Bringing PACE to logistics

A framework for automotive supply chain transformation in the digital era

Disruptions to the supply chain often hit without warning. Consider this scenario: Rob, a purchasing manager at an automotive Original Equipment Manufacturer (OEM) is in charge of managing the supply of imported parts for the OEM's assembly operations. Due to a strike by West Coast port workers, shipping containers are not moving on to the next leg of their journey, on time. As the plant's inventory diminishes, Rob is facing the serious risk of a plant shutdown. Rob's managers want answers.

- Exactly when will the plant run out of parts?
- Which model's assembly line will be affected?
- What specific containers could be airlifted to keep the line running?
- What are the cost implications of this disruption?

Without a framework in place that can provide immediate answers to these questions, Rob will be hard-pressed to find solutions that will prevent a shutdown. For the hyper-connected automotive value chain, there is an opportunity, not only to manage disruptions better but also to get ahead of them.

Automotive supply chain challenges

Currently, many automotive organizations find issues in the supply chain difficult to identify and mitigate. Departmental silos create barriers to sharing information within organizations and make it challenging for departments to collectively identify and predict issues. Even after issues are identified, response time is often too slow to be effective. When corrective actions are taken, OEMs may not have the tools necessary to assess their impact. This lack of visibility can potentially render any action ineffective.

The automotive supply chain is already extraordinarily complex, and it's only becoming more so. Today, software is embedded not only in the vehicle and its components but throughout the entire value chain. The industry's growing digitization—exemplified by smart robots, a connected ecosystem, and autonomous driving—will play an important role in the supply chain, especially in logistics.

In the automotive industry, logistics encompasses the coordination of millions of parts daily, from thousands of suppliers globally via multiple modes of delivery. Adding to this complexity, vehicles and aftermarket parts may leave manufacturing locations, warehouses and shipment yards, as completely built-up (CBU), semi knocked-down (SKD) or completely knocked down (CKD) units.

Throw in outside forces such as geo-political storms, fluctuating currencies, volatile market conditions, and rising customer expectations it becomes clear that organizations must have a strong logistics framework in place to closely track material and product flows across value chains. For such a model to work efficiently, it should be self-steered rather than centrally steered, and should be able to map and track the lifecycle of any given part.

PACE: Building a digital supply chain

Just as the health of the human body depends on the consistent beating of the heart, a healthy supply chain relies on smoothly functioning logistics. A PACE-maker ensures logistics is functioning in a smooth and orderly manner (Figure 1).

PACE is:

Predictive planning and sensing, to balance demand and supply.

Agility to respond quickly to sudden changes, handle unexpected disruptions smoothly and cost-efficiently, and recover promptly.

Collaboration between internal (manufacturing, procurement, sales, after sales) and external (customer, suppliers, 3PL) stakeholders to fulfill demand efficiently.

Efficiency to reduce supply chain costs, maximize profit and competitiveness, manage volatility, complexity and disruption.

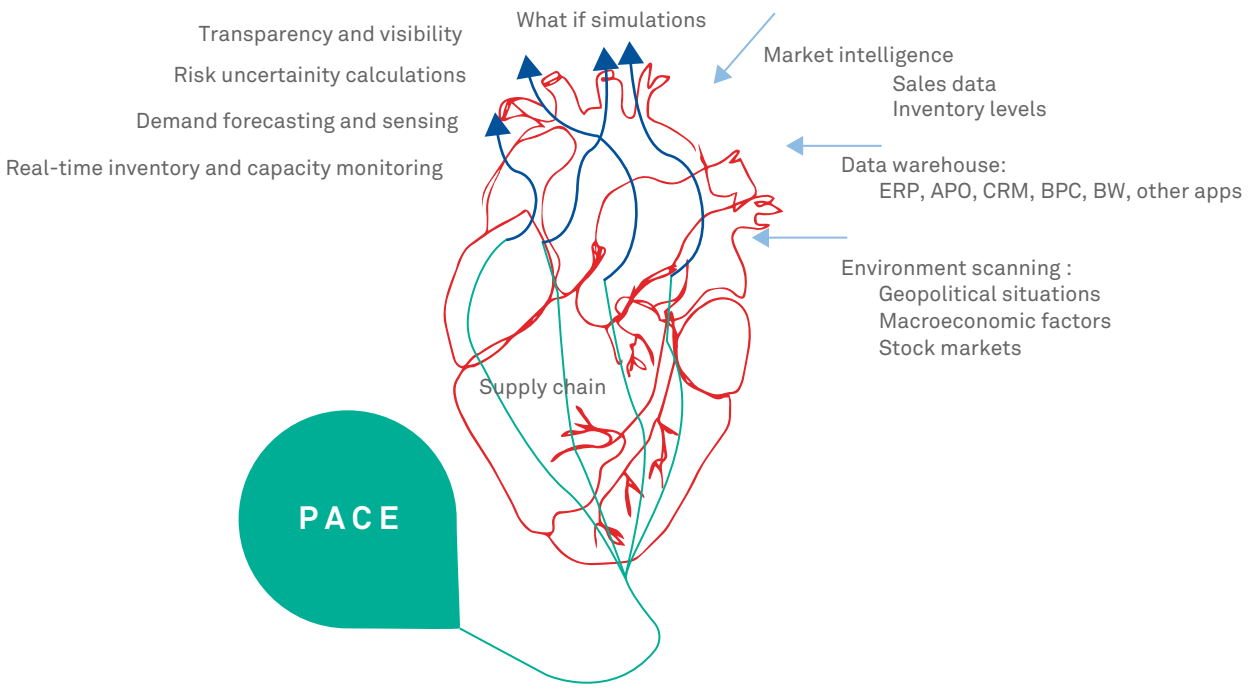


Figure 1: PACE for the supply chain

The PACE Forward

Let's get back to Rob's predicament.

Figure 2 depicts a basic PACE model that Rob's organization can use to identify and manage disruptions to the supply chain. With sufficient inputs from both demand and supply sides, this model enables an organization to monitor the supply chain and generate any number of what-if scenarios.

Demand-side inputs:

- **Plant's production schedule** including the exact production dates and times corresponding to each MTOC (Model Type Option Color)
- **Bill of materials** identifying parts' required quantity for each MTOC
- **Open orders** detailing part numbers, quantity, planned delivery date and time
- **Part receipts** showing the receiving status of the parts
- **Model mix** breaking down the split of MTOC at each plant
- **Inventory** detailing available quantities of each part at every location

Supply-side inputs:

- **Revised ETA** updating the time of arrival from the logistics provider
- **Serial numbers** of the containers on the shipping vessel
- **Part numbers and corresponding quantities** in each shipping container

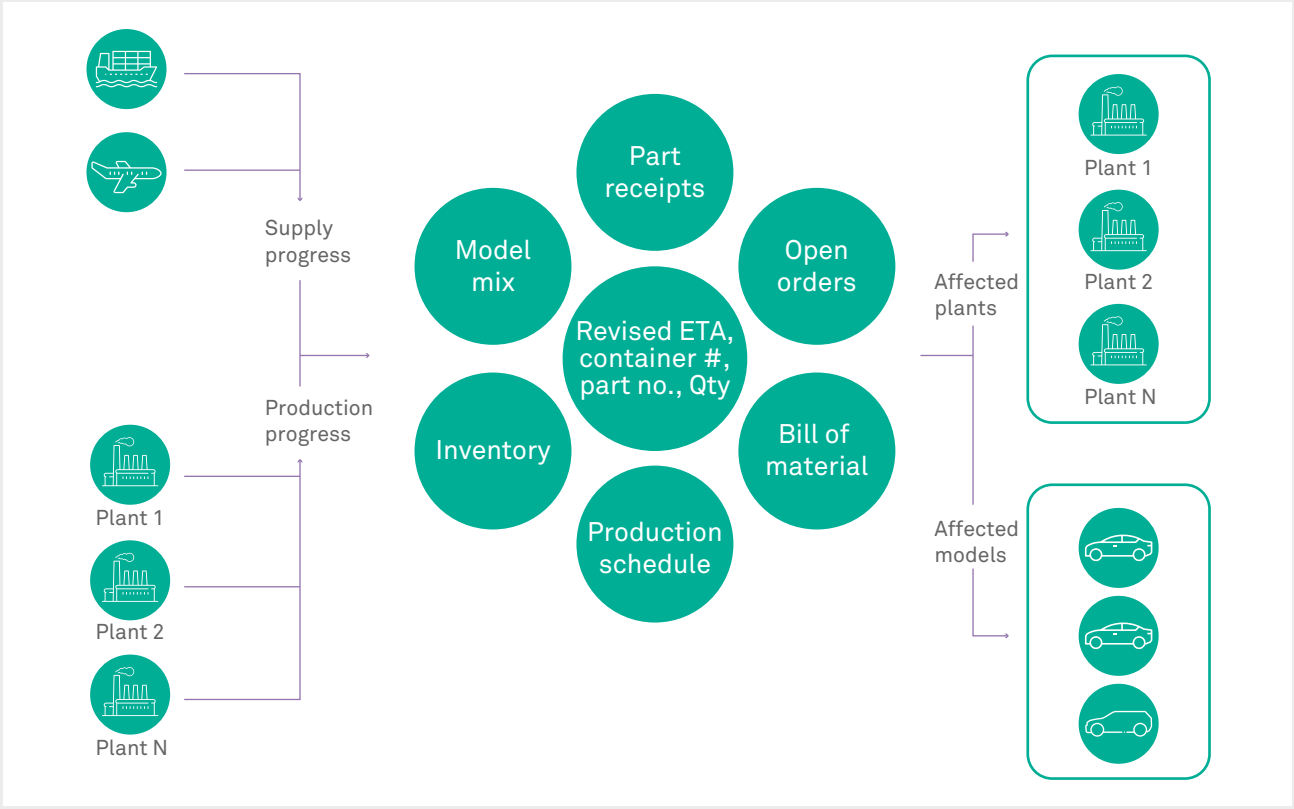


Figure 2: The model for the PACE forward

With this model in place, Rob is now in a position to monitor not only the supply status but also to simulate future disruptions and generate potential solutions.

Figure 3 shows Rob's simulation dashboard, which captures the current situation. All the shipping vessels and air carriers are arriving as planned. No part shortages are expected and all plants are projected to run smoothly.

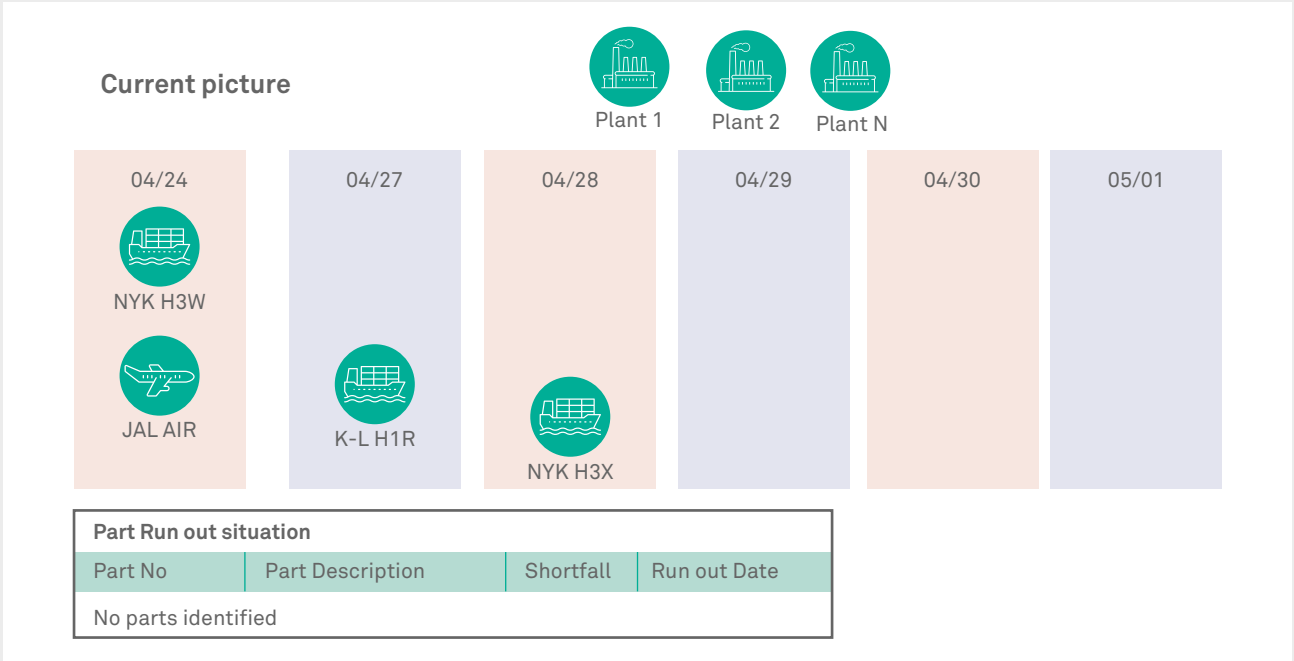
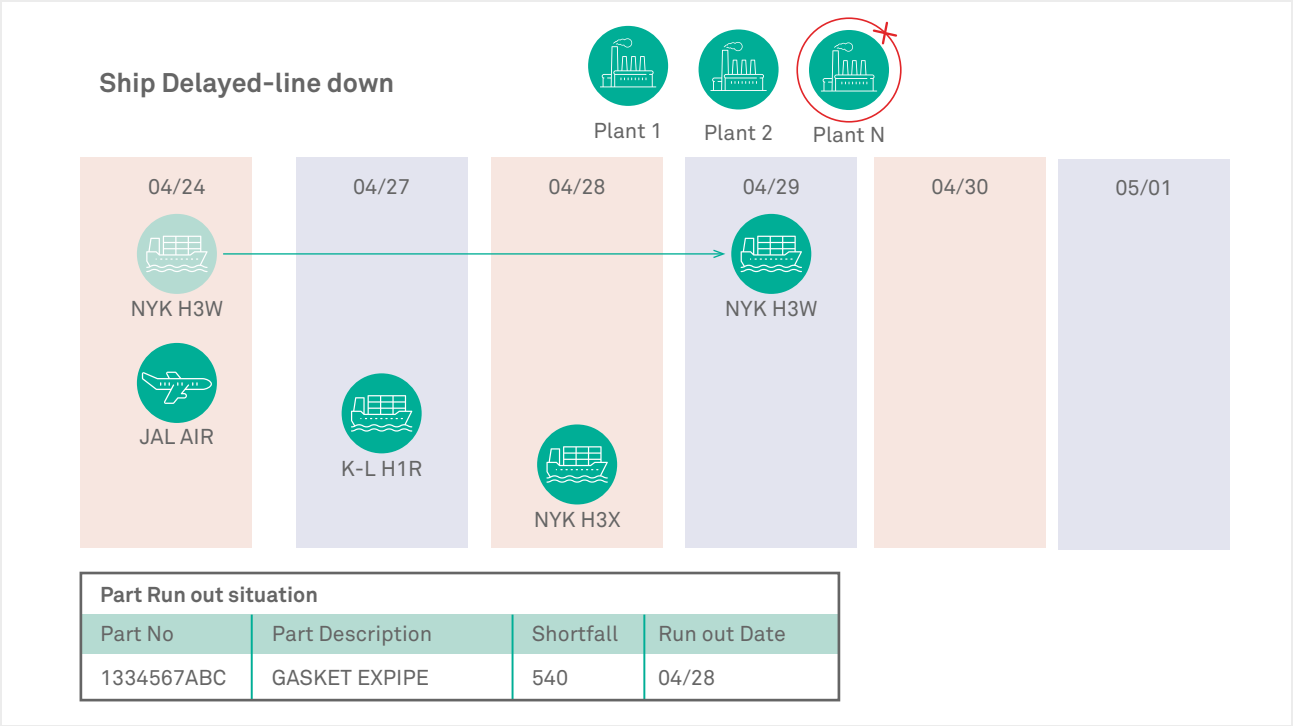


Figure 3: Rob's current dashboard - No parts shortage

This situation can change rapidly. The power of the PACE model is that the moment there is any disruption – a shipping vessel's ETA changes from 04/24 to 04/29, for example – the model reassesses the situation. In this scenario, as shown in Figure 4, the model identifies a part needed to keep the line from going down at Plant N.

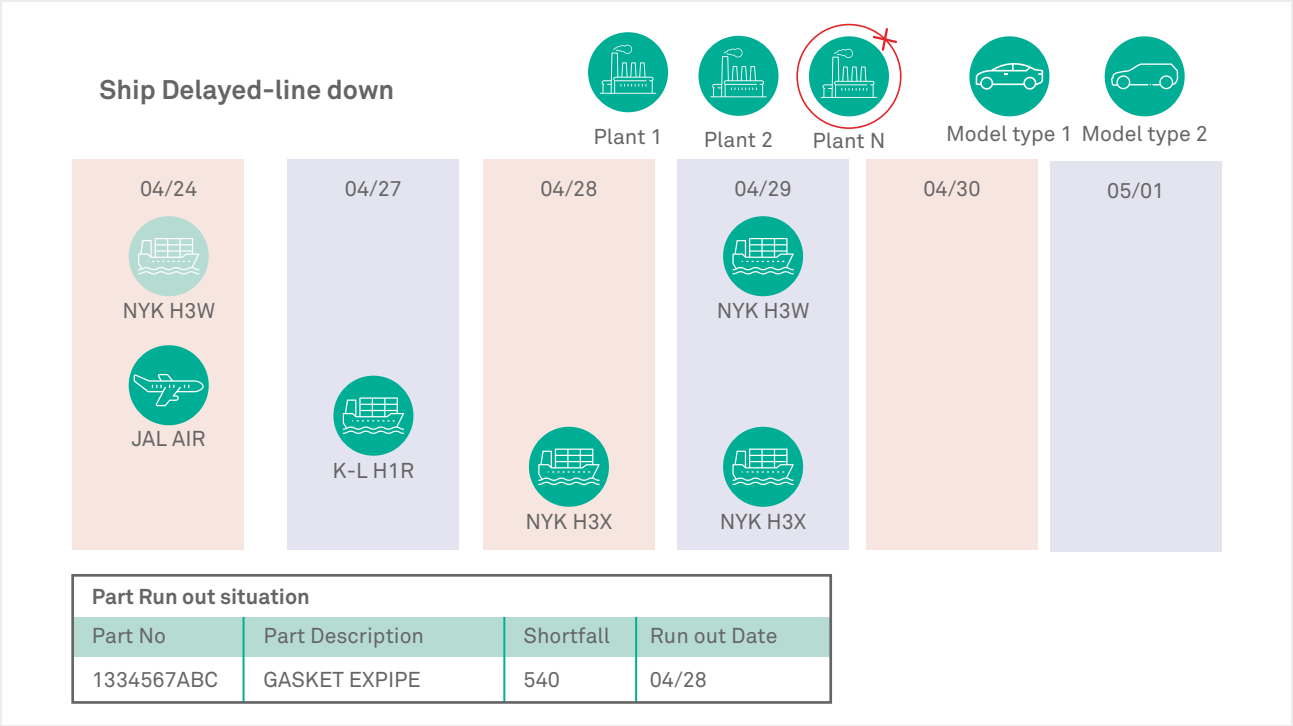


Part Run out situation

Part No	Part Description	Shortfall	Run out Date
1334567ABC	GASKET EXPIPE	540	04/28

Figure 4: Rob simulates - Shipping vessel delay

Rob can quickly check the vehicle variants that may be impacted, as shown in Figure 5. He can also check if the part is available at other locations or if he will need to expedite containers once they reach the port.



Part Run out situation

Part No	Part Description	Shortfall	Run out Date
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Figure 5: Model identifies impacted plants and models

Moreover, as illustrated in Figure 6, Rob can see which containers contain the part needed. Expediting all containers would be an expensive proposition – Rob would like to only expedite the critical containers.

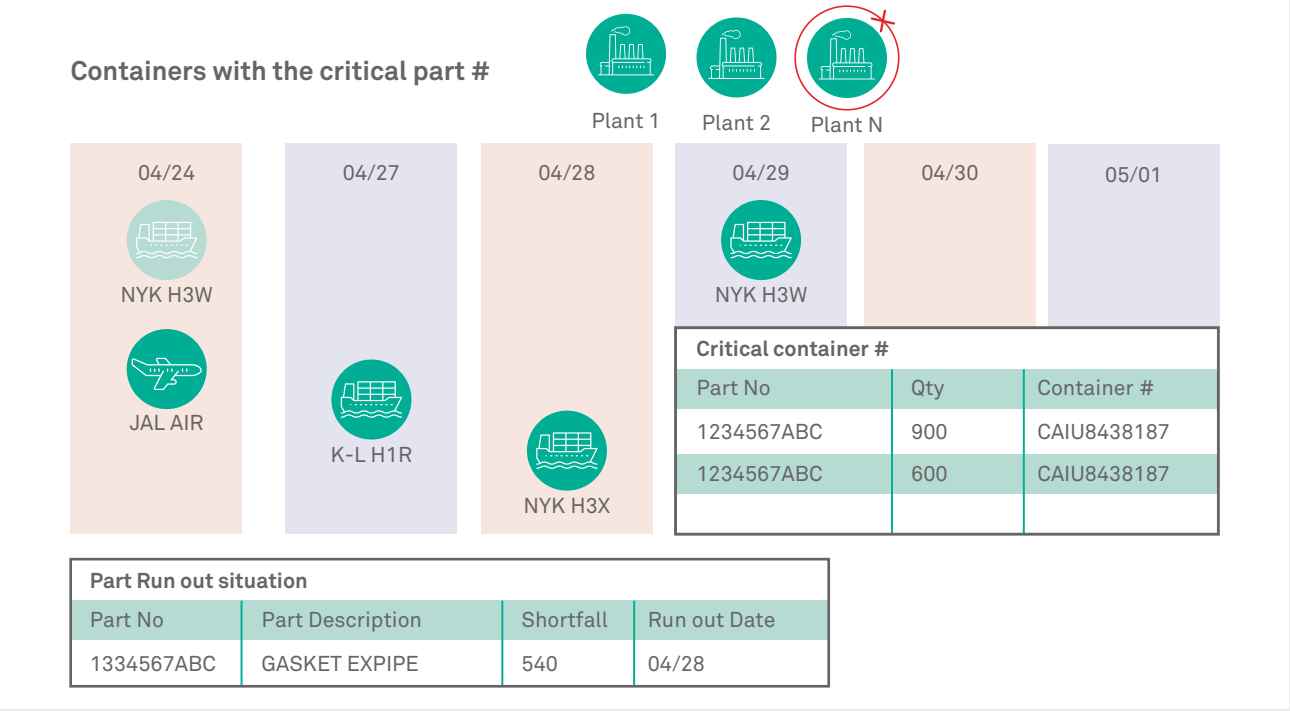

Figure 6: Model identifies containers that need expediting

The systems in place enabled Rob to meet the PACE objectives.

- **P**redictive – the system was able to predict the situation before it occurred
- **A**gile – Rob's organization was able to respond to the situation with agility
- **C**ollaborative – Rob was able to collaborate with the plant and with the logistics provider to arrange the logistics
- **E**fficient – Rob was able to selectively expedite critical containers instead of the whole shipment

Conclusion

With growth comes complexity. To effectively manage his supply chain, Rob has to focus on inbound operations while also maintaining visibility of the outbound operations in his company's supply chain. As markets continue to grow and OEMs keep expanding their portfolios, production capacities, and geographic reach, executives like Rob will require:

Supply Chain Governance

- Organizational focus on making logistics and supply chain key elements
- Strategic transformational changes to gain more visibility of their raw material, work in progress, and finished goods, as well as transparency in the complete value chain

Supply Chain Alignment

- Ability to link internal production capability with external supplier capacities
- Increased awareness of their supply chain cost (detailed breakdown of total landed cost)

Supply Chain Optimization

- Dissemination of real-time information effectively throughout supply network
- Automation and integration of company-wide processes and applications

To respond to the increasing complexity in the automotive supply chain, OEMs must move away from a forecast-driven approach to logistics and toward an approach that is methodical, demand-driven, and responsive end to end. Adopting the PACE framework is an excellent way to start.

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