Program Management vs Systems Engineering

How different are they?

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Overview

- PMBoK review
- DAU Guidebook review
- INCOSE handbook review (15288)
- What are the PM's goals, the SE's goals?
- What should a PM do, what should an SE do?
- PM skills, SE skills
- Can one person do both?

Perspective for this presentation

- DoD
- Technical Programs (heavy SE role)
- Possible R&D bias (mine)

PMBoK (3rd Ed 2004)

- 44 “Project Management Processes”
- Each is associated with one of 5 “Project Process Groups”

Initiating, Planning, Executing, Monitoring, Controlling

- Each is also associated with one of 9 “Knowledge Areas”

Integration, Scope, Time, Cost, Quality, Human Resource, Communications, Risk and Procurement Management

Let’s look at those 44 processes…

…<u>very</u> quickly

KA 4. Project Integration Management

- 4.1 Develop Project Charter
- 4.2 Develop Preliminary Project Scope Statement
- 4.3 Develop Project Management Plan
- 4.4 Direct and Manage Project execution
- 4.5 Monitor and Control Project Work
- 4.6 Integrated Change Control
- 4.7 Close Project

KA 5. Project Scope Management

- 5.1 Scope Planning
- 5.2 Scope Definition
- 5.3 Create WBS
- 5.4 Scope Verification
- 5.5 Scope Control

KA 6. Project Time Management

- 6.1 Activity Definition
- 6.2 Activity Sequencing
- 6.3 Activity Resource Estimating
- 6.4 Activity Duration Estimating
- 6.5 Schedule Development
- 6.6 Schedule Control

KA 7. Project Cost Management

- 7.1 Cost Estimating
- 7.2 Cost Budgeting
- 7.3 Cost Control

KA 8. Project Quality Management

- 8.1 Quality Planning
- 8.2 Perform Quality Assurance
- 8.3 Perform Quality Control

KA 9. Project Human Resource Management

- 9.1 Human Resource Planning
- 9.2 Acquire Project Team
- 9.3 Develop Project Team
- 9.4 Manage Project Team

KA 10. Project Communications Management

- 10.1 Communications Planning
- 10.2 Information Distribution
- 10.3 Performance Reporting
- 10.4 Manage Stakeholders

KA 11. Project Risk Management

- 11.1 Risk Management Planning
- 11.2 Risk Identification
- 11.3 Qualitative Risk Analysis
- 11.4 Quantitative Risk Analysis
- 11.5 Risk Response Planning
- 11.6 Risk Monitoring and Control

KA 12. Project Procurement Management

- 12.1 Plan Purchases and Acquisitions
- 12.2 Plan Contracting
- 12.3 Request Seller Responses
- 12.4 Select Sellers
- 12.5 Contract Administration
- 12.6 Contract Closure

DAU Defense Acquisition Guidebook

- Designed to compliment DoDD 5000.1 and DoDI 5000.2 “by providing the acquisition workforce with discretionary best practice…”

  a how-to guide

- Program Management (DoD style) is throughout the document
- Chapter 4 is Systems Engineering in specific *…so we’ll look at that a bit*

DAU Guidebook Ch 4 - SE

- Technical Management Processes:
  - Decision Analysis
  - Technical Planning
  - Technical Assessment
  - Requirements Management
  - Risk Management
  - Configuration Management
  - Technical Data Management
  - Interface Management

some of these look familiar…

DAU Guidebook Ch 4 - SE

- Technical Processes:
  - Requirements Development
  - Logical Analysis
  - Design Solution
  - Implementation
  - Integration
  - Verification
  - Validation
  - Transition

DAU Guidebook Ch 4 - SE

- Also mentioned:
  - Quality
  - Master Plan / Schedule

these ring a bell also…

INCOSE SE Handbook V3

- Technical Processes (Ch 4)
- Project Processes (Ch 5)
- Enterprise and Agreement Processes (Ch 6)

Consistent with ISO/IEC 15288

INCOSE SE Handbook V3

- Technical Processes
  - Stakeholder Requirements Definition
  - Requirements Analysis
  - Architectural Design
  - Implementation
  - Integration
  - Verification
  - Transition
  - Validation
  - Operation
  - Maintenance
  - Disposal

very similar to DAU Guide technical processes

INCOSE SE Handbook V3

- Project Processes
  - Project Planning
  - Project Assessment
  - Project Control
  - Decision Making
  - Risk and Opportunity Management
  - Configuration Management
  - Information Management

quite similar to DAU Guide technical management processes, which were similar to PMBoK

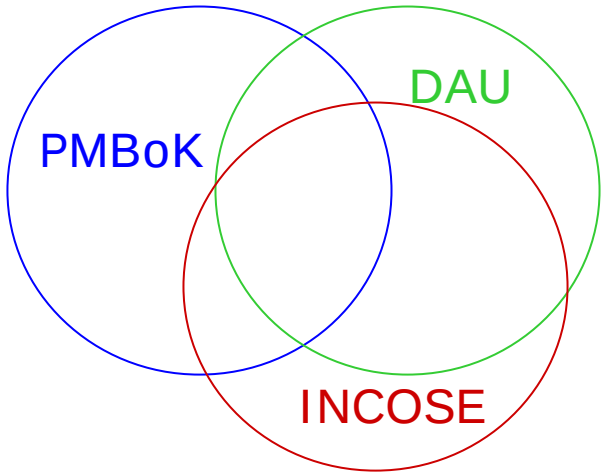
INCOSE SE Handbook V3

- Enterprise and Agreement Processes
  - Enterprise Environment Management
  - Investment Management
  - System Life Cycle Process Management
  - Resource Management
  - Quality Management
  - Acquisition
  - Supply

a few more familiar terms…

PMBoK vs DAU vs INCOSE Hdbk

So who does what?



PMBoK	DAU	INCOSE
4.1Develop Project Charter	Technical Planning	Project Planning, SLC Process Mgmt, Investment Mgmt
4.2 Develop Preliminary Project Scope Statement	Technical Planning	Project Planning, SLC Process Mgmt
4.3 Develop Project Management Plan	Technical Planning	Project Planning, Resource Mgmt, Investment Mgmt
4.4 Direct and Manage Project execution	Decision Analysis	Project Assessment, Project Control
4.5 Monitor and Control Project Work	Technical Assessment	Project Assessment, Project Control, Decision making
4.6 Integrated Change Control	Configuration Mgmt, Tech Data Mgmt	Project Assessment, Project Control, Configuration Mgmt
4.7 Close Project		Project Control
5.1 Scope Planning	Technical Planning	Project Planning, Enterprise Environment Mgmt, SLC Process Mgmt
5.2 Scope Definition	Technical Planning	Project Planning
5.3 Create WBS	Technical Planning	Project Planning
5.4 Scope Verification	Technical Assessment	Project Assessment, Enterprise Environment Mgmt
5.5 Scope Control	Decision Analysis, Technical Assessment	Project Control

PMBoK	DAU	INCOSE
6.1 Activity Definition	Technical Planning	Project Planning
6.2 Activity Sequencing	Technical Planning	Project Planning, Decision Making
6.3 Activity Resource Estimating	Technical Planning	Project Planning, Resource Mgmt
6.4 Activity Duration Estimating	Technical Planning	Project Planning
6.5 Schedule Development	Technical Planning	Project Planning
6.6 Schedule Control	Technical Assessment	Project Control, Decision making
7.1 Cost Estimating	Technical Planning	Project Planning
7.2 Cost Budgeting	Technical Planning	Project Planning, Resource Mgmt
7.3 Cost Control	Technical Planning	Project Control, Decision making, Resource Mgmt
8.1 Quality Planning	Technical Planning	Project Planning, Quality Mgmt
8.2 Perform Quality Assurance	Quality	Configuration Mgmt, Quality Mgmt
8.3 Perform Quality Control	Quality	Project Control, Quality Mgmt

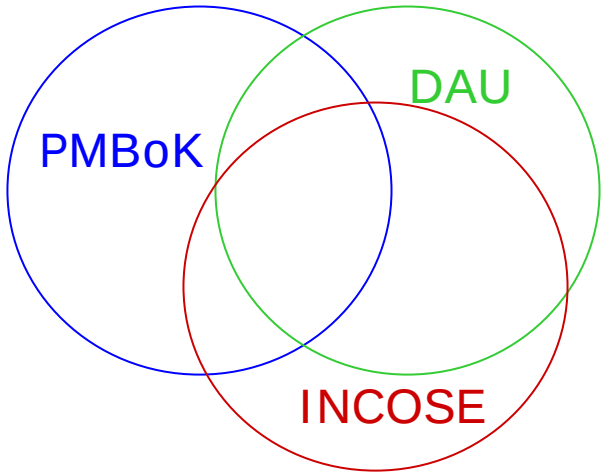
PMBoK	DAU	INCOSE
9.1 Human Resource Planning	Technical Planning	Project Planning, Enterprise Environment Mgmt, Resource
9.2 Acquire Project Team		Enterprise Environment Mgmt, Resource Mgmt
9.3 Develop Project Team		Resource Mgmt
9.4 Manage Project Team		Project Control, Resource Mgmt
10.1 Communications Planning	Tech Data Mgmt	Project Planning, Information mgmt
10.2 Information Distribution	Tech Data Mgmt	Information mgmt
10.3 Performance Reporting	Tech Data Mgmt	Information mgmt
10.4 Manage Stakeholders		Enterprise Environment Mgmt
11.1 Risk Management Planning	Technical Planning, Risk Mgmt	Project Planning, Risk and Opportunity Mgmt
11.2 Risk Identification	Risk Mgmt	Risk and Opportunity Mgmt
11.3 Qualitative Risk Analysis	Risk Mgmt	Project Assessment, Risk and Opportunity Mgmt, Decision making
11.4 Quantitative Risk Analysis	Risk Mgmt	Project Assessment, Risk and Opportunity Mgmt, Decision making
11.5 Risk Response Planning	Technical Planning, Risk Mgmt	Project Planning, Risk and Opportunity Mgmt, Resource Mgmt
11.6 Risk Monitoring and Control	Risk Mgmt	Project Assessment, Risk and Opportunity Mgmt

PMBoK	DAU	INCOSE
12.1 Plan Purchases and Acquisitions	Technical Planning	Project Planning, Acqusition & Supply Processes
12.2 Plan Contracting	Technical Planning	Project Planning, Acqusition & Supply Processes
12.3 Request Seller Responses		Acqusition & Supply Processes
12.4 Select Sellers		Project Control, Decision making, Acqusition & Supply Processes
12.5 Contract Administration		Project Control, Acqusition & Supply Processes, Resource Mgmt
12.6 Contract Closure		Acqusition & Supply Processes

PMBoK	DAU	INCOSE
	Requirements Development	Stakeholder Requirements Definition
	Logical Analysis	Requirements Analysis
	Design Solution	Architectural Design
	Implementation	Implementation
	Integration	Integration
	Verification	Verification
	Validation	Validation
	Transition	Transition
		Operation
		Maintenance
		Disposal

PMBoK vs DAU vs INCOSE Hdbk

So (again) who does what?



PM vs SE: what are their goals?

- PM is accountable for the success of the entire program and all aspects of it.
- SE is responsible for the technical success of the program.

Some “clear” distinctions

These are “owned” by the PM:

Enterprise Environment Management
Investment Management
System Life Cycle Process Management

Some “clear” distinctions

These are “owned” by the SE:

Stakeholder Requirements Definition
Requirements Analysis
Architectural Design
Implementation
Integration
Verification
Validation
Transition
Operation
Maintenance
Disposal

Some “not so clear” distinctions

These are probably “owned” by the PM, but require inputs and assistance from the SE:

- Project Planning
- Project Assessment
- Project Control
- Decision Making
- Risk and Opportunity Management
- Configuration Management
- Information Management
- Resource Management
- Quality Management
- Acquisition
- Supply

Getting the Right People

- What makes a good PM?
- What makes a good SE?

A “good” PM – the Program Leader

- Is ideally a business or management major, or has a strong background & skills in these areas

- Beware the Technical major as PM!
  - Might get stuck “in the weeds,” lack program level vision.
  - Tend to micromanage technical aspects.
  - Might get focused on technical problem and not make the best **programmatic** decision.
  - May not have the discipline to manage rigorously *(think CMMI: do “coders” like CMMI?)*

A “good” SE – the Technical Leader

- Is (hopefully!) a technical major
- Beware the Non-technical major who has some sort of SE role (or if there is no SE)
  - May lack ability to form and propagate an overarching technical vision
  - Might be more of a manager than a leader
  - Might not have the proper knowledge to resolve technical conflict or make/approve technical decisions.

PM vs SE perspectives

It is not necessarily bad for there to be a bit of friction between the two

...because sometimes the optimal technical solution is not the optimal programmatic solution

So, can one person do both?

- On a “small” program
- Very early in a program (even a big program)
- On a non-complex program
  - No hardware/software mix, single technology, few or no external interfaces…

Things to watch out for in these cases

- Need to get an individual with strong and broad technical knowledge and management skills
- Make sure they have a mental concept of their two “hats” and when they need to wear each one.

Perspective – a parting thought

- Both people need to appreciate the role of the other person, determine mutually agreeable dividing lines for their responsibilities.

Questions, comments?