Mint Jutras

Making Enterprise Business Systems Pay Dividends

INTRODUCING AERA'S COGNITIVE TECHNOLOGY

ENABLING THE SELF-DRIVING ENTERPRISE

About Aera

Aera Technology focuses on delivering technology that enables the Self-Driving Enterprise: a cognitive operating system. Aera endeavors to understand how businesses work and make real-time recommendations, predict outcomes, and take action autonomously. Using proprietary data crawling, industry models, machine learning and artificial intelligence, Aera's goal is to revolutionize how people relate to data and how organizations function.

Headquartered in Mountain View, California, Aera serves some of the world's largest enterprises from its global offices located in San Francisco, Portland, Bucharest, Cluj-Napoca, Paris, Munich, London, and Pune.

Cognitive capabilities are highly valued in human beings. They make people smart, and smart is good. According to the Oxford Dictionary, cognition is "the mental action or process of acquiring knowledge and understanding through thought, experience, and the senses." Yet as automation becomes more and more prevalent, we expect more and more functions and processes to be performed without human assistance. Can technology really imitate human cognition? Why not? After all, we live in a world where self-driving cars, although not yet ubiquitous, are a reality. And in a world where terabytes of data are being replaced with zettabytes, is it even possible for a human to process data at the speed and granularity necessary for timely, data-driven decisions?

*Enterprise applications have been used to streamline and automate transactional processes for several decades now, particularly where simple and straight forward rules can be applied. When inventory falls below safety stock, order more. But how do you know when to change safety stock? How do you balance inventory across your distribution network or work off excess inventory? How accurate is your forecast? Is it possible to automate the cognitive functions that **understand** (recognize patterns and learn from the past), **predict** the future, and not only **make recommendations**, but also **take action**? Aera Technology not only thinks it is possible, it is delivering on that promise today to enable the Self-Driving Enterprise.*

THE SELF-DRIVING ENTERPRISE

Aera starts with the premise that if built-in intelligence can drive a car, then it should be able to drive a company. Like a self-driving car, a self-driving enterprise must connect all the different data points both inside (engine, accelerator, steering wheel, brakes) and outside (roadways and road conditions, other vehicles, pedestrians). It must do all this in real-time, because speed and direction changes must occur immediately as any of those conditions change. And it must be always on and always thinking. No snoozing at the wheel allowed. It also must be able to operate autonomously. With no driver, a self-driving car has to take action without being told what to do.

A self-driving enterprise will still have humans at the helm. Aera is not setting out to eliminate the decision-makers, but it is trying to make them smarter

Definition of ERP

Mint Jutras defines ERP as the integrated suite of modules that forms the operational and transactional system of record of your business. As such, ERP provides a necessary foundation on which to build your business.

and more effective, able to use all the data available, not just the usual subset contained in an enterprise resource planning (ERP) solution.

Aera's philosophy: It's not about making the same decisions faster, it's about coming to different conclusions and making better decisions. If it was just about making the same decisions faster, you could use any enterprise application. Any application is smart in that it's not dumb. It can follow instructions – instructions like, IF <this condition> THEN <do this> ELSE <do that>. Business applications have been built on IF THEN ELSE statements since the earliest computer programs were developed. Most traditional business applications were intended to automate processes and procedures that followed clear rules, such as accounting processes and manufacturing procedures. And they were intended to report on status, operations and transactions.

While there is still a place for those kinds of rules-based decisions, other decisions aren't as easily automated and require access to another whole universe of data. The world has gotten a lot more complicated. Large enterprises have grown not only larger and more distributed, but also more global and more inter-connected.

No company that makes or moves a physical product is an island today, but rather a node in the network of a potentially complex supply chain and a participant in a global economy. Any decision made at a corporate level has the potential of directly impacting your corporate profitability, as well as the profitability, efficiency and productivity of your own subsidiaries. That's a lot of data to consider and a lot of complexity.

But the impact doesn't stop there. Those decisions also impact your customers and suppliers and their customers and suppliers, up and down the supply chain. Ignore this potential cascading impact and you put your own business at risk. It can and will come back to bite you. But fully understanding and utilizing the growing volumes of data, at a level that is granular enough to make a difference, taxes the cognitive capabilities of even the most astute.

Aera calls its technology a Cognitive Operating System. It is not intended to replace solutions like ERP. Mint Jutras defines ERP as the integrated suite of modules that forms the operational and transactional system of record of your business. As such, ERP provides a necessary foundation on which to build your business and regardless of what you call it, it's not going away. Aera provides a new layer that sits on top of ERP (and other data sources) to "understand how your business works, make real-time recommendations, predict outcomes, and take action autonomously."

So exactly what does Aera's Cognitive Operating System do? In short, it does four things:

- It understands
- It predicts

- It recommends
- It acts

AERA UNDERSTANDS

In order for Aera to understand your data, it must do some thinking. Thinking encompasses observation, attention, memory, judgment, valuation, comprehension, reason and problem solving. Aera uses patented "crawlers" to observe. The concept of a "crawler" was first introduced through event management, which has been around for at least a couple of decades, although many still might not be familiar with the term. "Triggers and alerts" is perhaps the more commonly referenced category.

The simplest triggers are those initiated by a transaction or an activity. A purchase requisition is created and must be sent for approval. A stock issue depletes inventory below safety stock and must be replenished. In each case, an alert is triggered and the appropriate individual is notified. Most modern-day ERP solutions can do this for you.

But often alerts must be triggered, not by a specific transaction, but when an activity that should occur doesn't or a condition is present. A due date on a customer invoice comes and goes but the payment never appears. A shipment from a supplier is not received. This requires a program to be running (crawling) in the background, trolling for these conditions. This is the simplest example of a crawler and more and more ERP solutions provide some form of this.

Aera takes this process to an elevated level. First of all, it is not confined to a single enterprise solution. No large enterprise today runs just one application. ERP provides a core for the business, but it is typically surrounded by other applications to address specific needs for customer relationship management (CRM), supply chain planning and management (SCP and SCM), demand planning, sales and operations planning (S&OP) and more.

Even when it comes to ERP, most large enterprises don't have just one. While Mint Jutras finds 96% of enterprises have defined corporate standards for enterprise applications today, this has not always been the case. For decades, corporate finances were run on a single administrative ERP (or accounting solution), which often didn't meet the operational needs of its divisions or subsidiaries. As a result, subsidiaries were left on their own to select and implement a solution that would then feed financials up to a corporate system, often in aggregate. This spurred a proliferation of applications that is still creating challenges for many companies today.

Even when all subsidiaries run the same solution, different implementations and definitions of master data introduce a level of variability that makes it

difficult for these different divisions or business units to interoperate. This also makes it difficult for corporate to have consistent and comparable visibility.

Aera normalizes and harmonizes all this data for end-to-end visibility…

While individual ERP solutions may be limited in their ability to scale, Aera's technology has no such limitations and even indexes data as it harmonizes it for improved and faster search capabilities.

Aera normalizes and harmonizes all this data for end-to-end visibility. It has already mapped the data models from some of the most widely used enterprise applications in the market (SAP, Oracle and Salesforce.com) and will continue to do so as new customers bring new requirements. And while individual ERP solutions may be limited in their ability to scale, Aera's technology has no such limitations and even indexes data as it harmonizes it for improved and faster search capabilities. And it doesn't limit itself to the structured data within solutions, but crawls the Internet for other useful data such as weather, commodities and other economic factors.

All this patented crawling technology collects, indexes and harmonizes billions of data points from transactions and any number of different data sources, encrypts the data and transfers it securely to the cloud. These crawlers are instrumental in enabling Aera to observe and pay close attention. But observation doesn't necessarily equate to "understanding." Aera's analytics engine helps take it to that next level.

Aera performs analytics in memory. For those not familiar with the benefits of in-memory computing, think speed and big data. Because it can derive results in milliseconds, there is no need to limit the volume or the granularity of the data. If today you are forced to handle data in aggregate form (e.g. summarized by time, region, product type or customer type), then you may indeed be missing the real story the full detail might tell you. And planning at an aggregate data really doesn't tell you how to execute against the plan.

Aera adds domain expertise, including thousands of predefined measures for all areas of the business.

As to judgment, valuation, comprehension, reason and problem solving… Aera adds domain expertise, including thousands of predefined measures for all areas of the business. While there are a growing number of virtual assistants on the market today that can answer questions like, "What's my revenue this month?" or "What is my inventory level?" Aera can also interpret the results as good news or bad news and anticipate your next question. In fact it might not even wait for you to ask it.

If your revenue falls short of forecast, it might also offer up the opportunities with the best chance of making up for the shortfall. If inventory is higher than normal it might suggest ways to reduce working capital by transferring inventory from one location to another. Or perhaps it has found a competitor that is anticipating a stock-out and suggests your excess inventory can accommodate it.

Of course with these follow-on questions we are getting into other things Aera does: recommend and predict.

AERA RECOMMENDS AND PREDICTS

We talk about these two capabilities together, not because they are the same thing, but because they are so closely related. If your recommendations are completely based on simple rules (observe this, do that), you really don't need Aera. You need Aera when you could use some help in figuring out the best course of action. However, there is no sense in making (or taking) recommendations unless you can predict, with some level of confidence, they will have the desired effect.

Aera relies on a combination of domain expertise and machine learning to make recommendations you can trust.

Aera relies on a combination of domain expertise and machine learning to make recommendations you can trust. For those still coming to grips with what machine learning has to offer, it basically looks for patterns in data. But it helps to know what you are looking for, hence the benefit of applying domain expertise. Data scientists can train the machine to distinguish between good conditions and bad, and look for certain anomalies. If those anomalies (breaks in pattern) have occurred in the past, it can then do a fast-forward to observe conditions and/or see what happened next, and make a prediction. Even if the exact conditions have not occurred, it can look for similarities.

Machine learning can consider millions (even billions) of data points in the blink of an eye.

This requires massive volumes of data, volumes far beyond the capacity of the human brain to process. But machine learning can consider millions (even billions) of data points in the blink of an eye. Of course, there is no guarantee that there was a specific cause and effect relationship between the patterns and the event or condition that resulted. But with enough correlated data, confidence levels rise.

Aera also provides search capabilities. Much of the artificial intelligence (AI) we know and use today relies on searches. If you ask a digital assistant (like Siri or Alexa) a question, these assistants are basically doing searches through anticipated questions, searching for the best (pre-defined) answer. And those search capabilities better be on steroids, because the volumes it must sort through are growing more massive every day. While extremely impressive, the technology today can't (yet) answer a question nobody has thought of before.

Indeed, most digital assistants today are used to answer rather simple questions like:

- What were my bookings and revenue this month?
- Who is the sales rep for this account?
- Which accounts have overdue payments?
- How much paid time off have I accrued?

They are also used to automate rather simple, but time-consuming tasks that add little value to the business – tasks like expense reporting. Because these digital assistants use natural language processing (NLP), employees can speak to them and get a verbal answer. They are also starting to use image recognition technologies. Employees can scan receipts from their mobile

devices and the assistant can recognize a restaurant receipt and distinguish it from a receipt for parking. They apply some simple machine learning by recognizing patterns in travel, making it easier to submit an expense report for your monthly trip to corporate headquarters. But the cognitive technology Aera provides would be wasted if all you wanted to do was ask simple questions and automate repetitive tasks.

Most analytic solutions stop at the "understand" stage, leaving the business user to figure out what to do. Predictive and prescriptive analytics start to push into the "predict and recommend" phase, but Mint Jutras research finds only 25% of companies claim to use predictive analytics and a mere 9% use prescriptive analytics. Aera is for those companies looking to move beyond "understanding" problems to actually fix them.

"Aera is the foundation of our self-driving supply chain. It's real-time and intelligent at scale, fundamentally improving the speed, the quality and the impact of our decisions."

Alessandro de Luca
Chief Information
Officer, Merck
Healthcare at Merck
Group

Most Aera customers are faced with the challenge of increasingly complex supply chains, which makes forecast accuracy more critical than ever before. An inaccurate forecast can very quickly have a cascading negative impact throughout a global supply chain. And therefore, most customers start with forecasting. They use Aera to either generate a forecast or refine one. In the words of one Aera customer, creating the forecast is just the first step in creating a "self-driving supply chain." That same customer estimates that the algorithms used have been more accurate than humans 80% of the time, and can of course work much faster.

But even if your solutions can understand your problem and make recommendations with predictable outcomes, the vast majority of them still rely on humans to take action.

AERA ACTS

This is the final step in creating a self-driving enterprise. Aera not only recommends actions, it actually automates those steps. The domain experts at Aera, working in conjunction with customers, develop a library of pre-defined processes. Aera traverses potentially complex decision trees to inititate and execute those processes automatically. Examples might include rebalancing inventory across a distributed network of warehouses and manufacturing facilities. Or it might include assigning inventory to open orders or committing to a forecast. These processes can actually create transactions within ERP.

These actions are taken by what Aera calls a suite of "Cognitive Skills." The more you think about it, the more you realize these are aptly named. Any human that would take these actions would require a set of skills. Aera's "Skills" are cognitive in that AI is embedded. The new Cognitive Skills recently released in November include:

- **Cognitive Demand Management (CDM)** delivers precise demand and sales forecasts at a granular level in real-time. While humans might need

to work at a summary level simply because of the sheer volume of data, CDM can plan and forecast down to the individual item level, potentially even at the customer level. Demand drivers, such as new product introduction and sales plans, are dynamically calculated using machine learning algorithms to ensure the accuracy of forecasts, revenue plans and growth.

- **Cognitive Manufacturing Performance (CMP)** seamlessly integrates end-to-end digital manufacturing processes from raw materials to finished products. CMP provides a real-time digital map that precisely tracks the lead-time and status of each product at each step in the manufacturing process. Machine learning algorithms accurately calculate and assess the impact of key drivers, such as safety stock, capacity and lead time, helping to balance customer needs with production capacity.

- **Supply Chain 360** offers real-time visibility into demand, supply, production and inventory by providing an algorithmic library of key metrics, trends and analytics for supply chain performance. With a Google-like search interface, users ask questions and get contextualized results with built-in analytics.

While most of Aera's customers start with the problem of forecast accuracy, we suspect that will be just the beginning. Once forecast accuracy is improved, they will see more and more applications for this technology.

Mint Jutras anticipates more and more of these types of "Skills" will be developed and released over time. While most of Aera's customers start with the problem of forecast accuracy, we suspect that will be just the beginning. Once forecast accuracy is improved, they will see more and more applications for this technology.

SUMMARY AND RECOMMENDATIONS

The technology that can add cognitive capabilities to enterprise applications is no longer the stuff of science fiction. Aera has just begun to leverage these technologies to make solutions, and the customers that use them, more intelligent. The first order of business is to better understand the possibilities that exist today and the trajectory of where they are going in the future. The next step is to define a business problem and actually solve it.

When most solution providers today talk about intelligent applications, they really mean new ways of interacting with the solution and analytics that help you derive more and better insights from the data. But this is the minimum of what you should expect today and Aera goes well beyond that. It is delivering cognitive technology that can understand your current situation, perhaps better than any single human being can. Based on that understanding it can make recommendations that can have a very predictable outcome. But best of all, it can take action in the context of your operational and transactional systems. After all, what good is understanding a problem without being able to fix it? Look for Aera's Cognitive Technology to help you turn your business into a self-driving enterprise.

About the author: Cindy Jutras is a widely recognized expert in analyzing the impact of enterprise applications on business performance. Utilizing 40+ years of corporate experience and specific expertise in manufacturing, supply chain, customer service and business performance management, Cindy has spent the past 11+ years benchmarking the performance of software solutions in the context of the business benefits of technology. In 2011 Cindy founded Mint Jutras LLC (www.mintjutras.com), specializing in analyzing and communicating the business value enterprise applications bring to the enterprise.