

Make Everything Count

Why orchestrating data is key to future logistics improvements

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Synopsis

The capture and availability of more and richer data has transformed the logistics management impact on businesses. More effective logistics management has become a competitive differentiator to businesses as it enables improved costs, quality and reliability, regulatory compliance, responsiveness to customer needs and achievement of corporate social responsibility objectives. As a result, the role of the logistics manager is being transformed, entailing new activities and competencies involving real time data collection and management to orchestrate the activities of an increasingly complex set of carriers and outsourcing partners. Enabling technology, and advances in functionality, are critical enablers of orchestration capability. It is vital for logistics and transportation managers to understand their existing data and master using it to refine their orchestration capabilities. These refined capabilities will enable logistics managers to not only optimize cost and operational performance now based on current capabilities, but also to prepare to capture and exploit the wealth of available data that will be available through evolving technology and business processes to drive improved performance for their companies. Emerging solutions are likely to include a complex web of technology elements including sensors, scanners, cloud, blockchain, machine learning (ML) and a variety of specialized logistics tools and platforms, as well as new advanced capabilities from service providers leveraging the emerging technology. Logistics managers that most effectively harness and orchestrate these capabilities to drive business outcomes will be increasingly valuable and in high demand.



Executive Summary

The importance of logistics management is being elevated as companies come to understand the scale of the cost, operational and other benefits to be derived from being able to use increasingly rich and complex data to orchestrate their supply chains, and the competitive disadvantages experienced by those companies that fail to do the same. Consequently, the logistics manager role and profile are shifting to a high visibility consumer and modeler of data to orchestrate increasingly complex operations.

Orchestration is an art and not just a science. It requires the right people, process and technology. It comprises analysis and using multiple data sources that are brought together to meet the demands of the business owners and their consumers to source solutions and to manage carriers, service providers and internal operations. In the transportation and logistics market, the orchestration of all data sources is king.

More and richer sources of available data are driving the potential for more effective and resilient operations	There must be an orchestration operating model that drives the access, analysis and use of logistics data
Effective application of this data drives significant cost, timeliness and quality improvements	Orchestration facilitates the optimal synchronization of operations
Customer expectations demand increased transparency and timeliness for logistics information	Technology advancements have enabled better alignment with business expectations
Compliance and corporate social responsibility requirements have increased	Logistics operations have increased impact and C-suite visibility
The outsourcer and carrier markets offer a more complex array of options than ever before	Logistics managers need to attain new levels of sophistication in data management and use to drive and coordinate performance across internal and outsourced operations

The Orchestration of Logistics Operations

Recent world events highlight the criticality of having control over logistics and the ability to be nimble and flexible. The overarching challenge in modern freight transportation has been the significant number of blind spots caused by a lack of connected data across the ecosystem. The nature of transportation itself means that there will always be problems, ranging from local accidents and failures to geopolitical issues and global economics. However, there are also significant opportunities, and logistics is now seen by many companies as a key area of innovation. To manage these problems and opportunities, and to evaluate the impact of both, it is clear that data visibility and modeling hold the key.

At the same time, there are demands being placed on transportation management that go beyond the traditional expectations for managing the costs and reliability of transportation solutions. There is an expectation of providing ever greater supply chain resiliency, visibility and transparency, higher levels of customer service, better predictability and an increasing focus on transportation management as a means to reduce the overall carbon footprint. This requires a new type of analysis, with the ability to flex a variety of transportation constraints and look at the resulting impact measured against a broad variety of different scenarios.

Similarly, and when looking at whether transportation should be run internally or outsourced, companies need to make these decisions based on empirical evidence rather than just gut feel. Having perhaps then outsourced, many companies look to validate the services that are being delivered, to ensure that the provider is performing as contracted.

The challenge for the logistics manager is getting access to the transportation data necessary to optimize operations and costs in the face of this complexity. Much of the data may reside in disparate and fragmented applications or spreadsheets

that are scattered across the company and the various other participants in the supply chain.

Transportation and logistics managers have always been challenged by an infinitely complex set of factors that can affect the movement and quality of goods around the globe. Their ability to react to this complexity is constrained by significant data gaps. In this context, transportation and logistics – which are increasingly critical to business operations – comprise a sizeable portion of the cost of goods sold. Thus, they need to be optimized to maintain schedules and quality, drive profitability and meet increasing customer service expectations. It is this shift towards using data to enable better decision making and gain more end-to-end control of the process that is leading companies to look at new solutions. A modern transportation management system (TMS) might be one option, although not every enterprise may necessarily want to initiate this type of project. However, they still want to be able to rapidly capture, cleanse, consolidate, enrich and utilize their transportation data to analyze the options to run more efficient, resilient and transparent logistics operations. This is where transportation orchestration is offering new possibilities.

Transportation managers must balance the complexity of their business functions among cost, delivery time, risk and social responsibility. Clients may be willing to consider higher costs for the benefit of faster delivery and for a transport option providing a lower carbon footprint. However, each situation has a unique set of criteria related to the point of origin and destination, the nature of the product being transported, customer needs and expectations, market capacity and other factors.

Logistics problems can shut down production lines, so customers rely on accurate inventory, shipping and delivery information to coordinate and adjust production and sales activities under highly dynamic conditions.

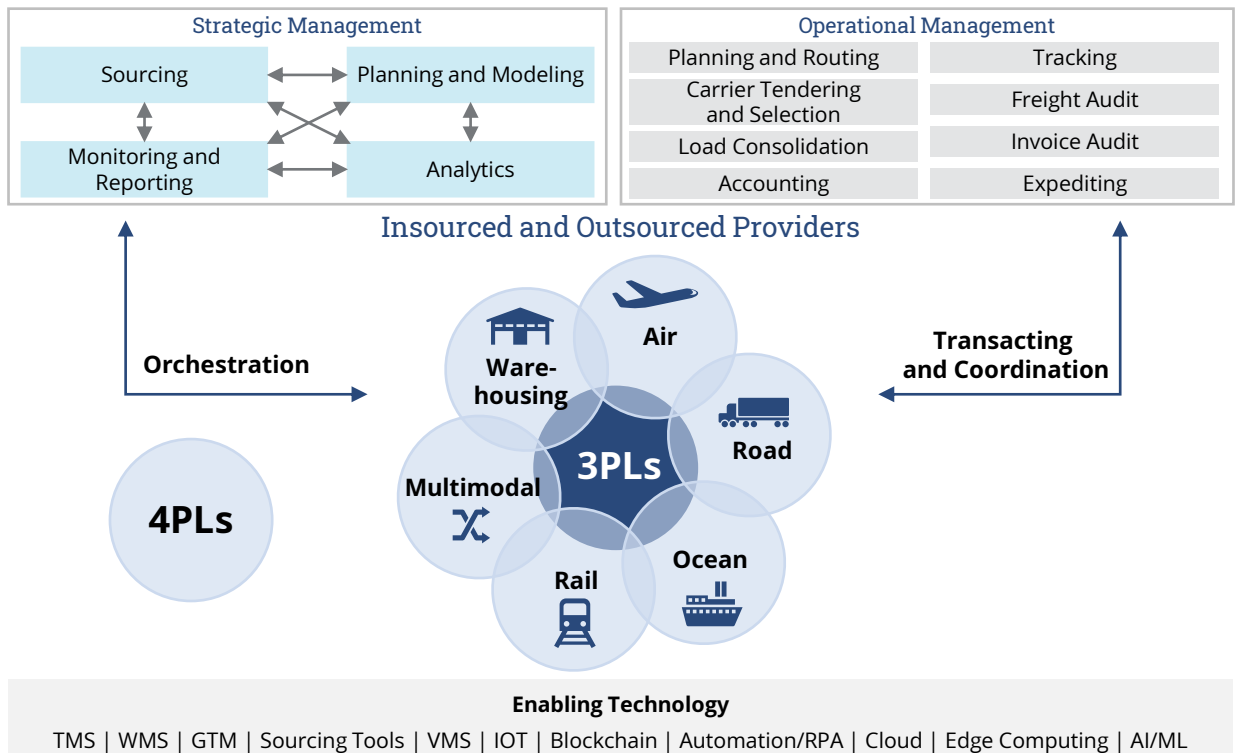
Transportation and logistics managers need the ability to model complex scenarios comprising multiple options, and the closer their activities can come to capturing all relevant data points and accurately model multiple scenarios, the better.

Technology, of course, is a critical enabler of enhanced logistics management capabilities. It enables gathering, measurement, sharing, transacting and modeling details of logistics operations across the supply chain participants. The technology landscape is complex, and usually federated across the various players in the supply chain. Significant improvements in orchestrating the logistics operations require more sophisticated data modeling to optimize complex scenarios, and to compare actual results against the model to continue to address gaps and drive improvements. These improvements raise the bar as a differentiator for companies that are competing for the same customers, transportation capacity or both.

Core to improving transport operations are more comprehensive and timely data related to status, capacity and pricing across the transportation network. Companies also need the tools to analyze and process this data to drive better and faster operational and strategic decisions. Insights from this data enable enterprises to review operational shipment plans or dependencies and relationships, to adjust routing and to validate and enforce service level performance from 3PLs and 4PLs more accurately. By applying what-if analyses, companies will be able to better predict possible consequences of current and future decisions.

Better data will provide insights that may also feed into more strategic investment decisions, including organizational and process changes, upgrading talent, and the deployment of transportation management systems, real-time visibility, IoT and other technologies. If done well, orchestration can be a means to prove the ROI from these investments, helping logistics planners and supply chain directors to understand and evaluate both the costs and the benefits.

Figure 1 – Orchestration Operating Model



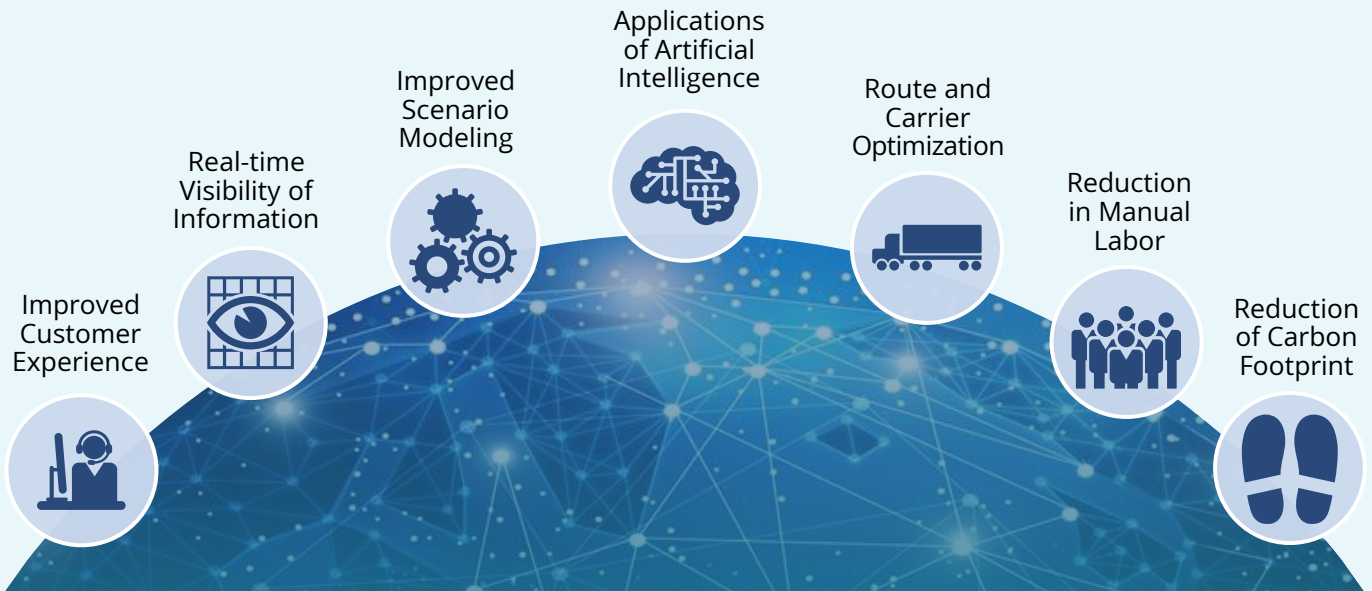
The Orchestration of Data – Synchronization of Operations

The criticality of data was driven home by recent events. On January 1, 2021, free movement of goods and people between the U.K. and the European Union ceased because of Brexit. This left transportation and logistics organizations around the world – already reeling from a year-long COVID-19 pandemic – flooded in new paperwork. Additionally, transportation capacity issues became severe as border crossing facilities became overloaded and the cost of air freight soared. In March 2021, the cargo ship Ever Given, which was headed from China to Rotterdam carrying 20,000 shipping containers worth an estimated \$9 billion, blocked the Suez Canal, one of the world's most important shipping routes. This added to already the critical shortages of many products, from fuel to computer chips. These events only underscored existing challenges in transportation and logistics resulting from a decades-long transformation of the global supply chain.

These examples further exposed weaknesses in the global supply chain and underscored the need for transportation and logistics managers to increase the level of information integration with, and among, the various stakeholders and outsourced partners across their transportation networks. The good news is that the increased visibility of logistics criticality, considering these situations, has built a climate of heightened C-suite interest in ways to optimize those multi-sourced networks. Dynamically managing the right mix of insourced and outsourced activities and routes, selecting and monitoring the right partners, and managing the overall network performance, is a strategic imperative. These actions support core production and sales operations, reduce costs, ensure socially responsible decisions, and deliver a better customer experience. Advances in data capture and modeling now enable users to better address these issues. These advances provide more accurate and actionable data – data that increasingly spans across, and is shared among, the numerous participants in the transportation network.



The relevant advancements in data application toward better orchestration and the associated benefits include:



- 1. Improved customer experience** – There are cloud and SaaS offerings that allow for rapid innovation. They provide visibility across many enterprise applications including finance, manufacturing and warehouse, inventory and transportation management.
- 2. Real-time information visibility** – Rich and accessible data lakes are being created by integrating Internet of Things (IoT) and telematics data into the transportation management system. Real-time predictive analytics can provide much more precise insights for estimated time of arrival (ETA), for example.
- 3. Improved scenario modeling** – Companies can now incorporate data with intuitive tools to enable predictive modeling across a multi-sourced transportation and logistics network. One use case is to create digital twins that give transportation and logistics managers virtual representations of different systems and situations, including shipping routes, warehouse configurations, packaging scenarios and more.
- 4. Application of artificial intelligence (AI)** – Results can be enhanced by applying AI that leverages machine learning and advanced analytics to proactively identify transportation risks, opportunities for route and carrier optimization, support automation and enhance the customer experience. This is the first step in leveraging AI and ML, the true value comes when the learning results in changes to the status quo. The companies that can recognize those changes and quickly adopt and adapt will leapfrog their competitors.

5. **Route and carrier optimization** – Applying improved data and insights enables real-time adjustments of routes and partners. This can take place in reaction to analysis of actual partner performance, and changes in relative costs and risks of different options, that together improve the timeliness, quality, cost and resilience of transportation solutions.
6. **Reduction in manual labor** – There are industry-focused and purpose-built solutions aimed at non-intrusive ways to remove friction from both complex networks and from complex tasks in the enterprise, such as load building, appointment setting and track-and-trace functions. There is increased demand for IT managed services that can help build and operate these transformational platforms.
7. **Reduction of carbon footprint** – By leveraging technologies such as AI, robotics, automation, and tracing and mapping applications in transportation management systems, businesses will be able to achieve transparency, energy efficiency, waste minimization across their supply chain. Sourcing of ethical raw materials and offering sustainable product and services will offer the businesses the opportunity to offer better customer satisfaction and experience.

The common thread among all these advances is how improvements in the data capture and modeling capabilities for orchestrating the logistics process of an enterprise can create awareness of the necessity of new solutions to support optimized business processes.

A key challenge in improving transportation solutions to better support core operations is how to do so with increased planning efficiency and more effective partner management capabilities. This includes capturing and integrating data from many sources; data is often locked in disparate systems ranging from enterprise resource planning (ERP) applications and unconnected transportation management tools to basic spreadsheets.

By adopting new transportation management features, the value of this data can be unlocked to optimize logistics, reduce costs and delays and improve transportation network performance. Positive impacts also include better resilience through modeling and forecasting, improved customer experience through real-time knowledge of network performance, adaptation of greener and more ethical logistics solutions, and improved ability to achieve regulatory compliance and mitigate risk. With increased emphasis on supply chains in the wake of recent disruptions, this could be an ideal time for companies to evaluate whether the improvements in transportation management technology can have much effect on their business.



The Challenges – Increasing Complexity in Transportation Management Impacts Business



Visibility of Information

Lack of end-to-end visibility in a multi-sourced transportation network affects transport planning, operations and reporting. Information about status of shipments at any given moment – especially the last mile – is unreliable. And overcoming obstacles like unpredictable traffic and driver shortages to meet service delivery requirements can be expensive. While enterprise resource planning (ERP) and transportation management systems (TMS) have revolutionized many industries, the more traditional legacy applications are often complex, poorly integrated and unable to share data, especially across participants outside of the enterprise.



Risk Assessment and Mitigation

Longstanding marketplace trends such as just-in-time inventory practices and lean supply chain methodology have made risk mitigation across many areas – geopolitical unrest, natural disasters, pandemic crises – mission critical for logistics managers. Lacking the buffers of inflated inventory stockpiles, without transparency across suppliers and partners, enterprises are at risk of seeing their core business operations disrupted by a myriad of possible transportation disruption scenarios. Furthermore, stop-gap solutions to such disruptions tend to be significantly more costly than pre-defined risk mitigation solutions. Companies need a single source of truth to track, manage and orchestrate multi-sourced networks as part of a cost-effective risk mitigation strategy.



Customer Experience Innovation

While the primary driver of customer satisfaction will always be delivering goods on time without damage, achieving full customer satisfaction today requires much more than that. Customers require real time information to coordinate and optimize their own operations – and knowing not only that a shipment is on a truck for delivery that day, but also, more specifically, that it is 30 miles away and will arrive at 3:15 in the afternoon can make a big difference to plant operations. Due to innovations such as same-day delivery and the now standard ability for customers to track order status in real-time on a smartphone, both business and consumer expectations are much different than they were just three years ago. Additionally, customers increasingly require access to richer data that can include IoT-based information that can indicate whether goods were exposed to any adverse conditions that might degrade their quality, as well as blockchain validation of provenance and compliance. With advances in AI other technologies, richer data becomes actionable, and the ability to provide more comprehensive data to the end customer becomes a critical expectation of customer experience.



Corporate Social Responsibility

Transportation and logistics are quite literally where the “rubber meets the road” in helping companies reduce emissions, eliminate waste, ensure ethical supply chain practices and meet the mounting regulatory requirements to address climate change and social inequities. It is no longer enough to rely on contractual provisions of transportation and supply chain partners. Companies need real-time visibility and proactive performance monitoring that allow for quick action to predict and remediate violations and limit the associated risk.

Market Observations

Two widely held, but contradictory, post-COVID supply chain planning strategies emerged from analysis of a [September 2020 survey of shippers by Transport Intelligence](#). The organization found that 43 percent of respondents were planning to increase the number of partners they work with, and 30 percent were planning to decrease their pool of partners. The organization noted: “Both strategies have their merits and can help to diversify risk, more suppliers may grant shippers access to more available capacity in times of crisis, while fewer stronger relationships with larger providers can grant access to capacity via those companies’ own networks and their own large supplier pools.” In either case, improved analysis and modeling of transportation data will better enable users to validate, refine and adjust their strategies more effectively.

As shippers consider their strategies, future logistics operations are expected to be even more adaptable, flexible and agile to changing business, customer and market dynamics. These operations and the systems that support them will have to manage a range of dynamic insourced and outsourced functions and partners, and leverage cloud platforms that can more effectively integrate and orchestrate data to tap into the power of advanced analytics. At the same time, these strategies need to be deployed seamlessly in an industry stubbornly resistant to major overhauls in both processes and technology.

From the systems perspective, the main application areas that are driving and will continue to drive transportation management systems are mode, carrier, shipment and load optimization, performance management analytics, invoice matching and settlement, and freight capacity planning. Increased globalization will bring higher focus on capabilities such as supporting multiple languages, time zones and currencies, compliance and regulations management, and multileg international shipments. Success depends on establishing a single source of truth as a foundation for optimization and innovation, and a governance framework that can improve transparency and increase resilience.



Challenges with Traditional Data Management and Analysis

Traditional logistics management capabilities provided significant benefits for more effectively managing routes and suppliers but were limited by significant blind spots that hampered logistics managers' ability to model and optimize routes, to accurately track status and to resolve issues with necessary agility. The inability to better manage the significant costs associated with the transportation portion of the transaction was the most impactful limitation.



Lack of Data Integration

Previous capabilities suffered from a lack of integration of transportation data into broader business intelligence systems. As a result, much of the data that logistics managers rely on comes from transportation suppliers in formats that they cannot easily analyze and mine for insights.



Lack of Correlation Among Data Sources

Traditional approaches for logistics companies have mainly focused on streamlining their own transactional activities and supporting major operations, and were limited when it comes to exchanging data across the full supply chain. Inconsistent data and unstandardized data structures hamper the accuracy of analytics (increasingly enabled by artificial intelligence) This can result in a failure to respond to environmental or operational signals, driving costs and delays.



Business and Market Uncertainty Demands Agile Systems

The transportation market is highly dynamic and is constantly impacted by changing micro and macro factors such as e-commerce growth, changing buying patterns, demand for same-day delivery, regulations, fuel prices and natural events. All these factors require an agile framework that can quickly adapt to

changing business conditions and incorporate a more advanced approach for planning, forecasting, execution and delivery. In general, a lack of agility in transportation management can lead to a rise in inventory carry costs, ordering costs, production costs and loss of sales.



Lack of Uniform Data Governance Framework and Standards

Data governance allows substantially higher data integrity, ease of use, availability and security based on standards set by businesses and global authorities. In the era of rising globalization, it is critical for logistics systems to maintain data governance standards across the network. Today, as more privacy and protection regulations continue to emerge, logistics executives need to work closely with compliance and legal teams. Next-generation data governance processes will remain focused around data sharing, appropriate roles for data consumption, organized metadata, privacy and other enablers.



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Lack of Scalability and Globalization

Many transportation solution analysis approaches have tended to be standalone applications deployed on a “per depot” or perhaps regional basis. While generally adequate for modeling local operations, they lack the scalability required to model the global supply chains in operation today. Attempting large-scale analysis using these tools often required a level of data aggregation that made the results theoretically strong, but operationally weak. It was difficult to understand the real operational implications of the output as the data had often been aggregated to such an extent that it was impossible to reverse engineer the results back down to the operational level.

Modern transportation management platforms can help to address this through analysis of vast quantities of granular data, so that the results can be directly applied into operational environments.

Besides the lack of scalability, traditional solutions could not generally model the characteristics that are fundamental to global supply chains. This could be manifested in various ways, from simple factors such as the use of different currencies, time zones and units of measure, to the complexities of understanding the varying customs duties and tariffs, free trade agreements and other features of global trade and compliance. Any solution that seeks to optimize the global supply chain must take into account the rules of both transportation and global trade, since the two disciplines increasingly work hand-in-hand both legally and operationally. For example, shipments cannot be dispatched on schedule without the right customs paperwork, and have to be routed in accordance with regulations governing both sanctions and denied party screening.



Lack of Security

Transportation and supply chain data has become not just mission critical, but in many cases super-sensitive. It is the type of data that is now prone to both industrial espionage and malicious hacking, as evidenced by the fact that all four of the world’s largest shipping companies have been hit by cyberattacks (source: <https://www.zdnet.com/article/all-four-of-the-worlds-largest-shipping-companies-have-now-been-hit-by-cyber-attacks/>). In this respect, when analyzing and orchestrating supply chain data it is vital that companies recognize both the value of the data itself as well as the potential impact of the resulting analysis being disrupted or stolen.



Business Decisions Made Easier – Key Areas of New Tools and Functionality

Advances in transportation-related systems and technologies, together with more efficient network orchestration, have the potential to solve seemingly uncompromising business problems. Areas where there have been promising advances include:

- Network capacity
- Digital twins
- Orchestration of information and systems
- Artificial intelligence and machine learning
- Ethical sourcing



Network Capacity

Many factors have limited transport network capacity and make it more volatile. These include Brexit and its effects on transportation control and on regulation changes, more frequent route and warehouse disruptions caused by natural disasters, rapidly shifting supplier and manufacturing resources, and the widespread, acute global trucker shortages. All these factors can cause shippers to be unable to meet their obligations. Network capacity functionality will enable transportation managers to accurately identify network constraints and available capacity, plan accordingly, and when necessary, adjust with greater agility.



Digital Twins – Let Decision Makers See the Future

Digital twins are models of real-world processes or ecosystems that enable planners to envision a myriad of possibilities and outcomes resulting from actions they can control. Organizations can use digital twins to run simulations to see the effects of activities such as outsourcing or insourcing certain supply chain functions or transportation routes, acquiring or decommissioning transportation assets, renegotiating non-asset-based transactions or automating processes to eliminate human error.

Creating digital twins allows an organization to model scenarios replicating various changes to these processes or ecosystems to constantly optimize the operational supply chain.

Digital twin capabilities added to logistics planning can enable users to better understand potential problems and business opportunities, and proactively mitigate any challenges or volatility such as closed ports, partner issues or climate change impacts. Using digital twins can also improve risk management and enable organizations to map most types of disruption. This can even include data-based solutions to understand environmental or political factors and their implications for transportation network structure. The digital twin enables data and plans to be analyzed without endangering real-life production data and plans.

By correctly applying logistics supply chain data orchestration, enterprises will be able to model how a broad variety of actions can affect operations and to continuously fine-tune this analysis against actual performance data. This will enable organizations to see the impact of operations from the country of origin to country of delivery. Informed organizations will see alternative ways to deal with the risks of broad environmental, economic or geopolitical disruptions, as well as specific localized problems. Furthermore, richer data will enable users to model and mitigate costly problems such as fuel waste, degradation of perishable items or inaccuracies relating to time and delivery. For example, data from IoT integration with sensors for measuring temperatures, physical acceleration and deceleration, outgassing and other environmental conditions will provide valuable inputs for modeling the impact to inventory quality in different scenarios. Supplier data, including financial stability and operational conditions, can further be included into scenario modeling.

Digital twins rely heavily on a data lake repository that can be used for the rapid, real-time storage of operational and surrounding environmental sensor data streamed through the IoT, which can then be structured according to the provided schema and stored in data warehouses. Data lakes, often referred to as “schema-on-read,” scale easily at a reasonable cost, and hence, are ideal for fast storage of massive amounts of data. Data lakes offer users structured data that can be used for further processing such as analysis or for having an operations replica using digital twins and extended reality (XR). This process requires analyzing historical data plus creating real-time insights from complex event processing (CEP).



Information Orchestration to Share Insights Among Peers

A key to coping with logistics challenges is orchestration of information. With orchestrated transportation management systems, companies can streamline their data and automated processes and facilitate ecosystem collaboration involving internal and external stakeholders. Logistics organizations like 3PLs and 4PLs, but also small business carriers, will become more resilient and agile through real-time visibility.

Data orchestration combines and manages siloed data from multiple sources, which helps create a structured data lake. Data orchestration organizes data, transforms it to one standard and makes data available for additional processing. This enables companies to automate and streamline data-driven decision making, and is the best option for companies with multiple disparate systems. But that is not the only benefit of data orchestration. It also helps companies comply with data privacy laws, remove data bottlenecks, and enforce data governance.

Through orchestration capabilities, customers and providers, shipping companies and warehouses will gain easy access to logistics data through advance dashboards, custom reporting solutions and performance analysis. Ideally, this access will be available without media breaks and interruptions in processes, and without significant requirements for data conversion or transformation. The key benefit will be the degree to which the system provides the right information at the right time to the right people. To this end, information visibility should include a manufacturer's providers, supply chain partners and peers in transportation management environments. Currently, many companies attempt to manage orchestration using spreadsheets and paper, so this capability will have a significant impact.



How AI, ML and Blockchain are Working in Real Enterprise Operations

Advanced technologies like artificial intelligence, machine learning and blockchain could revolutionize supply chain operations and the logistics of transportation. To leverage the potential of those technologies, users will need a modern cloud transportation management platform that can seamlessly integrate the modern technology stack.

Blockchain, in particular, will be a prerequisite to exchange information between interested parties. This technology will ensure that only those that require access to information will have access to it, and that the data will be correct, uncorrupted and uncompromised. Blockchain will become key to orchestration and ensuring privacy.

Business applications that integrate blockchain technology can create intelligent track-and-trace solutions not only for a truck, container or facility, but for any information across the supply chain network. Organizations can take advantage of this technology without requiring the client user to be an expert. Technology providers that offer blockchain as a service will enable clients to create their own solutions using blockchain.

By using artificial intelligence, logistics organizations can create automated scenarios that, for example, react to certain conditions like traffic or environmental data. Intelligent decision solutions or decision support systems, based on automated recognition of certain situations, will establish agility for logistics operations. AI applications will also alert users about any potential damage, breakdown, maintenance requirements and future events that might occur and create operational changes. The next step to this involves generating machine learning-based recommendations to deal with such scenarios, which are known as next best action (NBA) recommendations.

Instead of running down hard-coded to-do lists for external situations like disasters, strikes or heavy traffic, an orchestrated transportation management system that has AI capabilities can help to automate the required actions.

Machine learning is another emerging technology for logistics. ML algorithms can adapt by learning from information. Machine learning will become important when bulk loads of data from trucks, containers, hand-held devices and other sources become components of an orchestrated transportation management system. With machine learning algorithms, systems can learn to filter the “normal” from the data stream to find the known and unknown.



Ethical Sourcing Has Become a Strategic Imperative

Organizations are facing new challenges to track and trace every part or component of a product. This need might be forced by regulatory definitions but also by a company's awareness about environmental responsibility. As an example, Volvo Cars was searching for a method to trace cobalt from its extraction through its refinement, use, end of life and recycling.

Cobalt is an essential mineral in lithium-ion batteries, and more than half of the world's cobalt is extracted in the Democratic Republic of Congo. An estimated 15 to 20 percent of DRC cobalt is hand-dug by independent miners and then sold to traders and large-scale mining companies, making it extremely difficult to tell the difference between pirated and ethically sourced cobalt. To combat illicit practices, Volvo Cars inked 10-year deals with battery suppliers Contemporary Amperex Technology (CATL) in China and LG Chem in South Korea, with both agreeing to participate in a blockchain program that tracks cobalt-sourcing activities across their global supply chains.

In addition to using newly mined cobalt, Volvo Cars' electric vehicle battery suppliers are also sourcing cobalt recycled from older lithium-ion batteries. To ensure that various cobalt recycling and refining companies such as CATL and LG Chem use safe and ethical processes, Volvo Cars enlisted sourcing blockchain specialist [Circulator](#) to develop the carmaker's traceability network and run these nodes on [Oracle Blockchain Platform](#).

By authenticating each person, mining site and truck, blockchain helps Volvo Cars see exactly where the cobalt was extracted, who mined it and how it was transported. Using an orchestrated transportation management system to manage all data, Volvo Cars and its suppliers make sure that the raw materials in the batteries, including minerals like cobalt, come from ethical supply chains.

Future Practices in Sourcing and Vendor Governance

As we have firmly landed in the digital era, significant advances in design principles for strategic sourcing and vendor governance have become both possible and necessary. Traditional sourcing approaches tended to be prescriptive, where bidders focus on specific requirements. For strategic sourcing, ISG's FutureSource approach has shifted to a solution design-oriented sourcing method, where collaboration around solving critical business objectives has shifted to earlier in the process. We see this type of approach becoming more critical as more work is shifted to 3PL, 4PL and BPO providers that can bring additional innovation and specialization to logistics and transportation management.

Similarly, vendor management and governance require an increased connection between the day-to-day operational management and the strategic alignment of supplier relationships. The use of AI to extract deliverables and obligations (on both sides) from contractual agreements, a single recording system between the supplier and the customer for performance data, designed-in collaboration mechanisms, and the right extraction and summarization of key relationship and operational performance indicators at the strategic level provide for more robust, strategically aligned supplier and customer relationships. In addition to the technology, new skills in data science and scenario modeling will become necessary parts of the portfolio expected of vendor managers.



The Five Keys to Modernizing the Logistics Supply Chain

There are some critical steps to take to future-proof logistics operations.



1. Sourcing

In the future, it will be necessary to manage an increasingly complex ecosystem of suppliers. Dynamic sourcing capabilities will become more important than ever. To manage the providers and enable automated negotiations based on AI and data orchestration, shared performance data and collaboration capabilities will be increasingly important.



2. Data governance

Users will need to review and improve their data governance capabilities. Accessing and sharing data among all participants in a logistics supply chain is the foundation of future-proof logistics. Technologies like blockchain will support information exchange accuracy and security.



3. Flexibility and agility

Transportation managers will need to become increasingly adept at utilizing the significant increases in information availability and functionality to enhance flexibility and agility. Orchestrating all information between internal departments and partners like 3PLs and 4PLs will improve flexibility across the supply chain.



4. Transparency and visibility

Organizations need to shift to greater transparency to more effectively collaborate across the supply chain. Transparency and visibility are foundational for digitalizing logistics processes and operations. Information visibility across the complete set of data in the supply chain will help companies to monitor and adjust their partner ecosystems.



5. Integrating advanced technologies

This step will be key to providing superior user experience and customer experience. Blockchain can become an elementary part of a transportation management system to secure accuracy and safety across a supply chain. Blockchain also enables TMS integration with other enterprise applications. Business applications that use technologies such as blockchain, AI and machine learning will support intelligent track-and-trace for end users without needing support from IT experts.

Where Next

Global trade is dynamic in nature and is subject to frequent changes. Transportation, supply chains and the systems underneath therefore will develop further beyond tomorrow.

New markets are developing not just through political changes but also through the new responsibilities of organizations. New free trade agreements among countries will bring changes as well. Logistics enterprises need to understand the impact of moving products across the borders of jurisdictions.

There will be startups that might have disruptive solutions for logistics, supply chains and transportation management. Just think of how digital money has evolved. 3PLs, 4PLs, manufacturers and carriers will be facing new challenges. ISG recommends that companies create transportation management systems that provide the logistics organization with the agility and resilience to adapt to those new challenges.

Mobile apps will modernize to integrate with modern logistics platforms. In the warehouse management system area, new mobile platforms will be integrating warehouses, transportation applications and the IoT. Mobile apps will cause new workflows to emerge. Robots and drones for last-mile delivery will lead to even more data that needs to be monitored, controlled and analyzed. In addition, there will be shortage of 175,000 truck drivers by 2024, according to the American Trucking Associations, due to the aging workforce and difficulty of attracting younger workers. Coupled with a rise of e-commerce, same-day delivery is expected to give significant rise to autonomous trucks and vehicles to tackle these industry struggles. Autonomous vehicles are expected to be the next disruption in transportation management and distribution in the next four to five years.

Furthermore, improvements to analytics and machine learning can help an enterprise to achieve better information visualization and usability beyond logistics, to areas such as finance and production.

Conclusion

- The world of transportation logistics is rapidly changing. Businesses are changing due to new supply chains and new requirements for transportation and logistics. Social responsibility will become a competitive value for corporations.
- New concepts like information orchestration, digital twins, informational resilience and the visibility of information to all participants of a business process will support enterprises in coping with the challenges of a new normal.
- Leveraging the benefits of optimization and resilience leads to less waste, better routing, energy savings and therefore minimizes the environmental impact and carbon footprint.
- Eliminating manual labor and standalone spreadsheets do not, on their own, make companies more resilient and agile. Rather it is Orchestration that enables this, by allowing companies to have a common view of their transportation data and the ability to both accurately measure current performance as well as evaluate potential operational changes.

Sources

- **Market insights:** ISG internal research documents and project reports
- **Volvo:**
<https://www.oracle.com/connect/volvo-mines-blockchain-to-keep-ethical-sourcing-promise.html>



About the Authors

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Bill Huber is Partner – Digital Strategy and Solutions and a well-known thought leader in the field of technology, sourcing and transformation. In his current role, Bill is focused on helping clients to de-mystify, optimize, accelerate, and de-risk technology driven business transformation, through strategy, sourcing, and execution.

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At ISG Holm Landrock has built the multi-client studies and vendor benchmarks, now IPLs, and has supported renowned clients – Including internationally leading mobility and financial services providers – with the strategic selection of modern solutions. As an ICT analyst, technical journalist and author of several books, Holm Landrock's core topics include technical-scientific computing, enterprise computing and trend topics such as e-health and quantum computing.

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Tarun has nearly decade of extensive research experience across ICT domain including report writing, drafting though leadership, analyzing IT spending, consulting clients on latest trend and business use cases. Additionally, he has been responsible for delivering end-to-end research projects, working along with internal stakeholders in delivering various consulting projects.

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Mr. Aase brings extensive experience in the implementation and research of service integration and management of both IT and business processes. With over 35 years of experience, he is highly skilled at analyzing vendor governance trends and methodologies, identifying inefficiencies in current processes, and advising the industry. Jan Erik has experience on all four sides of the sourcing and vendor governance lifecycle - as a client, an industry analyst, a service provider and an advisor. Now as a research director, principal analyst and global head of ISG Provider Lens™, he is very well positioned to assess and report on the state of the industry and make recommendations for both enterprises and service provider client.



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