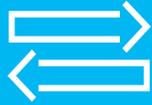




Achieving **Real AI Results** – the Definitive  
Buyers Guide to Delivering AI/ML Autonomy  
within Retail and the Supply Chain

**jda.**



It's coming from every direction. Disruption. The sea change is endless. The digital age isn't ending retail, but the industry will never be the same. Customer expectations, e-commerce, escalating service levels, extreme weather, increasing competition and a different kind of workforce are moving the marketplace in a new direction.

This buyer's guide explores why more than half of retailers are adopting artificial intelligence (AI) and machine learning (ML) and how to find the right technologies to achieve an autonomous supply chain.

<sup>1</sup> According to the 2019 Retail C-Suite Viewpoint Survey, research from JDA Software conducted by Incisiv in partnership with Microsoft.

# TRANSFORMATION IS UNSTOPPABLE.

Artificial intelligence and machine learning are making the Autonomous Supply Chain™ a reality. So, what is the Autonomous Supply Chain and how are these technologies bringing it to life?

## What's next?

An autonomous supply chain is constantly answering this question. With an autonomous supply chain, your business can deliver on demand, navigate disruptions months in advance and move in real time with the pulse of disruption and changes in consumer behaviors. Armed with AI, ML and the right data, the autonomous supply chain self-corrects in real time.

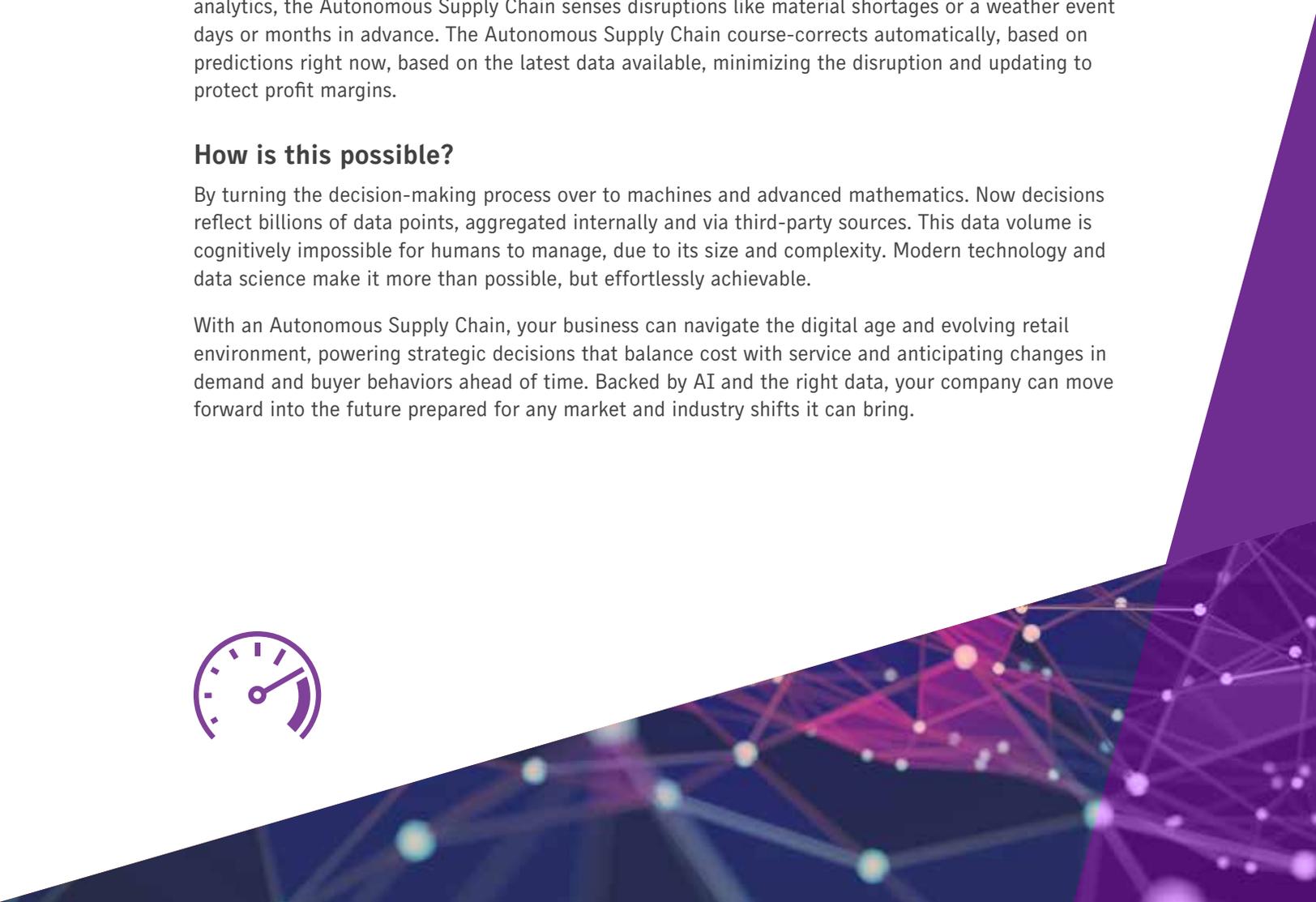
Traditional supply chain management approaches supported decision-making based on historic performance. The introduction of IoT devices and sensors is empowering decision-making based on real-time information gathered across the supply chain.

The Autonomous Supply Chain makes these decisions based on what's going to happen in the future – automated and without human intervention. Fueled by data, robust algorithms and predictive analytics, the Autonomous Supply Chain senses disruptions like material shortages or a weather event days or months in advance. The Autonomous Supply Chain course-corrects automatically, based on predictions right now, based on the latest data available, minimizing the disruption and updating to protect profit margins.

## How is this possible?

By turning the decision-making process over to machines and advanced mathematics. Now decisions reflect billions of data points, aggregated internally and via third-party sources. This data volume is cognitively impossible for humans to manage, due to its size and complexity. Modern technology and data science make it more than possible, but effortlessly achievable.

With an Autonomous Supply Chain, your business can navigate the digital age and evolving retail environment, powering strategic decisions that balance cost with service and anticipating changes in demand and buyer behaviors ahead of time. Backed by AI and the right data, your company can move forward into the future prepared for any market and industry shifts it can bring.





## GO BEYOND THE HYPE.

Building your Autonomous Supply Chain mandates the right technologies. AI and Machine Learning—software companies everywhere are talking about it—how do you know what’s real and what’s just hype?

### How to navigate all the noise?

Artificial intelligence and machine learning - these technologies are more than buzzwords. How can you navigate the buying process to partner with a software company that develops true AI solutions? First you need to understand AI.

### How can AI/ML optimally steer a supply chain?

They make many decisions on a regular basis. A modern AI/ML system works on this principle:

- Based on objective data (mainly your company’s daily or real-time operational data and master data on granular level, in addition to important external data).
- Laser-focused, individualized prediction of near future (up to months) on a granular level with results in form of probability distributions.
- Definition of strategy/utility function to be optimized, optimizing for availability versus stock levels.
- Decisions based on optimization of aggregated KPIs given all cost/utility functions and all probabilistic predictions.
- Potential to easily adapt the strategic/utility function as business goals change, immediately applying any new strategies across all decision making.
- Autonomous mass decisions by complete automation in exacting alignment with your corporate strategy.
- Automatic monitoring, human control management supported by AI/ML — managing exceptions and unique events.
- Business members guide the KPIs, assisted by AI/ML simulations.



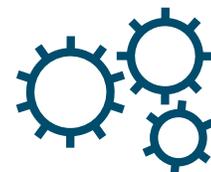
## **AI/ML vs existing time series predictions**

Traditional methods of predicting demand use basic historical-based algorithms to predict demand for a specific item at a specific location and time. Frequently a “baseline” forecast is determined and adjusted by hand for special events and promotions. This approach assumes that year-over-year demand does not evolve.

Artificial Intelligence / Machine Learning take this significantly further. When it comes to AI/ML, the prediction for a given item/location/day isn't only learned from its own history, but from the behavior of all items in all locations, and at all times. It learns causal effects from properties of products, locations and dates. With a longer history it also learns more while also adapting to current trends. Everything is learned from the data – without human intervention required.

## **How does AI/ML individualize?**

Capable ML algorithms can individualize all the information, corresponding to classical statistical methods, but for cluster size 1. It isn't necessary to build clusters first and then assume that all individuals in the cluster behave similarly. Good AI/ML is an automated science. Starting from all observations, the mean behavior is easily predicted. The art is to individualize each prediction as much as possible, but not more than possible. Especially for more unique challenges like slow-moving items, good ML algorithms have an advantage over classical ones.



## ASK THE RIGHT QUESTIONS

Identifying the right software partner can be challenging, but it's easier if you know what you're looking for and what to ask. Here's what you need to know.

Finding the right partner to power your Autonomous Supply Chain demands these questions:

### **Do they have real AI/ML expertise and experience?**

The vendor should have long and deep experience in that industry, speak its language and be fluent in the process and intricacies. They should also have significant experience in data science and operating ML and AI based systems within a complex enterprise software environment.

### **Do they have quantifiable customer stories?**

This isn't just POCs, you're looking for a company that has achieved full implementations that perform and do the work reliably and daily. On full scale, thousands of items in hundreds of stores. What were the results over time? How have customers armed with these technologies fueled more sustainable, more powerful and more competitive decision making?

How have the difficult cases, e.g. perishable food performed? How much have they reduced excess and cost? How have they driven new revenue, new profit and a more robust end customer experience? What are the KPIs that have been improved? How much manual and repetitive human labor has been reduced?

### **Do they have a scalable solution?**

And innovation power to embrace emerging technologies and a credible roadmap for the future?

### **Do they have the references?**

And references from the experts and C-level that deliver the most value and credibility?



## DIG DEEPER FOR CLARITY

Powerful AI uses prediction models that push further and deeper for more pin-pointed precision and accuracy. Know what can't be known. Make intelligent decisions with all the current knowledge and data.



### What's in a model?

- A causal prediction model should be explained as much as possible by properties of items, locations and time, instead of only pulling from their individual history.
- Prediction should not just be a point estimator (one number), but a complete probability distribution. It should at least predict a value and an uncertainty.

### Why a single number isn't enough?

Consumer behavior is not deterministic. No matter how precise the forecast, there is always a chance that the demand will be higher or lower than forecasted. It's impossible to know everything that will happen tomorrow and how shoppers will react. That's why it's important to optimize supply chain decisions based on the likelihood/probabilities of every possible scenario — including outside factors like day of the week, weather and current events.

### Why it's important?

Because the decisions based on the predictions take into account the complete risk profile and the individual cost/utility function for a given item/location/date

### In Supply Chain and Retail the cost comes from the unexpected:

- What happens if the demand is much higher than expected?  
Out-of-stocks, empty shelves, lost sales, dissatisfied customers.
- What happens if the demand is much lower than expected?  
Markdowns, excess waste, lost revenues.

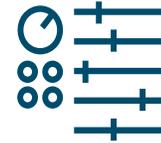
If a model only predicts what will happen on average, you can't know the risks. For an Autonomous Supply Chain, we must reliably and repeatedly predict the probability of out-of-stocks and the expected waste. Both strongly depend on the uncertainty (width of probability distribution), not just on the average.

Even if two items have the same predicted probability distribution, it doesn't mean that the stock levels for each should be the same. Because the costs may be asymmetric and depend on individual item properties like shelf life and ratio of sales to purchase price.

### The model cannot be easily confused.

The prediction model is optimized to operate accurately for retailers, without picking up random demand or buying patterns and incorporating them into future forecasting.

*Note: Common ML models are not optimized for retail and can cause issues and an inaccurate view of demand.*



## DITCH THE BLACK BOX

The right AI/ML technologies make decisions with calculations beyond human cognition, but not beyond our understanding.

### Can your business members understand the solution?

To drive acceptance and adoption, automated decisions based on AI must be explainable. Retailers cannot afford to put one of their most critical business processes – the flow of goods – into a “black box”. Even advanced ML algorithms, that can outperform the most experienced demand planners, must provide insights into the causal factors of their predictions and order decisions.

## THE FUTURE IS HERE, ARE YOU READY?

The number of retailers using AI and automation is predicted to double in the next 2-3 years.<sup>2</sup>

Global annual spending on AI by retailers alone is expected to break \$7.3 billion by 2022. And virtually half of retailer leaders are investing 5-10% of their IT budgets in AI.<sup>3</sup> That’s because these edge technologies are fundamentally changing the way we think about business. With exacting precision only machine learning can provide, more is possible than ever before – including reduced waste, increased operational efficiency, higher revenues and more personalized customer experiences.

Discover what’s possible and begin your journey today at [jda.com/moonshot](https://jda.com/moonshot).

<sup>2</sup> According to a study published in 2019 by the National Retail Federation (NRF).

<sup>3</sup> Capgemini Research Institute Report

Using JDA, you can plan to deliver.

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