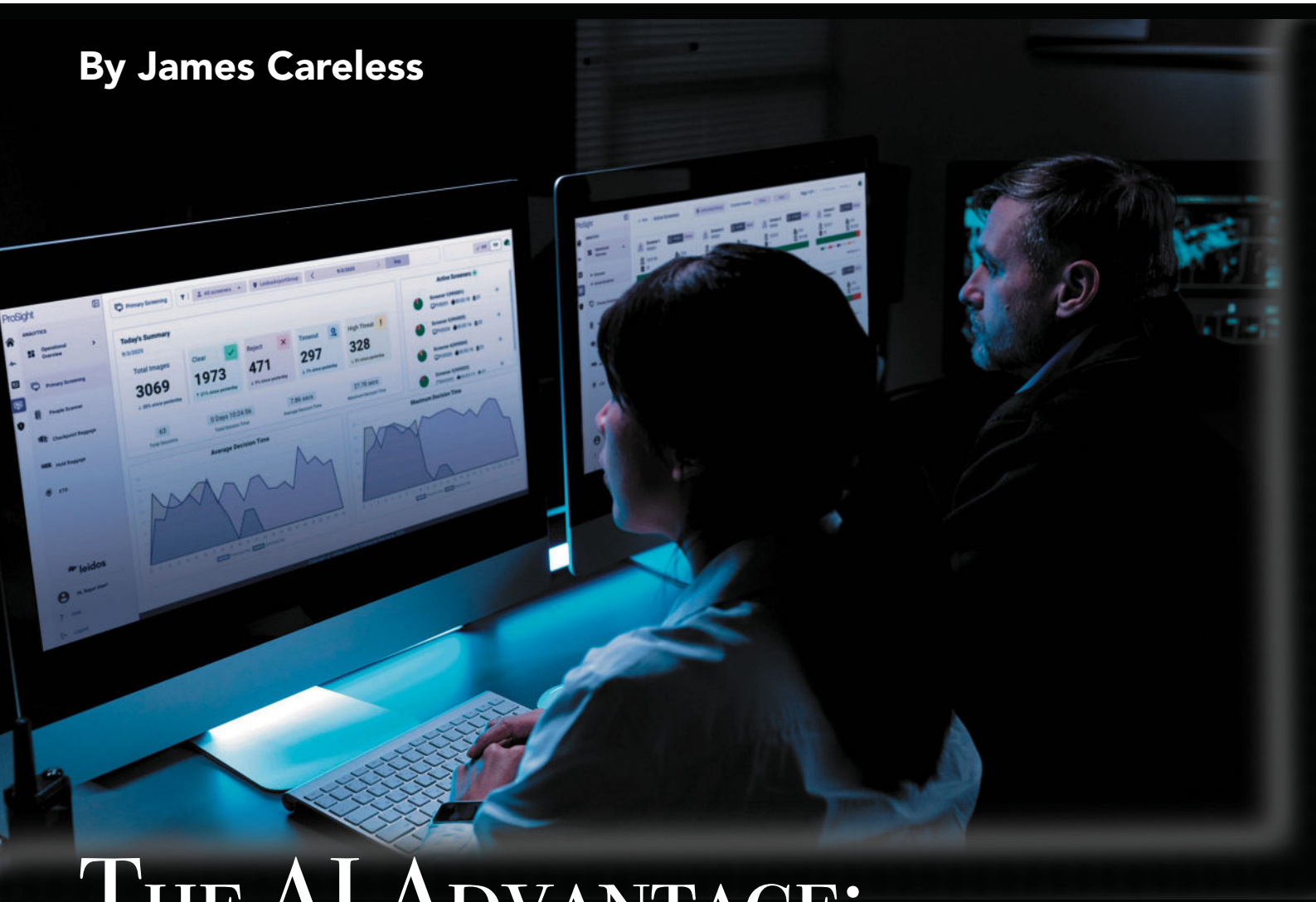
By James Careless



The AI Advantage: Predicting and Managing Threats in Modern Transportation

Protecting the security of transportation systems is a complex, details-driven business. There are so many potential threats to be detected and assessed that the sheer volume can overwhelm human operators.

This is why the implementation of artificial intelligence (AI) in transportation security systems is such good news. AI is designed to take in and analyze vast amounts of data quickly, sifting through it all to provide humans with the significant items they should be concerned about.

"The scale, speed, and complexity of modern commerce is overwhelming traditional, manual control models," said Mathieu Guillebaud, senior director of product development at Leidos, a defense and technology company that provides AI-driven screening solutions for ports and borders. "Global transport networks now process vast volumes of passengers, cargo, and data far beyond what human operators alone can consistently assess in real time."

"Transportation environments produce a huge volume of information every day, from video and access control to perimeter systems, intercoms, and operational data," added Shawn Enides, business development manager of transportation at Genetec, which

specializes in integrating massive amounts of physical security and operational data into a single, unified platform. "Security teams are looking for better ways to interpret all of that quickly and turn it into useful insight. That's where AI can help. It can surface patterns, highlight activity that needs attention, and give operators more context so they can respond faster and with greater confidence."

In this exclusive TSI article, we will examine how AI is predicting and managing security threats in modern transportation, and what the limits of its abilities are that humans need to be aware of.

The Power of Scale

Because of its vast, fast processing power, AI can enhance all aspects of transportation security management. Additionally, "AI capabilities such as automated image analysis, pattern recognition, and dynamic risk assessment are particularly well suited to the commercial transport domain," Guillebaud told TSI. "For example, AI can rapidly analyze X-ray or video imagery, correlate it with cargo manifests and historical patterns, and assign risk scores that help prioritize inspections. This allows border and security agencies to focus personnel on other aspects of their security operations. Border agencies can also increase clearance throughput while maintaining, or even enhancing, the integrity of their inspections."

For transport operators, AI is driving a fundamental shift in which the traditional trade-off between the flow of commerce and the rigor of security is being reduced. With AI-enabled targeting and automation, efficient movement and strong security controls are no longer opposing forces. Instead, they can be achieved simultaneously.

"Currently, AI is used to detect threats in real time, rather than predict them," noted Cymoril Metivier, digital portfolio director at Smiths Detection, which integrates physical screening equipment with AI-driven image analysis for global transport networks. "In terms of threat detection, the transportation industry is increasingly moving towards using AI to help screening teams identify threats faster by only highlighting areas that require screeners' attention, rather than requiring them to review every single item."

The fact that AI cannot predict threats explains why humans remain at the heart of the transportation security process. "AI is not meant to replace human decision-making in security screening operations," said Nicholas Ortyl, Leidos' chief engineer for aviation and critical infrastructure. "It helps augment it. By assisting operators with faster, more consistent analysis, trusted AI helps improve both the speed and quality of security controls. AI enables continuous analysis across checkpoints, cargo, and operations to identify subtle patterns and emerging threats earlier. This allows operators to anticipate risk, allocate resources dynamically, and improve both security and throughput simultaneously."

The Benefits of AI

The benefits of using AI to predict security threats across the aviation, rail, maritime, and trucking sectors are many and diverse. A case in point: "For high volume operations, such as airports, AI brings consistency, scalability, and the ability to quickly detect non-obvious threat patterns across modes, which contributes to improved detection rates and operational efficiency," Ortyl said.

"AI systems are a valuable tool in real-time anomaly detection as they are able to process huge volumes of data from multiple sources and identify subtle differences from normal patterns at a much faster speed than humans, providing a near-instantaneous alert," said Metivier. "In addition, deep learning models can recognize correlations or patterns across different datasets better than human personnel working in different locations could. Another advantage is that AI can maintain constant vigilance without experiencing fatigue, and provide scalability to monitor multiple locations and data streams simultaneously in a way that humans cannot."

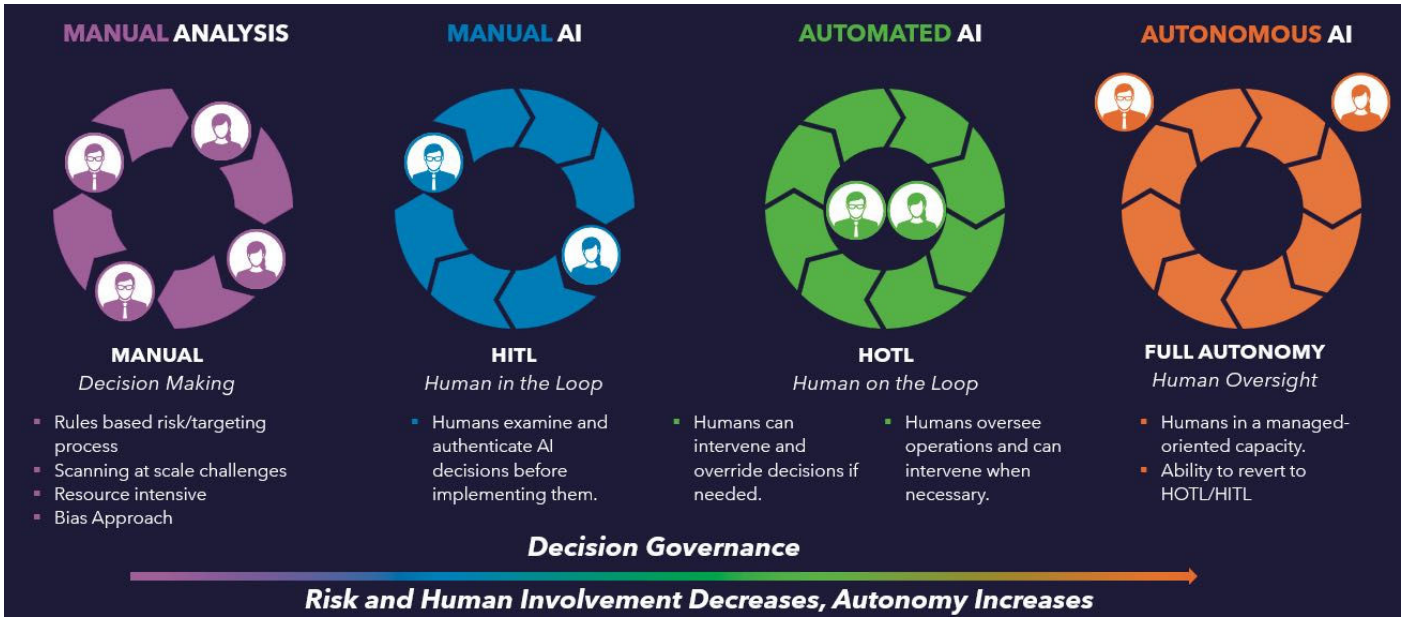
"One of the biggest benefits of AI is scale," Enides said. "AI can help teams process far more information than they could review manually, which is especially important in transportation because these environments are large, complex, and constantly moving. It can improve awareness, support faster response times, and help teams focus their attention where it matters most."

AI-enabled tools can be very effective when they are part of a broader operational strategy. "In transportation settings, operators are often responsible for monitoring a large number of inputs at once," Enides noted. "AI can help reduce that burden by narrowing attention, filtering noise, and drawing attention to activity that falls outside expected patterns. The real value comes from helping operators assess what they are seeing more quickly and act on it with better context."

Efficiency is yet another AI benefit. "AI-powered detection uses intelligent algorithms to enable alarm-only viewing," said Metivier. "This means that systems only highlight areas that require screeners' attention, rather than requiring them to review every single item. Furthermore, remote screening or Centralized Image Processing (CIP) can improve the manual review process by using a single location to screen and analyze images flagged by AI algorithms from multiple systems in different locations. This means that specialist teams can be deployed flexibly across different locations depending on

Mathieu Guillebaud
Leidos

Shawn Enides
Genetec



With AI-enabled targeting and automation, efficient movement and strong security controls are no longer opposing forces. Instead, they can be achieved simultaneously, according to Leidos. Leidos image.

real-time demand, rather than being tied to a specific machine, and also enables greater information sharing across multiple checkpoints."

In addition to these benefits, using AI in transportation security can increase screening throughput while keeping costs down. "By automating screening and risk assessment, operators and border agencies can process higher volumes without proportional increases in staffing or infrastructure, directly improving asset utilization and revenue potential," Guillebaud said. "At the same time, AI lowers the reliance on manual-intensive primary inspection and review, decreasing labor costs and minimizing costly disruptions from inefficient or overly broad security controls. Risk-based targeting ensures that high-cost interventions (e.g., inspections, shutdowns) are applied selectively, improving the return on security investment."

The takeaway: "AI systems enhance the ability of transportation security departments to detect and respond to anomalies," said Ortyl. "However, their effectiveness is not determined by technology alone. It depends heavily on how well AI systems are integrated into operational environments and decision-making processes. And we still need human security personnel to perform a final assessment that takes contextual factors and nuance into account."

The Risks

We've enumerated the benefits of using AI to enhance transportation security systems, and they are many. But there are risks that need to be considered when integrating AI into any security operation.

"Some risk examples include an overreliance on algorithms, a poorly trained workforce, and data quality issues, especially if algorithms are not designed to continuously learn and improve," Ortyl told TSI. "It is also critical that there is strong governance to ensure transparency and fairness when and how AI is deployed. This is why organizations should leverage AI as a decision-support tool with human oversight, not as a replacement."

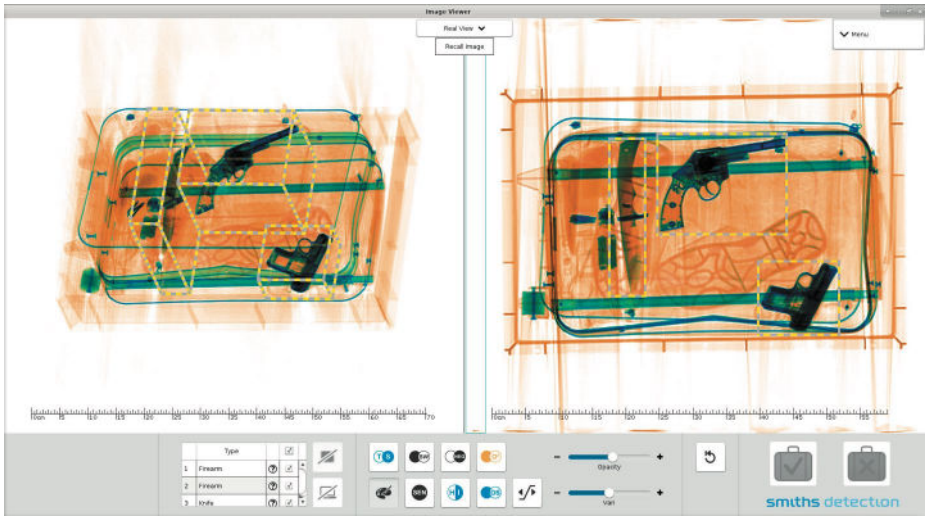
Indeed, AI systems that are not properly maintained with regular upgrades, and relied on in place of human final judgments, can deliver a range of unexpected risks to their users.

For instance, "Poorly calibrated AI models can generate excessive alerts, leading to unnecessary inspections, delays, and increased operational costs that erode efficiency gains," said Guillebaud. "Inaccurate or incomplete data can degrade model performance, leading to poor decision-making. Misuse of AI (e.g., biased decisions or privacy violations) can lead to legal penalties, reputational damage, and loss of public trust. Meanwhile, as systems become more digitized and AI-driven, they present higher-value targets for cyberattacks, requiring investment in cybersecurity."

"As security environments grow more complex, seamless collaboration between AI-driven tools, screening technologies, and operational systems becomes increasingly critical," Metivier added. "When these

Nicholas Ortyl
Leidos

Cymoril Metivier
Smiths Detection



AI-powered detection uses intelligent algorithms to enable alarm-only viewing according to Smiths' Cymoril Metivier. These systems only highlight areas that require the screeners' attention, rather than requiring them to review every single item.

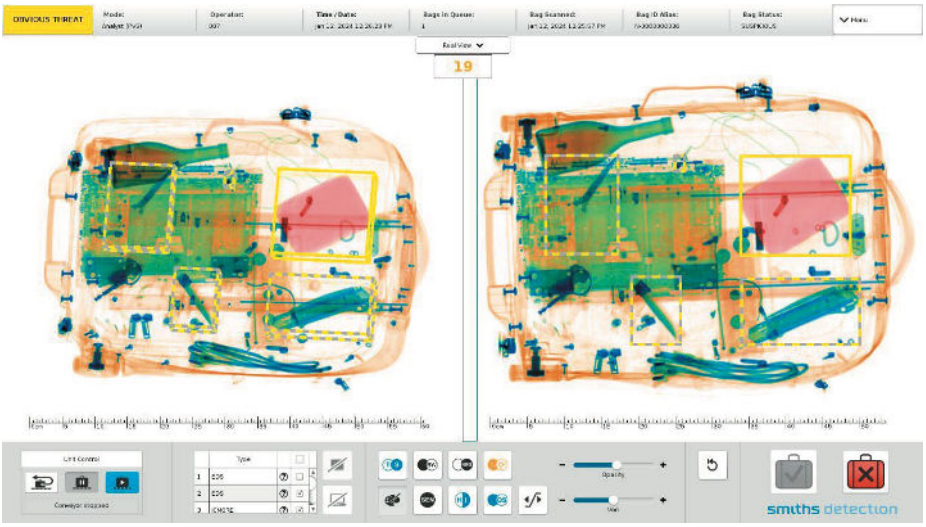
components do not work together effectively, hidden vulnerabilities can emerge. This risk is especially pronounced in multi-vendor environments, where the absence of clear governance, shared standards, and well-defined responsibilities can create friction around integration, compatibility, and accountability."

The moral to this tale? "The use of AI enables a shift from cost-heavy, reactive security models to more targeted, intelligence-driven operations," said Guillebaud. "When implemented effectively, this translates into both stronger security outcomes and measurable economic gains, but only if organizations actively manage the associated risks."

The Power to Predict

We have seen the power of AI to enhance transportation security screening systems in real time. But is AI able to predict future security threats and issues?

In a limited sense, the answer is yes. "Machine learning algorithms can identify patterns in data which then inform decision-making," Metivier said. "For example, data on prohibited items that



CTiX GUI with EDS alarm and items framed by APDIS. Smiths detection image.

pass through security systems can be used to train and refine algorithms to detect hazards or prohibited items through object recognition with high accuracy."

A practical example of this can be found with respect to cargo inspections, where AI algorithms can analyze images of the inside of containers and lorries to determine the probability that they contain the goods that have been declared. "This capability allows customs and security officers to quickly and reliably perform detailed cargo assessments, increasing throughput whilst also enhancing the protection of borders from dangerous goods and smuggling," she said. Additionally, "These models can adapt over time through continuous learning mechanisms. As new data is inputted, and human screeners provide feedback on false positives and missed threats, the models can refine their understanding and become progressively better at distinguishing risk."

"At a simple level, AI helps 'connect the dots' across many different sources of information that would be difficult for humans to piece together quickly," said Ortyl. "In transportation modes, data comes from non-intrusive inspection scans, commercial data, GPS tracking, video or camera feeds, biometrics, and more. AI can look at each individually, or orchestrate across all, and spot patterns or inconsistencies that might indicate a problem."

AI does this kind of predictive work best when the underlying systems it is assessing are connected to each other. "In transportation, relevant information can come from many places, including video, access events, perimeter alerts, communications tools, and other operational inputs," Enides said. "When those systems are brought together in a unified environment, AI can help connect signals that might otherwise seem unrelated. That gives teams a clearer picture of what is happening and helps them spot patterns that deserve closer attention."

Real-World Examples

According to the experts, AI-enhanced security is already proving itself in the transportation sector.

For example, "AI is having a significant impact on security checkpoints at airports," said Ortyl. "AI-enabled computed tomography (CT) screening is one example. Leidos' ClearScan CT is designed to provide enhanced explosive detection and enables passengers to keep electronics and approved liquids in their bags, supporting security protection while improving the passenger experience. Another example is advanced algorithms in people screening, such as those found in our Pro:Vision family of products. Our AI algorithms are designed to help identify underlying characteristics of known threats, regardless of gender and body, versus solely basing image comparisons to known templates. This approach is intended to support gains in detection performance and throughput with fewer false alarms."

"At ports of entry, we help streamline security operations for customs agencies through integrated screening systems, such as our portal and mobile VACIS X-ray inspection systems, Exploranium radiation detection system, and AI-driven trade analytics," Guillebaud said. "With our Mezzo enterprise software platform, we fuse imaging, sensor and manifest data to support real-time risk assessments — helping customs officers work to detect threats more accurately while increasing throughput and reducing unnecessary secondary inspections."

"In a ports and borders context, screening equipment has been enhanced by algorithms that can identify dangerous goods and contraband," said Metivier. "Software enhancements to existing security systems can provide automatic recognition of contraband, in addition to non-homogenous cargo and empty or partially filled containers."

AI can identify discrepancies between the images provided by scanning technology and the declared goods and their stated weight and volume. "This allows customs and border protection agencies to make more informed decisions about which containers to physically inspect, enabling resources to be focused on the highest-risk cargo and ensuring the efficient flow of legitimate trade," she said.

As well, AI can identify irregular patterns in logistics data, whether that means unusual routing, timing inconsistencies, or activity that falls outside normal movement patterns. "It becomes even more useful when that information can be viewed alongside physical security data such as video, access events, or vehicle activity," Enides said. "That added context helps investigators and operations teams understand anomalies faster and decide where they need to look more closely."

AI can play a useful role in detecting other inconsistencies that may indicate

smuggling, fraud, or sabotage. "On the data side, AI can assess shipment risk by analyzing information such as who is shipping the goods, where the shipment originated, its destination, the type of goods declared, and the historical behavior of the parties involved," said Guillebaud. "At the physical layer, AI enhances inspection technologies, such as X-ray and scanner systems. Automated image analysis can classify goods, detect specific items or commodities, and identify anomalies in cargo or vehicles, including hidden compartments or undeclared materials."

"The real value comes from combining these capabilities," he told TSI. "AI can compare what is physically detected in a container or vehicle with what has been declared in commercial trade data. For example, if the system identifies goods in an X-ray image that do not match the manifest or detects anomalies inconsistent with the declared cargo, it can raise a high-confidence alert."

AI's Limits

As effective as AI can be in enhancing transportation security, it does have its limits. "AI's performance depends on the quality of the data, the way models are trained and deployed, and the operational process around them," said Enides. "Transportation environments are dynamic, high-volume, and often unpredictable, so unusual behavior does not always point to malicious intent. AI can help teams work through complexity faster, but experienced personnel still play a critical role in interpreting events and making decisions that have real operational and public impact."

Additionally, AI systems are not "set and forget" installations. They require ongoing investment in maintenance, retraining, and validation to remain effective as operating conditions and threat patterns evolve. "There are also governance and trust considerations," said Guillebaud. "Security operators must be able to understand and act on AI outputs, which requires transparency, clear operating procedures, and human oversight. At the same time, regulatory and privacy requirements, particularly around surveillance and biometrics, can constrain how AI is deployed. Finally, as transport systems become more digitized and AI-enabled, they also become more attractive targets for cyber threats. Organizations must ensure that AI capabilities are deployed securely and resiliently."

"It is important to remember that AI works as a tool to support, rather than replace, human judgment in transport security contexts," Metivier reiterated. "AI lacks the ability to account for contextual factors or nuance, meaning that human interpretation of its judgment is always required."

What's Coming Next

We have seen just how effective and versatile AI can be in making transportation security systems faster, more efficient, and operationally successful. So, what is coming next?

"The future lies in fully integrated, data-driven security ecosystems where AI connects screening, operations, and cybersecurity into a unified platform," replied Ortyl. "In airports, we will see more adaptive algorithms, continuous model updates, and enterprise-level analytics that enable predictive, system-wide decision-making. The focus will be on scaling these capabilities responsibly while maintaining trust, transparency, and resilience."

"In customs screening operations, we will see greater integration, automation, and trust in AI-driven systems," Guillebaud predicted. "The sector is moving toward environments where data from multiple sources — video, sensors, trade systems, and operational platforms — are fused into a single, real-time view. More intelligence will shift to the edge, enabling faster decisions while reducing data movement and supporting privacy requirements. As threats evolve, particularly in the cyber domain, AI will also play a growing role in detecting and responding to attacks on critical transport infrastructure before they have physical consequences. The future is about moving technology out of isolation into integrated, intelligence-led ecosystems to improve border controls and the efficient flow of goods."

With any luck, AI's expanding capabilities will keep pace with the growing threats facing transportation systems worldwide. "As passenger and cargo volumes continue to grow, the transport industry is increasingly expecting digital capabilities such as agentic and generative AI to be embedded as standard to improve operational visibility and accelerate decision-making," concluded Metivier. "Ultimately, success will be defined by our ability to build a connected and resilient operating environment that ensures clarity, control and confidence without adding in unnecessary complexity and risk."

Portal and mobile VACIS X-ray inspection system helps streamline security operations for customs agencies. Leidos image.