NUCLEAR TECHNOLOGY · VOLUME 211 · 2663–2665 · NOVEMBER 2025

DOI: https://doi.org/10.1080/00295450.2025.2497023

Letter to the Editor

SAFECURITY: Harmonizing Safety and Security in Facilities and Activities

Tonguc Özdemir*

Mersin University, Chemical Engineering Department, Mersin, Türkiye

I. UNDERSTANDING SAFECURITY

Safecurity is a portmanteau word (or blend word), combining the words "safety" and "security," representing the seamless integration of safety and security measures to enhance the resilience of nuclear and radiation facilities and their operations. This word refers a combined and harmonized approach to the concepts of safety and security.

A provisional definition of safecurity could be "a term that includes safety and security measures that are designed and implemented in a harmonized manner, ensuring an equal balance regarding to the priority of each of safety and security with the aim of protecting people and the environment."

This definition is a provisional one; it is generally correct that safety could take priority over security in facilities if any conflict arises, particularly when human life or the environment is at risk. However, the goal is always to design and implement measures that harmonize safety and security to avoid such conflicts.

II. ROLE OF INTERNATIONAL ORGANIZATIONS IN SAFETY AND SECURITY

The International Atomic Energy Agency (IAEA) plays a pivotal role in promoting both nuclear safety and security. The IAEA's statute explicitly mandates the organization to enhance the safe use of nuclear technology worldwide. While the IAEA has developed comprehensive safety standards and security guidelines, these frameworks have often been implemented through separate channels.

Recognizing the interconnectedness of these domains, the IAEA has increasingly emphasized the need for an integrated approach. This involves harmonizing policies, strengthening collaboration between safety and security. The safecurity approach could define a good basis for the harmonizing the concepts of safety and security.

The International Nuclear Safety Advisory Group (INSAG), established by the IAEA in 1985, provides authoritative advice and recommendations on nuclear safety and security. In collaboration with the Advisory Group on Nuclear Security (AdSec), INSAG has issued a report emphasizing the importance of integrating safety and security cultures.[1]

A notable development is the joint INSAG-AdSec report, which reflects on the progress made over the past decade concerning the safety-security interface and identifies challenges for the future.[1] This report underscores the necessity of creating synergies between nuclear safety and security measures.

Additionally, the IAEA has published a harmonized safety culture model that aligns guidance issued by organizations, such as the World Association of Nuclear Operators, the Institute of Nuclear Power Operations, and government organizations from Finland, Japan, and the United States. This model aims to ensure consistency in safety culture guidelines and further integrates safety and security principles.[2]

The IAEA's Office of Safety and Security Coordination plays a pivotal role in this harmonization process, coordinating safety standards and security series in cooperation with member states.[3] Furthermore, the IAEA's Global Nuclear Safety and Security Network provides a platform for sharing knowledge and services, contributing to the harmonization of national approaches to nuclear safety and security.[4]

The IAEA has published the "Code of Conduct on the Safety and Security of Radioactive Sources" that covers both of the safety and security aspects for the safe and secure management of radiation sources.[5] This document could be regarded as one of the pioneering documents that lays down both of the aspects for the radiation sources.

*Email: tonguc.ozdemir@gmail.com

III. NEED FOR HARMONIZATION

A harmonized safecurity approach would ensure that nuclear and radiation facilities are not only equipped to prevent accidents, but are also fortified against external threats. This might involve the following:

1. *Design integration*: Incorporating safety and security features during the design phase of nuclear and radiation facilities.

2. *Cultural alignment*: Fostering a shared culture of responsibility, where safety and security personnel collaborate closely.

3. *Regulatory synergy*: Aligning national and international regulations to address overlapping concerns in safety and security.

4. *Emergency preparedness and response*: Developing integrated response plans that address both safety emergencies and security breaches.

The Nuclear Harmonization and Standardization Initiative (NHSI), launched by the IAEA in 2022, aims to advance the harmonization and standardization of the small modular reactor (SMR) design, construction, regulatory, and industrial approaches.[6] The NHSI comprises two complementary tracks: regulatory and industry tracks. The regulatory track focuses on harmonizing regulatory approaches to facilitate international prelicensing regulatory reviews and leveraging other regulatory assessments,[7] while the industry track concentrates on standardizing industrial practices, including the harmonization of high-level user requirements, common approaches on codes and standards, experimental testing and validation for design and safety analysis, and accelerating nuclear infrastructure implementation for SMRs.[7]

By bringing together policymakers, regulators, designers, technology holders, operators, and other stakeholders, the NHSI seeks to support the timely deployment of advanced reactors, maximizing their contribution toward achieving net-zero goals.[8] The safecurity approach would have the potential to complement this initiative.

IV. CHALLENGES TO INTEGRATING NUCLEAR SAFETY AND SECURITY

Safety and security, although interconnected, have historically been managed as distinct disciplines. This separation stems from differences in objectives: safety, aims to prevent accidents, while security focuses on preventing malicious acts. The key challenges might include the following:

1. *Regulatory gaps*: Diverging international frameworks and national regulations could lead to inconsistencies.

2. *Cultural perspective*: Safety culture often prioritizes openness and transparency, while security culture values confidentiality and restricted access.

3. *Allocation of resources*: Competing priorities may lead to conflicts in implementing safety and security measures concurrently.

V. OVERCOMING THE CHALLENGES

In order to overcome the challenges, some strategies could be adopted. The IAEA and other international bodies could establish comprehensive guidelines that integrate safety requirements and security recommendations. Cross-disciplinary training for personnel can foster a shared understanding and collaboration between safety and security teams. Innovations, such as digital twins and artificial intelligence–driven monitoring systems can enhance the integration of safety and security measures. On the other hand, the SMR Regulators' Forum report[9] discusses the regulatory challenges of SMRs, focusing on an integrated approach to safety, security, and safeguards (3S). It highlights the need for robust, harmonized regulatory frameworks to address unique SMR features and ensure safe, secure deployment with additional consideration of nuclear nonproliferation.

VI. INDUSTRY INVOLVEMENT

The nuclear industry has begun recognizing the importance of harmonizing safety and security. Companies could do the following:

1. Develop and apply integrated risk assessment models that consider both safety and security threats.

2. Invest in resilient infrastructure capable of mitigating a wide range of threats, from cyberattacks to physical breaches.

3. Collaborate with regulators and relevant institutions to develop best practices for harmonizing safety and security efforts.

By addressing these aspects, the safecurity concept could achieve a transition from theoretical concept to a practical

framework for advancing nuclear power and radiation facilities in a safe, secure, and sustainable manner.

Acknowledgment is needed that the integration of safety and security might be exercised by the nuclear industry, driven by the need for cost reduction. By integrating safety and security at every level, from design and operation to emergency response and international collaboration, the nuclear industry aims to minimize risks and ensure the safe and secure use of nuclear technology. Integrating safety and security in the nuclear industry would not only enhance protection, but also offer significant opportunities for cost reduction. By avoiding redundancies and streamlining operations, the industry could achieve a more efficient and cost-effective approach to manage risks.

VII. CONCLUSIONS

In an era where nuclear energy plays a vital role in addressing global energy needs and climate goals, it needs a comprehensive and unified approach. Safecurity could help form bridges that span the gap between safety and security, fostering a robust and resilient nuclear environment. Through continued leadership and collaboration, the international organizations could drive the implementation of safecurity, ensuring that nuclear technology remains a safe, secure, and sustainable solution for the future.

Disclosure Statement

No potential conflict of interest was reported by the author(s).

Author Contributions

CRediT: **Tonguc Özdemir:** Conceptualization, Investigation, Methodology, Writing – original draft, Writing – review & editing.

ORCID

Tonguc Özdemir http://orcid.org/0000-0001-8019-5829

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