The Digital Supply Network

New Era of Supply Chain Visibility and Tracking



esri

THE SCIENCE OF WHERE™



Table Of Contents

03 Manufacturing Supply Chains Face Unprecedented Market Pressures

05 The Rise of the Digital Supply Network

07 Location Intelligence Is Central to the Transformation

08 Visualizing a Global Operating Picture

10 Enabling Tracing

12 Real-Time Monitoring and Tracking—Always On

15 Understanding Service Levels and Gaps

17 Moving Forward in a Transformed World

18 About Esri



Manufacturing Supply Chains Face Unprecedented Market Pressures

Supply chain innovation will determine which companies succeed as traditional practices are disrupted.

Traditional supply chain practices are being disrupted and forcing leaders to pursue transformative strategies to overcome the challenges of an increasingly complex environment. Determining how to innovate begins with understanding how buyer behavior and technology are shaping the supply chain landscape.

Four developments are putting pressure on manufacturers:

1 Empowered Customers with High Expectations and Abundant Choices

- Most developed nations have more cars, more food, and more of everything else than needed to survive. As the world population grows and consumer buying potential continues to expand, the opportunity to produce, distribute, and sell globally will increase.
- Through online access to data, consumers put pressure on companies to be at least as knowledgeable as their customers.
- Buyers of all types want information and products right now, putting pressure throughout the supply chain for faster results.

2 Big Data

- Rich, informative data flows into organizations at unprecedented rates. Organizations need to access the right data as quickly as possible.

3 Speed

- Companies must respond faster to customers, environmental concerns, and operational risks. Managers need to make informed decisions more quickly than ever to solve real-time business problems.

4 Shifting Risk

- Historically, once products were manufactured, sold, and delivered, the burden of product performance resided with the owner or the operator. Today, manufacturers are expected to participate in the entire value chain, sometimes through disposition. Manufacturers need to keep tabs on finished goods throughout their life cycle, including how the supply chain enables the product's end-to-end life cycle performance.

Innovative strategies must provide connectivity and transparency in the supply chain to minimize transactional costs, poor customer experiences, and negative brand exposure. It's vital to keep pace with company demands for market share expansion, and supply chain leaders need to get in front of the daily crises to become strategic contributors for growth within their organizations.

This new world is just beginning, and the opportunities and risks have never been greater. It's imperative to embrace and adapt to these radical and global industry changes.



The Rise of the Digital Supply Network

Today's manufacturers face an increasingly complex network of physical and digital elements. To get ahead of market pressures and outperform the competition, companies need to completely transform their traditional supply chain philosophy.

The era of the linear supply chain is over. Visualizing supply chain operations as linear points along the value chain from supplier to end customer leads to discrete processes conducted in information silos. With a step-by-step approach, data gaps or errors occur without understanding the implications to downstream recipients. Poor or missing data continues to flow through the chain and is magnified, creating a ripple effect. Highly disruptive consequences result with the highest value resources placed in firefighting mode. None of this is acceptable in a digitally driven world.



Naturally, physical supply chains include warehouses, cargo ships, containers, production sites, retailers, and customers—but more and more, they're becoming connected. Consider the growth of smart products, smart factories, and smart cities. Essentially, technology has enabled manufacturers to create a digital twin of the physical supply chain, allowing operational managers to understand and analyze situations digitally and take action physically within the supply chain flow before incidents can occur.

Supply chain operations are at once global and local. Managers need to stay aware of global trends, patterns, and requirements and zoom in when and where needed. Companies must focus on the most important buying behaviors, the plants, the workforce, and the environmental concerns in a specific region.

Yet, whether due to political unrest, environmental considerations, workforce compliance, or import/export policies, organizations face intense regulations and risks that affect market potential.

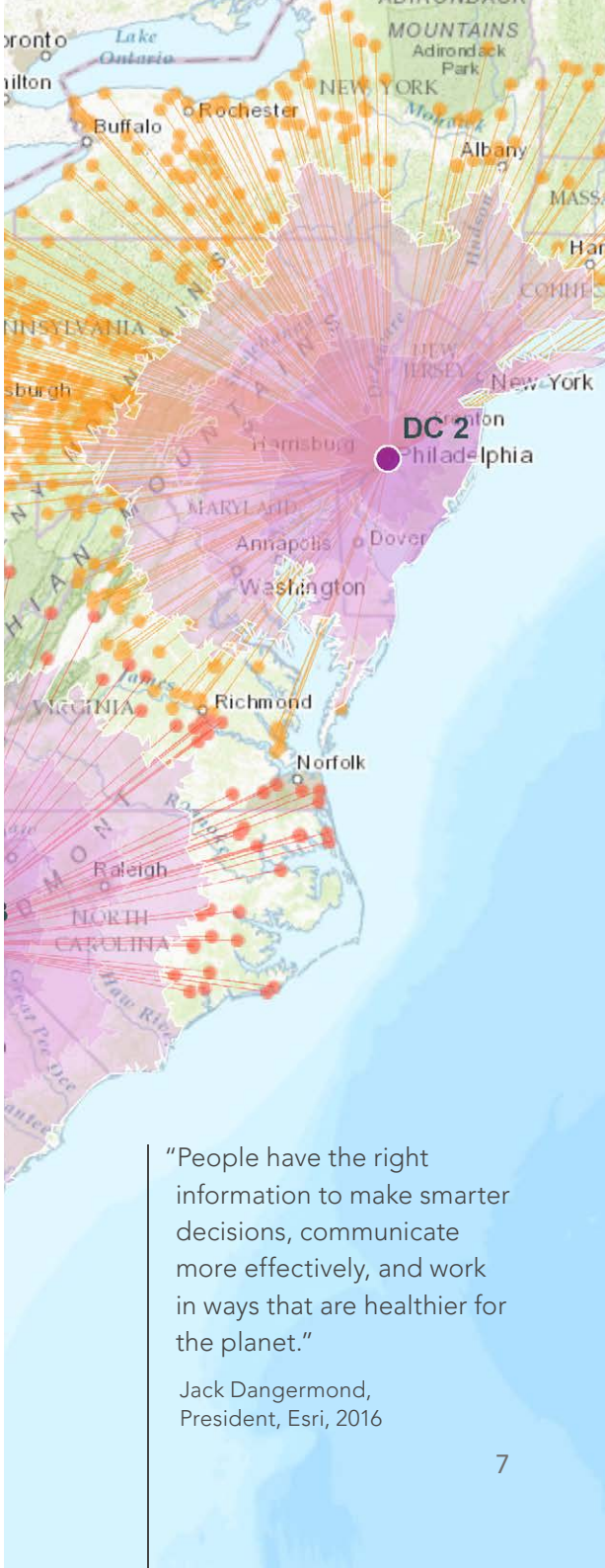
Location Intelligence Is Central to the Transformation

The global supply chain is a geographically intensive business with a widespread asset base serving high volumes of internal and external stakeholders over a distributed area. Location intelligence has a critical role to play in contemporary supply chain strategies and operations.

GIS—geographic information system technology—strengthens company-wide supply chain management while continuing to support its more traditional roles within planning and reporting.

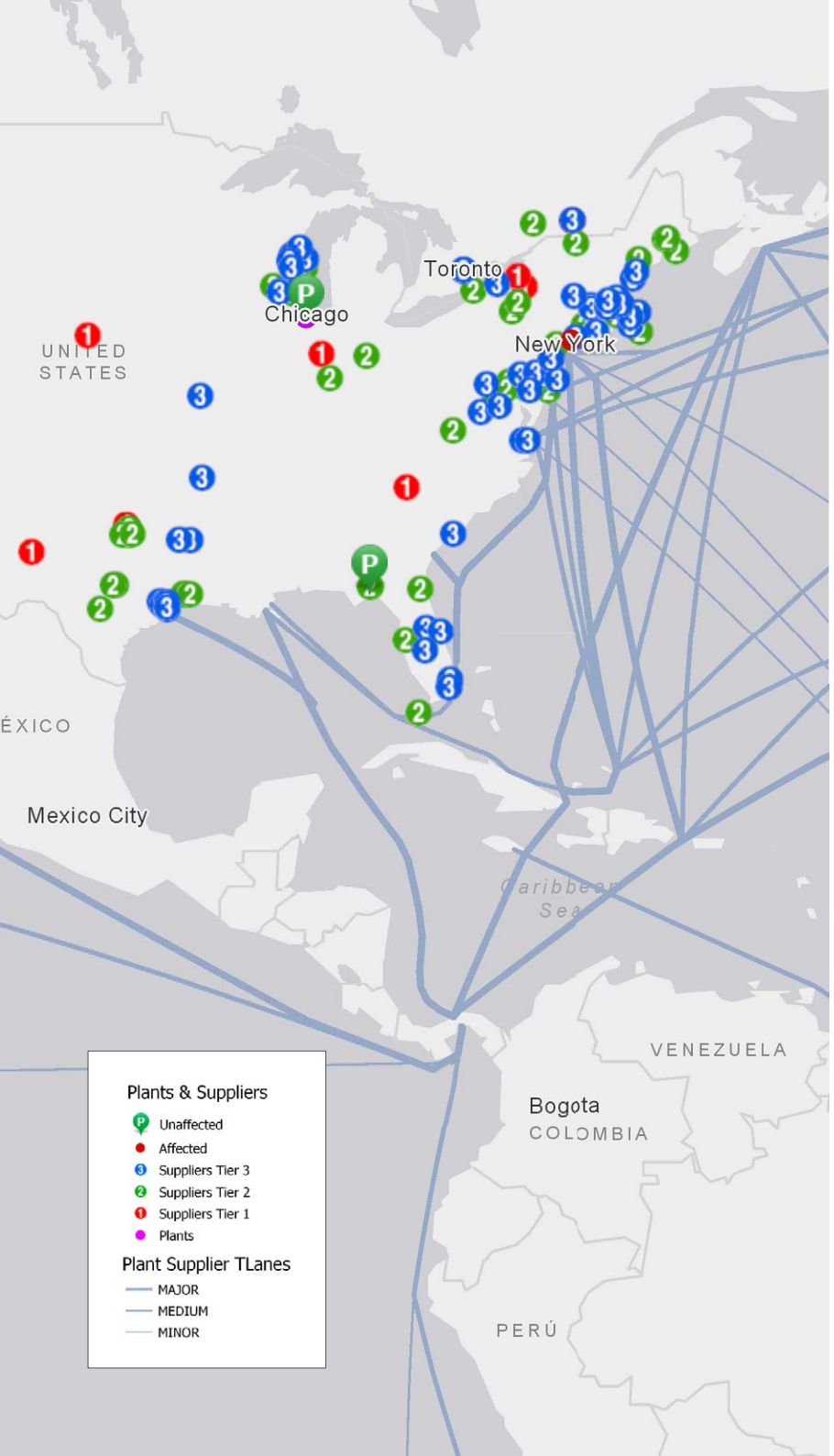
Geospatial specialists have long used GIS to monitor network assets; supplier and distribution sites; and the environments in which all those things are placed, whether stationary or in motion. In our more open, collaborative multistakeholder world, that location intelligence needs to be accessible to suppliers, producers, distributors, customers, and employees, in a form that they can understand and use.

Ready-to-use apps and content in Esri's ArcGIS platform empower everyone to visualize, analyze, and collaborate using maps—anytime, anywhere, and on any device. Now, all stakeholders can make, share, and use maps to collaborate, using maps hosted in web browsers and apps on whichever device they prefer, to improve business across the board.



"People have the right information to make smarter decisions, communicate more effectively, and work in ways that are healthier for the planet."

Jack Dangermond,
President, Esri, 2016



.

Visualizing a Global Operating Picture

Managers, suppliers, employees, and customers have a common need to know what is happening and where, in real time. GIS technology unites live operational data and multilayer geospatial data in a single view for enhanced operational awareness.

- See the locations of dynamic assets such as vehicles, ships, workers, or customers, and stationary assets including suppliers, ports, warehouses, and plants
- Combine streamed data feeds from a wide range of sensors (GPS devices, mobile devices, and even social media) with data from other enterprise systems (CRM, ERP, HRMS) to transform frontline decision-making



Intelligent maps with real-time information let managers quickly answer questions like these:

- Where are the tier one, two, and three suppliers?
- Where are our plants?
- Where are the warehouses?
- Where are my employees by region and category?
- Where are the primary ports that we're calling on?
- Where are the distribution centers?
- Where are our customers and installed base?
- Where are assets in motion?

Whether planning for future supply chain requirements or reacting to real-time incidents, live operational data in geographic context enables faster response times, reduces operating costs, and improves service levels, resulting in better customer outcomes.





Enabling Tracing

Understand up-to-date relationships between sources and customers.

In addition to knowing what is in the market and where it is located, supply chain organizations can use GIS to immediately visualize the complete end-to-end relationships and dependencies, from suppliers to production, distribution, and even the end buyer.

But even knowing all the tracing isn't sufficient. Companies must be able to interrogate the data based on what's at risk and what pattern is emerging in order to predict problems before they surface. GIS provides that capability.

If there is an incident—such as a threat or a recall happening in a region—and a production center is at risk, a manager can immediately visualize the exposure, see where the issue originated, and work through the risk or the threat at any given time to minimize repercussions.

Use Case:
From Field to Customer

Companies want to ensure and trace safety throughout the supply chain. With location intelligence, a commercial packaged-food provider can trace products from the location of origin—for example, where vegetables were picked in the field—through packaging, transportation, and delivery and, in some cases, to who purchased it. These insights speed response during recalls or other food safety predicaments.

Producers can quickly understand the implications of an issue and track the exposure down to the exact row in the field. This helps accelerate effective communications to the public, minimizing negative brand exposure while mitigating costly impacts from having too broad a recall base.







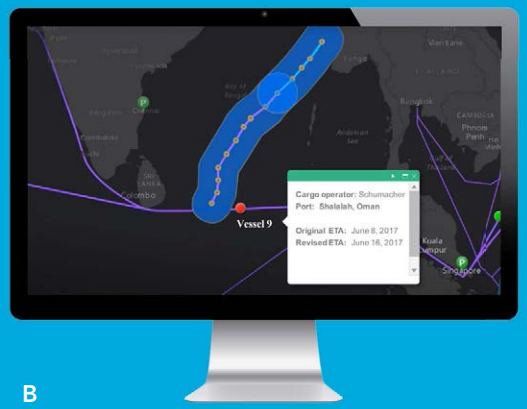
Real-Time Monitoring and Tracking—Always On

Keep businesses running with minimal disruptions.

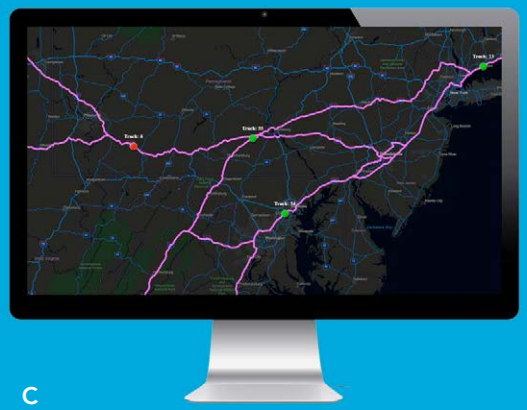
The supply chain is always on—365 days a year, 24 hours a day. Ships are at sea, trucks are on the road, planes are in the air, and trains are on the tracks. Suppliers, workers, and customers are located around the globe, spanning time zones and borders. In addition to this real-time operational data, ArcGIS can show current weather conditions, environmental concerns, and even regional traffic issues.



A



B



C

Alerts help supply chain managers be proactive when assets are in harm's way. For example, when a ship encounters a severe typhoon threat (A), supply chain managers can take action to change the ship's path, advise the distributor of the delay, and monitor the safety of the crew (B).

With this single operating view, it's possible to get alerts related to all aspects of the supply chain, especially when there's the potential of missing service-level agreement (SLA) requirements. These alerts can be tailored by region and category so that only the appropriate managers get involved.

In this example of global trucking alerts, a regional operations manager can interrogate alerts specific to his or her territory and find what is causing a critical delivery delay (C). By investigating a current alert, the manager can analyze a multiday delay of production components and work with an alternate supplier in the short term to mitigate the manufacturing line disruption.

Alerts to key personnel about map updates, event recording, and interactions with other enterprise systems can all be initiated. Alerts can be sent across multiple channels, such as emails, te xts, and instant messages.

As situations emerge around the globe, managers can be advised proactively of suppliers operating in known conflict mineral zones, workers' safety being at risk from an environmental threat or civil unrest, plants exceeding air or water safety levels, and more.

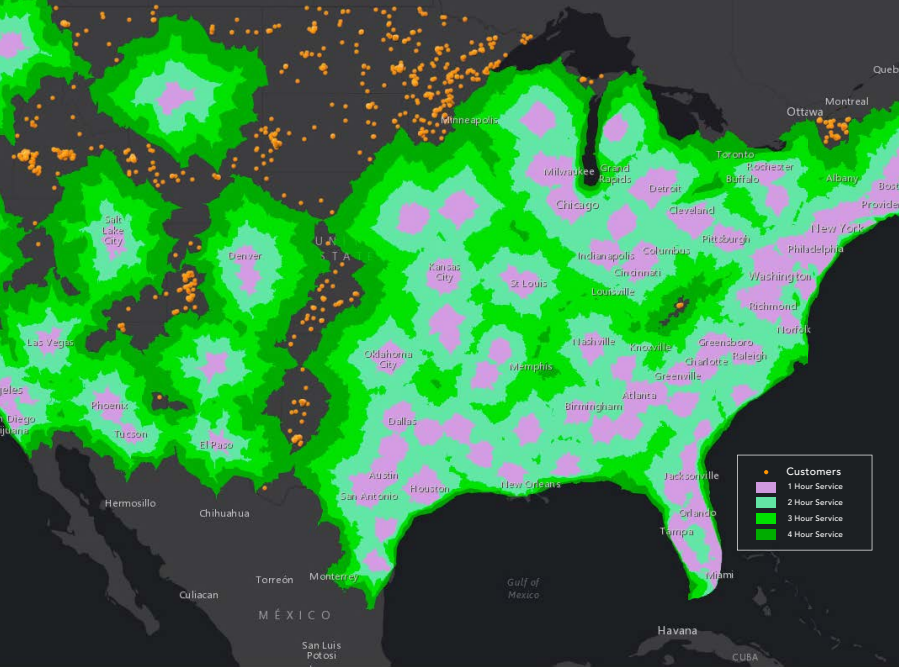




Use Case:
Working around Disruptions to Keep Production High

With the knowledge of a substantial delivery delay due to extreme weather, a manufacturer can quickly identify other accessible short-term sources—in the case of a winter storm, possibly ones from more southern routes—to keep production running.

Through real-time situational awareness of what's happening en route, managers can find alternatives to avoid a costly shutdown.





Understanding Service Levels and Gaps

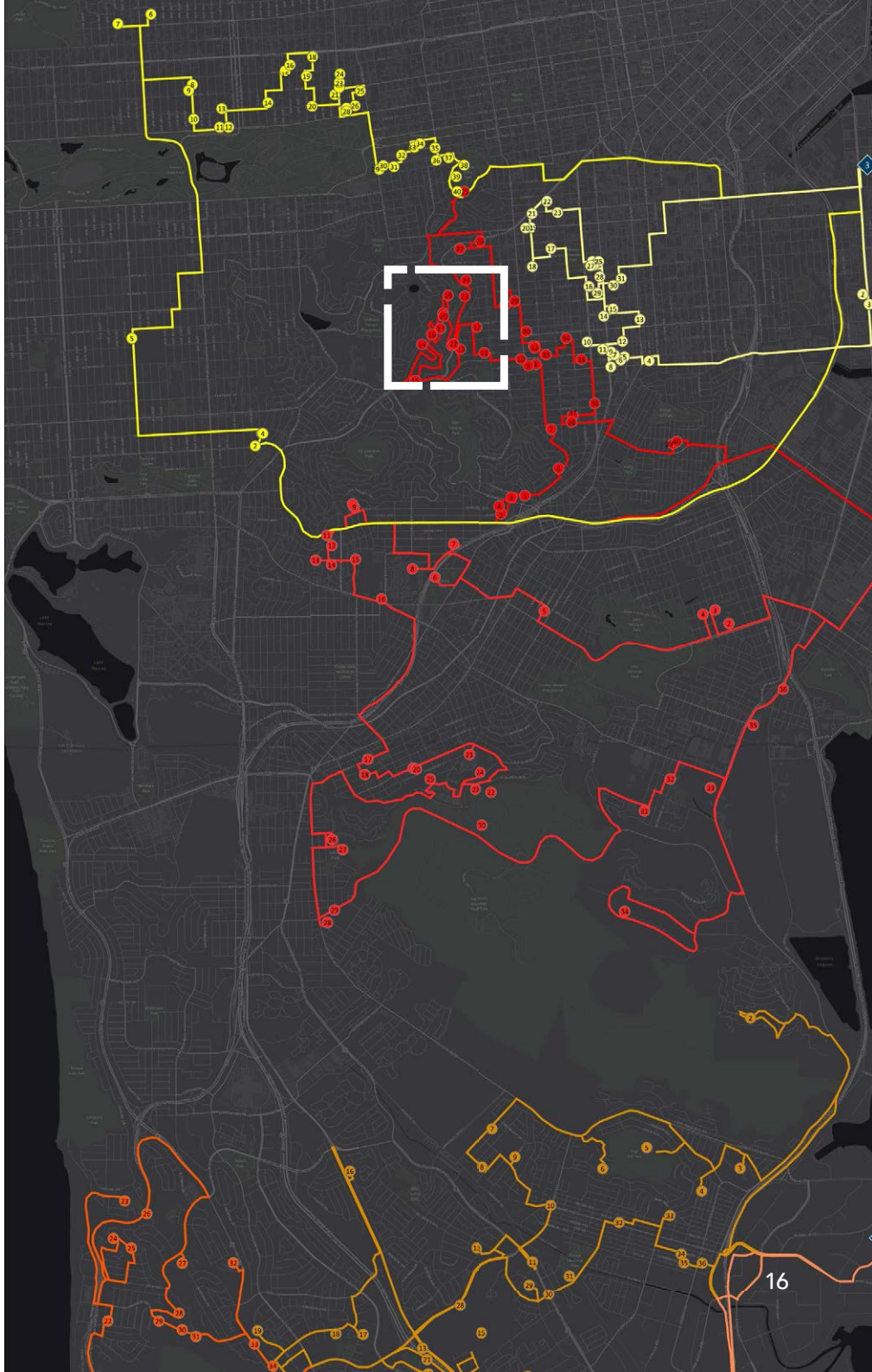
Manufacturers can expand service offerings and increase customer satisfaction.

The supply chain goes beyond distribution. Organizations need to understand access to and coverage of their customer base. This information is easily mapped and visualized to include locations of service centers and related drive times and then used to better serve customers.

Companies can use location intelligence to deliver reliable service-level contracts and identify the best locations for service depots, field technicians, and spare parts warehousing to meet SLA requirements as well as report where those SLAs are at risk of being unfulfilled.

Optimizing Service Performance

Service providers want to deliver world-class outcomes for customers. Based on the locations of customer installations, a service supply chain leader can analyze drive times between sites and service depots to prescript SLAs. This location intelligence also helps companies optimize parts and technician resources through understanding the landscape of the installed base, related detailed SLAs, and where gaps or overages occur.





Moving Forward in a Transformed World

The emergence of increasingly powerful geospatial technology helps supply chain innovators tackle the many new challenges they face on the journey to achieve higher performance in a smarter, more complex world.

By making location intelligence a key part of stakeholder communication and collaboration, this technology becomes more accessible, flexible, and powerful. Geospatial technology will also allow improved operational management of the supply network. As the digital supply network evolves from traditional linear models to complex, interconnected systems, managers will require more precise and granular location information for key processes such as end-to-end tracing, real-time tracking, and alerting and services delivery.



About Esri

Esri, the global market leader in geographic information system (GIS) software, offers the most powerful mapping and spatial analytics technology available. Since 1969, Esri has helped customers unlock the full potential of data to improve operational and business results. Today, Esri software is deployed in more than 350,000 organizations including the world's largest cities, most national governments, 75 percent of Fortune 500 companies, and more than 7,000 colleges and universities. Esri engineers the most advanced solutions for digital transformation, the Internet of Things (IoT), and location analytics to inform the most authoritative maps in the world. Visit us at **esri.com**.

Esri supports manufacturing and supply chain performance and visibility with skills, knowledge, and resources in the following:

- Mapping
- Spatial analytics
- Data-driven insights
- Real-time situational awareness and alerts
- Visualization

For more information, please visit **esri.com/industries/manufacturing**.

Esri
info@esri.com
1 800 447 9778
esri.com

G79155

Map and Imagery Sources and Credits: Esri, TomTom North America, Inc., U.S. Census Bureau, United States Postal Service, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community.

Copyright © 2017 Esri. All rights reserved.