Recognition of Risk

- The Forecast is "always wrong"
- Evidence
- Rationale

Ratio of Real Costs

Expressed in constant dollars, to estimated costs for routine airport projects

Real/Estimated Cost Ratio

Percent of Occurrences

Median: 1.25
Forecasts of Water Use in Boston
(MWRA Members)

Forecasts of Water Use in Boston
(MWRA Service Area)
NASA Microgravity Projects Cost Growth Experience

DOE Oil Price Forecasts

Source: M. Lynch, MIT
DOE Oil Price Forecasts

Source: M. Lynch, MIT

EMF6 Oil Price Forecasts

Source: M. Lynch, MIT
EMF6 Oil Price Forecasts
(Low Forecasts)

Source: M. Lynch, MIT

Forecasts of 1990 Price of Oil
(IEW Survey)

Source: M. Lynch, MIT
DOE Forecasts of Non-OPEC LDC Production

Source: M. Lynch, MIT

Error in OPEC Revenue Forecast at EMF6, 1980 - 1995

Source: M. Lynch, MIT
Recognition Of Risk

- The usual error
  - Search for correct forecast
- However: the forecast is "always wrong"
  - What actually happens is quite far, in practically every case, from what is forecast
  - Examples: costs, demands, revenues and production
- Need to start with a distribution of possible outcomes to any choice or decision

Reason for Uncertainty -- Surprises

- Reason 1: Surprises
  - All forecasts are extensions of past
  - Past trends always interrupted by surprises, by discontinuities:
    - Major political changes
    - Economic booms and recessions
    - New industrial alliances or cartels

- The exact details of these surprises cannot be anticipated, but it is sure surprises will exist!
Reasons for Uncertainty -- Ambiguity

- Reason 2: Ambiguity
  - Many extrapolations possible from any set of historical data
    - Different explanations (independent variables)
    - Different forms of explanations (equations)
    - Different number of periods examined
  - Many of these extrapolations will be "good" to the extent that they satisfy usual statistical tests
  - Yet these extrapolations will give quite different forecasts!

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Rear View Mirror Analogy

- Relying on forecasts is like driving by looking in a rearview mirror --
  - Satisfactory for a while, so long as trends continue, but soon one runs off the road.
Consequence of Not Recognizing Risk

- The Resulting Problem: Wrong Plans
  - Wrong Size of Plant, of Facility
    - Denver Airport
    - Boston Water Treatment Plant
  - Wrong Type of Facility
    - Although “forecast” may be “reached”...
    - Components that make up the forecast generally not as anticipated, thus requiring
    - Quite different facilities or operations than anticipated

What do we do?

- Estimate possible ranges

- Example: Atlantic City Power
  - Used a cost model
  - range of costs of resources
  - range of demands
  - range of patterns
  - range of reliability, etc

See Figure
Summary

- The Forecast is “Always Wrong”
- Better Analysis will not Provide Perfect Forecasts
- We must deal with Risk and Uncertainty