



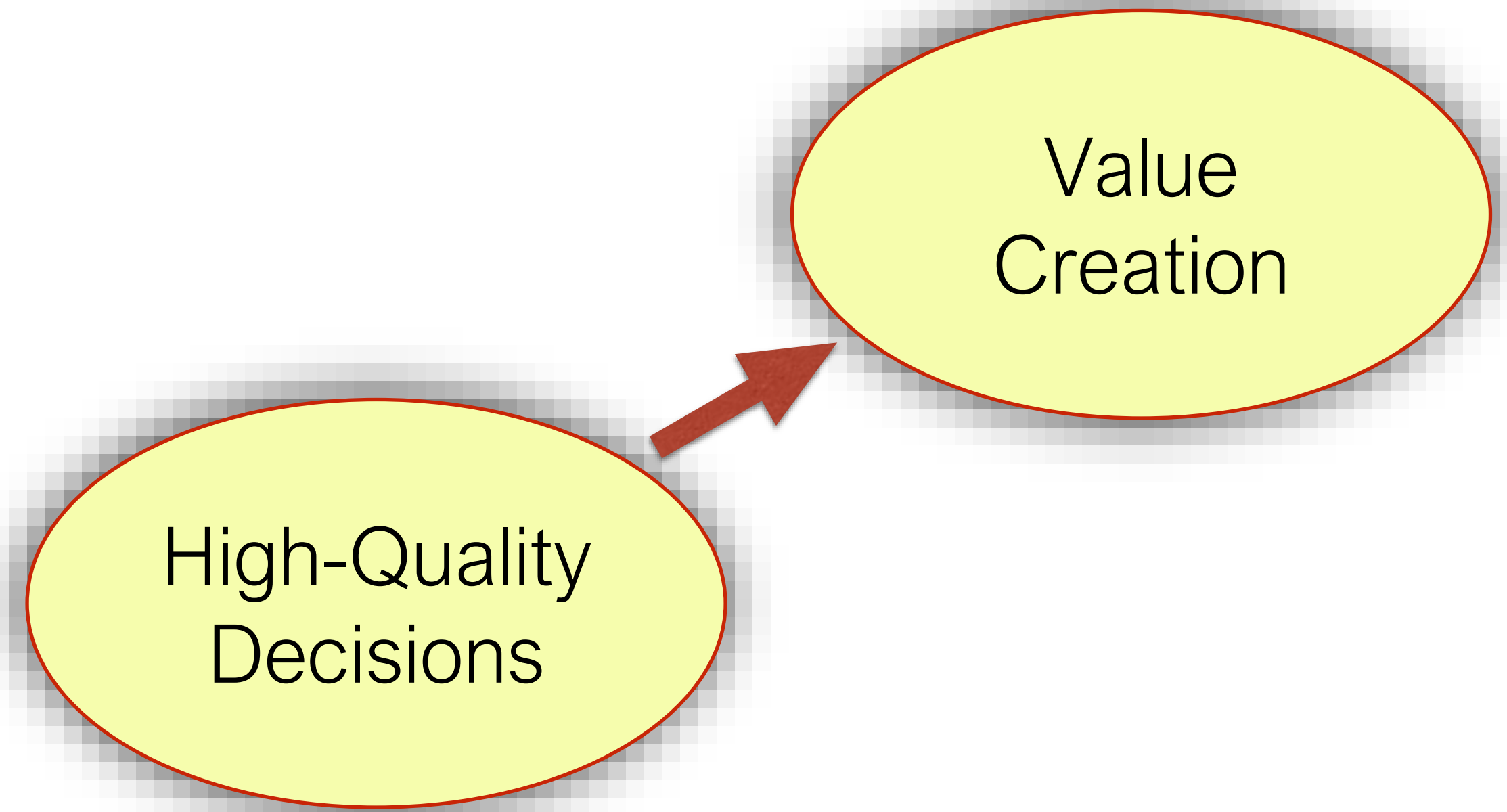
University of
Stavanger

Would You Know a Good Decision if You Saw One?

Reidar B Bratvold

University of Stavanger

The Only Way We Can Purposefully Create Value is Through Our Decisions



RE

Is this statement correct?

The only way we can purposefully create value is through our decisions

Nov. 30, 2022



Yes, the statement "the only way we can purposefully create value is through our decisions" is generally considered to be correct. Value creation is the process of increasing the value of something, whether it is a product, service, or asset. This can be achieved in many ways, such as through innovation, efficiency improvements, or cost reductions.

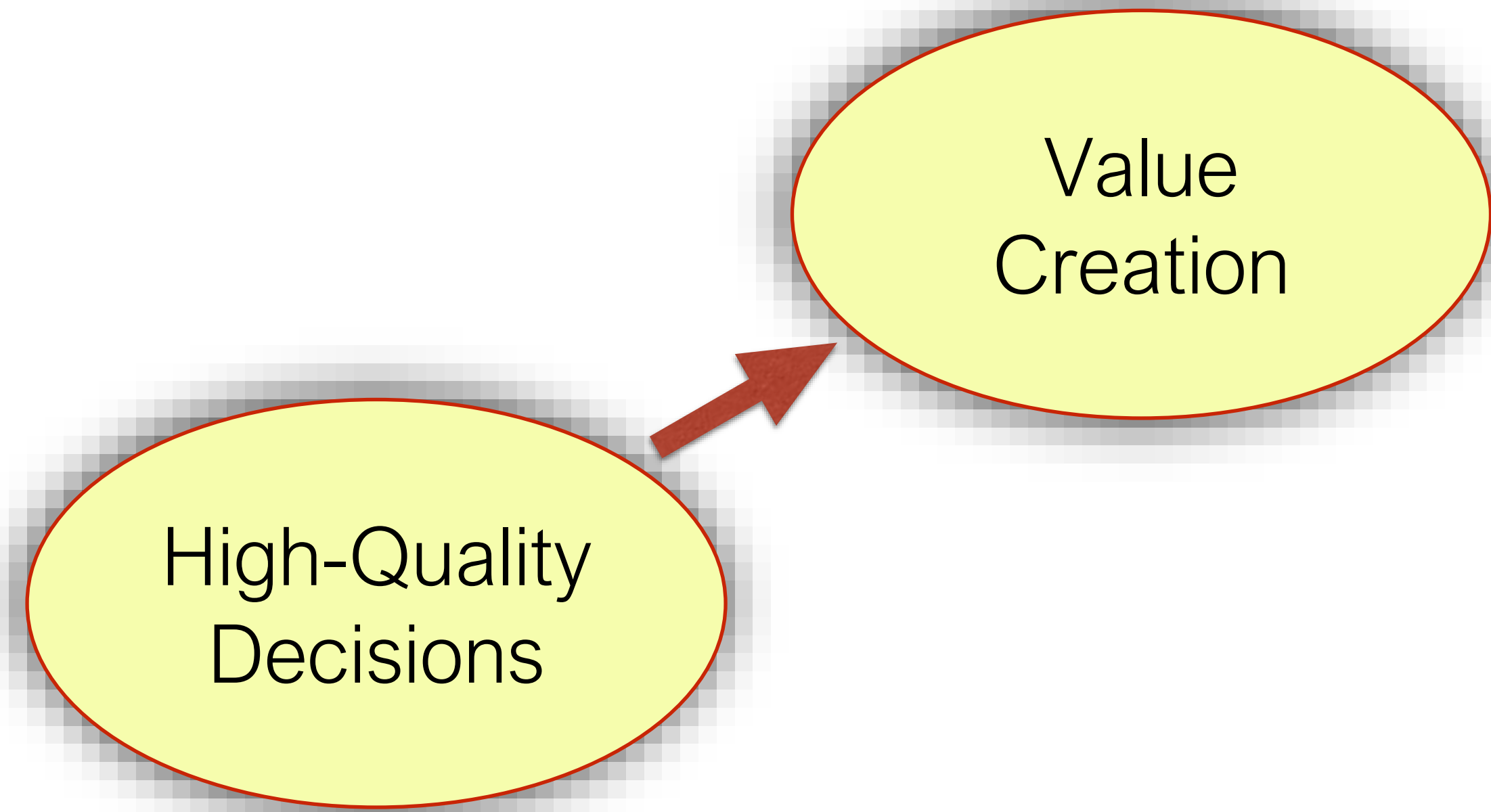
However, all of these strategies ultimately depend on the decisions made by individuals and organizations. Decisions about where to invest resources, how to allocate capital, and how to manage operations all play a critical role in creating value.

Therefore, it can be said that the only way to purposefully create value is through the decisions we make. This emphasizes the importance of effective decision-making processes in organizations and the need for individuals to make informed and thoughtful decisions in their personal and professional lives.

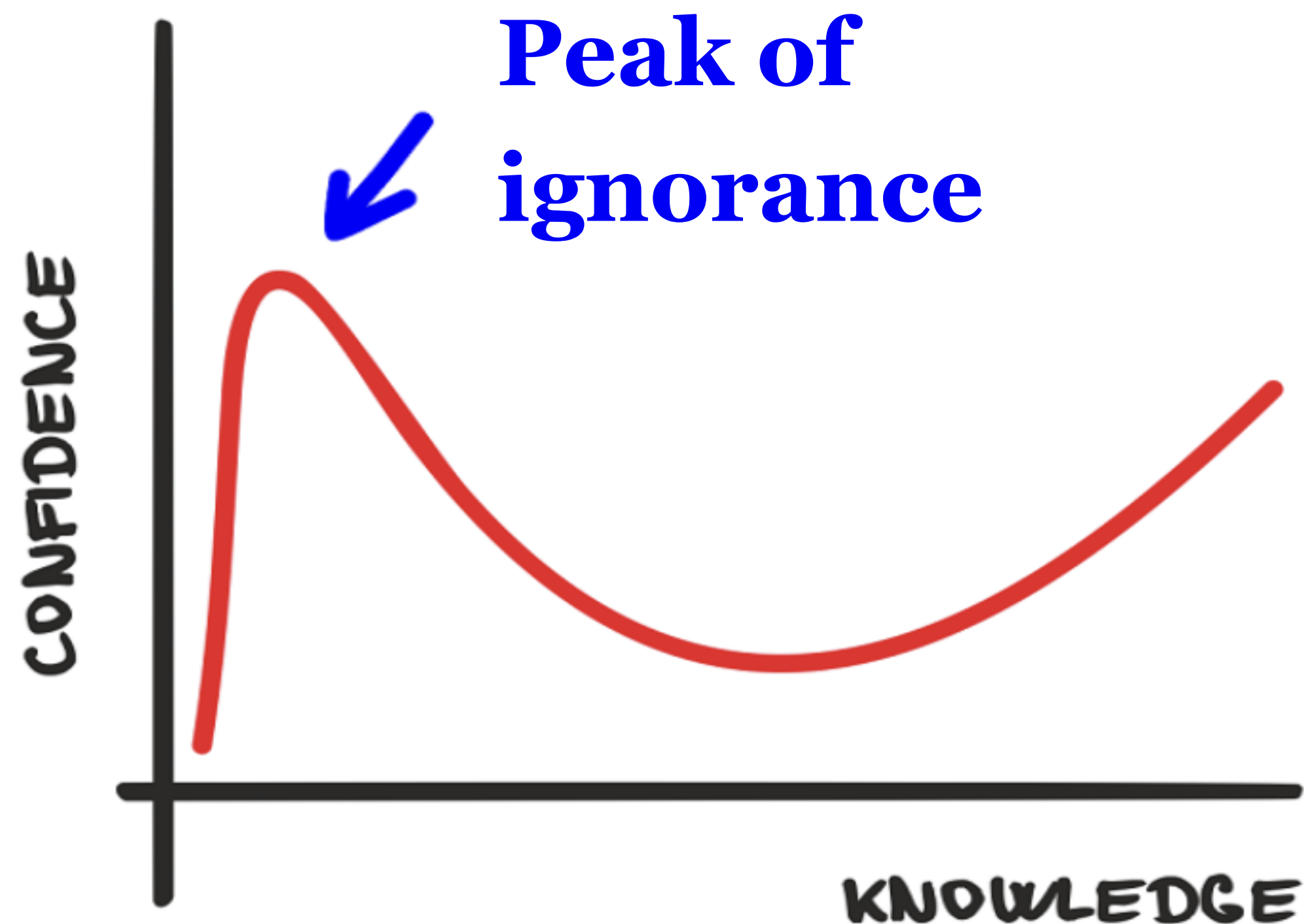


The Only Way We Can Purposefully Create Value is Through Our Decisions

- The only control an organization has over its future is its decisions!
- The rest depends on things it cannot control:
 - decisions of others, “nature”, chance, ...
- And the same applies to our personal futures!



We Tend to Believe our Decisions are Much Better Than They Actually are



Unskilled and unaware of it

Illusion of Decision Quality (DQ)

- When executives are asked to rate the quality of their decision on a scale of 0 to 100%,
- They typically rate themselves between around 80%
- The gap between the initially perceived DQ and the actual DQ is about 55%

Leads us to believe that our decisions are of much higher quality than they actually are

What is a Good Decision?

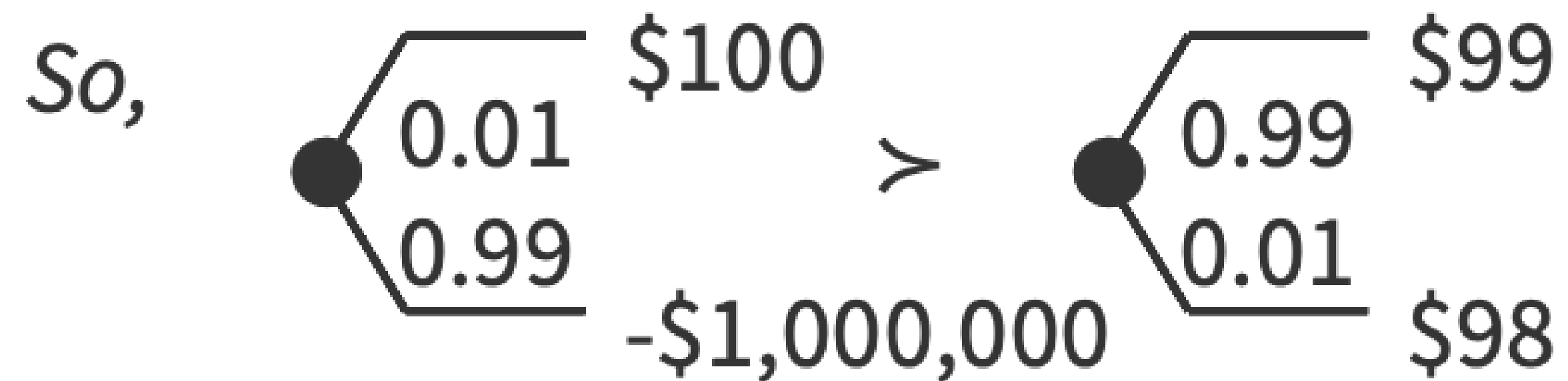
Definitions offered at a recent workshop:

- “A *good decision* is one that produces a *good outcome*”

What is a Good Decision?

Definitions offered at a recent workshop:

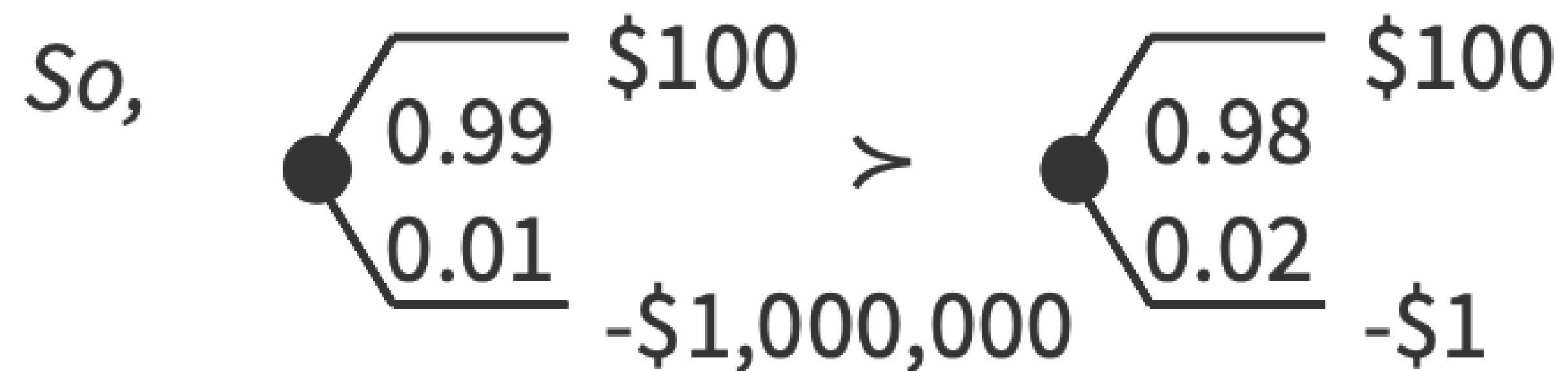
- “A *good decision* is one that has the *highest chance of getting the best outcome*”



What is a Good Decision?


Definitions offered at a recent workshop:

- “A *good decision* is one that has the *lowest chance of getting the worst outcome*”



We Must Separate Decisions and Outcomes

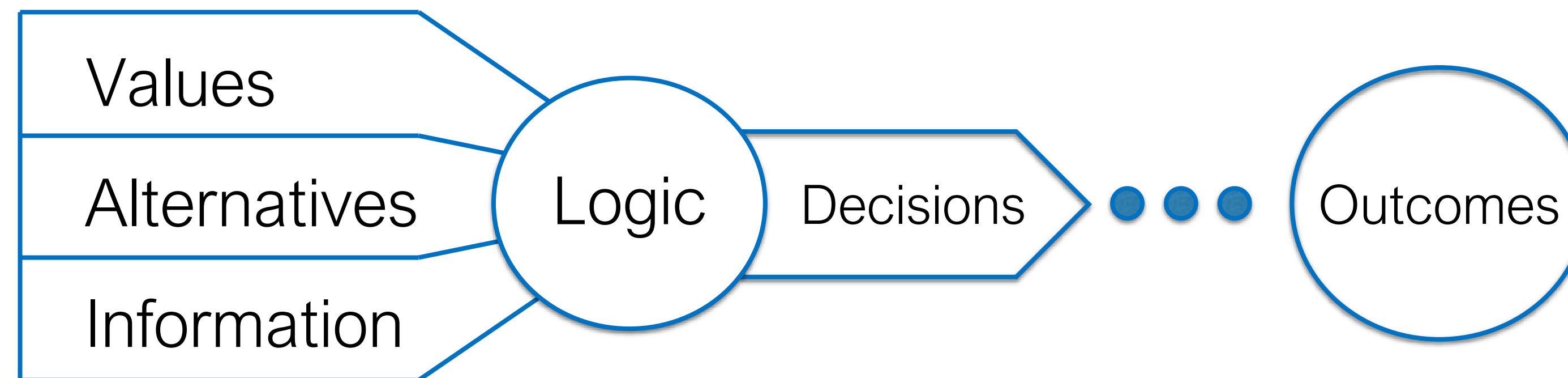
Quality of the Outcome

		GOOD	BAD
Quality of the Decision	GOOD		Bad Luck
	BAD	Luck	Justice

All we can control is what row we are in – nature (or others) will choose the columns

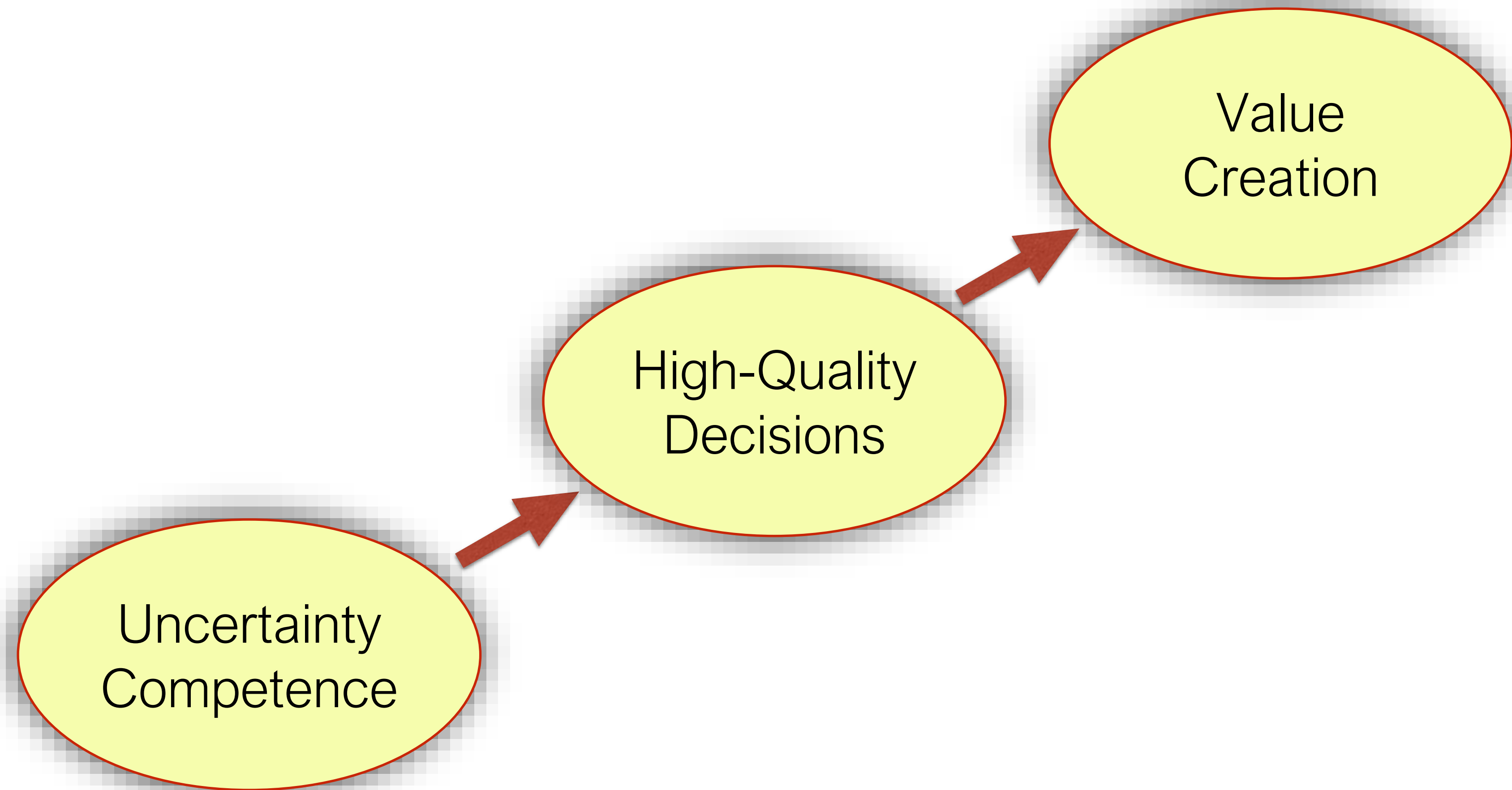
What is a Good Decision?

- A good decision is a **rational** decision – a decision that is consistent with the decision maker's alternatives, information, and preferences
- Therefore, we need to ensure that we have built quality into the **content** of the decision, which we call the **decision basis**

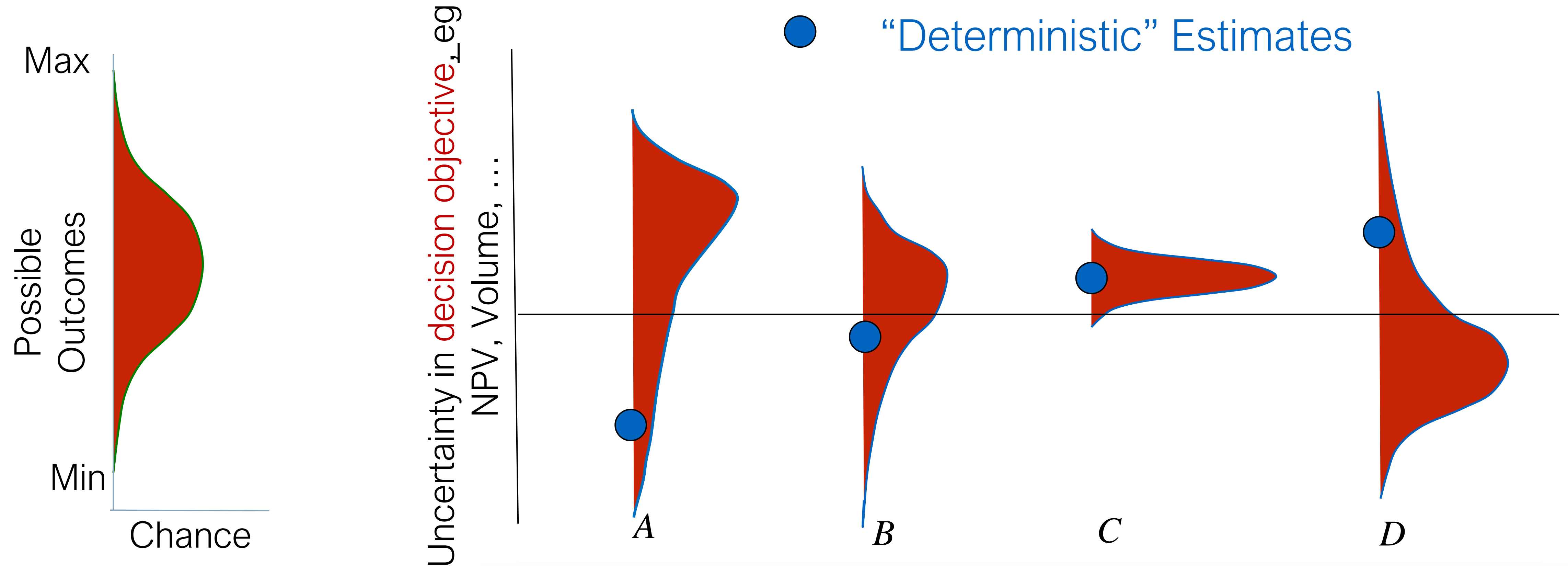


- Not all decision-making procedures will produce results that are consistent with the decision maker's preferences (e.g., risk matrices, AHP, etc.)
- Together, these elements define the problem we are trying to solve and how to solve it

You can't make good decisions without embracing uncertainty



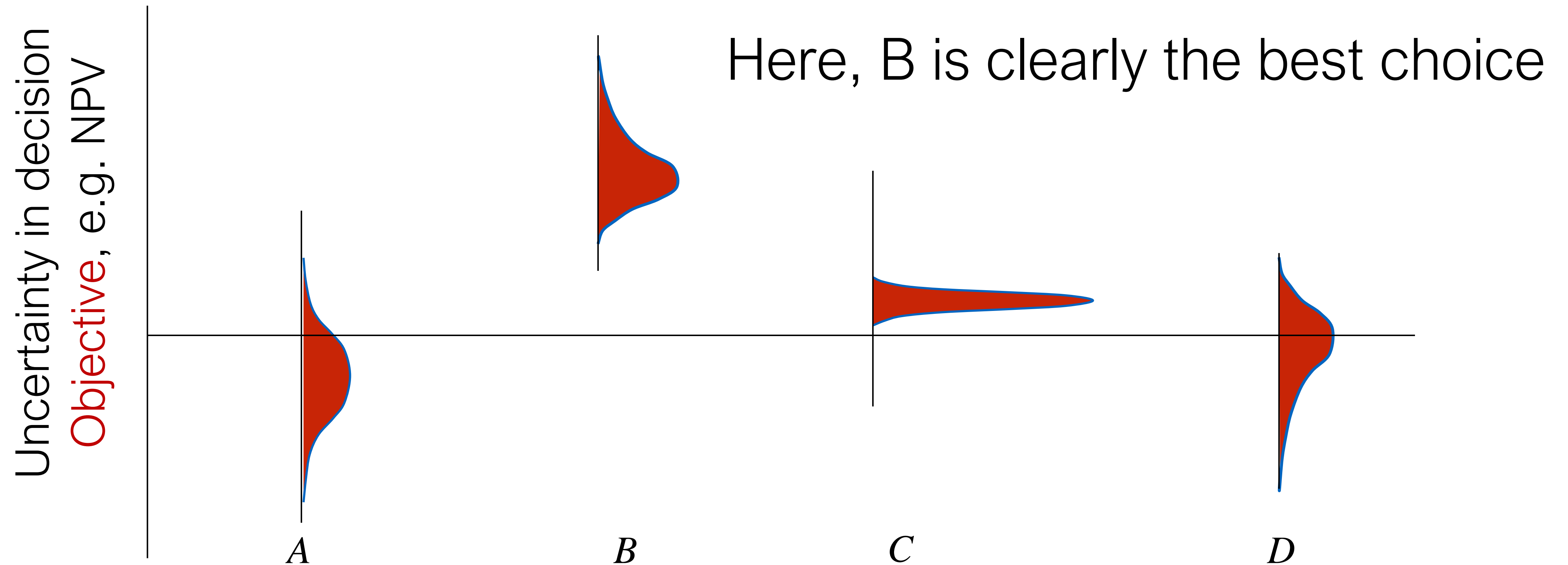
Decision-Making is About Ranking Alternatives



In absence of an assessment of the uncertainty: **worse than useless!**

Decision-Making is About Ranking:

Case 1: we don't even need a decision criterion

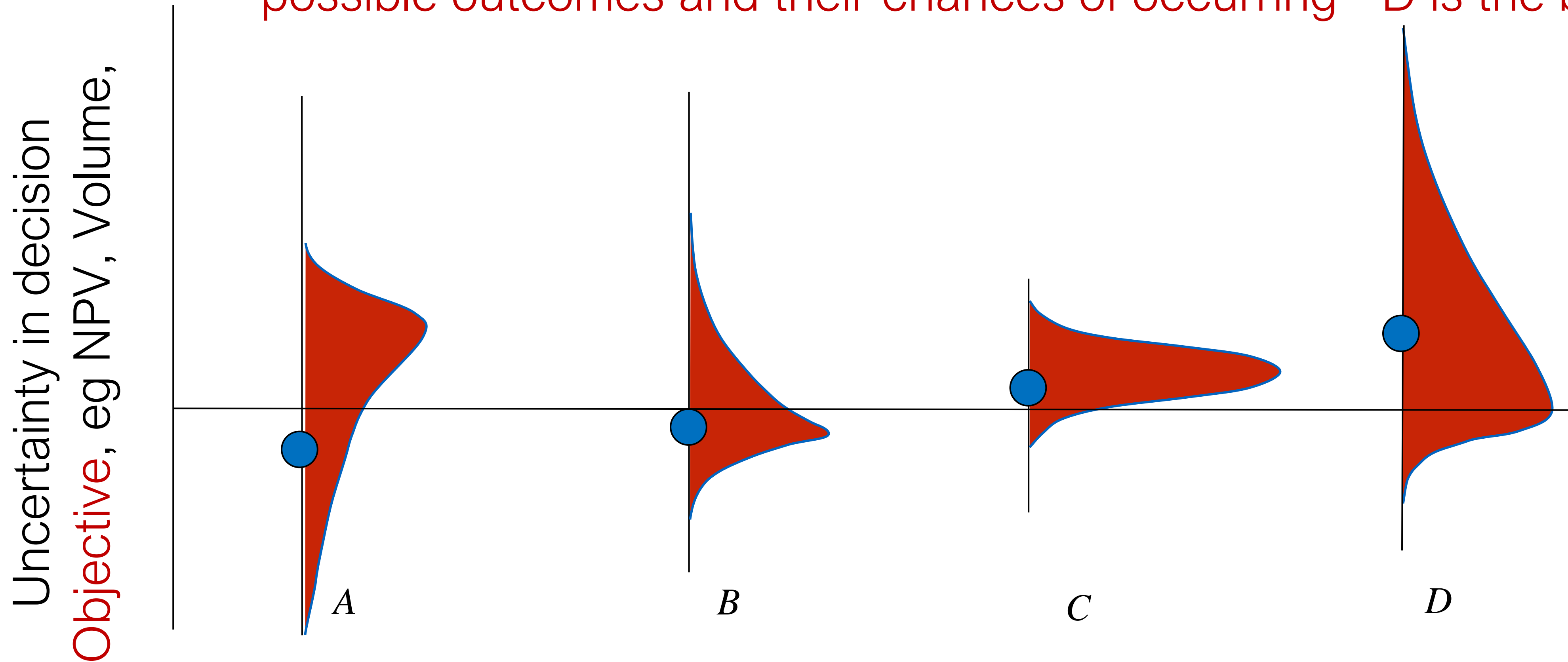


We only need to predict objective values precisely enough to determine which is the best alternative!

Decision-making is about Ranking:

Case 2: need a “Decision Value”

- “Decision Value” – captures DM’s view of value based on all possible outcomes and their chances of occurring - D is the best



You can be sure about what to do without knowing what will happen!

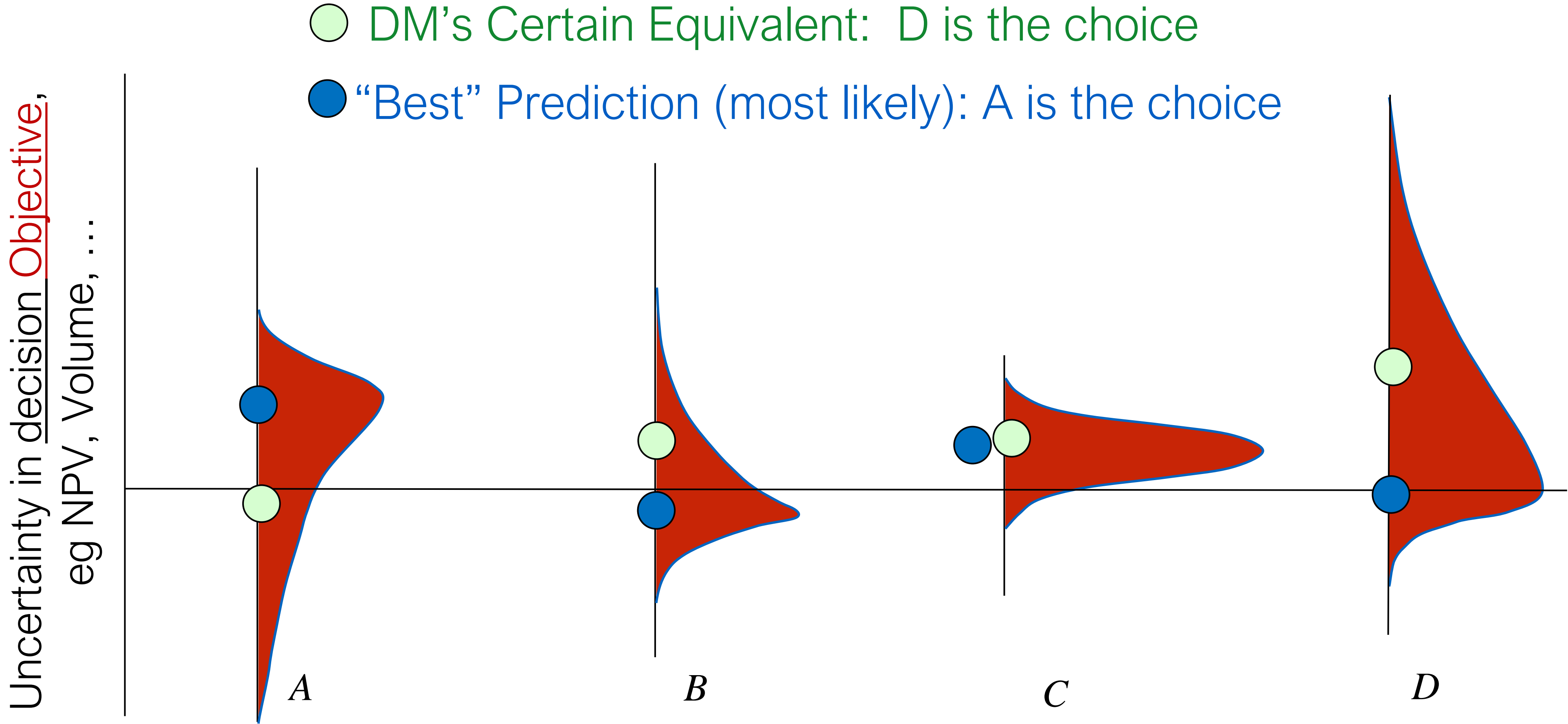
What value should we use to represent the uncertain situation? It's **Certain Equivalent (CE)**

- Some decision makers (DM) **mistakenly** think they need a “best prediction”, or be reasonably sure of the outcome - what they really need is a “best decision value”
- The x-axis of the PDF is the **prediction**, (of all possible outcomes) for a given alternative
 - the mode is the “**Most Likely**” outcome, often considered to be the “**best**” prediction
- The “decision value” is the DM’s **Certainty Equivalent (CE)**:



The number such that the DM would be **indifferent** between:
getting it for **sure** or accepting the outcome of the real **uncertain** situation

Avoiding Confusion: Best Prediction vs Certain Equivalent



The CE is applied to uncertainty in a decision-objective
(not input uncertainties)

A Common Certain Equivalent*: Expected Value

- The probability-weighted sum of the possible outcomes of a decision objective

$$\text{Expected value (EV)} = \sum p_i x_i$$

- Expected Value intuitively
 - defines what would happen “on average” if we repeated the situation
 - but, multiple decisions not required - EV is optimal* for a single decision
 - no other value measure (best estimate, P10/50/90, etc) will yield a higher total outcome over multiple decisions
 - EV* (or CE) represents the value of uncertain situation to the decision-maker, it is not a prediction of what will happen,
 - in general, it is not even be a possible outcome
- so don't “expect” the Expected Value! (or Certain Equivalent)

*for risk-neutral decision-maker - reasonable for most decisions

A Common Certain Equivalent*: Expected Value

- The probability-weighted sum of the possible outcomes of a decision objective

$$\text{Expected value (EV)} = \sum p_i x_i$$

- To get EVs (CEs) we need to know all possible outcomes of the decision objectives (e.g. NPV, Reserves) and have **unbiased** assessments of their probabilities
 - typically by **propagating** uncertainty in parameters/variables we can assess possibilities and probabilities, using a “model”, to get the PDFs of interest
 - in general, it is not even be a possible outcome
- so don't “expect” the Expected Value! (or Certain Equivalent)

*for risk-neutral decision-maker - reasonable for most decisions

Technical Work in the context of Decisions and Uncertainty: Knowing when enough is enough

The main role of a Geoscientist, Engineer, Economist
... is to support decision-making

- At its core, the purpose of data and information gathering and technical work is for uncertainty assessment to help make decisions
- First priority: Accurate (=unbiased) uncertainty assessment
- Second priority: Uncertainty reduction (if its worth it)
 - but if you have a “make the best possible prediction” focus, there is no stopping rule
 - you can always reduce uncertainty a bit more (more data, more time, more detail, more physics/geology, more analysis, ...)
- A decision-driven (ranking!) focus gives a trivially simple stopping rule:
 - Stop when further analysis / detail doesn't change the decision!!