

Can we Make Rational failures?

The least regret, best effort , acceptance

公開シンポジウム「科学の不定性と社会～いま、法廷では. . . ?」

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Experience of high school textbook writing

- Basic science (the following was rejected)

“However cautiously tested, some medicine can have unexpected side effect, then became a social issue. Science cannot clarify every impact of it on health.

To explain what can be clarified and what cannot be itself is a way of scientific thinking.”

Experience of high school textbook writing

- The following was accepted by textbook authorization.

“However cautiously tested, some medicine can have unexpected side effect, then became a social issue. **We need more scientific research to clarify it.**”

To explain what can be clarified and what cannot be itself is a way of scientific thinking.”

Message from minister of MEXT to school teachers

(3, April, 2012)

After the experience of the Great east Japan earthquake and Fukushima nuclear power plant accidents, we need to reconsider education in Japan.

For example, we must promote education of science and technology from the point of view including not only its merit but also its limit and risk.

http://www.mext.go.jp/b_menu/daijin/detail/1319422.htm

Discourse before 3.11 and

- No zero risk
 - If we take every possibility into account, we can make nothing.
- The best scrutiny by the best experts in those days
 - Experts discretion, engineers judgment
- Decision making by scientific and quantitative evidence

⇒ Fukushima Accident as a man made calamity

risk

Probability × Hazard ?

Risk criteria (Renn & Klinke 2004)

- **Extent of damage**
adverse effects measurable in natural units, such as deaths, injuries, or production loss
- **Probability of occurrence**
estimates of the relative frequency of a discrete or continuous loss
- **Incertitude**
an overall indicator for different uncertainty components
- **Ubiquity**
the geographical dispersion of potential damage
- **Persistency**
the temporal extension of potential damages
- **Reversibility**
the possibility of restoring the situation to the state before the damage occurred
- **Delay effects**
the latency between the initial triggering event and the actual occurrence of damage
- **Violation of equity**
the discrepancy between those who benefit and those who bear the risks
- **Potential of mobilization**
potential violation of individual, social or cultural interests and values that generate social conflicts and psychological reactions by individuals or groups who feel afflicted by the consequences. These could also result from perceived inequities in the distribution of risks and benefits.

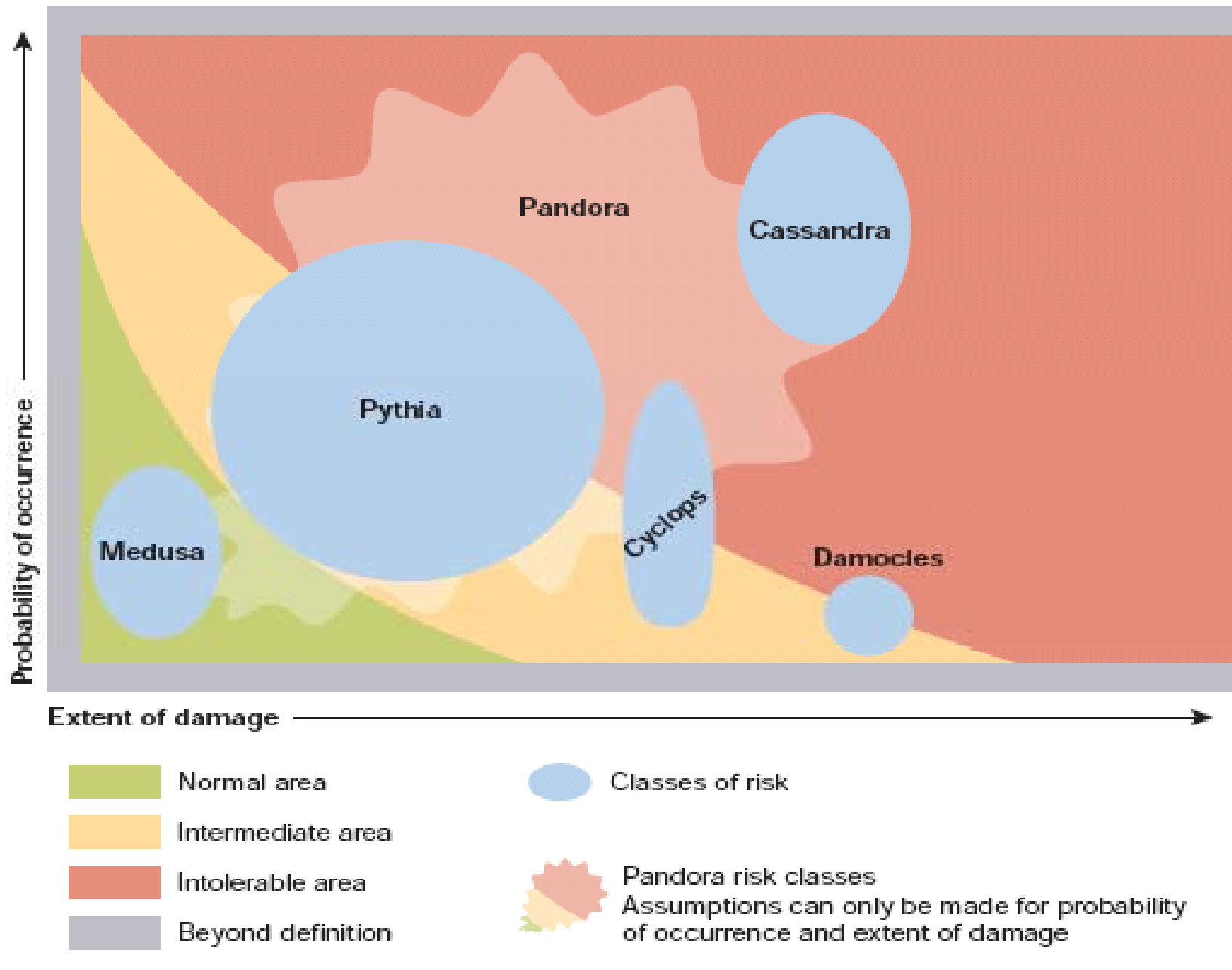


Fig 1 | Risk classes (WBGU, 2000)

Type of risk

- Damocles
 - Nuclear energy, large-scale chemical facilities and dams
- Cyclops
 - Earthquakes, volcanic eruptions, floods and El Nino, HIV / AIDS, other infectious diseases
- Pythia
 - Sudden, nonlinear climatic changes, genetic engineering in agriculture and food production
- Pandora
 - Chlorofluorocarbons, endocrine disruptors
- Cassandra
 - Anthropogenic climate change, the loss of biological diversity
- Medusa
 - Electromagnetic fields

Management strategies

Table 1 | Overview of the management strategies

Management	Risk class	Extent of damage	Probability of occurrence	Strategies for action
Science-based	Damocles Cyclops	High High	Low Uncertain	<ul style="list-style-type: none"> •Reducing disaster potential •Ascertaining probability •Increasing resilience •Preventing surprises •Emergency management
Precautionary	Pythia Pandora	Uncertain Uncertain	Uncertain Uncertain	<ul style="list-style-type: none"> •Implementing precautionary principle •Developing substitutes •Improving knowledge •Reduction and containment •Emergency management
Discursive	Cassandra Medusa	High Low	High Low	<ul style="list-style-type: none"> •Consciousness building •Confidence building •Public participation •Risk communication •Contingency management

Who are experts

- BSE in UK
- Prime minister official residence in Fukushima accident
- Influence of low-dose radiation
- Probability of earthquakes beneath the Tokyo metropolitan area
- Cost of nuclear power generation

How can we find the best experts

GMOs controversy in UK

2.51 Sir Robert May made this point clearly last year in a publication on GM crops: "There are real social and environmental choices to be made. **They are not about safety as such, but about much larger questions of what kind of a world we want to live in**"[23].

In Select committee on Science and Technology Third Report
Science and Society, 2000

「この論争は安全性についてなどではなかった。それよりもっと大きな問い、つまり我々はどんな世界に住むことを欲しているかをめぐるものだった。」

Living after 3.11

- No zero risk=no zero probability of failure
 - Who decide where to draw a line between significant probability and negligible probability?
 - No assurance of success
- Toward rational failures(=the least regret)
 - Mobilizing the best experts; how?
 - How to settle on the best solution
- Risk: multi dimensional concept
 - Not only risk is a matter
 - “What kind of a world we want to live in”

how can citizen understand and accept that we cannot but make the best effort and it may be the way to “rational failures” ?