Uncertainty in IRP: Common Pitfalls and Best Practices

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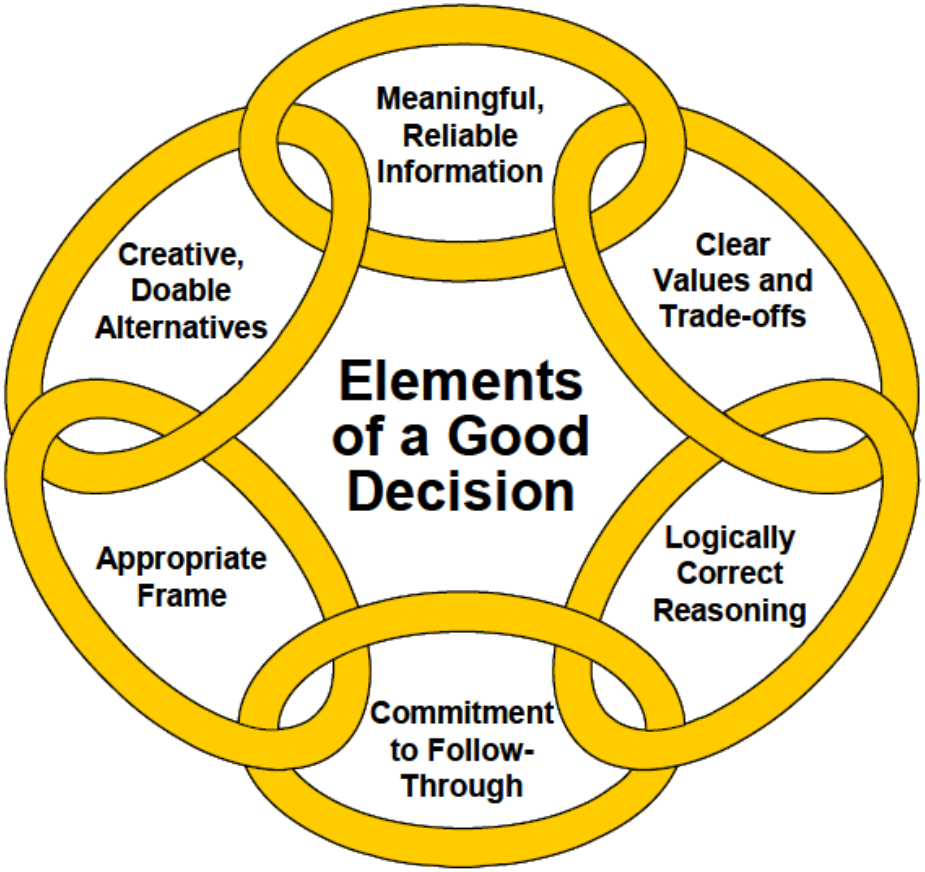
Better plan = better decisions

- "Decision Quality" can provide a best practice checklist for an Integrated Resource Plan.



Carl Spetzler, *Building Decision Competency in Organizations*, Advances in Decision Analysis, 2007.

Information

- Uncertainty is a state of information not a state of nature
- Probability is simply a formal (explicit and precise) way of conveying your state of information
- A common pitfall in IRP is to limit rigorous analysis to uncertainties where there is hard data; this misses some of the biggest factors
  - Technology change, market disruption, federal/state politics, environmental regulation
- A best practice is to recognize the subjective nature of uncertainty, and adopt rigorous methods for dealing with judgment
- Experts (both internal and external) have a critical role in providing these judgments; stakeholders (including utility executives and regulators) have a critical role in identifying these experts and in evaluating their judgment

Values

- Metrics are critically important in uncertainty analysis but must be selected and used carefully
- Multi-attribute utility theory (MAUT) provides a good guide to selecting, defining, and scaling metrics
- Some standard risk metrics may not be suitable for IRP
  - Problematic: Standard deviation, 10-90 range, 90-mean range, scenario-by-scenario difference (regret)
  - Recommended: 90th percentile (tail) value, expected tail value

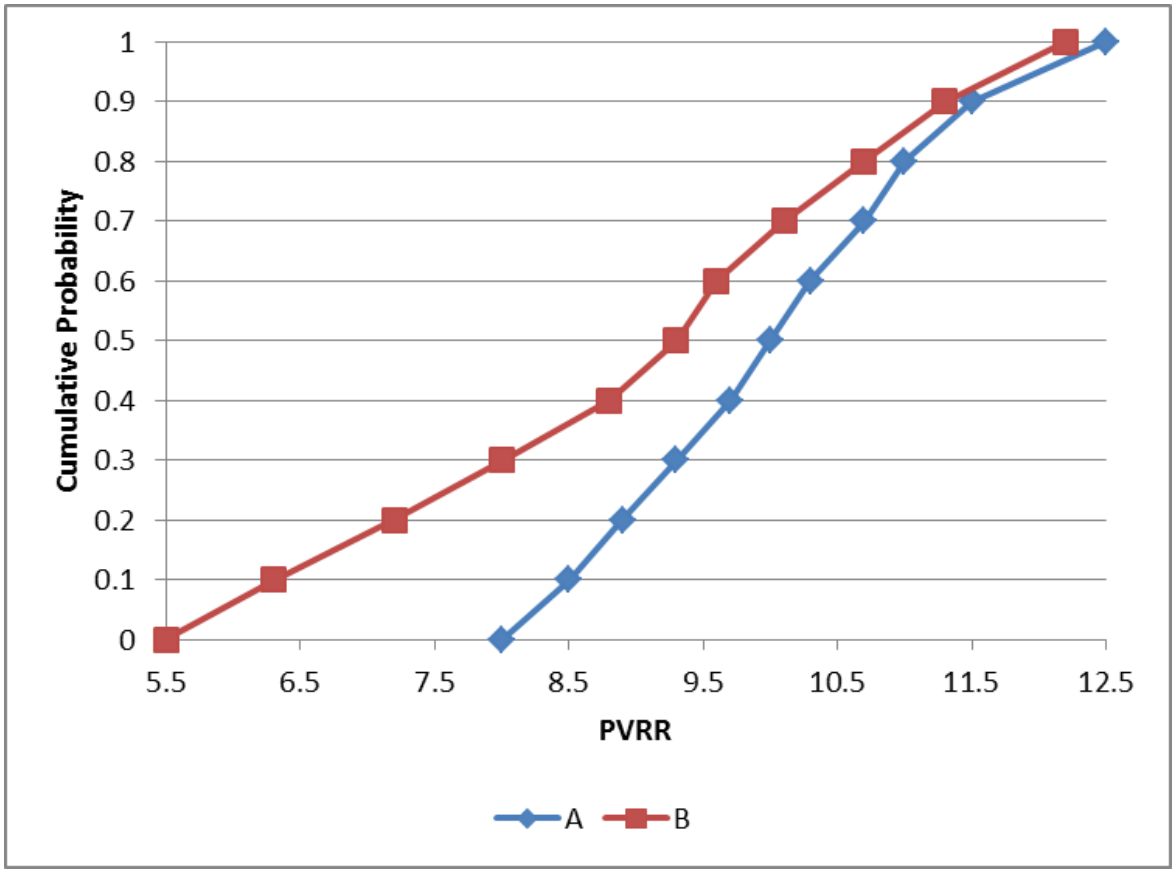
Risk Metrics - Demonstration

- Consider the following two resource plans (assuming all impacts are identical other than PVRR)

Resource Plan	PVRR Mean	PVRR 10-90 range
A	$10 billion	$ 3 billion
B	$9 billion	$ 5 billion

Risk Metrics - Demonstration

- Plan B dominates Plan A; it has a lower cost in all possible futures. There is no mean/risk tradeoff.



Logic

- Expected value is a powerful concept
  - $EU_v = \sum_i p_i v_i$
    - p_i is probability of scenario i
    - v_i is value of strategy v in scenario i
- Thinking about the probability of scenarios is important
- Other approaches make hidden assumptions about equal probability or reasonableness