Enterprise Risk in Acquisition: Initial Findings and Implications

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Outline

• The problem
• Literature insights
• Exploratory study
• Results, analysis, and Observations
• Implications
• Summary
Setting the Stage - Problem

• Chronic execution problems for large, complex, systems acquisitions

• Both Public and Private entities experience problems (in terms of outcomes)
  • Schedule
  • Budget
  • Performance

• Department of Defense Acquisition
  • Not just a few individual programs…nearly all with issues
  • A systemic issue
What to do?

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<td><strong>Key Studies and Initiatives Impacting the Defense Acquisition Process</strong></td>
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<td>• 1970 Fitzhugh Commission</td>
<td>• 1981 Carlucci Initiatives</td>
<td>• 1994 Federal Acquisition Streamlining Act</td>
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<td>• 1972 Commission on Government Procurement</td>
<td>• 1982 Grace Commission</td>
<td>• 1996 Clinger-Cohen Act</td>
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<td>• 1981 Carlucci Initiatives</td>
<td>• 1986 Packard Commission</td>
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<td><strong>DOD Acquisition Policy Changes</strong></td>
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<td>• 1971 DOD 5000 policy established</td>
<td>• 1980 Policy revised</td>
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<td>• 1975 DOD Policy revised</td>
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Notable actions in this decade


Source: DOD (data); GAO (Analysis and presentation) GAO 06-368

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Maybe the Focus is Wrong

• DoD programs have problems because they “do not capture the requisite knowledge when needed to efficiently and effectively manage program risks” (GAO 05-391)


• Risk Management is an important tool
  • Numerous methods and frameworks available for use
If Risk is Managed, Then What?

• Just as individual projects struggle, large enterprises often have a poor record of delivering many programs on time and on budget (GAO 04-53, 06-110, 06-257T, 06-368, 06-391, 06-585T, Cooper 2001, Cusumano & Nobeoka 1998)

• Multi-project Management/Portfolios* – a way to deal with the inherent risks & uncertainties encountered in system development [GAO 06-110, 06-585T]
  • Used to manage competing demands, resource constraints, and external Enterprise issues

• Managing risk together with portfolio management is the overriding mantra coming from the GAO [05-391, 06-110, 06-368] & also RAND [MG-271, MG-360, MG-415, TR-262]

* - Portfolio: a grouping of projects together that seek efficiencies otherwise lost
What about Risk and Project Portfolio Management?

• Wide variety of literature sampled to better understand topic
  • Risk
  • Portfolio
  • Management
  • Psychology/Decision Making
  • Product Development
  • System Engineering
  • Finance

Many of these sources could fall in multiple categories
Portfolio Practices Bring Benefits

- **Portfolio Best Practices supply**
  - Along with a Robust portfolio management process:
    - A good balance of projects
    - The right number of projects
    - Place to make go/kill decisions
    - Process treats all projects collectively as a portfolio vs individually
    - Uses multiple models to evaluate projects
    - Uses various information ‘display’ capabilities: transparency in data

Other Observations from Literature review

- “Management” dissatisfaction of portfolio methods using “risk” measures is high
  - However, management familiarity with traditional financial evaluation tools reinforces their use (NPV, IRR, etc)
    - From Portfolio Management for New Products, Cooper et al (2001)

- Portfolio Project Management Selection vs. Portfolio Project Management Efficiency
  - Focus on former (e.g. optimization, Decision Support Systems, etc) and very little information on latter

- “True” PD portfolio measures are not identified
  - Most are an amalgamation of existing project measures
  - Data manipulation is favored (e.g. how many ways can I look at this data)
Enterprise-level Risk is Absent from Literature and Research

- Hypothesis: Enterprise risk can be leveraged to improve enterprise portfolio outcomes

- But first, some questions:
  - Is there evidence in Acquisition that portfolio management techniques are being used?
  - How is risk used within a portfolio?
    - What do these risks reveal?
  - What are Portfolio Risks?
    - How do you measure them?
Initial Research Design

- Interview portfolio leaders about capabilities
- Characterize portfolio issues
- Understand risk at the portfolio level
- Use US Air Force Product Center as sample
  - Hanscom AFB – Electronic Systems Center (ESC)
  - Leaders at multiple levels of hierarchical organizational structure
Survey “State of the Practice” Portfolio Management

• ESC at Hanscom AFB - test location*
  • 75% of Wing Commanders (Level I) interviewed (75%)
  • 36% of Group Commanders (Level II) interviewed (45%)
  • 11% of Squadron Commanders (Level III) interviewed (21%)

• Portfolios were discussed in terms of project outcomes:
  • Performance (requirements), cost (resources), and schedule (time).
  • Outcomes noted in terms of control of money, personnel, or requirements, or some combination of all three.

*NOTE: Interviews were open-ended and did not always cover the same questions or material due to time restrictions. Furthermore, occasional forays into interesting stories or observations were allowed.
Emergent Issues

• Consistently across all interviews
  • Money (constraining)
  • People (not enough; skill set & experience – lacking)
  • Requirements (constant pressure)

• Areas of disagreement among levels in the hierarchy
  • Staffs (purpose, function, need)
  • Level of thinking needed (strategic vs. tactical)
  • Value of non-program activities (non-essentials)
    • “The fact that I haven’t had my PHA [a health screening] or that I am late on gas mask training is a far bigger deal up the chain than whether or not one of my programs slip.” Squadron commander (Level III leader)
• Affirmed its use as important
• 75% of those interviewed used traditional risk tools (e.g. risk cubes, mitigation plans) for individual programs.
• 50% used program-level metrics to help make portfolio decisions
• 42% used ‘high-level’ reviews to discuss risks of multiple projects – but without a structured process or integration of risks between projects
• 92% of all those interviewed felt Portfolio Management was an ‘art’.
• 42% acknowledged having no portfolio-level vision or strategy although another 33% claimed to have a vision or strategy.
Portfolio measures

• 33% of those interviewed want portfolio-level measures, while acknowledging difficulty in obtaining such measures.

• Representative quote
  • “For me, it’s done, it’s really done as ‘contentment’ among the portfolio...and if I have that good feeling, I’m satisfied with the direction of the entire portfolio”. Squadron commander (Level III leader)
Portfolio Risk

• Challenging concept for many.
  • Almost all interviewees had a different definition and understanding of portfolio risk and what it meant for them.
  
• 25% of those interviewed claimed to have a set of portfolio risks
  • One leader had an integrating contractor managing those risks*
  
• 42% said limited manpower prevented the use of portfolio risk management

• 33% felt that the structure of their organization inhibited portfolio risk management.

* The contractor was also interviewed. Although they had accepted the task of managing portfolio risks, determining those risks was proving to be very difficult & at the time of the interview, and after several months of effort, they did not yet have any portfolio risks enumerated.
Pathologies of Current AF Acquisition Portfolio Outcomes

• Cost, schedule, and performance instability
• Mismatches between program execution and portfolio emphasis
• Cacophony of stakeholder voices dilute portfolio focus and vision
• Emphasis on maintaining dollars, personnel
Observed Current Capabilities of AF Acquisition Portfolio Leaders

• Gatekeeper function (with limited influence)
  • Source Selection Authority
  • Milestone Decision Authority
  • Award Fee Designating Official

• Program Advocate
  • Lobbyist
  • Information conduit
  • Manage Reputation

• Greater influence over new programs
  • Cobble together budget ‘out of hide’ until officially in budget
  • Seed initial program office with personnel

• Can leverage ‘military’ personnel
  • Move
Observed Current Limitations of AF Acquisition Portfolio Leaders

- Difficult to prune portfolio/influence selection process
  - Start/stop/throttle programs
- Minimal portfolio analysis
  - Difficult to assess portfolio capacity/capability
  - Not likely able to articulate portfolio level risk
- Difficult to refuse new requirements
Implications for Program Managers

- Ensure your project has leadership attention
  - Demonstrate real value the program brings in terms the end customer understands
  - Program is either a user priority or badly broken
- Understand the position of your project with respect to the rest of the portfolio
  - Highlight risks of your program to the overall portfolio
  - Manage interfaces & information flow
  - Ensure transparency
  - Maximize financial execution
- Emphasize networks of key players & advocates for your program
  - User requirements & budget, resource (personnel), and finance communities
Portfolio Management is Coming to Acquisition

• Maj Gen Reimer, F-22 PEO is spearheading the use of Portfolio Management
• A Pre-release tool is being prototyped now
  • Uses three major pieces of information
    • Monthly Acquisition Report (MAR) data
    • Probability of Program Success (PoPS) data
    • Program interdependency data
Research Implications

• What is the right unit of analysis for the Enterprise?
  • Analysis suggests many of the ‘pathological’ issues and their root causes are outside of the control of acquisition ‘portfolio’ leaders
  • Are Acquisition leaders really able to use portfolio techniques or are they just leaders charged with the execution of what’s in their “portfolio”?

• Next stage of research underway
  • Insights from these results form foundation for model explaining US Air Force enterprise behaviors
    • Characterizing additional elements of enterprise model
    • Interviewing key players in acquisition portfolio selection and execution processes outside of product centers
    • Development and testing of portfolio risk measures
Wrap Up

- Critical thinking about enterprise risk is in a nascent stage within the US Air Force.
- Robust enterprise risk measures do not exist at present but potential candidates exist for future study & hypotheses testing.
- Using portfolios and enterprise risk information to achieve greater value is worthy of additional research.
Summary

• Introduction of problem
• Discussion of risk and portfolios in product development
• Introduction of ‘Enterprise Risk’ (or portfolio risk) as a concept
• Initial survey and interviews at Hanscom AFB regarding portfolio risk
• Analysis and observations of current state of practice of portfolio risk usage
• Implications for further research
Other Observations from Literature review

• Probabilities of risk are usually subjective or a combination of data containing uncertainty and often unacknowledged assumptions

• Many frameworks ignore uncertainties or try to account for them through simulation/optimization methods – assume Central Limit Theorem applies (e.g. Monte Carlo simulation)

• Uncertainties are distinct from risk and are present in most data
Money

• A key constraint
  • By purpose and design (statue and policy)

• Representative Quotes
  • “Everything is really about the purse strings.” Group Commander (Level II)
  • “…we rely on a lot of other folks, particularly your MAJCOM, your air staff folks to get the money to come down.” Squadron commander (Level III)
Personnel

• Personnel shortages and/or level of experience among key roles

• Representative Quotes

  • “…we don’t have all the right skill sets for the folks that are trying to run programs now. We have a lot of vacancies, or we don’t have the right skill sets in programs,” Squadron commander (Level III leader).

  • “It’s the experience. And it really surprises me that we are allowing decisions to be made or making decisions based upon an experience-base that is not really, I think, adequate. I’ve got sharp, sharp people in here. Wonderful people but then I take a look and they don’t have the experience.” Group Commander (Level II leader).
• Outcome: Continual pressure to tweak and adjust personnel assignments
  • “...people you get are based on where they think the priorities are. You don’t necessarily get the good ones if they don’t think you’re priority...” Squadron commander (Level III leader)
  • “…if they take my manpower, because then ...I’m stuck, I have to focus on only my highest high-level stuff, my high-priority stuff.” Squadron commander (Level III leader)
Requirements

• Instability drives larger burden on system

• Representative quote
  • “I think the changing user and I won’t just say requirements, because they don’t even come as requirements, but fancies: “I want to do this today.” “I think that’s a great idea.” Okay, in those great ideas, because if it is at the Pentagon and it may not even be the general who runs it, but his staff, when they have great ideas, it becomes like, you know, the ‘birth.’ It’s…we’re gonna shortcut everything and that’s probably one of the biggest gripes I have, I’ll tell you. We get considerable amount of re-taskings.” Squadron commander (Level III leader)
• Directed materiel solutions put burden on system

• Representative quote
  • “There’s a lot of folks who have good ideas on how to solve a problem, not just work the problem which needs solved and they tend to help us out with solutions as well as requirements and that’s a struggle that we have on a regular basis” Group commander (Level II leader)
• User Priorities change frequently

• Representative quote
  • “…the bottom line is it that at the end of the day that system is beholden to the user and the user only and it’s their priorities versus the priorities of the enterprise that are going to win.” Group Commander (Level II leader)
• Disagreement on ‘value’ provided by levels of hierarchy
  • Senior leaders felt they were the ‘last line of defense’

• Representative quote
  • “Working the staff, I think, is the hardest part. I think that is the most difficult part. The commanders, I think, they're pretty good, once you can get through their staff and get on their calendars.” Squadron commander (Level III leader)
Strategic thinking

• Less strategy at lower levels of portfolio execution

• Representative quote
  • “Honestly we’re focused on what inch-stones are this month.”
    Squadron commander (Level III leader)
Value proposition

• At lower levels, non-essentials are seen as being over-emphasized

• Representative quote
  • “The fact that I haven’t had my PHA [a health screening] or that I am late on gas mask training is a far bigger deal up the chain than whether or not one of my programs slip.” Squadron commander (Level III leader)
Portfolio leader capabilities

- At the highest levels of responsibility, commanders felt completely empowered to do whatever needed to be done to ensure their portfolio’s success.
- Further down the hierarchy, commanders felt more constrained.
- Upon closer examination, all of these leaders used words such as “influence,” “shape,” and “work with” to describe their capabilities or authority across the portfolio.
Risk Frameworks breakdown

• **Methods**
  - Quadratic Equations
  - Genetic Algorithms
  - Simulated Annealing
  - Branch and Bound methods
  - Entropy (Shannon numbers)
  - Linear Programming (ILP/NLP)
  - Real Options
  - System Dynamics
  - Monte Carlo simulation
  - Triangular distribution functions
  - Weightings
  - Utility Functions

• **Models**
  - Traditional Financial Valuation
  - Model Predictive Control
  - Decision Theoretic Model
  - Process-based model

Main objective: minimizing risk while maximizing return
Portfolio Frameworks breakdown

- **Methods**
  - BCG matrix
  - GE multi-factoral analysis
  - Advantage matrix
  - Ansoff Product-growth matrix
  - Contribution margin analysis
  - Probabilistic analysis
  - and all risk methods (from previous slide)

- **Models**
  - Process, capacity, and interdependency models
  - Organizational objectives and constraints
  - Sequential decision analysis
  - Control theoretic forms
  - Literature analysis
  - Markowitz portfolio optimization

Main objective: finding an efficient frontier along which a “risk” measure is compared against a measure of value
Why?

• Lots of reasons given:
  • Reasons are familiar
    • Requirements instability or creep
    • Funding instability
    • Technology challenges

• Lots of improvement efforts undertaken
  • But problems still remain
Current Manifestation of AF Acquisition
Portfolio Objectives

- Categorization method
- Live within resources available
  - ‘Fix’ problems within portfolio resources
- Reporting vehicle
  - Pass on all good news immediately
  - Delay ‘bad news’
- Leadership – mentoring of Program Managers
- Have Portfolio Leaders “closer” to programs
Implications for Portfolio Leaders

• Recognize the controls vested in you are “processes of influence” – along all dimensions.

• Program advocacy is a primary responsibility, both within acquisition as well as to users & other stakeholders
  • Includes confidence-building & forming trust relationships

• Emphasize capacity constraints & resource shortfalls (“be the squeaky wheel” without sounding like one)

• Remove barriers to spending money
  • Insist program budget documents are broadly worded for flexibility
Implications for Portfolio Leaders (cont.)

• **Short-term levers of control easiest to use**
  • E.g. moving of personnel, etc.
  • Ensure ‘unfunded’ requirements & task orders are ready for fallout $s$

• **Deflect new or changed requirements as long as possible**

• **Close out older activities and delay new work while maintaining current resource levels**

• **Longer-term levers of control effective via budgeting**
Do Possible Portfolio Risk Measures Exist?

- **Agility**
  - Process capacity measure? (measure of “throughput”)
  - Process capability measure? (measure of skill/experience)

- **Flexibility**
  - % of portfolio $s as management reserve?
  - % of process capacity used (warning if above 80%)?
  - Social network measures of leaders?

- **Alignment**
  - Strategic priority of “all” programs in portfolio to strategy?
Overall Conceptual Model

Law, policy, process constraints

Resources

Requirements

Product Development Portfolio

Steady stream of products

Strategic direction
Project selection and sequencing
Requirements of Ideal Portfolio

• Causal relationships between actions of Portfolio manager and portfolio outcomes must be established
  • Estimate magnitude of effects
  • Differentiate between factors, assign weights

• Transparency into portfolio

• Temporal delay between interventions and portfolio outcomes understood and anticipated
Ideal Portfolio Objectives

- Maximize return on investment
  - Bounded by capacity
- Maximize portfolio throughput
  - Minimize age of money tied up in portfolio
- Minimize cycle time
  - And minimize cycle time variability
- Guided by overall strategy

Satisficing objectives may be necessary in real world
Ideal Portfolio Outcomes

• Portfolio has predictable outcomes (cost, schedule, performance, quality)

• Stability in portfolio measures (with downward trends favored)
  • Cycle time
  • Age of money

• Robustness to variation in portfolio inputs
  • Resiliency

• Individual programs mimic portfolio behaviors dealing with their sub-programs
An Enterprise Response to Challenges

• Portfolio Management – A Commercial Best Practice (Cooper 2001)
  • Portfolio management allows organizations to:
    • Gauge System Capacity
      • Know how much is going through system at any given time
      • Leads to Better Resource allocation*
    • Place an Emphasis on Quality
      • Widespread use of six sigma, lean, balanced scorecard, and other methods – known across industry as best practices
      • Improvements noted across many areas – including cost, schedule, performance, margins, etc.

List is not exhaustive or all-inclusive
Ideal Portfolio Manager capabilities

- True gatekeeper functionality
  - Start, stop, and throttle programs as required
  - Requirements control
  - Complete resource fungibility
- Have a pooled reserve or portfolio reserve
- Confidence in portfolio forecasts
  - Based upon validated analysis
- Maintain balance in portfolio
  - Phase of development
  - Technology development
- Effective advocate for portfolio programs
Portfolio Manager Capability Action Matrix

Resource Fungibility (none to full)

Project selection ability (none to full)

Requirements (as given to tradeable)

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How do you manage a project portfolio efficiently?

- It depends on the objective
  - Meet the portfolio objectives OR achieve “operational” status for as many projects as possible
- What actions are effective?
  - Meet Portfolio objectives
    - Staffing uncertain projects
    - Number of projects kept low
    - Keep slack capacity in processes, money, and people
  - Achieve “operational” status of maximum projects
    - Resource planning (minimize projects in pipeline)
    - Review portfolio projects often (quarterly)
    - Re-allocate resources – keep schedule as much as possible

Primary Focus of Studies of AF Acquisition

- Execution only
- Selection (few, if any)
- Requirements (a few)
- Budget (many studies)
- Various combinations (limited in scope)
- All systems combined (few, if any)