Challenges for Risk Governance in Japanese Nuclear Power Industry

CRIEPI-NRRC Workshop 2024

Risk-informed Decision Making :

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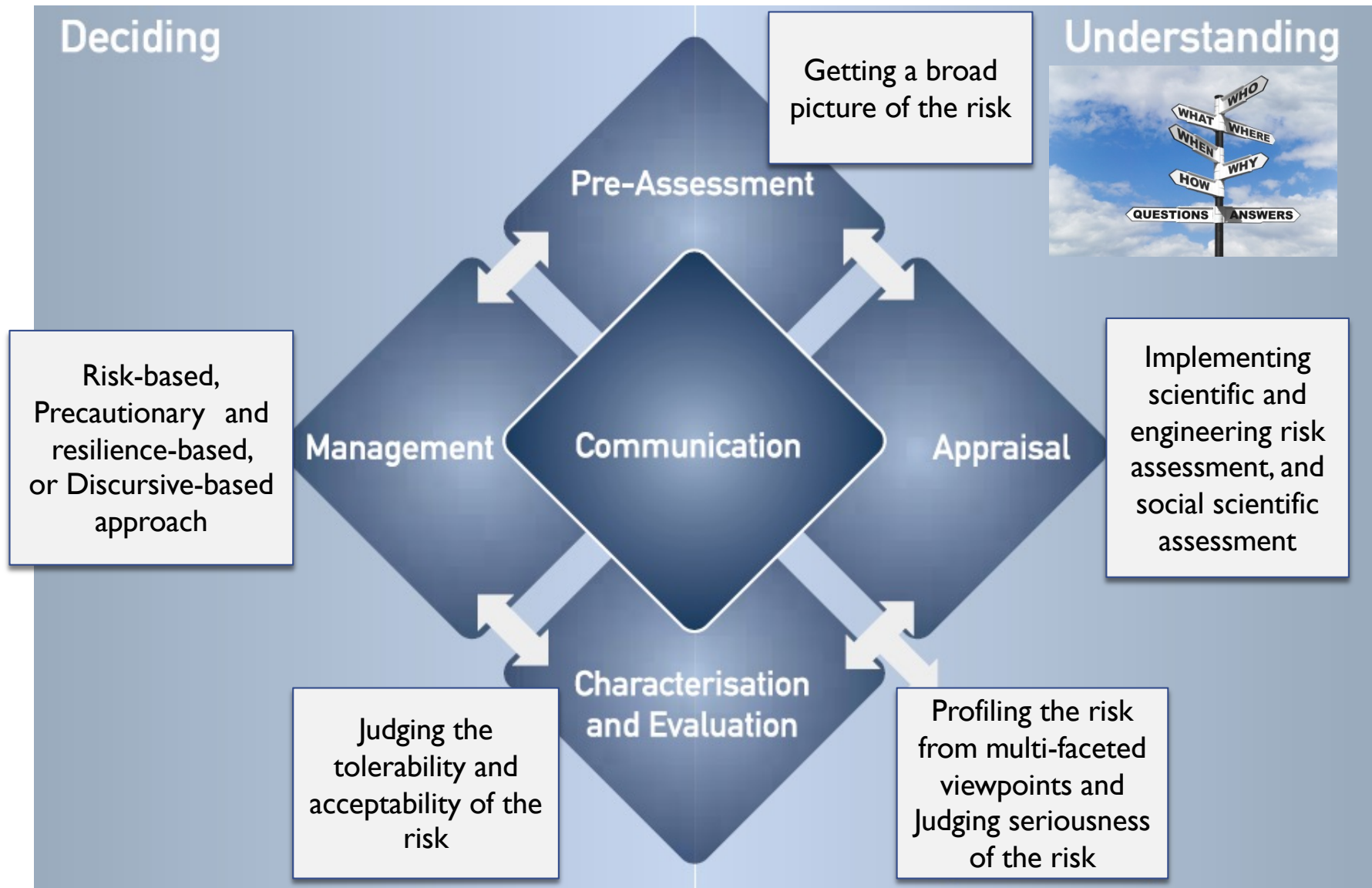
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RIDM and Risk Governance

Key concepts emphasized in nuclear safety field after the Fukushima #1 NPS accident

- **Risk-informed Decision Making (RIDM)**：Practical approach to make integrated decisions by using PRA outcomes in combination with deterministic evaluation and other considerations（NRRC）

- **Risk Governance**：Includes the totality of actors, rules, conventions, processes, and mechanisms concerned with how relevant risk information is collected, analyzed and communicated and management decisions are taken.

  - Awareness of the problem that we are not able to properly deal with the issues concerned because it lacks an appropriate mechanism.

- **United States:** Disclosure of risk-related information in development activities began in the 70s, RC was revisited by inputting research findings of social sciences in the 80s, and risk administration changed to the Analytic-Deliberative process in the 90s, learning the importance of early involvement of stakeholders from Europe.

- **Europe:** In the response to the distrust against the closed policy making system centered on experts (the Seveso accident, BSE problem etc.) , Europe learned RC revisited in the US, and TRUSTNET project implemented under the support of the European Commission proposed the basic concept of risk governance.

- **The RG framework proposed by IRGC（established in 2003）is the outcome by researcher and practitioners in both Europe and the US. In social risk issues (especially, systemic risks), it is important to make and deal with decisions based on dialogue, deliberation and collaboration by stakeholders, taking into account risk-related information and data analyzed from different perspectives, viewpoints and standpoints.
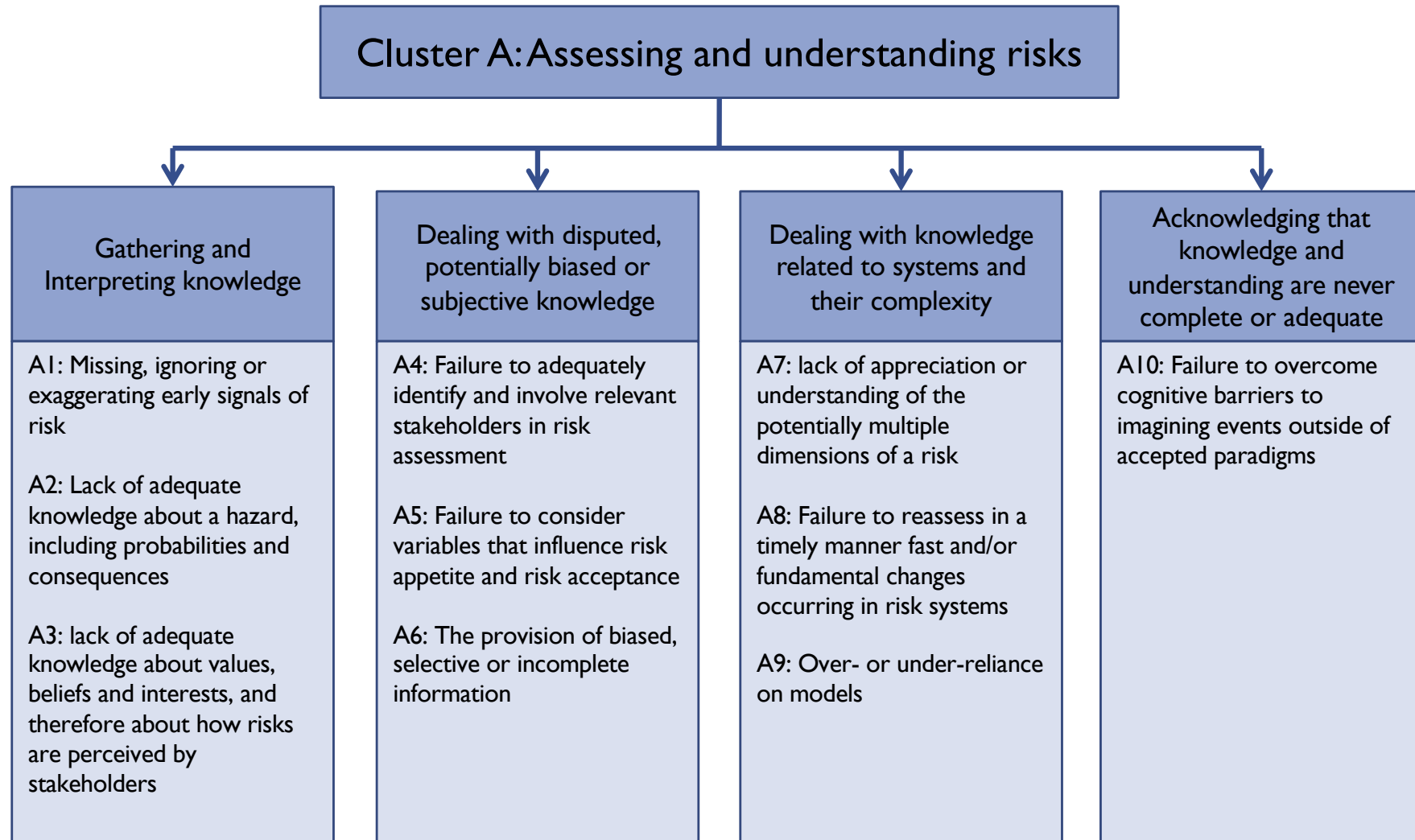
Risk Governance Process

Deciding

Understanding

Getting a broad picture of the risk

Pre-Assessment

Risk-based, Precautionary and resilience-based, or Discursive-based approach

Management

Communication

Appraisal

Implementing scientific and engineering risk assessment, and social scientific assessment

Judging the tolerability and acceptability of the risk

Characterisation and Evaluation

Profiling the risk from multi-faceted viewpoints and Judging seriousness of the risk

Source: An Introduction to the IRGC Risk Governance Framework, 2008

Risk Governance Framework : Assessment Sphere

- Knowledge generation
  - ➤ Needed to reduce complexity and uncertainty and to understand ambiguity
  - ➤ Needed to clarify the often confusing interactions between multiple sources of harm, what causes them to become risks, and their potential physical, social and economic consequences
  - ➤ Help to quantify the levels of risk to be experienced by different individuals and communities

- If knowledge exists but is not understood by decision-makers, stakeholders and the public, risk governance becomes highly vulnerable to error and unpredictability .

- Risk governance deficits emerge when the knowledge base is deficient or inadequate as the result of:
  - ✓ A lack of scientific evidence about the risk itself, or of the perceptions that individuals and organizations have of the risk;
  - ✓ Application of inappropriate methods, models or scenarios to derive this evidence;
  - ✓ Failure to understand or take account of available knowledge; and/or
  - ✓ Misuse of available knowledge, intentionally or unintentionally

Risk Governance Framework : Management Sphere

- Both the public and private sectors play important roles in risk management although they have different objectives and perspectives. Each has separate responsibilities, but the effective management of many systemic risks requires cohesion between them.

- They are also prone to some similar deficiencies.
  - ✓ Pressures to address near-term concerns are prevalent in both sectors.
  - ✓ The scope for action of politicians may be shaped by electoral cycles, while corporate actors are constrained by pressure from shareholders to maximize profits and short-term shareholder value.
  - ✓ Even leaders of NGOs dedicated to long-term causes may focus on short-term publicity to bolster their visibility and acquire an edge in fundraising and political influence.

- A pervasive challenge in risk management is to bring some long-term perspective to bear on risks when the pressures to focus on near-term concerns are powerful. This is heavily influenced by an organization's risk culture.

Deficits in Assessment Sphere

Cluster A: Assessing and understanding risks

Gathering and Interpreting knowledge

A1: Missing, ignoring or exaggerating early signals of risk

A2: Lack of adequate knowledge about a hazard, including probabilities and consequences

A3: lack of adequate knowledge about values, beliefs and interests, and therefore about how risks are perceived by stakeholders

Dealing with disputed, potentially biased or subjective knowledge

A4: Failure to adequately identify and involve relevant stakeholders in risk assessment

A5: Failure to consider variables that influence risk appetite and risk acceptance

A6: The provision of biased, selective or incomplete information

Dealing with knowledge related to systems and their complexity

A7: lack of appreciation or understanding of the potentially multiple dimensions of a risk

A8: Failure to reassess in a timely manner fast and/or fundamental changes occurring in risk systems

A9: Over- or under-reliance on models

Acknowledging that knowledge and understanding are never complete or adequate

A10: Failure to overcome cognitive barriers to imagining events outside of accepted paradigms

IRGC has identified the common deficits of risk governance that are defined as deficiencies (where elements are lacking) or failures (where actions are not taken or prove unsuccessful) in risk governance structures and processes.

Deficits in Management Sphere

Cluster B: Managing risks

Preparing and deciding on risk management strategies and policies

B2: failure to design risk management strategies that adequately balance alternatives

B3: failure to consider a reasonable range of risk management options

B4: inappropriate balancing of benefits and costs in an efficient and equitable manner

B6: Failure to anticipate, monitor and react to the outcomes of risk management decisions

B7: Inability to reconcile the time frame of the risk with those of decision-making and incentive schemes

B8: Failure to balance transparency and confidentiality

Formulating responses, resolving conflicts and deciding to act

B1: Failure of managers to respond to early signals that a risk is emerging

B11: lack of understanding of the complex nature of commons problems and of adequate management tools

B12: Inappropriate management of conflicts of interests, beliefs, values and ideologies

B13: Insufficient flexibility in the face of unexpected risk situations

Developing organizational capacities for responding and monitoring

B5: Failure to muster the necessary will and resources to implement risk management policies and decisions

B9: Failure to build or maintain an adequate organizational capacity to manage risk

B10: failure of the multiple departments or organizations responsible for a risk's management to act cohesively

Deficits Observed in Assessment Sphere
Case: Emergency preparedness and response and Severe accident management of Nuclear Facilities (Before Fukushima NPS accident)

- Missing, ignoring or exaggerating early signals of risk (A1) ← It was induced by failure to adequately identify and involve relevant stakeholders in risk assessment in order to improve information input and confer legitimacy on the process (A4). Underlying causes are lack and dysfunction of interfaces between actors/sectors.

- Lack of adequate knowledge about a hazard, including the probabilities of various events and the associated economic, human health, environmental and societal consequences (A2), lack of adequate knowledge about values, beliefs and interests, and therefore about how risks are perceived by stakeholders (A3) → They induced failure to consider variable that influence risk acceptance and risk appetite (A5), provision of biased, selective or incomplete information (A6).

- Failure to overcome cognitive barriers to imagining outside of accepted paradigms(A10) → It led to an over- or under-reliance on models and/or a failure to recognize that models are simplified approximations of reality and thus can be fallible (A9).

- Lack of appreciation or understanding of the potentially multiple dimensions of a risk and of how interconnected risk systems can entail complex and sometimes unforeseeable interactions(A7) → It was root cause of A2, A3 and A4.

- Failure to re-assess in a timely manner fast and/or fundamental changes occurring in risk systems (A8)
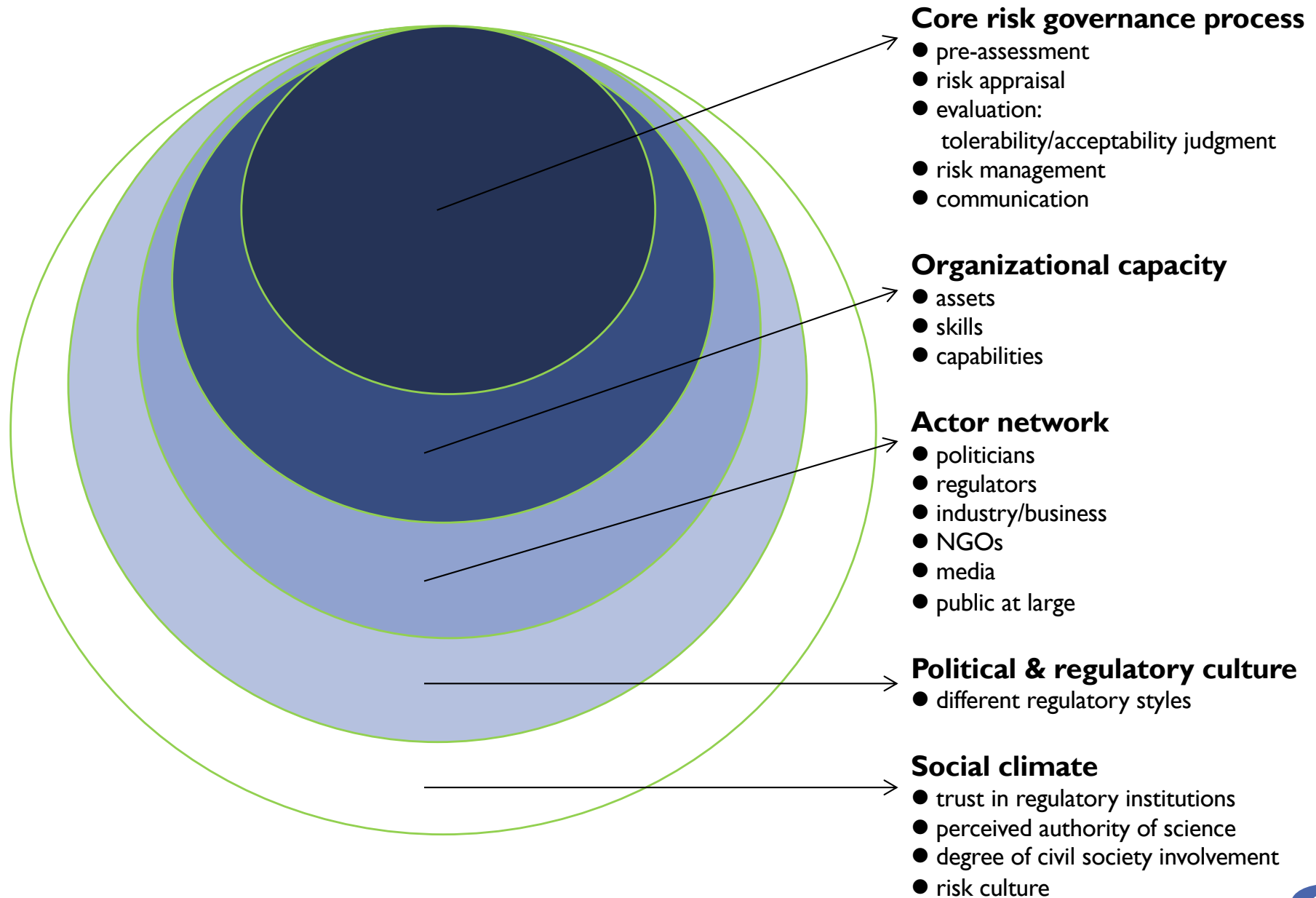
Deficits Observed in Assessment Sphere
Case: Emergency preparedness and response and Severe accident management of Nuclear Facilities (Before Fukushima NPS accident)

- Failure of managers to respond and take action when risk assessors have determined from early signals that a risk is emerging (B1)

- Inability to reconcile the time frame of the risk with the time frames of decision-making and incentive schemes (B7) → It related to failure to design risk management strategies that adequately balance alternatives (B2), failure to consider a reasonable range of risk management options (and their negative or positive consequences) in order to meet set objectives (B3).

- Failure to balance two of the necessary requirements of decision-making: transparency, which can foster stakeholder trust, and confidentiality, which can protect security and maintain incentives for innovation (B8)

- Failure to muster the necessary will and resources to implement risk management policies and decisions (B5)

- Failure to build or maintain an adequate organizational capacity to manage risk (B9)

- Failure of the multiple departments or organizations responsible for a risk's management to act cohesively (B10)

Awareness and Behavior Behind Deficits

● Attitude that justifying and maintaining the present situation

  ➢ To keep consistently past explanation on safety assurance and policy to local government and residents,

  ➢ To reduce or avoid too much impacts to the operating power plants and lawsuit against permission of nuclear facility installation (keeping infallibility of regulation)

☐ Following the precedent

☐ Stopgap solution syndrome, Putting off the essential problem

☐ Only formality; Plowing the field, don't forget the seed.

☐ Spread of moral hazard of the thought, Willful blindness,

☐ Inward and narrow perspective

Different Dimensions of Context Affecting Risk Governance Process

Core risk governance process
- pre-assessment
- risk appraisal
- evaluation:
  tolerability/acceptability judgment
- risk management
- communication

Organizational capacity
- assets
- skills
- capabilities

Actor network
- politicians
- regulators
- industry/business
- NGOs
- media
- public at large

Political & regulatory culture
- different regulatory styles

Social climate
- trust in regulatory institutions
- perceived authority of science
- degree of civil society involvement
- risk culture

Risk Culture

- Risk culture refers to a set of beliefs, values and practices within an organization regarding how to assess, address and manage risks.

- A major aspect of risk culture is how openly risks can be addressed and information about them shared among a risk community.

- ☐ *"The norms of behavior for individuals and groups within an organization that determine the collective ability to identify, understand, openly discuss, and act on the organization's current and future risks."* -Levy, Lamarre, & Twining 2010

- Risk culture is heavily influenced by the organization's information culture (the values, attitudes, or behaviors that affect the way members perceive, collect, organize, process, communicate, and use information, i.e., the strategic intelligent information process).
  - ➢ Functional culture (control), Sharing culture (conformity), Questioning culture (prediction), Discovery culture (creation)
  - ➢ Subcultures (divisions, departments, managerial posts) exist within an organization.

Ref. Safety Culture

"assembly of characteristics and attitudes in organizations and individuals which establishes that, as an overriding priority, nuclear plant safety issues receive the attention warranted by their significance." (IAEA-INSAG)

- Safety culture is reflection of risk awareness. (SwissRe)

Challenges for Risk Governance

- Develop and infiltrate risk culture in organization
- Build and operate stakeholder engagement mechanism
  - Key role in pre-assessment, risk judgment and communication activities
  - Extended peer review involving experts in neighboring scientific fields
  - Legislation of public involvement as an mandatory action from discretionary actions (public comments, public hearings) by administrative agencies
- Promote scientific and engineering risk assessment much more, and implement substantially social scientific researches
  - Identify if it's mass sentiment or public opinion
- Decision-makers should acknowledge and reflect oneself cognitive biases in personal and organizational judgements under risk situations
  - Put the red team as a devil's advocate in organization to practical use
- Decision-makers should keep one's eyes on balancing the transparency and confidentiality necessary for decision-making, and re-assess in a timely manner fast and/or fundamental changes occurring in risk systems.

Challenges for Risk Governance

- Many nuclear-related problems we face never can be technologically fixed, or rather these are likely to be able to solve by changing to societal mechanism enabling collaborative processes for knowledge generation, informed decision-making and so on.

- Challenges ahead for nuclear community are to dare make corrective actions to deal with the deficits of risk governance, build a new societal mechanism in collaboration with stakeholders, and operate it under transparently where social responsibilities lay. There is "no one-size-fits-all" approach to gain societal trust. The first step toward the reform depends entirely upon the nuclear community's will.