

# **Dilemmas on what is public and what is expert information: The case of Fukushima**

**Shin-etsu Sugawara**

Central Research Institute of Electric Power Industry

**Kohta Juraku**

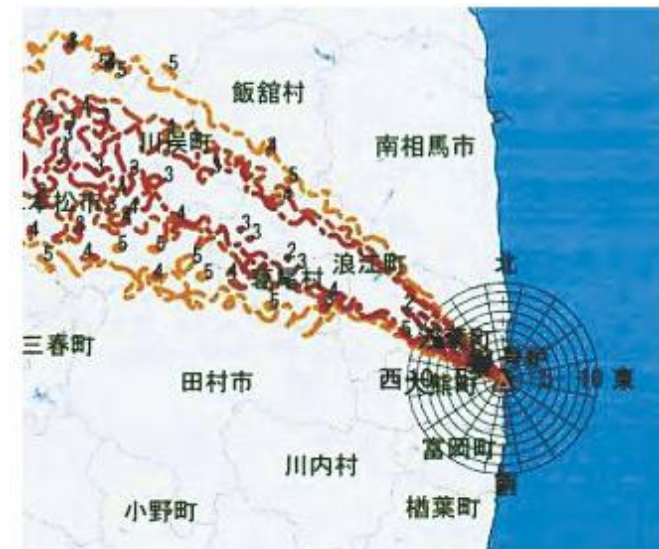
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# Introduction

- Simulation, decision-making and public information under nuclear emergency
- “SPEEDI”
  - System for Prediction of Environmental Emergency Dose Information
  - Japanese domestic technology
    - To simulate and predict the dispersion of radionuclides and its radiological consequences on nuclear emergency
    - Developed and implemented since 1980s
  - Expected to play a main role in decision-making for evacuation in case of radiological emergency
- Controversy over its usefulness and disclosure followed by the “Failure” in the Fukushima accident



# Post 3.11 Controversy over SPEEDI

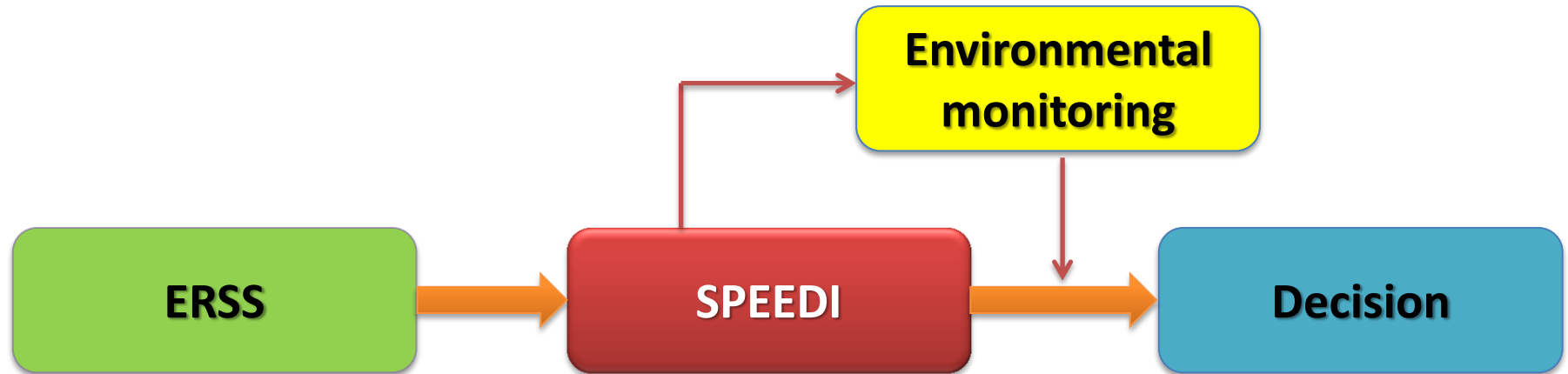


- ✓ Government could have made better use of SPEEDI when deciding evacuation area and route.
- ✓ SPEEDI outputs should have been disclosed immediately because of their usefulness.
- Gov't investigation committee (ICANPS)
- Experts of dispersion calculation
- Ministerial Council for Nuclear Power Utilization
- Some local governments and residents
- National Governors' Association
- Some SSH scholars
- ✓ SPEEDI w/o source term information could not be a reliable basis for decision.
- ✓ Government and experts have the responsibility to avoid public exposure to radiation and/or "panic".
- Diet Investigation committee (NAIIC)
- Experts of nuclear safety and emergency preparedness
- Nuclear Regulatory Agency (NRA)

# Research question

- What is the core and background of persisting “SPEEDI” controversy?
- Popular story: “Openness VS. Secrecy”
  - Issue of information disclosure of the government under emergency
  - “SPEEDI itself is useful, the problem is bureaucracy.”
- Our skepticism: Problem should be even deeper than openness issue.
  - It is rather relevant to **the nature and public imaginary of technology, and their interaction at the interface of “STS”**
- Methods: Qualitative surveys
  - Document survey: academic papers, official, journalism articles, informal documents provided by informants...
  - Semi-structured interviews: 16 interviews for 29 informants including national/local governmental officials, domestic/international experts, ...

# Emergency decision-making before 3.11



## ✓ *Emergency Response Support System*

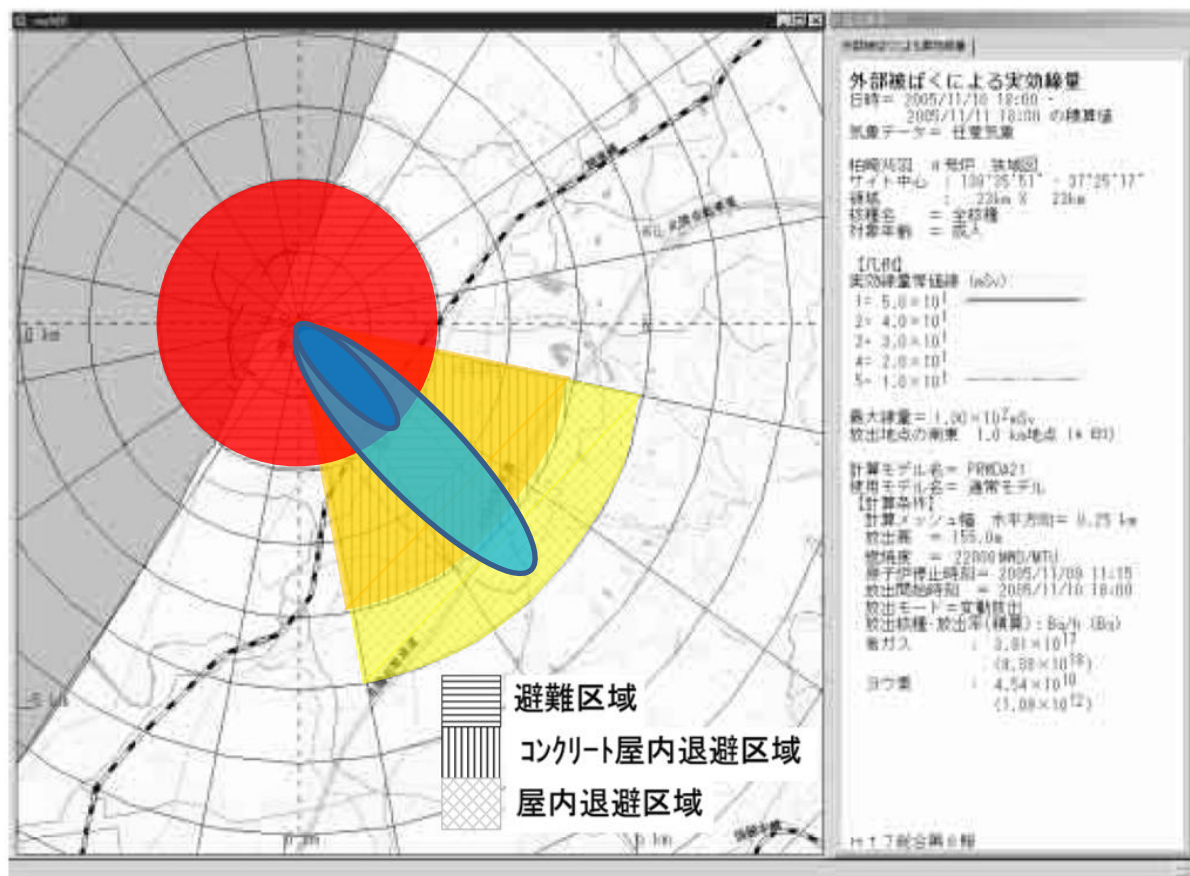
- ✓ Predicting accident progress based on the preset scenarios and real-time data
- ✓ Providing “source term information” including the timing, amount, type and composition of released radionuclides






## ✓ *System for Prediction of Environmental Emergency Dose Information*

- ✓ Predicting radiological consequences including atmospheric dispersion of radioactive materials, land contamination and radiation exposure
- ✓ Providing graphic data to related organs

## ✓ Deciding protective actions such as evacuation and sheltering

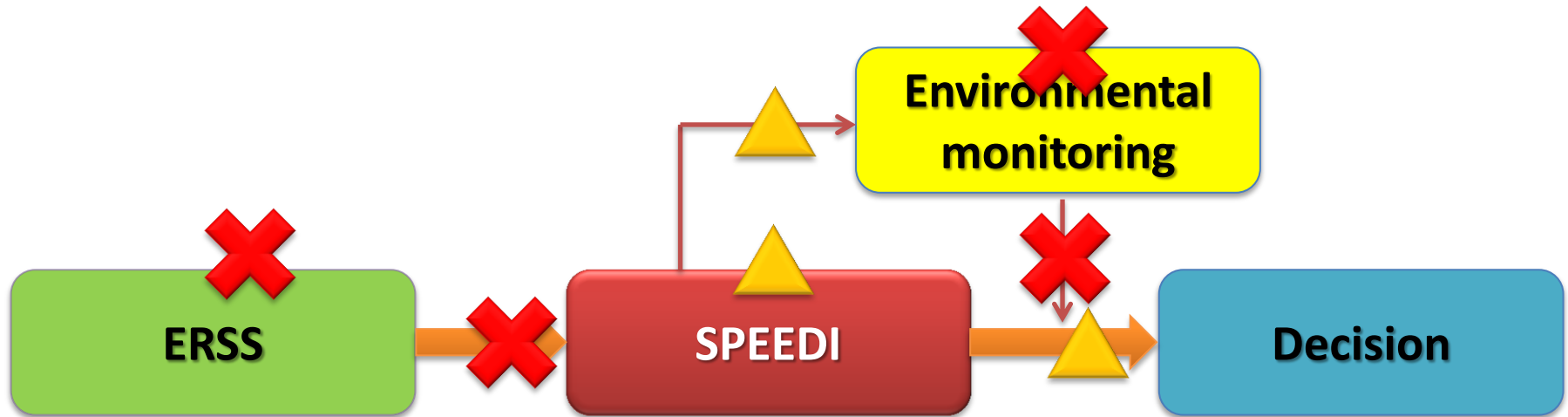
- ✓ Depending mainly on simulation results from SPEEDI
- ✓ Consideration among the experts in the Head Quarters  
→ Prime Minister’s decision  
→ Municipal mayors’ order  
→ Local residents



	Evacuation area
	Stay-in-concrete building area
	Stay-in-house area
	Projected effective dose from external exposure: 10-50mSv/h
	Projected effective dose from external exposure: >50mSv/h

Examples of SPEEDI  
in the past disaster drill

# Reality in the initial response of 1F accident



- ✓ Not functioned due to the failure of data transmission caused by the earthquake and SBO
- ✓ Couldn't provide source term information

- ✓ Provided calculation results **only under the very rough assumptions** such as unit rate release
- ✓ Distributed them to the related organs

- ✓ **The governmental agencies considered these results as useless** and didn't shared them among the keypersons of PM's office
- ✓ Evacuation decisions by the PM's office based not on SPEEDI but experts' judgment

# Disclosure of SPEEDI outputs

Month	Day	Substance
March	11	NISA, MEXT, NUSTEC start SPEEDI calculation.
	15	<ul style="list-style-type: none"> <li>Media requests during MEXT press conference that SPEEDI calculation results be made public.</li> <li>SPEEDI begins to draw attention from Social Media users.</li> </ul>
	23	NSC announces calculated values from <b>reverse estimate calculations</b> for release source information (internal exposure estimation for child's thyroid).
April	10	NSC announces calculated values from <b>reverse estimate calculations</b> for release source information (external exposure estimation).
	25	Mr. Edano, Chief Cabinet Secretary, orders disclosure of all SPEEDI calculation results.
	26-	Disclosure of SPEEDI outputs by MEXT and NSC
	30	Mr. Hosono, Special Advisor to the Prime Minister, announces in press conference that all SPEEDI calculation results have been disclosed.
May	2	Mr. Hosono announces in press conference that there were some undisclosed SPEEDI calculation results.

NISA: Nuclear and Industrial Safety Agency

MEXT: Ministry of Education, Culture, Sports, Science and Technology

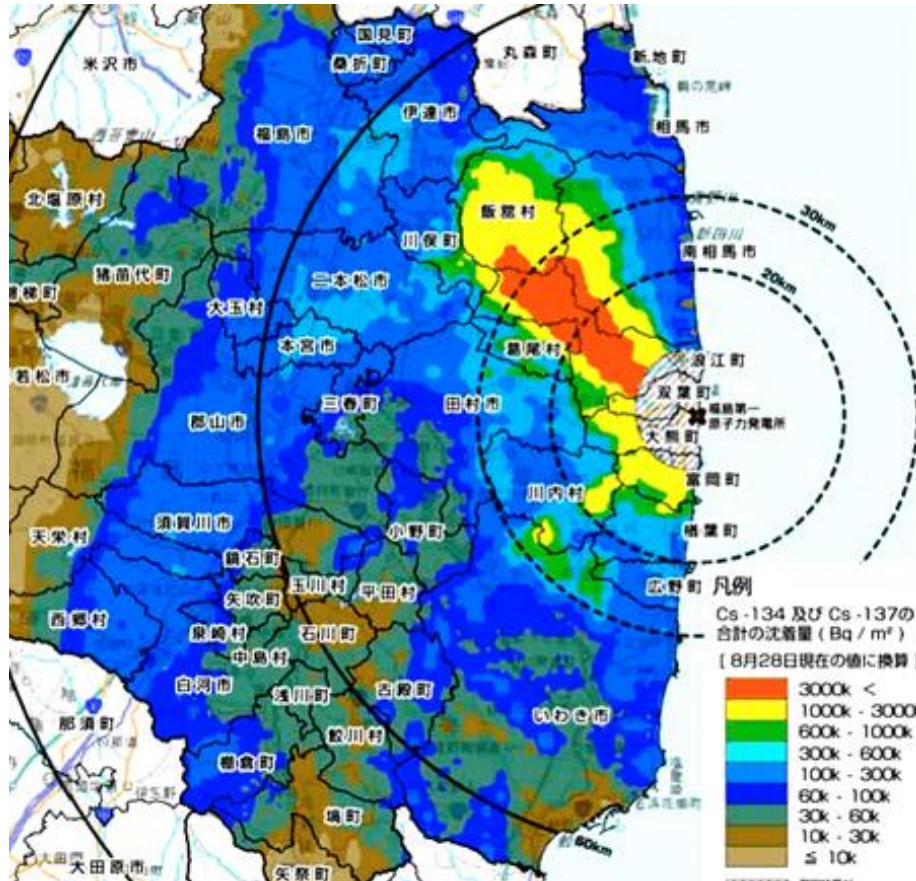
NUSTEC: Nuclear Safety Technology Center

NSC: Nuclear Safety Commission

\* Modified from the report of the National Diet Investigation Committee



# Between reality and simulation

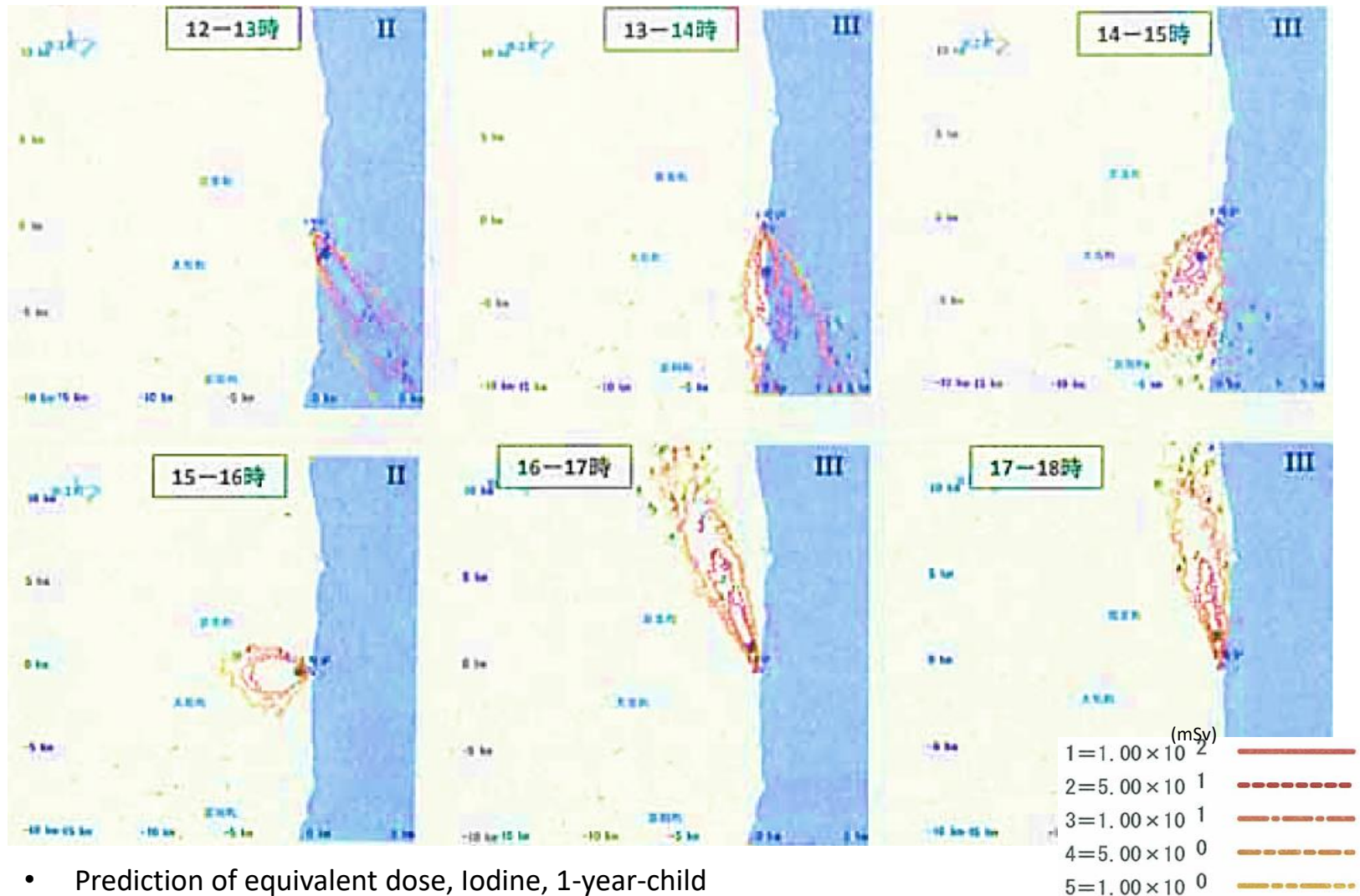


Radiation monitoring results by aircraft,  
published on 6<sup>th</sup> May by MEXT/USDOE



Reverse estimate calculation by SPEEDI,  
published on 23<sup>rd</sup> March by NSC

# Examples of SPEEDI prediction – MAR 12, 2011



- Prediction of equivalent dose, Iodine, 1-year-child
- Unit 1, Fukushima-Daiichi

\* Source: The report of MEXT (2012)<sup>10</sup>

# Usefulness of SPEEDI?

- Nature of SPEEDI
  - “If at a certain point, a certain amount of radioactive materials is released, it will be dispersed like this;”
  - **Overconfidence in SPEEDI:** the premise that we can get source term information even in case of severe accidents
  - GOOD for “to predict the possible scenarios in advance” or “to expect the ‘worst case’ scenario”
  - **NOT for “real-time simulation of the reality for the best optimized evacuation”**
- Discrepancy b/w technical limitation and social expectation
  - High expectations for SPEEDI even after 3.11 among stakeholders and general public

Actors	View to the SPEEDI	Conclusion
Developer of SPEEDI	<ul style="list-style-type: none"> <li>- One of the reference materials for emergency management experts</li> <li>- Not expect to disclosure directly to public</li> </ul>	- <b>USEFUL with some condition</b>
Officials of Nuclear Hosting Local Gov'ts.	<ul style="list-style-type: none"> <li>- Important basic information for decision-making to protect their people</li> <li>- Use the outputs for emergency monitoring and/or evacuation order with other information</li> </ul>	- <b>USEFUL with some condition</b>
Ex-guideline for nuclear disaster response	<ul style="list-style-type: none"> <li>- One of the information for making evacuation decision with emergency monitoring results</li> <li>- But, not so clearly defined</li> </ul>	- <b>USEFUL without careful thoughts</b>
Residents of Nuclear Siting Areas	<ul style="list-style-type: none"> <li>- Expect the output as the critical information to avoid any additional radiation exposure</li> <li>- Problems of the Fukushima case was secrecy (not due to technical limitation)</li> </ul>	- <b>USEFUL as innocent sense of expectation</b>
Customary practice in the past disaster drills	<ul style="list-style-type: none"> <li>- Major information for decision-making as a 'scientific evidence'</li> <li>- Sharing SPEEDI outputs among relevant organs, local gov., etc.</li> </ul>	- <b>USEFUL without hesitation</b>
Some experts in nuclear safety and emergency management	<ul style="list-style-type: none"> <li>- No one can predict accurately when and how nuclear reactor will lose its confinement function</li> <li>- Necessity for departure from prediction-oriented decision-making style</li> </ul>	- <b>USELESS at all</b>



# Contested imaginaries: experts and public

- Shared notion of “**information for the experts, not for the public**” among the conflicting professionals
  - “It is supposed to use the SPEEDI’s output to contribute top decision on evacuation, surely with appropriate consultation and advices by ‘qualified’ expert who understand the limitation of SPEEDI’s function and ability.”
  - “It should not disclose it to general public because it could result in not appropriate evacuation actions and increase of risk for them.”
- Public expectation
  - Strong aspiration for gaining first-hand information from real-time simulation under emergency
  - Innocent sense of expectation for advanced technology and distrust in government and experts

**Public information**

**Local residents**

**Some SSH scholars**

**ICANPS (Gov't investigation)**

**Useless** ←

**→ Useful**

**NRA (regulatory agency)**

**Some nuclear experts**

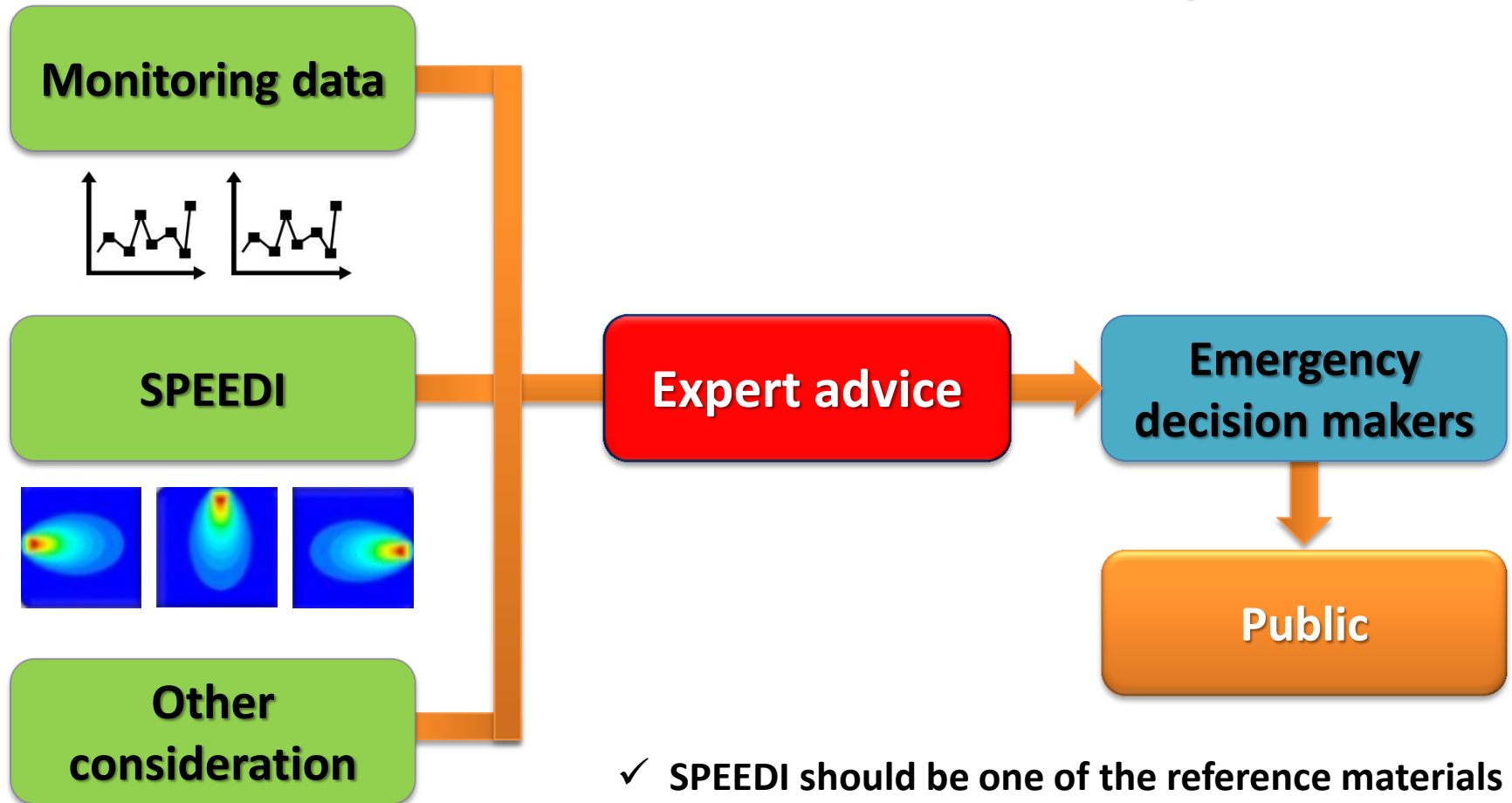
**NAIIC (Diet investigation)**

**Developer of SPEEDI**

**Some local gov't officials**

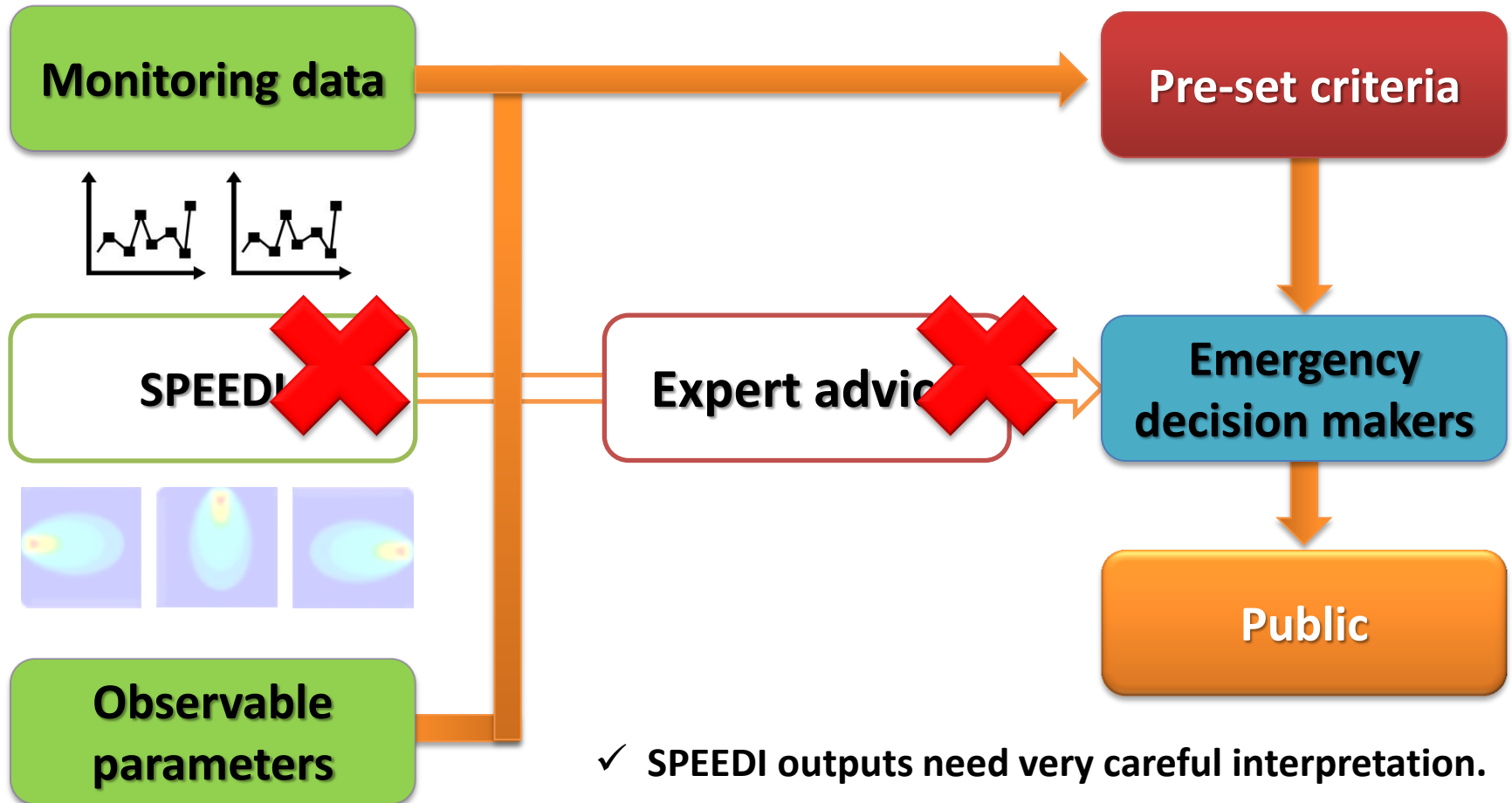
**Expert information**

# SPEEDI developer's view



- ✓ SPEEDI should be one of the reference materials for emergency management experts.
- ✓ Not expect to disclosure directly to the public
- ✓ Dispersion calculation experts may play a role of providing expert advice to the top managers.

# NRA's view



- ✓ SPEEDI outputs need very careful interpretation.
- ✓ Lack of experts for emergency advice
- ✓ Criticism against dispersion experts
- ✓ Ban of utilizing SPEEDI for avoiding dysfunction and establishing advance planning-oriented scheme



# Local residents' expectation



- ✓ SPEEDI can be a key technology for avoiding radiation exposure.
- ✓ SPEEDI outputs should be provided to the public via internet and/or TV like a typhoon's forecast.
- ✓ Those who can judge the usefulness of simulation results are not only experts but also the public.

# Discussion

- Computer simulation: shared notion of “information for the experts, not for the public” among experts
  - “Elite panic”? Too much paternalistic?
  - Can it be justifiable their sense of ethics and responsibility?
- Dilemma on what is public information and expert information
  - People have the right-to-know under emergency.
  - Should we share everything with the public including raw data?
- Who can/should provide strategic expert advice?
  - Dispersion calculation experts? Radiation protection experts?
  - Need for special institutional framework?
- Gap b/w public expectation and system performance
  - How to bridge this gap before something terrible happens

# Thank you for your attention.

[juraku@mail.dendai.ac.jp](mailto:juraku@mail.dendai.ac.jp)

[sugawara@criepi.denken.or.jp](mailto:sugawara@criepi.denken.or.jp)

S. Sugawara and K. Juraku “Post-Fukushima Controversy on SPEEDI System: Contested Imaginary of Real-time Simulation Technology for Emergency Radiation Protection,” S. Amir (ed.), *The Sociotechnical Constitution of Resilience: A New Perspective on Governing Risk and Disaster*, Palgrave Macmillan, 2018.

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