

**DRIVING
TOLLING INSIGHTS**

**The Next Wave of
Intelligent Tolling
Technology**

Darius Eshragh, SVP Business Solutions, North America at Emovis, discusses how AI, data readiness, and integrated mobility systems are reshaping tolling operations.



INTRODUCTION

The tolling industry is entering a critical phase of transformation, driven by artificial intelligence (AI), advanced analytics, and connected mobility technologies. From AI-powered tolling systems to real-time traffic data integration, these innovations are redefining how transportation infrastructure is operated, optimized, and experienced.

What is emerging is not simply an evolution of tools, but a structural reinvention of how data flows—across roadside systems, back-office platforms, and customer interaction—are increasingly interconnected. As tolling agencies and operators modernize legacy systems, the industry is shifting toward a fully intelligent, adaptive, and predictive mobility ecosystem.

In this interview, **Darius Eshragh**, Senior Vice President of Business Solutions North America at Emovis, shares insights on how AI in tolling, digital transformation, cybersecurity, and data-readiness is shaping the next generation of intelligent tolling.



01 AI and Workforce Transformation

Over the past decade, digital transformation has reshaped how tolling organizations operate. What fundamental shift is now required to move from digitalized processes to truly intelligent, AI-enabled operations?

Darius Eshragh: Digital transformation laid the essential groundwork for today's tolling operations by digitizing processes, integrating legacy systems, and making data more accessible. The move to AI-enabled operations is a natural extension of that journey, not a replacement of it. Digitalization helped organizations streamline and scale what they already knew how to do; intelligence builds on that foundation by enabling systems to learn, adapt, and support more dynamic, real-time decision making.

The key shift now is recognizing where traditional, rules-based solutions have reached their limits in meeting growing business needs and operational complexity. Rather than rearchitecting everything, organizations need to thoughtfully layer AI-enabled capabilities on top of existing platforms while augmenting analytics, automating judgment heavy tasks, and surfacing insights that teams couldn't previously see. When executed correctly, AI becomes a practical enhancement to trusted systems, helping tolling organizations move from reactive to more predictive, resilient, and adaptive operations.

Q: How is artificial intelligence redefining the role of human talent in tolling operations, and which capabilities will become most critical to ensure long-term competitiveness?

DE: Artificial intelligence is reshaping the role of human talent in tolling by shifting the focus from task execution to judgment, problem solving, and value creation; however, it does not eliminate the need for people. Human roles will remain central to operations, particularly where trust, context, empathy, and accountability matter. What AI changes is how those people are equipped to do their jobs. By embedding intelligent tools into daily workflows, organizations can reduce the time employees spend on low-value, repetitive effort and redirect their energy toward activities that support operational objectives and address complex, high-impact challenges.

A clear example is happening within the call center. Tolling organizations will continue to rely on skilled agents to engage customers and resolve nuanced issues. AI enhances that role by giving agents predictive insights, real-time access to relevant data across systems, and recommended next-best actions. Rather than searching for information or reacting after problems escalate, agents are better prepared to anticipate issues, resolve them faster, and deliver more consistent outcomes. In the long term, the most critical capabilities will be the ability to work effectively alongside intelligent systems, combining analytical thinking, domain knowledge, and customer judgment with AI-powered decision support. Organizations that invest in those human capabilities alongside technology will be best positioned to remain competitive.



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What strategies should organizations adopt to reskill and upskill their workforce to effectively collaborate with AI while maintaining human expertise at the core of decision making?

DE: Organizations should approach reskilling for AI the same way they approach any meaningful innovation: deliberately, incrementally, and anchored in real operational value. Leading organizations in industries such as aviation, utilities, logistics, and financial services have been successful by starting small and deploying AI in narrowly defined use cases, testing it in live environments, measuring outcomes, and refining before scaling. Airports and air navigation service providers, for example, introduced AI first as decision-support tools for operations staff, not replacements, learning quickly that adoption accelerated when employees could see how the technology reduced cognitive load and improved situational awareness without undermining human authority. The lesson has been clear: experimentation, iteration, and transparency build trust far more effectively than large, top-down rollouts.

Another common success factor across these industries is intentionally blending skills. Organizations that pair AI and data specialists, often through partners, with employees who have deep domain and operational knowledge, consistently outperform those that treat AI as a standalone technical capability. Utilities using AI for outage prediction and prioritization, for instance, learned that models are only valuable when informed by frontline operational context, while humans remain firmly in control of strategic priorities, risk tolerance, and outcomes. This reinforces a critical principle for tolling as well: humans always own the strategy, objectives, and decisions. AI can inform, recommend, and accelerate, but long-term competitiveness comes from a workforce that knows how to collaborate with intelligent systems while applying judgment, accountability, and institutional knowledge.

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02 Cybersecurity, Fraud, and Digital Trust

How can AI and advanced analytics strengthen cybersecurity and fraud prevention while ensuring a seamless and frictionless user experience?

DE: I'm not a cybersecurity expert, but I do have a strong appreciation for the critical role it plays in protecting tolling systems, data integrity, and public trust. Like our operational processes, cybersecurity relies on well established practices first, with AI and advanced analytics acting as powerful augmentations rather than replacements. Today, organizations already leverage robust, industry-standard tools to monitor, detect, and assess the cyber threat landscape. Those tools form the backbone of effective security programs, providing visibility and controlling across increasingly complex environments.

Where AI and advanced analytics add value is in helping security teams keep pace with an ever evolving threat landscape.

By working closely with technology partners, organizations can continuously optimize these existing tools—using AI to identify subtle anomalies, adapt detection models faster, and prioritize risks more effectively. This allows stronger defenses to operate largely in the background, applying more scrutiny only when warranted while preserving a seamless, low-friction experience for legitimate users. Ultimately, the combination of strong foundational security practices, trusted tools, and intelligently applied analytics is what enables both resilience and customer confidence over the long term.

03 Data Readiness and Scalable AI Adoption

What are the key challenges organizations face when scaling AI from pilot initiatives to fully operational systems, especially in terms of data readiness and legacy infrastructure?

DE: One of the most significant challenges organizations face is ensuring true data readiness; specifically, having open access to data and a clear understanding of how underlying systems and business workflows function end-to-end. Pilot projects can work well in controlled environments, but scaling often exposes fragmented data, loose integrations, or dependencies on intermediaries. These challenges are amplified when organizations have relied on closed or highly proprietary platforms that were not designed for transparency, extensibility, or AI-enabled evolution.

That reality makes vendor and partner selection a critical strategic decision. Organizations should seek partners that value transparency, are willing to solve problems collaboratively, and have technology roadmaps aligned with their own long-term objectives. Scaling AI successfully depends on shared visibility into data, system behavior, and integration points; not black box solutions. Vendors who invest in open architectures and clear data access enable agencies and operators to retain ownership of their data and decision making, creating the conditions for intelligent capabilities to augment existing systems rather than be constrained by them.

Legacy infrastructure is often another limiting factor, particularly when systems are stable but inflexible or not positioned for near-term modernization. In those cases, a practical path forward is to focus on extracting and organizing data into separate, well-governed repositories that can serve as the foundation for AI pilots and analytics improvements. This approach allows organizations to innovate without disrupting core operations. Over time, insights generated through these parallel environments can be thoughtfully integrated back into legacy systems through APIs, workflows, or decision-support layers. This approach helps to deliver value while creating a bridge toward future modernization when upgrade conditions allow.

04 Innovation in Action: From Pilots to Value



Q How can organizations ensure that pilot projects in tolling technologies evolve into real-world deployments that generate measurable operational and financial impact?

A **DE:** Organizations that successfully turn pilot projects into real-world deployments tend to follow a consistent, disciplined approach. The most important principle is to start small and do something like launch a focused pilot tied to a specific operational or financial problem, test it in real conditions, and define upfront how success will be measured. Not every pilot needs to scale, and that's okay. Failed or inconclusive pilots are often the price of innovation, provided they are low-cost, time-bound, and designed to generate quick learnings. What matters is creating tight feedback loops where results (positive or negative) inform the next iteration.

Equally critical is alignment across stakeholders from the outset. Pilots that remain experimental often fail because they are disconnected from real operational pain points or lack buy-in from the teams who would ultimately use the solution. Organizations should ensure that operations, technology, finance, and leadership agree on the problem being solved, the metrics that define impact, and the path from pilot to production if value is proven. When pilots are grounded in real business needs, measured rigorously, and iterated thoughtfully, they move beyond innovation theater and become scalable capabilities that deliver sustained operational and financial results.

Which key performance indicators (KPIs) should guide the evaluation of technology deployments across roadside systems, back-office operations, and customer service platforms?

DE: As technology across tolling systems continues to evolve, the metrics used to evaluate success should remain largely consistent. Technology itself is not the objective; it is an enabler to more efficiently and effectively achieve long-standing organizational goals. For that reason, KPI frameworks should be informed first by business and public agency strategy, not operate independently of it. Whether deploying new roadside systems, modernizing back-office platforms, or enhancing customer service capabilities, the question should always be how well the technology supports the outcomes the organization already cares about.

In tolling, those outcomes are ultimately measured by the value delivered to customers, both the road users and internal stakeholders, and by trust that is built with governing bodies and partners over time.

KEY INDICATORS CONTINUE TO INCLUDE:

- ✓ Customer experience
- ✓ Roadway safety
- ✓ Billing accuracy
- ✓ Timely and accurate revenue collection with minimal leakage
- ✓ Efficient resolution of customer inquiries and disputes

Advanced technology may allow these KPIs to be monitored more proactively or achieved more efficiently, but it shouldn't redefine what success looks like. Organizations that maintain clear, stable performance measures while using technology to strengthen how those measures are achieved are best positioned to deliver sustainable, meaningful impact across the tolling ecosystem.



05 Future of Tolling and Connected Mobility Ecosystem

Which emerging technologies—such as AI-driven analytics, connected vehicles, and next-generation payment systems—will most significantly redefine tolling operations in the coming years?

DE: Several emerging technologies will play a meaningful role in reshaping tolling operations over the coming years, but many of those shifts are already underway. Agencies are increasingly taking advantage of more advanced data analytics and performance metrics to optimize operations, improve reliability, and make better-informed decisions. As success stories are shared and analytical capabilities become more accessible and standardized, we can expect this to accelerate. What was once specialized or experimental is steadily becoming part of the core operating toolkit, allowing organizations to move from reactive reporting to more predictive, proactive management.

At the same time, toll facilities, particularly managed lanes, represent a uniquely strong test bed for connected vehicle technologies. These environments combine controlled roadways with increasingly smart infrastructure, creating ideal conditions for piloting CV2X use cases, safety enhancements, and integrated mobility services. In parallel, next-generation payment systems are continuing to reduce friction for customers by offering more flexible, convenient, and seamless ways to pay, removing barriers that historically separated tolling from the broader mobility experience. The common thread across all these technologies is that they enable tolling to evolve from a bespoke, standalone function into an integrated component of shared mobility ecosystems; better connected to how people move, pay, and interact with transportation networks overall.



06

Leadership and Integrated Mobility Transformation

How do you envision the evolution of traffic management systems as tolling becomes increasingly integrated with broader, real-time mobility ecosystems?

DE: Traffic Management Centers (TMCs) have undergone a transformation journey very similar to tolling over the past decade—moving from centralized, hardware heavy environments to more distributed, software-driven, and data-rich operations. That evolution is continuing as TMCs become increasingly connected through smarter field devices, edge computing, cloud platforms, and third-party data sources. As a result, traffic management is becoming more real-time, predictive, and responsive, shifting from monitoring conditions to actively managing them. These same trends naturally create more opportunities for convergence with tolling systems, particularly as both domains rely on shared data, analytics, and operational coordination.

As tolling becomes more tightly integrated into broader mobility ecosystems, we'll see deeper coupling between TMCs and tolling platforms in areas where real-time context matters most. Dynamic pricing is a clear example of how tolling systems must understand live-traffic demand, congestion patterns, and corridor performance to adjust pricing in near real time. That level of integration requires continuous data exchange and aligned operational models between traffic and tolling teams. Over time, this convergence will allow agencies to manage corridors more holistically, in balancing safety, throughput, revenue, and customer experience, while positioning tolling as an active lever within real-time mobility management rather than a standalone function operating in parallel.

What leadership principles are essential to guide organizations through rapid digital transformation while balancing innovation, operational excellence, and trust?

DE: Leading through rapid technological change starts with being very clear about why change is needed and what it must improve.

In tolling, reliability, trust, and performance are nonnegotiable, so leaders must anchor innovation directly to operational realities like revenue assurance, customer experience, safety, and system resilience.

When technology initiatives are explicitly tied to those outcomes, teams understand that transformation isn't about chasing trends, it's about strengthening the systems the organization is already accountable for delivering every day.

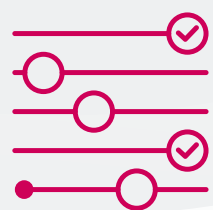
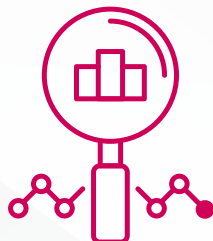
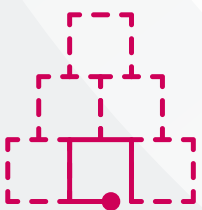
Equally important is disciplined, pragmatic execution. Effective leaders create room to experiment without putting core operations at risk. They start small, test ideas in live environments, measure results honestly, and scale only what proves its value. That also means being willing to stop initiatives that don't deliver results. Trust is built through transparency on what technology can and cannot do, investing in workforce readiness, and keeping humans firmly responsible for strategy, judgment, and outcomes. Organizations that lead this way can innovate continuously while preserving the confidence of customers, partners, and stakeholders.

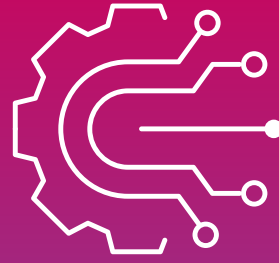
Start Small

Test in Live Environments

Measure Results Honestly

Scale Only What Proves its Value





The future of tolling is being shaped by the convergence of artificial intelligence, data intelligence, and connected mobility systems. As these technologies advance, organizations will increasingly differentiate themselves not by the tools they adopt, but by their ability to transform information into coordinated, real-time action across the entire mobility ecosystem.

This shift marks a fundamental redefinition of operational intelligence in transportation—one where human expertise and intelligent systems work in tandem to drive performance, trust, and long-term resilience. **As Darius Eshragh underscores, the path forward is not about adopting more technology, but about applying it with discipline, intention, and purpose to build a more seamless and sustainable mobility ecosystem.**

