Los Alamos National Laboratory

Planning for the Unknown:

How do you build a 50-year laboratory when you can't see the science 10 years from now?

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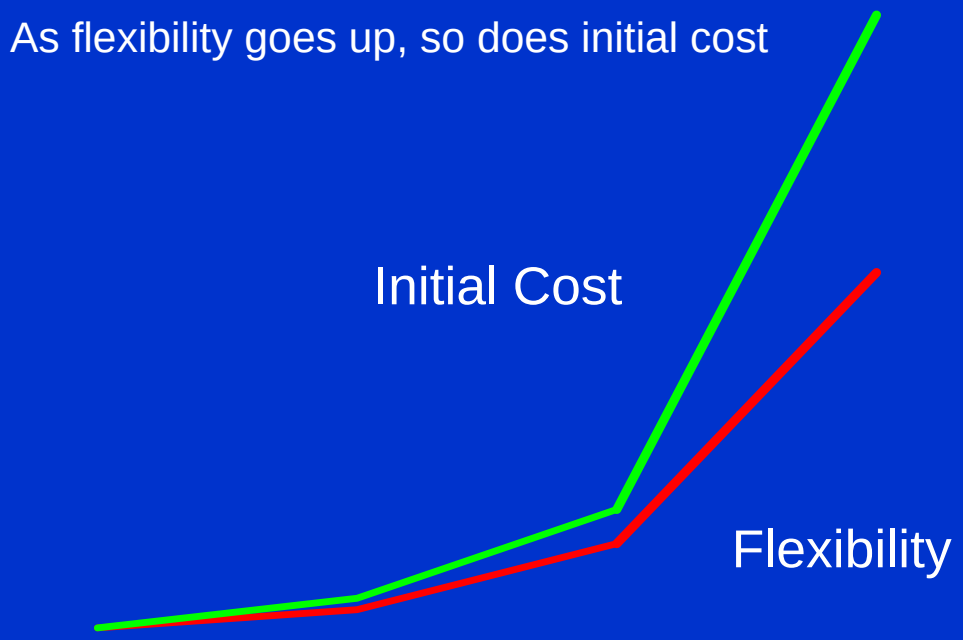
Two notional curves

- Unfortunately, flexibility is rarely free:



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The Problem -- Flexibility is good, but sometimes expensive

- Everyone agrees that good laboratory buildings need to be flexible…but not everyone can afford maximum flexibility
- The Federal Government is perhaps the worst offender
  - —Two colors of money
  - —“Value” engineering
  - —Rank stupidity
- We need Life-cycle Cost

  Police

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Two tools to gather and sort data

Delphi Technique

- A forecasting methodology developed by RAND; later transformed into a group decision-making tool.
- Allows a group of experts to come to consensus with incomplete data and in areas with high subjective content.

Scenarios

- Tell a coherent story about a future state or condition.
- Provide a means of securing informed involvement throughout a research organization.
- Using scenarios is a particularly good to bring scientists and non-scientists together to build supportive teams.

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Delphi Technique - Round One

- Involve the building's future occupants.
- Ask a series of open-ended change related questions.
- Do not clarify; let clarification come from the discussion.
- *What role will experimentation play in the future?*
- *What changes are expected in environmental regulation?*
- *How will microscopy change over time?*
- *What other changes do you foresee in the way we will operate in the future?*

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Delphi Technique - Round Two

- Once Round One is complete, seek to have the group prioritize the importance of its findings.
- *Which of these trends will matter most to us?*
- *Which changes should we begin to accommodate immediately?*
- *What changes involve risk? Which are sure bets?*
- Work toward consensus around reasonable probabilities.

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Delphi Technique - Round Three

- Once Round Two is complete, relate priorities to the building.
- *What will these prioritized changes mean for our activities?*
- *What are the people and staffing implications of the identified process changes?*
- *What will they mean for our new building?*
- Establish a consensus priority listing for accommodating process change.

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Using scenarios for further definition

- Write up one or two scenarios based on Delphi results.
- Work to define a scenario reflecting the “ideal” case described by the building’s future occupants.
- Use this as a metric to judge design changes.
- *Does this change support or detract from our preferred outcome?*
- Share the scenario widely.
- Revise as needed.

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Relating the “ideal” to the “possible”

- Hoping for an unlimited budget might leave you waiting a long time.
- Use the Delphi results to examine each cost element separately.
- Consider the “set” implications of your decisions.
- Consider the whole building.
- Know what to do if the budget shrinks or grows.

- Be honest, and public.
- Tell the story to everyone who will listen.

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Where do you draw the line?

- An Expected Value Function:
  - Flexibility Importance Score = ((Retrofit cost - Initial Cost) * Likelihood of Need)
  - Examples: Mobile lab fixtures, spare HVAC components, roof photovoltaic systems
  - Half-way or Preparative Measures
  - Examples: Open HVAC space, fume hoods, non-load bearing walls.

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Keeping faith with the initial vision

- Recognize initial limitations.
- Syndicate the concept of trade-offs.
- Seek validation of costs and likelihoods.
- Publicize any decisions.
- Don’t let the need for trade-offs, reduce support for the final outcome.

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Problems

Heavy front-end process investment

- Participant cynicism and burn-out.
- No Government-provided templates.
- Long funding and construction lead times necessitate revision.

External Concerns

- Maximum square footage for minimum dollar.
- “You are not saving **my** money.”
- Machismo.

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