Integrating Program Management and Systems Engineering

Methods, Tools, and Organizational Systems for Improving Performance

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PMI Melbourne, Australia Chapter
Implementing Integration of Program Management and Systems Engineering

• Four main sections proceed from issues to actions
  1. Why is integration important to program outcomes?
  2. What actions produce better integrated programs?
  3. How to improve integration in programs and organizations?
  4. Who must act to make this happen?

• Case studies illustrate the principles in application, e.g.,
  – Aerospace, large infrastructure, automotive, information systems and other major programs

• Tools provide guidance for application, including standards, best practices, and methods
Vision: Toward a New Mindset of Integrated Program Management and Systems Engineering Disciplines

- Current state: “…some systems engineers and program managers have developed the mindset that their work activities are separate from each other rather than part of the organic whole…”

- Result: routine failure of complex and large-scale engineering programs to meet cost budgets, schedule, and requirements

- Vision: “…an understanding that all of the work is relevant to both groups, and that the delivery of stakeholder value requires an appropriate contribution from both areas of professional expertise.”

Disappointing Outcomes from Large-Scale Engineering Programs

US Department of Defense Development Portfolio – Change from initial estimate (2008)

- Total cost growth: $296 billion
- Average schedule overrun: 22 months
- Similar situation in other industries

Sources: GAO 06-368 (April 2006), Bloomberg, GAO 10-374T (January 2010)
Few Organizations Are “Fully” Integrated

Most organizations are *somewhat* or *mostly* integrated and its occurring as a mix of formal and informal methods.

Majority find the integration of the two roles to be *somewhat effective*.

Some unproductive tension is occurring between the roles that makes it challenging for them to work together.

Lack of planning for the integration is seen as the main source of tension.

Integration of Program Management and Systems Engineering

Those who perform both roles are more likely to rate the integration at their organization as *highly effective*.

Systems engineers are more likely to say there is unproductive tension between the roles than program managers.

Systems engineers are more likely to attribute the tension to unclear expectation and authority than program managers.
Program Manager and Chief Engineer are Distinct Roles – With Some Important Overlap

<table>
<thead>
<tr>
<th>Program Managers (PM) view their responsibilities as:</th>
<th>Chief Systems Engineers (CSE) view their responsibilities as:</th>
<th>Both roles are responsible for:</th>
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<tbody>
<tr>
<td>• Overall Results</td>
<td>• Technical Requirements</td>
<td>• Program/Project Risk</td>
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<tr>
<td>• Goals &amp; Objectives</td>
<td>• Systems Definition</td>
<td>• External Supplier Relations</td>
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<td>• Program &amp; Project Risk</td>
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<td>• Configuration Management</td>
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The integration must clarify how:

• **Responsibility can be effectively shared** for risk management, external suppliers, quality management and lifecycle planning; and

• **Communication optimized** for the other domains of responsibility.
Integration is...

- Having a shared set of objectives defined by the success of the overall effort...
- Everyone knowing what those objectives are...
- Clarity and understanding around everyone's roles and how they contribute to achieving the objectives...
- Respecting the value of the others’ role and contribution to achieving the objectives...
- Valuing and promoting “collaboration” over “competition”...
Unproductive Tension Results From...

- Failing to communicate and establish a common set of objectives “vision” shared by all...
- Individuals/groups focusing on achieving objectives defined by their own discipline identity and/or processes...
- Being unable to work together to achieve the globally-superior outcome...
- Not valuing the others’ role and contributions to achieving the globally-superior outcome...
A System View of PM/SE Integration

**Dimension I**
- Processes, Practices, and Tools
  - Use of combined standards
  - Clear roles and responsibilities
  - Assess use of leading practices
  - Boundary-spanning systems

**Dimension II**
- Organizational Environment
  - Promote the right culture
  - Value knowledge sharing
  - Reward and recognition
  - Strong executive support

**Dimension III**
- People Competencies
  - Experience in different roles
  - Education and certifications
  - Leadership and communications skills
  - Fast learning attitude

**Dimension IV**
- Contextual Factors
  - Program characteristics
  - Team characteristics
  - Organizational structure
  - Stakeholders alignment

**Dimension V**
- Effective Integration
  - Rapid and effective decision making
  - Effective collaborative work
  - Effective information sharing

**Dimension VI**
- Program Performance
  - Program schedule
  - Program budget
  - Client satisfaction
  - Client requirements

Processes, Practices, and Tools

Processes, practices, and tools help to enable integration by:

- Enabling communication and common understanding
- Defining specific work activities
- Establishing expectations of each person’s contribution
- Documenting approaches for coordinating and tracking work efforts
- Identifying critical points where individual and group work efforts must come together
- Facilitating problem identification and resolution
- Applying and updating best practices
- Supporting and improving specific work activities

Organizational Environment

- Organizational structures, behaviors, and norms shape how program participants work and interact with each other, and determine the nature of relationships.

- An integrated program environment should:
  - Narrow the cultural divide between PM and SE disciplines
  - Foster team building
  - Develop respect for each-others’ views and opinions
  - Build trust between executive management and program teams

Developing Integration Competencies in People

Organizations develop integration competencies in people by:

• Defining integration competencies using, e.g., standards, role definitions, and assessments
• Using education and training to develop integration competencies and teaming behaviors
• Managing integration competencies in the workforce at the individual and organizational levels

Contextual Factors

• Program and organizational characteristics influence management approaches
  – Management approach needs to be tailored to program realities
  – Management owns program culture which influences behavior throughout the program life cycle
  – Stakeholder alignment requires significant management and engagement
    • One view of the program
    • Transparency
    • Engagement/community

Integration as a Characteristic of the Organization

Integration is a reflection of the organization’s ability to combine program management and systems engineering practices, tools and techniques, experience, and knowledge in a collaborative and systematic approach in the face of different challenges, in order to be more effective in achieving a common goal/objective in complex program development environments.

Program Performance

• Integration influences key program performance elements
  – Cost and time show better performance with higher integration
  – Outcomes are more predictive with higher integration
  – Programs with schedule pressure are more resilient with higher integration

Royal Australian Navy’s Anzac Class Frigate

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<thead>
<tr>
<th>Integration Practices</th>
<th>Organizational Environment</th>
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<tr>
<td><strong>Integration Processes, Practices, and Tools</strong></td>
<td><strong>PM/SE leaders</strong></td>
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<td></td>
<td><strong>leaders worked closely</strong></td>
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<td><strong>Ensured contractors</strong></td>
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<td><strong>had direct links with each other to reduce third party bottlenecks</strong></td>
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Questions?

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