The predictive supply chain evolution

here

for location

The industry is transforming

Just a few years ago, predictive supply chains seemed out of reach because the data wasn't available. Tasks weren't digitally connected and were often done manually, sometimes with pen and paper. Drivers were using static routes — or worse — consumer apps not designed for large trucks or commercial vehicles. Even warehouse operators could easily lose a valuable forklift or roll container and were often in the dark when it came to shipment arrivals.

Some organizations still operate this way but for the vast majority, times are changing.

Now, companies are building data lakes and have abundant access to technology. They are forming partnerships to manage this data (eg. having connections with carriers for greater end-to-end shipment visibility) and are bringing it into one place to utilize it. With all of this accessible information at our fingertips, supply chain leaders are now perfectly positioned to build more predictive supply chains.

Let's explore how location technology can help.

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The role of location in predictive supply chains

The power of location has already helped supply chains evolve and the most resilient ones use multiple forms of location technology. What was once a paper map and a clipboard has transformed into navigation, routing and shipment visibility — and that's just the beginning.

Location technology is a crucial element of predictive supply chains because it's a unifying link between disparate pieces of information. It enables companies to create digital networks where functional silos are replaced with end-to-end visibility, collaboration, responsiveness and risk mitigation, agility and optimization.

Building a predictive supply chain involves the collection, enrichment and analysis of terabytes of data; this could include warehouse, vehicle, fleet, vessel, rail, air cargo, shipment and environmental data. However, the richness of this data is typically hidden due to volume, velocity and variety. Additionally, most data generated by each segment of the supply chain is fragmented and living in silos, which restricts our collective ability to create new products and services.

This is why we need to look at the common element across data sources: location. Every piece of data has a location attribute, which can serve as a unifying element for diverse data types. Location can connect disparate and dynamic data sources, providing rich context and increased relevance.

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Benefits of location-powered predictive supply chains

Precision

Optimizing transport planning, predicting events during the execution of multimodal shipment ETAs and post-trip analyses

Resilience

Enabling proactive workflow and decision support during disruptions and events

Sustainability

Unlocking a complete picture of your transportation footprint and enabling you to optimize accordingly

Orchestration

Providing the insights necessary to optimize workflows across multiple stakeholders in the transportation chain while also improving stakeholder communication and collaboration

Data integration

Unifying shipment, carrier, telematics and logistics business data with rich and accurate contextual data

Data quality/science

Delivering the highest quality of information through machine learning (ML) location-based analytics

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Static, dynamic & predictive

Real-time visibility is a necessity amidst constant global supply chain and logistics disruptions. Companies are undertaking significant efforts to integrate visibility into their supply chain, logistics and transportation planning processes.

Currently, there are three phases of a company's supply chain evolution: static, dynamic and predictive. Let's take a look at each to see how they operate.

Static

The first phase is a static supply chain. While this type is the easiest to implement, it offers the lowest value to an organization by relying on static maps and basic information.

Let's look at it through the lens of ETAs. A static ETA would be a routing-based, distance and speed estimation. However, as any driver knows, on the road you often encounter unexpected conditions making static ETAs unpredictable. Real-time traffic, vehicle profile, truck attributes, port congestion, vehicle breakdown and more factors all need to be considered when relying on a static ETA. If the planned route matches the actual route taken, the estimate will be relatively accurate. However, if the actual route differs from the planned route or the estimation is based on inaccurate traffic updates or driving patterns, any chance at an accurate ETA goes out the window.

Dynamic

The second step towards a predictive supply chain is the addition of visibility and dynamic ETAs. This phase allows more room for optimization as it leverages real-time ETAs to generate alerts, manages and analyzes dwell times and creates driver-facing applications. The dynamic phase is complex with the addition of external factors such as weather, traffic, regulations, etc, but results in greater efficiency and better value to the organization.

Through our lens of ETAs, a successful dynamic ETA would be comprised of accurate estimates obtained through route matching and actual traffic. Leveraging real-time location intelligence at this stage also allows for post-trip performance analysis.

Predictive

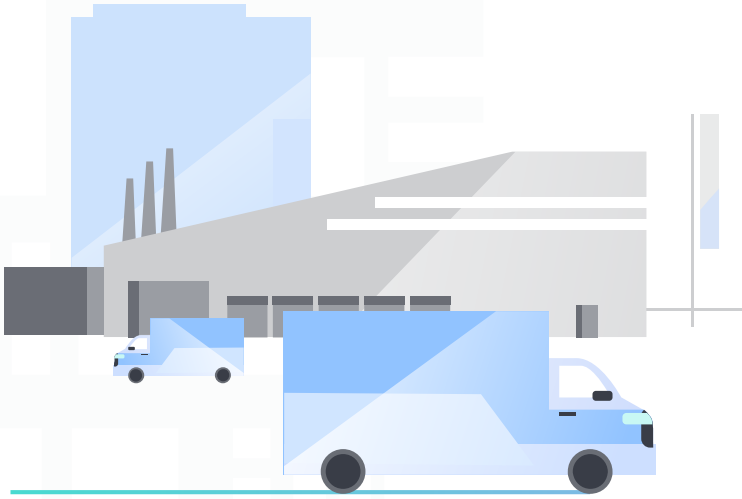
The third and final phase is a predictive supply chain. With automated workflow management and decision-making support, it leverages a deep learning-based predictive algorithm. In this phase, users can create accurate multimodal ETAs and replace time-consuming, manual tasks, such as load and capacity, optimization and risk analytics.

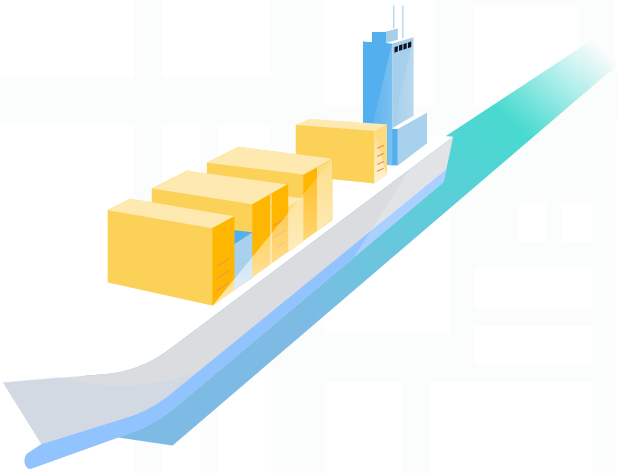
When it comes to predictive ETAs, the following variables are considered which allow organizations to make robust decisions: historical traffic patterns, driving behavior, seasonality, derived features, routing history, break data and KPIs which can be tuned to customer requirements and measured directly.

Clearly, there are many advantages in the predictive phase. Predictive estimates are made through multiple learned features as they require fewer updates and it's easier to add more data feeds (eg, specific waiting times at warehouses, port delays, etc).

For the value it offers (chiefly, efficiency gains and growth potential), the disadvantages are few. For one, predictive ETAs require data for training and testing, including substantial historical data covering seasonal patterns. Also, model performance truly depends on the quality of the data; low quality data will result in low quality performance.

Bringing your predictive supply chain to life





Some areas that can greatly benefit from predictive supply chains include yard management; coordinating inbound and outbound traffic; first-, middle- and last-mile deliveries; and connected warehouses. Let's dive deeper into a few examples.

End-to-end shipment tracking: End-to-end shipment visibility is critical for maintaining delivery SLAs between you and your customers. Tracking and monitoring the location, condition and ETA of shipments can help reduce the time spent guessing ETAs, looking for deliveries in warehouses, improving on-time and in-full delivery (OTIF) performance and saving money. Learn more about **HERE Shipment Tracking**.

Warehouse automation: Standard warehouse management systems have limited visibility into workforce, material handling equipment and inventory. A layer of location intelligence beyond standard warehouse management systems (WMS) or yard management systems (YMS) can generate additional operational data in real time. This gives operators uninterrupted visibility on the location and operational status of their workforce, machines and inventory and enables them to make proactive decisions, eliminating blind spots and inefficiencies, saving money and boosting service levels. Learn more about **HERE Asset Tracking**.

Optimizing middle- and last-mile operations: Managing fleet operations is complex. Adapting to changing conditions in real time requires visibility into your fleet's operations, current status and plans. Location intelligence can help you streamline your business and optimize middle- and last-mile journeys with advanced routing based on truck attributes and predictive traffic rather than best-guess estimation. Tour planning algorithms that account for real-time conditions, time windows and job constraints reduces human error and makes your dispatchers more effective. Closing the loop between dispatcher, driver and customer enables you to deliver accurate ETAs while reducing the cost of operations. Learn more about **HERE Tour Planning** and **HERE Last Mile**.

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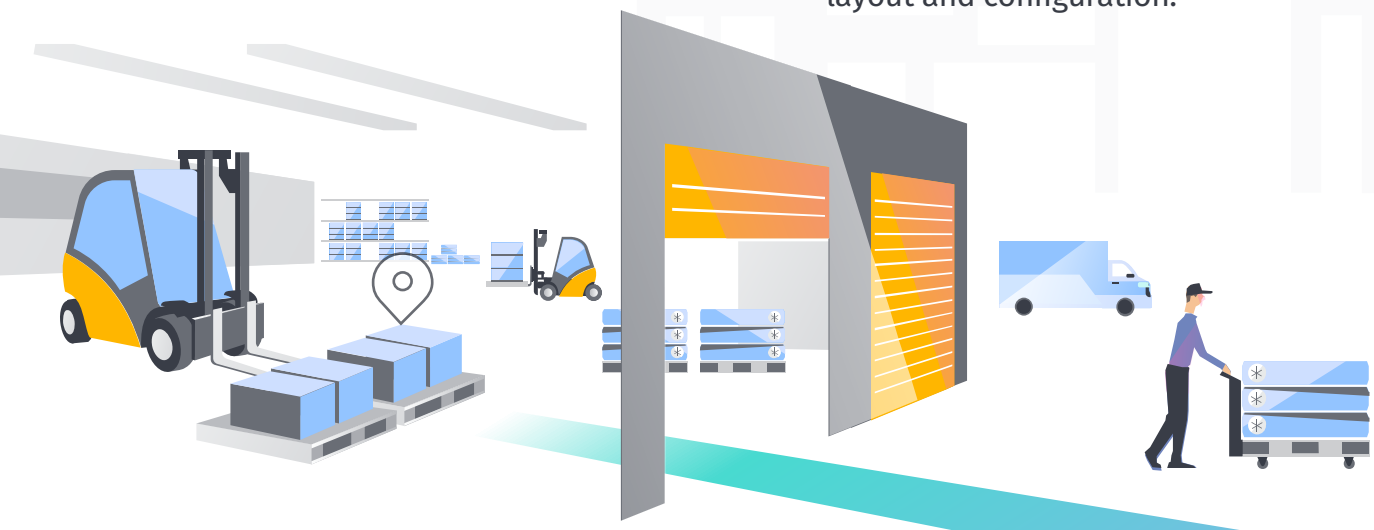
A smarter, connected warehouse

Yojee, a cloud-based software as a service (SaaS) logistics platform, teamed up with HERE to leverage location intelligence and create a solution that transforms warehouse operations and management through digitization.

The solution combines Yojee's logistics software expertise along with HERE Asset Tracking and HERE map-making capabilities to uncover crucial data from the warehouse floor. By feeding the real-time and historical data into an AI-powered data analytics dashboard, businesses receive a digital representation of their warehouse operations. Through customization and maintenance, the connected warehouse solution can help users improve overall logistics planning and reduce operational costs.

Now, customers can benefit from next-generation real-time tracking and can track materials, equipment and workforce movement faster and more accurately. They can reduce costs by optimizing the utilization of labor, utilities and storage space. And they can achieve a seamless workflow by using the data collected by IoT devices to determine the best warehouse layout and configuration.



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Building a more predictive supply chain

Five areas to consider when looking to build a more predictive supply chain include: diagnosing areas of improvement, identifying data gaps and silos, considering the larger tech stack, testing implementation and implementation.

1 Diagnose areas of improvement

What problems are you looking to solve?

Before you can fully embrace a predictive supply chain, you'll first have to identify any weak areas within your operations. Common fleet challenges include load optimization, ETA inaccuracies, inefficient driver onboarding, poor driver retention and safety and performance issues. And, when it comes to supply chain, top challenges can be warehouse optimization, asset tracking, shipment visibility and yard management.

2 Identify your data gaps and silos

Be sure to have the full picture. When it comes to data, it's important to understand what's going on within your operations and what you do or don't have access to. Is there a lack of transparency anywhere? Are there data gaps and is your data useable?

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3 Consider the larger tech stack:

There are off-the-shelf solutions and software that can easily integrate into your larger tech stack. Here are some common problem areas and their ready-made solutions:

- **If the problem is visibility or ETA accuracy**, then HERE's shipment tracking and ETA solutions can help you unlock real-time visibility and traceability along your supply chain.

- **If the problem is driver onboarding or safety**, then using HERE Last Mile's driver app and the HERE platform gives you immediate access to turn-by-turn navigation and post-drive analytics.

- **If the problem is warehouse optimization**, HERE Asset Tracking is an end-to-end solution that reduces cost and asset idling by tracking assets in real time indoors and out. It helps you better understand what's in stock, what's sitting idle and what's on the move.

- **If the problem is optimizing your middle and last miles**, then using HERE Tour Planning API can add visibility and optimize deliveries through truck-specific routing. It can streamline performance from back office planning to execution — end-to-end — improving the customer experience and making fleets more resilient for tomorrow's demands.

4 Test implementation

The testing process for a new solution will largely depend on the area of the business you're trying to improve. If you or your company manage first-, middle- or last-mile deliveries, the testing stage could look something like this:

- Use sample data to model concepts (tours, spend, etc) generated by HERE APIs against the actual completed tours to see optimization potential

- Test conversion of job data from an order management system to ensure that all necessary data is being properly included

5 Implementation

Using the same fleet scenario, after testing is complete, this is what the implementation process would look like:

→ **Step one:** Define depot and fleet locations in HERE Last Mile

→ **Step two:** Register drivers and dispatchers for HERE Last Mile and the HERE Last Mile Driver App

→ **Step three:** Import job data

→ **Step four:** Optimize and dispatch tours

→ **Step five:** Complete tours via the guidance and delivery confirmation in the driver app

→ **Step six**: Review completed tours via the analytics dashboard

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Final thoughts

As we can see, the industry is changing and in order to stay competitive, organizations should adopt a more predictive supply chain. HERE offers solutions that can be deployed quickly and can easily integrate into an existing customer system. Our solutions reduce the cost to serve while increasing supply chain visibility and process automation. With our modular offering, customers can either integrate our solutions into their own systems and applications, or opt for end-to-end solutions.

Our readily available solutions and services are built with prediction models and correlation analysis in mind and have location as a unifying layer. With easy access to insights, you can optimize your processes across the entire supply chain, freeing up your resources so you can focus on what truly matters.

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Further reading

Whether you're looking to cut costs, drive workflow productivity or enhance operational efficiency, location technology can help make it happen.

The predictive supply chain conversation doesn't have to end. Check out our additional materials below and reach out to us; we'd love to hear from you.

Supply chain solutions powered by HERE

Discover the solutions

How to digitally transform your warehouse

Read the article

How the supply chain is pioneering autonomous driving

Read the article

HERE, a location data and technology platform, moves people, businesses and cities forward by harnessing the power of location. By leveraging our open platform, we empower our customers to achieve better outcomes - from helping a city manage its infrastructure or a business optimize its assets to guiding drivers to their destination safely. To learn more about HERE, please visit **here.com** and **360.here.com**.