

Harnessing Artificial Intelligence for Enhancing Regulatory Oversight in the Safe and Secure Transport of Nuclear and Radioactive Material

The safe and secure transport of nuclear and other radioactive material is fundamental to supporting peaceful applications in medicine, industry, and energy. Competent authorities face increasing challenges in maintaining effective regulatory oversight due to the growing complexity of supply chains, evolving security threats, and the introduction of advanced technologies in transport systems. Artificial Intelligence (AI) presents a transformative opportunity to strengthen regulatory processes, enhance risk assessment, and optimize decision-making in the transport of nuclear and radioactive material. It explores the potential applications of AI in regulatory activities for transport safety and security. Specific use cases include automated compliance verification, predictive analytics for identifying high-risk shipments, real-time anomaly detection in transport monitoring systems, and AI-enabled inspection technologies. The paper highlights how AI can assist regulators in streamlining inspections, improving operational efficiency, and enhancing the detection of security threats while maintaining compliance with international safety standards. It examines the key challenges associated with integrating AI into regulatory practices, such as data quality, cybersecurity risks, interpretability of AI-driven decisions, and the need for capacity building among regulatory authorities. Drawing on global best practices and relevant case studies, the paper provides recommendations for fostering international cooperation, developing regulatory guidance, and promoting responsible AI adoption in line with the objectives of the IAEA and its Member States. By addressing both opportunities and challenges, it will contribute to the ongoing dialogue on leveraging emerging technologies to ensure the continued safe, secure, and sustainable transport of nuclear and radioactive material in an increasingly digitalized world.

Country or International Organization

Instructions

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