Nuclear Safety Resources Management (Nu-SRM): An Approach toward Strengthening Safety Culture through the Integrated Management System in Korea

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Prologue
Personal Information

Name
Sa Kil Kim

Formal Background/Education
Ph.D., Industrial Engineering, Kyung Hee Univ.

Work Experience
Senior Researcher in KAERI from June 2009 to now

My Own Definition of Safety Culture
Safety Culture is common awareness among members in the organization to improve plants safety firstly.
Contents

I. Background

II. Basic Framework of the Nu-SRM

III. Discussion
I. Background
Recent Major Issues in Korea Nuclear Industry

**Good News**

- Received order for UAE NPP Project
- Completed the construction of Shin-Kori Unit 3 reactor building

**Bad News**

- Safety Injection of Shin-Kori Unit 1
- Fukushima Daiichi Accident in Japan
- Kori Unit 1 incident (SBO) concealment
- Delivery corruption
- Quality counterfeit
Organizational Factors in Human Error Events

Unintended Trip Events in Korea
(186 cases, 2000 - 2011)

Key Hazards of Human Errors

- Organization: 51.9%
- Individual: 40.7%
- Environment: 7.3%
- Others: 79.57%

Human Errors: 20.43%

Source: KAERI, Technical report for investigations on human error hazards in recent unintended trip events of Korea nuclear power plants, KAERI/TR, 2012
Energy Security vs. Public Acceptance
Energy Security: Energy Situation in Korea

**Imports**

- Overseas Dependence 96.5% (121.7 bil. $)

**Primary Energy**

- 262.6 mil. toe (100%)

**Transformation**

- 68.8 mil. toe (26.2%)
- 193.8 mil. toe (73.8%)

**Final Energy**

- Industrial 59.4%
- Residential 11.2%
- Commercial 8.0%
- Transportation 19.1%
- Public 2.3%

**Source:** 2011 Energy Info. Korea, KEEI, December 2011
Public Acceptance: Benchmarking UK?

Shifting Opinions

Agree: Nuclear Power is relatively safe/important electricity source/should build new plant

Source: BBC World Service/Globe Scan, November 2011.
Support for replacement new build in UK reaches a new high point of 50%

Source: Ipsos MORI poll, all adults aged 16+ (1,000-2000), December 2011.
Firstly public acceptance,

at the same time energy security inherently.
How to ensure public acceptance?

How to improve organizational safety innovatively?

How to settle down and strengthen safety culture?
Endeavor of Nuclear Power Company

- Improving accident reporting system
- Reinforcing electric power system (e.g., movable generator)
- Reinforcing periodic safety review
- Spreading safety culture (e.g., IAEA SCART, self-assessment)
Safety Experts’ Worries

- Is it possible that the nuclear power company can overcome current issues alone?

- If safety culture were spread then public acceptance will be ensured?

- Is the safety culture a key to resolve current issues?

- Can be settle down or strengthen the safety culture?

- How to settle down or strengthen the safety culture?
How about Integrated Management System?

Is it possible that the nuclear power company can overcome current issues alone?
☞ No, government intervention is necessary.

If safety culture were spread then public acceptance will be ensured?
☞ Partially yes, safety culture is one of the key factors to ensure the public acceptance.

Is the safety culture a key to resolve current issues?
☞ No, safety culture is not a solution but a method.

Can be settle down or strengthen the safety culture?
☞ Strongly yes, however, it is difficult with just assessment.

How to settle down or strengthen the safety culture?
☞ Building a integrated management system to strengthen safety culture is the key.
Nu-SRM (Nuclear Safety Resources Management) is based on Integrated Management System.
II. Basic Framework of the Nu-SRM
Nu-SRM is a new operation technology to strengthen safety culture continuously though systematically managing all safety resources 1).  
1) Safety resources: indispensible resources to improve safety such as human, task, organization, information etc.

Core engine of the Nu-SRM is a platform, which controls deviations of safety resources by real time processing.
Safety Culture and Nu-SRM

Safety Culture is like eliminating hydrogen in containment

Safety Culture

Safety Information Resources

Nu-SRM

Crew Resource Management

Task Resource Management

Organization Resource Management

Information

Requirements

Feedback

Requirements

Requirements

Requirements
Mechanism to Strengthen Safety Culture

Integration & Planning

- External Information
  - Workers characteristics
  - Difference among teams, organizations, countries etc.
  - International and domestic issues
  - Others

- Internal Safety Information
  - Incident & accident, Safety culture survey data etc.

Surveillance & Feedback

- Integrated Management System
  - Assessment and evaluation module (Fitness for duty, team performance, safety culture etc.)

Management measures

- Improving crew capability
- Improving organizational system
- Improving task process

Actions

- Technical measures

Operating Organization

Plant Facilities
Configuration of the Nu-SRM

1 platform and 3 modules

- Safety information resource management platform
- Crew resource management module
- Task resource management module
- Organization resource management module
Crew Resource Management Module

Improving Crew Safety Capability

Managing Fitness For Duty
- Health management program
- EAP
- ...

Evaluating and Managing Crew Safety Capability
- Optimal decision making manual
- Team decision making program
- Leadership & fellowship program
- Conflict management program
- Shared situation awareness program
- Task supporting interface

Basic CRM training program
Task Resource Management Module

Improving Task Process for Safety

Safety Information Resource Management Platform

Maintenance process manual
Integrated maintenance program
Overhaul procedure management program
Test management program

Robust safety & quality management program

Test process manual
Improving Organizational Safety Capability

Robust Safety & Quality Management Program

- Enterprise operating program
- Safety management policy and public relations program
- Robust organizational safety program
- Learning organization program
- System dynamic modeling, organizational characteristics analysis, safety culture assessment
- Self-diagnosis and learning manual
III. Discussion
Safety Culture = Centrifugal Force

Crew safety capability

Evaluation and Assessment

Organizational Capability

Robust Safety information

Task process for safety

Reward

Motivation

Encouragement

Efficiency

Trial and error

Safety

Nu-SRM
Nu-SRM during Pre-Operational Phase

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