

안전문화에 접근과 평가



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CONTENTS

I. THE EXPERIENCES

II. IAEA APPROACHES

III. KOREAN PRACTICES

IV. REMARKS

NRC Special Inquiry Group, TMI, A report to the commissioners and to the public (1980)

The one theme that runs through the conclusions we have reached is that the **principal deficiencies** in commercial reactor safety today **are not hardware problems, they are management problems.** - - - But the most serious problems will be **solved *only by* fundamental changes in the industry and the NRC**

- The Commission is incapable, - - - , of managing a comprehensive national safety program for existing NPPs - - - to ensure the public health and safety
- We have found an industry in which the expertise and responsibility for safety is fragmented among many parties. - - - There are **many institutional disincentives to safety**, and **safety issues** that are identified at some point in the system **often fall through the cracks**

INSAG-1, Summary report on the post-accident review meeting on the Chernobyl accident (1986)

- There is a need for a 'Nuclear Safety Culture' in all NPPs

INSAG-7, The Chernobyl Accident: Updating of INSAG-1 (1992)

- Not learned the lessons of earlier accidents at Leningrad # 1 (1975), and Chernobyl # 1 (1982)
- Deficient safety culture, not only at the Chernobyl plant, but throughout the Soviet design, operating and regulatory organizations
 - An insufficient effective regulatory regime that was unable to counter pressures for production
 - A general lack of safety culture in nuclear matters, at the national level as well as locally

The National Diet of Japan, The official report of The Fukushima Nuclear Accident Independent Investigation Commission (2012)

A “manmade” disaster

The TEPCO Fukushima NPP accident was the result of collusion between the government, the regulators and TEPCO, and the lack of governance by said parties. - - -

*We conclude that the accident was clearly “manmade.” We believe that **the root causes** were the organizational and regulatory **systems that supported faulty rationales for decisions and actions**, - - -*

In order to prevent future disasters, **fundamental reforms must take place**. These reforms must cover both the structure of the electric power industry and the structure of the related government and regulatory agencies as well as the operation processes

Common features of the 3 accidents

✓ Lars Högberg (Chair of SC of the OECD/NEA)

“All 3 severe accidents (TMI, Chernobyl, Fukushima) had **their root causes** in system deficiencies indicative of poor safety management and poor safety culture **in both the nuclear industry and government authorities.**”

CONTENTS

I. THE EXPERIENCES

II. IAEA APPROACHES

III. KOREAN PRACTICES

IV. REMARKS

1. Fundamental Safety Principles (SF-1)

□ Fundamental safety objectives

To protect people and the environment from harmful effects of ionizing radiation

- Achieved **without unduly limiting** the operation of facilities or the conduct of activities that give rise to radiation risks
- To ensure that facilities are operated and activities conducted so as to achieve the **highest standards of safety** that can **reasonably be achieved**, measures have to be taken:
 - To control the radiation exposure - - -
 - To restrict the likelihood of events - - -
 - To mitigate the consequences - - -

□ 10 safety principles

① Responsibility for safety

② Role of government

③ Leadership and management for safety

Effective leadership and management for safety must be established and sustained in organizations concerned with, and facilities and activities that give rise to, radiation risks

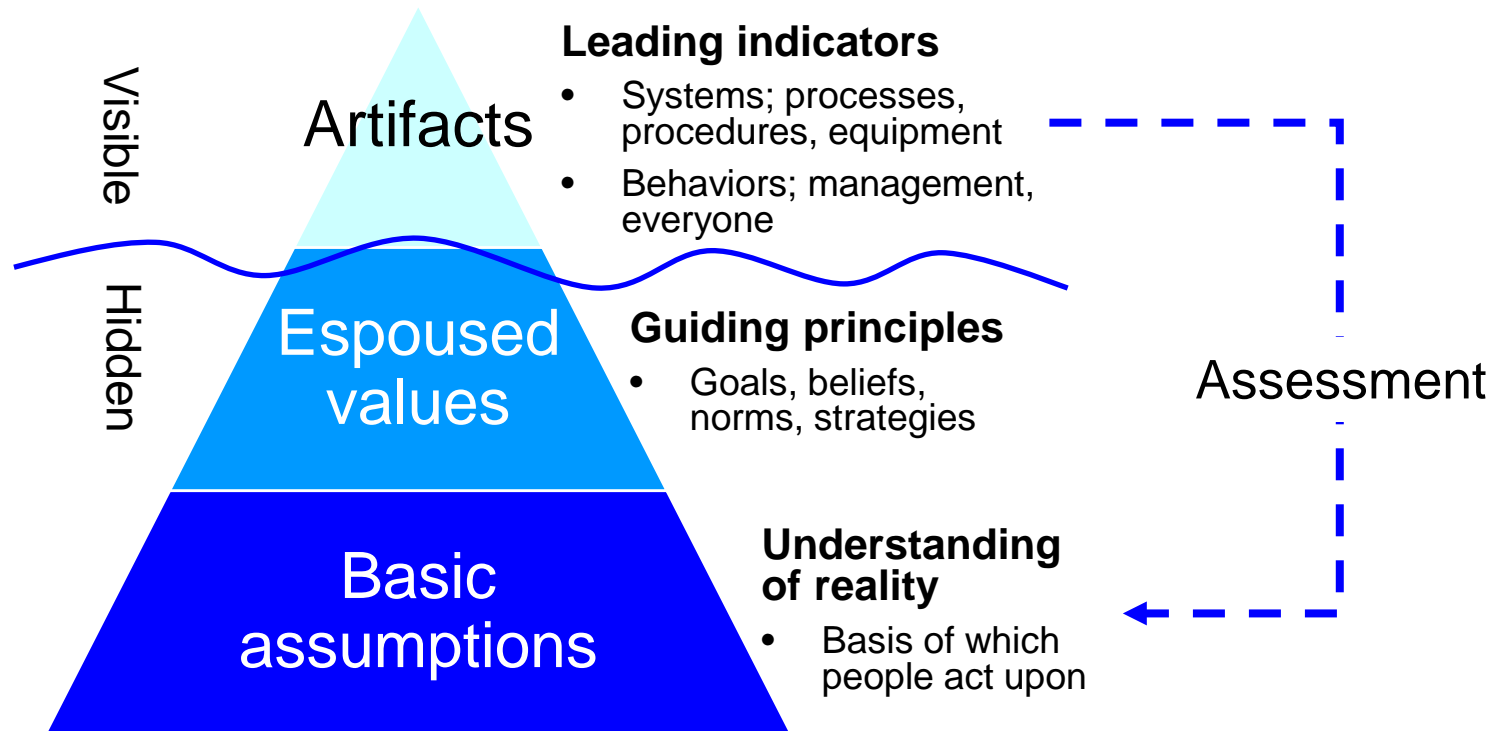
3.12. Leadership in safety matters has to be demonstrated at the highest levels in an organization - - -

3.13. A SC that governs the attitudes and behavior in relation to safety of all organizations and individuals concerned must be integrated in the management system. SC includes:

- Individual and collective commitment to safety - - -
- Accountability of organizations and of - - -
- Measures to encourage a questioning & learning attitude and to discourage complacency - - -

2. Approach for SC

- Organizational culture study (E. H. Schein)
 - Culture is a **pattern of basic assumptions**
 - Invented, - - - as *it learns to cope with its problem of external adaptation and internal integration* which have **evolved over time and are handed down** - - -
 - **Iceberg model** of 3 layers



- IAEA publications for SC

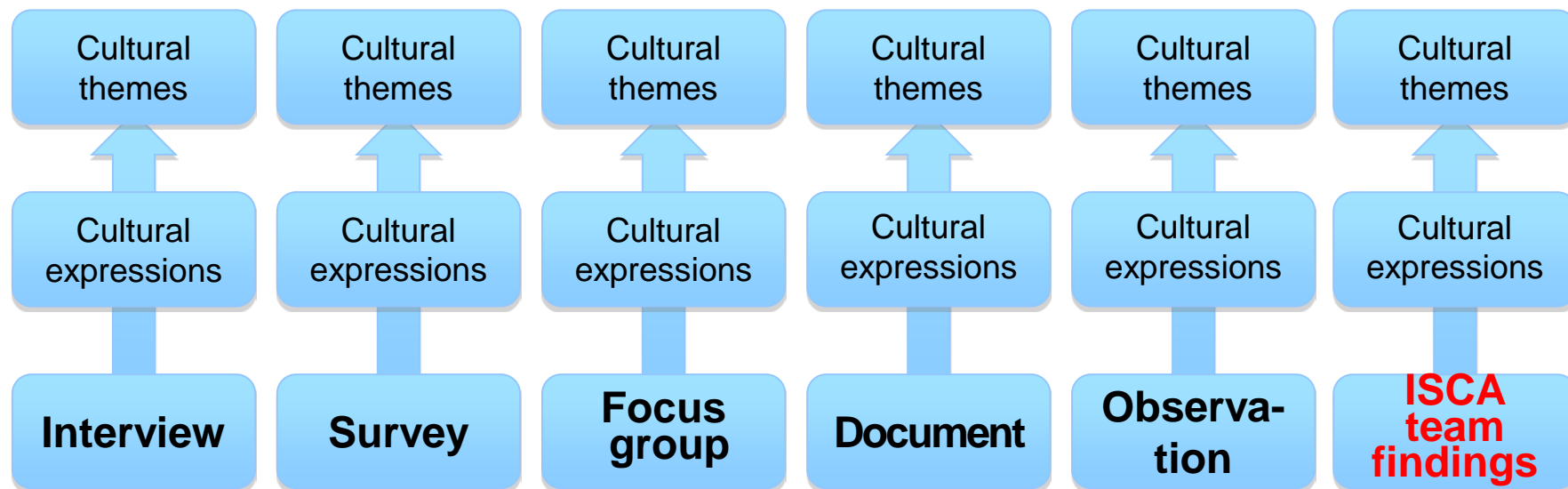
Document	Title
Safety Fundamentals No. SF-1	Fundamental Safety Principles
Safety Requirements No. GSR Part 2	The Management System for Facilities and Activities
Safety Guide No. GS-G-3.1	Application of the Management System for Facilities & Activities
Safety Guide No. GS-G-3.5	The Management System for Nuclear Installations
Safety Series No. 75-INSAG-4	Safety Culture
INSAG Series, INSAG-15	Key Practical Issues in Strengthening Safety Culture
INSAG Series, INSAG-27	Ensuring Robust National Nuclear Safety Systems - ISid
Safety Report Series No. 11	Developing Safety Culture in Nuclear Activities
Safety Report Series No. 42	Safety Culture in the Maintenance of NPPs
Safety Report Series: No 74	Safety Culture during Pre-Operational Phases
Safety Report Series No. 83	How to Perform Safety Culture Self-Assessment
Safety Report Series:	How to Continuously Improve Safety Culture - draft
TECDOC-1321	Self-assessment of safety culture in nuclear installations
TECDOC-1329	Safety culture in nuclear installations
TECDOC-1707 (2013)	Regulatory Oversight Of Safety Culture In Nuclear Installations

- Safety culture assessment



Part 2: Normative analysis;
evaluates the cultural
conclusions in relation to the
IAEA SC normative framework

Part 1: Descriptive analysis; describes the overarching image of culture



✓ ISCA: Independent Safety Culture Assessment

3. Ensuring Robust **National Nuclear Safety Systems** – Institutional Strength in Depth (INSAG-27, 2017)

- ✓ Application of Defense in Depth of the **multiple levels of protection** to institutional strength
- ISiD concept
 - **Establish a foundation for a strong safety culture**
 - Provide a framework for developing, assessing, reviewing and improving nuclear safety system
- 3 independent institutional sub-system levels:
 - A strong nuclear industry
 - A strong nuclear regulator
 - **A strong set of stakeholders**

CONTENTS

I. THE EXPERIENCES

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IV. REMARKS

□ Before 2012

- Encouraged safety awareness and/or consciousness
 - Nuclear Safety Charter, Nuclear Safety Policy Statement, Nuclear Safety Day, and campaigns
- Promoted voluntary self-assessments for SC
 - Development of SC assessment tool and a few special inspections on an ad hoc basis
- ✓ Focused on the self-promotion of licensee's SC

□ Since 2012

- Established a new policy for regulatory oversight of licensee's SC
 - Prompted by the F.D. accident in 2011 and the SBO cover-up at Kori-1 in 2012
- Commenced to manage KINS own SC, incorporating SC promotion into the Management System Manual in 2014
 - Revised MS manual into Integrated Management System (IMS) in line with the IAEA GSR Part 2 in 2016
 - Developed the SC Management Procedure, including the role of management and individuals, provisions to foster SC with diagnosis, assessment, improvement, communication and education
- ✓ Keep pace with the global movements

□ Oversight framework

- Comprehensive Plan for Nuclear Safety (2012 ~ 2016)

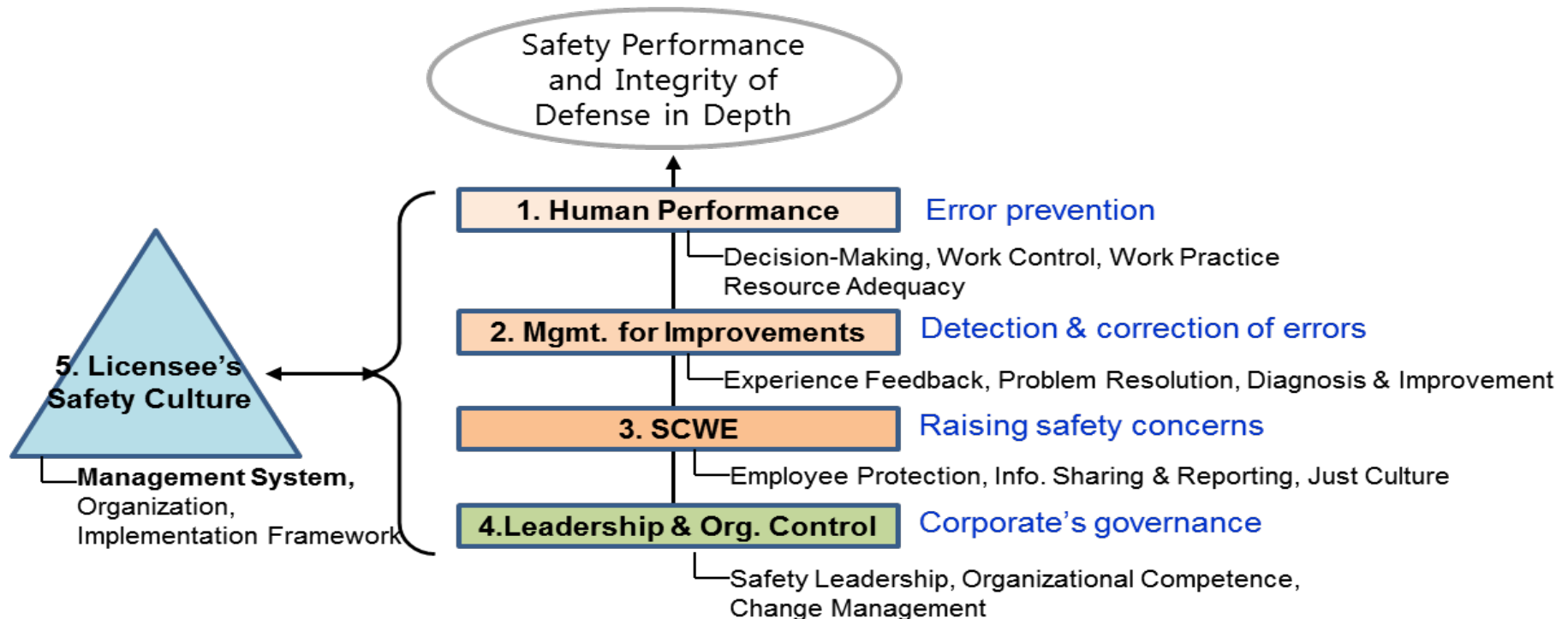
- 1 of the 7 targets; ‘Promote Safety Culture & Strengthen Public Communication’
 - R&D to develop regulatory framework for SC oversight
 - Pilot inspection program of licensee’s SC for their head office and NPP sites

- Regulatory framework

- Cover the oversight methodology, inspection & review guides, training program for inspectors, and institutional elements
- Revised the Enforcement Decree of the Act in 2014
 - “Organization, management system and **safety culture**” as 1 of the 14 items for Periodic Safety Review of NPPs
- Safety culture inspection
 - To be coupled with safety inspection framework, being under the improvement in accordance with the 2nd Comprehensive Plan for Nuclear Safety (2017 ~ 2021)

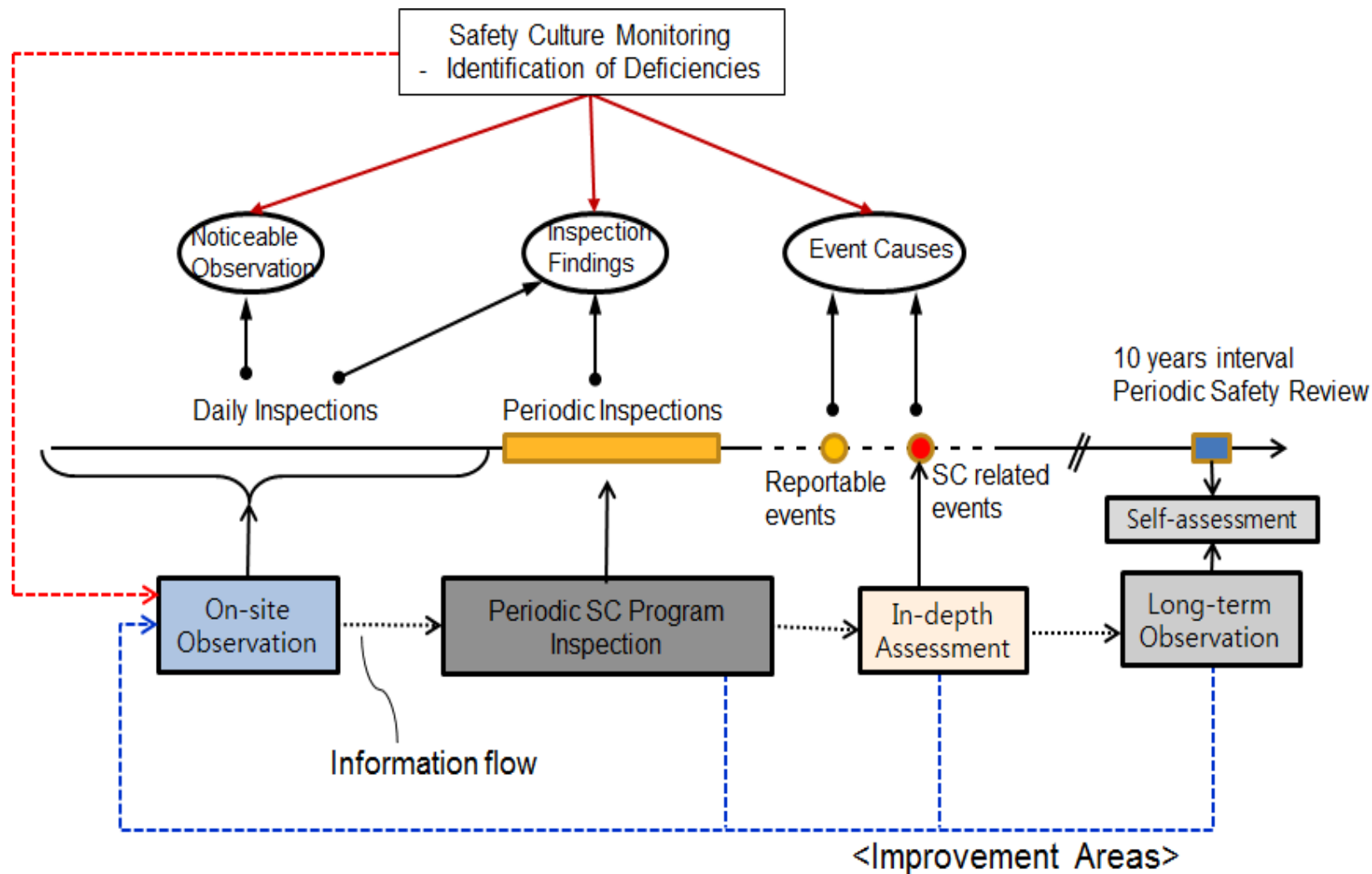
- SC model for oversight

- The assembly of *behavioral patterns*, *core values* and *basic beliefs shared by* individuals in the organization with regard to the importance of nuclear safety
- 4 layers of organizational barriers as the areas and components for oversight
- Aim at a *holistic oversight* of human, organizational and cultural elements



✓ SCWE: Safety Conscious Working Environment

- SC Monitoring and assessment process



- SC into the KINS IMS since 2014
 - Management commitment to foster and improve SC
 - 5 SC principles with 40 attributes cover:
 - Safety leadership
 - Ethics and independence
 - Communication and cooperation
 - Questioning attitudes and decision-making
 - Expertise and continuous improvement
 - SC management procedure includes:
 - Role of management and individual
 - Provisions to foster SC including diagnosis, assessment, improvement, communication and education
- Annual self-assessment in accordance with the “SC Management Procedure”
 - Each unit organization to evaluate their work practices and safety climate in accordance with the checklist
 - Peer review by an independent review team

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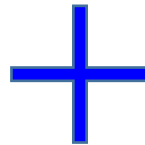
- Formed a consensus on the perceived importance of safety culture itself, at all areas
- Completed the frameworks for the regulatory oversight and internal promotion
 - Assessment & peer review as suggested by the IAEA
- ✓ Key lessons learned from the 3 accidents
 - **Overall climate surrounding the use of nuclear energy at a national level**
- ✓ Any cultural issues, in general
 - Root in the structural aspects at a national, industrial, or organizational level
 - **Fundamental changes** for creating or changing culture, the basic assumptions

- 2 track approach for SC promotion
 - Analytic approach based on the cultural expertise developed
 - **Intuitive approach** utilizing the authority and leadership inherent in institutions and organizations, **as the other axis** for promoting safety culture
- **Role of the leading people or entity of the organization and society**
- ✓ Trade-off between the analytic and intuitive towards the practicality to foster a culture

✓ 안전; 큰 역할, 큰 책임

안전을 위한 효과적인 투자

(법제도의 사회 안전인프라, 인적역량, 연구개발, 시설 및 설비 개선, 조직운영)



안전에 관해 깨어 있는 관심

(모두가 안전을 중시하고 유념하는 마음을 갖는 것)

경청, 감사합니다.



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