science micro-services and "what-if" scenarios, are more accurate than 80% of predictions made by humans. Aera leverages AI to predict business outcomes, such as, for example, a competitor stock-out for the product X in Germany.

Here the system can then find excess inventory to fill, say, 53% of the predicted stock-out.

What's most impressive is that Aera analyzes data continuously and makes prompt decisions on its own about the company's resources using a predefined process library. Examples of autonomous actions include rebalancing inventory, shipping sales orders, and committing to a forecast. For the sake of some human supervision, Aera proactively engages relevant users and suggests appropriate actions.

Other Considerations

Some companies might be torn about using software systems that provide mainly visibility and decision support that sits on top of execution systems or enterprise systems. The impression is that these types of systems have costly and time-consuming integration (that is even fraught with errors). This seems to be exacerbated by the frequent upgrades of underlying systems that provide the data, especially those systems that reside in the cloud.

This is also compounded by the fact that no two deployments of SAP or Oracle ERP software are ever alike. And furthermore, no two customers ever have the same topography of software (systems, versions, databases, operating systems, cloud deployments, etc.).

While traditional enterprise software vendors have different data models for different packaged apps and fixed business, pricing, and service models, Aera has a singular data model. Aera's holistic and real-time data model allows the vendor to power all "Aera Skills" in a unified fashion.

As an example of this, the vendor is currently developing a co-innovation app for predicting available-to-promise (ATP) and capable-to-promise (CTP) dates. It's doing this by applying multiple levels of machine learning on full data sets and operationalizing this new "Skill" to gain end-to-end inventory visibility across the supply chain. If the customer wants to expand to a service level agreement (SLA) guarantee for its customers, Aera could support this.

What about monetization and pricing? Aera works together with the potential software buyer to evaluate the customer's business needs and objectives, the scope of usage, and the system's need for customization and integration—to ensure that it meets the customer's expectation for digital transformation. Aera's pricing model is based on the business value the software delivers (i.e., the Aera Skills) and the scope and scale of the Aera COS core platform.

Still, once the overlaying AI software detects a problem and identifies a resolution (be it automated or manual), the system is typically not capable of performing that action—the underlying execution system (ERP or SCM software) can only do that. Perhaps the AI software could be automated with web services integration

to the underlying enterprise system, which brings us back to complex integration issues.

Aera Technology Case Study

Case Study

Merck KGaA, a leading science and technology company in healthcare, life science, and performance materials.

Challenge

The company needed to leverage intelligent supply chain processes to increase efficiency across its expanding product portfolio and become a top supplier to its customers.

Solution

Aera Solutions helped the drugs manufacturer streamline and accelerate its supply chain processes, including demand, inventory, replenishment, and life cycle planning. In addition, the solution's machine learning capabilities have significantly improved the accuracy of the company's demand forecasts, helping it reduce waste in its supply chain.

Results

- Increased customer service level of pharmaceuticals to hospitals from around 97% to 99.9%.
- Real-time measures of supply chain performance, down to the stock-keeping unit, drawn from sensors on factory machines and data collected from the company's ERP system.
- Improved forecast accuracy in 90% of products.
 - Engineers at The Merck Group use Aera algorithms that use machine learning techniques to analyze the information, factoring in external data such as weather, natural disasters, trends in patient health, and even the expansion plans of pharmacies that sell The Merck Group's products to produce forecasts about where and how much the company's products will be needed.
 - Aera is the foundation of The Merck Group's self-driving supply chain. It's real-time and intelligent at scale, fundamentally improving the speed, quality, and impact of decisions.

User Recommendations

AI software adoption requires a change in the organization's cultural mindset and represents a huge transformational step for most companies. C-level executives

stepping up and championing this type of software would go a long way toward enhancing adoption throughout the organization.

Aera may be a good fit for large enterprises that are eager to adopt new technologies and challenge current thinking. The system could help these businesses find ways to reduce costs; improve profit margins, productivity, and efficiency; and meet modern customers' expectations. Once an organization decides to go forward with Aera, it should think big—start small and scale fast.

Aera's useful recommendations to customers are as follows:

- **Quality Matters:** Companies should maintain high-quality data for all their AI initiatives.
- **Measure Success:** Businesses should establish a baseline, and measure and compare the results of their AI initiatives.
- **Future Is Now:** Companies should plan now for how they will operationalize AI within their supply chain.
- **Be Strategic:** As AI will impact organizations, and their culture and processes, companies need to prepare themselves for tackling change management.

Related Reading

[The Impact of Digital Transformation on the Supply Chain](#)

[What Is Artificial Intelligence and What Can AI Do for Your Business?](#)

About the Author

Predrag (PJ) Jakovljevic focuses on the enterprise applications market. He has over 20 years of industrial experience within the discrete manufacturing sector, including the machinery and equipment, automotive, construction and engineering, and electronics industries.

Prior to joining TEC, Jakovljevic was a senior consultant in the package-based solutions (PBS) group of CAP Gemini in Houston, Texas (US), with Baan's Manufacturing and Logistics modules as his main field of expertise. At CAP Gemini, Jakovljevic was involved in system demonstrations, software gap analysis for prospective clients, and Baan implementation assignments.

Before CAP Gemini, Jakovljevic was employed as a senior consultant for Deloitte & Touche Consulting Group in Johannesburg (South Africa), where he specialized in Baan's Manufacturing and Logistics modules, and engaged in the processes of ERP package selections, as well as in proposal preparation. Jakovljevic served as a team lead for manufacturing, and for service and maintenance package system integration. As a consultant he has been involved in business requirements definition and software gap analysis, business process mapping to software functionality, software configuration and parameter setup, and key user training.

Jakovljevic holds a degree in mechanical engineering from the University of Belgrade in Serbia. He has also been certified in production and inventory management (CPIM) and integrated resources management (CIRM), and is an Association for Operations Management (APICS)-certified supply chain professional (CSCP).



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