# **Development of the Nuclear Safety Information Disclosure Framework** : In Conjunction with the Implementation of the Nuclear Safety Communication Act

Ji-Yoon Shin<sup>a\*</sup>, Jae-Woong Chung<sup>a</sup>, Jin-A Jeong<sup>a</sup>, Young-Sik Park<sup>a</sup>, Kye-Hee Lee<sup>a</sup>, Byeong-Hyeon Chae<sup>a</sup> <sup>a</sup>Korea Institute of Nuclear Safety., Public Affairs Dept., 62 Gwahak-Ro, Yuseong-Gu, Daejeon, Korea 34142 <sup>\*</sup>Corresponding author: k755sjy@kins.re.kr

\**Keywords* : nuclear safety information, information disclosure system, Nuclear Safety Communication Act, information classification, disclosure framework development

#### 1. Introduction

#### 1.1 Background of the Study

With increasing public interest in nuclear safety and growing demand for safety-related information following incidents such as the Fukushima accident, the Korean government (ROK) enacted the *Act on Nuclear Safety Information Disclosure and Communication* (hereinafter referred to as the *Nuclear Safety Communication Act*) in June 2021 as a special law, which came into effect in June 2022.

Previously, nuclear safety information (hereinafter referred to as the NS-Info) was disclosed mainly through the *Nuclear Safety Information Center (NSIC)* under the *Official Information Disclosure Act* (hereinafter referred to as the *Information Disclosure Act*) and the *Nuclear Safety Act*, focusing on the legally designated information such as safety review and inspection reports. The NSIC has been operated by the Korea Institute of Nuclear Safety (KINS), which is entrusted by the government.

However, with the enforcement of the *Nuclear Safety Communication Act*, significant changes occurred in the scope, authority, methods of disclosure, data analysis, and communication processes of nuclear safety information. Consequently, a fundamental shift in the current NSIC-centered information disclosure system has become necessary, prompting a transition to an enhanced framework grounded in the *Nuclear Safety Communication Act*.

#### 1.2 Scope and Methodology of the Study

This study conducted a comprehensive environmental analysis of nuclear safety information disclosure, including the current status of nuclear safety information disclosure, the information disclosure system under the *Nuclear Safety Communication Act*, comparative analysis with information disclosure systems in other sectors (such as pharmaceuticals), and international nuclear safety information disclosure practices.

Based on these analyses, this study established a strategic direction for constructing an enhanced information disclosure system, formulated a mid- to long-term vision (including goals, strategic objectives, strategic projects, and implementation roadmap), and initiated the first-phase project.

Furthermore, by incorporating legal, policy, and technological environmental analyses along with feedback from various stakeholders, we derived improvements for the system architecture across different domains (business, UI/UX, applications, data, technology) and developed a *TO-BE* model.

- The fundamental directions of this study include:
- (1) Enhancement of the information disclosure system based on NSIC,
- (2) Integration of channels for nuclear safety information collection,
- (3) Establishment of a Data Hub for regional NS Info Sharing centers in the long term, and
- (4) Initiative aims to establish itself as a global standard for NS-Info disclosure.

# 2. Environmental Analysis and Derivation of Improvement Measures

#### 2.1 Environmental Analysis

A comprehensive review was conducted on relevant laws, institutional policies, social and industrial conditions, ICT technological trends, and best practices from other sectors (such as food and pharmaceuticals), as well as international NS-Info disclosure.

Special focus was placed on comparing the NS-Info disclosure framework before and after the implementation of the Nuclear Safety Communication Act, as well as assessing the current status and improvement needs of the NSIC.

The Nuclear Safety Communication Act, as a special law, takes precedence over other laws and supplements the Information Disclosure Act where necessary. Compared to other domestic and international information disclosure laws, the Nuclear Safety Communication Act exhibits the following distinctive characteristics:

- (1) Expansion of the scope of disclosure authorities (related government & institutions including nuclear operators),
- (2) Transition from a positive listing (enumerating items subject to disclosure) to a negative listing

approach (stipulating only non-disclosable items), thereby significantly broadening the scope of disclosure,

(3) Reduction of non-disclosure reasons to approximately half of those in the Information Disclosure Act.

These features make the Nuclear Safety Communication Act an internationally unique and strong legal framework for the information disclosure in a specific sector.

Additionally, stakeholder opinions, including feedback from the public, experts, government officials, local authorities, and residents, were gathered and analyzed to identify areas for improvement in the information disclosure system.

# 2.2 Establishment of Improvement Measures

# 2.2.1 Development of a Mid-to-Long-Term Vision

To systematically and sustainably enhance the NS-Info disclosure system, a mid-to-long-term vision was established. The overarching vision is: "Transparent and open information disclosure that fosters public trust and confidence."

vision	Transparent and open information disclosure that fosters public trust and confidence.						
Goals	User	Provide easy-to-understand and prompt customized information services.					
	System	Establish a user-friendly system that promotes the public communication.					
	Info	Link information to provide integrated and useful information					
Strategies	Expansi of	on Provision of Integration Customized of New					

 
 Strategres
 Of
 Customized
 Of New Technologies
 Infrastructure

 Fig. 1. Mid-to-Long-Term Vision for Nuclear Safety

Information Disclosure

A total of 16 strategic projects were defined, structured into three implementation phases, with 13 tasks to be completed by 2026 and three long-term tasks to be carried out beyond 2027. The phase-wise objectives include:

(1) Phase 1: Establishment of institutional and system infrastructure for information collection and management.

(2) Phase 2: Development of an integrated information portal tailored to user needs.

(3) Phase 3: Advancement of information services utilizing AI and the promotion of information utilization in policy and research.

stage	2024	2025	2026	Beyond2027	
stage	Phase1	Phase2	Phase3	Long-Term	
System Development	Information Management system	Customized Information Disclosure	Advanced Management	Data Management system	
	Standardization of Safety Information	Integration of System Management	AI Chatbot	External Data Linkage	
	Integrated Database	Integrated Search	AI-Driven Services		
		Internal Data Linkage and Migration			
Infrastructure Expansion	Establishment of Infra	Expansion of Infra	Enhancement of Infra	Cloud Transition	

Fig. 2. Three-Phase Implementation Roadmap for Strategic Projects

# 2.2.2 Establishment of a Safety Information Production-Distribution-Consumption Procedure

Roles and relationships between key stakeholders including nuclear safety-related institutions(eight), the information disclosure portal, regional NS-info sharing centers, and end-users (public, experts, local residents, etc.)—were defined.

Based on this framework, an end-to-end procedure for the production, distribution, and consumption of NS-Info was formulated, specifying the responsibilities of different entities, system functionalities, and interconnections.



Fig. 3. Nuclear Safety Information Disclosure System Concept

# 2.2.3 Design of the Information Disclosure System Architecture

An assessment of the current state of the system across four key areas-business processes, application

systems, data and infrastructure/security-was conducted.

Improvements were identified in relation to:

- (1) The organizational structure and workflow of the eight related institutions,
- (2) User interface design and functional requirements,
- (3) Categorization and classification of disclosed information, and
- (4) IT infrastructure, including hardware/software and security mechanisms.

A total of 35 design elements were restructured and analyzed for interdependencies, which were then incorporated into the architecture of the envisioned TO-BE system.



Fig. 4. Information Disclosure System Architecture

# 3. Achievements of the First-Phase of the Vision

In accordance with the implementation roadmap of the mid-to-long-term vision, the first-phase strategic projects(4) were successfully completed in the second half of 2024. This phase established the foundation for an integrated information management system to support the collection, disclosure, analysis, and management of NS-Info.

Specifically, the following key initiatives were implemented:

- (1) Development of an Information Management Portal for administrators to oversee integrated safety information,
- (2) Standardization of data to ensure systematic information management,
- (3) Establishment of a unified database model for structured data integration, and
- (4) Deployment of integrated IT infrastructure to facilitate data exchange and management.

The integrated information system developed in this allows multiple relevant phase institutions to collectively utilize standardized processes for categorizing, registering, managing, and storing information, thereby ensuring consistency and coherence in information management.



Fig. 5. Nuclear Safety Information Management Portal

Additionally, a unified classification applicable across all relevant institutions was established. This classification was structured based on legally defined activities and further enhanced by incorporating metadata such as target facilities, substances, geographic locations, and keywords. The inclusion of such metadata is expected to serve as a basis for the processing, analysis, and utilization of NS-Info in the future.

Category	Regulated Entity		Regulatory Action		Regulatory Region	
	Subcategory	Detailed Subcategory	Subcategory	Detailed Subcategory	Subcategory	Detailed Subcategory
Nuclear Reactors and Related Facilities	ear Readors Operating Nuclear Power Pants Nuclear Power Plants under Construction Decommissioned Reactors Nuclear Fuel Cycle Facilities Radioactive Waste Management Facilities	Individual reactors and related facilities	Construction Permit Operating License	Review of Construction Permit Review of Construction Permit Amendment  Review of Operating License Review of Operating License Amendment 	Metropolitar/ Provincial     Covernment     Autorativide     Overseas	an (Muncopa) Local nt Government de
			Safety Inspection	Pre-Operational Inspection Periodic Inspection		
Radioactive Materials and Related Equipment	<ul> <li>Radioactive Materials</li> <li>Radiation Devices</li> <li>Radioactive Wastelli</li> </ul>	Radioactive Specific Materials materials and Padiation Devices equipment Padioactive Waste	Safety Review	Design Certification(Change Review Review of Manufacturing and Distribution License :		
			Safety Inspection	Radiation Equipment Inspection Transportation (Manufacturing,Use) Inspection E		
			Safety and Hazard Prevention Measures	Actions on Defective Products Leakage Testing and Contamination Measurement		

Fig. 6. Integrated Classification for NS-Info

#### 4. Conclusions

With the enforcement of the *Nuclear Safety Communication Act*, constructing an integrated information portal that systematically collects, connects, analyzes, and preserves safety data from multiple institutions has become a legal obligation.

This study has established a mid-to-long-term vision, identified improvement measures, and designed an information disclosure system architecture based on an analysis of domestic and international information disclosure practices. The successful implementation of the first-phase strategic projects in 2024 laid the foundation for an integrated information disclosure system.

Since public trust is essential for the utilization of nuclear energy, transparent information disclosure and open communication are crucial. The Nuclear Safety Communication Act represents a globally unique legislative case, and its implementation through an integrated digital system for NS-Info disclosure is an unprecedented initiative.

By prioritizing full transparency, bidirectional information sharing, user-centric information services, and the unification of public access points, this initiative is set to redefine the paradigm of NS-Info disclosure.