What's Different about an Integrated Approach?
Based on *Integrating Program Management and Systems Engineering* , Eric Rebentisch, Editor in Chief, 2017

"There's something happening here; what it is ain't exactly clear."
Steven Stills, *For What It's Worth* , Recorded by Buffalo Springfield

Factor:	Less Successful Approaches	Superior Approach
1. Needs of the program	The needs of the program or project are not critical; participants are content to conduct business as usual.	The needs of the overall program are sufficiently important that participants subordinate individual functional and organizational identities. Leaders and the numerous organizations involved in the program are deliberate about their intent to support an integrated, high-functioning relationship between the program manager (PM) and the chief systems engineer (CSE). Note: Transformational change often occurs during particularly turbulent times. Stated another way, troublesome times on programs and projects and in organizations provide an opportunity to enact needed change.
2. Vision, sense of purpose, and productive tension	A vision for the program or project is not articulated and embraced. A concerted effort to get all stakeholders and participants on the same page is not made. A strong sense of purpose is not created and instilled by the leaders. Unproductive tension jeopardizes efforts.	A vision for the program is articulated and communicated effectively to all participants in the program or project. A set of objectives is evolved and embraced by all stakeholders and participants. A strong sense of purpose is established. Productive tension exists throughout the project that strengthens efforts.
3. The roles of leaders	The PM works to determine the necessary work components and to develop the program implementation plan; the CSE attempts to optimize components and to describe and define the optimal solution. The problems that result from this mindset are lack of authority and responsibility for the systems engineer and inability of the systems engineering group to implement the program objectives.	Realizing that combining work under one individual does not scale well and, in the final analysis, does not really solve the issue of unproductive tension across the organization; and that one must find a way to promote integration across the organization, the PM and the CSE embrace the goal of excellent program and technical performance. Senior leaders play a defining role in establishing a vision and ensuring integration; they are willing to expend time, resources, and leadership capital over an extended period of time to ensure that the entire program participates in enacting the vision. They provide a critical need: **systems thinking** [looking at the whole rather than the individual parts in order to gain a better understanding]. The leaders possess a high degree of emotional intelligence (self-awareness, self-regulation, motivation, empathy, and social skills).

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4. Leadership style	"Leaders" manage. They have relatively limited authority and freedom to make decisions.	"Leaders" lead. Executives create an appropriate organizational climate with clear and consistent values and purpose to help improve employees' satisfaction and value contribution. Leaders have the authority and the freedom to make decisions as required to adapt to the situation at hand. Leaders provide a model of rejecting blaming behaviors. Complex programs require leadership skills that encourage an environment of inclusivity, collective creating, shared ownership, and large scale transformation. Leaders have critical thinking, influence, motivation, and conscientiousness competencies. They are ethical. They possess intracultural relations skills. Leaders energize people to give their best efforts, empower them with appropriate authority, and enable them to build collaborative networks that deliver results for the organization. Leaders demonstrate the behaviors they expect their teams to mirror.
5. Trust	There is a lack of trust and a lack of respect for each other's discipline. There is a lack of trust, openness, collaboration, and shared responsibility among professionals from different areas of the organization.	There is a good working relationship between the PM and the CSE. A culture of trust, openness, collaboration, and shared responsibility for the success of the program is developed among professionals from all areas of the organization.
6. Goal(s)	1) Customer satisfaction 2) Cost 3) Schedule 4) Deliver a system that can be verified against its requirements and validated by the customers 5) Program benefits 6) Business value	Clear and shared goals, responsibility for the whole program's success, people working together to make things work, deliver a system that meets the program needs. The program management team is accountable. Excellent program and technical performance. Note: Ironically, if a program delivers what it promised, the fact that it is over budget or late is usually not determinative of the ultimate success of the program!
7. Objective	PM: Manage for benefits delivery CSE: Optimize the components	Find ways to apply the specialized knowledge of both disciplines in a way that works to produce a sum greater than the parts (empowered teams).
8. Limitation/Result of this approach	Members of the PM and SE fields see solutions through their respective lenses ("isolated mind sets"). Key program risks may not be identified.	An integrated approach is more likely to identify and address key program-level risks.

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9. Culture	Lack of effective teamwork. Tension exists among the PM and SE disciplines that has its roots in the specialized practices and standards that are highly role-specific and often have different measures of success. The organizational culture reflects a characteristic division of labor, responsibility, and accountability where program management jealously defends its role as business overseer and decision maker while the systems engineering function protects its authoritative role as exclusive technical advisor and the decision point for all technical issues. Program issues that arise are divided into technical and programmatic challenges. The issues are then assigned to the one domain with little communication or concern for the other. This approach to managing complex programs can have a measurable negative impact on progress, productivity, quality, and the end result. A persistent siloed culture exists that inhibits alignment of practices, effective communication, mutual respect, and collaboration.	Effective teamwork. Integration is addressed by utilizing the concept of organizational culture through the combination of elements that frame the perceptions, decisions, and actions that help people to work together more effectively. The promise of a single, strong, and cohesive organizational culture is that it helps its employees to share goals across critical boundaries, be more committed to working together toward common objectives, understand what to do when the situation is uncertain, promote more group cohesion and capability around solving problems and learning, and improve clarity around the "big picture" for the organization.
10. Approach and Values	Informal. Members of the PM and SE areas on programs and projects each pursue their work based on traditional values of separate disciplines. The practices, principles, guidelines, standards, and approaches of "my" discipline are better. Cost-driven. "Buy-in" (commitment) from technical contributors is limited and undermined.	Formal or deliberate. Use of mechanisms such as an organizational effectiveness seminar or the "partnering process" that results in commitment of all participants to the program objectives and formally defined processes to evolve a common goal of improved technical program performance. Achieving effective teamwork is paramount in getting things done.
11. Work environment (See Chapter 9)	The opportunities and rationales for the two disciplines not working together closely are manifold, and the result can be unproductive tension or worse. Examples based on interviews with PMs and CSEs: 1) Failing to communicate and establish a common set of objectives shared by all; 2) Individuals and groups focusing on achieving objectives defined by their own discipline identity and/or process; 3) Being unable to work together to achieve the desired outcome; 4) Not valuing others' roles and contributions to achieving the desired outcome.	Based on trust, respect, and collaboration. Using active approaches to develop and maintain an integrative and collaborative team, results such as those that have been achieved on several major successful programs can become the norm. For example, among many major successful complex programs are: - Development of the F/A-18 E/F Super Hornet aircraft (see Chapter 7). - Development of an improved tactical electronic support capability for Anzac class frigates for the Royal Australian Navy (see section 12.5). - SpaceX. - The Big Dig. - The 2012 London Olympics. - The Airbus A380 and the Boeing 787 Dreamliner planes with longer range and higher fuel efficiencies.

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12. Behavioral approach	Employees are viewed as resources to accomplish work.	Employees' psychology and fit within their organization is important - leadership, recognition, interpersonal skills, communication, and motivation are valued. Integration is influenced by how people in organizations interact with one another and how the organization encourages their participation and mental and emotional well-being.
13. Clearly defined roles and responsibilities	The research results are that the lack of clearly defined roles and responsibilities between program managers and systems engineers is a primary source of unproductive tension.	
14. Organizational Environment [Organizational structures, behaviors, and norms shape how program participants work and interact with each other.]	Rules are used to encourage behavior. There is a hierarchical structure. Individual voices are not heard. Creativity is not encouraged. There is difficulty merging the technical with the creative. Feedback from customers and end users is not valued. There is distrust between executives and staff. There is too much focus on the bottom line.	The organizational culture is based on effective trust, communication, cooperation, and teamwork. Integrative programs are essential in developing strategies for maintaining sustainability over the long term. A "**systems perspective**" [The mental view of an organization's ability to combine program management and systems engineering practices, tools, techniques, experience, and knowledge in a collaborative and systematic approach in the face of challenges, in order to be more effective in achieving common goals and objectives in complex program environments] increases the likelihood of program success. Incentives including those relating to policy, leadership, value propositions, and contractual obligations foster positive, cooperative outcomes and encourage integration of SE and PM goals and objectives. Change implementation practices are embraced.
15. Expectations	Stakeholders are allowed to believe that all of their needs will be met in the delivered system.	Leaders continually engage and proactively communicate with stakeholders concerning expectations that can actually be realized.
16. Organizational competencies	The PM is viewed as a "hero" figure responsible for a program or project's success or failure.	The PM and the CSE provide creative tension that unleashes energy and fosters teamwork. Organizational competencies reflect an organization's values, culture, and business strategies. All organizations should have competency models that describe successful performance (for the organization, program, and a particular role or position).
17. Training and people development	Training and people development is not perceived as critical to achieving program performance.	Training and people development are perceived as critical to achieving program performance.

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18. Technology	Often, the challenges, unknowns, and knowledge necessary to address program-specific challenges are not addressed thoroughly. What disciplines must contribute and how will their knowledge be integrated within the program?	Develop initial technical requirements to utilize as much relevant existing technology as possible to reduce both the level of complexity and potential risk. Select mature technologies to limit the overall program scope. Negotiate tradeoffs and develop alternate solutions. Place nonessential upgrades on a separate development path for later integration.
19. Use of effective requirements practices	If the PM and the CSE cannot effectively collaborate with customers and other stakeholders to ensure that there are stable requirements, both may share responsibility for program failures associated with cost, schedule, performance, and solutions.	Capture a value proposition reflective of the highest level of value utilizing a team in which the individuals can apply their own competence, wisdom, and experience, and then negotiate with the team to reach consensus.
20. Use of effective risk management practices (See the SE Handbook [INCOSE, 2015, pp. 114-122] for a thorough overview)	Too often, risk management activities are not focused on ensuring that the sponsoring organization realizes its desired benefits, for example, stakeholders are not engaged early in the program to discuss their expectations regarding management of uncertainty.	Tailor the risk management approach to the particular needs and overall goals of the specific program. The assessment and reduction of uncertainties and risk must become a natural part of all program planning and decision making and must be owned by both the PM and CSE.
21. Ability to apply and utilize the decision-management process	The technical management process is performed independently by the program management and systems engineering roles. Tension between the roles is resolved unproductively.	Decision management is a shared responsibility (between the PM and the CSE) and is team-based. *Opportunity management* is analogous to risk management but considers potential *positive* outcomes instead of, or in addition to, negative ones. Creative tension [the gap between the current "as-is" reality and an individual's or an organization's "to-be" vision] if addressed and managed productively, is the source of creative energy.
22. People competencies	6	The program or project is staffed with people who have the appropriate skills and background (see Chapter 10).
23. Processes, practices, and tools	High performance within specialized disciplines. For example, systems engineers use systems engineering standards exclusively and program managers use program and project management standards exclusively.	Formally codified processes, practices, and tools are used to define the work in a way that embeds collaboration, communication, and shared decision making in the tasks. Mechanisms such as joint early planning, formal gate reviews, dedicated team meeting space, iterative development, standards/methodologies/assessments, work design processes, and technical performance measures (TPM) are used. See Chapter 8.
24. Formal assessments of practices and capabilities	Not used.	Used. For example, a comprehensive review and assessment process initiated by the UK Cabinet Office in 2011 shifted many programs and projects from being at risk of failure to improved performance.

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25. Continuous improvement	Not expected.	Expected and integrated into work processes. Organizations view continuous improvement of their processes as a competitive advantage.
26. Program complexity	Typically grows in an uncontrolled manner.	Reduced proactively by (for example) using a derivative product strategy and leveraging organizational relationships.
27. Integration	Low engagement - only 30%of U.S. workers report that they are engaged at work. The program or project team is pushed to start development prematurely (before technical requirements and components have been validated by systems engineering), limiting integrated planning. Program management and systems engineering behaviors often operate in separate silos due to separate life cycles, standards, missions, goals, influences, cultures, and perspectives.	Integration between systems engineering, the program management team, and the operations team should be initiated during the earliest stages of the program and continue throughout the program. Four conditions in successful organizations that create program management and systems engineering integration and team-oriented behaviors are: 1) Use standards from both domains; 2) Formalize the definition of integration; 3) Share responsibilities in key areas; and 4) Develop integrated engineering program assessments. Systems engineering is the emerging paradigm in complex environments to transfer governance from program-based to system-based governance and thereby increase the probability of holistic success. Systems integration is a form of governance that can surface problems and solve them long before they spiral out of control. See Table 11-4, Optimizing the Benefits of Integration
28. Integrated Product Delivery (IPD)	An important example of integration during program delivery that is often overlooked is the integration and coordination of the program team with operations - those who will actually execute or operate the program or project.	Integrated Project Delivery (IPD) is a delivery approach that integrates people, systems, business structures, and practices into a process that collaboratively harnesses the talents and insights of all participants to optimize results, increase value to the owner, reduce waste, and maximize efficiency through all phases of design, fabrication, and construction.
29. Evaluating Integration Activities Integration is composed of three main factors: rapid and effective decision making; effective collaboration work; and effective information sharing.	No or very limited effort is made to measure, monitor, or evaluate integration activities that are made on programs, projects, or in the organization. The research showed that programs with even a moderate degree of integration may achieve significant benefits; and that programs, projects, and organizations with greater integration are *significantly more likely* to achieve better performance in schedule, budget, meeting client requirements, and overall client satisfaction.	PMs and CSEs share a common vision of program goals, objectives, priorities, benefits, and results. The PM and the CSE consider goals in each others domains when resolving issues and making decisions. All core program, project, or organization team members actively participate in program decisions and collaboratively tackle problems and challenges with enthusiasm and commitment. Team members demonstrate commitment to executing and achieving program and organizational performance. Communication between and among the PM, CSE, and team members is effective. All team members have full and easy access to the information they need. Note: Section 12.6 provides a concise explanation of and guide to how to undertake an integration improvement initiative.

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30. Metrics used to evaluate progress and success	Planned results mindset: schedule adherence, resource utilization, (low) change rates, weekly or monthly status reports.	Desired results mindset: technical excellence, process discipline, PM/Team interactions daily, team productivity, customer happiness, performance tracking transparent and done in an openly visual way, continuous significant reduction of critical defects, increase in employment engagement, very high productivity levels, pervasive culture focused on delivering great solutions for customers.
31. Talent Management	A capability that encourages and fosters improved communication, collaboration, and team effort to deliver results is lacking.	A capability is provided in an organization that provides resources to help people understand vital elements of multiple disciplines and key points of integration so that they are better able to communicate, collaborate, and deliver results.
32. Methodologies	The organization does not develop and institutionalize documented, aligned, integrated methodologies (practices, techniques, procedures and rules used to meet requirements and deliver value to stakeholders; it relies on ad hoc processes.	The organization develops and uses documented, aligned, integrated methodologies. Business process management and ongoing process improvement is valued by organizational leaders.