33rd Annual INCOSE international symposium

hybrid event

Honolulu HI USA

Tensions and Opportunities: Program Management and Systems Engineering

Dr. Tina P. Srivastava (MIT) | Mark S. Kaufman (MITRE) | July 2023

LEARNING OBJECTIVES

At the conclusion of this session, participants will be able to:

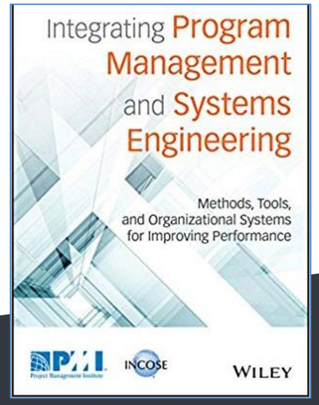
1. Identify opportunities to achieve improved program outcomes and reduced overruns in complex environments.

2. Critically evaluate and, when necessary, credibly challenge management on potentially unrealistic expectations related to project cost, schedule, scope, and risk.

DR. TINA P. SRIVASTAVA

- S.B. Aeronautics & Astronautics, MIT
- S.M. Engineering & Management, MIT
- Ph.D. Strategy, Innovation, & Engineering, MIT

Founded security company with fellow MIT alums; exited to public company



- Board of Directors
- Co-author

Co-Founder Badge Inc.

badge

MIT

Zero-Gravity Flight Testing

Pilot

Raytheon

INCOSE

- Chief Engineer, Raytheon
- $40M Radar Program
- Team of 30
- Received National Recognition for Technical Innovation

www.incose.org/symp2023

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Bachelor Engineering

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Department Manager
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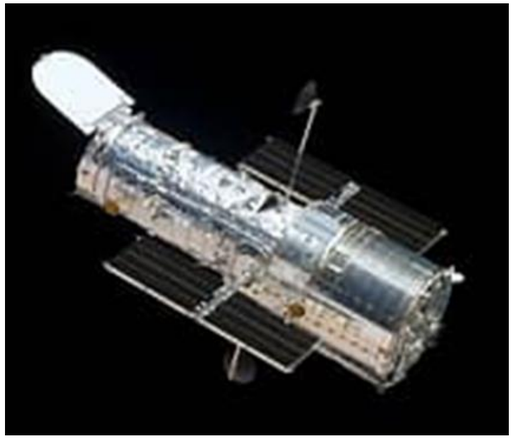
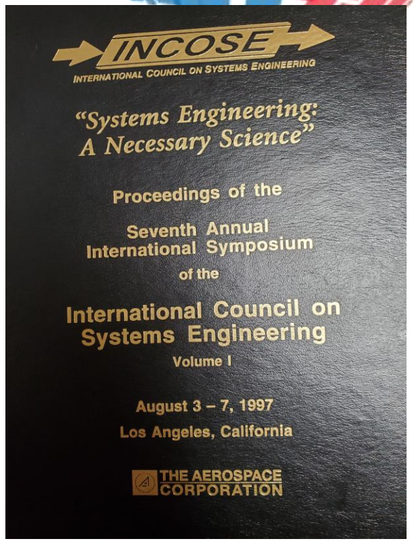
EARTH OBSERVING SYSTEM





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Source: Minerva Studio

Source: Zurijeta

EXERCISE:

"Who Has the Responsibility?"

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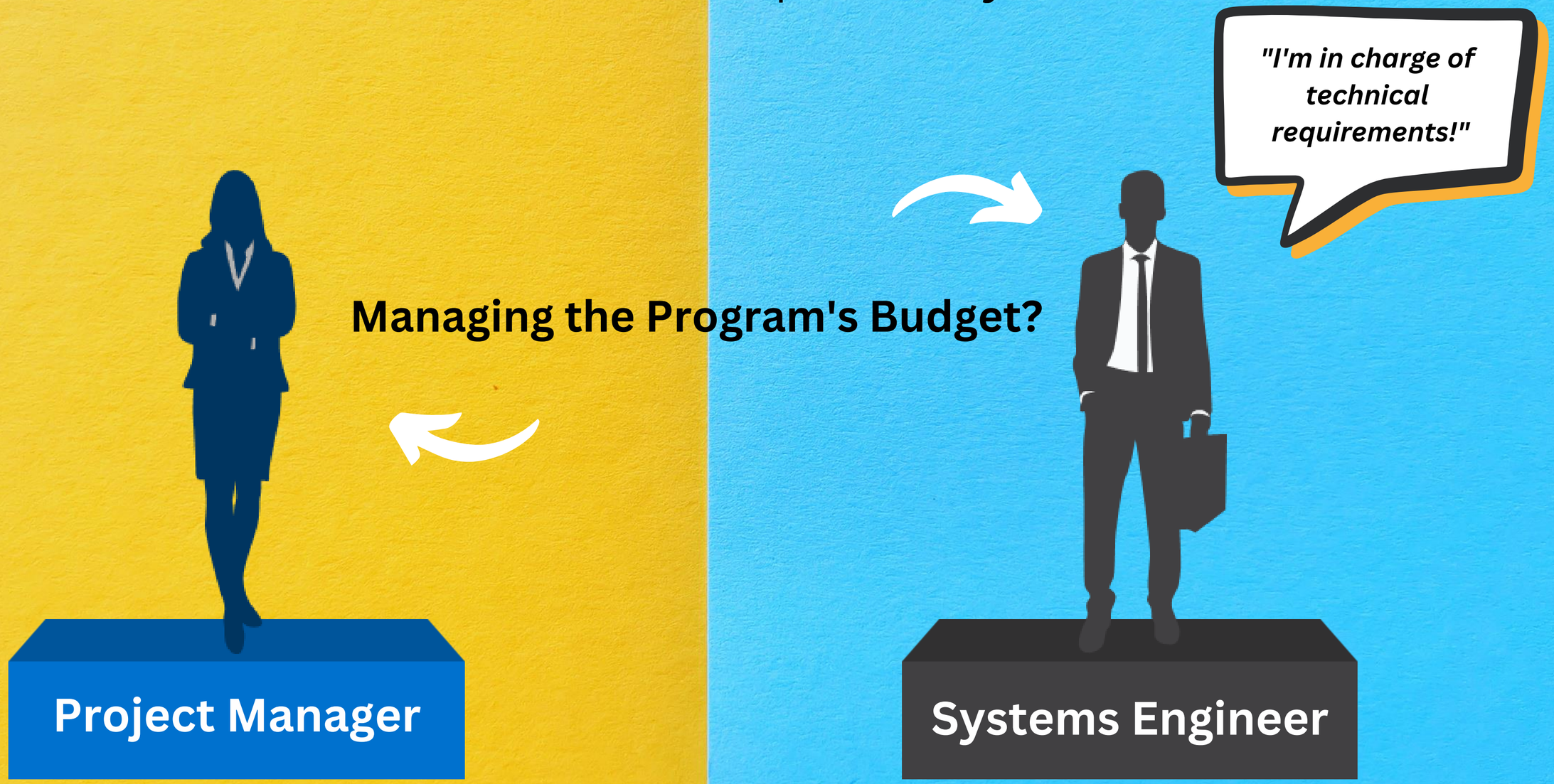
Technical Requirements?

Project Manager

Systems Engineer

EXERCISE:

"Who Has the Responsibility?"



EXERCISE:

"Who Has the Responsibility?"

"I manage the project's budget!"

Project Manager

Systems Engineer

Responsibilities:

- Technical Requirements

EXERCISE:

"Who Has the Responsibility?"

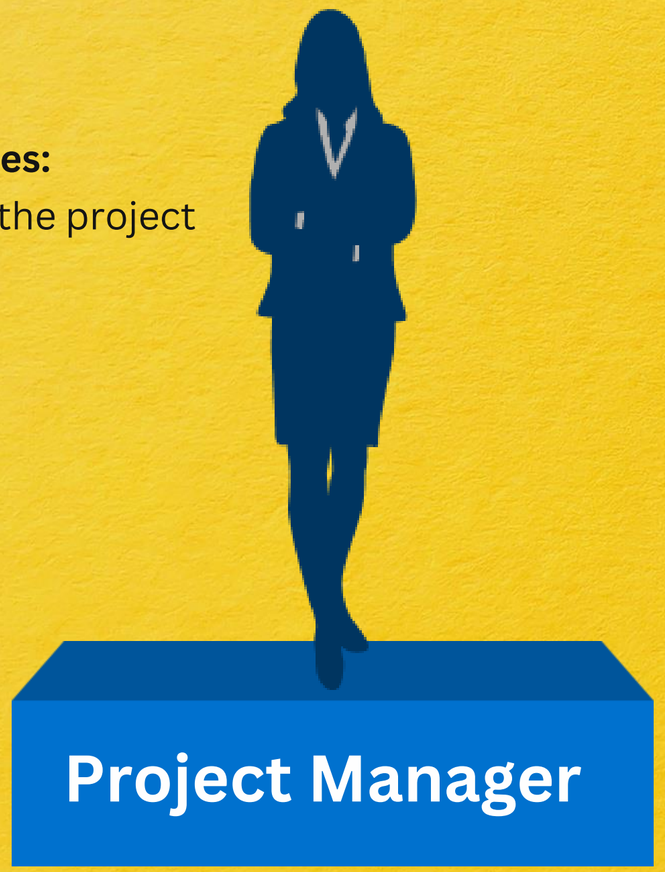
Life Cycle Planning?

External Supplier Relations?

Program/Project Risk?

Responsibilities:

- Managing the project budget



Project Manager

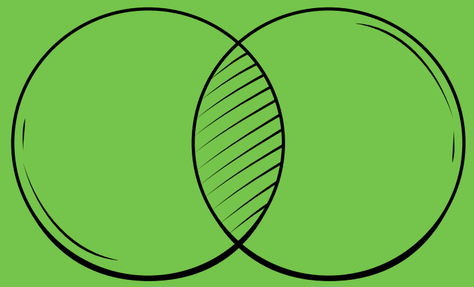
Systems Engineer

Responsibilities:

- Technical Requirements

EXERCISE:

"Who Has the Responsibility?"



Life Cycle Planning

External Supplier Relations

Program/Project Risk

Responsibilities:

- Managing the project budget

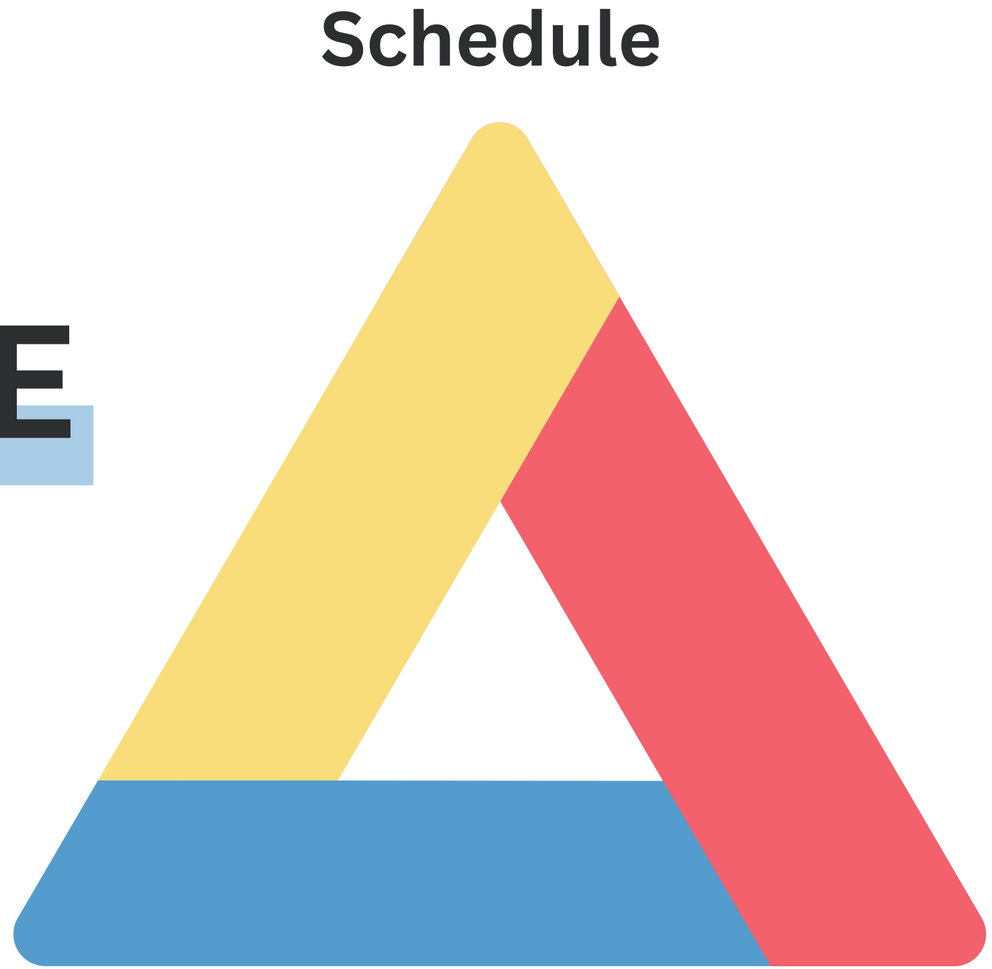
Project Manager

Responsibilities:

- Technical Requirements

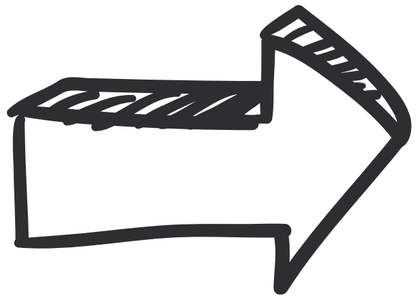
Systems Engineer

IRON TRIANGLE



HOW DO WE ACHIEVE A VISION OF INTEGRATED PROJECT MANAGEMENT AND SYSTEMS ENGINEERING?

- Who controls scope?
- How do we meet budget?
- Who is responsible for delays?



Successful delivery of stakeholder value requires contribution, collaboration, and cooperation across disciplines.

Source: Comstock Images

OVERLAPPING RESPONSIBILITIES:

THE SYSTEMS ENGINEER VIEW

SOMETIMES:

- THE PROJECT MANAGER IS THE TECHNICAL LEADER
- THE SYSTEMS ENGINEER IS THE PROJECT MANAGER

SYSTEMS ENGINEERING VIEW:

- Systems engineering **integrates all disciplines and specialty groups into a team effort** forming a structured development process that proceeds from concept to production to operation.
- Systems Engineering considers both the business and technical needs of all customers with the goal of providing a quality product that meets the user needs. [1]

[1] Source: INCOSE Web Site

OVERLAPPING RESPONSIBILITIES:

THE PROJECT MANAGER VIEW

Source: Pexels

PROJECT MANAGEMENT VIEW:

- Project managers play the lead role in **planning, executing, monitoring, controlling, and closing out projects.**
- They are accountable for the entire project scope, the project team and resources, the project budget, and the success or failure of the project. [2]

[2] Source: cio.com

WHAT CAUSES THE TENSION?

- Conflicting practices between the two roles
  - + Focus on achieving objectives defined by discipline
- Not valuing the other role
- Lack of planning for the integration of roles
- Roles and responsibilities not clear or respected
- Who works for who?
- Not having clearly defined authority
- Failing to communicate a common set of objectives and vision
- Unclear communication

How Do We Manage Unproductive Tension?

Source: FatCamera/Getty Images Signature

TANGIBLE EFFECTS OF UNPRODUCTIVE TENSION

Source:https://project-management.com/how-to-avoid-project-failure-effective-scheduling

Source: LawrenceSawyer/Getty Images Signature

Source: gregory_lee/Getty Images Pro

INTEGRATING THE ROLES

The Team Recognizes their Shared Objectives

The Team Understands the Objectives and How Each Contributes to Them

The Team Understands Each Other's Role

The Team Respects All the Roles and Their Associated Contributions

The Team Values "Collaboration" over "Competition"

PROJECT MANAGER AND SYSTEMS ENGINEER ARE DISTINCT ROLES – WITH SOME IMPORTANT OVERLAP

Project Managers (PM) view their responsibilities as:

- Overall Results
- Goals & Objectives
- Program & Project Risk
- External Supplier Relations
- Lifecycle Planning

Systems Engineers view their responsibilities as:

- Technical Requirements
- Systems Definition
- Systems Requirements
- Configuration Management

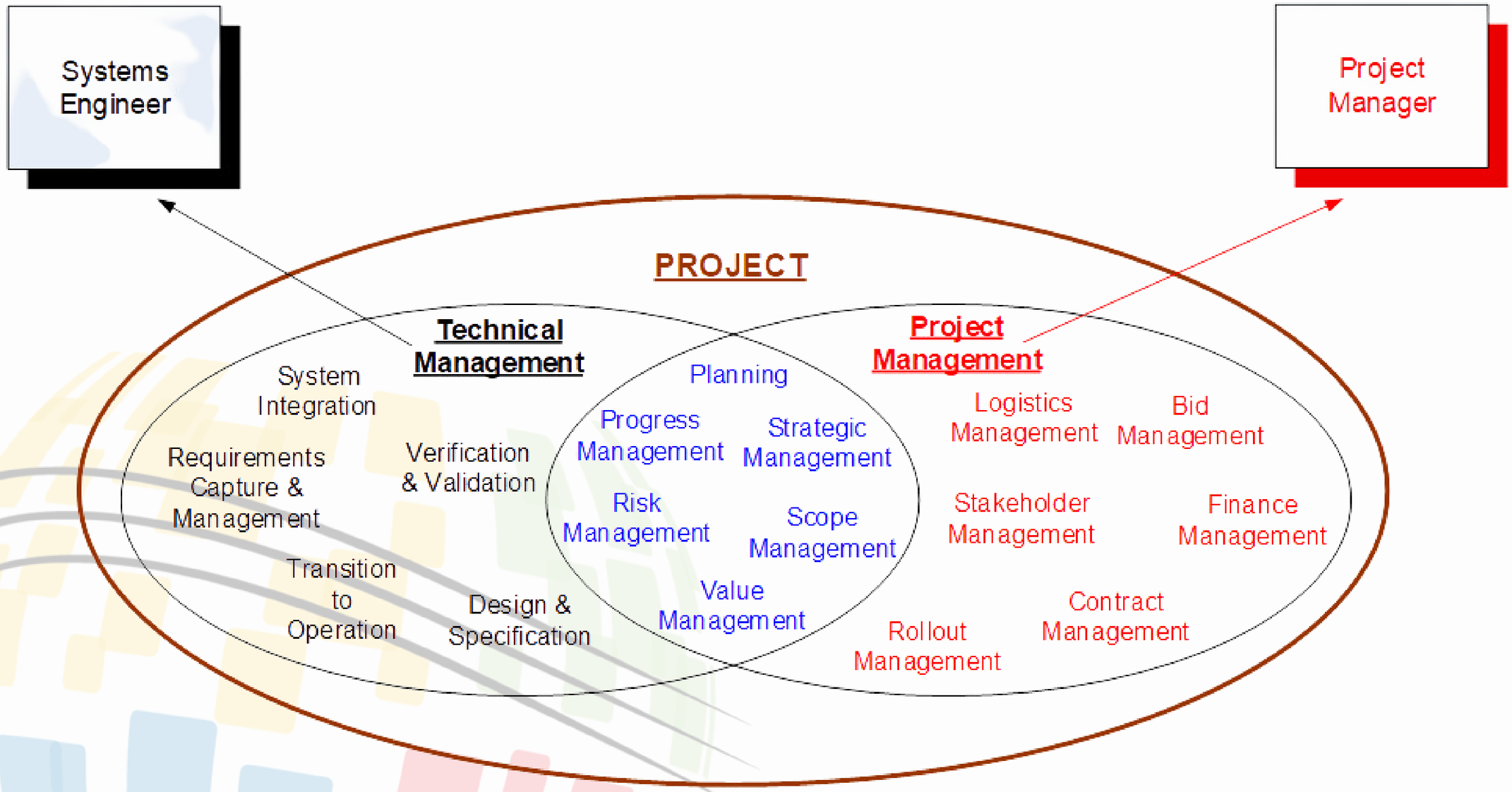
Both roles are responsible for:

- Program/Project Risk
- External Supplier Relations
- Quality Management
- Lifecycle Planning

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.

WHAT ARE THE PM AND SE INTERSECTIONS?



MOVING TOWARDS EFFECTIVE PM/SE INTEGRATION

Processes, Practices and Tools
- Use of combined standards
- Clear roles and responsibilities
- Use of leading practices
- Boundary spanning systems

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

People Competencies
- Experience in different roles
- Education and certifications
- Leadership/comm. Skills
- Fast learning attitude

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Effective Integration

Rapid and effective decision making

Effective collaborative work

Effective information sharing

Program Performance

Program schedule

Project budget

Client satisfaction

Client requirements

Source: Rebentisch et al (2017)

PUTTING THIS INTO PRACTICE

Processes, Practices, and Tools

- Enable communication and common understanding
- Define specific work activities
- Establish expectations for each person
- Coordinate and tack work efforts
- ID critical points where work efforts come together
- Facilitate problem identification and resolution
- Best practices

Organizational Environment

- Establish positive culture
- Grace and respect
- Narrow the cultural divide between PM and SE
- Team building
- Develop respect for views and opinions across disciplines
- Establish working relationship between PM and SE management
- Build trust between executives and project team

Integration Competencies in Staff Members

- Develop standard role definitions and communicate
- Develop integration competencies and teaming behaviors on project staff
- Manage integration competencies in the workforce at individual and organizational level

PUTTING THIS INTO PRACTICE

Contextual Factors

- Tailor management approach to project realities
- Develop and own project culture to influence behavior throughout the project life cycle
- Stakeholder and team alignment
- One view of the project
- Transparency
- Engagement - Community

Integration as Organization Characteristic

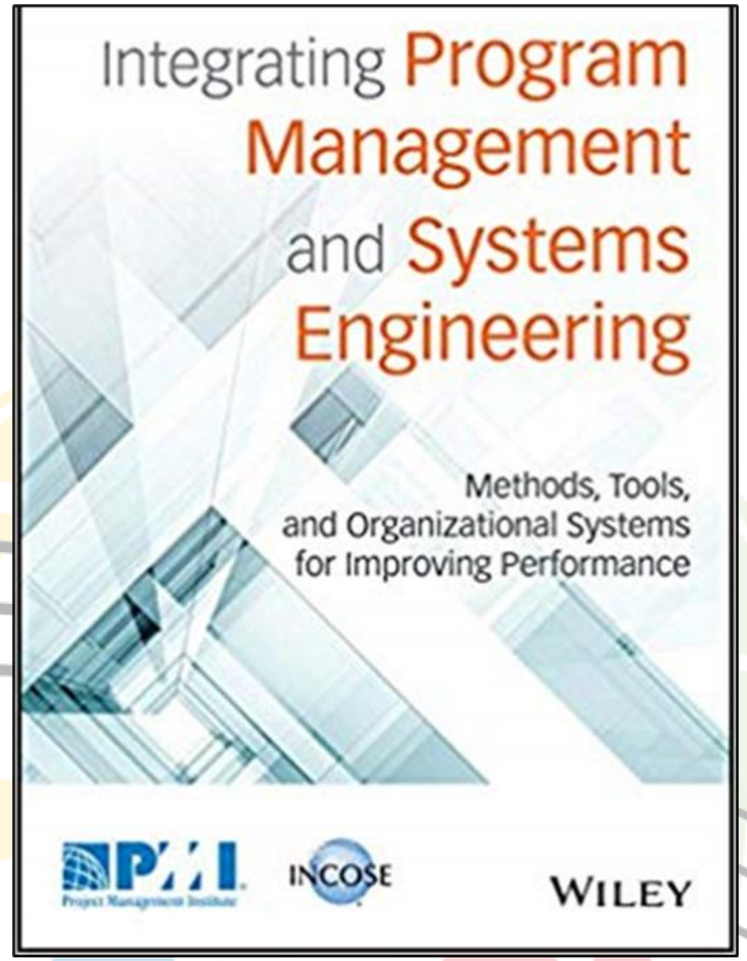
- Combine PM and SE practices, tools and techniques
- Establish culture to meet common objectives

Program Performance

- Higher integration yields better cost and schedule metrics
- More predictable outcomes
- More resilience to schedule pressures

PMI AND INCOSE RECOGNIZE THE ISSUE

PM-SE Integration WG *Purpose*



- PMI and INCOSE have been working together for over 10 years, and have identified specific value for integration between PM and SE.
- 2011 Reference: Toward a New Mindset - https://www.pmi.org/learning/library/bridging-gap-program-management-systems-engineering-6213
- PMI and INCOSE recently co-authored a book: https://www.amazon.com/Integrating-Program-Management-Systems-Engineering/dp/1119258928

RECOGNITION

“On behalf of PMI, I congratulate the MIT-PMI-INCOSE team on their receipt of the Shingo Research and Professional Publication Award for their work on ‘The Guide to Lean Enablers for Managing Engineering Programs,’” said Mark A. Langley, president and CEO of Project Management Institute (PMI). “This team clearly demonstrated the added value that can be delivered through integrated program management and systems engineering.”

https://www.incose.org/events-and-news/incose-and-se-news/2013/06/20/mit-pmi-incose-team-receives-the-shingo-prize-for-the-guide-to-lean-enablers-for-managing-engineering-programs-

Source: Geber86/Getty Images Signature

- A complex relationship exists between project managers and systems engineers
- Each discipline needs to understand their role and work together to establish boundaries
- Cooperation and collaboration lead to project success

REFERENCES

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- Van Gemert, Dennis, “Systems Engineering the Project” PMI Global Congress, 2013

- INCOSE Webinar Series, “What PMI and INCOSE are doing to advance the Future of PM-SE Integration”, April 2021

QUESTIONS?

Source: 9dreamstudio/Getty Images

THANK YOU!

Let's continue the conversation.

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Identity without secrets™

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