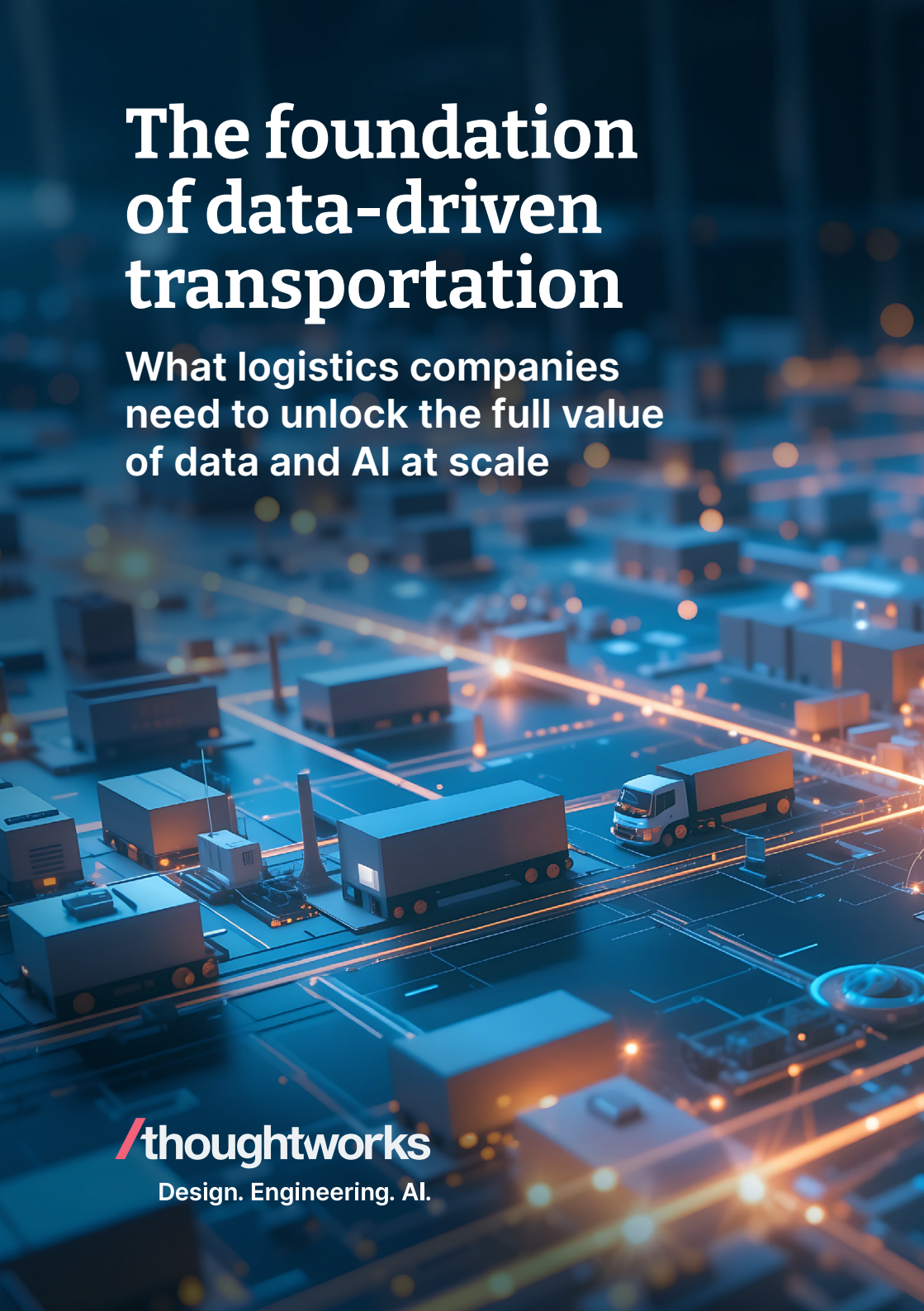
The foundation of data-driven transportation

What logistics companies need to unlock the full value of data and AI at scale



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Design. Engineering. AI.

When disruption is the default, data is your key to success

It's almost hard to quantify the full scale of change and disruption impacting the transportation and logistics industry. According to McKinsey research, supply chain disruptions lasting longer than a month now occur every 3.7 years on average, and can cost businesses up to 45% of a year's profit over the course of a decade[1].

Further research by the Economist Intelligence Unit[2] found that disruptive events can carry a cost of between 6–10% of an organization's annual revenue — and that's before reputational damage and the impacts of poor customer experiences are factored into the equation.

Major disruptive events like the Red Sea crisis, and trade and tariff wars between economic superpowers are just the tip of the iceberg. Today, organizations are challenged to navigate and respond to:

- Emerging and intensifying sustainability regulations that are driving change to core operations and transformation of essential infrastructure and equipment.
- Continuous geopolitical disruption, including volatile tariff rates that are upending the international trade landscape and challenging buyers to rapidly evolve their supply chain strategies.

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1 World Economic Forum. "Supply Chain Disruption: Digital Winners and Losers." *World Economic Forum*, January 2025. Available at: https://www.weforum.org/stories/2025/01/supply-chain-disruption-digital-winners-losers/

2 Economist Impact. "The Business Costs of Supply Chain Disruption." *Economist Impact*. Available at: https://impact.economist.com/projects/next-gen-supply-chains/reports/the-business-costs-of-supply-chain-disruption/

- Environmental challenges, such as disruptive weather events that cause widespread damage and halt or divert transportation and logistics operations.
- A shift in how transportation and logistics customers buy and negotiate contracts, including the use of new data-driven platforms and capabilities that increase buyer intelligence.
- Technological disruption, including the emergence of new transportation technologies such as self-driving vehicles, and the shift toward electric vehicles, which places new constraints on transportation infrastructure.

While challenging, these forces aren't news to major transportation and logistics organizations. They've been planning for them for years, and most have drawn the same conclusion — that the only way to effectively mitigate and respond to shifts of this magnitude is by harnessing the full potential of data. Yet many organizations are still experiencing underwhelming results from their data modernization initiatives due to impediments in execution.

In this white paper, we'll explore how organizations can evolve their digital foundations to not only survive, but thrive in this continuously changing transportation and logistics environment.

The new priorities of modern transportation and logistics

Today's transport and logistics organizations understand what they're up against. The myriad forces impacting their industry are constantly shifting, and the only way to understand and prepare for what's coming next is by applying data-driven technologies in the right areas.

Each organization is responding to this need in its own unique ways. But, there are five broad areas of transformation that the vast majority are exploring and investing in today:

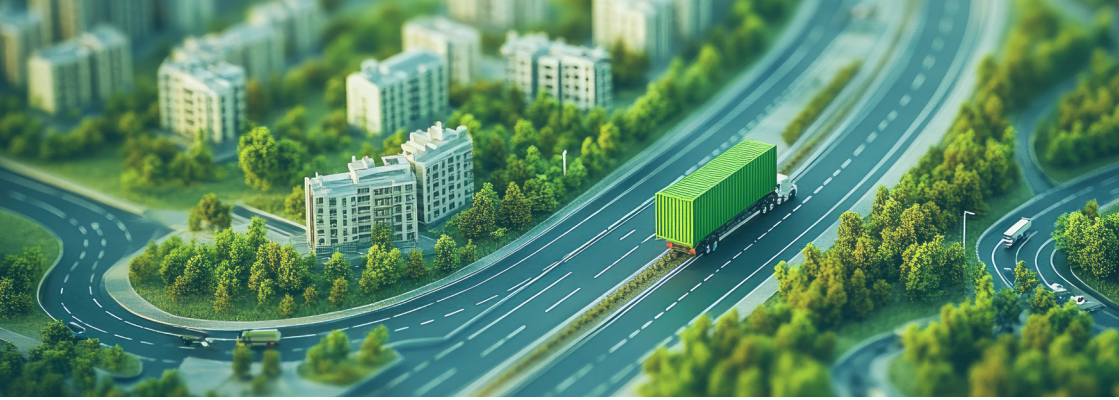
#1 Supply chain visibility and resilience

IoT devices deployed in connected assets and across dynamic supply chains create vast amounts of data that help companies build a clear, accurate view of complex operations.

Equipped with that data, teams can continuously optimize operations and increase efficiency. But crucially, they can also build operational resilience and quickly adapt when new disruptions emerge.

#2 Connected and automated operations

With everything connected across their operations, teams can promote efficiency and productivity even further by implementing automation in a wide range of processes. Whether it's data collection and reporting or processing freight as it moves between transportation modes, there are numerous opportunities to reduce human effort and accelerate routine operations.



#3 Green and sustainable transportation

As the sustainability agenda grows, organizations are investing to ensure they can meet rising standards for years to come. For most, that means going beyond today's legislative requirements and building a future-ready green fleet that's resilient against further climate and sustainability-based regulation.

Common strategies in this area include adopting alternative fuels such as methanol-based options, emissions offsetting, route optimization, and developing data-driven solutions to increase the visibility of emissions and enable more accurate impact measurement.

#4 Impactful AI

From revolutionizing transport planning and asset management, to streamlining and optimizing warehouse operations, AI has the potential to unlock end-to-end efficiency and productivity gains for transport and logistics organizations.

Teams are actively experimenting to discover which use cases could help their organization become more resilient and adaptive in an era of continuous operational disruption. But in many cases, these use cases remain trapped at the POC stage, as organizations lack the technical foundation required to scale them out into production.

#5 Cloud-native solutions

While cloud solutions certainly can't be considered new or emerging, many transportation and logistics companies are still in the relatively early days of their cloud journeys. Cloud "lift and shift" initiatives succeeded in transferring infrastructure spend from data centers to cloud providers, but a lack of cloud-native modernization has often prevented the full realization of cloud's innovation and scalability promise.

With some large organizations still dependent on legacy on-premises and even desktop-based solutions, cloud adoption, cloud-native modernization — and the migration of existing solutions to cloud platforms — remains a key area of investment for many firms in the industry.

Creating a new foundation for continuous evolution in transportation

Each of those investment areas demands not only the right digital strategy, but also a robust digital foundation to support that strategy. To realize the full benefit each technology area can deliver and become an efficient, resilient and adaptive data-driven organization, you must first take three key steps:

- Build a robust platform foundation for AI and data analytics.
- Modernize legacy systems to help break down silos and support your evolution.
- Build connected ecosystems that support data sharing and data-driven decision-making.

In the next three sections, we'll explore each one in detail, examining how they can set transport and logistics organizations up for long-term success.

Priority area #1
AI and data analytics platforms

The transportation and logistics industry has always run on wafer-thin margins. But constant disruption is putting greater pressure on profitability than ever before.

To drive sustainable growth, organizations must continue to optimize their processes to deliver new levels of operational efficiency. For most teams, that will require investment in new AI and data analytics capabilities.

Precedence Research[1] recently calculated the global artificial intelligence (AI) in logistics market size at $26.35 billion in 2025, and forecasted it to reach around $707.75 billion by 2034, accelerating at a CAGR of 44.40% from 2025 to 2034.

Efficiency-boosting use cases for AI and data analytics include:

- Real-time or near-real-time views of operations that empower organizations to identify inefficiency and antipatterns and take steps to reduce them proactively.
- Optimizing pricing and contracting with customers to keep prices competitive, sustainable, and aligned with current market expectations.
- Modeling precise and complex transportation processes and generating suggestions for how they could be improved.
- Transforming interactions between different people and parts of logistics and supply chains, and simplifying hand-offs between them.

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1 Precedence Research. "Artificial Intelligence in Logistics Market." *Precedence Research.* Available at: https://www.precedenceresearch.com/artificial-intelligence-in-logistics-market

- Enabling proactive and preventative maintenance to keep vehicles and other essential equipment active and operational for longer, and reduce unforeseen downtime.
- Modeling and forecasting disruptive weather and geopolitical events and using scenario planning to improve resilience and operational continuity.

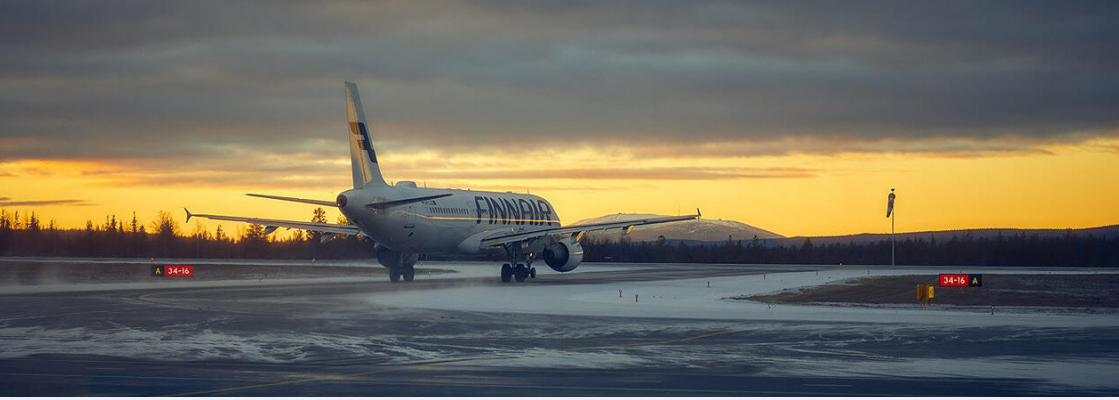
Every day, more use cases for AI and data analytics emerge. So, rather than getting caught in a cycle of continuous one-off, use-case-specific investments, teams will see far greater returns and impact if they focus on building the foundational capabilities into a platform that will support diverse use cases now and into the future. That can include:

Creating robust data platforms that make data more easily accessible for a wide range of use cases.

Transforming data strategies and building stronger pipelines for the ingestion, analysis and consumption of data.

Embedding a culture of data-driven innovation that empowers teams across domains to build their own data products for specific use cases.

Ensuring infrastructure and systems are AI-ready, and that the right governance practices are in place to make data trustworthy and reliable enough to support decision-making.



Finavia: Operating an optimal airport with AI

Kittilä in northern Finland is a unique airport. Serving the Lapland region, it's relatively quiet for much of the year, then experiences a huge surge in demand around the festive season.

It's a small airport with just twelve parking spots. But on its busiest days, 58 flights arrive and depart; 58 flights can be parked 10^31 different ways, presenting a very complex organizational challenge for airport teams.

In cooperation with the parking experts at Kittilä airport, we created an AI model that generates optimal parking plans. The optimization model uses flight data to build a mathematically perfect parking plan based on all the data available.

In the year following the model's deployment, Finavia — the airport operator — saw:

- **12%** increase in the number of flights at the airport.
- **61%** reduction in the share of airport-related flight delays.
- **66%** decrease in the duration of average airport-related flight delays.
- **€500,000** in estimated cost-savings due to reduced delays.
- **20-point** increase in the airport's NPS.

Priority area #2
Legacy modernization

Over the past few decades, technology has repeatedly transformed how transportation and logistics organizations operate. As processes have formed around global trade, organizations have applied data-driven technologies to numerous use cases — leaving processes fragmented and creating complex technology environments with low interoperability.

Now, these complex environments are restricting organizations' ability to innovate further. Systems with low interoperability have created data silos, limiting the availability of data needed to power valuable AI and analytics workloads. And layering new point solutions on top of these environments simply adds to their complexity and inefficiency.

Instead of building workarounds and point connections between individual siloed systems, organizations need to fundamentally reassess whether their legacy systems and architectures are fit for the demands of the modern transportation industry.

Future-ready architectures are:

- Built from composible pieces which can easily be modernized in isolation without causing downtime or disruption to other systems.
- API-driven to enable reuse and easy data sharing.
- Designed to enable the automation of infrastructure deployment and testing.
- Transparent enough to support advanced observability and analytics.

While a daunting prospect, legacy modernization is now essential for many major transportation and logistics firms. It provides the opportunity to reimagine their systems based on their current and future needs, instead of continuously working around what was created in the past.

By undertaking core legacy system modernization, those organizations can:

- **Cut costs** by streamlining the day-to-day management and upkeep of systems across their global IT footprint.
- **Accelerate innovation** and make it easier for teams to implement new solutions to emerging challenges.
- **Break down data silos**, unlock the full value of the operational data they already have, and apply that data to valuable AI and analytics use cases.
- **Reimagine data flows** and connections between systems, and realign technology with how they operate today rather than how they operated years ago.
- **Migrate systems to the cloud with ease** and unlock the value and performance gains offered by major cloud service providers.

Thoughtworks and Magaya: Partnering for cloud platform modernization on AWS

To enable superior security, reliability and interoperability among its solutions and third-party applications, leading logistics and supply chain automation software provider Magaya decided to modernize its legacy estate and move to the cloud.

After identifying Amazon Web Services (AWS) as its ideal destination cloud, the company partnered with Thoughtworks to help execute its modernization plans and make the move as seamless as possible.

The move will allow Magaya to accelerate its advancements in areas including AI, automation and business analytics. Through this expanded effort, Magaya is modernizing for the future as the company scales, delivering the high confidence and quality its customers expect.

Priority area #3
Building connected ecosystems

As technology has evolved, the number of touchpoints across the digital transport and logistics landscape has exploded. Today, companies must manage and integrate:

- IoT devices that track core transportation attributes such as route, current location, and cargo conditions like temperature and humidity.
- EV charging stations.
- Customer-facing platforms.
- Vehicle maintenance and upkeep platforms.
- Upstream and downstream partner activities and platforms.

The problem is, because of issues like legacy system complexity, many of those touchpoints and platforms have proven hard to connect — limiting their value.

Once organizations tackle their underlying digital challenges, they can begin to look at each touchpoint, platform and digitized element of their supply and value chains in a whole new way. They can start building ecosystems by design, where each element is connected in ways that amplify the value generated by the others it's connected to.

Crucially, the boundaries of those ecosystems can extend beyond their own organization. According to Gartner[1], "45% of logistics say they intend to increase collaboration and share infrastructure and resources with other companies." Building and enabling connected ecosystems will be an essential step in making that happen.

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1 Gartner® Blog, 10 Reasons to be Optimistic About the Future of Logistics, David Gonzalez, February 18, 2025
https://www.gartner.com/en/supply-chain/insights/power-of-the-profession-blog/10-reasons-to-be-optimistic-about-the-future-of-logistics

SF Express: Building a connected ecosystem for logistics excellence at scale

With a workforce of around 200,000 people, SF Express is the largest logistics company in China, priding itself on delivering packages within a day.

The company has partnered with Thoughtworks since 2013, collaborating on a wide range of projects, from full system rebuilds to building connected customer communities. This gave us a deep understanding of the company's operations and what it could achieve by connecting them more effectively.

For example, we rebuilt the company's route management system, connecting and controlling 65,000 vans in 250 major cities. A cloud platform enables the SF Express teams to monitor and optimize every route. And new handheld terminals designed for couriers ensure all the company's 130,000 drivers can immediately put new route insight into action.

The result is a highly connected logistics ecosystem. Every person — whether they're an individual courier or a dispatcher responsible for hundreds of thousands of packages per day — is empowered with deep insight into the organization's operations and able to make data-driven decisions in an instant.

The true goal: Unlocking new levels of efficiency through collective intelligence

Individually, each of those priority areas for transformation will help organizations tackle the underlying challenges that have limited their responsiveness to shifting market dynamics. But together, they enable a wider shift — one which will support true evolution in how organizations operate at every level.

To break through the barriers and challenges they're facing and unlock new levels of operational efficiency, transportation and logistics organizations need 'collective intelligence'.

Collective intelligence is insight gathered from across mature, connected ecosystems. Within these environments, all elements of transportation operations are empowered by insights generated in the others. It enables continuous operational improvement, allowing organizations to improve efficiency, cut costs, accelerate delivery times, drive sustainability and deliver superior services that keep customers loyal to their brand.

While this idea isn't new, recent technological advances have finally made achieving this level of operational excellence realistically possible. But as already observed in this paper, the theoretical performance gain offered by breakthroughs in networking and AI is only realised by organizations that invest in analytics platforms, manage their legacy and build for ecosystem readiness.

BMW: Bringing connected AI to life

To help its teams use AI and machine learning to make the experience of owning and driving its vehicles even more intuitive, the BMW Group assigned Thoughtworks and others to build a scalable, cost-efficient and future-ready platform for AI-based connected services and products.

For AI applications to be usable throughout the BMW Group's global operations, the platform needed to account for multi-region compliance regulations. It also needed to offer a standardized, scalable way to support all current and future connected AI use cases. And to ensure cost-efficient AI deployments, enabling multi-tenancy and portability between cloud providers were also key considerations.

With the new platform, the BMW Group's data scientists can deploy the infrastructure for AI use cases on demand. Data scientists don't have to worry about infrastructure aspects like persistent storage, identity, access and infrastructure security — everything is built into the platform.

As a result, the teams can apply Continuous Delivery for Machine Learning (CD4ML) best practices and work with large datasets without experiencing slow-downs or bottlenecks, allowing them to iterate on models faster.

All of this contributes to a more robust and secure development pipeline, allowing teams to fail fast and bring their use cases to market more quickly.

Collective intelligence in action

With collective intelligence, transportation and logistics organizations can embrace new data-intensive use cases and overcome some of their most persistent and pressing challenges.

Data-driven decarbonization

With emissions regulations tightening, it's imperative that transportation organizations build the capabilities to effectively decarbonize and minimize the environmental impact of their operations.

With a foundation that enables collective intelligence across their operations, organizations can finally make the emissions (and other related environmental impacts) of their operations visible and traceable.

This supports accurate carbon accounting and data-driven decarbonization, where capabilities like AI can help organizations continuously identify opportunities for emissions reduction and efficiency gains.

Real-time route optimization

Companies are great at gathering route data and detecting patterns to drive optimization. But with a platform foundation that makes operational activity visible in real time, and connects that data to individual drivers and operational teams, these insights can be turned into action immediately.

With dynamic routing that's capable of instantly adapting to upstream challenges such as freight delays or demand surges, and ground-level issues like changes to road networks, organizations can significantly boost the efficiency of their operations — keeping productivity and customer satisfaction high.

Building highly valuable partnerships

The data and intelligence gathered by transportation and logistics companies isn't just valuable to them — it can also be extremely valuable for their customers and partners.

By sharing the insights enabled by collective intelligence, organizations can build mutually valuable partnerships that increase their visibility of upstream and downstream partner activities, enabling them to further optimize operations, using data that would typically be out of reach.

When those insights are passed on to customers, organizations can increase their loyalty by offering them peace of mind and visibility that competitors can't. For many enterprise customers, this is a hugely valuable differentiator that they increasingly look for from their delivery and logistics partners.

The journey to collective intelligence starts with a modern foundation

AI and data-driven technologies and use cases can help transportation and logistics companies unlock new levels of efficiency and productivity, and tackle some of their most persistent operational challenges. But, to do that, they can't simply be layered on top of fragmented legacy systems and architectures.

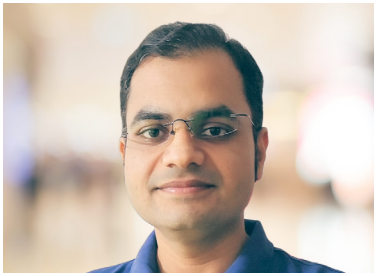
As organizations plan their digital future, they need to start by establishing a foundation that will enable AI success. That means modernizing legacy systems, building the right data and AI platforms, and connecting diverse digital touchpoints to build powerful ecosystems.

Thoughtworks has helped companies throughout the transportation and logistics industry — and almost every other industry — plan and execute transformations like these for decades. We understand what it takes to unlock the value of AI and scale it across modern organizations, and we start from the ground up to help our customers realize its full potential.

To learn more about how we can help you bring your AI and data plans to life, and establish a foundation for data-driven success that moves you toward collective intelligence, contact us today.

thoughtworks.com/contact-us

Authors



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