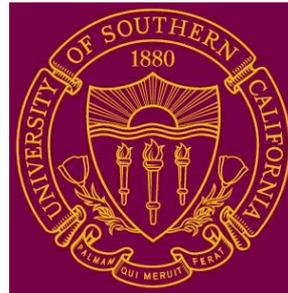


Uncertainty Analysis and Expert Elicitation: Comments

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IIASA



USC



LSE

EMF Workshop, Snowmass, CO, July 31, 2012

Types of Uncertainties

- Variability and heterogeneity
- Model and parameter uncertainty
- Deep uncertainty

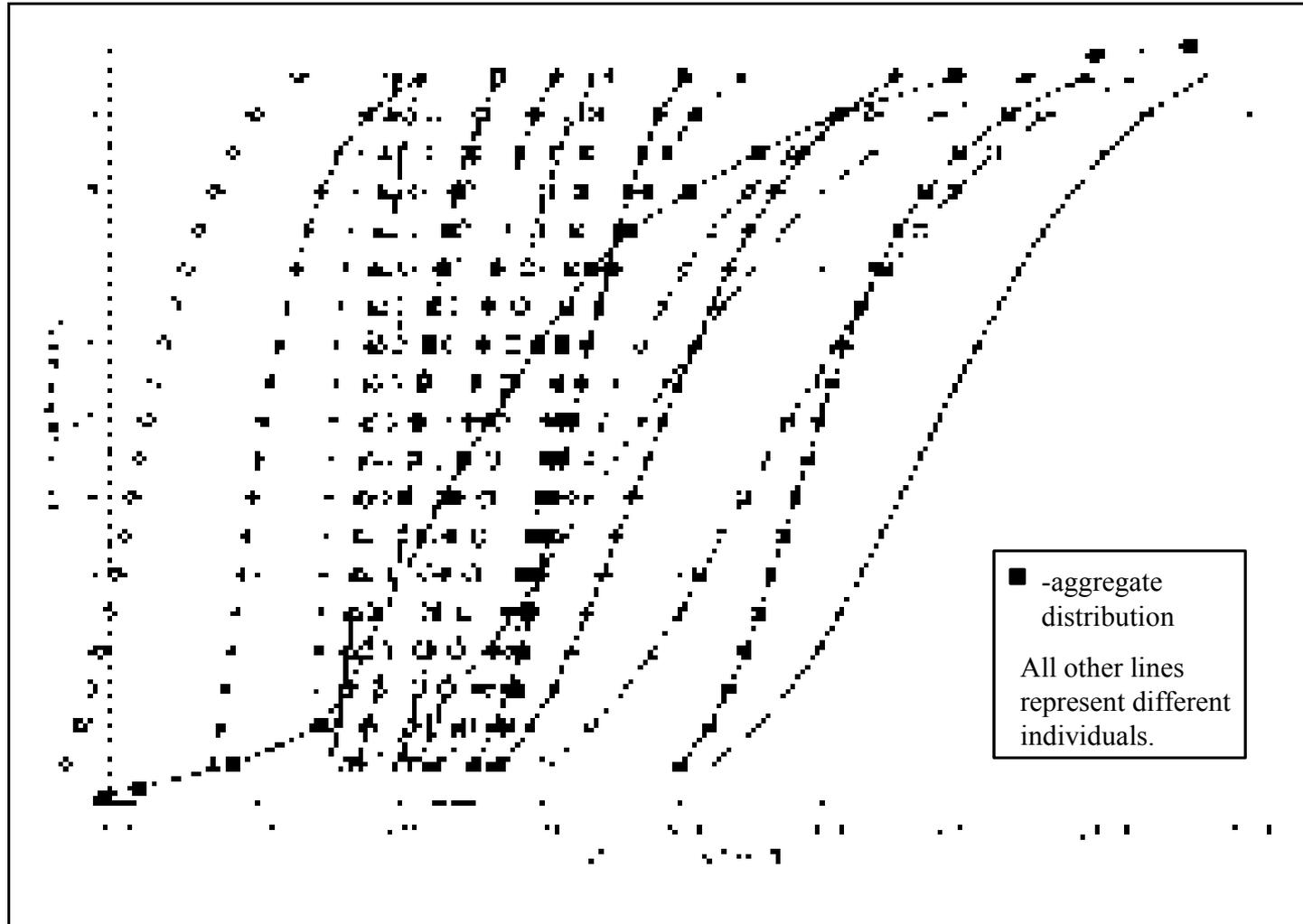
Formal Expert Elicitation

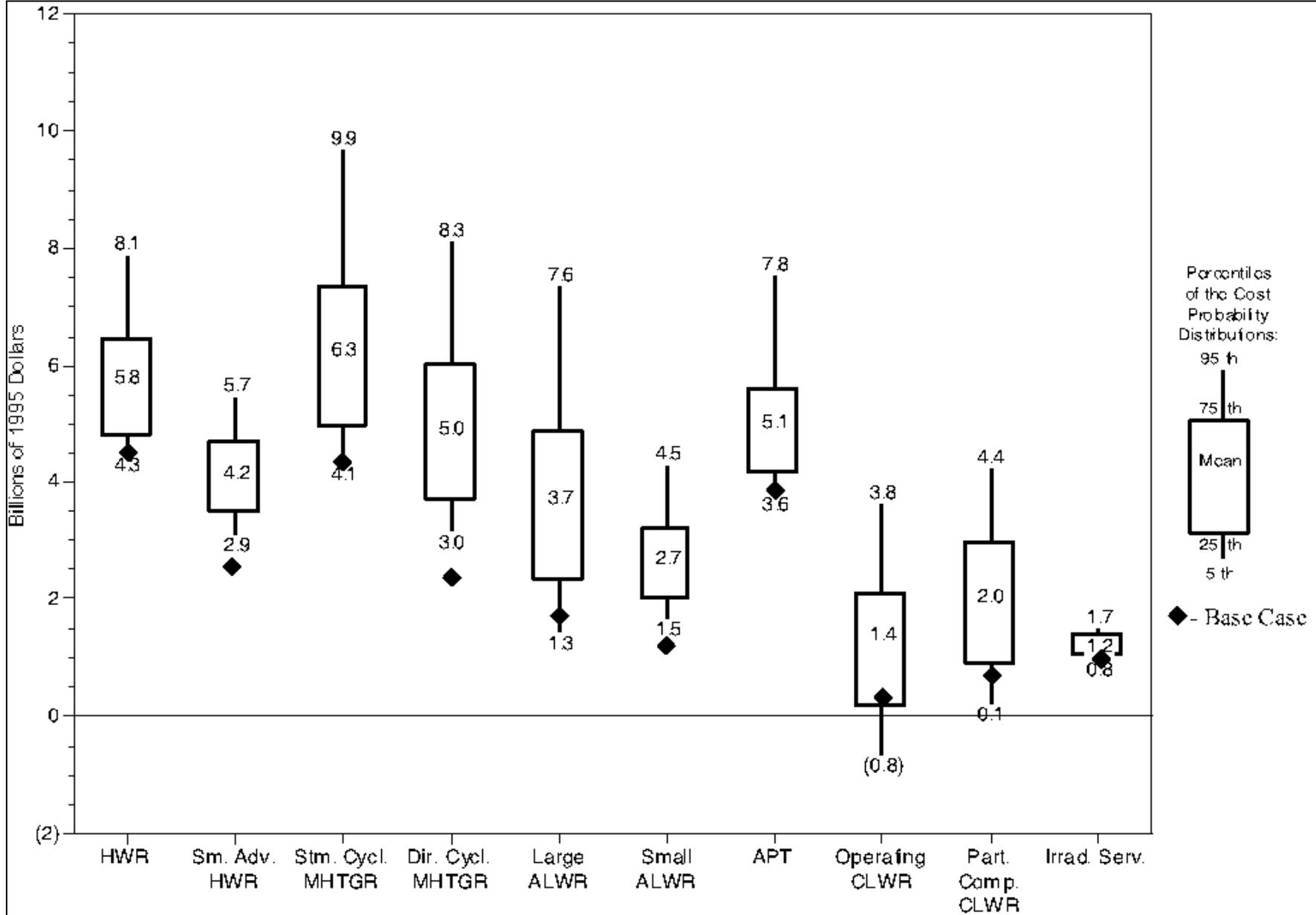
- Identify the issues
- Select experts
- Group activity 1
 - ❖ Clarify issues, assumptions, define events and variables, discuss literature
- Study period (individually)
- Group activity 2
 - ❖ Discuss findings, assumptions
 - ❖ Probability training, redefine events and variables
- Elicit experts (individually)
- Group activity 3:
 - ❖ Discuss results, disagreements
- Re-elicite, if necessary
- Aggregation across experts

Disagreement Among Experts

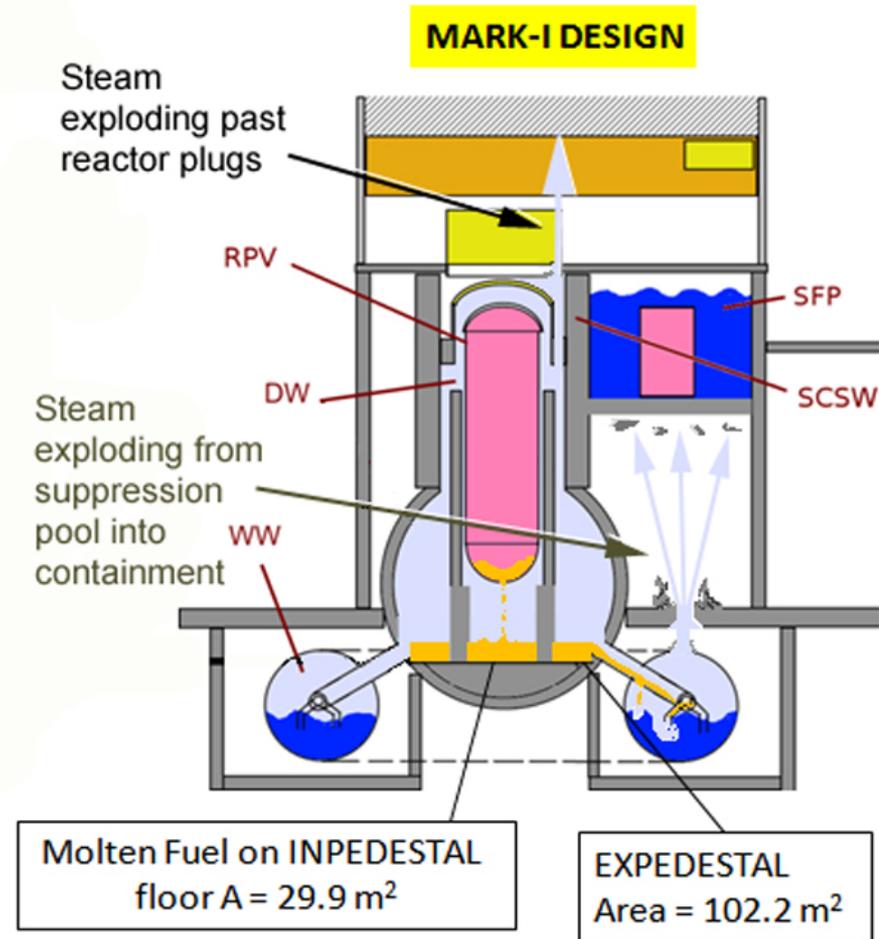
- Different assumptions
- Different disciplinary approaches
- Different models
- Motivational biases
- Cognitive biases

Estimates of Lifecycle Cost of an Accelerator





Steam Explosions in Nuclear Power Plants



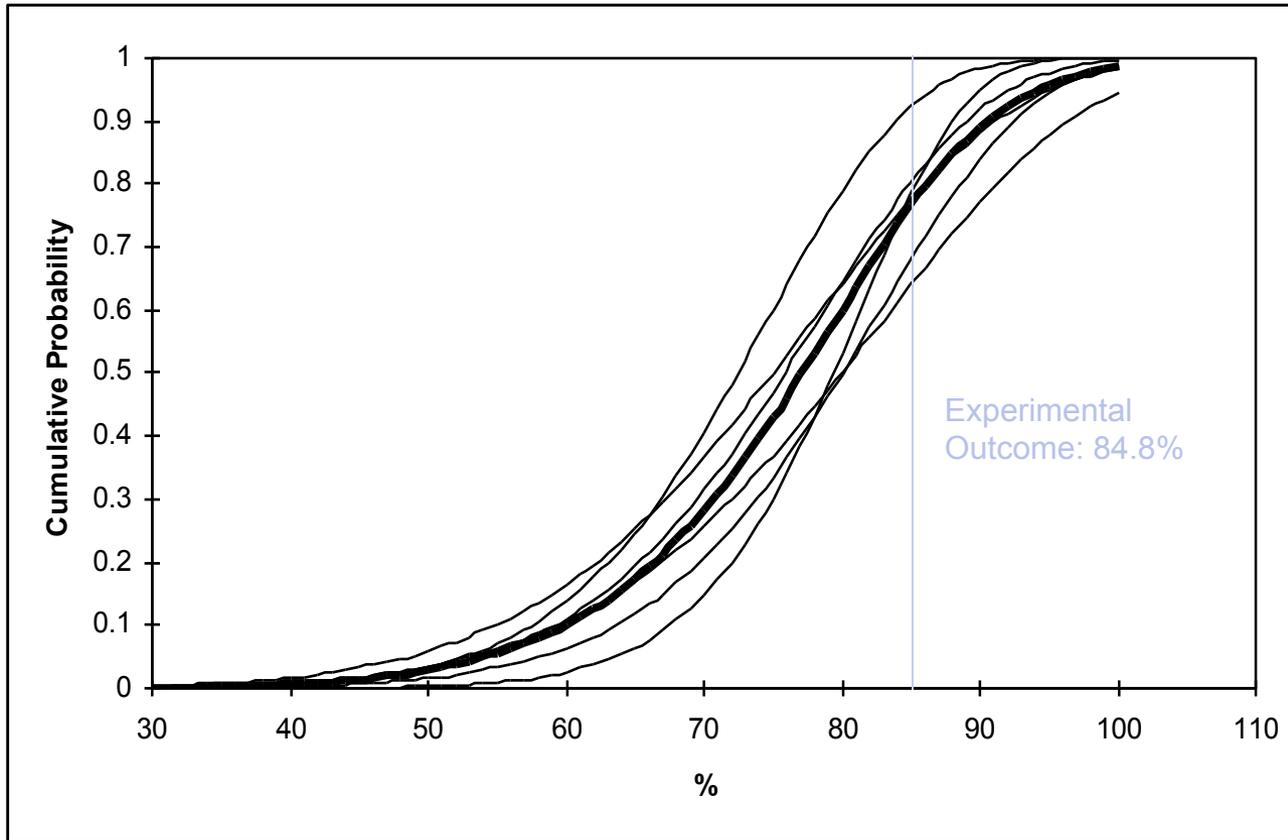
Variables to Predict

- ❖ Peak pressure at 0-3 sec (Mpa)
- ❖ Time to peak pressure (sec)
- ❖ Pressure at 15 sec (Mpa)
- ❖ Long term maximum pressure (Mpa)
- ❖ Time to long term maximum pressure
- ❖ Percentage of debris fragmented (%)
- ❖ Median diameter of fragments (mm)

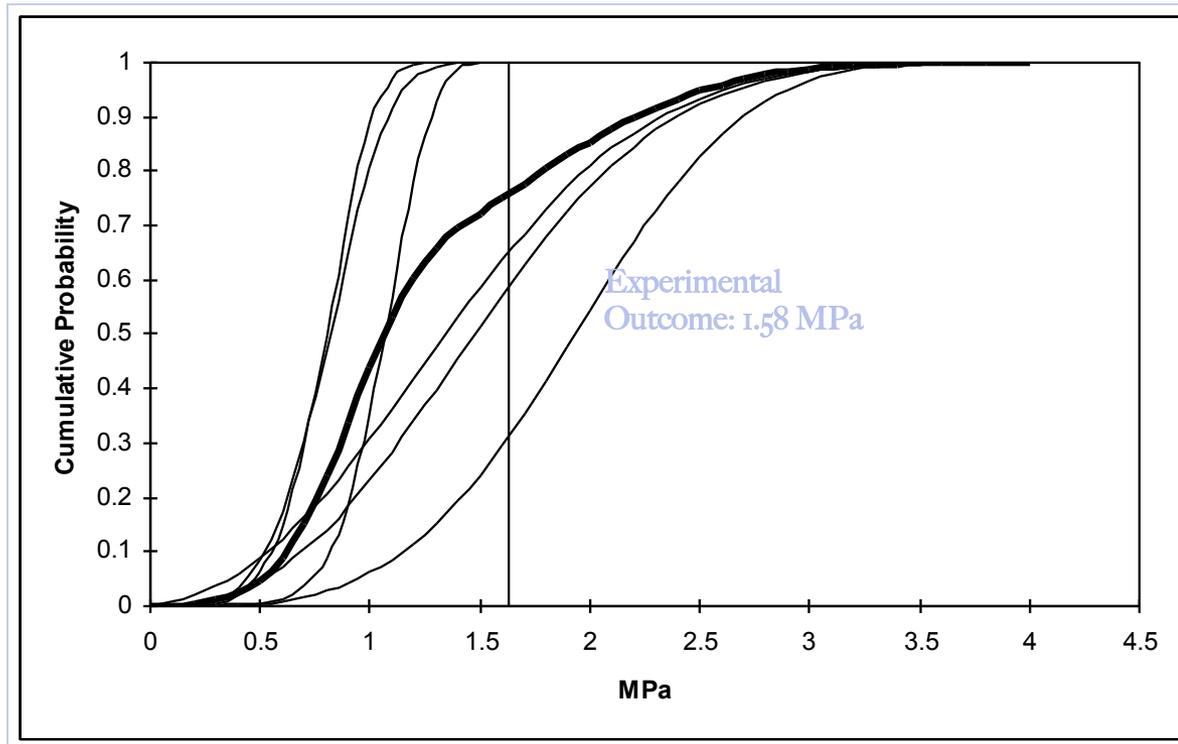
Team “USA”

- Six experts from five countries
- NUREG 1150 Protocol
- Pre-elicitation and training
- Study time (about 2 months)
- Elicitation
- Resolution of disagreements
- Final result by averaging six experts

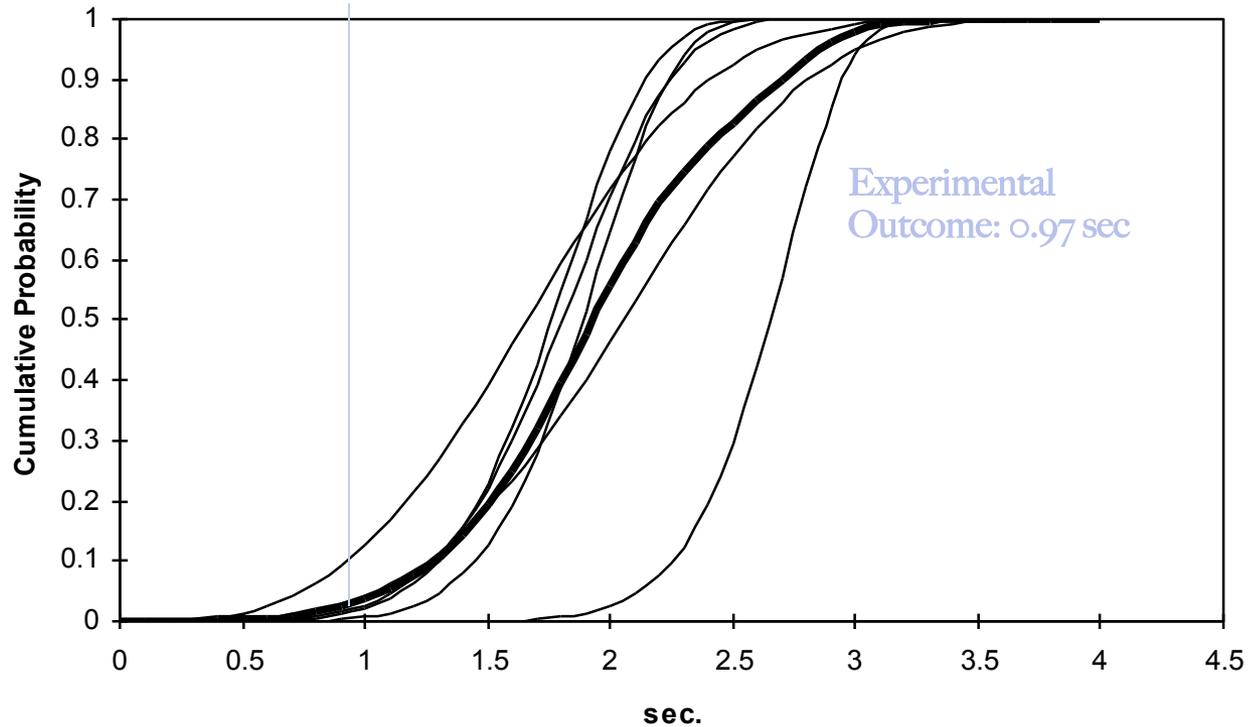
Percent Degree Fragmented



Peak Pressure at 0-3 Seconds



Time to Peak Pressure



Thoughts on Uncertainty Analysis and TEAM

- Focus on uncertainty or decisions?
- Disagreements in assumptions, models, metrics
- Clairvoyance test
- Issues in expert elicitation
 - ❖ Formal elicitation vs. collection of estimates
 - ❖ Technology preference bias
 - ❖ “Can do” bias
 - ❖ Overconfidence, availability, anchoring
 - ❖ Aggregation (not re: MegaJoule.org)
- Value of information
- Deep uncertainty?