Navigating the Labyrinth: Unraveling Schedule Complexity

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Panel 11

How to Improve the Art of Schedule Management?

FRAMEWORK

- Estimates prior to program start (*ex ante*)
- Mitigating difficulties during program execution (*in media res*)
- Lessons from completed programs (*ex post*)

➔Focus Here: Making schedules more resilient with respect to unexpected difficulties

Our Focus Here: more resilience with respect to unexpected events in complex programs

- Useful Paradigms
  - Rework: do-overs to get it right
  - Systems Dynamics: better understanding of what's happening, including rework cycles.
- Data Gathering and Analysis: a variety of tools
  - Capturing Bottom-up Information
  - Perhaps through Prediction Markets

COMPLEX SYSTEM

Includes a large number of compo-nents (complicated). However, not all the components are known *ex ante*; and their relationships are imperfectly understood.

A Standard Rework Depiction, After The First Encounter

Figure 1. The Rework Cycle (adapted from (Cooper, 1993a)

Dealing with Complexity: Two Case Studies

- F-35 Weight Episode: macro-level schedule issues arising from recognizing (or not) complexity and dynamic forces in program development
- Peace Shield Program (Saudi Arabia): Insights into systemic causes and consequences of rework events

F-35 Weight Episode: 2004

- LM “stand-down” with all-out efforts to cut weight
- Hard, ingenious work “solved” the problem, but …
  - … ~$5B in added cost
  - … ~18-month schedule
  - … loss of “good weight”
  - … reduction in generator capacity
  - … smaller B-model weapons bay

PEACE SHIELD PROGRAM: upgrade to Saudi air defenses

- Second try started in 1991 (54-month sched estimate)
- Hughes delivered ahead of new schedule
  - “Teaming process”: better communication
  - More robust staffing
  - Management informed by Rework Cycle model
  - Simulations using Systems Dynamics methods

Improving Information Quality Through Prediction Markets?

Executives know … valuable information is scattered across the organization. They just don't know how to retrieve it (Thompson, 2012).

The Wise Crowds Proposition: groups generally better than experts

Attributes of Wise Crowds:

- cognitive diversity,
- individual independence,
- non-hierarchical processes,
- means of aggregation, e.g., Prediction Markets

Prediction Markets: easier said than done

- Barriers to effectiveness in DoD setting
  - Self-negating (or self-fulfilling) predictions
  - Structure of Incentives
  - Definition of Outcomes
- Potential Pitfalls
  - Organizational Culture
  - Who asks the questions?
  - Manipulating Prediction Market Outcomes
  - Manipulating Real-World Events
  - Legal Complications
  - Poorly Informed Participants

➔ Sweet Spot for Prediction Markets?

Closing Remarks

- Continuation of Research Program (started 2016)
- Focused this year on resilience in program management: paradigms and information methods.

➔Still emphasizing tools for program managers