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INTEGRATION of PROJECT MANAGEMENT and SYSTEMS ENGINEERING

San Diego INCOSE Mini-Conference

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John Wood, PhD, PMP, ASEP
Director, Systems Engineering Education
jwood@calipm.org

Yves Theriault, PhD, PMP
President
ytheriault@calipm.org

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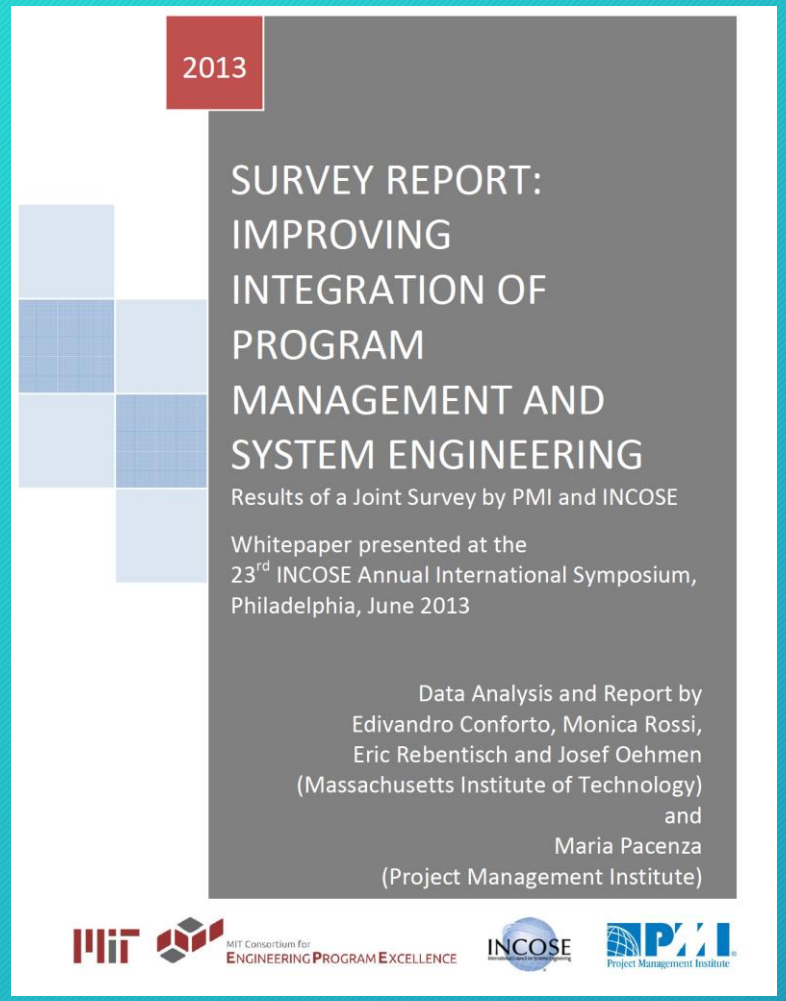

- 680 Systems Engineers & Program Managers
  - 467 Program Managers
  - 356 Chief Systems Engineers
- Organizations that are better integrated use standards. They are also more effective.

What are the most important skills to succeed as PM or SE?

Skill	PM (%)	SE (%)
Leadership	58	39
Communication	61	42
Stakeholder Management	40	18
Systems Thinking	22	86
Requirements Management	11	46

- F … en PM a…
- D… pline.
- … y … l Alignment
  - Formalizing the definition of integration
  - Developing integrated engineering program assessments
  - Effectively sharing responsibility for risk management, quality, lifecycle, and external suppliers.

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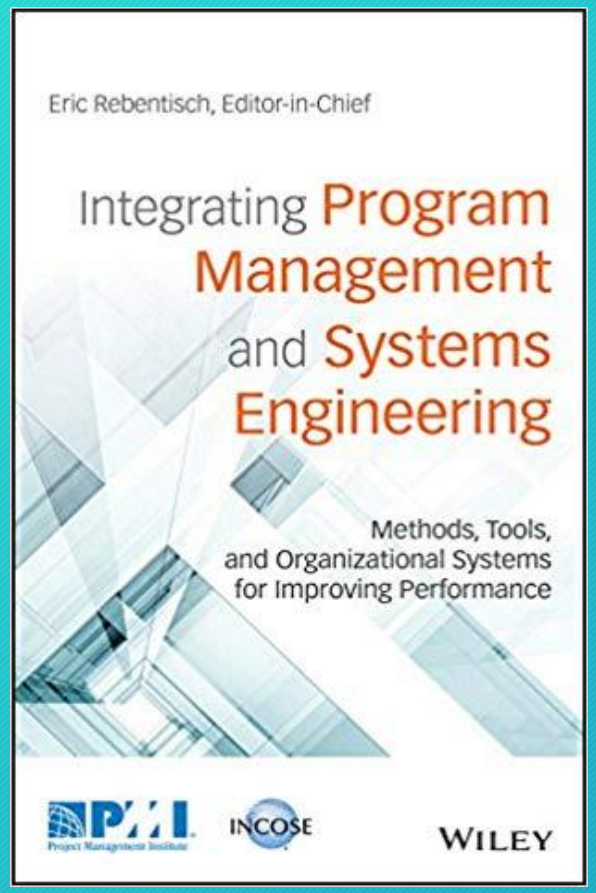
Selected Prior Work



Part I: In search of integrated solutions

Part II: Building capabilities to effectively execute engineering programs

Part III: Developing integration competencies in your organization

Part IV: A call to action

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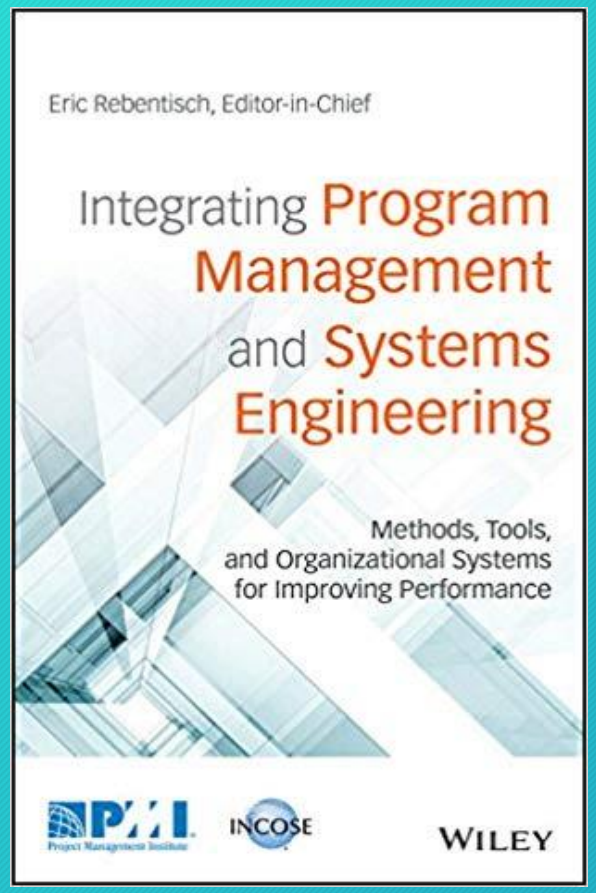

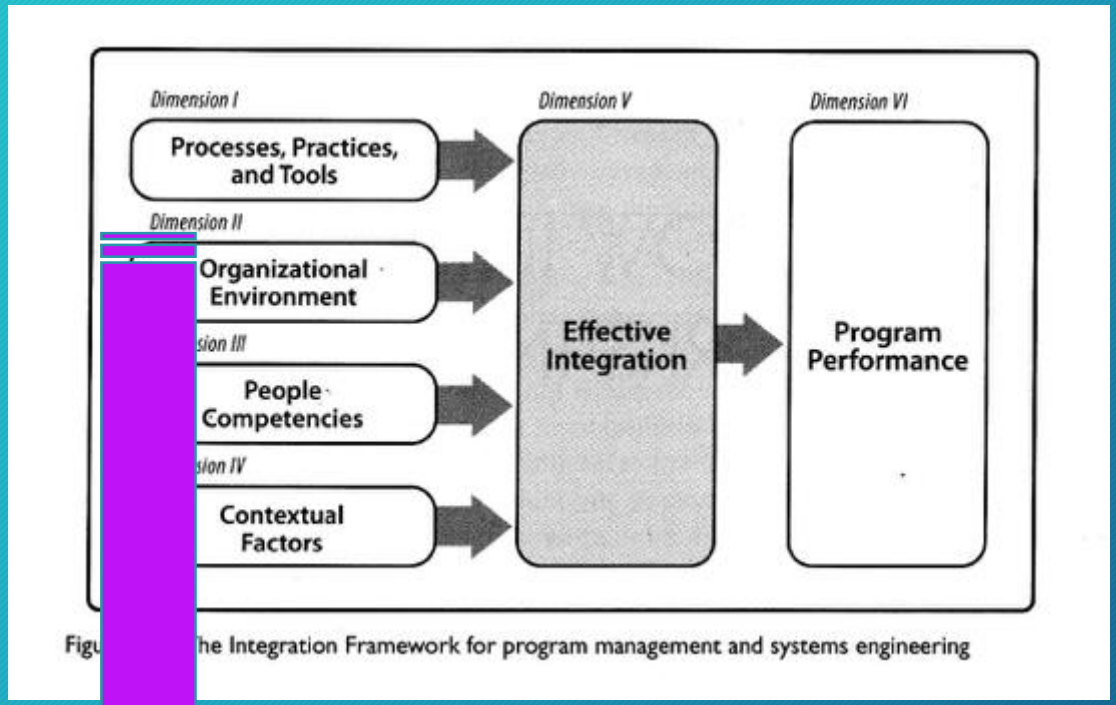

Figu he Integration Framework for program management and systems engineering

The Learning Organization Model

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IMPORTANT ASSUMPTIONS

1. Integration must start with Project Management and Systems Engineering Standards
2. The relationships between Project and Program Management shall be as defined by PMI
3. The Project Manager and Systems Engineer must work together as a TEAM and share ALL responsibilities
4. Leadership and Communication should be a Priority when training and aligning
5. The Model of the Learning Organization shall govern the Standards

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Important Assumption:
The PMBOK can be used to manage Any and All projects, to include Engineered Systems Projects

Knowledge Areas	Project Management Process Groups				
	Initiating Process Group	Planning Process Group	Executing Process Group	Monitoring and Controlling Process Group	Closing Process Group
4. Project Integration Management	4.1 Develop Project Charter	4.2 Develop Project Management Plan	4.3 Direct and Manage Project Work 4.4 Manage Project Knowledge	4.5 Monitor and Control Project Work 4.6 Perform Integrated Change Control	4.7 Close Project or Phase
5. Project Scope Management		5.1 Plan Scope Management 5.2 Collect Requirements 5.3 Define Scope 5.4 Create WBS		5.5 Validate Scope 5.6 Control Scope	
6. Project Schedule Management		6.1 Plan Schedule Management 6.2 Define Activities 6.3 Sequence Activities 6.4 Estimate Activity Durations 6.5 Develop Schedule		6.6 Control Schedule	
7. Project Cost Management		7.1 Plan Cost Management 7.2 Estimate Costs 7.3 Determine Budget		7.4 Control Costs	
8. Project Quality Management		8.1 Plan Quality Management	8.2 Manage Quality	8.3 Control Quality	
9. Project Resource Management		9.1 Plan Resource Management 9.2 Estimate Activity Resources	9.3 Acquire Resources 9.4 Develop Team 9.5 Manage Team	9.6 Control Resources	
10. Project Communications Management		10.1 Plan Communications Management	10.2 Manage Communications	10.3 Monitor Communications	
11. Project Risk Management		11.1 Plan Risk Management 11.2 Identify Risks 11.3 Perform Qualitative Risk Analysis 11.4 Perform Quantitative Risk Analysis 11.5 Plan Risk Responses	11.6 Implement Risk Responses	11.7 Monitor Risks	
12. Project Procurement Management		12.1 Plan Procurement Management	12.2 Conduct Procurements	12.3 Control Procurements	
13. Project Stakeholder Management	13.1 Identify Stakeholders	13.2 Plan Stakeholder Engagement	13.3 Manage Stakeholder Engagement	13.4 Monitor Stakeholder Engagement	

Integrate

Integrate

Technical processes

- Business or mission analysis process
- Stakeholder needs & requirements definition process
- System requirements definition process
- Architecture definition process
- Design definition process
- System analysis process
- Implementation process
- Integration process
- Verification process
- Transition process
- Validation process
- Operation process
- Maintenance process
- Disposal process

Technical management processes

- Project planning process
- Project assessment and control process
- Decision management process
- Risk management process
- Configuration management process
- Information management process
- Measurement process
- Quality assurance process

Agreement processes

- Acquisition process
- Supply process

Organizational project-enabling processes

- Life cycle model management process
- Infrastructure management process
- Portfolio management process
- Human resource management process
- Quality management process
- Knowledge management process

PMBOK Covers these 3 knowledge areas

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Integrated Processes

	Project & Product Management Process Groups						
	Project Life Cycle						
	Product Life Cycle						
Knowledge Areas	Initiating	Planning	Executing	Monitoring and Controlling	Closing	Utilizing and Supporting	Disposing
4. Project Integration Management	4.1 Develop Project Charter	4.2 Develop Project Management Plan.*	4.3 Direct and Manage Project Work. 4.4 Manage Project Knowledge	4.5 Monitor and Control Project Work. 4.6 Perform Integrated Change Control.	4.7 Close Project or Phase		
5. Project Scope Management		5.1 Plan Scope Management. 5.2 Collect Requirements 5.3 Define Scope. 5.4 Create WBS		5.5 Validate Scope. 5.6 Control Scope.			

	Project & Product Management Process Groups						
	Project Life Cycle						
	Product Life Cycle						
Knowledge Areas	Initiating	Planning	Executing	Monitoring and Controlling	Closing	Utilizing and Supporting	Disposing
4. Project Integration Management	4.1 Develop Project Charter 4.1.1 Analyze Business Need or Mission 4.2 Stakeholders & Needs and Requirements.	4.2 Develop Project Management Plan.*	4.3 Direct and Manage Project Work. 4.3.1 Perform Design Development. 4.3.2 Implement Systems, Components, Subsystems, System Integration 4.4 Transition Systems to Operations. 4.5 Manage Project Knowledge	4.6 Monitor and Control Project Work. 4.6.1 Validate Design Requirements. 4.6.2 Verify Systems Parts, Components, Subsystems, Requirements. 4.6.3 Perform Verification 4.6 Perform Integrated Change Control 4.6.1 Perform Integrated Change Control	4.8 Close Project or Phase	4.9 Operate System 4.10 Maintain System	4.11 Disposal of System
5. Project Scope Management		5.1 Plan Scope Management. 5.2 Collect Requirements 5.2.1 Elicit, Refine, Define System Requirements. 5.2.2 Define Architecture 5.3 Define Scope. 5.4 Create WBS		5.5 Validate Scope. 5.5.1 Validate System of Interest 5.6 Control Scope.			

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The Remainder of the Mapping Remains the same.

	Project & Product Management Process Groups						
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10. Project Communications Management		10.1 Plan Communications Management	10.2 Manage Communications.	10.3 Monitor Communications.			
11. Project Risks Management		11.1 Plan Project Risks Management. 11.2 Identify Risks. 11.3 Perform Qualitative Risk Analysis. 11.4 Perform Quantitative Risk Analysis. 11.5 Plan Risks Responses.	11.6 Implement Risk Responses	11.7 Monitor Risks			
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13. Project Stakeholders Management	13.1 Identify Stakeholders	13.2 Plan Stakeholder Engagement	13.3 Manage Stakeholder Engagement	13.4 Monitor Stakeholder Engagement			

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PROGRESSIVELY ELABORATED

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1.1 Project Management
1.1.1 Project Charter
1.1.2 Project Management Plan
1.1.2.1 Scope management plan
1.1.2.2 Systems Engineering management plan
1.1.2.3 Requirements management plan
1.1.2.4 Schedule Management plan
1.1.2.5 Cost management plan
1.1.2.6 Quality management plan
1.1.2.7 Resource management plan
1.1.2.8 Communications management plan
1.1.2.9 Risk management plan
1.1.2.10 Procurement management plan
1.1.2.11 Stakeholder engagement plan
1.1.2.12 Scope baseline
1.1.2.13 Schedule baseline
1.1.2.14 Cost baseline

1.1.2.2 Systems Engineering Management Plan***
1.1.2.2.1 Systems Engineering Specialty Integration
1.1.2.2.1.1 System operational requirements
1.1.2.2.1.2 Software requirements
1.1.2.2.1.3 Reliability, Performance Measures (TPMs)
1.1.2.2.1.4 Functional analysis (system level)
1.1.2.2.1.5 Allocation of requirements
1.1.2.2.1.6 System Synthesis, Analysis, and System definition
1.1.2.2.1.7 System test and evaluation
1.1.2.2.1.8 Manufacturing and production engineering
1.1.2.2.1.9 Logistics and supportability engineering
1.1.2.2.1.10 Disposability engineering material recycling/disposal
1.1.2.2.2 Engineering Specialty Integration
1.1.2.2.2.11 Quality engineering
1.1.2.2.2.12 Environmental engineering
1.1.2.2.2.13 Value/Cost engineering
1.1.2.2.2.14 Other disciplines as needed
1.1.2.2.3 References (Specifications, Standards, Plans, Procedures, etc.)

*** Adapted from Systems Engineering Management, Blanchard Benjamin S. 4th Edition, 2008, John Wiley & Sons. ISBN: 978-0-470-16735-9

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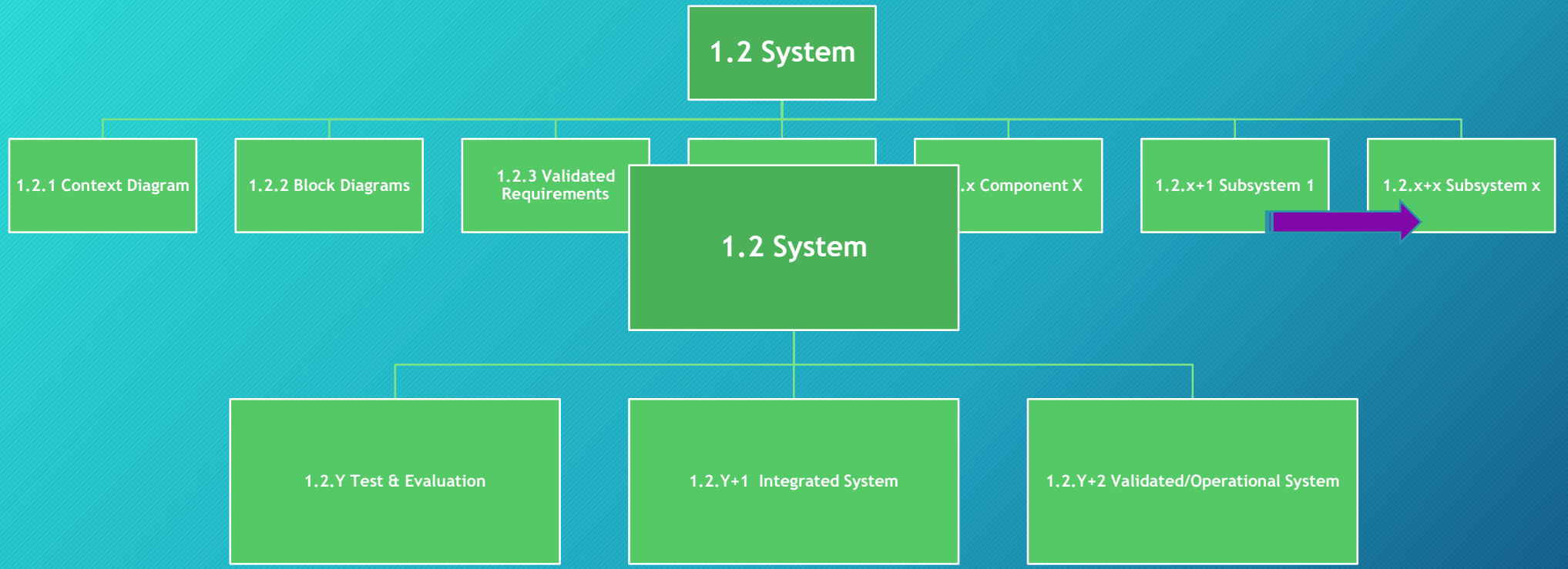
WORK BREAKDOWN STRUCTURE



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IN 2019
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