



Decisions Under Uncertainty

Module 1: Introduction

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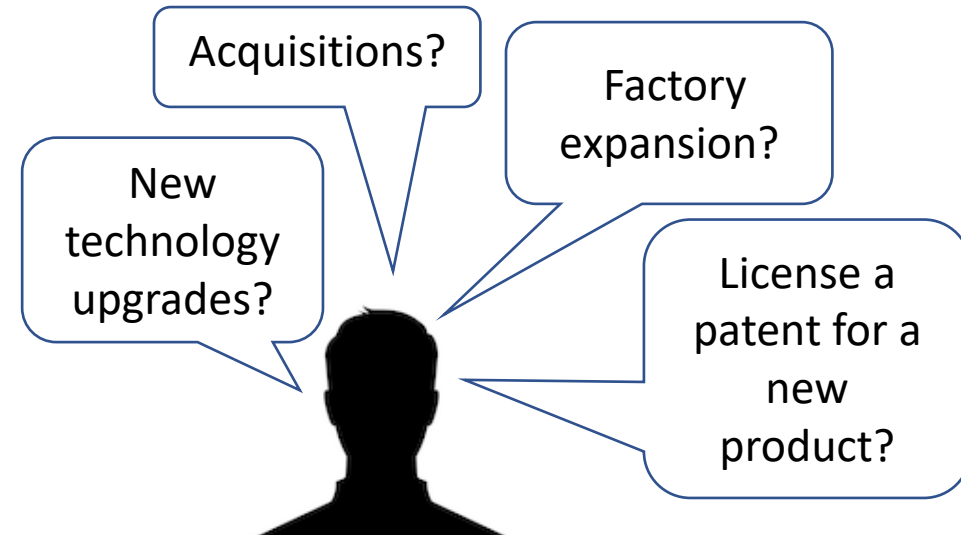


Decisions Under Uncertainty: Course Outline

1. Introduction with a simple decision under uncertainty
2. The value of information in the simple decision
3. The value of information in continuous variables
4. Risk Tolerance
5. A more complicated decision with a cash flow



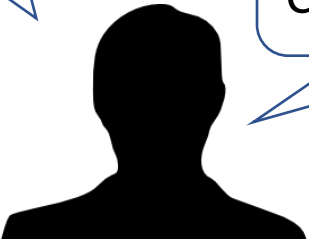
Decisions, Decisions






An Illusion of Certainty

| | |
|----------------------|-------------|
| First Year Costs: | \$3,000,000 |
| Annual Sales: | \$6,000,000 |
| Annual Sales Growth: | 15% |
| Profit Margin: | 35% |
| Etc... | |



Bottom Line:
Certainty of a Big Win!



That's a no-brainer!





Uncertainty Is Part of Real Decisions

First Year Costs: ?
Annual Sales: ?
Annual Sales Growth: ?
Profit Margin: ?
Etc... ?

Bottom Line:
Could go either way!

Ok, now what
do I do?

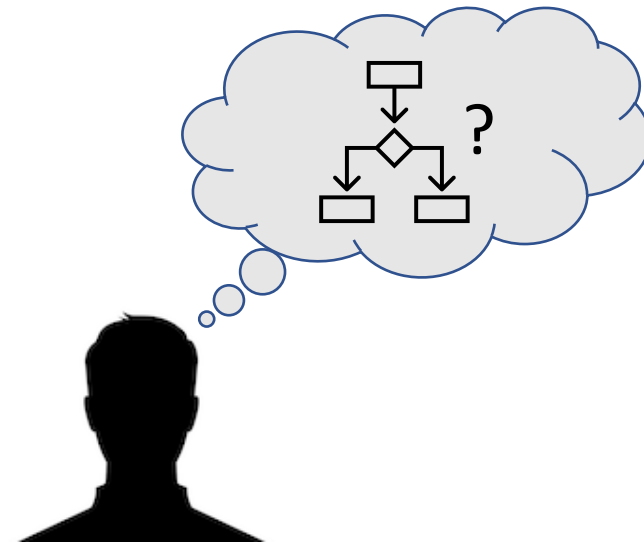




What Constitutes A Decision?

A Decision Requires:

1. More than one possible alternatives to decide among
2. More than one possible outcome for one or more of those alternatives
3. A decision maker





The Benefits of Expressing Uncertainty

Explicitly stating uncertainty is the only way to...

- 1)...quantify risks;
- 2)...compute the value of information.

Why do I need to bother with uncertainty?



What is the probability we will lose more than \$1 million on this project?



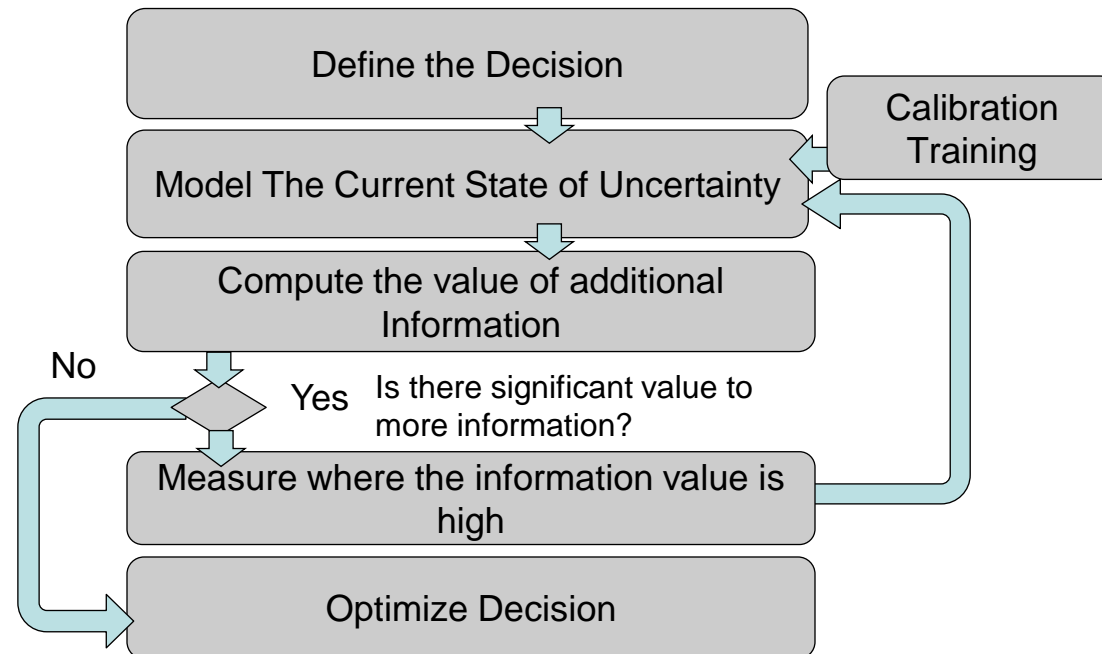
Is it worth \$50,000 to better measure productivity improvements from this technology?





A General Procedure for Measurement

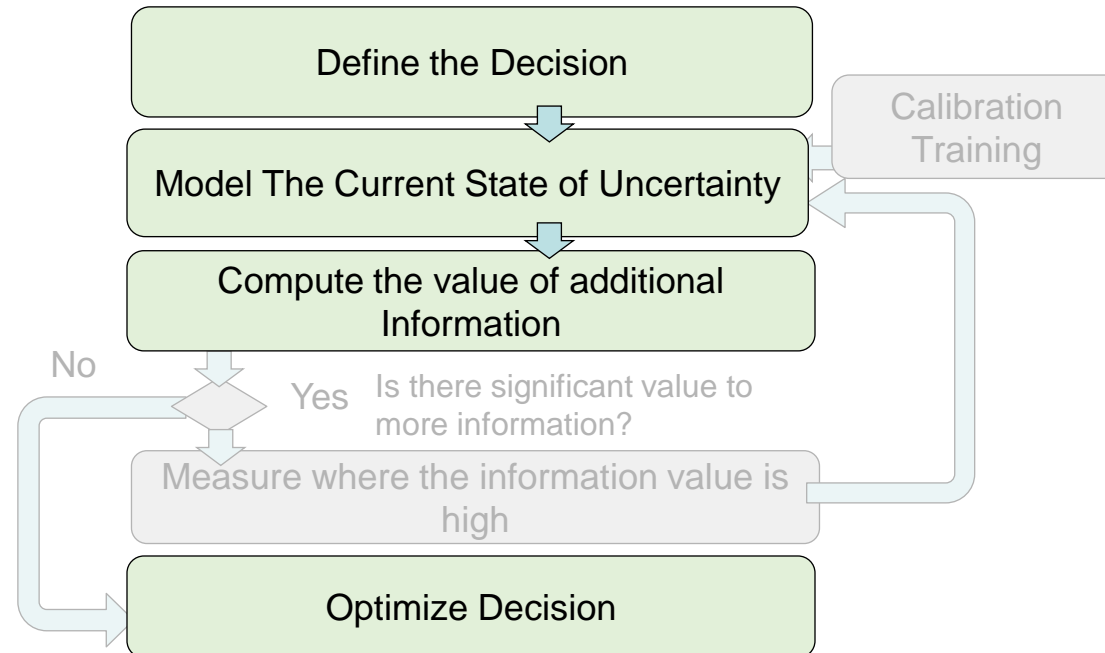
Applied Information Economics (AIE) quantifies and then optimizes decisions by focusing measurements where it matters most





A General Procedure for Measurement

Applied Information Economics (AIE) quantifies and then optimizes decisions by focusing measurements where it matters most





The Simplest Decision

For now, we'll make the following simplifying assumptions:

1. There are just two possible choices for the decision maker – to accept or reject an investment.
2. The decision to accept will result in just two possible outcomes – success resulting in a gain or failure resulting in a loss. Rejection has no gain or loss.
3. The decision maker is *risk neutral*.

Risk Neutral: A type risk tolerance where the decision maker holds value of an uncertain outcome equal to the probability weighted average of values of outcomes.

Example: To a risk neutral person, there is no difference in \$100,000 cash and a 10% chance of winning \$1 million.

