Deloitte.

Embracing a digital future—
A roadmap for fleet digitization

The emergence of fleet digitization as a strategic solution to address key challenges faced by fleet operators

MAKING AN IMPACT THAT MATTERS since 1845

Fleet digitization: a strategic imperative for modern logistics

In today's rapidly evolving business landscape, fleet digitization has emerged as a cornerstone of operational resilience, enabling organizations to navigate complex challenges such as supply chain volatility, labor shortages, and sustainability mandates. By integrating advanced technologies like IoT, AI, and telematics, fleets can transform inefficiencies into competitive advantages. This whitepaper expands on five domains of digital transformation, supported by actionable insights and global trends shaping both private fleets and logistics service providers.

Lifecycle management and fleet sizing

Digital tools enable precise lifecycle management by analyzing vehicle utilization patterns, maintenance histories, and Total Cost of Ownership (TCO). Telematics data helps right-size fleets—identifying surplus assets or shortages, and optimizing rentals during demand peaks.

Fleet management systems can serve as the operational backbone for modern fleets—unifying telematics, financial data, and maintenance records into a single decision-making platform. By leveraging these systems, organizations achieve end-to-end visibility of asset performance, enabling strategic lifecycle planning and dynamic resource allocation.

In focus: EV fleet integration

For electric vehicle (EV) integration, lifecycle management is the basis of fleet decisions on where best to integrate for the highest ROI from a cost and emissions reduction perspective. Once implemented, digitization for EVs addresses battery longevity challenges by monitoring degradation rates, charging patterns, and environmental impacts. Predictive analytics forecast battery health, enabling fleets to balance resale value and operational efficiency. Dynamic charging schedules and route optimization tools for EVs reduce energy costs and align with sustainability goals, while government incentives for low-emission vehicles improve ROI.

Deloitte supported a national courier in its decarbonization efforts by developing a comprehensive roadmap to transition its 6000-vehicle fleet to EVs, aiming for a 40% reduction in Scope 1 emissions by 2030. Utilizing telematics data, Deloitte analyzed the fleet's stops, distances traveled, and fuel usage to identify optimal vehicle replacements and charging infrastructure requirements. This strategic roadmap facilitated a seamless, data-driven transition to EVs with minimal operational disruption. It provided actionable insights for infrastructure implementation and OEM partnerships, ensuring that capital expenditures were balanced by long-term operational savings, thereby supporting the courier's emission reduction goals with a robust business case.

Figure 1

Lifecycle management and fleet sizing

Fleet management solutions, detailed and accurate trip recording, and custom rules and reports.

- Vehicle and asset tracking
- Fleet utilization and benchmarking
- Fuel management
- Parts management
- EV performance monitoring
- Vehicle acquisition/disposal

Predictive maintenance

Uses data analytics and sensor technology to predict and proactively address vehicle maintenance needs before failures occur

- Vehicle diagnostics
- Optimized maintenance scheduling
- Data driven insights
- Automated alerts and notifications

Autonomous

Laying the groundwork to autonomous vehicles of the future

- Advanced Driver Assistance Systems (ADAS)
- Route optimization algorithms
- AI driven predictive models
- Computer vision driver tracking

Safety, training and driver retention

Advanced insight on driving behaviour. Risk and safety reports, seat belt detection, instant accident notifications, and driver coaching tools.

- Driver scorecards
- Compliance monitoring
- Collision notification and reconstruction
- Track speeding and aggressive driving
- Collision avoidance systems
- In-vehicle driver feedback

Route optimization and visibility

Leveraging technology and data analytics to efficiently plan and monitor transportation routes, enhancing operational efficiency and transparency.

- Dynamic routing algorithms
- Automated dispatching
- Driver scheduling and management
- Geofencing
- Vehicle and asset tracking
- Real-time data and communication

Industry sources suggest that the use of decision-making platforms and analytics can optimize asset longevity and cost efficiency through lifecycle management and dynamic fleet sizing, and are effective in enabling:

- **Predictive replacement cycles**: Analyzing utilization rates, repair histories, and residual values to strategically schedule asset retirements at optimal resale periods, thereby maximizing recovery rates. This approach is particularly effective given that approximately 35% of an asset's total lifecycle cost is typically incurred during the final 15% of its operational life[1]. A North American logistics firm reduced TCO by 15–25% using Fleet management Information System (FMIS)-driven insights to retire vehicles at 7–8 years instead of 10, avoiding steep maintenance spikes[2].
- **Warranty compliance tracking**: Automating OEM service schedules, cutting manual oversight costs by 30%[3].
- **Underutilization alerts**: Identifying assets with <60% utilization for redeployment or divestment, trimming ownership costs by 10–20%[4].
- **Demand-responsive leasing**: Integrating rental market APIs to scale fleets during peak seasons, avoiding overcapacity.
- **Scenario modeling**: Simulating fleet expansions using historical route data and growth projections to optimize CAPEX.
- **Inventory management**: Analyzing historical usage patterns to predict demand for maintenance and operational resources such as spare parts, and fuel—enabling optimized inventory levels aligned with seasonal trends and vehicle maintenance cycles.

Predictive maintenance

Digitization of fleets shifts maintenance from reactive to proactive strategies. Fleet software solution providers suggest predictive analytics using real-time engine diagnostics and historical data can identify the failure before it occurs, reducing downtime by up to 25%, extending vehicle life by 20%, reducing maintenance costs by 12–30%, and optimizing maintenance scheduling, thereby minimizing unnecessary repair shop visits and expenses[5,6].

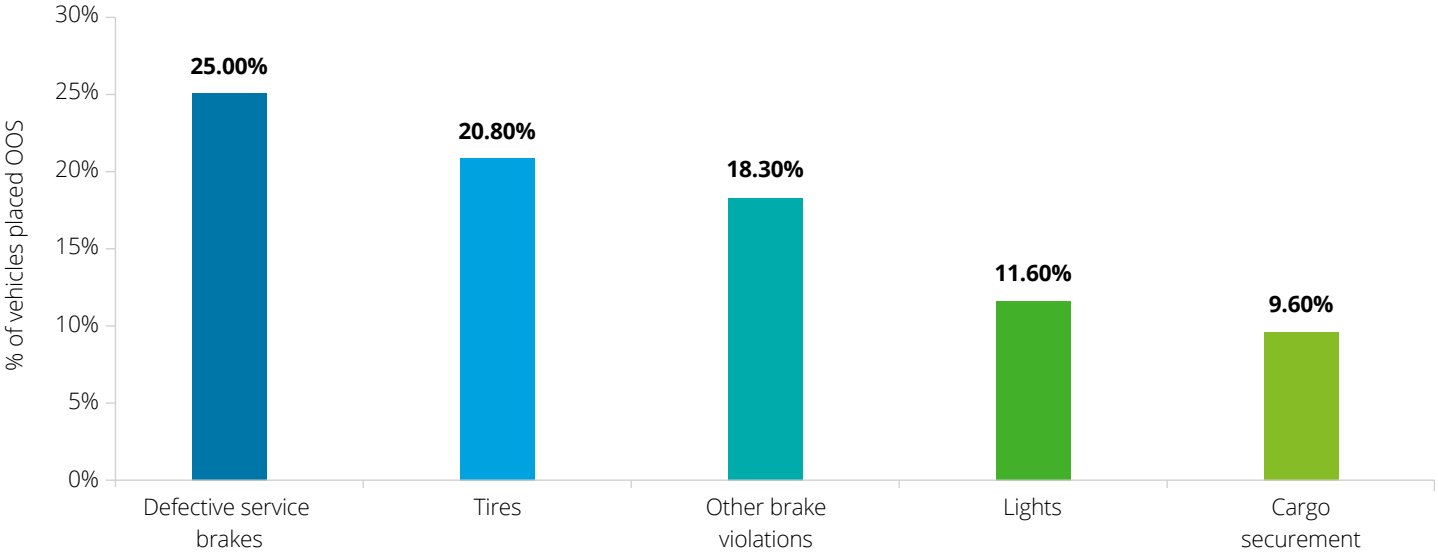
In 2024, The Commercial Vehicle Safety Alliance (CVSA) revealed that the leading vehicle out-of-service violation in North America was defective service brakes, followed by issues with tires, other brake violations, lights, and cargo securement. 23% of vehicles were placed out-of-service due to these violations[7].

To mitigate the risk of violations leading to vehicles being placed out of service and downtime, fleets can harness the power of IoT sensors to monitor vehicle health, ensuring timely maintenance and compliance. These sensors are a building block for a comprehensive solution that:

1. Continuously monitors and collects data on critical parameters such as temperature, vibration, pressure, and fluid levels
2. Transmits data in real-time to a central repository (system, data base or data lake) for thorough analysis
3. Utilizes analytics and AI algorithms to process data, identifying patterns and anomalies that may signal potential issues
4. Generates predictive insights that inform when maintenance is needed, often before a problem becomes critical

Figure 2.

% of total vehicle out of service (OOS) violations

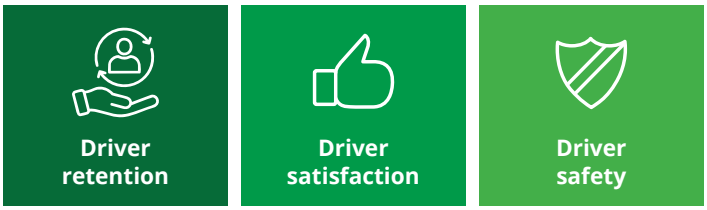


Data source: Commercial Vehicle Safety Alliance (CVSA), 2024

Transitioning to predictive and proactive condition-based maintenance can often begin by utilizing data from existing sensors, enabling organizations to capture initial value and help fund further fleet digitization initiatives.

Safety, training, and driver retention

In today's evolving workforce, attracting, and retaining qualified drivers, driver satisfaction, and enhancing driver safety are key focus areas for fleet operators[8]. Some fleet operators encounter challenges due to limited internal IT expertise, which can hinder the effective implementation and management of new technologies. These issues require careful consideration and proactive measures to facilitate the success and efficiency of fleet operations.



Driver retention remains an ongoing challenge, as drivers are often attracted to the higher compensation and enhanced benefits available in a competitive market. Recruiting and training new drivers is time-intensive and costly, with industry estimates indicating expenses ranging from $6,000 to $12,000 per driver[9]. Safety concerns may be heightened when less experienced drivers replace seasoned personnel, potentially increasing the risk of accidents. Additionally, the departure of experienced drivers results in the loss of valuable knowledge regarding routes and customer preferences. Addressing driver retention is crucial for reducing costs, maintaining operational efficiency, ensuring safety, and preserving expertise within the organization.

In recent years, fleet operators have increasingly adopted digital in-cab technologies to improve the driver experience and/or driver safety. Leveraging in-cab technologies offers several advantages, including enhanced operational efficiency, improved driver experience, reduced collision risks, promotion of safer driving behaviors, comprehensive accident documentation, and the potential to incentivize insurance providers.

Telematics systems offer a robust solution for monitoring various aspects of driver behavior and safety compliance, including alertness levels, speed, braking patterns, rapid acceleration, and idle time. By leveraging this information, fleets can develop driver performance scorecards that promote safer driving practices and significantly reduce the risk of accidents. A case study conducted by a fleet safety technology company found that monitoring driver behavior reduced collision rates by 23%.[10] Advanced telematics systems can enhance overall fleet safety and efficiency by integrating seamlessly with sensors to facilitate specialized data collection and transmission.

In focus: leveraging telematics for safety and compliance

Telematics, camera, and advanced driver assistance systems (ADAS) can be leveraged to provide advanced insight on driving behaviour and provide in-vehicle driver feedback. Risk and safety reports, seat belt detection, instant accident notifications, and driver coaching tools. These tools can help to track and improve:

- Driver scorecards
- Seatbelt usage
- Collision notification and reconstruction
- Speeding and aggressive driving
- Hours of service (HOS) compliance
- Driver vehicle inspection report (DVIR) compliance

Route optimization and visibility

Route optimization (RO) and visibility technologies transform traditional logistics operations into agile, data-driven enterprises enhancing operational efficiency and transparency in the supply chain. In 2024, Deloitte helped a major Canadian transportation services provider implement route optimization technology; this resulted in:

- **Cost savings:** Lower fuel costs and vehicle wear and tear
- **Driver time savings:** Reduction in the time it takes for drivers to complete their routes, allowing them to make more deliveries or pickups in a shorter amount of time
- **Dispatcher time savings:** Eligible orders are automatically assigned to drivers through advanced algorithms, significantly reducing the need for manual intervention or phone-based updates. This has led to up to a 50% reduction in dispatcher workload for managing daily pickups
- **Improved customer experience:** Reduction in the likelihood of missed pickups

Dynamic routing provides a more intelligent and adaptable alternative to traditional static routing, which requires all orders, vehicles, and constraints to be predetermined at the planning stage, leaving little room for flexibility or unexpected events. By leveraging advanced algorithms and real-time data such as traffic patterns, road conditions, and vehicle availability—dynamic routing continuously adjusts routes to maximize efficiency and enables fleet operators to react to last-minute orders, cancellations, or changes in delivery windows.

Automated dispatching uses real-time information such as available capacity, remaining shift time, and proximity to the customer location to efficiently assign orders to drivers. This also enables faster driver scheduling and management by dynamically allocating resources—reducing manual intervention and ensuring optimal utilization of drivers and vehicles.

Real-time data and communication provides immediate insights into vehicle locations, driver performance, and cargo status. Digital platforms provide end-to-end transparency with benefits for drivers, customers, and fleet operators:

- **Customer portals** with real-time shipment tracking transform fleet operations by delivering instant, end-to-end visibility for both operators and customers. These platforms provide live updates on shipment location, status, and estimated arrival times, allowing fleet managers to monitor every leg of the journey and proactively address disruptions before they escalate. Customers gain transparency and control, reducing the need for phone calls or emails and boosting satisfaction through accurate, self-serve information
- **Claims management** powered by GPS and sensor data gives fleets real-time visibility, reducing fraud and expediting the resolution of disputes. By capturing precise delivery locations, images, environmental conditions, and vehicle behavior, fleets can instantly verify delivery status and cargo integrity, providing indisputable proof for claims. Freight Industry strategists report this approach has reduced fraud by up to 35% and payout disputes by 40%. Real-time access to claims information accelerates settlement times from 45 days to 10 days, building trust with customers and insurers[11].
- **Anti-theft systems** with geofencing and remote immobilization offer robust fleet protection. Insurers can reward these measures with premium discounts due to the reduced risk of loss. Additionally, these technologies provide real-time visibility of asset locations and movements, enabling rapid response to unauthorized activity. This dual benefit of lower insurance costs and enhanced operational control makes advanced anti-theft systems essential for modern fleet management.

Bridging to full autonomous

While fully autonomous fleets remain nascent, industry data and the insights outlined below indicate that digitization lays the groundwork to autonomous vehicles of the future through Advanced Driver Assistance Systems, route optimization algorithms, AI-driven predictive models, and computer vision driver tracking.

Advanced driver-assistance systems (ADAS) use sensors, cameras, radar, and software to monitor the vehicle's environment and assist the driver. ADAS enhances fleet safety and bridges toward autonomy by mitigating human error—responsible for 94% of accidents—through real-time hazard detection and automated interventions[12,13]. Collision avoidance systems, lane departure warnings, and adaptive cruise control reduce collision risks by up to 63,000 incidents annually in commercial fleets[14]. This technology allows vehicles to proactively avoid accidents and trains fleets for safe automation, supporting advanced technologies like self-parking systems and truck platooning, where one manually driven truck leads and 2–3 semi-automated trucks follow.

Route optimization algorithms merge real-time data with predictive analytics to slash accident risks while paving the road to autonomy. These systems can dynamically reroute vehicles away from dangerous conditions—reducing collision-prone scenarios. Advanced models enable self-adjusting routes that respond to accidents or road closures within seconds, a critical capability for autonomous vehicle decision-making. By layering predictive maintenance insights, these systems create integrated networks where vehicles autonomously redistribute workloads during mechanical failures or demand spikes. Additional advantages of route optimization include improved delivery efficiency by 15–25% and reduced fuel consumption by up to 15%[15].

AI-driven predictive models for traffic and demand forecasting enable fleets to anticipate demand and dynamically adjust routes, reducing delivery times and improving on-time performance. This directly enhances customer

satisfaction with more precise delivery windows and fewer delays. AI-powered load management allows fleets to efficiently participate in digital freight brokerage platforms, matching loads in real-time to minimize empty miles, lower costs, and increase asset utilization. The ability to forecast seasonal surges or unexpected demand shifts enables fleets to scale operations seamlessly, avoiding overcapacity and shortages.

Computer vision driver tracking uses cabin-mounted cameras and deep learning algorithms to detect speeding, fatigue, distraction, and risky behaviors—factors responsible for 83% of accidents[16]. By generating millions of data points on human responses to complex road scenarios, this technology trains autonomous algorithms to better predict pedestrian movements, navigate construction zones, and handle edge cases. It enforces safer human driving through instant alerts and coaching, leading to measurable safety improvements, such as a 90% reduction in accidents due to human error[16]. This satisfies regulators and insurers concerned about full autonomy. Crucially, computer vision bridges manual and self-driving operations in semi-autonomous trucks by enabling autonomous driving while allowing the driver to re-engage during complex or unexpected situations.

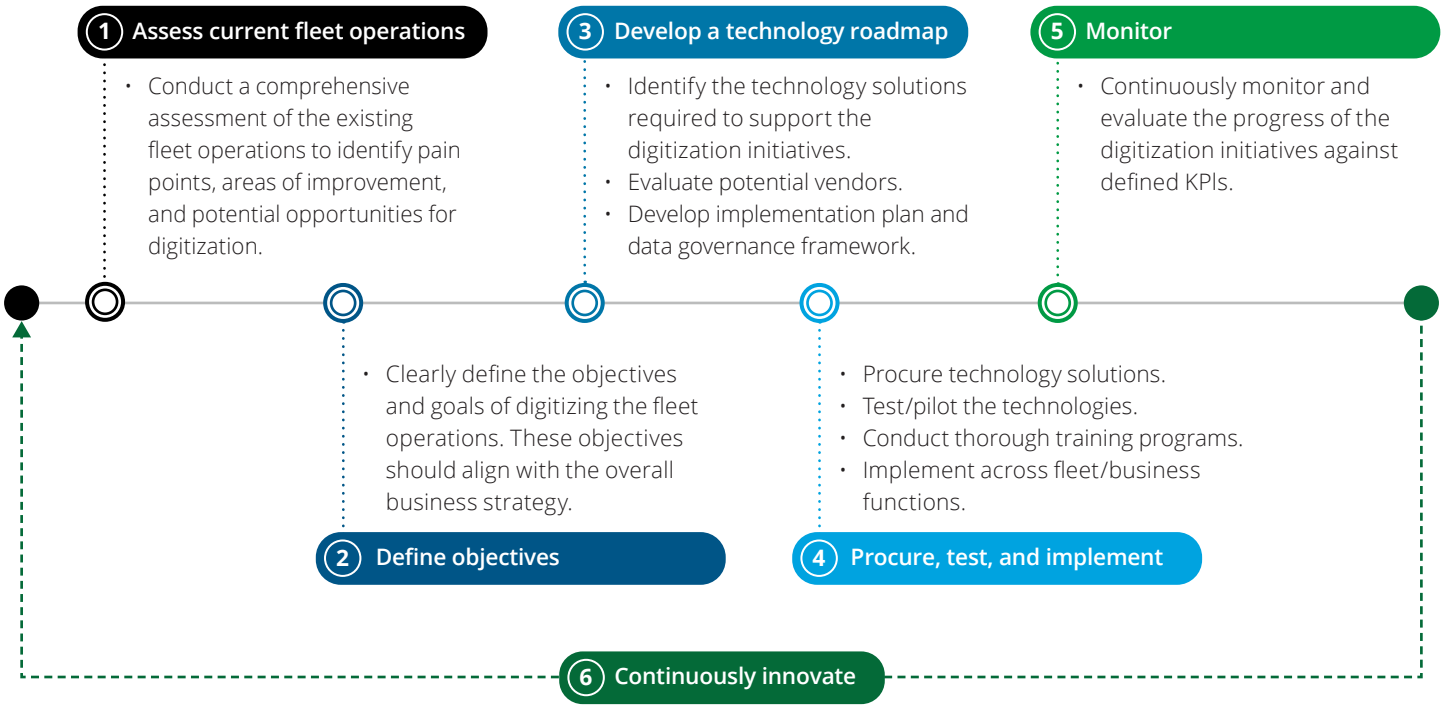
Embracing a digital future

A comprehensive six-step methodology for developing an effective fleet digitization roadmap.

Fleet operators often encounter challenges in selecting the most suitable technology from the multitude of options available in the market, given the rapidly evolving landscape, and their diverse operational needs and priorities. A structured methodology can help fleet operators systematically address these challenges. This following six-step approach includes an assessment of current operations, defining objectives, developing a technology roadmap, procurement, testing, and implementation of the technology solutions, and continuous improvement.

Deloitte specializes in assisting fleets of all sizes with creating customized fleet digitization roadmaps that cater to their specific requirements. Our team can leverage years of internal expertise and cutting-edge research to help fleet operators at every step of the journey.

Figure 3



Embrace a culture of continuous improvement and innovation.

Future outlook

Amidst a transportation environment shaped by supply chain volatility, labor shortages, and sustainability mandates, fleet operators can strategically leverage the five fleet digitization value drivers to secure a resilient future.

Lifecycle management and optimal fleet sizing will be crucial in mitigating supply chain disruptions, ensuring that resources are allocated efficiently and sustainably. Predictive maintenance will enhance operational efficiency and reduce downtime. Strengthening safety protocols, investing in comprehensive training programs, and improving driver retention through digitization will enhance the driver experience and provide fleets with advanced insight on driving behaviour. The integration of autonomous technologies promises to revolutionize fleet operations by reducing dependency on human labor and enhancing efficiency, while route optimization and visibility will enhance operational efficiency and transparency, enabling fleet operators to swiftly adapt to dynamic market conditions.

The future of fleet management lies at the intersection of data acuity and strategic agility—where every sensor, algorithm, and policy converges to drive sustainable growth.

Get in touch

With our experience and expertise, we are committed to helping you navigate the future with confidence

To confidently navigate the future, organizations must make and act upon informed, clear, and timely decisions that enable fleets to thrive in an ever-evolving landscape. This is particularly crucial for medium and heavy-duty fleets, which are constantly adapting and facing numerous challenges to ensure the seamless, sustainable and cost-effective movement of goods on our roads.

At Deloitte Supply Chain & Network Operations, we blend deep industry insights with cutting-edge methodologies and a profound understanding of technology to assist leaders in making these pivotal decisions. Our aim is to help resolve the most critical issues, drive substantial value, and achieve transformational success.

We will work alongside you, fostering collaboration to build resilience and confidently shape a prosperous future.

Elizabeth Baker
Partner
National Logistics & Distribution Leader
elizbaker@deloitte.ca

Ryan Ernst
Partner
National Consumer Transport leader
rernst@deloitte.ca

Authors

Brendan Maynard
Supply Chain & Network Operations

Onkar Chander
Supply Chain & Network Operations

Satwik Chugh
Supply Chain & Network Operations

Endnotes

1. Automotive Fleet, Extending service lives requires preservation strategies, 2023
2. OpenFleet. How fleet management tools can help companies reduce the total cost of ownership (TCO) of their vehicle fleets, April, 2024.
3. MaintainX, How to Make a Preventive Maintenance Schedule, Mar 2025
4. Arthur D. Little, Optimizing fleet management to drive efficiency & sustainability, n.d.
5. Ben Halverson, Fleet Telematics: Top 5 Use Cases in the Last Mile, Elite EXTRA, July 2024
6. Transmetrics, Benefits of Predictive Maintenance for the Logistics Industry, Supply & Demand Chain Executive, September 2022
7. Commercial Vehicle Safety Alliance, CVSA Releases 2024 International Roadcheck Results, September 2024
8. American Transport Research Institute (ATRI), Critical Issues in the Trucking Industry—2024, October 2024
9. Today's Trucking (Newcom Media), Measuring the true cost of recruitment, March 2021
10. Element Fleet, WHITEPAPER: Case Studies on Reducing Accident Rates Per Million Miles, n.d.
11. LinkedIn, Case Study: How AI-Driven Claims Processing is Reducing Fraud in Marine Insurance, March 2025
12. Cyrstal Glass, All You Need to Know About Advanced Driver Assistance System—Crystal Glass, n.d.
13. Starkenn, Understanding the Levels of ADAS—Complete Guide 2025, n.d.
14. Lytx, What is ADAS? Advanced Driver Assistance Systems Explained, n.d.
15. Deloitte, Digital transformation in transport and logistics, n.d.,
16. National Library of Medicine, Risky behaviors and road safety: An exploration of age and gender influences on road accident rates Risky behaviors and road safety: An exploration of age and gender influences on road accident rates—PMC, Jan 2024

Deloitte.

About Deloitte Canada

At Deloitte, our Purpose is to make an impact that matters. We exist to inspire and help our people, organizations, communities, and countries to thrive by building a better future. Our work underpins a prosperous society where people can find meaning and opportunity. It builds consumer and business confidence, empowers organizations to find imaginative ways of deploying capital, enables fair, trusted, and functioning social and economic institutions, and allows our friends, families, and communities to enjoy the quality of life that comes with a sustainable future. And as the largest 100% Canadian-owned and operated professional services firm in our country, we are proud to work alongside our clients to make a positive impact for all Canadians.

Deloitte provides industry-leading consulting, tax and legal, financial advisory, audit and assurance, and risk advisory services to nearly 90% of the Fortune Global 500® and thousands of private companies. We bring together world-class capabilities, insights, and services to address clients' most complex business challenges.

Deloitte LLP, an Ontario limited liability partnership, is the Canadian member firm of Deloitte Touche Tohmatsu Limited. Deloitte refers to one or more of Deloitte Touche Tohmatsu Limited, a UK private company limited by guarantee, and its network of member firms, each of which is a legally separate and independent entity. Please see www.deloitte.com/about for a detailed description of the legal structure of Deloitte Touche Tohmatsu Limited and its member firms.

To learn more about Deloitte Canada, please connect with us on LinkedIn, X, Instagram, or Facebook.