Integration between Program Management & Systems Engineering

Co-Chairs of PM-SE Integration WG:

Dr. Tina P. Srivastava (MIT Lecturer & Co-Founder of Badge Inc.)

John Lomax (Airbus, ESEP)

PM-SE Integration WG Co-chair

Dr. Tina Srivastava

tinaps@alum.mit.edu

➢ MIT Aeronautics and Astronautics Engineering

➢ S.B., M.S., PhD from MIT

➢ Former Chief Engineer, Raytheon, Electronic Warfare

➢ Co-Founder of MIT security company, Badge Inc.

➢ Author of *Innovating in a Secret World*

➢ MIT Lecturer: Pilot, Aerodynamics, 16.687

➢ Previously served on INCOSE Board of Directors, Officer
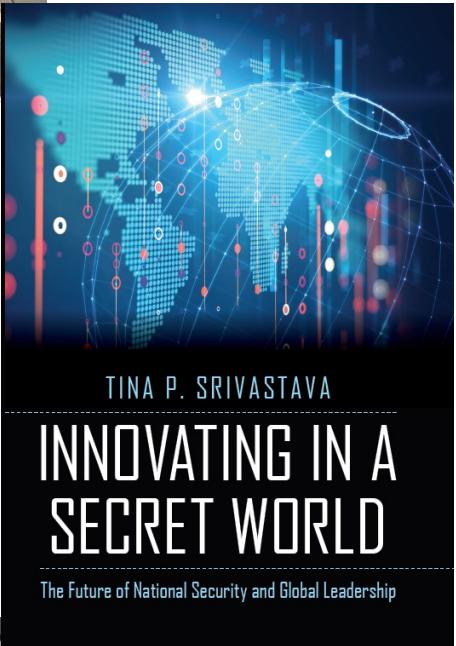
PM-SE Integration WG Co-chair

John Lomax
john.lomax@airbus.com

➢ Certified ESEP

➢Ex-Certification Advisory Group (CAG) Member

➢Systems Engineer with over 30 years of experience at Airbus Defence and Space

➢Location: U.K.

Project Manager

Source: Minerva Studio

Systems Engineer

Source: Zurijeta

EXERCISE:

"Who Has the Responsibility?"

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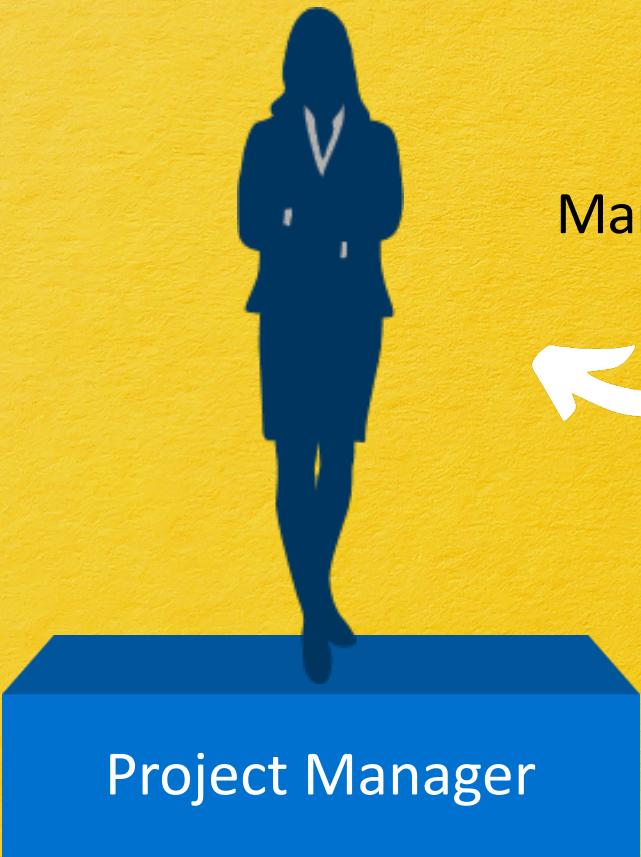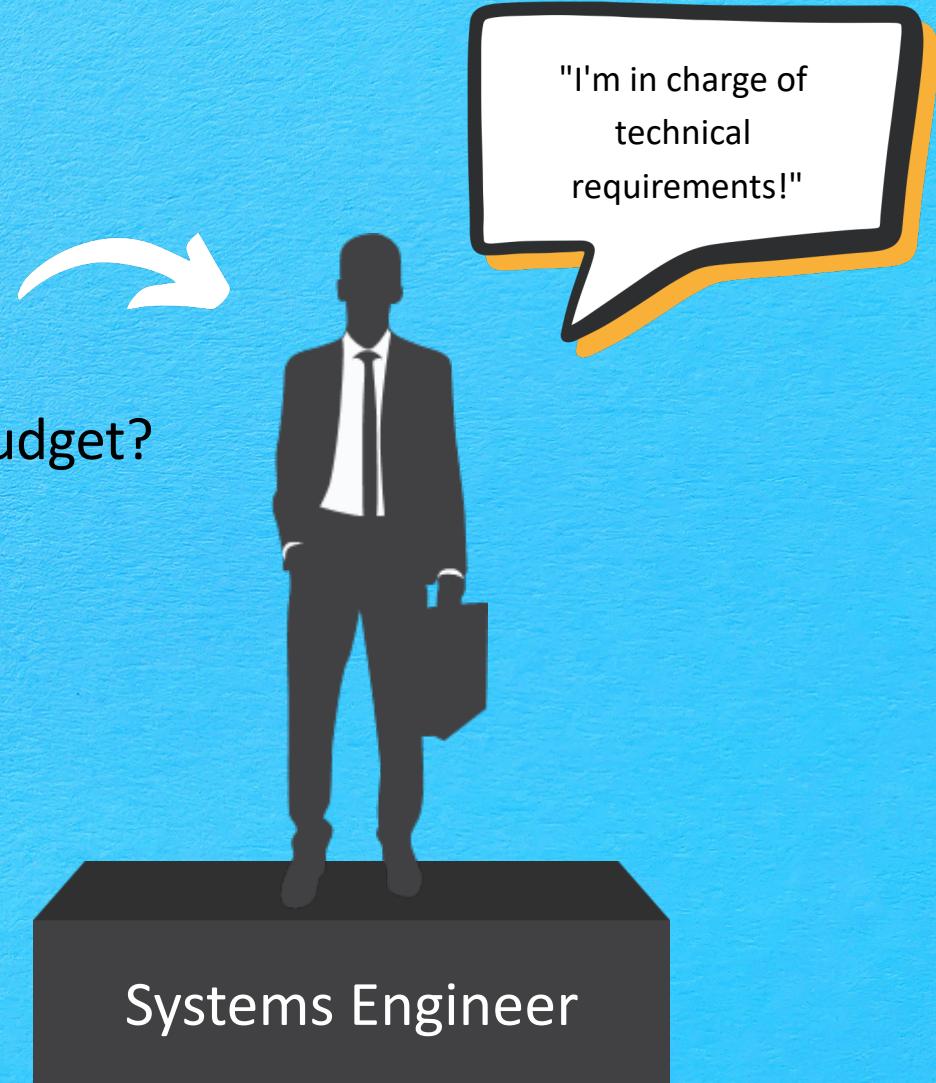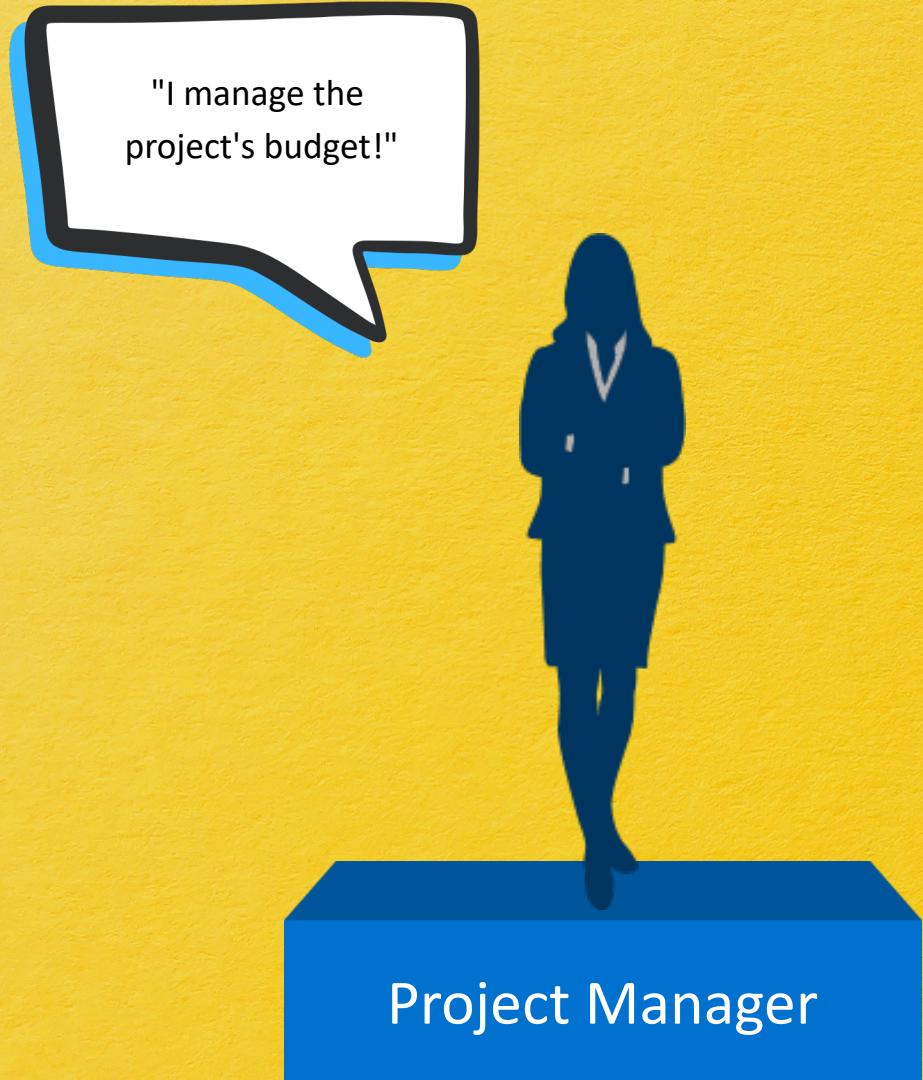
Life Cycle Planning?

Responsibilities:

- Managing the project budget

Responsibilities:

- Technical Requirements

Project Manager

Systems Engineer

EXERCISE:

"Who Has the Responsibility?"

Life Cycle Planning?

External Supplier Relations?

Program/Project Risk?

Responsibilities:
- Managing the project budget

Responsibilities:
- Technical Requirements

Project Manager

Systems Engineer

EXERCISE:
"Who Has the Responsibility?"

Life Cycle Planning

External Supplier Relations

Program/Project Risk

Responsibilities:
• Managing the project budget

Responsibilities:
• Technical Requirements

Project Manager

Systems Engineer

IRON TRIANGLE

Schedule

Cost

Performance

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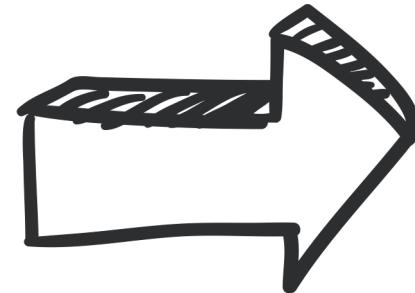
Successful delivery of stakeholder value requires contribution, collaboration, and cooperation across disciplines.

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

74images

OVERLAPPING RESPONSIBILITIES:

THE PROJECT MANAGER VIEW

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

INTEGRATING THE ROLES

The Team Recognizes their Shared Objectives
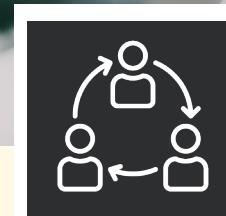
The Team Understands the Objectives and How Each Contributes to Them
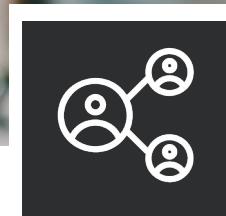
The Team Understands Each Other's Role
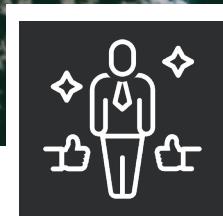
The Team Respects All the Roles and Their Associated Contributions

The Team Values "Collaboration" over "Competition"
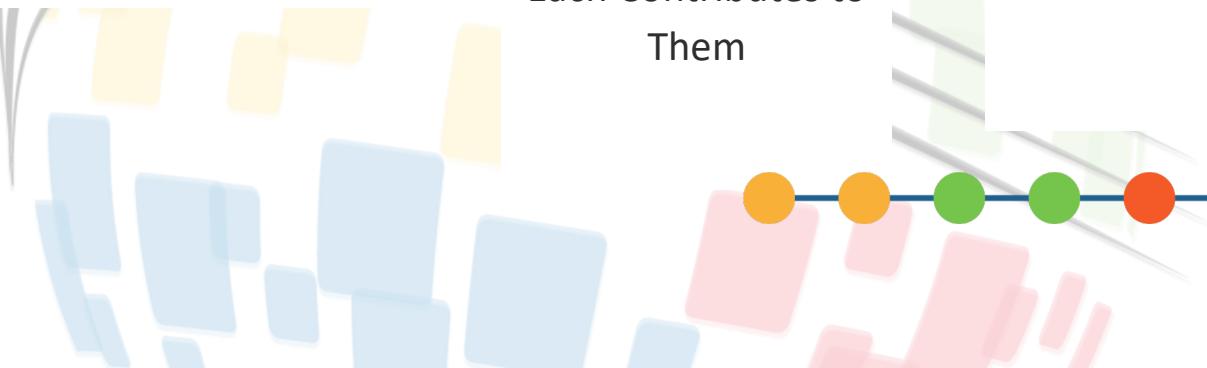
PROJECT MANAGER AND SYSTEMS ENGINEER ARE DISTINCT ROLES – WITH SOME IMPORTANT OVERLAP

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.
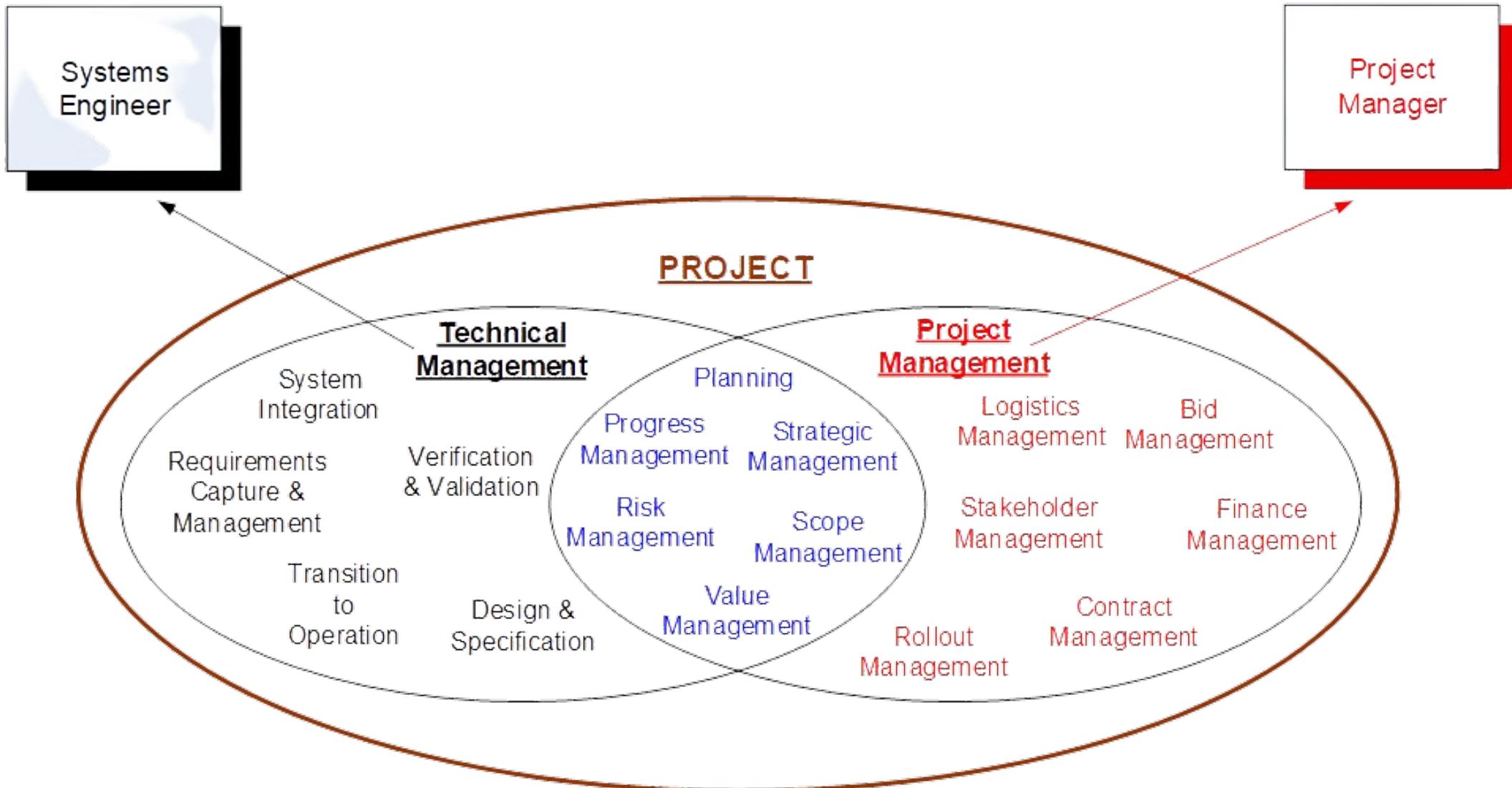
Formation of the INCOSE/PMI Alliance: 2011

– 2011: Joint white paper, "Toward a New Mindset: Bridging the Gap between Program Management and Systems Engineering" published in *INSIGHT* and *PM Network*

- Authors: PMI CEO Mark Langley| INCOSE President, Pres-Elect: Samantha Robitaille, John Thomas

– 2011: Strategic Alliance Agreement signed by INCOSE/PMI

- Alliance was *closed* – (not open to general participation by members of PMI, INCOSE, or others)
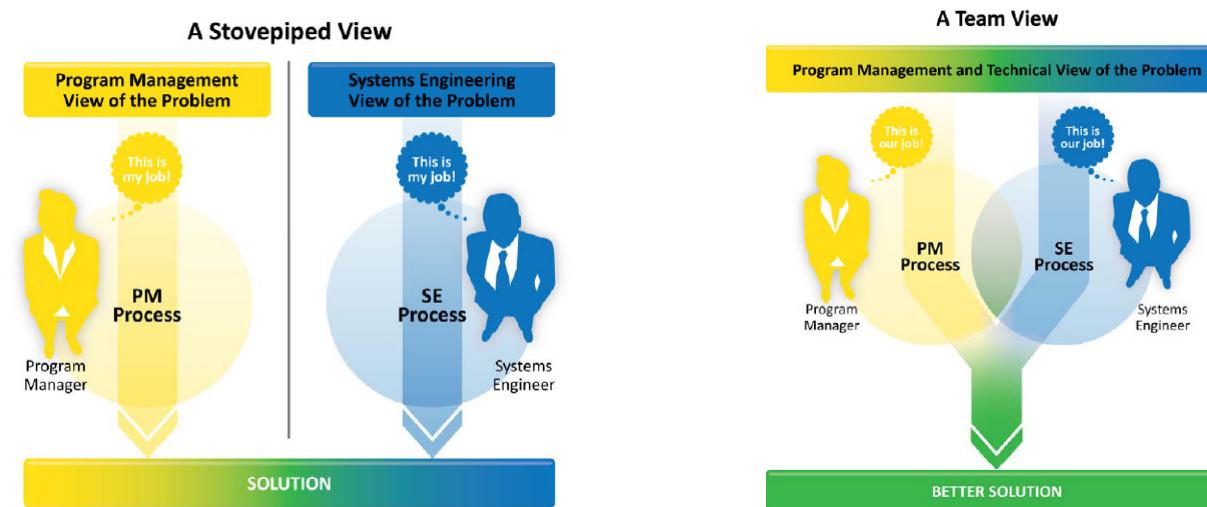
INCOSE/PMI Alliance: Joint Research

- 2012: PMI and INCOSE conducted a joint survey to better understand the roles of the **Program Manager and Chief systems Engineer** and to gauge their current level of integration.

- Massachusetts Institute of Technology (MIT) provided strategic support in analyzing, reviewing and finalizing the survey results with INCOSE and PMI

*Q23. You identified that there is **unproductive tension** that affects team or program performance. Please describe the applicable source of the tension*

Source	Percentage
Lack of integrated planning	57%
Authority not clearly defined	44%
Conflicting practices for program…	41%
Job position not clearly defined	32%
Unclear expectations from…	32%
Authority not clearly understood	28%
Job position not clearly understood	23%
Other	8%
Don't know	2%

2013

SURVEY REPORT: IMPROVING INTEGRATION OF PROGRAM MANAGEMENT AND SYSTEM ENGINEERING

Results of a Joint Survey by PMI and INCOSE

Whitepaper presented at the 23rd INCOSE Annual International Symposium, Philadelphia, June 2013

Data Analysis and Report by Edivandro Conforto, Monica Rossi, Eric Rebentisch and Josef Oehmen (Massachusetts Institute of Technology) and Maria Pacenza (Project Management Institute)

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INCOSE/PMI Alliance: Joint Research

– **2012:** The Guide to Lean Enablers for Managing Engineering Programs
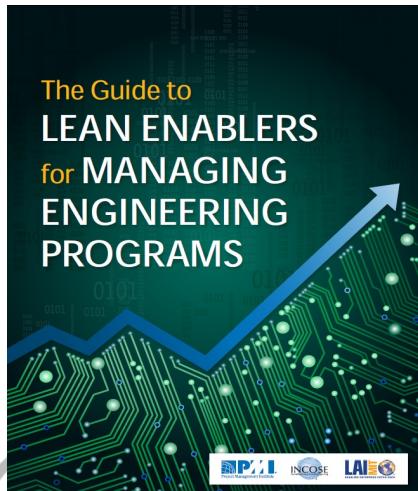
*"On behalf of PMI, I congratulate the MIT-PMI-INCOSE team on their receipt of the **Shingo Research and Professional Publication Award** for their work on 'The Guide to Lean Enablers for Managing Engineering Programs. **This team clearly demonstrated the added value that can be delivered through integrated program management and systems engineering.**"*

Mark A. Langley, President and CEO of PMI

INCOSE/PMI Alliance: Joint Research

- 2015-2017: INCOSE, PMI, MIT collaborated to publish a book titled: *Integrating Program Management and Systems Engineering.*

  o Book includes a **practical framework** for how to streamline project workflow, tools for assessing and deploying best practices.

  o **Case studies** detail how real-world companies have successfully implemented the framework to improve cost, schedule, and technical performance.

Book authors and editors:
- Eric S. Rebentisch
- Tina P. Srivastava
- Kenneth M. Zemrowski
- Virginia A. Greiman
- Edivandro Carlos Conforto
- Marin R. Nelson
- Stephen A. Townsend
- Eric S. Norman

The book is available for sale with an INCOSE membership discount on the **INCOSE Store**

Integrating **Program Management** and **Systems Engineering**

Methods, Tools, and Organizational Systems for Improving Performance
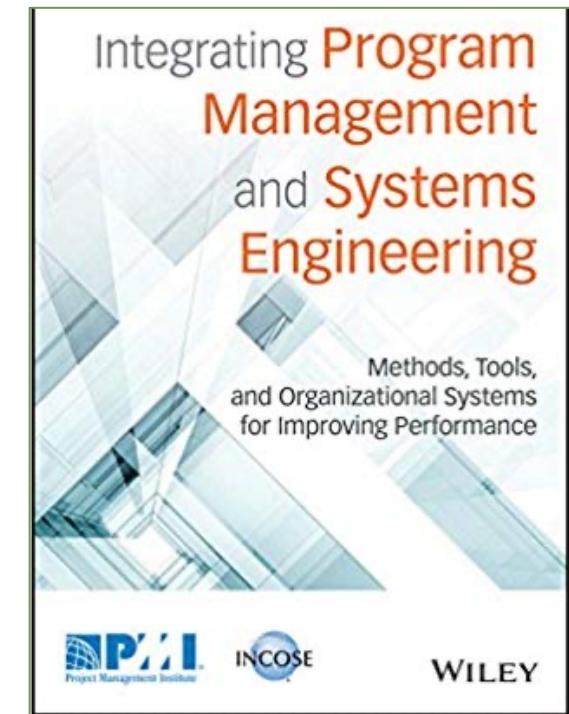
Formation of PM-SE Integration WG

- 2016: *open* PM-SE Integration Working Group was formed
  - Co-chairs Jean-Claude Roussel, Tina Srivastava
  - Website: www.incose.org/pmse
- 2022: PM-SE Integration WG awarded INCOSE Working Group Award at IW 2022 for:
  - Collaboration with PMI
  - Contributions to the new *SE Handbook*, including new section on SE-PM, additions to sections (acquisition, portfolio management, etc.) – coordinating contributions from dozens of volunteers, members of INCOSE and PMI

INCOSE Systems Engineering Handbook, 5th Edition

3.2 Agreement Processes
3.2.1 Acquisition Process
3.2.2 Supply Process

3.3 Organisational Enabling Process
3.3.3 Portfolio Management Process

3.4 Technical Management Process
3.4.1 Project Planning Process
3.4.2 Project Assessment and Control Process

5.3 Systems Engineering Relationship
with others disciplines
5.3.3 SE and Project Management (PM) – New

Recent PM-SE Activities

PMIWDC chapter at 2023 Professional Development Day - Dr. Tina P. Srivastava and Mark Kaufman presented at the event in **September 2023** in the Washington D.C. Metro Area. **PMI counterpart Matt Kwasiborski** attended.
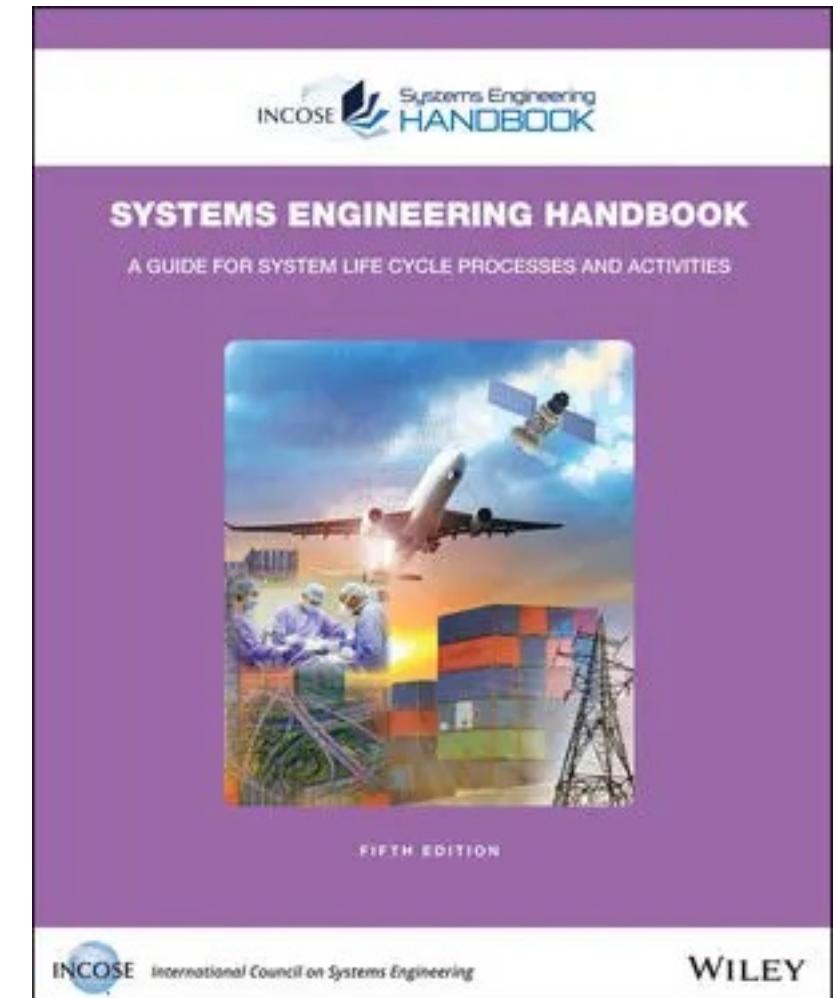
May 10th 2023 presentation to INCOSE WMA Chapter
Mark Kaufman and Dr. Tina P. Srivastava gave a well attended presentation to the INCOSE WMA Chapter. Our **PMI counterpart Matt Kwasiborski also participated**.

May 2, 2024 PMI Baltimore chapter hosted a live virtual event to examine the intersection between Project Management and Systems Engineering

Dr. Tina P. Srivastava, tinaps@alum.mit.edu

PM-SE Integration Working Group

Mission:

Identify and promote opportunities associated with the effective integration of the **Systems Engineering** and **Project/Program Management** disciplines.

- Explore the linkages necessary to create effective integration and collaboration between Systems Engineers and Program Managers.

- Be the intersection point where Systems Engineers, Program/Project Managers collaborate and integrate their efforts.

- Study the interface between Systems Engineering and Project Management domains and Tools. Especially relationship between Systems Engineering tools (MBSE, Requirement management) and tools supporting project management (scheduling, cost estimate models, portfolio management). This includes the digitalization/data models connection between the two domains.

- Support the SE Vision 2035.

Process Enablers

TechOps Domain
497

Members
2012

Established

Co-Chairs

Tina Srivastava

John Lomax

Samuel Boutin

IT Director

Molly Kovaka

pmse@incose.net

Inquiries

"Identify and promote opportunities associated with the effective integration of the Systems Engineering and Project / Program Management disciplines"

Homepage: www.INCOSE.org/pmse
Contact us: pmse@incose.net

PM-SE Integration WG
IW2024 Opening Plenary: WG Award!
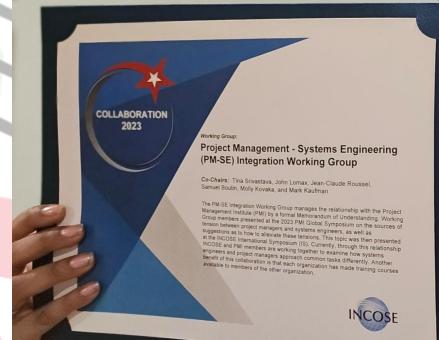
SUMMARY

- **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

- J.W. Boswell, F.T. Anbara, and J.W. Via, "Systems Engineering and Project Management: Points of Intersection, Overlaps, and Tensions", 2017 Portland International Conference on Management of Engineering and Technology (PICMET)

- Nelson, Marvin, "Integrating Program Management and Systems Engineering", MIT Consortium for Engineering Program Excellence

- Rebentisch Eric (Editor) – Integrating Program Management and Systems Engineering Methods, Tools and Organizational Systems for Improving Performance

- 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

- Srivastava, Tina; Kaufman, Mark. "Tensions and Opportunities: Program Management and Systems Engineering." INCOSE International Symposium. July 2023

PM-SE Integration WG
Leadership

➢ Co-Chairs

    ➢ Tina Srivastava (tinaps@alum.mit.edu)

    ➢ Samuel Boutin (samuel.boutin@normalesup.com

    ➢ John Lomax (john.lomax@airbus.com)

➢ Leadership Team

    ➢ Steven Dam (steven.dam@specinnovations.com)

    ➢ Mark Kaufman (mkaufman@mitre.org)

    ➢ Tammy Tober (ttober@mitre.org)

**34**th Annual **INCOSE**
international symposium

hybrid event

Dublin, Ireland
July 2 - 6, 2024

www.incose.org/symp2024
#INCOSEIS

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

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

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**