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From algorithm to action:

Digital infrastructure, essential services, and key national assets



AI generated image

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Physical AI (PAI) is increasingly used to monitor, control, and maintain critical infrastructure. In data centers, PAI can manage power and cooling, detect equipment issues, and support robots that install or service servers. At ports, AI can coordinate autonomous cranes and vehicles to move containers more efficiently. In energy networks, drones can inspect remote power lines, while AI-enabled systems can forecast demand and balance electricity loads. These applications connect AI decision-making with physical assets to improve efficiency, reliability, and resilience.

However, the consequences of failure in these systems carry a different weight since a failure here is rarely a localized event. A compromised AI in a data center could trigger a cascading hardware meltdown, destroying the critical data of countless organizations. A hijacked AI orchestrating a port could halt the flow of essential goods, creating immediate and widespread economic disruption.



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What organizations must plan for

When the asset itself is a nexus of commerce, the stakes are about economic and national security. Developing safe and trusted systems is paramount. Organizations can start with the following actions:



Strategically identify PAI opportunities.

Develop a strategic roadmap for PAI deployment. This involves identifying the highest-value use cases, whether for optimizing port logistics, enhancing data center energy efficiency, or deploying autonomous inspection drones and prioritizing them based on a clear business case and risk assessment.



Implement PAI-driven predictive maintenance.

Leverage the sensing capabilities of PAI to shift from reactive repairs to predictive asset management. This includes using AI to analyze thermal, acoustic, and vibration data to foresee failures in critical machinery (such as power converters or cooling pumps) before they lead to costly downtime.



Develop a grid-responsive energy strategy.

Large power consumers such as data centers can use AI to shift flexible computing work off peak periods and pair it with on-site batteries so the facility supports the grid instead.



Conduct integrated PAI threat modeling.

Perform security assessments that model how a single cyber-attack could cascade into a kinetic event, such as a compromised PAI system causing physical equipment damage or a widespread service outage and failure of response protocols.



Design and test manual overrides.

Regularly stress-test manual fallback procedures that allow human operators to safely retake control of an autonomous system during a security incident or AI failure.



Build a unified compliance and assurance program.

Create an evidence-based compliance program that addresses the overlapping requirements of traditional OT security (NIST SP 800-82), AI risk management (NIST AI RMF), and specific, high-stakes regulatory mandates from entities like NERC for grid reliability and CISA for national security.

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Wins for our clients

The pain point	The solution	The value
Creating a robotics transformation strategy A company had a vision for an automated data center and needed to connect that high-level goal with a practical roadmap for identifying high-value robotics opportunities and integrating them safely into live operations.	**Developed a business-centric deployment strategy** Conducting detailed "as-is" process mapping to identify high-value opportunities and then defining the future state through new operational workflows and an integrated automation operating model.	**A clear, actionable strategy for automation** The organization moved from a high-level concept to a concrete, data-driven plan. It now has a prioritized roadmap for deploying robotics, a clear understanding of the expected business outcomes, and the operational model required to scale. 01
Unpredictable system-wide risks The company's complex and interconnected port operations made it difficult to anticipate how equipment failures or new optimization strategies (e.g., for crane scheduling) could create cascading bottlenecks across the entire terminal.	**Established a control tower for the port** Creating a dynamic, data-digital twin of the entire terminal. This allowed the enterprise to simulate and validate the real-world impact of new automation strategies and PAI threat scenarios in a safe, offline environment.	**Data-driven optimization and enhanced resilience** The company can now safely test and de-risk new operational strategies before deployment, identifying potential bottlenecks and security vulnerabilities and gaining the ability to optimize throughput while building a more resilient and predictable supply chain hub. 02

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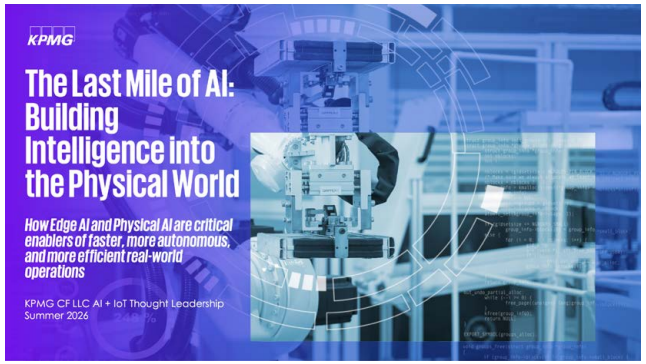

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DASD-2026-20825