

Smart Stores, Engaged Shoppers: The AI-Driven Retail Edge





The retail landscape is undergoing a seismic shift, driven by evolving market dynamics, changing consumer behaviors and technological advancements. In this fast-paced environment, only the most agile and modern retailers who are both customer- and employee-centered will survive. There is a critical need for retail modernization and to develop and deploy edge, artificial intelligence (AI) and computer vision-based technologies necessary to transform operations to meet the demands of today and the future of its customers.

In Kroger's 2024 Annual Report to Investors, the supermarket and department store chain said,

"Our business is increasingly dependent on information technology systems that are complex and vital to continuing operations, resulting in an expansion of our technological presence and corresponding risk exposure. If we were to experience difficulties maintaining or operating existing systems or implementing new systems, we could incur significant losses due to disruptions in our operations. **As we modernize legacy systems, if we are unable to successfully implement those systems in a coordinated manner across internal and external stakeholders, we could be subject to business interruption or reputation risk with our customers, suppliers or associates.**"¹

¹ Kroger Co., Annual report pursuant to section 13 or 15(d) of the securities exchange act of 1934, for the fiscal year ended February 3, 2024, April 2024.

The future of intelligent brick-and-mortar retail: Where consumers and retailers converge

As retail evolves, both consumers and retailers envision a future where convenience, efficiency and personalized experiences are paramount. Despite the rapid growth of ecommerce, physical stores remain at the heart of the retail experience.

In-store experience

88% of customers prefer to experience products in-store before making a purchase. This hands-on approach leads to higher consumer confidence and satisfaction.²

Higher customer spend offline

Offline shopping continues to dominate in terms of revenue generation, with customers spending an average of **83% more in-store** compared to online.³

Predominance of offline sales

Despite the digital revolution, **72% of total retail sales still occur in stores**, underscoring the enduring importance of brick-and-mortar stores.⁴

²Publicis Sapient, [The Return to In-Store Shopping: How Technology Is Fueling Customer Experience](#), November 2023.

³CapitalOne Shopping, [Online vs In-Store Shopping Statistics](#), August 2024.

⁴Retail Dive, [Despite online growth, stores will still account for three-fourths of retail sales in 2024](#), Forrester says, July 2021.

⁵Anyline, [Millennials and Gen Z Love Scan and Go and Here Is Why](#), accessed November 2023.



A modern supply chain to meet customer demand

Data analytics can help retailers make **informed and proactive inventory** management decisions, **forecast more accurately** to avoid stockouts and boost supplier collaboration.

Need for contactless checkout

57% of shoppers across all age groups **prefer self-checkout systems**. As the demand for contactless checkout grows, retailers are challenged to close the gap in loss prevention while meeting consumer expectations for seamless, touch-free transactions.⁵

Operational and technological challenges: Navigating the path to intelligent modern retail

The journey to reimagine retail is fraught with challenges. Market and economic headwinds are pushing back on all segments — grocery, discount, quick service/convenience, specialty, and warehouse store — as they look to modernize and build their store of the future.



Inflation and rising costs

Inflation drives up overall operating costs, weakening profits and putting pressure on retailers to find efficiencies. Retail wages increase faster than private-sector wages, squeezing profit margins and increasing the need for cost-effective labor solutions.⁶

Customer-experience expectations

62% of consumers turn away from retailers when they have unpleasant in-store experiences, emphasizing the need for retailers to invest in creating welcoming and engaging environments.²

Organized retail crime

Expected to cost U.S. retailers over \$143 billion by 2025, organized retail crime poses a significant threat to profitability and safety.⁷

Not enough compute power at the edge

Legacy systems are time-consuming and expensive to maintain, unable to support modern technologies, and often riddled with security vulnerabilities. These outdated infrastructures keep stores unable to move forward.

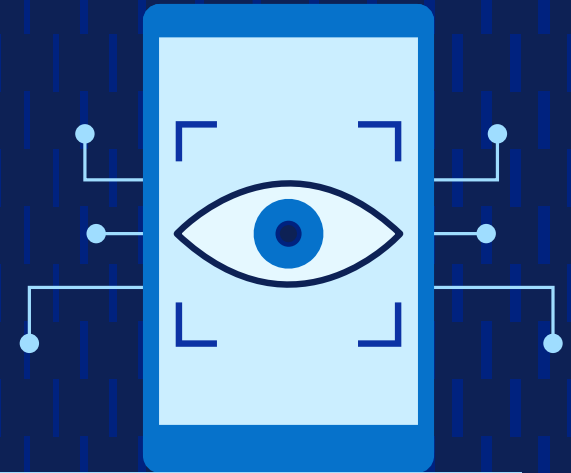
⁶Deloitte, [2024 Retail Industry Outlook](#), January 2024.

⁷Capital One Shopping, [Retail Theft \(Shoplifting\) Statistics](#), October 2023.

Better outcomes and modernization: A path forward

Despite headwinds, Dell, NVIDIA®, and ServiceNow® see a path forward for retailers to modernize and reimagine retail operations to become the store of the future. This path forward will lead to better outcomes that drive revenue and reduce operational costs.

To achieve those goals, leading retailers will need to leverage three essential elements: **edge computing, AI, and computer vision**. These innovations can drive significant improvements across multiple areas of retail operations.



Creating amazing customer experiences

requires modern edge and AI-driven computer vision applications that enable faster and more accurate self-service checkout through product recognition while preventing shrink (theft) at self-checkout lanes.

Computer vision is also key in alerting store associates of stockout and optimizing merchandising, two key drivers of customer satisfaction, by ensuring the stores are stocked with the right products.

Interactive kiosks will enable retailers to deliver personalized, real-time in-store recommendations that drive customer loyalty and repeat business.

Driving intelligent automation

will provide a real-time view across the organization, enabling better mapping of stores, staff, items, hierarchies, assets, and automation workflows that will reduce human error and shorten time to resolution, leading to smoother operations and happier customers.

Simplifying retail store operations

with a modernized edge AI-based infrastructure allows for connected, scalable and secure operations, both in the front and back of the store. With a centralized nervous-system approach, retail operations managers can provision, deploy, secure and manage their SKUs, data, applications and infrastructure. This will increase visibility into store incidents, resolutions and performance metrics.

Boosting employee productivity with generative AI (GenAI)

such as enabling associate shopping advisors to provide better product recommendations or helping employees to "talk to the data" to answer operational questions related to inventory management and product availability across multiple locations.

Harnessing data

or better decisions with in-store analytics provides retailers with actionable insights that lead to better real-time omnichannel as well as in-store shopping experiences, customer safety, targeted marketing, inventory management, employee performance and customer service.

The retail industry stands at a crossroads

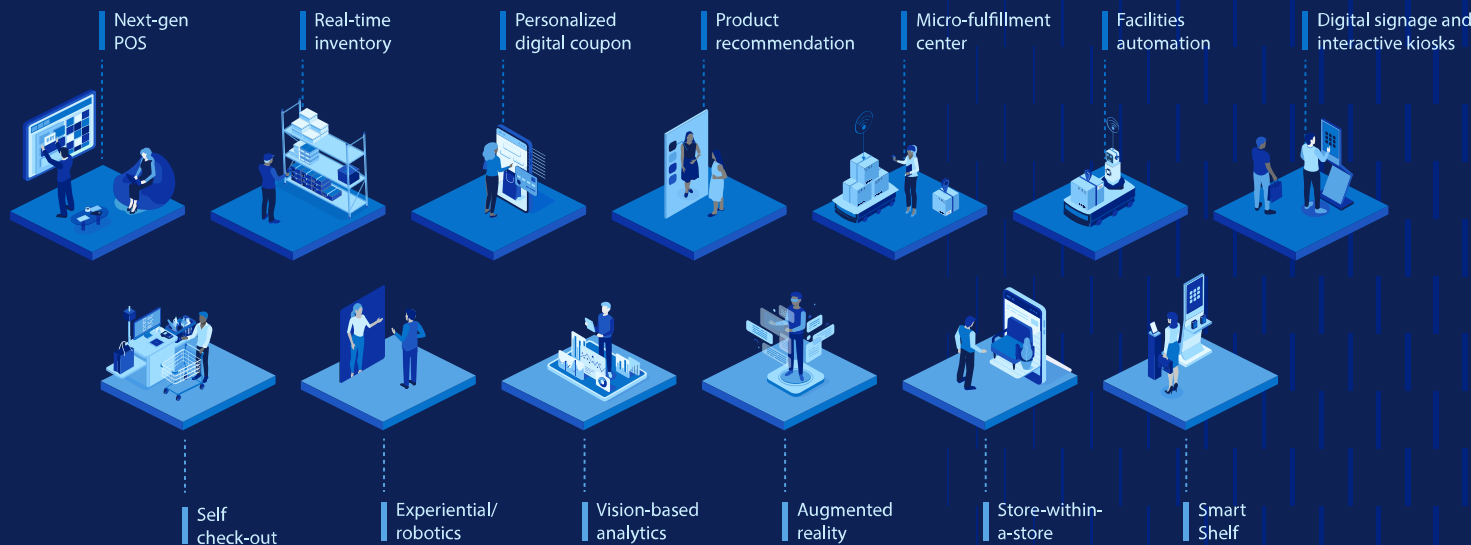
Those who embrace modernization and adapt to the evolving demands of consumers will thrive, while those who cling to outdated models risk being left behind. By investing in technology and reimagining the retail experience, organizations will win in the new era of retail. The key to success lies in being agile, customer-centric and technologically advanced. The future of retail belongs to those who are ready to reimagine it today.

To help meet the seismic shift within the retail landscape and create the retail store of the future requires more than traditional approaches – it demands the integration of cutting-edge technology. By combining the power of

Dell NativeEdge, NVIDIA AI Enterprise, ServiceNow Smart Operations, and ServiceNow, retailers can transform their stores into intelligent, human-centric environments that not only meet but exceed expectations. In this paper, we explore how each solution from Dell, NVIDIA, and ServiceNow helps retailers modernize and transform.

The future of retail is intelligent, efficient, and customer-centric, and with Dell, NVIDIA, and ServiceNow at your side, that future is within reach.

Intelligent modern retail store of the future



Foundation of cybersecurity

Unified customer shopping experience

Store operations efficiency and loss prevention

Personalization

ServiceNow and ServiceNow Smart Operations: Orchestrating seamless retail operations

Dell NativeEdge for Retailers is an innovative edge computing platform designed to streamline and elevate store operations. Not just one store to one device, but to hundreds and across thousands. By bringing computation and data analysis closer to where the data is generated — in your stores — NativeEdge simplifies, secures and scales real-time processing, reducing latency and enabling real-time decision-making.

With Dell NativeEdge providing the infrastructure and orchestration management foundation, ServiceNow Retail Operations and Smart Operations complement it with a robust AI-driven platform to enhance in-store real-time outcomes, data, analytics, workflows, tasks, reporting and performance.

With Smart Operations we want to make the physical world digitally actionable. This will allow optimization of not only your digital workflows, but also your core in-store processes, like your customer interactions and business-critical store conditions. We do this through 3 abstract steps; 1. See & Sense real-world happenings through sensors (such as cameras) and IoT devices; 2. Detect & Understand happenings through an AI/ cognition layer that analyzes data from IoT devices; 3. Act by triggering workflows and tasks or generate insights that support optimizing business operations.

- **Retail Operations** streamlines and automates processes and workflows and provides real-time visibility into your data, operations, risks, assets and potential supply chain issues. It empowers frontline employees to collaborate across stores, warehouses, central teams and third parties, and gives managers the ability to benchmark against other stores or regions.
- **Smart Operations** transforms the way retailers manage and create amazing customer experiences using the power of computer vision and AI. It creates a unified operational view, enabling your teams to work smarter and focus on delivering exceptional customer experiences.

ServiceNow Retail Operations and Smart Operations, integrated with Dell NativeEdge, empower retailers to harness in-store and customer data for better decision-making and enhanced customer experiences. This seamless integration ensures retailers can proactively address issues, improve efficiency, and deliver exceptional, personalized shopping experiences, driving customer loyalty and long-term success.



Dell NativeEdge: Powering retail digital operations

By bringing computation and data analysis closer with its optimized edge computing hardware infrastructure and edge orchestrator, retailers can manage and scale their retail footprint, deploy a truly zero-trust/zero-touch architecture, and seamlessly manage traditional and AI-driven front and back of store applications to realize accelerated time to value.

NVIDIA: The AI engine behind retail transformation

At the heart of this intelligent ecosystem is the NVIDIA accelerated computing platform, providing the AI and computational muscle that powers both Dell NativeEdge and ServiceNow solutions. NVIDIA GPUs, combined with the NVIDIA Metropolis Application Framework, enable real-time interference of computer vision applications in stores to prevent theft and provide real-time alerts to store associates.

NVIDIA accelerated the demanding workloads of intelligent modern retail, ensuring that NativeEdge and ServiceNow run efficiently, even in the most data-intensive scenarios.

NVIDIA GPUs and AI accelerators

are the backbone that supports the heavy lifting in both NativeEdge and ServiceNow Smart Operations. These accelerators enable real-time data processing, whether analyzing customer behavior in-store to optimize product placement or processing video feeds to enhance security and operational efficiency.

GenAI-based ServiceNow Now Assist

helps retailers enhance customer support, boost employee productivity, and streamline operations through AI-powered automation and data-driven insights. By deploying virtual agents and providing real-time assistance to customer service representatives, Now Assist enables quick, personalized interactions and efficient issue resolution. It automates routine tasks, proactively manages IT incidents, and offers predictive analytics, allowing retailers to make informed decisions, minimize downtime, and improve overall operational efficiency. This leads to consistent, high-quality service, driving customer loyalty and enabling scalable, flexible retail operations.



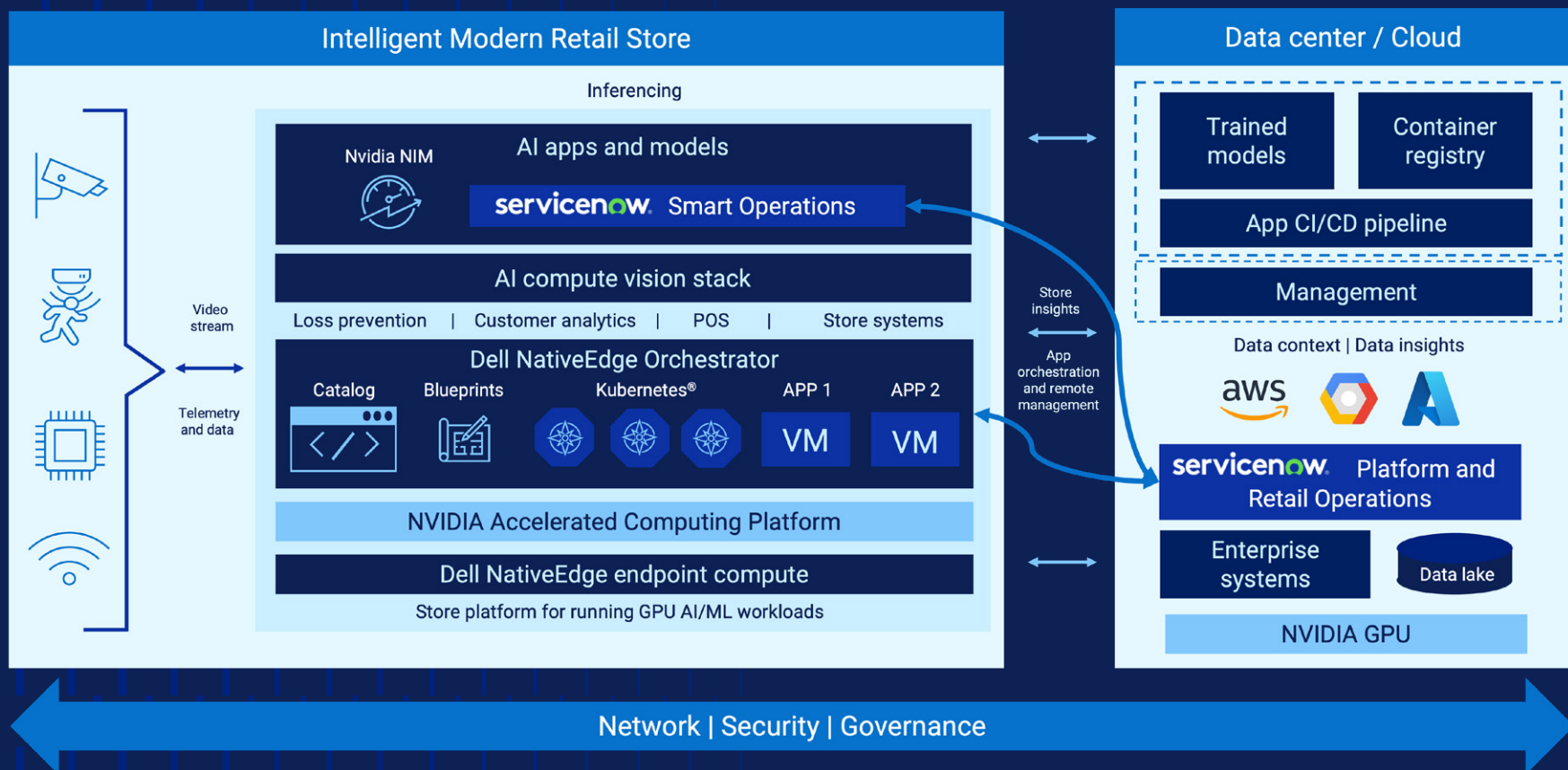
Dell NativeEdge

offers specialized blueprints — such as Metropolis, Riva, and NVIDIA NIM microservices — which are tailor-made for retail scenarios. NVIDIA Metropolis Application Framework dramatically accelerates the video analytics pipeline, enabling real-time response of CV AI applications to prevent theft and provide real-time alerts to store associates. Riva powers natural language processing (NLP), allowing you to implement voice-activated customer service kiosks or enhance your chatbot interactions. NVIDIA NIM microservices accelerate the responsiveness of GenAI applications for real-time in-store product recommendations, delivering more personalized shopping experiences.

A unified approach to intelligent modern retail

By seamlessly integrating Dell NativeEdge, NVIDIA AI technologies, and ServiceNow Smart Operations retailers can create a unified, intelligent system that drives both operational efficiency and exceptional customer experiences. The partnerships and the solutions are designed to increase store performance by integrating tasks, workflows, AI and edge computing reduce operational costs, and boost revenue through more efficient processes. This approach and architecture addresses today's retail challenges and also positions retailers to lead in an increasingly competitive and omnichannel-driven market.

The intelligent modern retail store powered by Dell, NVIDIA and ServiceNow



The time to reimagine and modernize retail operations is now

The retail industry is at a pivotal moment where technological innovation is creating an opportunity for modernized problem-solving. By embracing this rapid retail evolution, leaders can solve challenges faster and think beyond the norm of cost savings and staying competitive to optimize planograms and merchandising, revolutionize loss prevention and labor strategies and more.

The seamless integration of Dell NativeEdge, NVIDIA AI technologies, and ServiceNow is essential for retailers aiming to transform their operations and meet the evolving demands of consumers. This unified approach empowers retailers to create intelligent, human-centric environments that deliver exceptional customer experiences, streamline operations, and drive business growth.

By leveraging edge computing, AI and computer vision, retailers overcome the challenges of outdated systems, rising costs and heightened customer expectations. Dell NativeEdge provides the foundation for real-time processing and decision-making, ServiceNow Smart Operations orchestrates seamless operations, and NVIDIA delivers the AI power needed to manage data-intensive workloads efficiently. Together, this partnership enables retailers to reduce operational costs, increase revenue and stay competitive in a fast-changing market.

The future of retail is intelligent, efficient and human-centric. This transformation is not just about surviving — it's about thriving in the new era. With the combined power of Dell, NVIDIA, and ServiceNow retailers can adapt to the seismic shifts in the industry and help create the store of the future. The future of intelligent modern retail is within reach today.

Learn more

Dell.com/NativeEdge

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