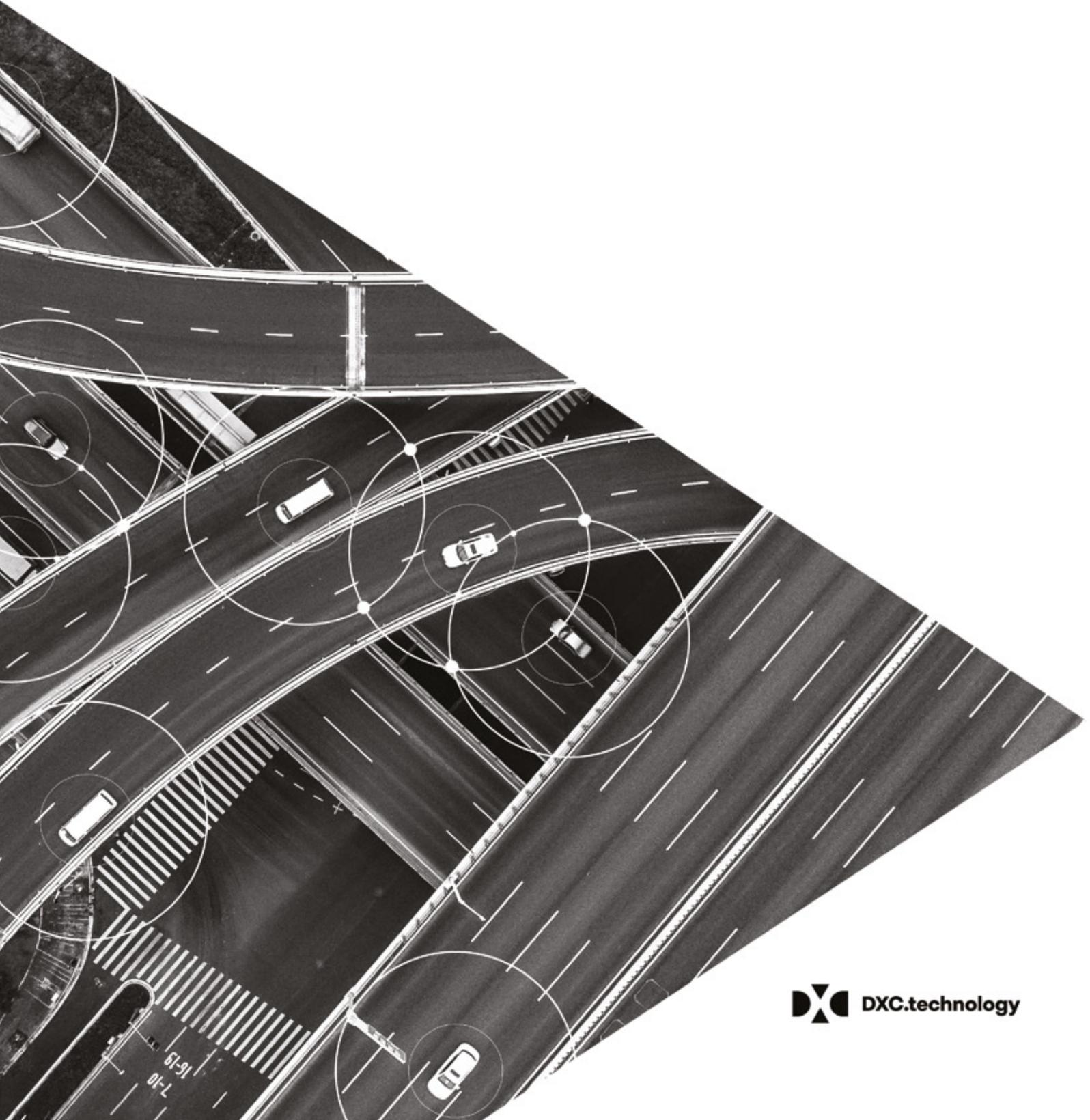
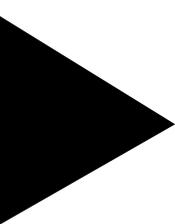


How intelligent transportation systems are changing the industry





Connected transportation is creating new opportunities for personal travel discovery and enrichment, as well as the efficient movement of goods. Cross-linked itineraries across multiple modes of transportation will provide the context needed to provide more systemic solutions to delays. But connected transportation is about more than keeping to a schedule. “Sticking to the itinerary” is giving way to an experience-rich journey built from an open ecosystem of participants that includes airlines, trains, buses, ride-shares, hotels, events and restaurants.

Understanding the traveler’s interests will enable vendors to suggest travel plans that keep travelers on time while offering them new options to explore and learn. Spend your layover in an airport lounge, if you like. Or, how about lunch at a four-star restaurant with time left to browse the local bazaar? A travel app could suggest that and provide the details.

Ecosystems of travel, transportation and hospitality companies are moving to make this happen, and much more. Those who best understand how to localize and personalize journeys with data-driven precision, and that can find problems in advance and fix them, will earn the traveler’s loyalty.



The top three marketing priorities for travel and hospitality companies for the next 24 months are:

- **Improve customer experience**
- **Revenue/pipeline**
- **Improve customer data**

Source: IDC's "Next Tech" Survey of Marketing and MarTech in Travel and Hospitality, Gerry Murray (Doc # US43613818 / March 2018)

A dynamic journey

Travel is consumed in real time and subject to a customer's changing whims as well as obstacles encountered along the way. Meeting times change. Flights are cancelled or delayed. Or we simply feel inspired to add another leg to a journey.

What's more, travelers pass through radically different environments along the travel continuum, with different suppliers, channels, regulations, currencies and payment options.

All of this makes delivering a flawless, well-integrated experience an enormous industry challenge. To deliver that experience, the industry will have to develop a connected transportation system that offers equal participation and access to all industry members and puts the customer in the center of the vision, not legacy protocols and formats. It must be able to serve the individual across companies and channels, starting with the flight system, coordinating with airport-wide retail systems, and connecting to hotels and local service providers.

On the cargo side, the same challenges apply. It's critical for organizations to have full visibility into the freight journey, as goods move from the distribution center, to a freight forwarder or third-party logistics company, to delivery. This is complicated by the transportation industry's shift to an intermodal approach. Companies must now maintain visibility across all locations and modes of transport.

As transformation sweeps the industry, it is clear that many conventions will have to be reevaluated, and some even turned on their head.

Destination: digital transformation

Most transportation companies have mission-critical platforms that contain valuable data, but they are reluctant to bridge these systems for fear of losing their value proposition. Those monolithic processes and siloed data-hoarding strategies no longer work. Digital transformation is about becoming part of an ecosystem that not only shares data, but also delivers context and intent. What's needed is a digital enablement strategy.

Digital transformation is built around an information architecture that enables companies to look across a chain of travel events for an individual customer or package to identify problems, predict the impact and automatically develop and execute solutions that keep passengers and freight moving.

New services can be built around a platform like this that help companies differentiate their offerings or add value in new ways, through mobile tracking solutions, or by using analytics to improve warehousing fulfillment and distribution. For example, sensors in a refrigerated freight car that sense a rise in temperature could trigger a maintenance request to repair a problem or move cargo to another car before it spoils.

Passenger transportation companies can tap into these same tools to find ways to extend their brands and expand into the multiple modes of transportation available to passengers. Digital enablement helps companies understand the full passenger journey and allows for a seamless approach, even if the company is not part of the entire chain of events.

A hotel notified that incoming guests are experiencing delays could offer weary travelers an added comfort or convenience as a way to differentiate its customer service. A tour company notified that a traveler has a long airport layover, and that this traveler loves gourmet food and hand-made crafts, could recommend having lunch at a four-star restaurant and browsing the local bazaar after, and arrange for transportation back to the airport in time for the flight.

Capabilities to provide this level of personalization don't require wholesale integration. They can be developed and delivered through loosely connected systems that share selected data, understand the most important attributes of a customer's journey, and have the awareness to detect issues, the context to recognize the impact and the intelligence to take action.

Implement a connected transportation platform

A connected transportation platform comprises elements such as enterprise services, a partner ecosystem, API gateways and infrastructure delivered by scalable hybrid cloud computing, and storage that incorporates external data sources such as internet of things (IoT) sensors and geolocation data from different transport modes. It allows third parties to gain access via an API portal, with software distributed through a microservices marketplace that enables platform members to inform users across different channels. Every element of the platform is connected by ubiquitous, software-defined, secure digital networks.

Companies that are connected to this kind of ecosystem can benefit in multiple ways. Artificial intelligence (AI)-driven analytics can be applied to monitor data streams to identify irregular operations (IROPs) that might have an impact on the delivery time of a package or a customer's ability to make a flight connection, and initiate actions to mitigate delays. For example, if a small local delivery company were notified that

a high-priority package requiring special handling was arriving soon at an airport, it could dispatch a pickup early to account for heavy traffic conditions, thus avoiding late fees and possibly compromising the contents of the package.

Automation and machine learning architectures coupled with microservices and cloud applications make it possible to abstract functions from one industry to create new services in another. Few companies can afford to bear the development cost of an industry platform, but by spreading the cost across participants in a connected transportation platform ecosystem, the entry cost becomes affordable for companies of all sizes.

Solutions developed for the connected transportation platform can reach a broader, bigger audience than solutions built for niche markets. For example, systems that coordinate functions such as maintenance, repair and overhaul (MRO) share many common features, which means that a vendor building MRO solutions for airlines on the connected transportation platform could enter markets for rail systems, trucks and other transport modes.

LEF Perspective

Building a transportation ecosystem

Imagine that you run a small e-commerce shop and need to ship a parcel. Ideally, there is an API from a transportation provider that can be integrated with your software. You prepare the package, scan a code and receive a notification telling you when the parcel will be picked up.

Now imagine that there is a software company that integrates all the transportation providers. Using that company's API, you specify what you want to ship where. The company finds the best transport provider and uses individual APIs to connect with the chosen provider.

From your perspective, you are making a deal with the software company; the transportation provider acts as a subcontractor. The software company can switch providers as it wishes, possibly manage the transaction using blockchain — and you, the customer, will not notice. This is especially important when extended to multimodal shipping that could involve airplane, boat, train and truck.

In this scenario, efficiency is what matters. It requires transportation providers to break down communication barriers, consume multiple data sources and feed other providers. Although this must be done with technology, technology alone is not enough. Efficient transportation requires cooperation with many different parties (“leave a parcel in the car trunk or in your nearest grocery store”), and that requires building an ecosystem.

There are multiple strategic issues related to this business model. Should a transportation provider create a software company to aggregate providers and possibly compete with itself? What if several transportation providers did this? What are the implications for the transportation provider if it loses direct access to customers because it has become part of a larger transportation ecosystem?

Moreover, if transportation providers focus only on transport, who will create the interface to connect that to your business? Apple? Google? Samsung? If transportation providers try to become true transportation hubs, where you book end-to-end journeys, will this mean they compete with companies offering digital assistants? Can transportation providers play in this arena?

Transportation providers must have a vision of their future selves, as any decisions made today shape the market of tomorrow.

What is your vision for the transportation experience, and what will you do?

Leading Edge Forum (LEF) is DXC Technology's independent cross-industry think tank.

From optimizing runs to optimizing the experience

For many organizations in the travel, transportation and hospitality industry, success is all about “optimizing runs.” Optimizing focuses on getting passengers and cargo from point A to point B faster using less fuel. The two primary factors are efficiency and routing. Whether in the air or on the ground, it’s all about moving passengers and goods at the lowest operational cost.

That’s why an intermodal perspective is so important. Today, cargo tends to travel from truck to train, to ship, to train, to truck – or some combination thereof. People jump from car to train to bus to airport. Intermodal integration and a full view of the supply chain are essential to today’s travel landscape, and companies must adopt a strategy that embraces this intermodal view.

A connected transportation platform doesn’t abandon optimization, but adds a customer-focused layer to preserve elements that have a direct impact on the travel experience. For example, optimization based on traveler preferences during reaccommodation would include features of the previous flight, such as contiguous family seating or maintaining a preferred level of hotel room in the event of a venue change. If a flight delay will cause a cruise ship boarding to be missed, how can the vacation be salvaged?

Every vendor in the ecosystem that participates can offer travelers an enhanced experience. When your arrival time and gate change, everyone from your car driver to the hotel you will be staying at knows.

Optimizing runs and the experience may mean partnering with a third-party provider to gain a wider perspective. For example, companies can put IoT devices on train tracks and wagons to monitor track condition in real time, and use drones to inspect runways in support of flight operations. It may also mean considering the use of automation and robotics, instead of people, to analyze physical objects in the field and assist with functions such as predictive maintenance.



By 2021, 60% of manufacturers will be leveraging an advanced analytics-driven data aggregation platform for supply chain operational data to improve the speed and accuracy of the fulfillment process.

Source: IDC FutureScape: Worldwide Supply Chain 2018 Predictions (Doc #US43146317 / Oct 31, 2017)

Julia's journey

Connected transportation sounds great, but what does it mean to customers? Ask Julia Jones, connected traveler. Arranging a trip from her home in California to a science conference in Malaysia, with a connection through Tokyo, Julia used a single online app to arrange her journey from end to end across airlines, railroads and ground transport services.

Connected and personalized travel

Understanding where the conference was, her app suggested preferred accommodations at conference rates and made reservations with her approval, rather than Julia having to construct the itinerary leg-by-leg and provider-by-provider. Knowing she'd have a few days free, Julia decided to bring her mom Candace along to share in her adventure. Everything was set for a good time.

Behind the scenes, though, every facet of her itinerary was in flux. Advance weather advisories required her airline to revise its flights. Determining that an earlier flight was her best alternative, the airline offered Julia and her mom a change, which they accepted. Future flight segments were adjusted, as was her local pickup and her transport in Malaysia. Hotel reservations were adjusted.

Along the way, the hotel's artificial intelligence (AI)-driven concierge service offered Candace some travel options to consider while Julia was at the conference. Choosing several options triggered a series of reservations and confirmations. Understanding that its guests would be weary from a long journey, Julia's hotel included vouchers for complimentary room service on their arrival.

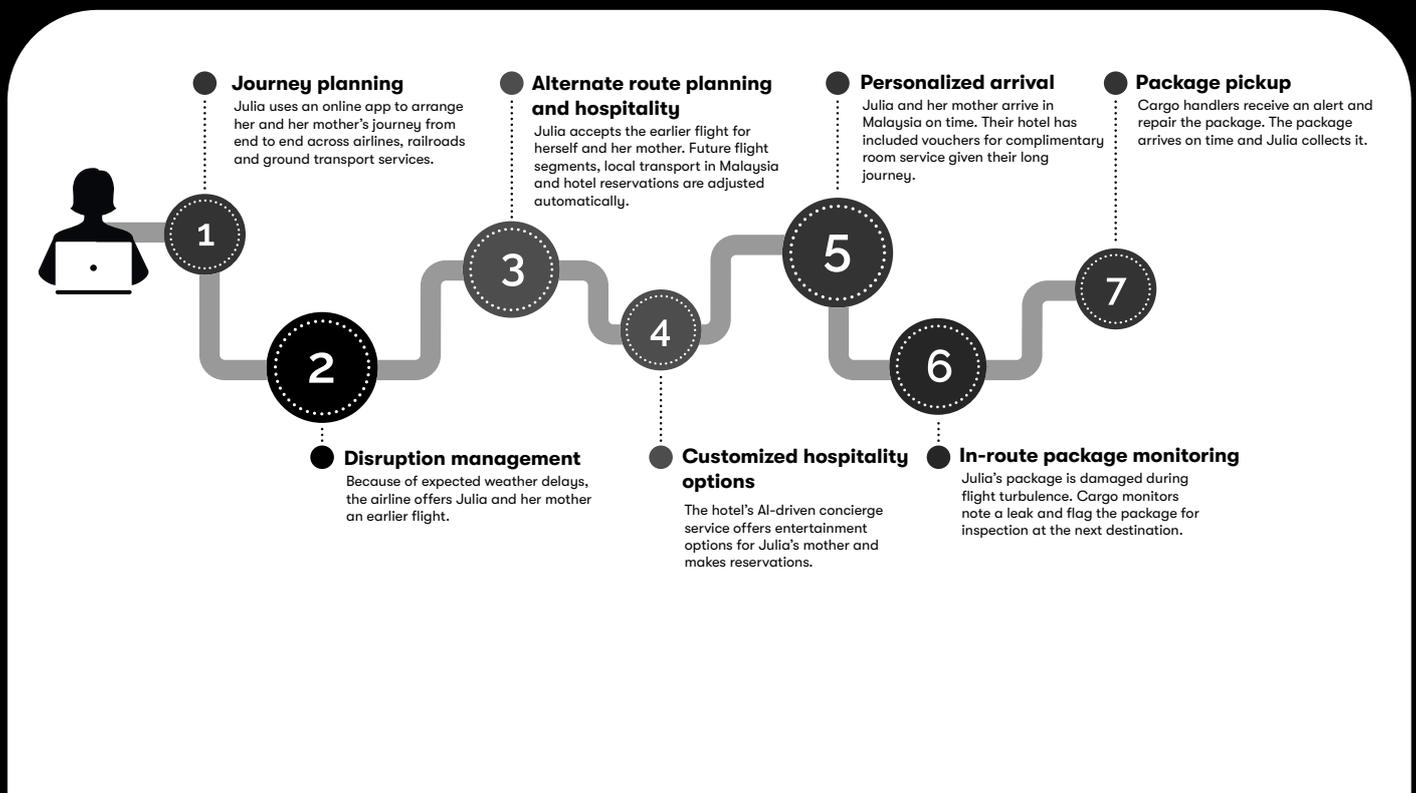
Julia's package

Julia's presentation on methods to detect and isolate space-borne antimatter particles was expected to draw a crowd at this year's conference on astrophysics. As a crowning achievement, Julia planned to demonstrate a special piece of equipment she had developed.

But getting it to the conference would require special care. Highly delicate sensors in the equipment had to be maintained at low temperatures in a liquid nitrogen bath, at near-surface atmospheric pressure. Shipping by air could happen only as long as cargo-hold conditions were strictly monitored and maintained. Embedded sensors in the container system tracked the most critical variables, and real-time monitoring watched the data stream for any trends that might portend trouble.

Turbulence over the Pacific gave everything in the cargo hold a good shake, breaking a latch on the equipment case. The resulting blow created a leak that allowed a small but continuing amount of coolant to escape. Monitors immediately noted the change and flagged the package for inspection at its next destination.

As cargo handlers pulled the box from the plane, they were alerted to its status, discovered the broken latch, and effected a repair to stop the leak. Julia's state-of-the-art equipment arrived in Malaysia successfully, ready to help her offer audiences a rare and unique glimpse of the cosmos.





80% of travel and hospitality companies have a customer experience initiative underway, and approximately 80% of Customer Experience teams have a technology budget.

Source: IDC's "Next Tech" Survey of Marketing and MarTech in Travel and Hospitality, Gerry Murray (Doc # US43613818 / March 2018)

Effective security

We live in a connected world where travel, transportation and hospitality organizations, and the customers who use those services, can do so from any device and from any part of the world. While this creates new levels of convenience and value for customers, it also creates a much larger attack surface for hackers to gain access to an organization's network or supply chain.

As a result, security in the travel, transportation and hospitality sector should incorporate controls that protect organizations from loss of data, safeguard customer data and, in so doing, help protect a company's reputation. Three key areas require special attention in crafting an effective security strategy.

Digital dependence. Organizations face an imperative to digitally transform their business models, leveraging new cloud technologies and shared services. These new technologies create new security risks if they are not managed correctly. Cyber security needs to consider internal, boundary and external security controls to protect an organization's sensitive data.

Proactive fraud detection. The transaction of services needs to consider security controls that allow the services to be secure by design, and in the event of fraudulent activity being conducted, for such activity to be detected and remediated.

Customer privacy. Companies must also ensure that they have strategies to comply with regulations to assure the privacy and security of customer data. Since the May 25, 2018, rollout of Europe's new consumer privacy regulations, travel, transportation and hospitality companies have had to ensure that they have the appropriate security controls in place to protect an individual's personal information.

Manage disruption efficiently

Just as transportation companies must navigate digital disruption, they must also learn how to efficiently manage common industry disruptions, from weather delays and emergency situations to maintenance and repair issues. To handle these challenges, they need a system that alerts them when a disruption occurs, tells them what it affects and suggests how it can be quickly resolved in a way that meets original commitments.

For example, if an emergency occurs at an airport, companies will know immediately how many flights and passengers are affected and what cargo needs to be rerouted. At the same time, passenger communications can be coordinated with operations, alerting customers to the issue at the earliest possible time and making new arrangements and reservations to help them reach their ultimate destination. Actions that exceed customer expectations will help preserve the relationship — and the brand's reputation. The same applies to shipping operations.

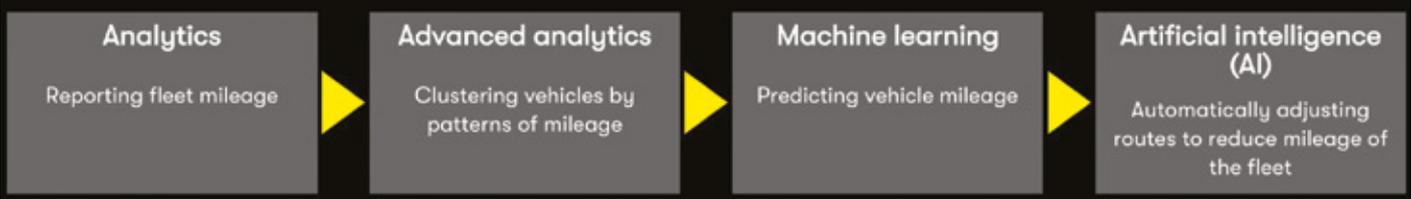
By linking an MRO strategy and other pieces of the puzzle, organizations can get operations back to normal as quickly as possible. Clear visibility into the entire landscape enables enterprises to deal with irregular operations more effectively. Be it rebooking tickets or putting cargo on different planes, dealing with disruptions becomes much easier. And because data has been collected and integrated, enterprises can analyze that information to spot trouble ahead and deal with it in a proactive way.

Build the 21st century enterprise

Digital leaders in travel, transportation and hospitality understand that incremental strategies aren't enough to address the scale of change in today's industry. Established companies need to take a fresh view of the industry and develop bold, clean-sheet plans, or face competition from new entrants such as Google, whose multi-modal planning on Google Maps and comprehensive Google Trips products have set the bar for what a consumer-centric approach to travel planning and management can do.

AI in travel, transportation and hospitality

Moving people and cargo around the globe, safely and on time, is a logistical challenge that uses vast amounts of data. This data is a powerful but under-leveraged resource that can be put to greater use with artificial intelligence (AI).



Components of analytics and intelligence in travel, transportation and hospitality

Here's what it looks like when you use AI to put travel and transportation data to better use:

Take care of the fleet. AI can learn to predict vehicle failures and detect fraudulent use of fleet assets. With predictive maintenance, we anticipate failure and spend time only on assets that need service. With fraud detection, we ensure that vehicles are used only for intended purposes.

Take care of disruption. AI provides the insights you need to predict and manage service disruption. AI can monitor streams of enterprise data and learn to forecast passenger demand, operations performance and route performance. If you can predict problems, you can handle them early and minimize disruption.

Take care of business. AI can augment operations decisions by narrowing choices to only those options that support price optimization, load planning, schedule planning, crew planning and route planning. You cut fleet costs by eliminating wasteful practices from consideration.

Take care of the passenger. AI can provide real-time supply-and-demand matching, pricing and routing. Whether it's rebooking tickets or making sure products reach customers, AI can help you deliver a richer, more satisfying travel experience.

Apply AI as a differentiator. AI can mean competitive advantage. Find an area of the business that you can make as smart as possible as quickly as possible. Identify the data stories (such as predictive maintenance or real-time routing) that you think might make a real difference. Test your ideas using utilities and small experiments. Learn and adjust as you go.

Solutions such as the connected transportation platform must be a part of those plans. A connected transportation platform brings together an array of resources in a way that supports new revenue models and value-creation streams that shift the focus from what's good for industry members to what's good, what's needed and what's expected by the end consumers.

In the best-case scenario, tactical and operational information from external and internal sources is ingested, cleaned and validated, and then analyzed to deliver actionable business intelligence that delivers seamless experiences and new benefits for end customers.

With a full review of budget spend and investment goals, you can empower your chosen business outcome, and transform and grow your business. And remember, there are ways to reduce costs and find savings, such as moving noncritical, monolithic systems to the cloud. To fill in the gaps, consider working with a partner that can help guide the journey and provide the experience and tools needed to achieve transformational success.

Differentiation and industry leadership go hand in hand. Stay ahead of the competition by knowing how to use advanced technology and tap into your greatest resource — your data. With this approach, you can move from chasing customers to leading the industry, with customers and competition chasing you.

How DXC can help

With more than 40 years of experience serving the transportation industry, DXC Technology provides mission-critical systems for top airline, consumer travel, freight and logistics, railway and hospitality firms. As the travel, transportation and hospitality industry undergoes a digital metamorphosis, DXC offers customized solutions for modernizing aging infrastructure, running mission-critical systems, and helping IT adapt to industry consolidation and commoditization, as well as to the always-on consumer.

DXC's Connected Transportation Platform supports rail, air, truck and maritime operations and includes services such as fleet management, geolocation awareness and maintenance solutions. As one of the world's leading airline IT services providers, DXC helps airlines bring new revenue streams to market, drive efficiency and reduce costs. Also, we help freight and logistics companies achieve end-to-end visibility into the supply chain.

DXC also offers a suite of applications that efficiently integrate flight operations-related systems and help improve employee decision making. Real-time flight, aircraft and station information increases productivity, generates cost savings and provides updates that improve operational awareness. In addition, DXC's disruption management solution lets airlines manage travel disruptions with the automatic generation of recovery solutions.

The DXC Connected Transportation Platform solution enables interaction with customers to influence passenger movement, improve retail interactions through contextual analytics, and improve efficiency during moments of engagement between airport operations, retailers, airlines, ground transportation and customers.

DXC delivers innovative business and technology solutions that enable digital transformation. With our integration-focused, industry-specific solutions, organizations can enhance efficiency, improve traveler experiences, and create new services and revenue sources.

Now is the time to act. Don't be disrupted — be the disruptor. Let us help you innovate and transform to differentiate with speed and quality. That's DXC. That's Digital Delivered.



Learn more at
[**dxc.technology/
travel_and_transportation**](https://dxc.technology/travel_and_transportation)

About the authors



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Horst Stohrer is the chief technologist of consumer travel at DXC Technology, where he oversees current and future technology development across products and services. Horst is currently focused on using the next generation of breakthrough technologies in hardware and software algorithms to improve travel. This work has resulted in a breakthrough retail product for airline availability processing. Using an application developed in conjunction with HP Labs, the product gives airlines an affordable method of controlling seat availability in real time.

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dxc.technology/digitaldirections

As the world's leading independent, end-to-end IT services company, DXC Technology (NYSE: DXC) leads digital transformations for clients by modernizing and integrating their mainstream IT, and by deploying digital solutions at scale to produce better business outcomes. The company's technology independence, global talent, and extensive partner network enable 6,000 private and public-sector clients in 70 countries to thrive on change. DXC is a recognized leader in corporate responsibility. For more information, visit dxc.technology and explore [THRIVE](#), DXC's digital destination for changemakers and innovators.