Project Uncertainty Management

Opportunity or Oxymoron?

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What makes project outcomes difficult to predict?

Survey answers from session attendees in word-cloud format (larger font = more common responses)
The gap in traditional PM?

“We didn’t see that coming!”

“Why didn’t we know about that sooner?”

“Why is that end date so hard to predict?”
“Everyone has a plan, until they get punched in the mouth.”

- Mike Tyson
Successful delivery of innovative projects is a core business competency

- Organizations that can deliver innovative & difficult projects have an advantage.
- Why? Simple projects are too easy to replicate and become commoditized. No long-term competitive advantage.
- Innovative & difficult projects = more uncertainty...
- Managing uncertainty is key to delivering innovative projects.
Working Definition of Project Uncertainty

Project Uncertainty: Gaps in knowledge and awareness that affect our ability to foresee project outcomes.

A driver of risk.
Uncertainty Management

• Uncertainty management is about identifying and managing all the many sources of uncertainty which affects our perceptions of threats and opportunities.

• Implies exploring the origins of project uncertainty before seeking to manage or compensate for it.

Source.
Embedded Uncertainty in Projects

• Variability with estimates – basis and assumptions
• Uncertain which outcomes will happen
• Ambiguous outcomes
• Information uncertainty
• Uncertainty in tempo and pace – when things will happen
• Uncertainty in objectives and priorities
• A byproduct of complexity

Source.
Our Path Forward

Develop a framework for thinking more broadly about project uncertainty – and ideas on how to better manage it.
JoHari Window
Disclosure/Feedback Model of Self Awareness

- Known to self
  - Known to others: Open Arena
  - Not known to others: Facade

- Not known to self
  - Known to others: Blind Spot
  - Not known to others: Unknown

Reference:
A Framework for thinking about project uncertainty
Awareness & Knowledge Model for Uncertainty Management

- **KNOWLEDGE** (known knowns)
- **RISKS** (known unknowns)
- **HIDDEN KNOWLEDGE** (unknown knowns)
- **UNPREDICTABLE UNCERTAINTY** (unknown unknowns)

Adapted from: David Cleden, Managing Project Uncertainty, Gower
Quadrant 1: Knowledge (known knowns)

- You know what to do (or think you know) & plan it out.
- Compatible with traditional project management methods.
- Uncertainty is variation around the known (e.g. task duration).

<table>
<thead>
<tr>
<th>Type of Uncertainty</th>
<th>Strategies</th>
<th>Potential Traps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variation</td>
<td>Monitor &amp; Control</td>
<td>Estimation Error &amp; Bias</td>
</tr>
<tr>
<td></td>
<td>Monte Carlo simulation</td>
<td></td>
</tr>
</tbody>
</table>
Cognitive Biases that affect prediction & estimation

We have a tendency to be overconfident in our optimistic predictions despite knowing that it took longer in the past.
Planning Fallacy

“People underestimate the time it will take to complete a future task, despite knowledge that previous tasks have generally taken longer than planned.”

– Roger Buehler
Awareness & Knowledge Model for Uncertainty Management

- **KNOWLEDGE** (known knowns)
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Quadrant 2
Quadrant 2: Risks (known unknowns):

You know there are some outcomes that have some chance of happening.

Risk management involves estimating the probability of occurrence and the impact of the risk should it occur.

Risks come from uncertainty, but not all uncertainty can be expressed as risks.
## Probability and Impact Matrix

<table>
<thead>
<tr>
<th>Probability</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greater than 80%</td>
<td>Risk A</td>
</tr>
<tr>
<td>80%</td>
<td>5=High</td>
</tr>
<tr>
<td>60%</td>
<td>4=Med/High</td>
</tr>
<tr>
<td>40%</td>
<td>3=Med</td>
</tr>
<tr>
<td>20%</td>
<td>2=Low</td>
</tr>
<tr>
<td>Less than 20%</td>
<td>1=Very Low</td>
</tr>
</tbody>
</table>

**Impact Levels:**
- 1=Very Low
- 2=Low
- 3=Med
- 4=Med/High
- 5=High
- 6=Very High
Track the level of uncertainty in estimates.

<table>
<thead>
<tr>
<th>Risk</th>
<th>Probability</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>80%</td>
<td>60%</td>
</tr>
<tr>
<td>B</td>
<td>20%</td>
<td>40%</td>
</tr>
<tr>
<td>C</td>
<td>20%</td>
<td>60%</td>
</tr>
</tbody>
</table>

Likelihood Levels:
- 1=Very Low
- 2=Low
- 3=Med
- 4=Med/High
- 5=High
- 6=Very High
**Incorporate uncertainty in scenario planning**

<table>
<thead>
<tr>
<th>Risk Scenarios</th>
<th>Potential Schedule Impact (can use probability vs impact calculation)</th>
<th>Optimistic</th>
<th>Most Likely</th>
<th>Pessimistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplier is late with prototype delivery</td>
<td>0</td>
<td>10 days</td>
<td>20 days</td>
<td></td>
</tr>
<tr>
<td>Sub assembly needs rework</td>
<td>5</td>
<td>20 days</td>
<td>30 days</td>
<td></td>
</tr>
<tr>
<td>Customer feedback requires redesign</td>
<td>0</td>
<td>15 days</td>
<td>20 days</td>
<td></td>
</tr>
<tr>
<td><strong>Schedule variation</strong></td>
<td>5</td>
<td><strong>45 days</strong></td>
<td><strong>70 days</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Aggregated risk scenarios**

Ref: Cledan, Managing Project Uncertainty
Risk Management Tools

• Requirements management
• Brainstorming
• Planning for risk mitigation
• Critical risk reporting to senior management
• Quality Control
• Time-limited action-item lists

• Prototyping
• Responsibility assignment
• Simulation
• Risk impact assessment
• Subcontractor management
• Risk probability assessment
• Configuration control

Which risk management tool do you find most useful?

Survey answers from session attendees

Requirements Management: 25%
Planning for risk mitigation: 15%
Risk impact assessment: 15%
Prototyping: 10%
Brainstorming: 15%
Risk probability assessment: 10%
Time-limited action-item lists: 5%
Responsibility assignment: 5%
Configuration control: 5%
Simulation: 5%
Critical risk reporting to senior mgmt: 5%
Quality control: 5%
Value Contribution of Risk Tools

Project Performance criteria:
- Extent /Freq of plan changes
- Freq. of emergency meetings
- Agreement in effort estimation
- Participant satisfaction
- Customer satisfaction
- Post-delivery product changes

The Limitations of Traditional Risk Management Methods

• Assumes we can:
  • Conceive the range of outcomes even if we can’t predict with certainty which ones will happen.
  • Have the resources and capability to analyze the risks.
  • Produce acceptable estimates for probability and impact.
  • Have the resources to mitigate and track (throughout the project lifecycle).

• May give us **false confidence** that all key risks / outcomes have been identified.

• Stakeholders could react negatively to changes in project situation because risks and outcomes should have been considered.
What if you replace risk with uncertainty?
Uncertainty Management Strategy: Increase Awareness

**Quadrant 3**

- **Project Team Awareness**
  - Known
  - Unknown

- **Project Team Knowledge**
  - Known
  - Unknown

**Knowledge (known knowns)**

- Known

**Risks (known unknowns)**

- Unknown

**Hidden Knowledge (unknown knowns)**

- Known

**Unpredictable Uncertainty (unknown unknowns)**

- Unknown
Quadrant 3: Hidden Knowledge (unknown knowns)
Group Dynamics:
Risk Workshop vs Risk Interview
Great Questions for Uncovering Hidden Knowledge

• How might we … ?
• And what else …?
• How did we get to our assumptions?
• What may we be missing?
• What obstacles can we anticipate if we take this course of action?
Premortem

Prospective Hindsight – Imagining the event has already happened.

30% Increase in the ability to correctly identify reasons for future outcomes

Uncertainty Management Strategy: Increase Awareness

- KNOWLEDGE (known knowns)
- RISKS (known unknowns)
- HIDDEN KNOWLEDGE (unknown knowns)
- UNPREDICTABLE UNCERTAINTY (unknown unknowns)

Quadrant 4
Quadrant 4: Unpredictable Uncertainty (Unknown Unknowns)

- We don’t know - we don’t know
- Unpredictable events & Unfathomable outcomes
- Stuff we didn’t bother to find out
- “Black swans” and “Bolts from the blue”
Factors that Increase Unk Unks in Projects
Classifying Projects to Evaluate Uncertainty
Project Classification – Hard & Soft Framework

**HARD**

- Clearly defined
- Physical artifact
- Only Quantitative
- No external influences
- Refinement of single solution
- Low stakeholder interactions

- Goal Clarity
- Deliverable
- Success Measures
- External Susceptibility
- Number of Solutions
- Stakeholder Interactions

**SOFT**

- Highly Ambiguous
- Abstract concept (e.g. Organizational Change)
- Only Qualitative
- High external influences
- Exploration of many alternatives
- High stakeholder participation

Strategies for project uncertainty

**Increasing Uncertainty** of Objectives and Solutions

- Monitor & Control
- Buffer management
- Risk countermeasures
- Outcome contingencies
- Plan iteratively
- Refine targets
- Solution searching
- Parallel paths & multiple explorations
- Rapid prototyping & fast learning loops
Adapting PM to level of project uncertainty

Increasing Uncertainty of Objectives and Solutions

Traditional Project Management (e.g. waterfall)

Iterative PM Methodologies (e.g. Agile)

Extreme PM Methodologies (e.g. Emertxe)

Extreme: Project goal is high-level vision. Search for solutions to meet a business value. Rapid iteration. Emertxe: Solution in search of business value (R&D)
PM Methodology & Confronting Uncertainty

Traditional Project Management (e.g. waterfall)

Iterative PM Methodologies (e.g. Agile)

Extreme PM Methodologies (e.g. Emertxe)

Planned Path

Suppress

First Path

Adapt

Project Objectives

Successive Path

Adapt

Project Objectives

Initial Path

Initial Project Objectives

New Path

New Project Objectives

Reorient

Project Objectives
Be Alert for early warning signs of project uncertainty
Early Warning Signs of Project Failure

Early Warning Sign occurs within first 20% of the project
What warning signs indicate high uncertainty or risk of failure?
Survey answers from session attendees in word-cloud format (larger font = more common responses)
Dominant Early Warning Signs of Project Failure
(Keppelman et al)

People-Related

1. Lack of top management support
2. Weak project manager (uh oh)
3. No stakeholder involvement and/or participation
4. Weak commitment of project team
5. Team members lack required knowledge or skills
6. Subject matter experts are overscheduled

Reference: Kappelman, McKeeman, Zhang, “Early warning signs of IT project failure: the dominant dozen”, Information Systems Management, Fall 2006
Dominant Early Warning Signs of Project Failure
(Keppelman et al)

Process-Related

1. Lack of documented requirements and/or success criteria
2. No change control process (change management)
3. Ineffective schedule planning and/or management
4. Communication breakdown among stakeholders
5. Resources assigned to a higher priority project
6. No business case for the project

Reference: Kappelman, McKeeman, Zhang, “Early warning signs of IT project failure: the dominant dozen”, Information Systems Management, Fall 2006
Track Your Predictions!

Establish a process to capture the results of past predictions as a gauge of latent uncertainty

Example: Silverberg Chart – Checking the predictability of your predictions

In **Summary** ...
Uncertainty Management Strategies & Tools

- Be aware of bias in estimates.
- Manage variation
- Name the elephant
- Better Inquiry
- 1:1 Risk Interviews
- Premortem

- Recognize uncertainties in estimates
- Know limitations of risk management
- Use Risk Management tools throughout project lifecycle

- VUCANTO
- Hard & Soft classification
- Adapting PM methods to uncertainty profile
- Early Warning Signs
- Track predictions

- Increase Awareness

**Project Team Knowledge**

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Final thoughts

Managing project uncertainty is necessary for difficult projects (the ones your organization should be doing!)

Recognize sources of uncertainty and make it more transparent in the project management lifecycle

Use the Knowledge-Awareness model as a framework for managing project uncertainty.

Strive for an open and alert culture with no elephants in the room and change is not viewed negatively
Thank You!

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