

Bridging the Safety-Security Interface: Strengthening Safety and Security Culture in the Transport of Nuclear and Radioactive Material

The transport of nuclear and other radioactive material is an essential component of global efforts to support peaceful applications of nuclear technology in fields such as energy, medicine, and industry. While international frameworks established by the IAEA and other organizations have successfully developed distinct standards for transport safety and security, real-world implementation reveals the critical need for a coherent and integrated approach at the operational level. The paper explores the concept of the safety-security interface in the context of radioactive material transport and highlights the pivotal role of safety and security culture in bridging potential gaps between these two domains. The interface between safety and security is often characterized by overlapping but occasionally conflicting objectives. Safety focuses on minimizing the risk of accidental exposure or release of radioactive material, while security emphasizes preventing unauthorized access, theft, or sabotage. In transport operations, conflicting requirements—such as accessibility for emergency responders (safety) versus limiting information dissemination about shipment details (security)—can create operational challenges. Without careful coordination, fragmented approaches may compromise either safety or security, or both. The paper argues that strong organizational culture is the critical enabler for harmonizing safety and security practices in transport operations. Safety culture, as described in IAEA publications, emphasizes continuous learning, transparent communication, and shared responsibility for preventing accidents. Security culture, by contrast, highlights threat awareness, vigilance, and the protection of sensitive information. Achieving a balanced interface requires cultivating a shared mindset across organizations, supported by leadership commitment, integrated procedures, and joint training programs.

Through analysis of case examples and current practices, the paper identifies key strategies for strengthening the safety-security interface. These include, Conducting joint safety-security risk assessments at both the design and operational stages of transport, Incorporating safety-security interface modules in regulatory frameworks, industry training programs, and emergency planning, Promoting cooperation between competent authorities, industry operators, and law enforcement agencies to build trust and streamline communication, Embedding cultural attributes such as questioning attitudes, personal accountability, and a commitment to both safety and security into all levels of transport organizations. The paper highlights the challenges that some Member States face in harmonizing national frameworks for safe and secure transport, particularly in contexts with limited regulatory capacity or competing priorities. In addressing these challenges, the role of capacity building—including targeted training for regulators, operators, and front-line personnel—is emphasized. Enhancing the safety-security interface through an integrated cultural approach is not only desirable but necessary to ensure the robust, resilient, and sustainable transport of nuclear and radioactive material worldwide. This paper calls for increased international cooperation, the development of practical guidance for implementing integrated culture programs, and continuous assessment of cultural effectiveness to adapt to evolving risks and operational realities. By focusing on the human and organizational factors that underlie successful safety and security performance, this paper contributes to ongoing global efforts to strengthen transport frameworks, promote sustainable nuclear technology use, and build a common foundation for future challenges in the transport of nuclear and radioactive material.

Country or International Organization

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Track Classification: Track 1 Legislative and Regulatory Framework for Safe and Secure Transport