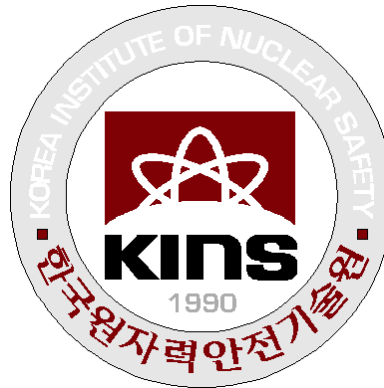


Work Force Planning and Organization for Conduct of Review & Assessment



Hokee KIM

Korea Institute of Nuclear Safety

CONTENTS

I. OVERVIEW

II. WORK FORCE PLANNING

III. ORGANIZATION

IV. REMARKS

1. Nuclear safety objectives

□ Fundamental safety objective (SF -1)

- 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
- So as to **achieve the highest standards of safety that can be reasonably achieved**
 - Control the radiation exposure and the release of radioactive material
 - Restrict the likelihood of events that may lead to a loss of control
 - Mitigate the consequences

✓ *Definitive decision-making to achieve the objectives and for public confidence*

- Safety assessment for all facilities and activities
 - Involve **systematic analysis** of **normal operation** and its effects, of **the ways** in which failures might occur and of **the consequences** of such failures
 - Cover **safety measures** to control the hazard, and **design and engineered safety features** to demonstrate their safety functions
 - Perform an **initial safety assessment**, where control measures or operator actions are called on to maintain safety
 - Demonstrate **satisfaction of RB** that the proposed safety measures are adequate, before the construction of facilities or the commencement of an activity
- ✓ *Prudent judgement by a broad range of experts*

- Objective of regulatory functions (GSR Part 1)
 - Verification and assessment of safety in compliance with regulatory requirements
 - Commensurate with the radiation risks associated with facilities and activities, in accordance with a graded approach
 - Safety optimization
 - Balance between operational benefits and potential consequences for people and the environment
 - Safety assessments for facilities and activities
 - Demonstrate that an adequate level of safety has been achieved, and
 - The objectives and criteria for safety established by the designer, the authorized party and the regulatory body have been met

□ Independence of RB (R 4)

- The government shall ensure that RB is **effectively independent** in its safety related decision making and that it has **functional separation** from entities - - - that could **unduly influence** its decision making
 - Have sufficient authority and **sufficient competent staff**
 - Have access to sufficient financial resources for the proper and timely discharge of its assigned responsibilities
 - Make **independent regulatory judgements and regulatory decisions**, at all stages in the lifetime of facilities - - -
 - Free from any pressures associated with political circumstances - - -, or pressures from government - - -
 - Give **independent advice** and provide reports to government -
 - Liaise directly with regulatory bodies of other States and with international organizations to promote cooperation - - -

✓ *Authority and competence for independence*

- Review and assessment of information (R 25)
- RB shall review and assess relevant information
 - Determine whether facilities and activities comply with regulatory requirements and the conditions specified in the authorization
 - Performed prior to authorization and again over the lifetime of the facility or the duration of the activity
- Considerations & factors to be accounted by RB
 - Regulatory requirements
 - Nature and categorization of the associated hazards
 - Site conditions and the operating environment
 - Basic design of the facility or the conduct of the activity
 - Records provided by the authorized party or its suppliers
 - Best practices
 - Applicable management system

- Competence and skills for operation
- Arrangements for protection of people and the environment
- Arrangements for emergency preparedness and response
- Arrangements for nuclear security
- System of accounting for, and control of, nuclear material
- Relevance of applying the DiD concept
- Arrangements for the management of radioactive materials
- R&D plans or programmes to demonstrate safety
- Feedback of operating experience, nationally & internationally
- Information compiled in regulatory inspections
- Information from research findings
- Arrangements for the termination of operations

✓ *Wide range of areas and factors to be reviewed*

- Functions and Processes of RB for safety (GSG-13)
- Basic objective of review and assessment of RB
 - Determine whether the authorized party's submissions demonstrate that it will comply with all safety requirements
- RB's own independent review and assessment
 - Even if the same or a similar design or a similar facility has been authorized in another State
- Take into account the review and assessment made by the other State
 - New experience and knowledge that have been gained since that review and assessment
 - Differences in the legal and regulatory framework of the States concerned
 - Establish close contact in order to facilitate the review and assessment process

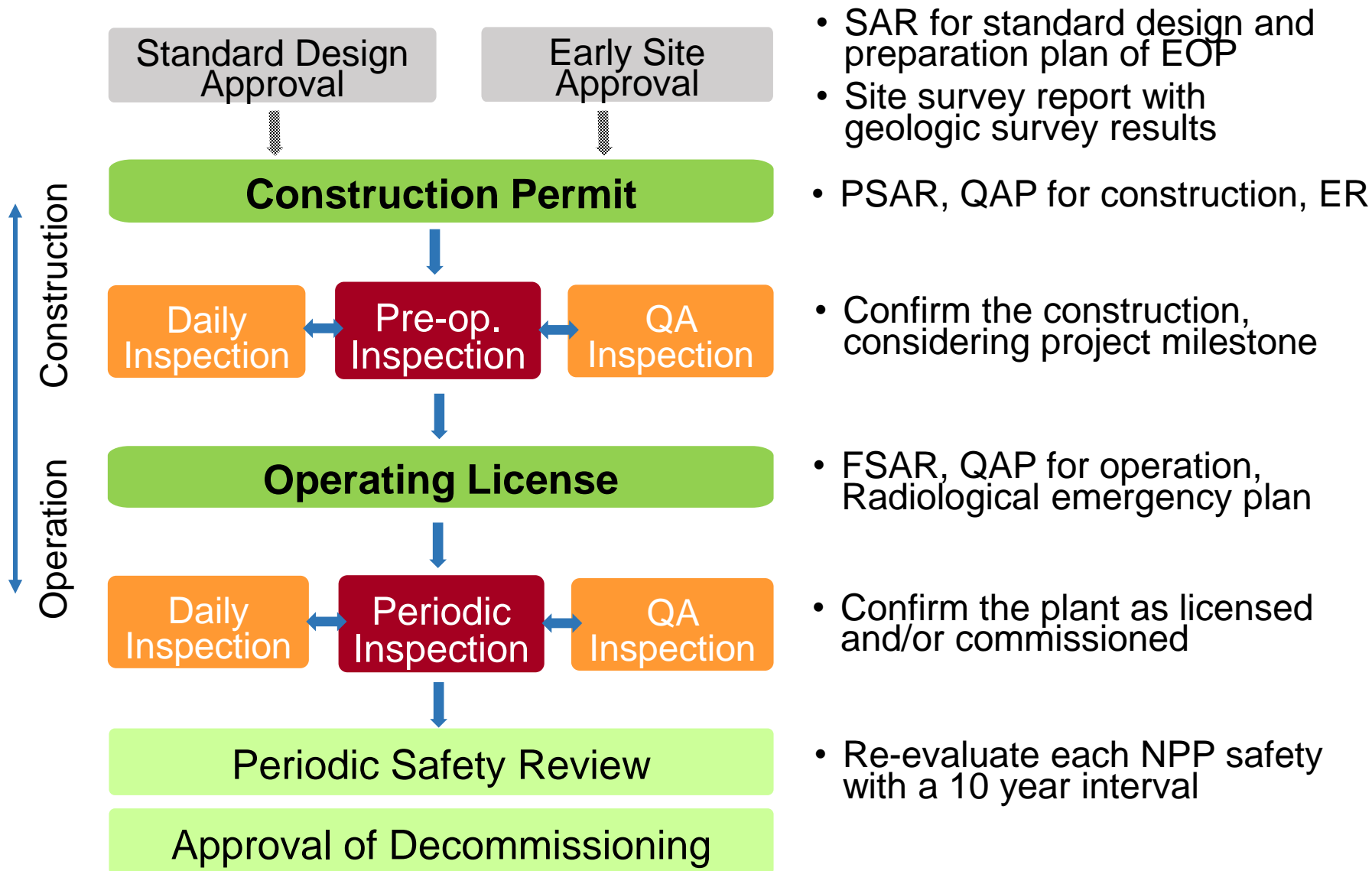


Statutory obligation and skillful approach by RB

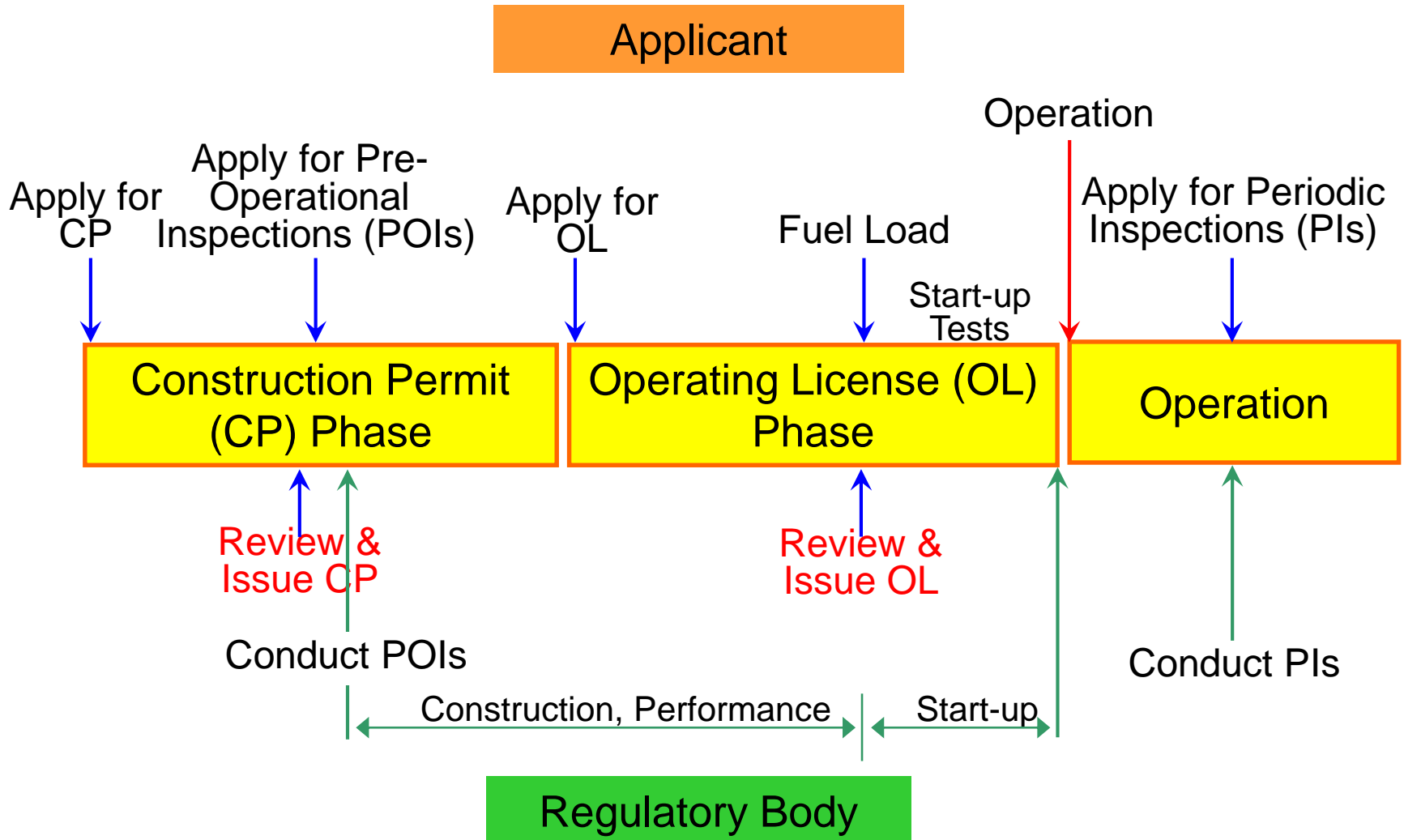
- Review and assessment process
 - Systematic and formalized process implemented through specific procedures
 - To provide assurance that all topics significant to safety will be covered consistently with submissions for similar facilities or activities
 - Steps of review and assessment process
 - Definition of the scope of review and assessment
 - Specification of the purpose of and technical bases
 - Acceptance criteria for the review and assessment
 - Identification of additional information, if necessary
 - Performance of a step by step review and assessment procedure to determine whether the applicable safety objectives and regulatory requirements have been met for each aspect or topic
 - Decisions on the acceptability of the authorized party's safety arguments or the need for further submissions
 - Reporting and documentation

✓ *Comprehensive and procedural approach*

2. Licensing process and activities



- Process and activities



CONTENTS

I. OVERVIEW

II. WORK FORCE PLANNING

III. ORGANIZATION

IV. REMARKS

1. Staffing and approaches for competence

- Effective independence in the performance of regulatory functions (GSR P1, R 17)
- RB shall perform its functions in a manner that does not compromise its effective independence
 - Develop competence of staff for effective independence in decision making
 - Train staff to operate professionally within its remit, emphasizing independence of regulatory body, regulatory aspects and safety considerations
 - Prevent or duly resolve any conflicts, or seek the resolution within the governmental and legal framework
 - Intervene in connection with any facilities or activities presenting significant risks, irrespective of the possible costs to licensee

✓ *Competence of the crucial element for independence*

- Staffing and competence of RB (R 18)
 - RB shall employ a **sufficient number of qualified and competent staff**, commensurate with the nature and the number of facilities and activities to be regulated, - - -
 - Develop **human resources plan** that states the number of staff necessary and the essential knowledge, skills and abilities
 - Cover recruitment and rotation of staff, and include a strategy to compensate for the departure of qualified staff
 - Establish **a process to develop and maintain the necessary competence and skills of staff**, as an element of knowledge management
 - Include the development of a **training programme**
 - Core regulatory functions
 - Development of regulations and guides , notification and authorization, review and assessment, inspection, enforcement, emergency preparedness and response - - -

- 2 categories of supporting functions for RB (GSG-12)
 - Administrative functions supporting the routine operations
 - Finance, management of - - -
 - **Technical functions** relating to the effective implementation and fulfilment of regulatory functions
 - Legal support, R&D, functions of **advisory committees, external expert support**, liaison with other governmental organizations, international cooperation and assistance
- ✓ Legal support
 - Legal advice on - - - national legal framework and legislation, and development of rules, regulations - - -
- ✓ Advisory committees
 - **Independent expert opinion** on the adequacy of regulatory activities, not technical input
- ✓ External expert support
 - **Adequate competence**, - - - , in every core function and supporting function so that it has the ability **to formulate and manage its requests** for technical advice and **to understand, evaluate and implement** the advice received

- Staffing and competence of RB staff
 - Employ staff with expertise in a **wide range of technical matters** and in human and organizational factors
 - In consideration of the stage in the lifetime and the extent of the authorized facilities and activities
 - Have appropriate academic degree for technical staff
 - To be supplemented with specialized training and/or professional work experience
 - Provide opportunities for training and career development
 - To facilitate recruitment and avoid a high turnover of staff
- Human resources plan
 - State the number of staff necessary and the essential knowledge, skills and abilities to perform regulatory functions
 - Cover recruitment and, rotation of staff in order to obtain staff with appropriate competence and skills
 - Include a strategy to compensate for the departure of qualified staff

- Appropriate **size for RB** depends on a range of factors
 - Types and numbers of facilities and activities, **regulatory approach adopted** and legal arrangements in place
 - In large RB, staff may be assigned to a **specific functional area**
 - Alternatively, staff may specialize in particular types of facility or activity, and thus covers **more than one functional area**
 - **Number of staff and their specialized skills**
 - Depend on decisions about the **coverage of functional areas** and on the **extent** to which the regulatory body will use **external experts and/or advisory committees**
 - Sufficient numbers of staff with the **basic knowledge, skills and attributes**
 - To operate the regulatory system **without depending on the immediate availability** of external expert support, irrespective of the arrangements in place
- ✓ *Many different ways of staffing, but minimum required number of core staff*

□ Methods for acquiring competence

- Recruitment
 - Establish recruitment strategy and review periodically
- Filling competence gaps
 - Analyze gap and **identify short and long term priorities**
 - Acquire competence through **training** and **development** for existing staff, reallocation of existing competence to fill gaps, recruitment, **participation in knowledge networks**, - - -
- Training
 - Provide an **individual training and development plan**, based on the individual competence analysis, and reviewed and updated regularly
- Participation in knowledge networks
 - The IAEA and other international organizations, and professional bodies and associations

✓ *How to analyze competence gaps?*

- Use of external expert support

- Seek advice or assistance from external experts, if RB is not entirely self-sufficient in all the technical or functional areas necessary to discharge its responsibilities
- Required to have the necessary competence to evaluate the work of external experts or a technical support organization

- Need for external expert support

- Unexpected applications or demands combined with a lack of internal resources
 - Number of specialists or specific competences
- A need to build up specific internal competences
- A specific project for which special additional competences are needed
- A need for a second opinion
- Permanent outsourcing of certain activities
 - Complex, specialized or infrequent activities

- Examples of external expert
 - Advisory bodies
 - Expert panels
 - Dedicated technical support organizations
 - Government laboratories or research centres
 - Legal organizations
 - Other governmental organizations
 - International and regional organizations
 - Regulatory bodies of other States
 - Standards organizations, quality assurance organizations and professional bodies
 - Engineering or service organizations
 - Academic institutions, etc.

2. Competence development model

□ Theory of workplace learning

- All about doing some great learning in a workplace instead of a classroom
- Learn about work and also through work, using opportunities of work experience or work placement

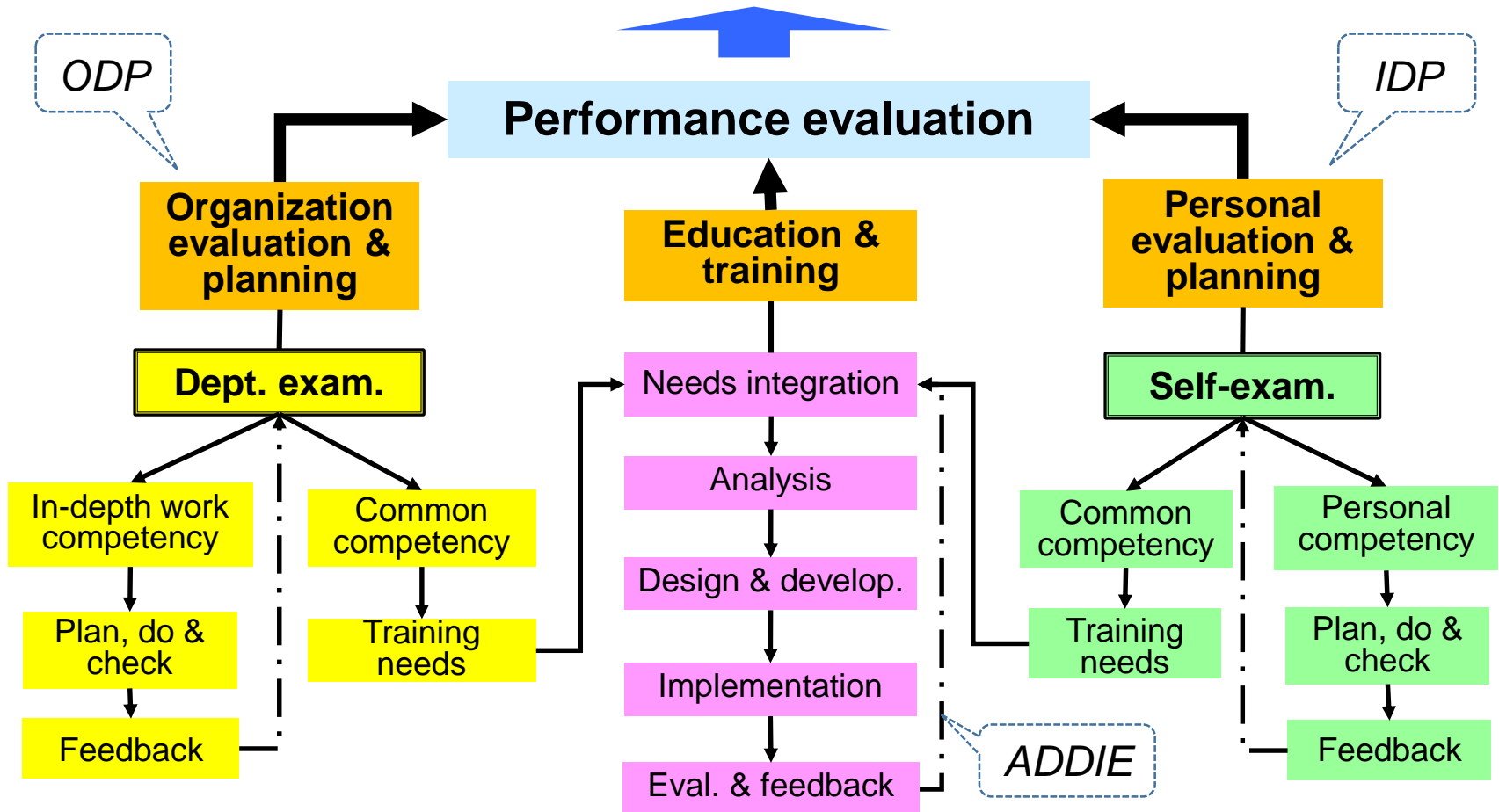
Cave painting in the Old Stone Age, Altamira, Spain

Listed as World Heritage by the UNESCO

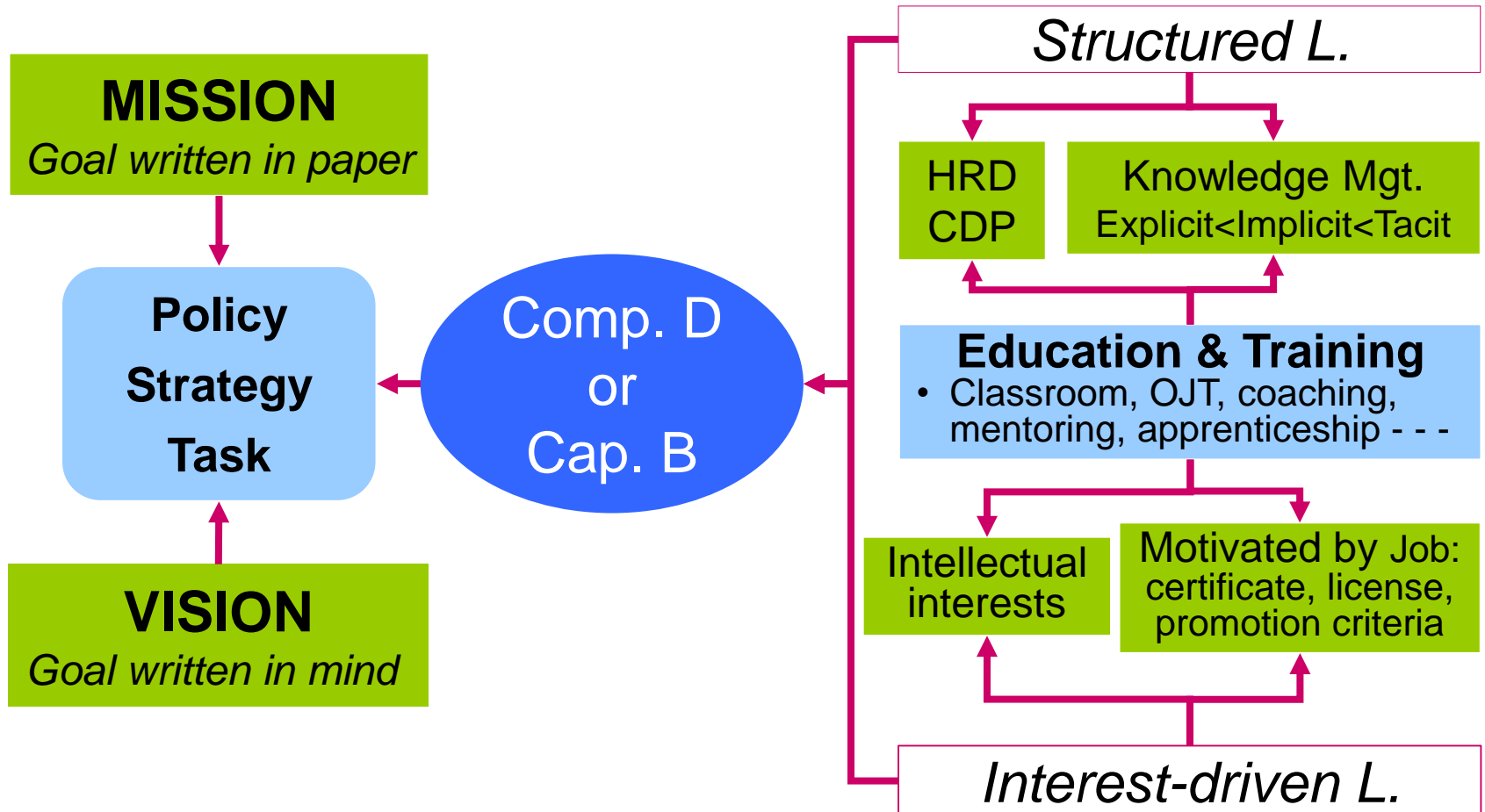
“After Altamira, all is decadence,” by Picasso

□ Process to strengthen job competence

COMPETENCE



- Learning mechanism in organization
- Goals and approaches



3. Examples of HRD

- Human Capacity Building (HCB) programme for K.A.CARE
 - Launched in January 2018 for the 19 KACARE staff
 - Capacity building for nuclear safety regulation, sharing the practical as well as theoretical knowledge

✓KINS-
K.A.CARE
Framework
Arrangement
in Oct. 2017



- Programme overview

	Level 1	Level 2	Level 3
Course	Basic 3 months	Intermediate 5 months	Advanced 8 months
Object.	Fundamentals of safety regulation & technologies	In-depth technical knowledge for safety assessment	Practice of safety reviews & inspections
Scope	Safety regulation, NPP design & operation, Safety assessment, Rad. safety	Siting, Mechanical engineering, I&C, Safety assessment, QA	Simulated type OJO & field exercises for reviews & inspections

- Level 1, Basic course
 - 1.1 Overview of nuclear safety regulation
 - 1.2 Overview of NPP design
 - 1.3 Commissioning and operation of NPP
 - 1.4 Safety assessment
 - 1.5 Radiation safety and waste management
 - 1.6 Emergency preparedness & response
 - 1.7 Regulation of nuclear fuel cycle facilities & research reactors
 - 1.8 Management and leadership
 - 1.9 Global nuclear safety framework
 - 1.10 Quality Assurance (QA)

- Level 2, Intermediate course

- 2.1 Siting and structural engineering

- 2.2 Mechanical and material engineering

- 2.3 I&C and electrical engineering

- 2.4 Radiation and radwaste management

- 2.5 Safety assessment

- 2.6 Reactor system

- 2.7 Quality assurance

- 2.8 Radiological impact evaluation

- 2.9 On-site accident manage

- 2.10 Emergency preparedness & response

- 2.11 Operational experience feedback

- 2.12 Regulator training (NPP simulator)

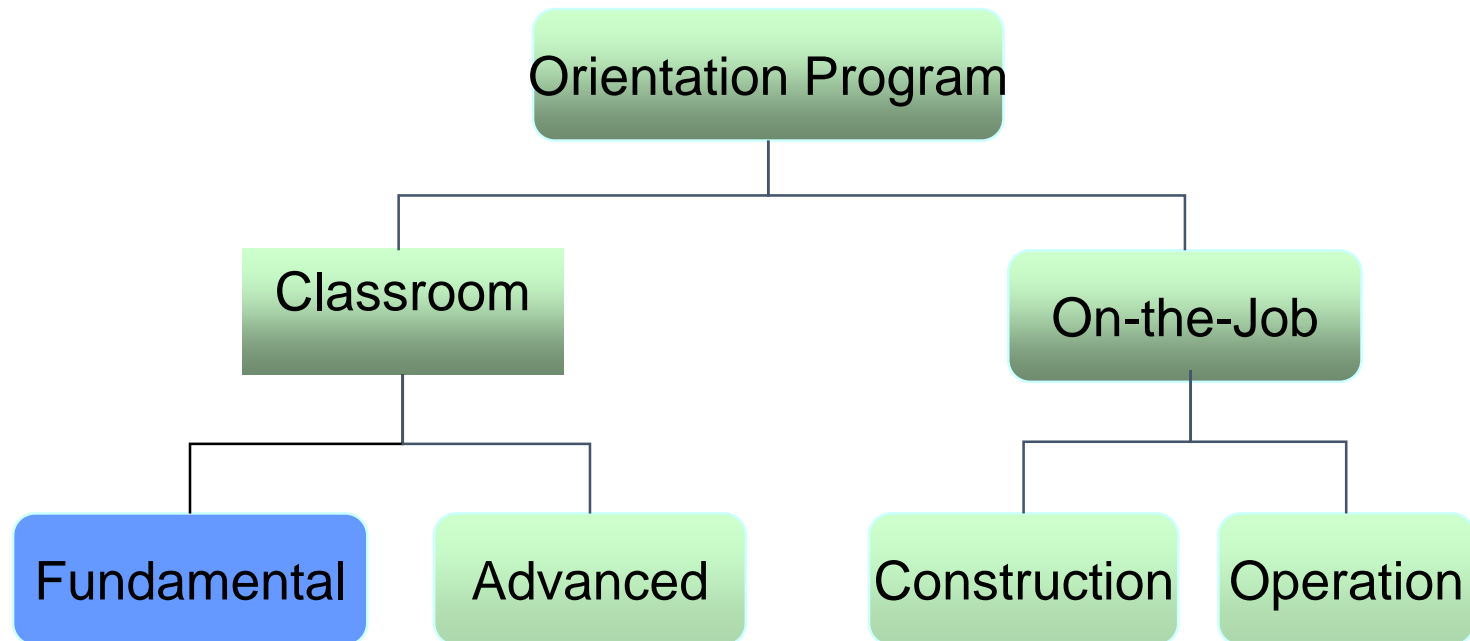
- 2.13 Design of SMART

- 2.14 Case study by groups

- Level 3, Advanced course
 - 3.1 Overview of licensing review and inspection
 - 3.2 Overview of technical areas
 - 3.3 Essential attributes of regulator
 - 3.4 Computer code exercise I (PSA code)
 - 3.5 OJT on licensing review and assessment of NPP
 - 3.6 Computer code exercise II (safety analysis code)
 - 3.7 Construction, operation and maintenance
 - 3.8 OJT on inspection of NPP
 - 3.9 Individual report & lecturer training
 - 3.10 Group project
 - 3.11 Technical tour

□ Orientation for the DPRK regulatory staff

- Implemented in July 2002 for the 25 DPRK regulatory staff
 - Developed, in 1999, the orientation program referencing the SAT methodology and analyzing KINS jobs and tasks
 - Orientation texts by KINS experts
- Program structure



- Classroom orientation

	No	Title of Course	Number of		Applicability
			Mod.	Ses.	
Fundamental Package	F1	Nuclear Safety Regulation	3	10	Common (5 wks, in succession)
	F2	Overview of NPP Technology	2	7	
	F3	NPP System Overview	6	23	
Advanced Package	A1	Safety Evaluation	3	11	
	A2	NPP Quality Assurance	2	7	
	A3	Civil Engineering and Site	4	19	Specific (1 ~ 2 wks, in parallel)
	A4	Mechanical and Material Eng.	3	14	
	A5	I&C and Electrical Engineering	3	9	
	A6	Radiation and Radwaste	3	12	
	A7	Environmental Impact Evaluation	4	8	
Total			33	120	

- On-the-Job orientation (32 modules, 3 ~ 20 wks, each)
 - 4 courses for construction
 - 4 courses for operation

CONTENTS

I. OVERVIEW

II. WORK FORCE PLANNING

III. ORGANIZATION

IV. REMARKS

1. Organizational arrangements

- Organizational structure of RB and allocation of resources (GSR P1, R 16)
 - RB shall **structure its organization** and manage its resources so as to **discharge** its responsibilities and **perform** its functions effectively; - - - in a manner commensurate with the radiation risks - - -
 - Responsible for **structuring its organization** and managing its available resources so as to fulfil its statutory obligations - - -
 - **Allocate resources, commensurate with the radiation risks** associated with facilities or activities; a graded approach
 - Carry out a **detailed scrutiny** before and subsequent to authorization, **for the highest radiation risks**
- ✓ *Organizational structure to function effectively, commensurate with the relevant risks*

□ Organization, Management and Staffing of RB for Safety (GSG-12)

- Verify and assess safety **through an effective system** of authorization, review and assessment, - - -
- Establish an **organizational structure that is flexible and adaptable** to different circumstances & demands
- Factors to consider
 - Size, number, type, nature and stage in the lifetime of existing facilities and activities
 - **Future plans:** New installations and/or facilities, new technology and activities relating to new stages in the lifetime of facilities
 - National legal framework
 - Other existing regulatory authorities
 - **Expectations of interested parties**
 - Availability of **competences** at a national level
 - Availability of funding

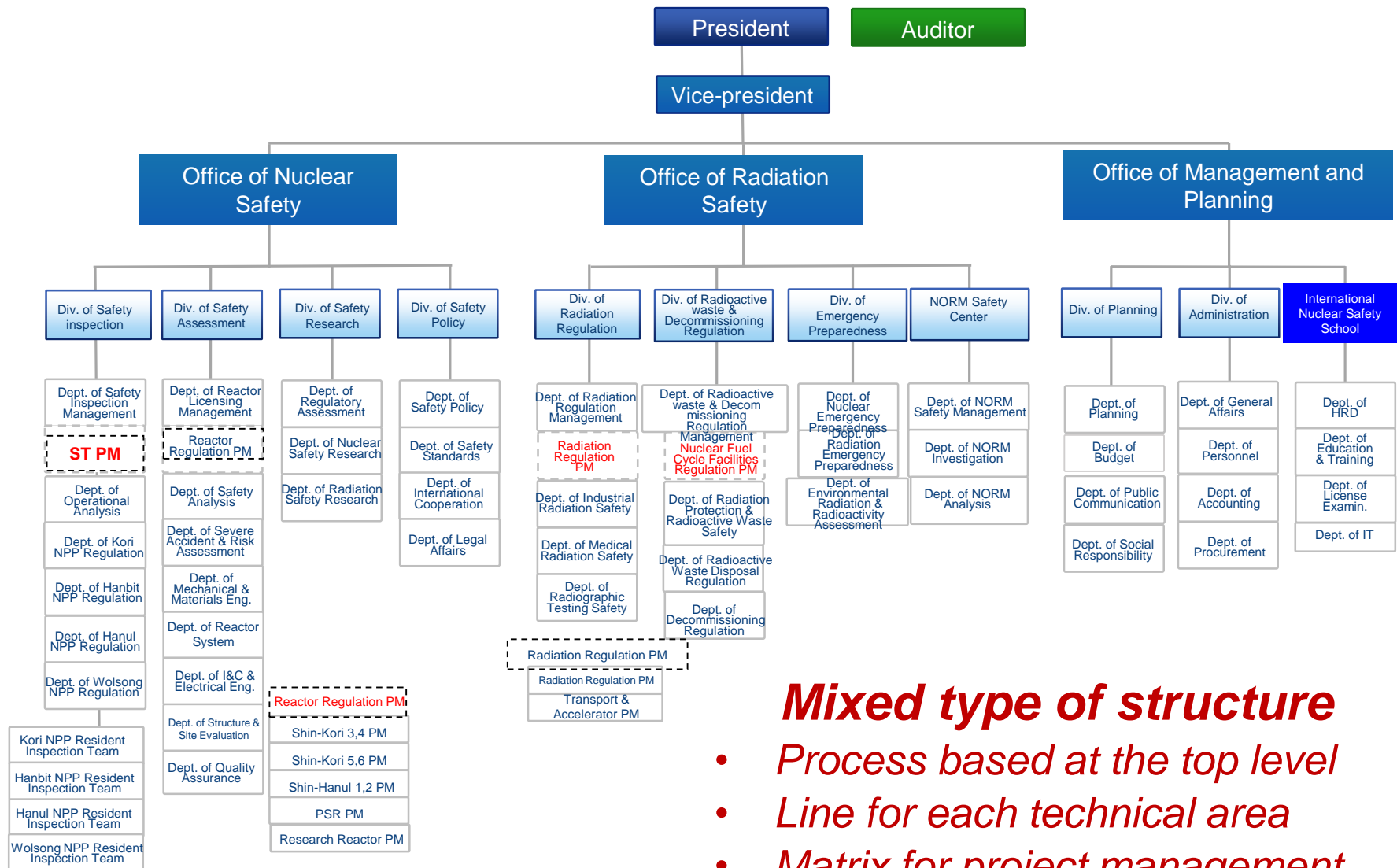


Need to be prepared for the future situation

- Impact, these factors, the organization in terms of the regulatory functions, structure and size, the use of external expert support and competence management
 - Ensure, nevertheless, that it is capable of discharging its responsibilities and fulfilling its functions effectively and efficiently
 - Define clearly the responsibilities assigned to different parts of its organization in accordance with:
 - Regulatory functions (a process based structure)
 - Technical areas to be covered (a line structure)
 - Facilities and activities to be regulated, or a mixture of these (a matrix or project structure)
- ✓ *Normally, mixed type of structure in terms of whole organization, but the matrix or project type is dominant for a specific licensing case*

- Use an **interdisciplinary approach** to the oversight concept
 - Pay attention to the **distribution of expertise and required competences** in organizational units, and to the **integration and interaction** of the technical and administrative units
 - Implement a systemic approach in which **all aspects relevant to safety are adequately considered** with respect to human, technical and organizational factors and their interactions
- **Flexible structure and composition** of RB organization
 - To act effectively and to address changing circumstances and demands that arise at any time during the different stages of the lifetime of authorized facilities
- Effective and efficient implementation of the core functions and supporting functions
 - Define clearly and assign the **roles, responsibilities and lines of communication** of organizational units, managers and staff

2. KINS organization



Mixed type of structure

- *Process based at the top level*
- *Line for each technical area*
- *Matrix for project management*

CONTENTS

I. OVERVIEW

II. WORK FORCE PLANNING

III. ORGANIZATION

IV. REMARKS

- Strategic plan to build competence
 - Develop in consideration of the regulatory infrastructure, and also in line with national programme to deploy NPP
- Stepwise approach, focusing on regulatory decision-making for licensing
 - Outsourcing based in-depth review and overall decision-making
 - Limited outsourcing of review
 - Self review and decision-making with advisory services

- Facilitate the use of outside services for technical expertise
 - Outsourcing of activities, use of advisory committees, cooperation with national or international organization
- Promote regulatory HRD, coupled with workplace learning as the key principle
 - Safety confirmation by joint activities with the applicant
 - Training through international cooperation
 - Utilization of international resources
- ✓ *Discover opportunities for workplace learning*
- ✓ *Systematic framework to analyze and fill competence gaps*

Always we keep watching
our Atomic Power



Thank You



한국원자력안전기술원
KOREA INSTITUTE OF NUCLEAR SAFETY