

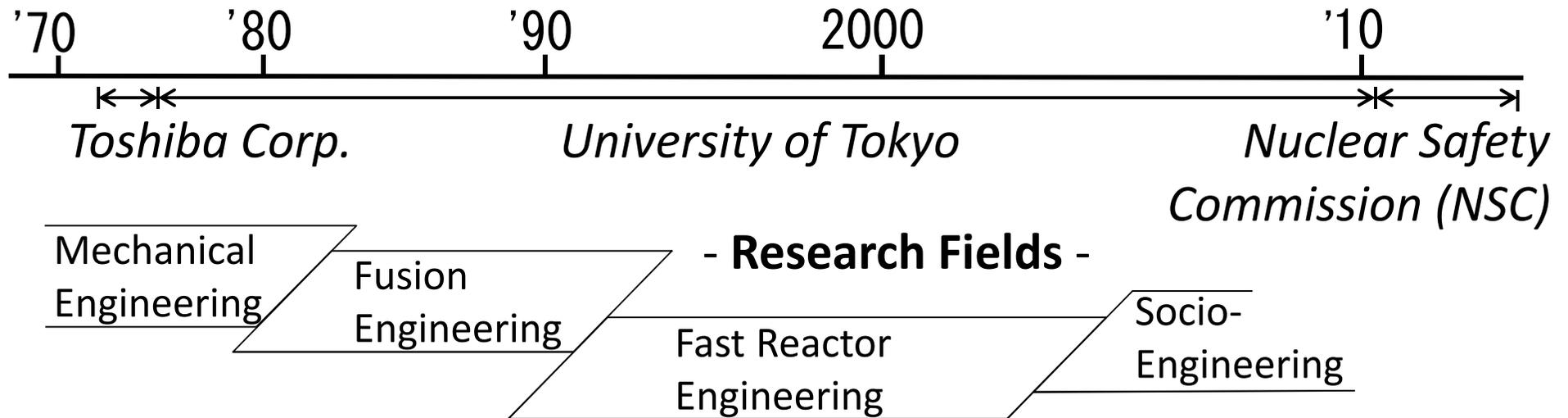
# **Japanese Nuclear Regulatory System Prior to Fukushima Dai-Ichi Accident**

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# Speaker's Background



## Regulatory Background

'81 Technical Adviser, Ministry of International Trade & Industry (METI's predecessor)

'01 Technical Adviser, Nuclear & Industrial Safety Agency (NISA/METI)

*Recognition of Regulatory Evolution*

## Research Initiatives

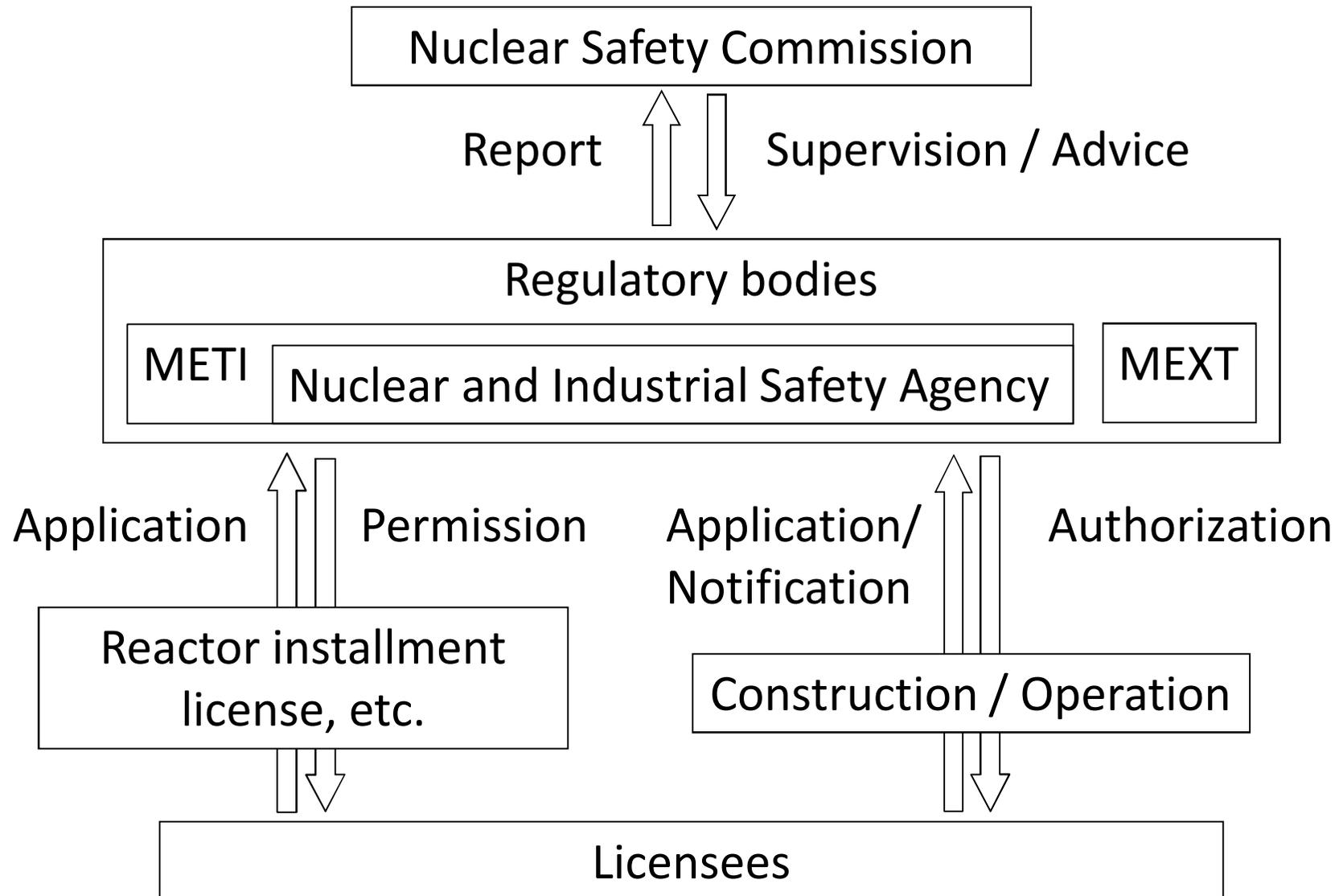
'05 JSME Research Section on Optimization of Nuclear Safety Regulation

“Improvement of inspection”

'07 University of Tokyo Research Meetings known as “Hosei Kenkyu-kai”

“Proposal on regulatory amendments”

# Structure of Organizations Involved Prior to Fukushima Dai-Ichi Accident



# Japanese regulatory system did not adequately meet “IAEA Safety Standards : GSR Part 1 (2010).”

## Requirement 3: Establishment of a regulatory body

The government, through the legal system, shall establish and maintain a regulatory body, and shall confer on it the legal authority and provide it with the competence and the resources necessary to fulfil its statutory obligation for the regulatory control of facilities and activities.

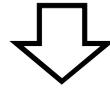
## Requirement 11: Competence for safety

The government shall make provision for building and maintaining the competence of all parties having responsibilities in relation to the safety of facilities and activities. *including the regulatory body*

## Requirement 18: Staffing and competence of the regulatory body

The regulatory body shall employ a sufficient number of qualified and competent staff, commensurate with the nature and the number of facilities and activities to be regulated, to perform its functions and to discharge its responsibilities.



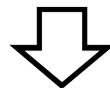


## IRRS to Japan in 2007

The current Government requirement for a 5% reduction in the administration and the policy of staff rotation pose a potential challenge to the effective regulation of nuclear safety in Japan.

NISA should produce a workforce plan that clearly identifies its minimum staffing needs to discharge the functions and tasks required to secure effective nuclear safety regulation in Japan against the elements of its 5-year strategic plan. Future staff number / budget requests would then be based on these minimum resource needs plus any supplement required for additional work / tasks. (The workforce of the regulatory system JNES/NISA and NSC should be ensured considering respective functions –mandates, completeness, fairness, neutrality, etc. – for this issue.)

NISA should consider different staff / job rotation frequencies and patterns (particularly for its senior management) to further enhance its knowledge management and effectiveness of nuclear safety regulation of strategic and operational issues.





The largest issue remains in the absence of competence and sense of mission in the regulatory body.

- The transfer of high-level officers from the regulatory body to the promotion organization is prohibited after the accident.
  - The prohibition for the last part of career path is ineffective in the improvement of competence,
  - though it may help the improvement of sense of mission.
- The new regulatory body announced the training policy without the identification of minimum staffing needs.

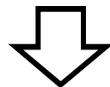
# Japanese regulatory system did not adequately meet “IAEA Safety Standards : GSR Part 1 (2010).”

## Requirement 4: Independence of the regulatory body

The government shall ensure that the regulatory body is effectively independent in its safety related decision making and that it has functional separation from entities having responsibilities or interests that could unduly influence its decision making.

## Requirement 17: Effective independence in the performance of regulatory functions

The regulatory body shall perform its functions in a manner that does not compromise its effective independence.

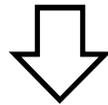


Some NISA officials interfered with regulation innovations for fear of adverse effects to nuclear development.

Japanese regulatory system did not adequately meet  
“IAEA Safety Standards : GSR Part 1 (2010).”

Requirement 33: Review of regulations and guides

Regulations and guides shall be reviewed and revised as necessary to keep them up to date, with due consideration taken of relevant international safety standards and technical standards and of relevant experience gained.



More specifically described in

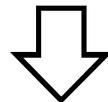
- “ No. NS-R-3 Site Evaluation for Nuclear Installations
- “ No. SSR-2/1 Safety of Nuclear Power Plants: Design

# Japanese regulatory system did not adequately meet “IAEA Safety Standards : NS-R-3 (2003).”

Requirement 3.24. The region shall be evaluated to determine the potential for tsunamis or seiches that could affect the safety of a nuclear installation on the site.

Requirement 3.25. If there is found to be such a potential, prehistorical and historical data relating to tsunamis or seiches affecting the shore region around the site shall be collected and critically evaluated for their relevance to the evaluation of the site and their reliability.

Requirement 3.26. On the basis of the available prehistorical and historical data for the region and comparison with similar regions that have been well studied with regard to these phenomena, the frequency of occurrence, magnitude and height of regional tsunamis or seiches shall be estimated and shall be used in determining the hazards associated with tsunamis or seiches, with account taken of any amplification due to the coastal configuration at the site.





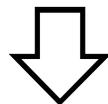
The impact of tsunamis has been underestimated for the following reasons:

- Infrequent tsunamis were paid scant attention, though earthquakes generated frequently were paid attention.
  - TEPCO NPPs were suffered from the Chuetsu-Oki Earthquake in 2007, which did not generate a tsunami.
- Earthquake is the issue for all NPPs, but tsunami is for some.
  - Anti-nuclear people still claim the seismic influence was larger than the consequence of tsunami in Fukushima Dai-ichi Accident.
- The possibility of massive tsunamis has not been discussed until recently.
  - Jogan tsunami in 869 was drawn attention after 2000s.
  - No seismologist predicted the M9.0 earthquake in Japan.

Japanese regulatory system did not adequately meet  
“IAEA Safety Standards : No. SSR-2/1 (2012) or DS-414.”

Requirement 20: Design extension conditions

A set of design extension conditions shall be derived on the basis of engineering judgement, deterministic assessments and probabilistic assessments for the purpose of further improving the safety of the nuclear power plant by enhancing the plant’s capabilities to withstand, without unacceptable radiological consequences, accidents that are either more severe than design basis accidents or that involve additional failures. These design extension conditions shall be used to identify the additional accident scenarios to be addressed in the design and to plan practicable provisions for the prevention of such accidents or mitigation of their consequences if they do occur.





Japanese government hesitated in demanding measures against severe accidents for fear of the following situation:

- “ Government issued construction and operation permission in line with the *“Law of the Act on the Regulation of Reactors.”*”
- “ There existed only criteria *“Adequate Prevention of Disasters.”*”
- “ Raising the possibility of severe accident may be misinterpreted as DBA-based regulation does NOT fulfill above clause.
- “ Civil courts may rule preferably on *“cease and desist”* petition on existing nuclear power plants. Litigation risk was considered higher than accident risks.



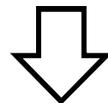
The regulatory body had requested licensees to implement severe accident management voluntary.

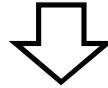
Japanese regulatory system did not adequately meet  
“IAEA Safety Standards : No. SSR-2/1 (2012) or DS-414.”

Requirement 42: Safety analysis of the plant design

A safety analysis of the design for the nuclear power plant shall be conducted in which methods of both deterministic analysis and probabilistic analysis shall be applied to enable the challenges to safety in the various categories of plant states to be evaluated and assessed.

*not only design extended conditions  
but also design basis accidents*





NISA had been discussing how to utilize probabilistic analysis in regulation from 2005 without result.

The barriers to the utilization were as follows:

- Both NISA and the licensees did not strongly expect the utilization, because
  - the innovation was troublesome, and
  - both did not have enough experts of probabilistic analysis.
- The review of design basis accidents was removed from the subject of discussion.
  - NISA could not discuss the subject which led to the revision of NSC Regulatory Guides.



IRRS to Japan in 2007

As the regulatory body in Japan, NISA should take major responsibility in the development and endorsement of safety regulations and guides.

# Japanese regulatory system did not adequately meet “IAEA Safety Standards : GS-R-2 (2002).”

## Functional Requirement 4.3

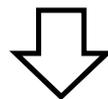
The off-site emergency response shall be effectively managed and co-ordinated with the on-site response.

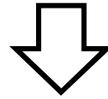
## Functional Requirement 4.4

The emergency response shall be co-ordinated between all responding organizations.

## Functional Requirement 4.5

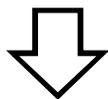
Information necessary for making decisions on the allocation of resources shall be appraised throughout the emergency.

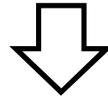




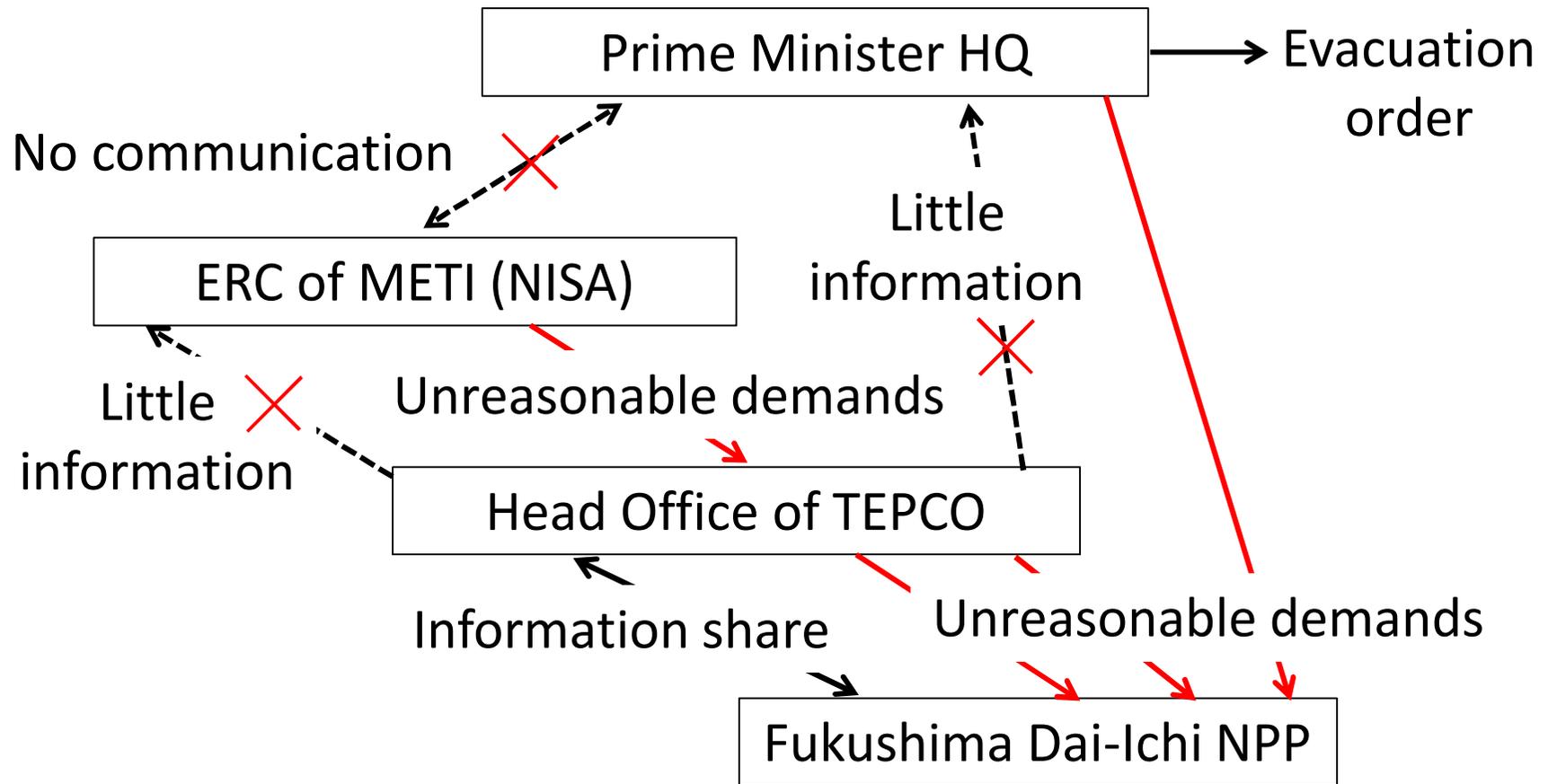
Prime Minister established a provisional Headquarters in a small reception room, while NISA gave TEPCO irrelevant instructions independently.

- No co-ordination of on-site and off-site responses
  - Disaster relief to the site was impeded by evacuation order, but no adjustment was made for several days.
- No co-ordination of Prime Minister HQ and NISA
  - No information was conveyed systematically to Prime Minister HQ for a few days.
- No appraisalment during the emergency
  - Politicians decided the emergency responses without sufficient knowledge.





## The chaotic chain of command

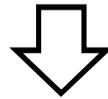


Response to the accident without effective support

Japanese regulatory system did not adequately meet  
“IAEA Safety Standards : GS-R-2 (2002).”

Functional Requirement 4.11

Arrangements shall be made for coordinating the response to a nuclear or radiological emergency between the response organizations and jurisdictions that fall within the precautionary action zone (PAZ) or the urgent protective action planning zone (UPZ).



PAZs were not predefined, because announcing necessity of evacuation may encourage anti-nuclear movements.

“Do not wake up a sleeping tiger!”, said former head of NISA.

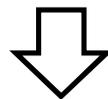
# Japanese regulatory system did not adequately meet “IAEA Safety Standards : GS-R-2 (2002).”

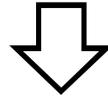
## Functional Requirement 4.12

When circumstances necessitate an emergency response, operators shall promptly determine the appropriate emergency class or the level of emergency response and shall initiate the appropriate on-site actions. The operator shall notify and provide updated information, as appropriate, to the off-site notification point.

## Functional Requirement 4.20

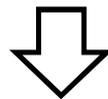
..... The criteria for classification shall be predefined emergency action levels (EALs) that relate to abnormal conditions for the facility or practice concerned, security related concerns, releases of radioactive material, environmental measurements and other observable indications. ....





TEPCO did not notify and provide indispensable information in violation of the law, but no investigation committee indicated that it was serious problem.

- There was no report on the batteries loss occurred with the station blackout.
  - The lack of information made the supply from the off-site insufficient.
- No indication from the committees symbolizes the incomplete recognition of the law.

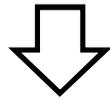


Even if arrangements for the prompt identification are made, they are useless without the common recognition among the organizations concerned.

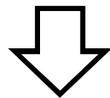
Japanese regulatory system did not adequately meet  
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### Requirement 8: Emergency preparedness and response

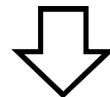
The government shall make provision for emergency preparedness to enable a timely and effective response in a nuclear or radiological emergency.

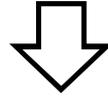


Though the provision for emergency preparedness was made, it did not operate in Fukushima Dai-Ichi Nuclear Accident.



Provision against unforeseeable contingencies must be made.



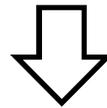


- Clear chain of command needs to be established by the leadership, with continuous information flow and angles of advice from subject-matter experts.
  - Clarification of person in charge and organizations involved
  - Systematic information flow to technical advisors
- Frank, open yet formal coordination among organizations involved is the decisive factor.
  - Regulator's limitation – first-hand knowledge of the plant
  - Licensee's limitation – situation outside the plant

# Japanese regulatory system did not adequately meet “IAEA Safety Standards : GSR Part 1 (2010).”

Requirement 21: Liaison between the regulatory body and authorized parties

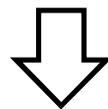
The regulatory body shall establish formal and informal mechanisms of communication with authorized parties on all safety related issues, conducting a professional and constructive liaison.



IRRS to Japan in 2007

The IAEA Review team also formed the impression that NISA seems to direct and overrule operating organizations, rather than listening to them and evaluating their reviews.

It is suggested that NISA continue to foster relations with industry that are frank and open, yet formal and based on mutual understanding and respect.





- The lack of frank and open, yet formal relation has been causing many problems.
  - Mutual distrust between NISA and the licensees delayed the regulatory system reform.
  - Contrary to its intention, regulation itself became the cause to disturb the safety improvement.
  - The licensees slacked off the effort to improve safety.
  - .....
- The emergency cooperation is impossible without daily good relation.



New regulatory body NRA seems to direct and overrule licensees increasingly, ...

# Japanese regulatory system did not adequately meet “IAEA Safety Standards : GSR Part 1 (2010).”

Requirement 6: Compliance with regulations and responsibility  
for safety

The government shall stipulate that compliance with regulations and requirements established or adopted by the regulatory body does not relieve the person or organization responsible for a facility or an activity of its prime responsibility for safety.



NISA’s labored directions and overrules on licensees caused licensees’ excuse:

➤ “Our plant safety was guaranteed by the government.”

# Japanese regulatory system did not adequately meet “IAEA Safety Standards.”

IRRS to Japan in 2007

Suggestion: NISA should take care that the current IAEA safety standards are duly taken into account, especially regarding the development and updating of an overall safety analysis report or comparable overall safety documentation summarizing the overall licensing basis.

Suggestion: Before approval of the operational safety programme and start of routine operation, NISA should add an additional hold point for an integrated review of all factors essential for safety.

Suggestion: NISA should encourage licensees to use alternative technical solutions to achieve safety objectives at least as good as those required by current technical standards.

# Japanese regulatory system did not adequately meet “IAEA Safety Standards.”

IRRS to Japan in 2007

Recommendation: NISA should ensure that its inspectors have the authority to carry out inspections at the site at any time, on a continual basis. This would ensure that inspectors have unfettered access to the site, to interview people, and to request the review of documents at any time rather than just at prescribed inspection times as in the law. This applies to both the construction and the operational inspection programmes.

Suggestion: NISA should establish a process with more flexibility to change the type and frequency of inspections without having to change the law.

Suggestion: NISA modifies the inspection programme based on events, but should be more proactive in doing this on the basis of inspection findings not only from the nuclear power plant being inspected, but also from experiences derived from other nuclear power plants.

# Conclusion

- Nuclear safety can be achieved by observance of IAEA standards.
- Japanese regulatory body did not make effort to meet IAEA safety standards, which expanded the accident.
- All countries using nuclear energy must try to improve the regulatory system to adequately meet IAEA safety standards, which is not easy.