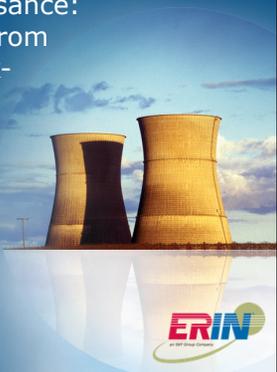


**Risk-informed Renaissance:
It's Time to Emerge from
the Dark Ages of Risk-
informed Regulation**

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Risk-informed Realities

- We were naïve
 - Extrapolating from internal events model experience led to overconfidence
 - Undue focus on numbers/reduced emphasis on insights
- If you haven't analyzed it, it doesn't mean the risk is zero
 - Some of you might have heard about an accident that happened in Japan a few years ago
- The uncertainties are real and unavoidable
 - Reliance on numerical mean values is not sufficient



Risk-informed Realities

- Conservatism not an antidote
 - Anathema for good risk-informed decision-making
 - Masks insights
- Reg. Guide 1.174 is right:
 - We must be risk-informed, not risk-based
- We need risk-informed decision-making now more than ever
 - Important decisions to make
 - Cannot afford another surprise
 - Industry financial pressures are very real

We have work to do



Why Do You Say "Dark Ages"?

- "Fukushima proves PRA can't be trusted"
 - Dangerous fallacy
 - Fukushima proved that PRA is an important safety tool
- Voluntary initiatives slowed to a crawl
 - Burden of Standards, Peer Review, etc. should be examined in light of benefit
- Conservative methods, e.g., applied to Fire PRA
 - Obscures the important contributors
 - Breeds distrust
 - Impedes good decision-making in applications
- Executive disillusionment with PRA
 - "Creates more problems than it solves"
 - "Too costly"
 - "Compliance is the 'easier' route"



The Value of PRA

- PRA provides a unique, integrated view of plant design, siting, and operation
- Requires integration of multi-disciplinary analyses:
 - Natural Phenomena
 - Plant Operations
 - Thermal-Hydraulics
 - System Design
 - Human Reliability
 - Equipment Reliability
- Extendable well beyond the design envelope
- Manages a nearly unlimited set of scenarios



The Value of PRA (Cont.)

- Model structure provides insights on systems and site interactions far beyond the go/no-go criteria of the design basis
- Likelihoods help us understand what may be more or less important, but should not be the sole basis for a safety decision
- Rare events/conditions considered in PRAs have irreducible uncertainties
 - Not a reason to ignore PRA
 - A reason to better understand these uncertainties that impact both deterministic and probabilistic approaches
- PRA is an indicator, not a measurement
 - Decision-making must account for this



Emerging from the Dark Ages

- Clarity on the need for PRA
 - Unanalyzed ≠ 0 risk
 - Another accident would be unacceptable
- Clarity on the role of PRA
 - PRA not PRA (don't over-emphasize the numbers)
 - A return to insights
 - Graded approach to assessing risks
- Clarity on the risk-informed decision-making process
 - Reconciliation of PRA and DID insights through an integrated decision-making process
- Education
 - PRA is a relative newcomer to safety decision-making
 - Few decision-makers have an appreciation for the strengths and limitations of PRA
 - Fewer still understand risk-informed decision-making



The Path to Renaissance

Objective	Proposed Actions	
	Industry	NRC
Gain a more complete and balanced understanding of important risk contributors	Continue development of more realistic and complete plant-specific PRAs	Move away from imbedding conservatism in PRA models - Starts with fire PRA
Clarify risk-informed decision-making process that can deal with uncertainties	Propose a practical integrated decision-making process	Adapt/adopt a practical integrated decision-making process consistent with RG 1.174
Educate decision-making stakeholders on risk-informed decision-making	Provide focused PRA training to industry staff and decision-makers	Provide focused PRA training to NRC staff and decision-makers
Develop technical resources to support better risk-informed understanding	Expand EPRI/OG commitment to training and technology	Expand training on truly risk-informed decision-making



Summary

- Reclaiming the promise of risk-informed decision-making is not an option, it is essential to the viability of nuclear power
- Many lessons-learned to build from
- Both industry and NRC must examine their contribution to the Dark Ages
- Both industry and NRC must work to achieve the needed Renaissance

Let's get to work!