Governing Nuclear Risk: The Interplay of Standardization and Improvisation

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1. Organizational theories of disaster, qualitative theories of risk
2. “Cultural” explanations for failure (Chernobyl, Fukushima)
3. Current common industry practices
4. Challenges for international governance of nuclear risk

Outline

- Normal Accident Theory
- High Reliability Organizations
- Normalization of Deviance
- Culture of Control

1.a Organizational Theories of Disaster

Normal Accident Theory

- Accidents as “normal” outcome of a system’s high complexity and tight coupling
- TMI as paradigmatic case (Perrow 1984/1999)
- Chernobyl was “an accident waiting to happen”

Organizations that have succeeded in "avoiding catastrophes in an environment where normal accidents can be expected due to risk factors and complexity."

High Reliability Organizations (1)

Characteristics:

- Preoccupation with failure
- Reluctance to simplify interpretations
- Sensitivity to operations
- Commitment to resilience
- Deference to expertise

High Reliability Organizations (2)

Diane Vaughan (1996)

- "Dark side of organizations": mistakes, misconduct, disaster
- When "deviant" behavior is no longer recognized as such
- Significance of hindsight
- History *as* cause

Normalization of Deviance

Constance Perin (1998, 2005)

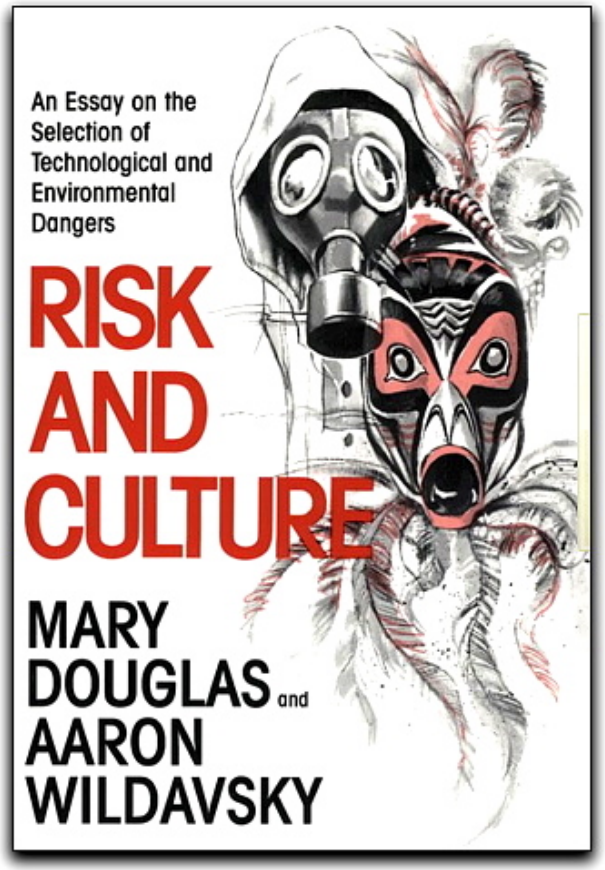
- Limitations of written rules
- *De facto* constant work-arounds
- Trend toward standardization

Joy Parr (2006, 2010)

- Self-awareness
- Understanding reasons for rules

Culture of Control

- Cultural Theory of Risk



1.b Qualitative Studies of Risk

- Cultural Theory of Risk
- Risk Society

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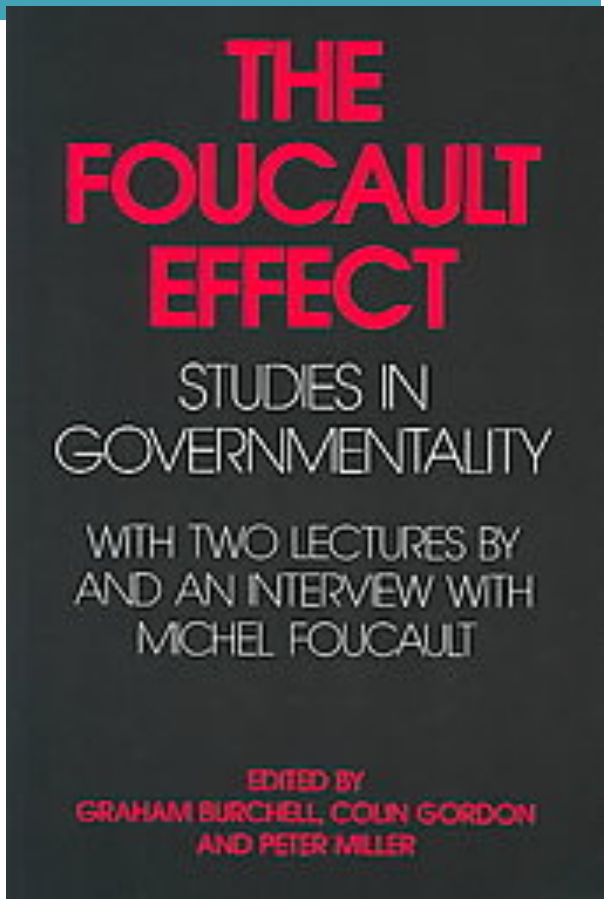

1.b Qualitative Studies of Risk

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1.b Qualitative Studies of Risk

- Soviet officials in 1979: “TMI could have never happened here.”
- U.S. officials in 1986: “Chernobyl could have never happened here.”
- International summary of Japanese accident investigation reports: “made in Japan.” (in other words, “could have never happened here”)

2. Cultural Explanations for Failure

Standardization

Organizational transformation of global nuclear industry after Fukushima

- FLEX
- “Stress tests”

3. Current Common Practices

- A “diverse and flexible coping capability” addressing loss of power and reactor cooling capability
- Stationing vital emergency equipment — generators, battery packs, pumps, air compressors and battery chargers — in multiple locations *and* “secure offsite locations”
  - Portable equipment providing power and water
  - Reasonable staging & protection of portable equipment
  - Procedures for ER personnel use of FLEX capability
  - Programmatic controls to assure viability and reliability of FLEX capability (maintenance, testing, training)

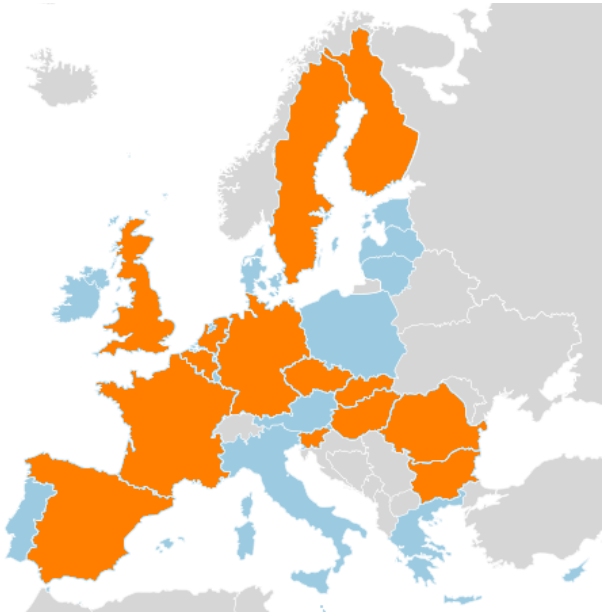
FLEX


REGIONAL CENTERS
2

“Stress Tests” (1)

Post-Fukushima European Council mandates

- Carry out EU-wide comprehensive risk and safety assessments of nuclear power plants (“stress tests”)
- Review legal and regulatory framework for safety of nuclear installations and propose improvements



Scope

- Initiating events (earthquake, flooding, other extreme natural events)
- Consequential loss of safety functions (electrical power, including SBO, UHS, combination of both)
- Severe accident management (protect and manage loss of core cooling function, of spent fuel pool cooling function, of containment integrity)

Results

- Recommendations: implementation left to national authorities
- “Technical fixes” to reduce risk of a nuclear disaster
- Miss social expertise and improvisational skills

“Stress Tests” (2)

- Global, trans-boundary dimension
- Traditional emphasis on risk *prevention*
- Continuing reliance on standardization
- Lack of effective global institutions
- Significance of *expert improvisation*

4. Challenges for Nuclear Emergency Response

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Thank you!

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