

# Information Quality, Risk Assessment, and Heresy

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# Eras of Risk Assessment

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- Heuristics
- Animal Data
- Human Data
- Uncertainty and Variability
- Information Quality

# Brief Tour of Information Quality

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- 'Information Quality Act' [44 USC 3516 note]
- Office of Management & Budget guidelines
  - Individual agency guidelines, establishing:
    - Pre-dissemination review systems
    - Administrative procedures for error correction
    - An independent appeal mechanism
- Indirect effects on 3rd party research
  - Increasing demands for public access to your data
  - Transparency and reproducibility are expected

# Information Quality

## Terms and Definitions

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- Utility
- Integrity
- Objectivity
  - Substance
    - “accurate, reliable, and unbiased”
  - Presentation
    - “accurate, clear, complete, and unbiased manner”
    - “within a proper context”
  - Procedure (transparency, reproducibility)

# Types of Information Quality Error

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## Substance

- Transcription
- Units
- Excess precision
- Misapplication
- Misuse
- Bias (not policy-neutral)

## Presentation

- Caveats omitted
- Sources omitted
- Context omitted
- Data/results censored
- 'Best' models only
- Bias (not policy-neutral)

## Procedural

- Non-transparency
- Irreproducibility

# Regulatory Checkbook Study of 5-Year Agency Performance

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## Procedural compliance

- Timely?
- Informative?
- Interpretively correct?
- Forgiving of limited sophistication?

## Substantive compliance

- Accurate: Is response true?
- Honest: Are legitimate complaints admitted?
- Responsive: Is the remedy reasonable?

# Agency Performance on the Least Demanding Procedural Index

Requests for Correction of Information Quality Errors, 2002-2007:  
Selected Agency Response Times (Days)

Agency	<i>N</i> Cases	<i>Avg</i> (days)	<i>SD</i> (days)	<i>Min</i> (days)	<i>Max</i> (days)	'Timely' (days)	% 'Timely'
HHS	33	171	128	35	605	60	12%
EPA	41	175	128	17	689	90	15%

# Agency Performance on the Least Demanding Substantive Index

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- Perchlorate Study Group petition
  - ‘Document A’ summarized new data & new analysis, neither of which were disclosed
  - Analysis could not be reproduced by 3rd party experts
- Response (10 months)
  - Transparency is not required for documents distributed for peer review if they have a disclaimer (why?)
  - ‘Document B’ had a disclaimer
- Appeal
  - ‘Document B’ disclaimer does not cover ‘Document A’
  - ‘Document A’ had no disclaimer
- Response to appeal (10 months)
  - We don’t have the data, we don’t have to show our work



# Agency Performance on the Least Demanding Substantive Index

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- US Chamber of Commerce petition
  - 16 agency databases & models contain phys/chem constants
  - They are not constant, differing in some cases by many 10x
- Response (7 months)
  - ‘Databases & models are in conformance with our guidelines’
  - ‘Some have been superseded’
- Appeal
  - ‘The Agency is using these superseded databases & models’
- Response to appeal (15 months)
  - ‘The Agency should continue to enhance its efforts to implement and improve policies and procedures for addressing life cycle management of data and databases’

# Why Is Performance So Bad?

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## □ Institutional

- Externally imposed
- Some errors are useful
- Acknowledging error increases litigation and compromises enforcement

## □ Legal

- Limited enforcement by OMB
- No enforcement by courts (so far)
- No Congressional oversight (so far)

# Why Risk Assessors Should Care

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- Plurality of error correction petitions involve risk assessments or data therein
- Many petitions allege risk is understated
  - Dept. Health and Human Services
  - Dept. of the Interior
  - US Army Corps of Engineers
- Some petitions seek the replacement of default assumptions with data

# Types of Bias

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## □ Incidental

- Not material to decision-making

## □ Unavoidable

- No model is perfect, data are limited and expensive

## □ Purposeful

- '2 + 2 = 5 for large values of 2'
- Best justification given: avoids false negatives
- Consequence: many false positives
- Conflates RA and RM functions, hides weights on errors
- Fundamentally incompatible with information quality

# An Example of Freely Advertised Purposeful Bias

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“EPA’s policy is that risk assessments should not knowingly underestimate or grossly overestimate risks. This policy position prompts risk assessments to take a more ‘protective’ stance given the underlying uncertainty with the risk estimates generated.”

U.S. Environmental Protection Agency Office of the Science Advisor. 2004. An Examination of EPA Risk Assessment Principles and Practices. Available: <http://www.epa.gov/osainter/pdfs/ratf-final.pdf>

# Can Information Quality Be Enforced?

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- Office of Management and Budget
  - Very limited staff, too many other duties
  - Few enforcement tools
- Courts
  - Unwilling (so far) to allow petitioners to challenge agency decisions
  - Case law is limited
- National Academy of Sciences?

# Information Quality and the *Red Book* (1983)

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- ❑ *Pentateuch* of risk assessment
- ❑ Only selected provisions are obeyed; flagrant sin continues unabated
- ❑ Later Scripture has not resolved fundamental controversies, and maybe added new ones
- ❑ Is it compatible with information quality, or is it heresy?



# Top 3 *Red Book* Recommendations

(A)	Agencies: ‘Establish and maintain a <u>clear conceptual distinction</u> between assessment and management’
(C)	Congress: ‘Establish a Board on Risk Assessment Methods’
(B)	??????: ‘Uniform inference guidelines be developed’



# Top 3 *Red Book* Recommendations: Where Are They Now?

(A)	Agencies: ‘Establish and maintain a <u>clear conceptual distinction</u> between assessment and management’	Dead. <u>Functional and organizational separation</u> instead, RA & RM intimately interwoven
(C)	Congress: ‘Establish a Board on Risk Assessment Methods’	Dead on arrival.
(B)	??????: ‘Uniform inference guidelines be developed’	Dead. Guidelines exist, conflict with (A), highly resistant to new science

# Top 3 *Red Book* Recommendations: What Happened?

(A)	Agencies: ‘Establish and maintain a <u>clear conceptual distinction</u> between assessment and management’	Incompatible with internal agency interests
(C)	Congress: ‘Establish a Board on Risk Assessment Methods’	No interest in delegating RM decision-making to NAS
(B)	??????: ‘Uniform inference guidelines be developed’	Too clever by half; Incompatible with balancing ‘Factions’

# James Madison, Risk Management Expert

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“By a faction, I understand a number of citizens, whether amounting to a majority or a minority of the whole, who are united and actuated by some common impulse of passion, or of interest, adversed to the rights of other citizens, or to the permanent and aggregate interests of the community.”

-- Federalist #10, November 22, 1787

# James Madison, Risk Management Expert

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“There are again two methods of removing the causes of faction: the one, by destroying the liberty which is essential to its existence; the other, by giving to every citizen the same opinions, the same passions, and the same interests.”

# James Madison, Risk Management Expert

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“It could never be more truly said than of the first remedy, that it was worse than the disease. Liberty is to faction what air is to fire, an aliment without which it instantly expires. But it could not be less folly to abolish liberty, which is essential to political life, because it nourishes faction, than it would be to wish the annihilation of air, which is essential to animal life, because it imparts to fire its destructive agency.”

# Why the *Red Book* Paradigm Cannot Succeed

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- ❑ The *Red Book* model seeks to suppress politics beneath the scientific ‘judgment’ of Great Men
- ❑ Exercising scientific ‘judgment’ is risk decision-making, even when Great Men do it
- ❑ Every Great Man belongs to a Faction
- ❑ Factions will not allow Great Men who belong to other Factions to make risk decisions for them

# Why the Information Quality Paradigm Could Succeed

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- It takes *Red Book* Recommendation #1 to the next level
  - Science is science, and policy isn't
  - If it's science, objectivity must be maximized
  - If it's policy, objectivity is irrelevant but it belongs in risk management
- It rewards growing scientific knowledge; defaults are regents, not kings
- Places accountability where it belongs