How to align National Culture with Strong Safety Culture as Utility

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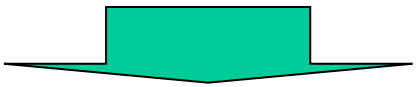
What Culture?

- TEPCO Culture?
- Japanese Nuclear Community Culture?
- National Culture?
- Asian Culture?

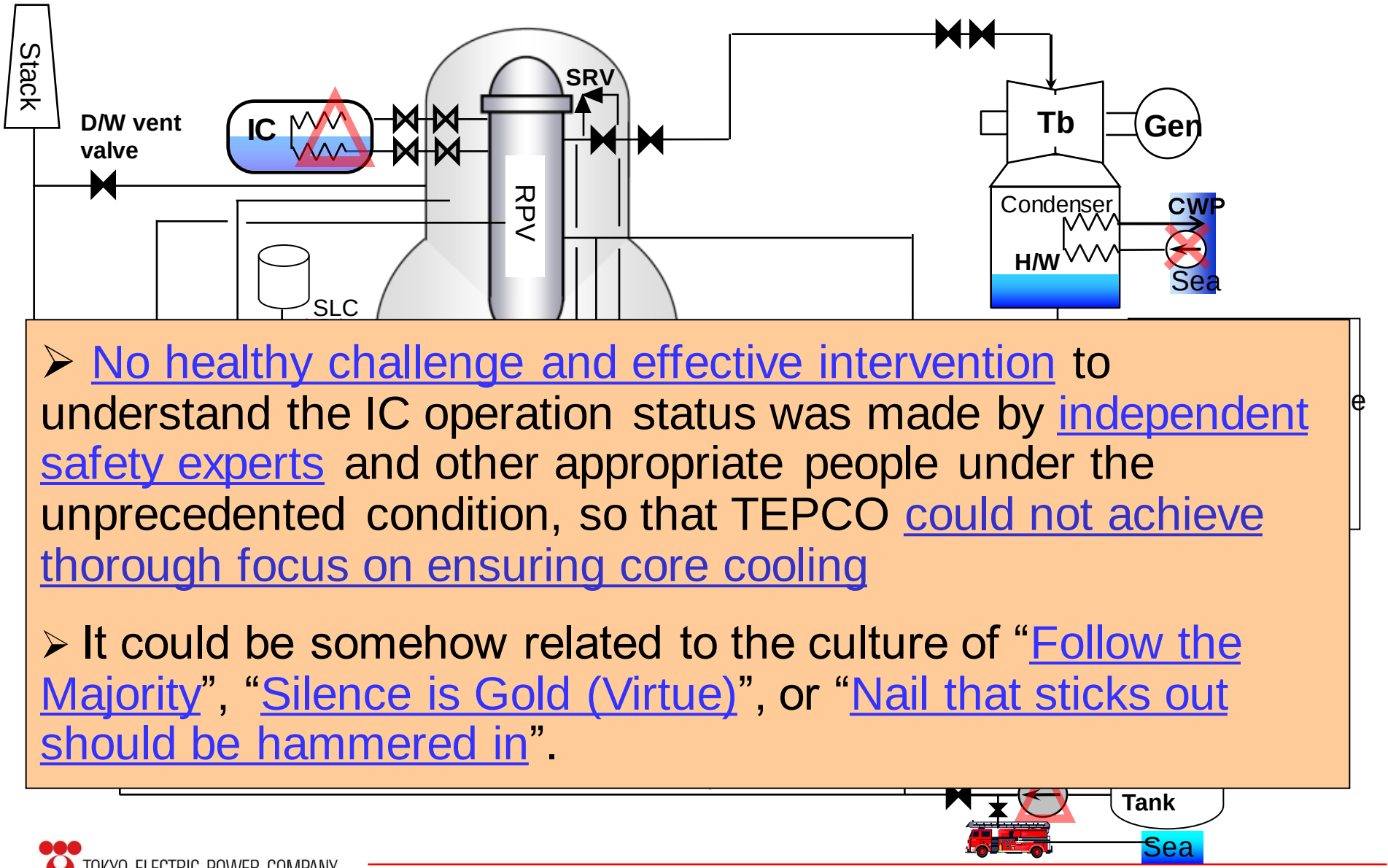
Japanese National Culture 1

- Politeness
- Respect of Others
  - Expertise
  - Seniority
  - Authority
- No Imprudent Invasion of Inside of Others



Could hamper "Healthy Mutual Challenge" and "Critical Thinking"

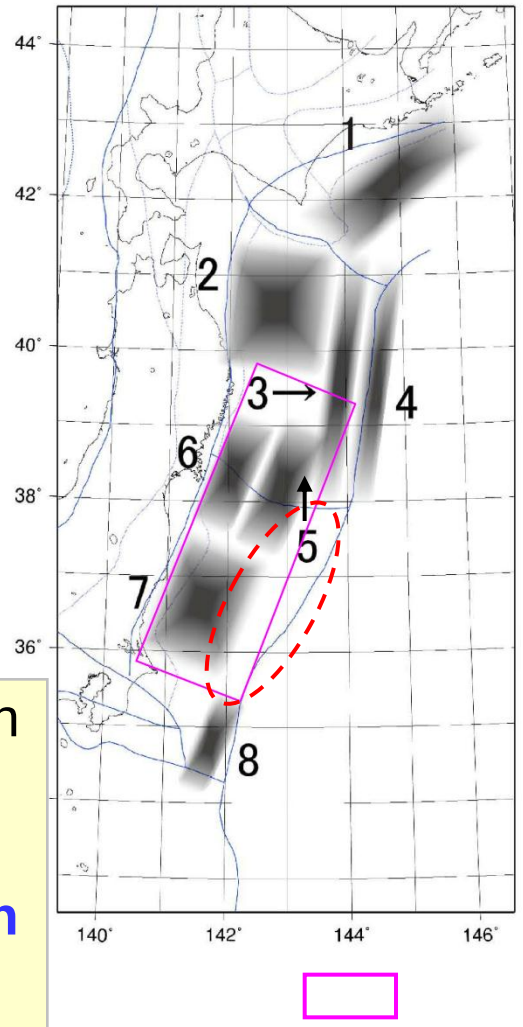
No Effective Challenge during Unit 1 Recovery



- No healthy challenge and effective intervention to understand the IC operation status was made by independent safety experts and other appropriate people under the unprecedented condition, so that TEPCO could not achieve thorough focus on ensuring core cooling
- It could be somehow related to the culture of "Follow the Majority", "Silence is Gold (Virtue)", or "Nail that sticks out should be hammered in".

JSCE Tsunami Assessment Method in 2002

No	Mw	Earthquake
1	8.2	1952 Nemuro-oki
2	8.4	1968 Tokachi-oki
3	8.3	1896 Meiji-Sanriku
4	8.6	1611 Keicho-Sanriku
5	8.2	1793 Miyagi-oki
6	7.7	1978 Miyagi-oki
7	7.9	1938 Fukushima-oki
8	8.1	1677 Enpo-Bousou



➢Uncertainties, such as inexperienced event, are taken into account by **parametric study** of the standard fault model.

➢**JSCE 2002 did not consider the tsunami source in the area along the trench of off the coast of Fukushima prefecture.**

Common Use of JSCE Method among Utilities

	TEPCO		JAPC	Tohoku EPCO
Event	Fukushima Daiichi	Fukushima Daini	Tokai Daini	Onagawa
Ground Level of main buildings	O.P.+10 or 13m	O.P.+12m	H.P.+8.9m	O.P.+14.8m
Establishment Permit	Unit 1 in 1966 O.P.+3.122m	Unit 1in 1972 O.P.+3.122m Unit 3/4 in 1978 O.P.+3.705	— in 1971	Unit 1 in 1970 O.P.+2～3m (Literature Suevey) Unit 2 in 1987 O.P.+9.1m (Numerical Simulation)
JSCE Method in 2002	O.P.+5.7m (Tsunami off the coast of Fukushima is dominant.)	O.P.+5.2m	T.P.+4.88m	O.P.+13.6m (Tsunami off the coast of Sanriku is dominant.)
	Countermeasure such as raise of the seawater	Countermeasure such as making the buildings	Countermeasure was	Countermeasure was
Scen disast pub prefe				
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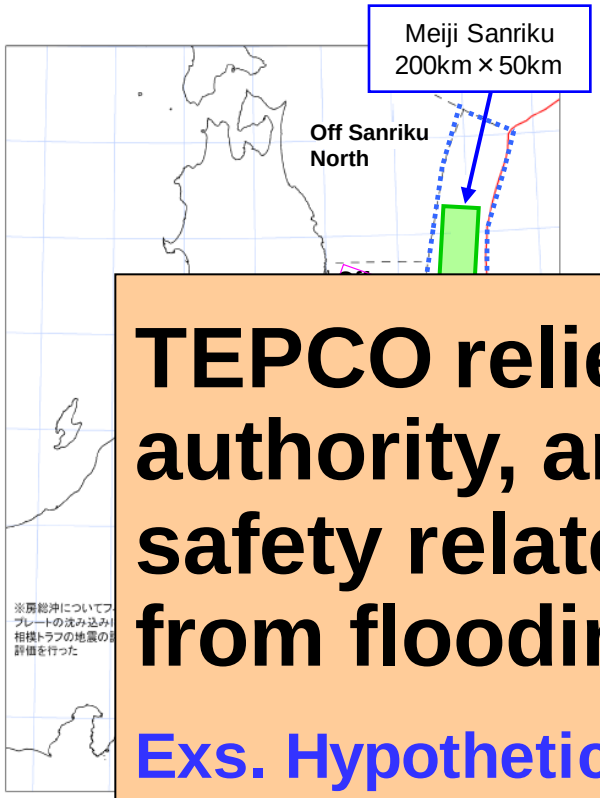
Latest bathymetric and tidal data in 2009	O.P.+.6.1m Countermeasure such as raise of the seawater pumps was completed.	O.P.+.5.0m Countermeasure was unnecessary.	unexplained	unexplained
Tsunami in 2011	O.P.+13.1m (Tsunami height) O.P.+15.5m (Inundation height)	O.P.+9.1m (Tsunami height) O.P.+14.5m (Inundation height)	T.P.+5.4m	O.P.+13.8m

TEPCO was relatively comfortable with the commonly used methodology among all the utilities.

Trial Calculation in the Light of HERP in 2008



➢The Headquarters for Earthquake Research Promotion **(HERP)** proposed in 2002 that **there is a possibility that M8.2 earthquake could occur anywhere along the Japan Trench.**

➢**TEPCO carried out a trial calculation in a**

TEPCO relied too much on the outside authority, and lost chances to protect safety related components/systems from flooding by themselves.

Exs. Hypothetical Calculations, Sumatra Tsunami, Okushiri Tsunami etc.

Fig. E
H
R

Touch in the materials by HERP, 2002

	2F				
unit	1	2	3	4	(O.P.12m)
Tsunami Hight [m]	7.6	7.2	7.8	8.2	15.5(Southern part)

Run-up Height

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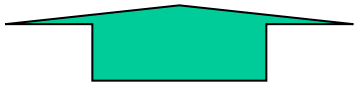
Background of Missed Opportunity

- Counted 'probability' rather than 'consequence'
- Silo – did not promote cross-functional discussions among associated organizations, civil engineering was a sort of isolated area not to be challenged
- Insufficient Learning Culture – Ex. what we learned from the flooding event at Blayais NPS, France
- Lack of Self-Independent and Proactive Thinking – lost an opportunity to take an temporary safety enhancement measures

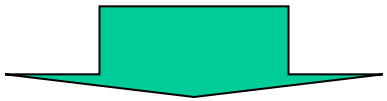


✓TEPCO believed that severe accident was unlikely then it was not necessary to improve safety measures more, at least immediately (putting off the decision), that could be closely associated with Japanese National Culture 2.

Japanese National Culture 2

- **Danger past, God forgotten!**
- **Boiled Frog**

Might not be a National Culture, instead Utility Culture in Japan



Although we start something new looking at the "Burning Platform", we sometimes do not continue it consistently after it is extinguished and lose an opportunity of "Thorough Implementation".

On the other hand we Japanese are basically dedicated people.

TEPCO Scandal in 2002

Fact:

- Found Cracks/Indications in Core Internals and Recirculation System Piping, but NOT Reported to Regulator

- Intentionally Injected Air in the Containment Leakage Test

Cause:

- Lack of **"Reporting Culture"** and **"Nuclear Professionalism"**

based on **Production Oriented Culture** (Rather than Safety)

- Lack of **Oversight** Function and Weak **Governance** over the isolated functional groups (**Silos**) with **Complacency**

- Lack of **Safety Management System/Mechanism**, such as CAP, Safety Performance Review, Self-Assessment, etc.

- **Safety Culture** not yet permeated over the organization and not built into the processes, Ex. **Weak Questioning Attitude** and **Learning Culture**

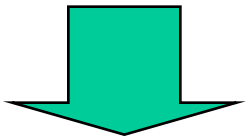
- Lack of Mechanism and Passion for **Pursuit of Excellence**

Countermeasures taken

Remedial Actions taken:

1. Oversight committee, in-house oversight group & corporate ethics committee
2. Organizational change: implemented and plans discussed by Managing Board

   (ex. Quality & Safety Group at each site, New Maintenance Department – responsible for all of planning, management, supervision and engineering)
3. Procedure/manual development meeting new QA structure
4. Ethics education and ethics hotline (in house): functional
5. CAP (Corrective Action Program): functional and “Passport” has been applied
6. Modernization of Maintenance Practices: RCM/CBM implemented on a part of equipments and evaluated



further improvement for Pursuit of Excellence

Nuclear Renaissance Activities

Nuclear Renaissance Activities for pursuit of Excellence

Since the TEPCO scandal in 2002

Benchmark Activities (Learning from the Best Practices)

Process Improvement (Core Activities: Implementation)

The reason why this activity was not fully successful was that:

- Sponsorship and Passion had not been shown continuously by top management
- Thorough focus on safety was not clearly demonstrated by top management
- Our people did not try to understand the values of standardization and commonality, rather stayed in their own silos.

Activities (Assessment – Self & External)

Activities: Training)

- LDE - LDE Overview

Learning and assessment for making changes

Implementing changes

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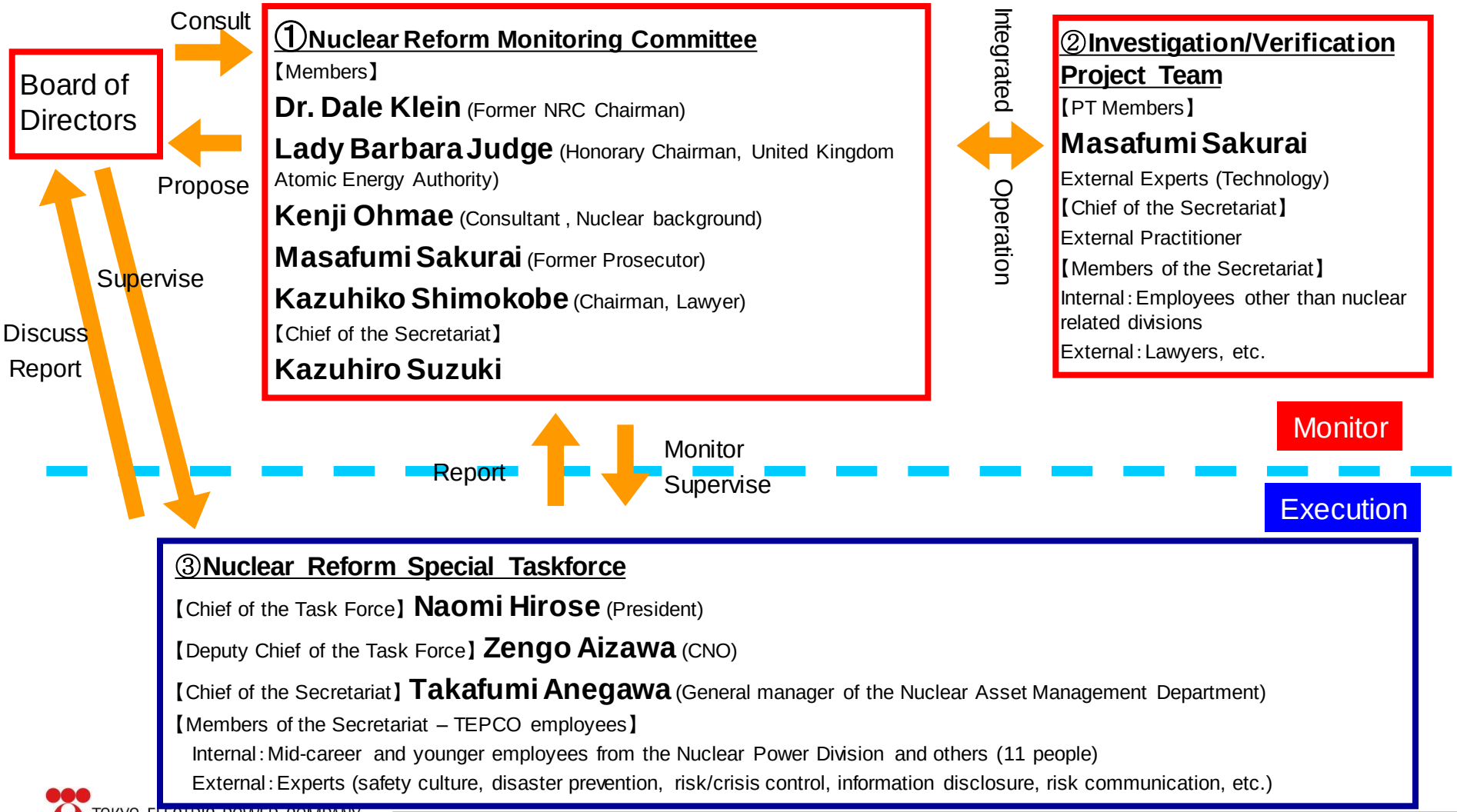
Framework for Nuclear Safety Reform

Introduction of external objective perspectives/ insights



Challenge for Nuclear Safety Reform

Objective: Strengthen Safety Culture in TEPCO.

Root cause analyses: Reviewed safety activities in the 2000s and identified deficiency in safety awareness, engineering and communication ability.

Action Plan:

- Enhance safety awareness of top management

2. Establishment of Nuclear Safety Oversight Office

3. Reorganize emergency response team based on Incident Command System (ICS)

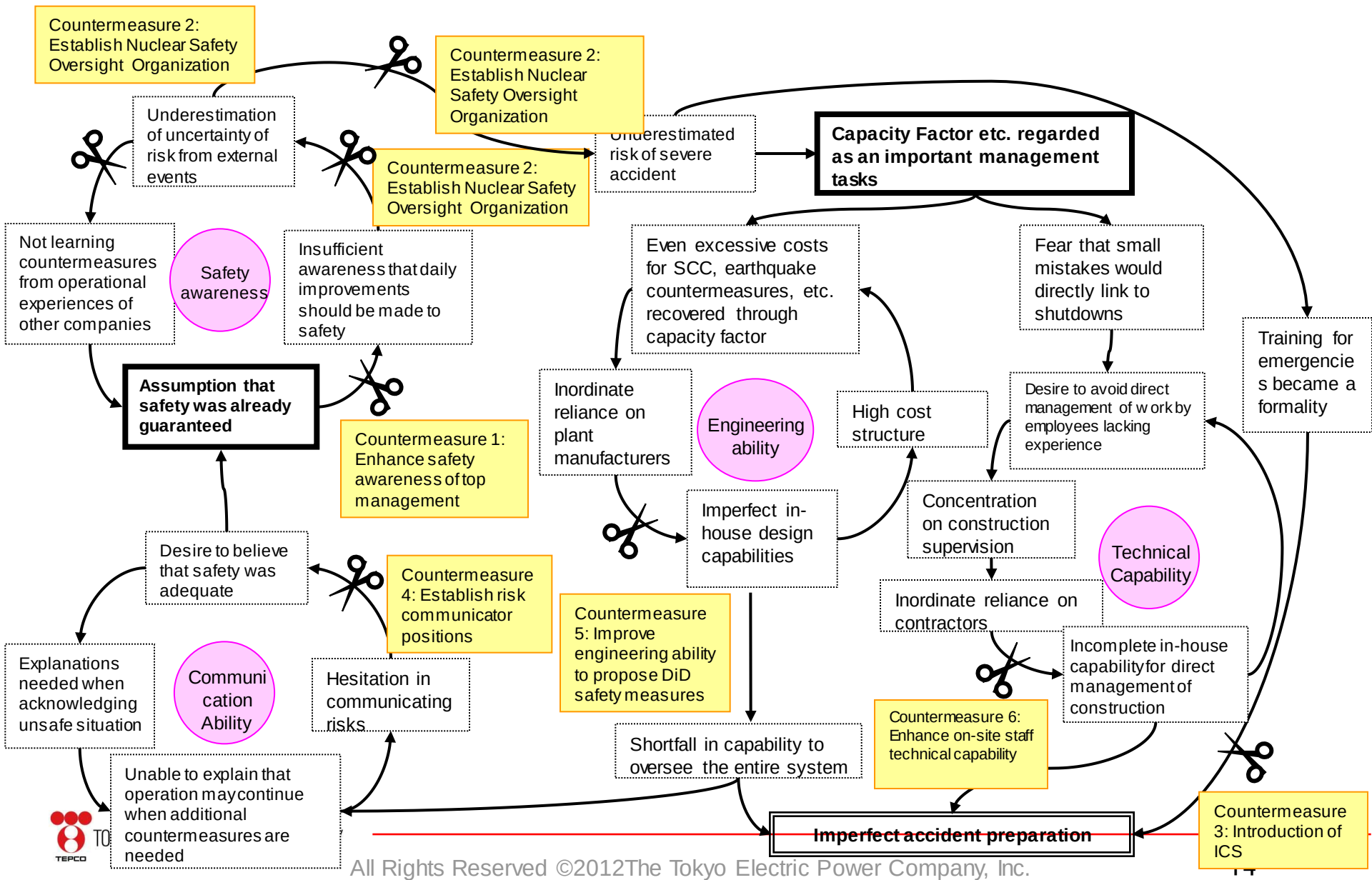
4. Improve engineering ability to propose Defense in Depth (DiD) safety measures

5. Establish risk communicator positions and Social Communication Office to build trust with the public

6. Enhance on-site staff technical capabilities

Ref. Negative Spiral of Insufficient Accident Preparation

We believed safety had been established and concerned capacity factor mainly then reluctant to improve safety measures.



How to align National Culture with Strong Safety Culture as Utility?

In order to achieve thorough focus on nuclear safety, Senior Management should:

- Pursue the Value-based, Cultural and Behavioral Solution with Passion
- Share and Recognize Common Value
- Be More Demanding and Less Forgiving on Matters of Nuclear Safety
- Promote Mutual Learning among Utilities Based on Effective Communication