Deontological Approaches to the Ethics of Radiological Protection during the Post-Nuclear Accident Phase

Michio Miyasaka
Niigata University, Japan

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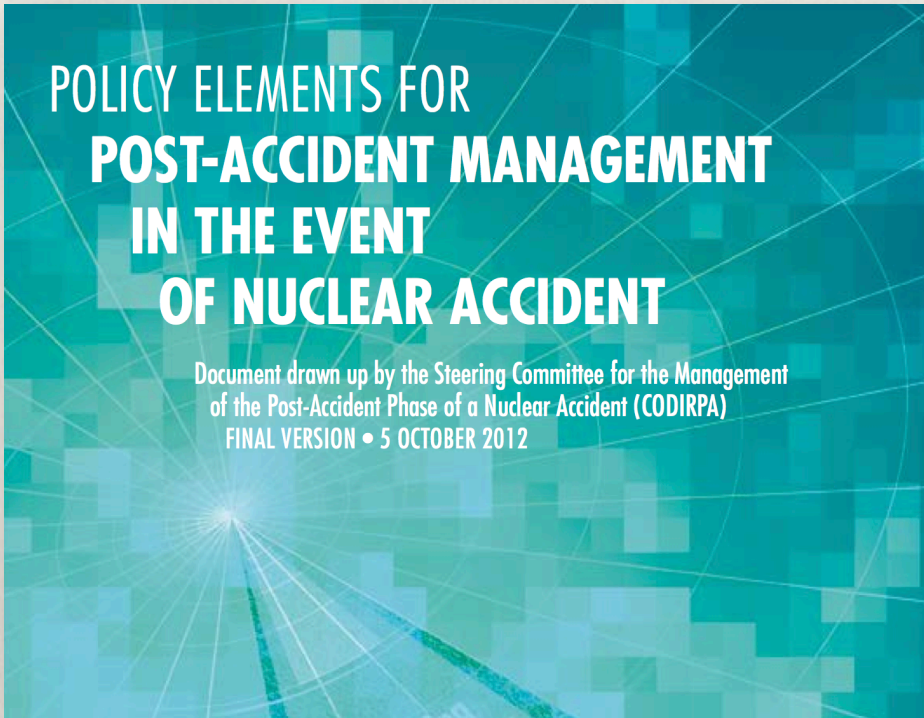
I

In which phase is Fukushima now?

Definition of phases

* Since 2005, the Nuclear Safety Authority (ASN) of France has been working to address post-accident situations following a nuclear accident. ASN formed a committee (CODIRPA) to clarify the policy elements for post-accident. It published a summary report in 2012, one year after the Fukushima disaster.
* The report presuppose French context, what might occur at French nuclear facilities, but at the same time it can be regarded as one of the earliest trial of conceptualizing what should be done in a post-accident situation all over the world.



Nuclear accident phases and actions

* Emergency Phase
  - Period of threat
    - Period of releases
      -Period of exit of emergency phase

* Post-accidental Phase
  - Transition period
    - Long term period

* Emergency protection actions
  - sheltering /evacuation /iodine tablets, etc.

* Post-accidental management actions
  - displacement /food prohibition /cleaning, etc.

Nuclear accident phases and actions

My target

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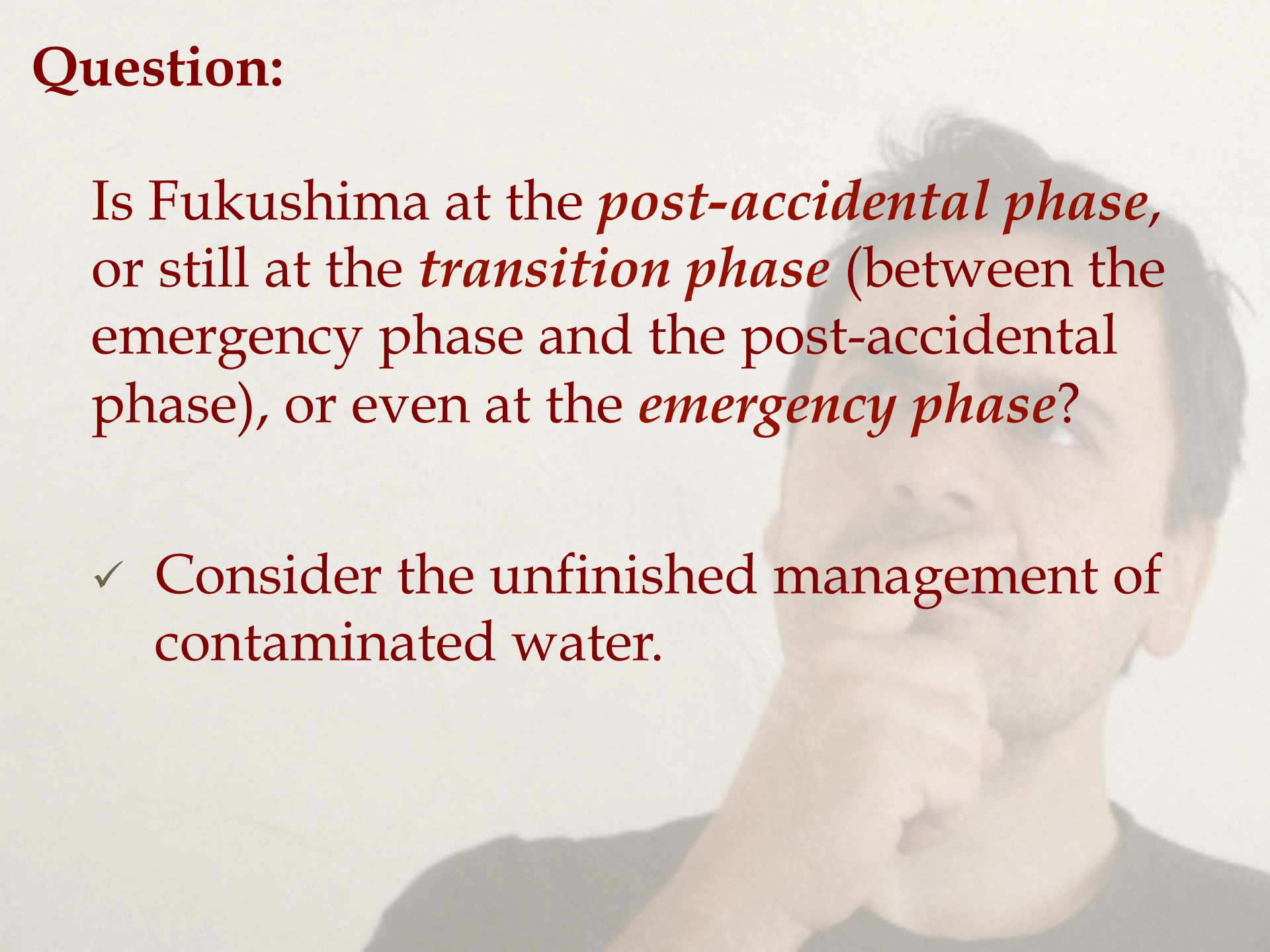
  - displacement /food prohibition /cleaning, etc.

Question:

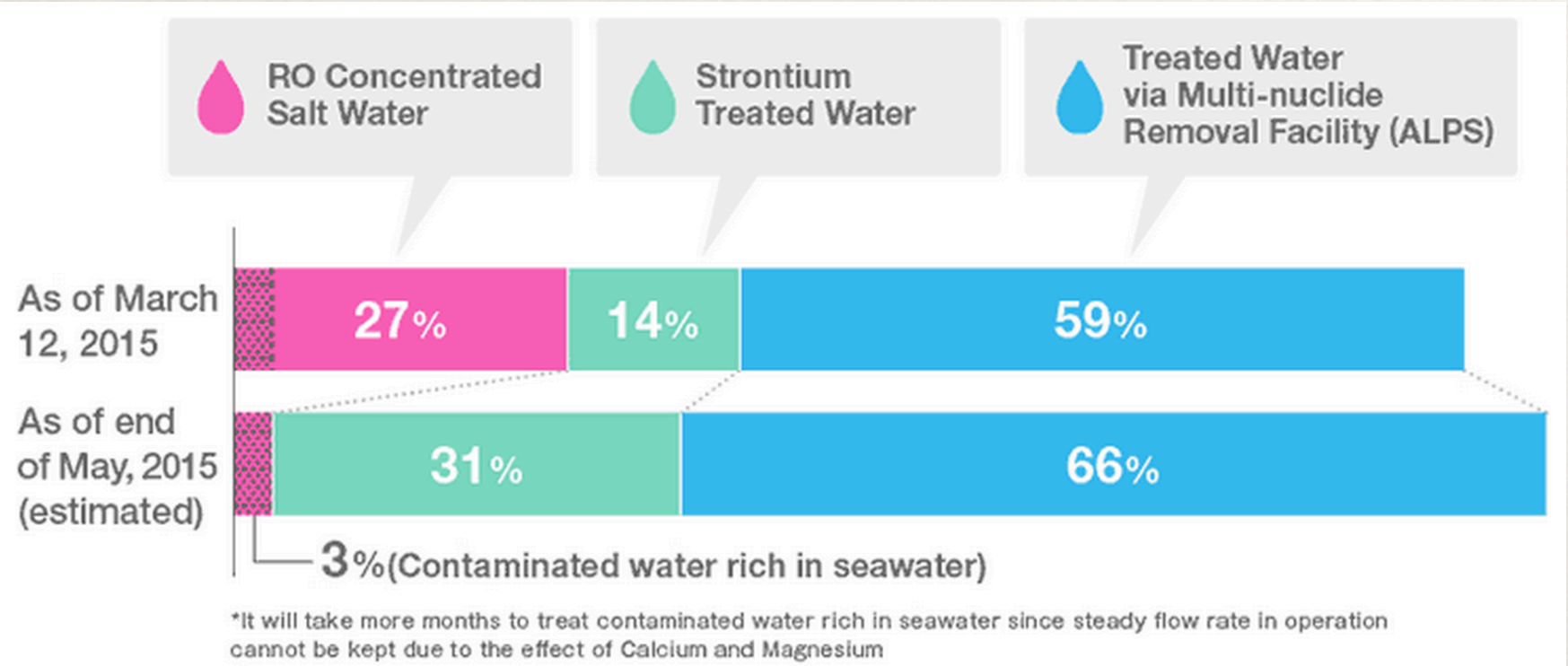
Is Fukushima at the ***post-accidental phase***, or still at the ***transition phase*** (between the emergency phase and the post-accidental phase), or even at the ***emergency phase***?

- ✓ Consider the unfinished management of contaminated water.



Unfinished management of contaminated water

* Tokyo Electric Power Co. (TEPCO) is using water to cool molten nuclear fuel, installing on-site tanks to hold 800,000 cubic meters of effluent.
* It pledged that they would filter all the water kept in tanks by March 31, 2015.



Unfinished management of contaminated water

* However, the engineers have battled leaks and ground-water contamination.

天下莫柔弱於水　而攻堅強者莫之能勝　其無以易之　弱之勝強　柔之勝剛　天下莫不知　莫能行

There is nothing in the world more soft and weak than water, and yet for attacking things that are firm and strong there is nothing that can take precedence of it.

- Laozi

Unfinished management of contaminated water

* TEPCO announced contaminated water had leaked or seeped out of 15 tanks. The highest concentration of radioactive cesium in the leaked wastewater was around 9,000 Bq/L.

  - *The Mainichi Shimbun* (May 05, 2015)

* Contaminated water had leaked out of a pressure hose in a gutter. The highest concentration of beta radioactive in the leaked wastewater was around 1,100,000 Bq/L.

  - *TEPCO press release* (May 29-30, 2015)

* "TEPCO should consider discharging water contaminated ..... into the Pacific Ocean", the International Atomic Energy Agency said.

  - *Bloomberg Business* (May 15, 2015)

Suggestion: Things are not clear-cut in real accidents.

- The unsuccessful (or extended) water management in Fukushima appears the "period of releases" persists even after other aspects appear to pass the "exit of emergency phase".
- It can be concluded that Fukushima' s situation is mostly at the ***post-accidental phase,*** but it also remains at the ***emergency phase,*** at least from the viewpoint of waste water management.

II

Ethics of Radiological Protection
during the Post-Nuclear Accident Phase

- Behind the expertise narratives

The ASN report says,

Three basic objectives

1. to protect the populations from the dangers of ionising radiations
2. to provide support to the populations victim to the consequences of the accident
3. to reconquer the territories affected, from the economic and social standpoint

The ASN report says (very closed to ICRP 103 and 111),

Four management principles

1. *Anticipation*
2. *Justification*
3. *Optimisation*
4. *Co-construction and transparency*

1. *Anticipation*
   the issues at stake in post-nuclear accident management need to be taken into account from as early as the exit from the emergency phase; consequently, the first actions need to be planned during the preparedness stage.

2. *Justification*
   the actions especially those aimed at protecting the populations must be warranted, meaning that the expected benefits, in particular in terms of radiological harm prevented, must exceed the risks and drawbacks inherent in their implementation.

3. *Optimisation*
   population exposure to ionising radiations must be kept to a level as low as reasonably achievable, taking into account economic and societal factors.

4. *Co-construction and transparency*
   shared construction and transparency: post-accident management must involve the populations, elected official, business community and social stakeholders. The transparency of the information provided is one of the pre-requisites for this joint spirit to come about.

The ASN report says,

Six key points in post-accident management

1. The immediate delineation of the contaminated territories, to be adjusted over the course of the transition stage and beyond, is a major decision and serve as the structuring framework by which action designed to protect the populations will be managed. This zoning makes it possible in particular to prohibit the consumption and placing on the market of locally-produced foods (main source of population exposure.

2. The population affected by the consequences of the accident, one portion of which may be lastingly taken away from its living environment, must be given the benefit of medical and psychological care, dosimetric monitoring, epidemiological follow-up, financial support, and receive compensation for the damages incurred.

3. The characterisation of the radiological situation in particular in living environments and the characterisation of the levels of contamination of foodstuffs and waters are to be undertaken as urgent necessities and as early as the exit from the emergency phase, in order to understand the extent of the contaminated territories and the impact of the said contamination as quickly as possible, with the aim of optimising the protection system. Once the radiological situation has been established, a long-term standard-practice radiological surveillance system must be implemented and be maintained throughout the post-accident phase

4. A water management plan specific to tap water is to be instituted taking into account the specifics of the exposure due to resource contamination. The aim is to maintain the best radiological quality of drinking water while adapting the actions to be initiated and possible restrictions on water resources or distribution in accordance to the potential risk.

5. New governance based on watchfulness and the active participation of those affected is needed in particular to begin, where the radiological situation allows, reviving business activity and revitalising the territories impacted.

6. Action to mitigate contamination and manage the contaminated products may generate large amounts of waste from varying sources and different types. This sizeable influx makes it necessary to gradually replace the temporary management solutions selected at the exit from the emergency phase with lasting management solutions.

The ASN report appears to anticipate current situation of Fukushima

Mid-and-Long-Term Roadmap towards the Decommissioning of FDNPS (TEPCO)

Individual Schedule for Each Unit

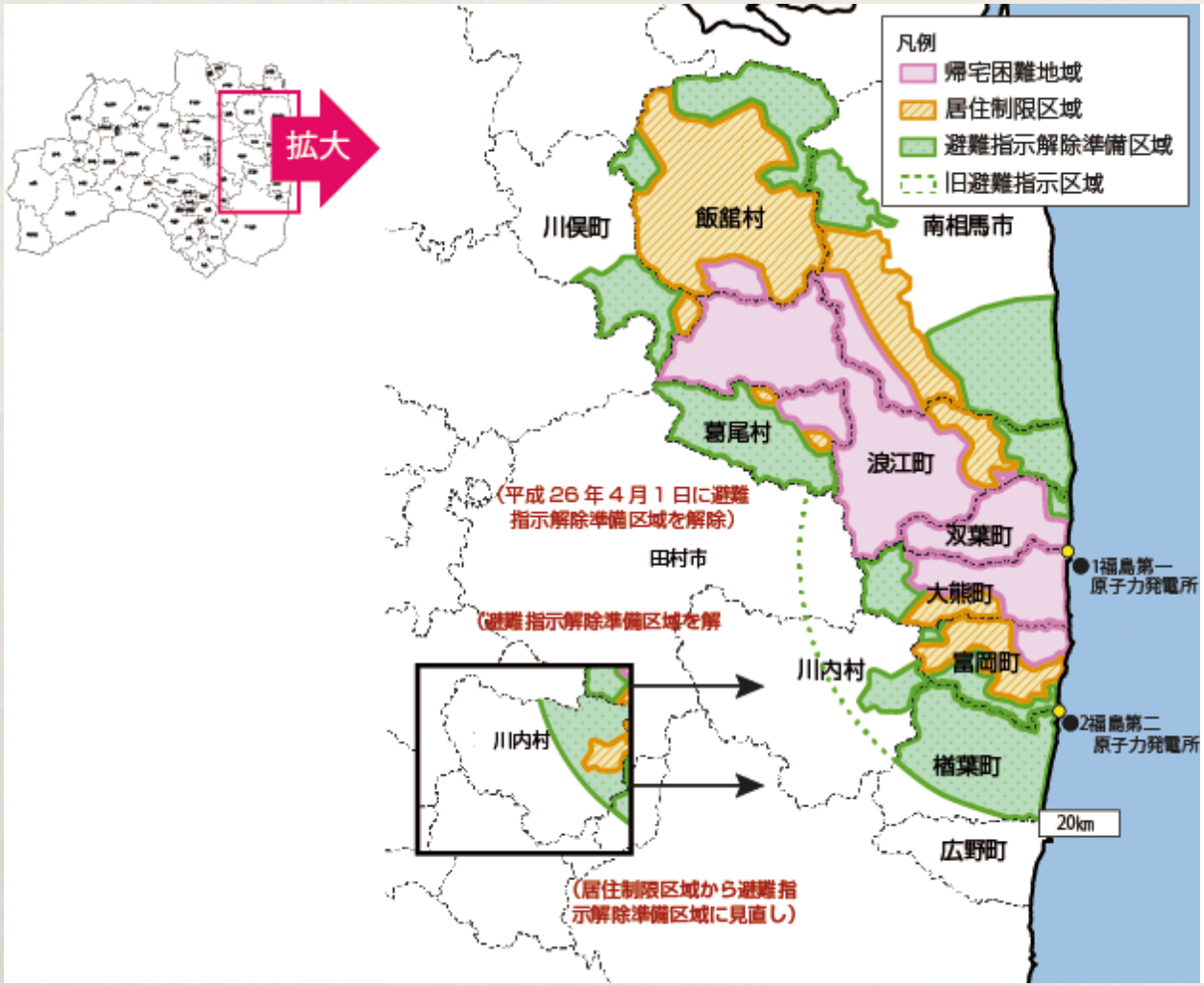
・To reduce risks, (i) removal of the fuel from the spent fuel pool and (ii) removal of the fuel debris will be carried out at the earliest possible time. According to the condition of each unit, work processes will be accelerated and multiple plans will be formulated.

	Fuel removal	Fuel debris removal
Initial targets	December 2013 (the earliest unit)	December 2021 (the earliest unit)
Unit 1 (Earliest plan = Plan 2)	Second half of FY2017	**First half of FY2020 (one-and-a-half years earlier than the initial plan)**
Unit 2 (Earliest plan = Plan 1)	Second half of FY2017	**First half of FY2020 (one-and-a-half years earlier than the initial plan)**
Unit 3 (Earliest plan = Plan 1)	First half of FY2015	Second half of FY2021
Unit 4	**November 2013 (one month earlier than the initial plan)**	—

Basic Principles for Mid-and-Long-Term Initiatives

1. Systematically tackle the issues while placing top priority on the safety of local citizens and workers.
2. Move forward while maintaining transparent communications with local and national citizens to gain their understanding and respect.
3. Continuously update the roadmap in consideration of the on-site situation and the latest R&D result.
4. Harmonize the efforts of TEPCO and Government of Japan to achieve the goals indicated in this Roadmap. The Government of Japan should take the initiative in promoting the efforts to implement decommissioning measures safely and steadily

Delineation of the contaminated territories (as of October 1, 2014)



Areas where it is expected that residents will face difficulties in returning for a long time

Area where the radiation levels are so high that protective measures including installation of barricades are taken, and citizens are forced to evacuate.

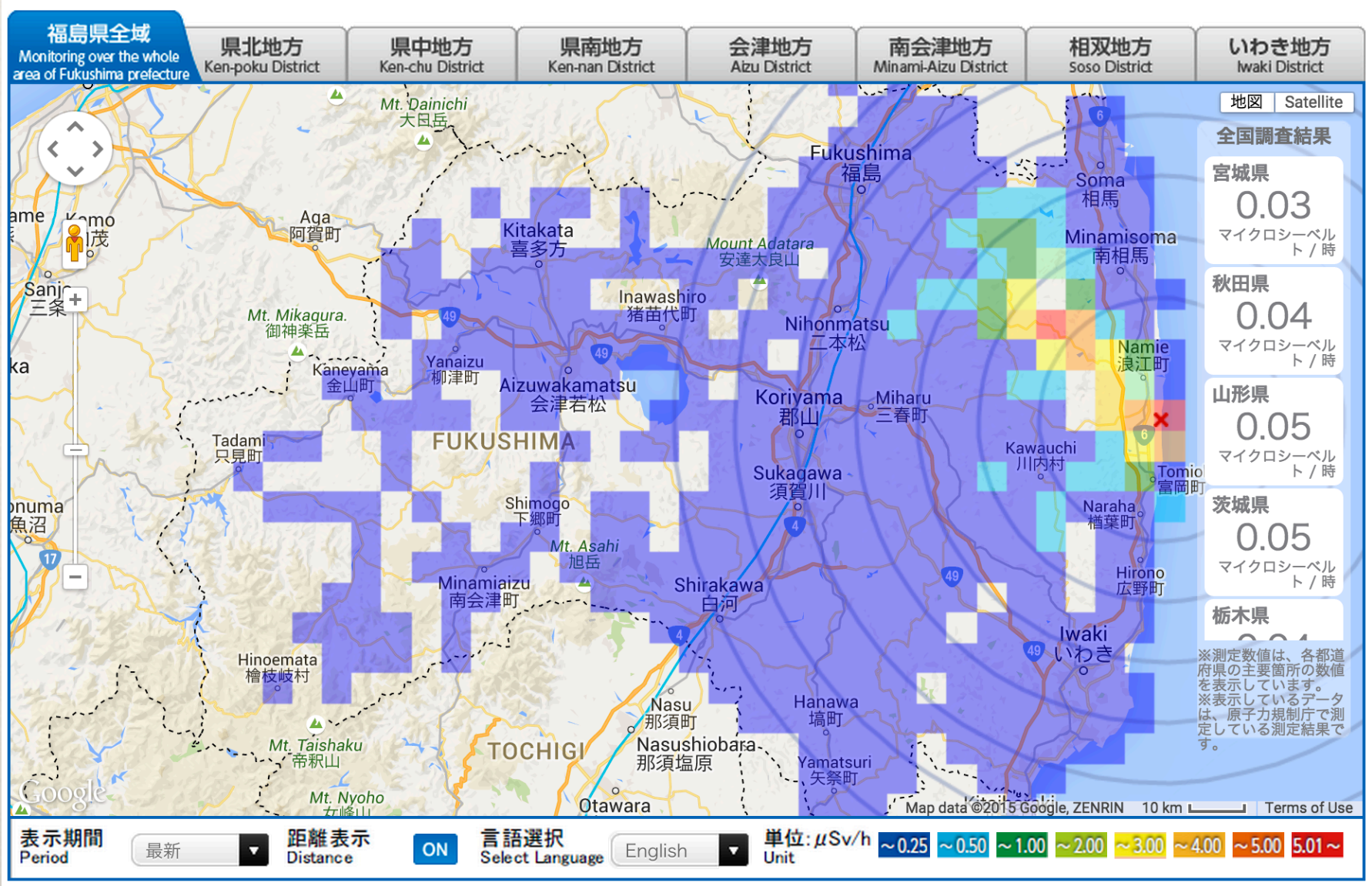
Areas in which residents are not permitted to live

Area that inhabitants return in the future, and carries out decontamination for rebuilding community premeditatedly, and aims at recovery of base facility where early recovery is indispensable.

Areas to which evacuation orders are ready to be lifted

Area aiming at environmental maintenance for to carry out aid package for recovery, recovery quickly, and inhabitants to be able to return.

An attempt for transparency: Radioactivity updated three times a day on the web of Fukushima Pref.



III

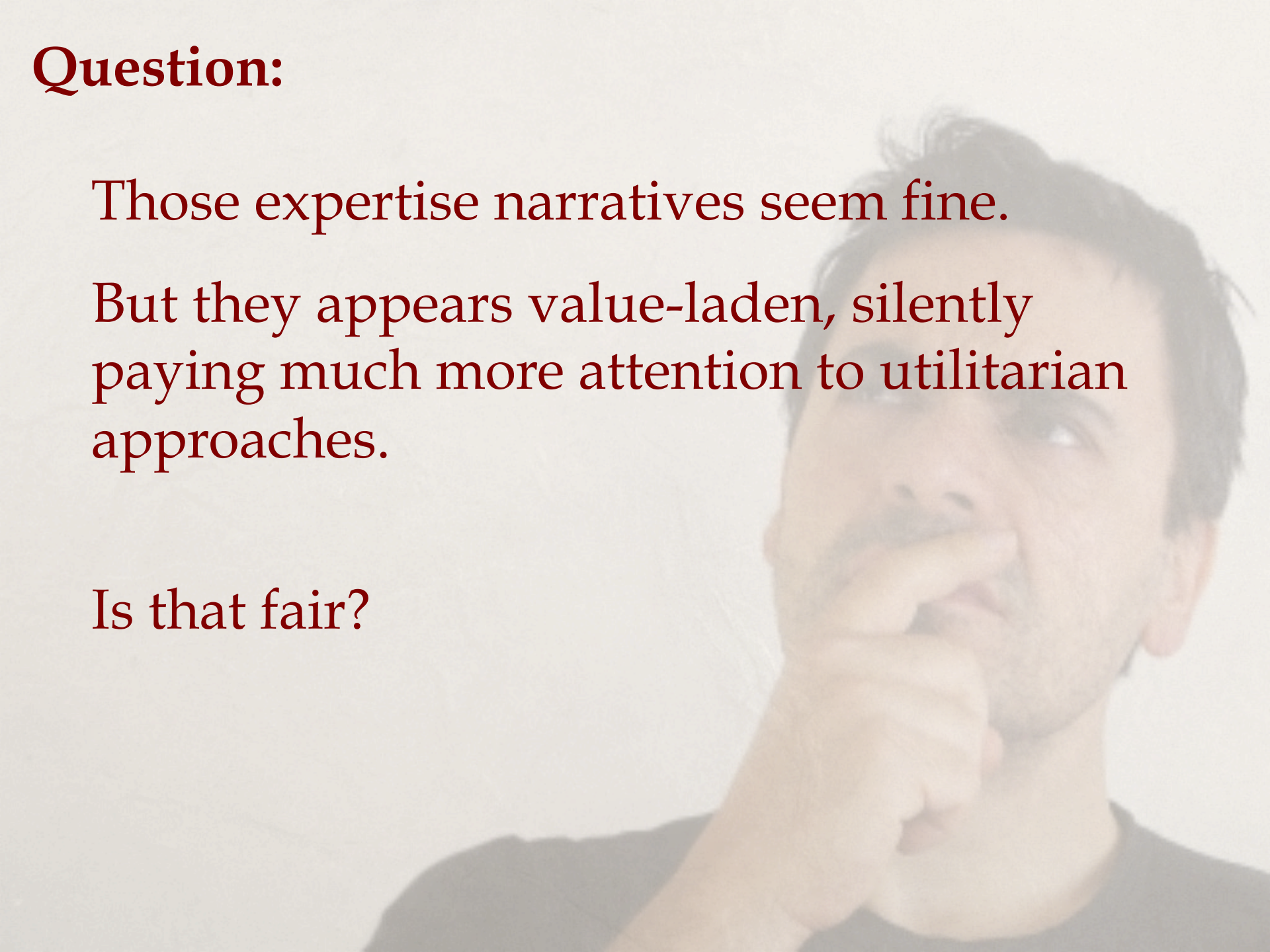
Critique of the set of guiding principles

Question:

Those expertise narratives seem fine.

But they appears value-laden, silently paying much more attention to utilitarian approaches.

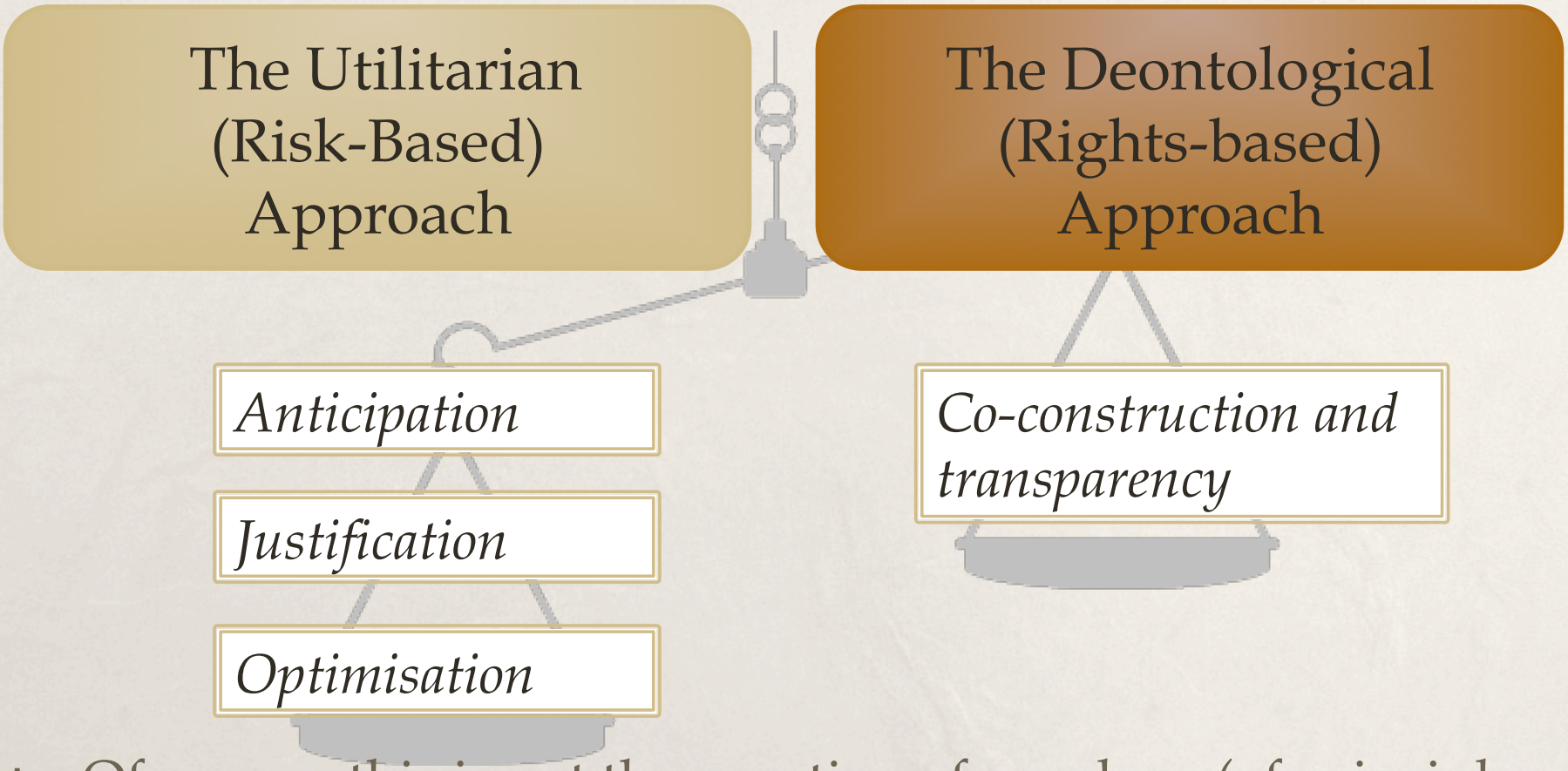
Is that fair?



Note: Deontological theories

* Found morality on duty or obligation (rooted in the Greek word “deon”).
* Irrespective of the consequences that might follow from our actions (best understood in contrast to consequentialist /utilitarian theories).
* Lay greater stress on protecting individual rights.

Only *transparency* principle is in Deon. camp



* Of course, this is not the question of numbers (of principles rooted in utilitarian or deontological theories)
* Conventionally, the utilitarian approach had been prioritized in engineering ethics over the deontological approach.

The weakness of utilitarian (risk-based) approach

- Questions over agency
  - ✓ Whose *cost* (*risk)* should be taken into account?
  - ✓ Whose *benefit* should be taken into account?

The weakness of utilitarian (risk-based) approach

* Questions over *who*
  - ✓ Whose *cost* (*risk)* should be taken into account?
  - ✓ Whose *benefit* should be taken into account?

* Questions over *how*
  - ✓ How the *cost* (*risk)* should be apportioned?
  - ✓ How the *benefit* should be distributed?
  - ✓ How the *cost (risk)* and *benefit* should be estimated?

Question:

No warranty is given whether each one of the four principles is fairly and sufficiently implemented.

Do they anticipate, justify, optimize fairly?

Do they invite all the stakeholders to the decision-making process?

Do they provide sufficient information to them?

- Since Fukushima disaster undermined credibility of, and provoked skepticism against the management competence of expertise.

The principle of *fairness* (*procedural due process*)

* The utilitarian approach must be ***watched*** by means of principles based on another guiding principle that can warrant both procedural justice (participation of stake-holders) and distributive justice (apportion of cost & risk, distribution of benefit).

* The principle can be coined "fairness", "procedural justice", or "procedural due process" as adopted in other fields.
  (I should leave the name up to you!)

The principle of *fairness* (*procedural due process*)

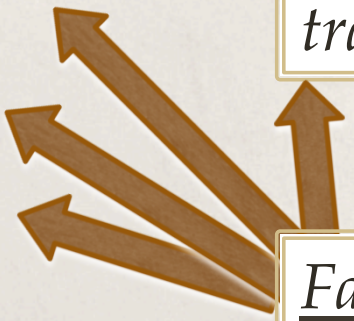
The Utilitarian (Risk-Based) Approach

The Deontological (Rights-based) Approach

Anticipation

Justification

Optimisation



Co-construction and transparency

Fairness (procedural due process)

watching other principles

The principle of *fairness* (*procedural due process*)

* The cost, risk, and benefit should be fairly (in a scientifically sound way) recognized (taken into account).
* The cost, risk, and benefit should be properly (in a scientifically sound way) estimated (anticipated, justified, optimized).
* Those whom co-construction is invited should be fairly selected, and should be sufficiently informed.

VI

Conclusion

* The unsuccessful water management in Fukushima appears the “period of releases” persists even after other aspects appear to pass the “exit of emergency phase”.
* ASN set a guiding principles (along with objectives and detailed recommendations in post-accident management), which anticipate current situation of Fukushima.

* However, the guiding principles appears paying much more attention to utilitarian approaches.
* The utilitarian approach must be watched by another deontological principle of “fairness”, (“procedural justice”, or “procedural due process”) that can warrant both procedural justice (participation of stake-holders) and distributive justice (apportion of cost & risk, distribution of benefit).