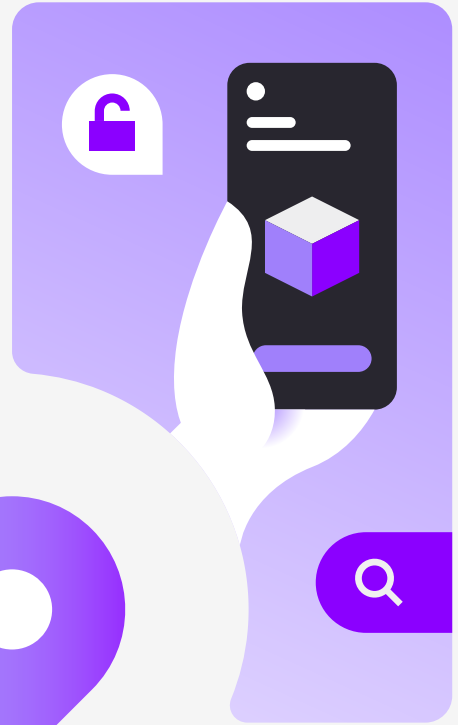
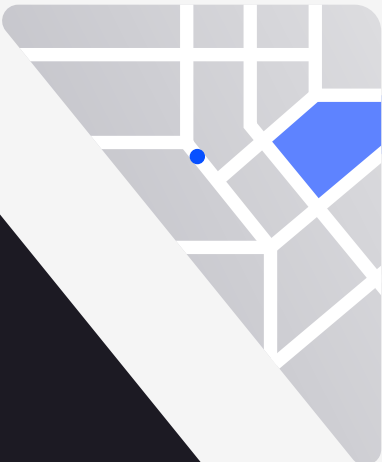


whitepaper



supply chain



Supply and withstand: The case for Supply Chain Intelligence (SCI)

KIN+CARTA

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Towards Supply Chain Intelligence...

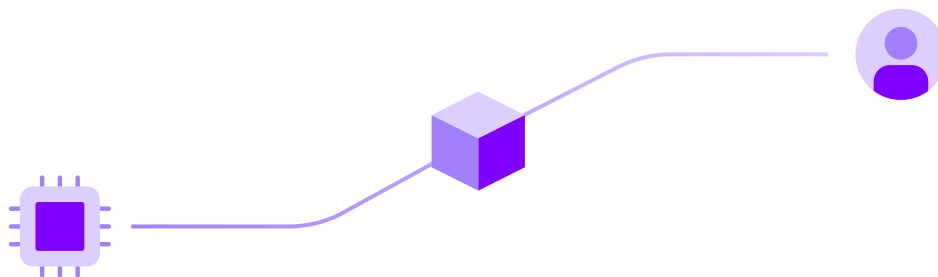
Executive summary

The global supply chain is in a constant state of flux. It requires intelligent, resilient and sustainable solutions to meet demand, no matter how quickly or dramatically it changes.

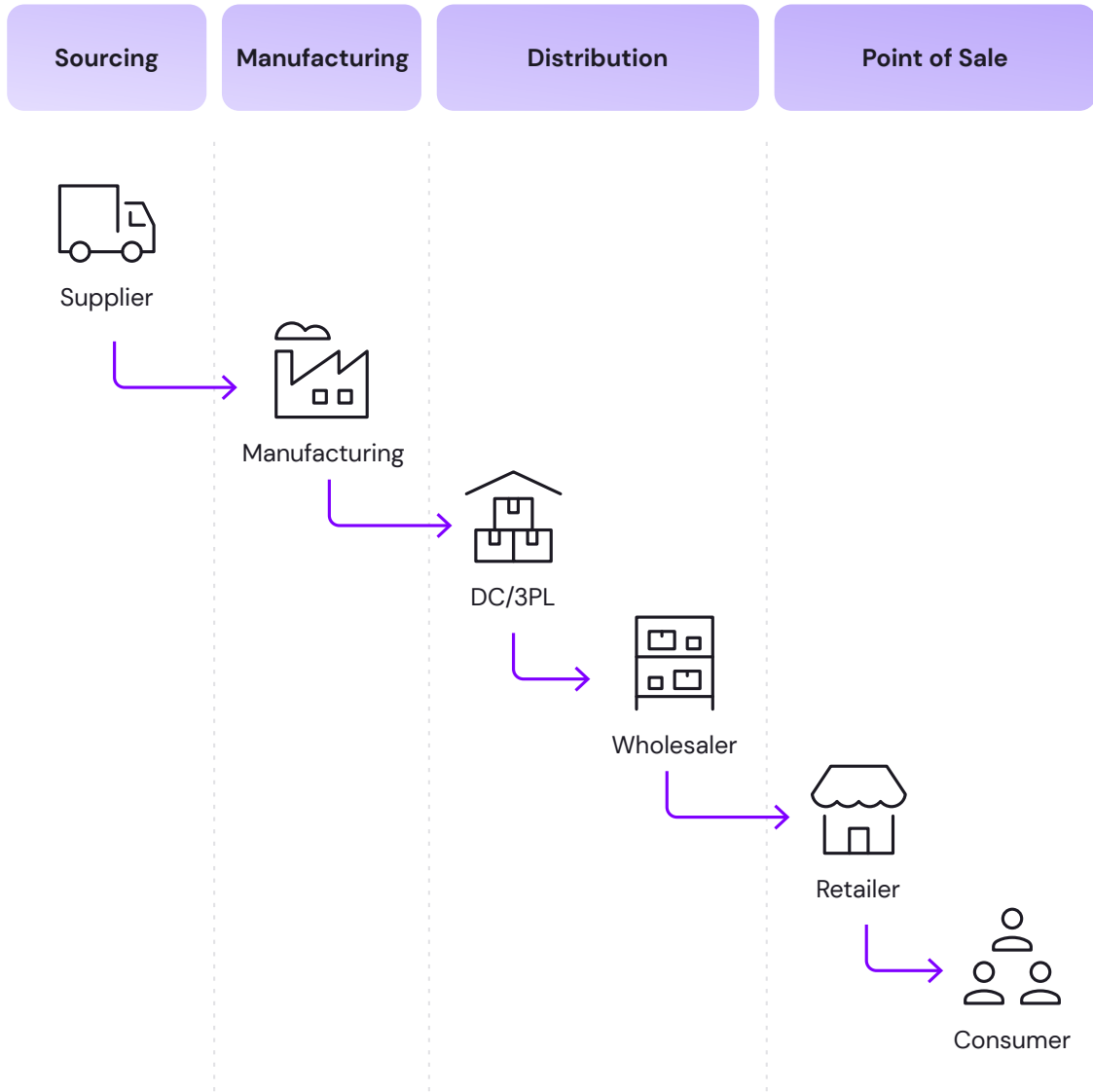
Redefining the requirements and capabilities of an effective supply chain has perhaps never been more necessary than now, with behaviors upended, opportunities missed and weaknesses exposed.

This has perceptibly put innovation in high and urgent demand amongst organizations. Technology vendors respond by championing automation to improve efficiency and productivity, while operational designers prioritize human processes and adaptability. **Each pursuit might well be noble in its own right, but the outcomes are often disjointed at best and disparate at worst, especially when volatility puts resiliency to the test.**

In reality, the path towards true Supply Chain Intelligence (SCI) exists yet it is uncharted. When AI-based tooling and human supervision come together, highly accurate predictions and recommendations can be made, explainable outcomes can be attained and human invention and creativity can be preserved.



It's **a vision of sustainable digital transformation**—one that both leverages technology and empowers humans—that can be realized by every organization concerned with speed and agility in the supply chain.



- Forecast cycles plan weekly or monthly demand at various aggregated levels.
- Sales & Operations Planning processes don't address SKU by location accuracy.
- Advanced: demand driven, demand sensing & shaping techniques occur outside daily operations.
- Network & Inventory optimization initiatives don't address on-going variability.

Blending people and technology to optimize SCI

Achieving SCI is about reducing friction at every point in the supply chain, from technology to people to the processes that connect them. It's about removing bottlenecks and unnecessary constraints that prevent parts of a supply chain from moving and adapting freely.

A supply chain is never a centralized data ecosystem—the data is typically spread all over the organization—so trying to manage and understand it is a challenge in itself. If it's broken down into small use cases and approached iteratively, though, a slick and agile supply chain can be achieved and a sustainable level of growth can be realized.

At every stage of this process, it's important to remember that experimentation is not only OK, but it is expected of modern organizations that want to become cloud-native masters of their own supply chain. Instead of aiming for a complete solution with the first draft, take incremental steps to make gains along the way.

The state of the supply chain

Many of the world's most prominent consumer brands have embraced the concept of a vertically integrated supply chain. Acquisitions, partnerships and joint ventures helped these organizations minimize inefficiencies and maximize profits as part of a seemingly fit-for-purpose logistics architecture.

Moreover, the integrated data systems that emerged from the activation of supply chain automation and enterprise resource planning (ERP) systems made for seamless, instantaneous communications between each link of their supply chains. The result? Efficient supply to meet demand.

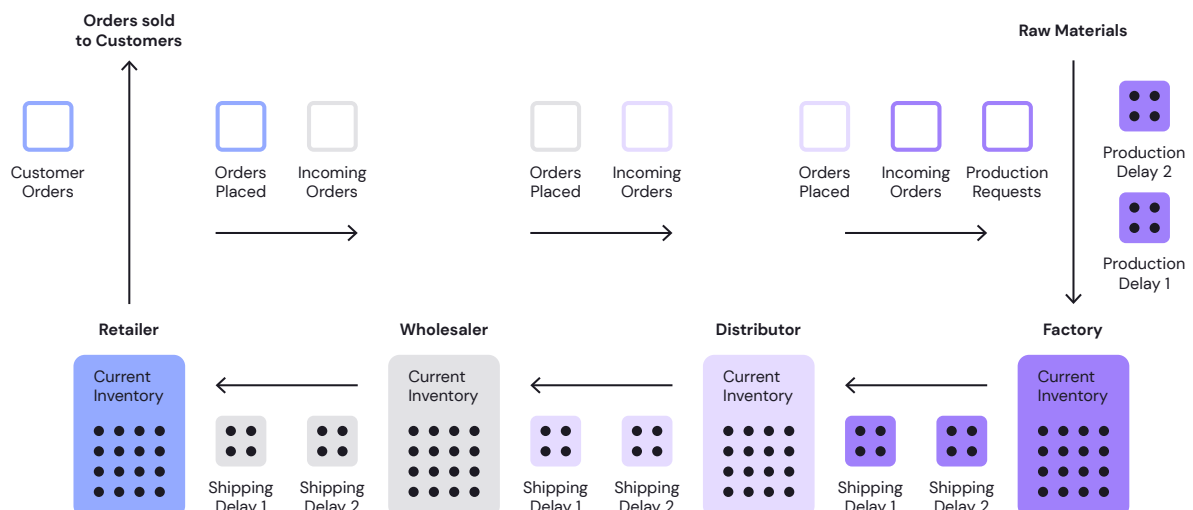


Efficiency, however, only works if the landscape remains at least somewhat predictable. While firms large and small have built complex supply chains that rely on just-in-time (JIT) inventory and extensive automation, the extreme delays and shortages experienced during the COVID-19 pandemic exposed critical failures in the global approach to supply chain management. We have seen this arise in both B2B and B2C, from information services to consumer packaged goods, as some organizations have paid for their lack of resilience and digital maturity in the face of major disruptions to manufacturing, shipping and distribution.

From an overreliance on automation to an obsession with instant analytics, we have seen many reasons why businesses were backed into a corner of global supply chain chaos. Even before 2021, the bandwidth, standards and sophisticated systems existed to allow businesses to both capture opportunities and mitigate risk, but, on their own, they were clearly not enough to instill organizational resilience.

Automation over imagination

Let's take a classic exercise from engineering or business classes circa 1990s: the Beer Game. Players at four fictional stations respond to changing market conditions by moving chips around the supply chain, dictated by the roll of the dice; the goal, is to make it run as smoothly as possible.



The Beer Game is played on the above game board.

Market demand for a product might increase, but wholesale prices will then follow suit, which also means the demand for and price of commodities will rise. Before the product developed in response to these signals can make it to market, consumer preference might change, so players who don't move their chips in time are often left reeling from massive inefficiencies at each stage of the supply chain. They face inflation, lost profit and revenue from a mismanaged inventory and a great deal of waste—a pretty lousy business outcome.

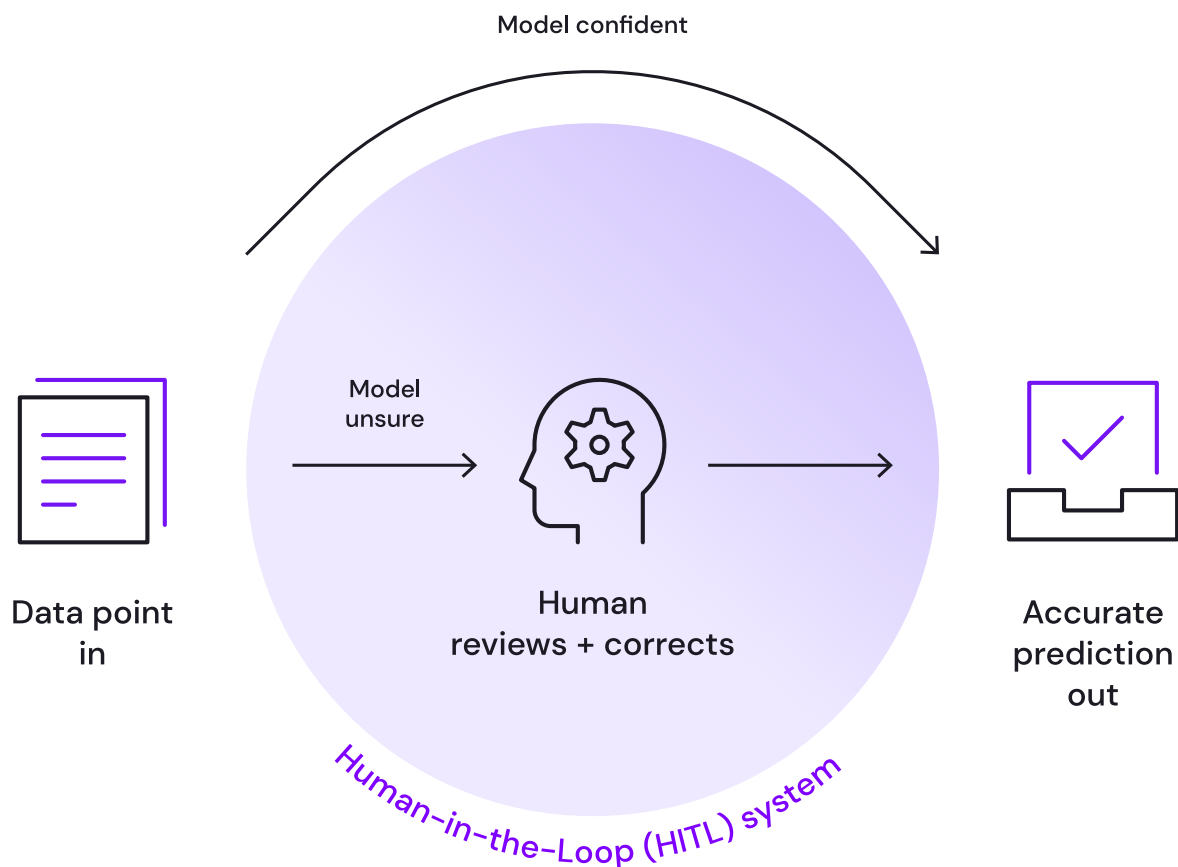
The primary issue in this example is **information and response latency**: either the data required to act arrive too late or the resultant action taken reaches its market too late to meet the demand upon which it was based.

In the real world, the problem runs deeper than the basic speed of data transfer. Modern supply chains are connected by broadband or fiber all over the world, so the flow of data is rapid; it's the presence (or, indeed, absence) of human oversight at each 'station' that's the real challenge.

By following traditional bottleneck logic, provisioners of highly standardized supply chains look to automation to solve their time-to-market issues, but, in doing so, they neglect missing factors that can cause significant errors.

Such errors are avoidable, but they are not detectable in fully automated systems due to the retrospective nature of the data they use. That's why **Human-in-the-Loop (HITL) systems are critical to any form of automation** because they bring imagination, creativity and critical thinking. This is especially the case in the realm of artificial intelligence (AI) where full automation can lead to wild outcomes,

such as market drops caused by automatic trading systems or, worse still, fatal accidents caused by fully autonomous vehicles.



It's clear by now that the dash for automation has been misdirected on the path towards SCI. We need a touch of human ingenuity to backtrack, fix up and push on together if our supply chains are to become sustainable.

The art and science of the sustainable supply chain

It's obvious that adding human supervision to data-led processes will deliver beneficial business outcomes, but it's unfortunately not that straightforward. The challenge lies in defining the roles and functions that each part should play in a smart supply chain.

At the advent of industrial/applied AI, many practitioners promised it would replace menial, repetitive, low-skilled jobs and tasks. AI would enable people to retrain for more interesting and creative roles.

For example, when Uber and Lyft began operations, many believed that taxi drivers would be replaced by fully autonomous vehicles—à la Johnny Cabs from *Total Recall*—controlled by a few humans in a centralized system operations center. In reality, the opposite occurred: the centralized data and AI behind rideshare, delivery and a multitude of other such jobs came to control the humans, who literally serve as the ‘last mile’ of service.



Johnny Cab in Paul Verhoeven's film *Total Recall*, 1990. © Columbia Pictures Industries

To rediscover the rightful place of humans in the supply chain and debug the problems that plague our current systems, we need to identify the strengths of both pursuits.

On the one hand, AI systems are better at quantified optimization of supply chains and making instantaneous recommendations based on changes in market demand. On the other hand, humans are better at applying creativity, imagination and emotion to devise novel solutions

or alternatives. **A meeting of (human and AI) minds.** Both automated systems and humans have inherent strengths and weaknesses.

AI can make useful, timely recommendations based on the information supplied to it. Modern AI-enabled supply chain systems are able to generate multiple alternative scenarios, often with different recommendations at brand, type and SKU levels. They can even generate conflicting, context-based recommendations when it comes to specific retailers and locations, for instance. The flaw here, though, is that **the information supplied to such a system can only ever be historical**, if only by a matter of nanoseconds.

For this reason, AI is susceptible to making the same mistakes as previous systems time and again, and will optimize recursively against them, compounding the problems further still. Left to its own devices, so to speak, **AI will never achieve maximum value and may even make massive ethical missteps because of this reliance on 'old' data.**

As sentient human beings, we carry our own biases into the supply chain game. We make snap judgments based on personal experiences, whether they happened a day or a decade ago, and we naturally look for 'rules of thumb' to apply to broad sets of circumstances. However, **we also carry the ability to think beyond the information present** and develop new hypotheses and approaches based on changes in our underlying assumptions.

However, all of these strengths and weaknesses are highly complementary. An intelligent supply chain built on a combination of human intuition and AI-led automation can not only deliver accurate predictions, timely recommendations and explainable outcomes, but also novel ideas, adaptive processes and extensible solutions.

Why do we need SCI?

While multiple attempts have been made to extend supply chain technology beyond the human concept of analytics, and to extend supply chain automation beyond humanless mechanics, results so far have been mixed.

The reason for this is that **pure-play consulting firms are overly focused on developing the human process, while technology vendors are predisposed to creating one-size-fits-all, automated solutions.**

The problems they are both trying to fix requires something much more bespoke. It's not about perfecting one or the other, but instead optimizing the ways in which these two approaches work together towards outcomes that benefit all parties.

SCI is that fitting blend of people and technology, which is a critical component in the creation of scalable, adaptable and sustainable supply chain solutions.

The great supply chain of being: Four steps to success

Whether you're a supply chain giant or a consumer brand start-up, there are certain steps you need to take to minimize risk and maximize market potential as part of the global supply chain. They are [Assessment, Planning, Solutioning and Growth](#). Each has a business outcome to aim for as you progress.

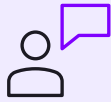
Step one: Assessment

In this phase, it's critical to develop a clear understanding of the current state of supply chain maturity and risk. As aforementioned, increased efficiency often reduces resiliency, so each level of assessment must consider multiple short-term and long-term target outcomes.

Supply chain risk is assessed in terms of efficiency and resiliency. To the latter, questions must be asked around your ability to adapt to change within the supply chain. How will your locations and staffing levels be affected? Are wait times excessive at certain points in the process? Are you relying on passive data reporting to tell you what's happened? Are there opportunities to develop predictions?

Understanding where you can improve your reaction times and, indeed, start being proactive to ensure value and efficiency are crucial outcomes of the assessment phase.

Action items



Answer questions around your ability to adapt to change within the supply chain.



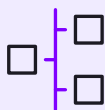
Understand current signals available to measure current state.



Undergo gap analysis to determine difference between current and sufficient data to achieve supply chain visibility.



Proof of concept modeling to validate opportunities for improvement.



Productionalize and harden approach through Data as a Product process.



Sustained management of supply chain intelligence through managed service and automated monitoring.

Step two: Planning

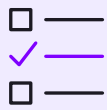
Next, you can start developing a plan to optimize the points of interest you've identified in your supply chain. This phase can and should be mapped out in bitesize chunks; it's impossible and unrealistic to reinvent the entire supply chain in one go, so take the time to pick small use cases that aren't 'life or death' for your organization. Develop your hypotheses and sets of parameters from there and line them up for comprehensive tests.

Planning should always be conducted from the perspectives of business outcomes, technical merit, feasibility/ability to execute and human impact. Too often, organizations overly index on one vs. all of these. This can lead to short-term capitalization, but it lacks long-term sustainability. Consider how you'll balance people and technology. Then focus on the business outcomes you need from your supply chain.

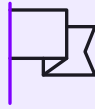
Think about what you might gain from partnerships with third-party experts during this phase, such as the cross-pollination of concepts from other industries. For example, net revenue management (NRM)

was first developed in the aviation industry, but now serves as the backbone of many supply chain strategies.

Action items



Develop list of organization priorities based on key success drivers/metrics for your business



Quantify goals based on effects (sensitivity analysis to organizational priorities)



Develop concise key stakeholder list, with outcomes/effects of interest.

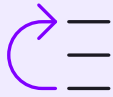
Step three: Solutioning

Now your teams can start moving quickly through testing hypotheses towards iteration on a minimum viable product (MVP). This will help both validate assumptions and generate working models that extract real value for your organization.

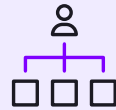
At this phase, it's common to come up with more questions than answers, but this allows you to drive on from MVPs and towards higher-value outcomes that are more creative and holistic. You'll be able to start training models to support decisions and drive automation, and ultimately make your supply chain more responsive and adaptive in the long run.

Solutions are used in real-life scenarios by early adopters, who serve as a champion of the new system to put it through its paces. Pain points will inevitably arise, change champions work through these challenges to enable new benefits for the organization. The teams that are well-versed in agile methodologies with a product-first mindset are primed to set their supply chains up for success.

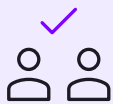
Action items



Leveraging prioritization process above, create definition of success.



Map stakeholder personas to scenarios which enable demonstrable lift.



Establish panel of early adopters mapped to quantified stakeholder/beneficiaries.

Step four: Growth

Once they've moved beyond MVP, your teams can start maximizing value from the refined solution by building out across bigger and more impactful use cases. This incremental approach to supply chain intelligence must be built on a solid, tried and tested framework that makes it clear (1) what you are measuring and (2) how to apply new human + machine automation to the right areas at the right times.

Of course, what works for a supply chain in one market probably won't apply to all, so continuous learning are required to fit solutions to new markets, geographies and products. Much of the groundwork will have been done during the process of achieving MVP, so teams can push for continuous improvement and sustainable growth at this stage.

This is also where that product-based mindset comes into its own, as it unlocks the kind of agility you need to pivot and adapt to new market challenges and opportunities. Without it, organizations can be held back by sluggish processes or legacy technology that aren't fit for today's demanding markets.

Action items



Redefine target audiences based on areas of opportunity within the business.



Develop list of both economies of scope (where else can this approach be fruitful) and economies of scale (how can we scale the successes seen in our MVP/POC?).



Identify evangelists within target audiences to assist in organizational transformation toward a data-driven approach.

The possibilities of SCl in action

AI insights for better predictions using machine learning



Real-world results:

Wait time predictions within six minutes.

In many industries, wait times can negatively impact customer experience. Predicting wait times accurately is a challenge, but it can be achieved through AI and predictive modeling. By aggregating years' worth of data, filtering the labeled data for supervised learning, and building the models to quickly identify factors and predictions, machine learning can be used to accurately predict wait times to address consumer pain points, which ultimately creates a competitive advantage.

Create a center of excellence (COE) to enable a proactive data approach

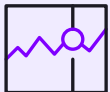


A COE can improve:

- Retargeting
- Consumer engagement
- Governance and privacy: Ethical AI
- Automated AI for supply chain

Centers of Excellence create a centralized hub that works across business units, or product lines, with specialized talent and best practices. This system leads to improved internal efficiency, cross-function data sharing, and privacy/compliance, while reducing waste and sell-out scenarios.

End-to-end intelligence to improve supply chain forecasting



Real-world results:

Improved forecasting by 12%, leading to a savings of \$2.7B in error reduction.

Organizations must make data accessible to the entire company by creating a new operating model and consolidating access to first-party data, third-party data, and consumer insights. This can fundamentally change an organization by empowering decision-making across functions that weren't previously possible.



86% of research participants believe data consolidation will reduce the time they spend looking for data.

Driving growth and efficiencies with data



Real-world results:

Improved average error from 17% to 5%

Supply chain models developed in the past often only focused on sell-in and sell-through, without the capability to predict future market demand. To accurately forecast downstream finance and upstream manufacturing demand, organizations must aggregate data and leverage auto/ML tools, such as [Kin + Carta's Octain](#), to build and deploy a system to predict future unit demand at the SKU level. A focus on sales here will help the organization predict future demand. This type of model can significantly reduce error in prediction, enabling the business to confidently and thoughtfully serve its customers.

Towards Supply Chain Intelligence...

The journey to supply chain utopia requires a steadfast focus on sustainability and resiliency. Each organization requires a different blend of human oversight and automated systems, but the abilities to absorb shocks and, change tack are crucial.

Planning for a new kind of smart supply chain doesn't have to involve a trade-off between efficiency and agility; it's possible to achieve both by adopting SCI and embracing a mindset of continuous learning and improvement. As a human-first, technology-agnostic digital transformation partner, it's something we put into action on a daily basis for digital leaders.

Get in touch

Are you ready to learn more about sustainable supply chains and how we can help you at Kin + Carta?

Please reach out to cameron.turner@kinandcarta.com or provide your information below to discover more.



Cameron Turner

VP of Data Science, Kin + Carta



About Kin + Carta

Kin + Carta is a global digital transformation consultancy committed to working alongside our clients to build a world that works better for everyone.

Our 2,000 strategists, engineers and creatives around the world bring the connective power of technology, data and experience to the world's most influential companies, helping them to accelerate their digital roadmap, rapidly innovate, modernise their systems, enable their teams and optimise for continued growth.

As a Certified B Corp, our triple bottom line focus on people, the planet, and profit is at the core of everything we do.

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