

**SPESS F**  
**Document Preparation Profile (DPP)**  
**Version 1 dated 14 April 2022**

## 1. IDENTIFICATION

**Document Category or batch of publications to be revised in a concomitant manner**

**Nuclear Security Technical Guidance**

**Working ID:** NST071

**Proposed Title:** Concepts and Application of Security by Design

**Proposed Action:** New publication

**Review Committee(s) or Group:** NSGC

**Technical Officer(s):** Ek, David; Shakoor, Abdul; Ladsous, David (NSNS/MAFA); Hewes, Mitchell (NSNS/INMA)

## 2. BACKGROUND

Integrating nuclear security concepts as early as possible in a facility's lifetime is commonly referred to as 'security by design', which is an approach that incorporates nuclear security aspects into the design decisions for the entire lifetime of the facility. The term describes an approach to voluntarily address design features with respect to their security considerations for facilities, means of transport or devices using, storing or processing nuclear or other radioactive material in order to reduce security vulnerabilities related to design, layout or operations at the design stage. This approach can be more effective than attempting to mitigate these vulnerabilities after the facility, means of transport or device is designed and constructed. The application of security by design principles provides an opportunity for the security personnel to influence the design to reduce security vulnerabilities.

Consideration of security early in the design process minimizes the risk of impacts on schedule or budget, and facilitates better integration with other design considerations such as those relating to operations, safety and the State system of accounting for and control of nuclear material. The trend is for new facilities to be built with inherent safety and security features as well as accommodations for safeguards, and these efforts should be coordinated as security effectiveness is influenced and benefits from safety measures, and safety systems effectiveness is influenced and benefits from physical protection measures.

The need for States to address security by design is identified in a number of IAEA Nuclear Security Series (NSS) publications, including:

- Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities (INFCIRC/225/Revision 5), NSS 13-G
- Nuclear Security Recommendations on Radioactive Material and Associated Facilities, NSS 14-G
- Physical Protection of Nuclear Material and Nuclear Facilities (Implementation of INFCIRC/225/Revision 5), NSS-27-G,

- Security of Radioactive Material in Use and Storage and Associated Facilities, NSS No. 11-G (Rev. 1),
- Security of Radioactive Material in Transport, NSS 9-G
- Security of Nuclear Material in Transport, NSS No. 26-G,
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However, although these publications note the need to address security by design, there is no guidance provided so far in the NSS on the concepts and application of security by design. Detailed technical guidance on this topic would be valuable for States, facility & device manufacturers and operators that are planning to design and/or construct new nuclear facilities or facilities involving radioactive material, or devices involving radioisotopes.

### **3. JUSTIFICATION FOR THE PRODUCTION OF THE PUBLICATION**

As noted above, the NSS does not currently provide specific guidance on implementing security by design.

The guidance needed by States on this topic, as highlighted by the NSGC through its roadmap group, is specialized and complex enough that it would not be appropriate to provide it through a revision or addendum of an existing publication, as this would entail developing a considerable portion of new text. In addition, the cross-cutting nature of the topic implies that guidance for both nuclear facilities and facilities and activities involving radioactive material is needed.

### **4. OBJECTIVE**

The objective of the proposed publication is to provide technical guidance on concepts and application of security by design to enable them, at the design stage, to reduce security vulnerabilities, improve security efficiency and effectiveness related to design, layout, operations, maintenance, etc and enhance the synergy and optimize the interfaces between the Safety, Security and Safeguards planned measures in the facility. This result of security by design could be to reduce potential consequences, complicate the ease if committing malicious acts, and reduce vulnerabilities. This would involve identifying design features of facilities possessing nuclear or radioactive material, medical or industrial devices using radioactive sources, and means of transport for these materials and devices.

The target audience of this publication includes competent authorities and relevant support organizations with responsibilities for the security of nuclear and other radioactive material, as well as designers, vendors and operators of facilities and devices.

### **5. SCOPE**

The proposed publication will provide guidance on security by design considering both the unauthorized removal and sabotage, including computer security, for new nuclear facilities, facilities involving radioactive material, devices possessing sealed radioactive sources, and the means of transport for nuclear and other radioactive material.

The proposed publication will also address the methods to consider security, including computer security, within the context of a facility, transport, or radiotherapy or industrial radiography device. It will not address security for existing facilities nor security actions performed by people.

### **6. PLACE IN THE OVERALL STRUCTURE OF THE RELEVANT SERIES AND INTERFACES WITH EXISTING AND/OR PLANNED PUBLICATIONS**

This Technical Guidance publications will be subordinate to the following NSS publications:

- *The Objective and Essential Elements of a State's Nuclear Security Regime* (NSS No. 20),

- *The Nuclear Security Recommendations for the Physical Protection of Nuclear Material and Nuclear Facilities (INFCIRC/225/Revision 5)* (NSS No. 13),
- *The Nuclear Security Recommendations on Radioactive Material and Associated Facilities* (NSS No. 14),
- *Physical Protection of Nuclear Material and Nuclear Facilities (Implementation of INFCIRC/225/Revision 5)* (NSS No. 27-G),
- *Security of Radioactive Material in Use and Storage and Associated Facilities* (NSS No. 11-G, Revision 1),
- *Security of Nuclear Material in Transport* (NSS No. 26-G),
- *Security of Radioactive Material in Transport* (NSS No. 9-G, Revision 1).

It will also interface with the following NSS Technical Guidance publications and international legal instruments:

- *Handbook on the Design of Physical Protection Systems for Nuclear Material and Nuclear Facilities* (NSS No. 40-T),
- *Computer Security Techniques for Nuclear Facilities* (NSS No. 17, Revision 1),
- *Computer Security of Instrumentation and Control Systems at Nuclear Facilities* (NSS No. 33-T),
- *Convention on the Physical Protection of Nuclear Material (INFCIRC/274/Rev. 1) and its Amendment (INFCIRC/274/Rev. 1/Mod. 1 (Corrected))*,
- *Code of Conduct on the Safety and Security of Radioactive Sources*.

As this Technical Guidance publication addresses the design of all types of nuclear facilities and facilities and devices involving radioactive material, it is connected to all other NSS publications involving security system design for nuclear facilities and facilities involving radioactive material.

The proposed publication will primarily inform the application of guidance which is provided in the following NSS Implementing Guides: NSS No. 11-G (Rev. 1), NSS No. 9-G (Rev. 1), NSS No. 26-G, and NSS No. 27-G.

## **7. OVERVIEW**

The proposed publication will outline general concepts of security by design and will then provide guidance separately on the application of these principles to nuclear facilities, facilities or devices involving radioactive material, and their means of transport. These concepts apply not only to the initial design, but also to later modifications.

For nuclear facilities, the publication will consider site location, layout, approaches, topography and local installations; and location/placement of structures, systems and components having security or safety implications in order to reduce vulnerabilities and/or increase security efficiency and optimize interfaces between safety, safeguards and security. For facilities using or storing radioactive material, the publication will consider layout and design features of the facilities that could be modified in order to reduce security vulnerabilities and/or improve security efficiency. For devices incorporating radioactive sources, the design could consider features that would improve detection of and delay for

unauthorized access to the radioactive source and/or facilitate anchoring of the device to delay its unauthorized removal. For means of transport, the publication will address methods to increase vehicle resistance to threats of a forced penetration, and methods to facilitate the inclusion of barriers on transport, and detection and alarm communication. Finally, for nuclear facilities, facilities using or storing other radioactive material, and for their transports, the design should consider the category of nuclear or radioactive material and its associated protection requirements considering the theft and sabotage consequence severity

The tentative table of contents of the publication is foreseen to include the following sections

1. Introduction
2. Objectives of security by design for nuclear and other radioactive material under regulatory control
3. Concepts for security by design
4. Engagement of Stakeholders in the process of Security by Design
5. Guidance for the application of security by design to nuclear installations
  - a. Nuclear power plants
  - b. Research reactors
  - c. Nuclear fuel cycle facilities
6. Guidance for the application of security by design facilities and devices involving radioactive material
  - a. Radioactive material devices
  - b. Medical and industrial facilities
  - c. Biotechnology and agriculture facilities
7. Guidance for the application of security by design during transport
8. Guidance for the application of security by design computer security
  - a. Identification of computer-based systems that support facility functions
  - b. Sensitive digital assess classification
  - c. Defensive computer security architecture
9. Guidance on the methods to assess the adherence of design to security-by-design concepts

**8. PRODUCTION SCHEDULE:**

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STEP 1: Preparing a DPP	DONE
STEP 2: Internal review of the DPP (Approval by the Coordination Committee)	March 2022
STEP 3: Review of the DPP by the review Committee(s) (Approval by review Committee(s))	June 2022
STEP 4: Review of the DPP by the CSS (approval by CSS) or information of the CSS on the DPP	

STEP 5: Preparing the draft publication	July 2022 – December 2023
STEP 6: First internal review of the draft publication (Approval by the Coordination Committee)	March 2024
STEP 7: First review of the draft publication by the review Committee(s) (Approval for submission to Member States for comments)	July 2024
STEP 8: Soliciting comments by Member States	July-October 2024
STEP 9: Addressing comments by Member States	October 2024-December 2024
STEP 10: Second internal review of the draft publication (Approval by the Coordination Committee)	Jan 2025
STEP 11: Second review of the draft publication by the review Committee(s) (Approval of the draft)	June 2025
STEP 12: (For Safety Standards) Editing of the draft publication in MTCDD and endorsement of the draft publication by the CSS	
STEP 13: Approval by the Board of Governors (for SF and SR only)	N/A
STEP 14: Target publication date	2026

## 9. RESOURCES

Estimated resources involved by the Secretariat (person-weeks) and the Member States (number and type of meetings)

4 Scientific Secretaries, 10 person-weeks each

3 Consultancy Meetings

1 Technical Meeting