



Practical Application of the CMMI and PMBOK Using the SSC San Diego Project Management Guide

**Brian Groarke
SPAWAR Systems Center, San Diego (SSC San Diego)
Systems Engineering Process Office (SEPO)
Nov 17, 2004**

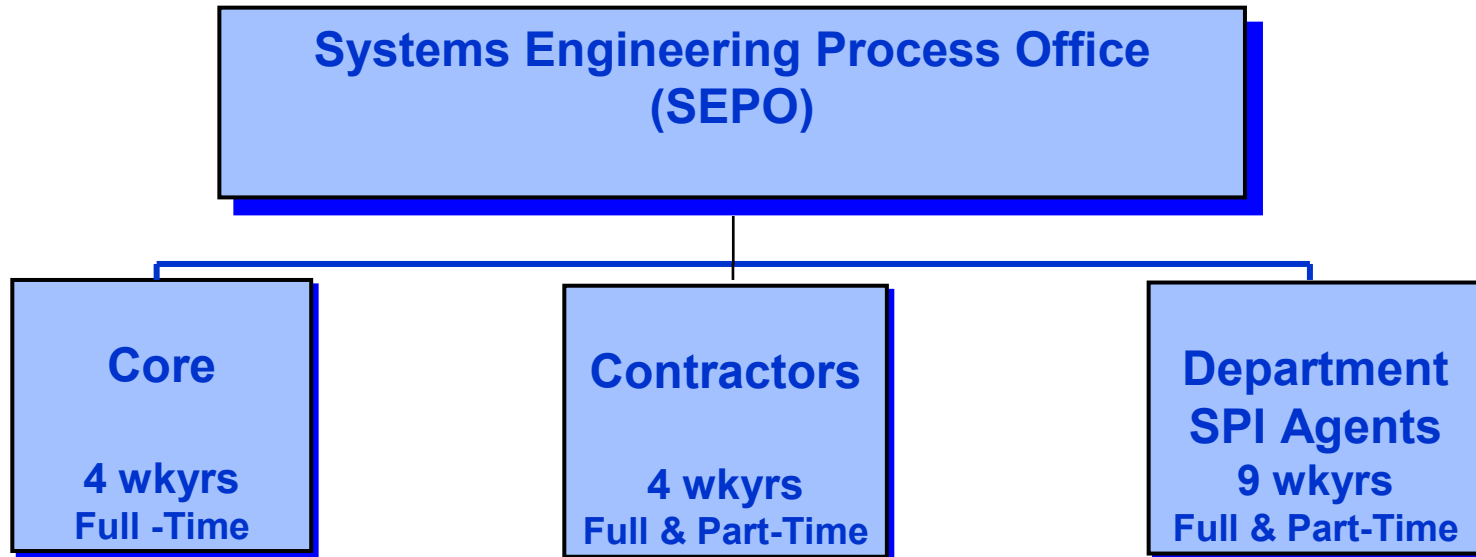
Objectives of the Briefing

- Provide an overview of SSC San Diego and SEPO
- Describe the organization's CMMI approach using the PMBOK
- Share lessons learned – so far

Space and Naval Warfare Systems Center San Diego (SSC San Diego)

- **Mission:** to be the Navy's RDT&E, engineering and fleet support center for command and control, communications, ocean surveillance, and the integration of those systems which overarch multi-platforms
- **Vision:** to be the nation's pre-eminent provider of integrated C4ISR solutions for warrior information dominance
- ~3,500 civilians, 70 military, and several thousand contractors
- Actual funding for FY 03 was ~\$1.3 billion
- Attained SW-CMM Level 3 in Oct 2000; Reassessed at Level 3 in Aug 2003

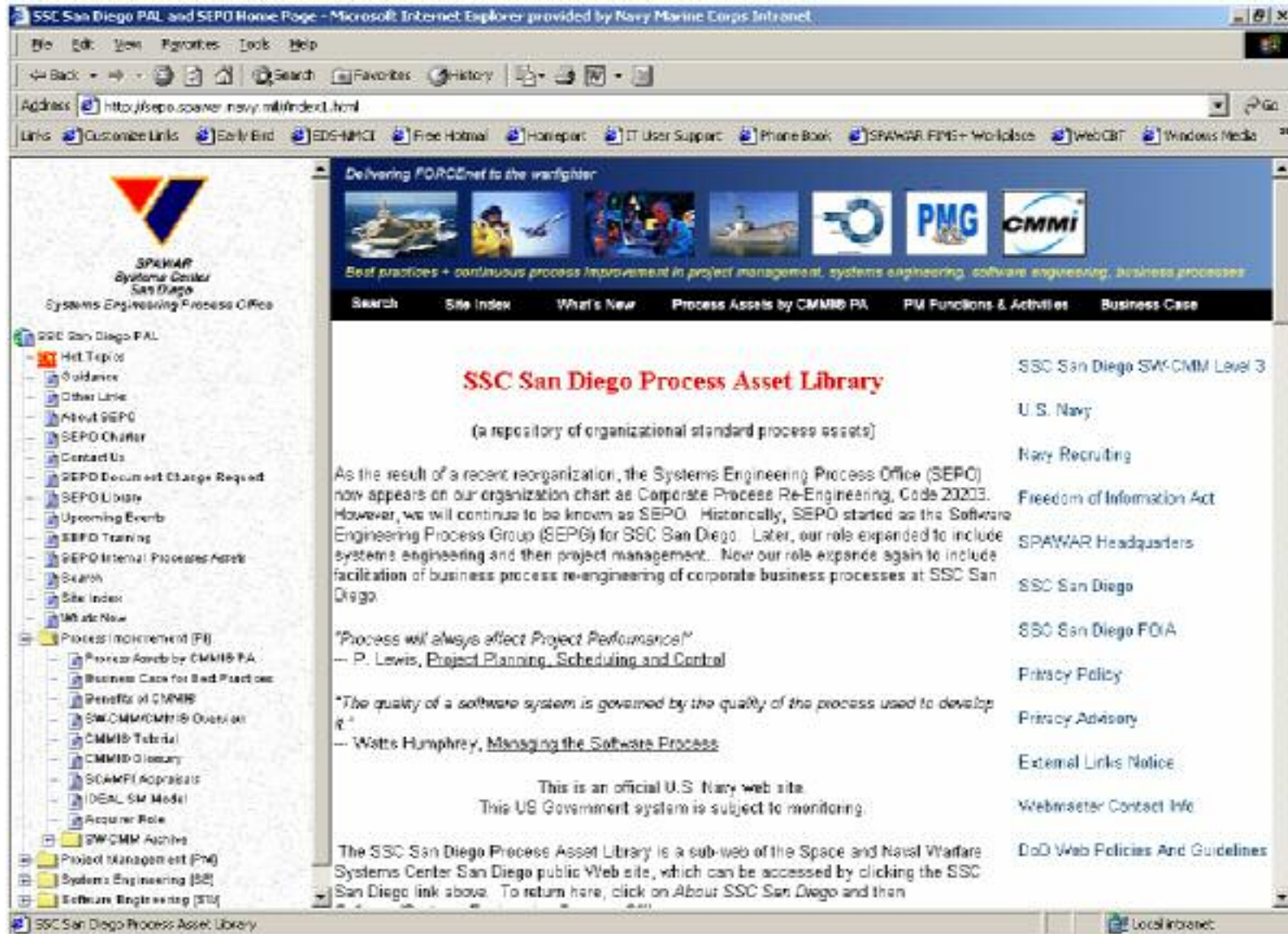
SSC San Diego Process Improvement Organization



-Funded by overhead

SEPO Products and Services

- **Maintains SSC San Diego's Process Asset Library (PAL): Comprehensive web page of process improvement material: at <http://sepo.spawar.navy.mil/>**
- **Facilitates process improvement across all of SSC San Diego**
- **Conducts training courses**
- **Assists with internal appraisals on projects to determine best practices and areas for improvement**
- **Maintains Software Community Alias: Email alias with over 800 members for announcements, requests for assistance**
- **Facilitates Systems Process Improvement Working Group (SPIWG): periodic meetings, seminars, lectures, debates, demos about systems engineering and process improvement issues**
- **Maintains SEPO Library: process improvement related books, guidelines, standards, products, processes, publications, proceedings, articles, videos**
- **Performs Community Liaison: Interface with the process improvement community outside of SSC San Diego, both government and commercial**



The screenshot shows a web browser window titled "SSC San Diego PAL and SEPO Home Page - Microsoft Internet Explorer provided by Navy Marine Corps Intranet". The address bar shows the URL <http://sepo.spawar.navy.mil/index.html>. The page content includes the SPAWAR Systems Center San Diego logo, a navigation menu, and a main heading "SSC San Diego Process Asset Library (a repository of organizational standard process assets)". The page also features a sidebar with a tree view of site sections, a central text area with quotes about process and project performance, and a right-hand column with various links.

SSC San Diego PAL

- Hot Topics
- Guidance
- Other Links
- About SEPO
- SEPO Charter
- Contact Us
- SEPO Document Change Request
- SEPO Library
- Upcoming Events
- SEPO Training
- SEPO Internal Process Assets
- Search
- Site Index
- What's New

Process Improvement (PI)

- Process Assets by CMMB PA
- Business Case for Best Practices
- Benefits of CMMB
- SW-CMM/CMMB Overview
- CMMB Tutorial
- CMMB Glossary
- SCAMP Appraisals
- DEAL SW Model
- Acquire Role
- SW-CMM Archive

Project Management (PM)

- Systems Engineering (SE)
- Software Engineering (SE)

SSC San Diego Process Asset Library

(a repository of organizational standard process assets)

As the result of a recent reorganization, the Systems Engineering Process Office (SEPO) now appears on our organization chart as Corporate Process Re-Engineering, Code 20203. However, we will continue to be known as SEPO. Historically, SEPO started as the Software Engineering Process Group (SEPG) for SSC San Diego. Later, our role expanded to include systems engineering and then project management. Now our role expands again to include facilitation of business process re-engineering of corporate business processes at SSC San Diego.

"Process will always affect Project Performance!"
— P. Lewis, *Project Planning, Scheduling and Control*

"The quality of a software system is governed by the quality of the process used to develop it."
— Watts Humphrey, *Managing the Software Process*

This is an official U.S. Navy web site.
This US Government system is subject to monitoring.

The SSC San Diego Process Asset Library is a sub-web of the Space and Naval Warfare Systems Center San Diego public Web site, which can be accessed by clicking the SSC San Diego link above. To return here, click on About SSC San Diego and then

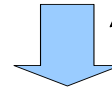
SSC San Diego SW-CMM Level 3
U.S. Navy
Navy Recruiting
Freedom of Information Act
SPAWAR Headquarters
SSC San Diego
SSC San Diego FOIA
Privacy Policy
Privacy Advisory
External Links Notice
Webmaster Contact Info
DoD Web Policies And Guidelines

CMMI Implementation Approach

- Start by applying basic project management best practices to all projects
- Develop “Project Management Guide” and policy requiring its use
 - Guide will apply to all projects; big and small
- Focus will be applying the best practices described in the PMBOK and CMMI and not “doing CMMI”
- Develop contact and awareness training to support the PM Guide
- Work with the Project Management Council (PMC) to get input and gain approval of project management standards and processes
- Use SPI Agents to follow-up and ensure completion of requirements

Project Management Documents

**Project Management and
System / Software
Engineering Management
Policies**

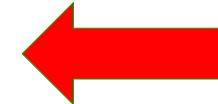


Implemented by

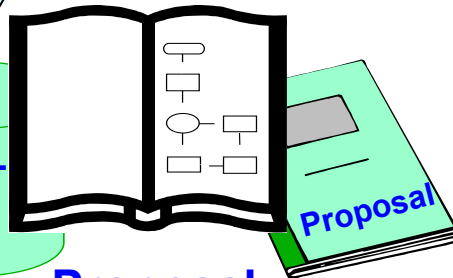
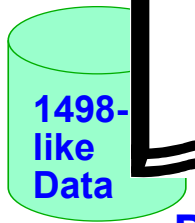
**Project Management Guide,
& project best practices**



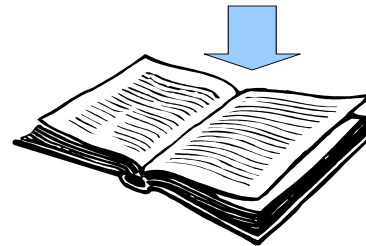
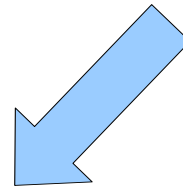
- CMMI
- PMBOK



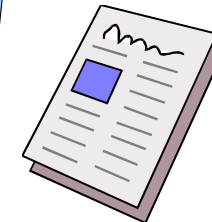
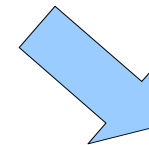
supported by



**Proposal
Preparation Guide**



**Project Mgt Plan,
procedures, templates and
project examples and best
practices**



**Basic PM
Guidelines
(Job
Description)**

Project Management Guide

Objectives:

- Defines SSC San Diego standard project management process for Project Managers to use for successful project execution
- Focus on management responsibilities, not practitioner details (Audience: primarily Project Manager, and levels above the PM)
- Take advantage of best practices:
 - For project management in PMBOK and its DoD Extension
 - For systems and software engineering listed in CMMI
- Provide simplified method to measure project status; and provide guidance to SSC San Diego upper-level managers in successful oversight of projects
- Be a basis for management, training, Project Manager qualification, QA
- Be compatible with IEEE/EIA 12207, IEEE 15288, and existing SSC San Diego processes and assets
- Be **SHORT!** Comprehensive. Readable. Usable.

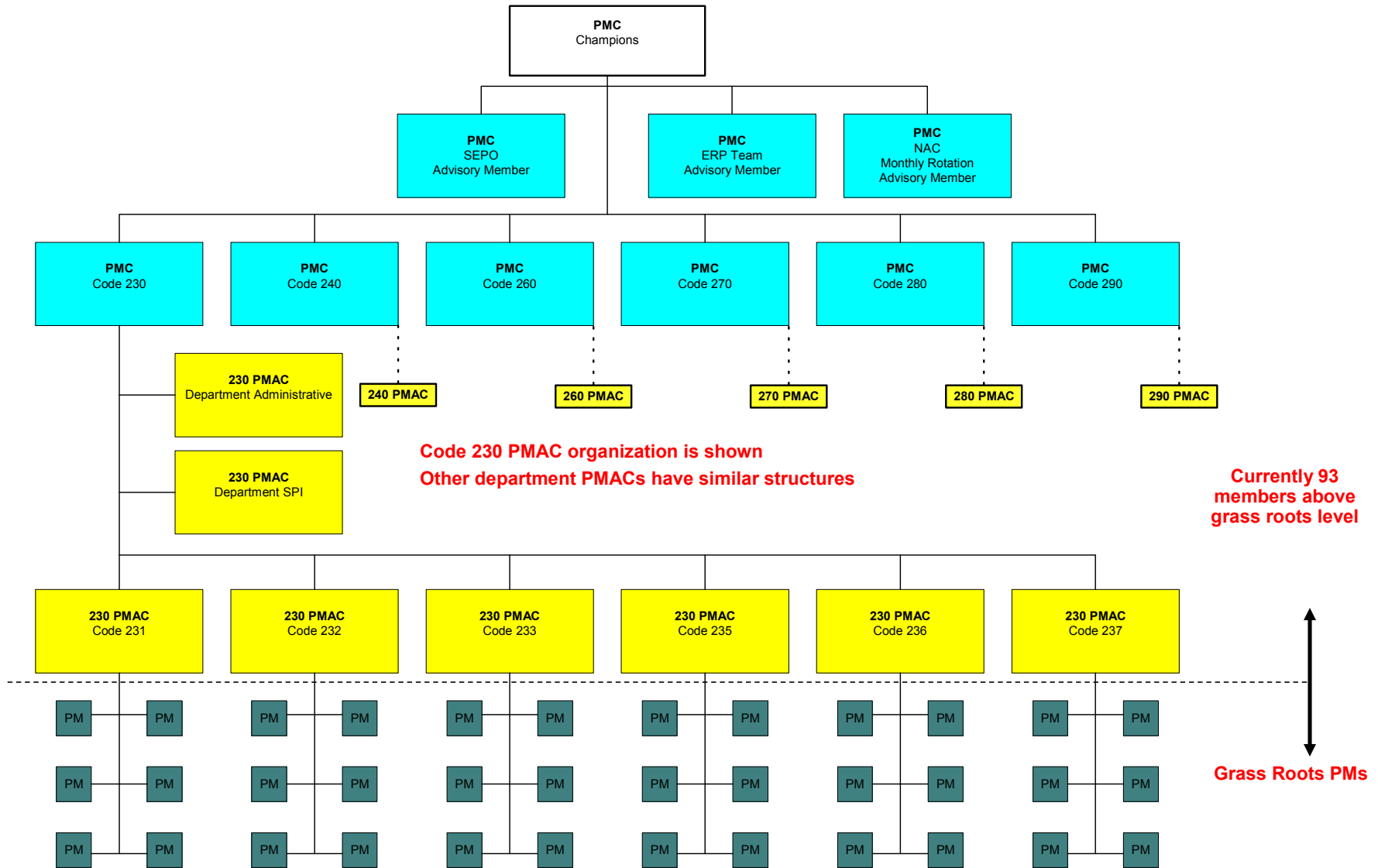


Keep project goals in mind:
quality products, on-time delivery, within budget

Project Management Guide (2)

- Peer reviewed by Project Management Council and Department Project Management Advisory Councils (PMACs)
- PM Guide had ~490 comments (plus hand-written red lines not incorporated into the comment sheets)
 - After SEPO processing, consolidation, and review, and PMC review and agreement total comments were reduced to 281
 - Breakdown of the comments were as follows:
 - » 5 Major defects
 - » 146 Minor defects
 - » 40 Nots (comments not accepted)
 - » 90 Red Lines
 - » 24 Open Issues resolved

Project Management Council (PMC) Organization



PM Guide
PR-OPD-29 v0.62
1/22/03

- c. Determine risk reduction and contingency actions. Determine what actions or decisions could reduce the probability and/or the severity of the identified risk, including formal monitoring, peer reviews, or configuration audits. Determine the contingency plans for actions needed if the risk is realized or is expected to occur soon.

Develop and document reduction/mitigation plans and contingency plans for high-priority risks.

- d. Determine what measurable or observable events can be tracked to know if the risk are being encountered, avoided, or minimized.

Define measurements for tracking high-priority risks. Refer to the Risk Management Process document on the PAL.

3.4 Identify Quality Approach.

Planning for product control encompasses quality assurance (QA), configuration management (CM), peer reviews, and measurements. Project QA includes the steps required to ensure that the project will satisfy the needs for which it was undertaken. It includes all activities that determine the quality policy, objectives, and responsibilities. CM establishes and maintains the integrity of the work products. Measurements provide visibility into the actual progress of the project so that management can take effective actions when performance deviates significantly from plans.



Identify Quality Approach

- a. Define the (QA) approach for evaluating the quality of the product, associated documentation, and the engineering processes. Develop a strategy to verify that the product will meet the requirements. Develop a strategy to validate that the processes are being followed correctly.

Identify the QA structure and personnel resources for performing QA activities on the products and for evaluating the engineering or development processes. Identify tools utilized for QA. Refer to Software QA Process, Expert Mode, and SQA Plan template on the PAL.

Establish a verification strategy for selected work products. Develop plans and an environment to support verification that "you build the product right."

Establish a validation strategy, environment, and procedures to demonstrate that the product fulfills its intended use when placed in its intended environment, that you "build the right product."

- b. Define the (CM) approach for controlling the configuration of the product, documentation,

Basic requirements in regular text

Advanced requirements inside dashed boxes

Appendix A of the PM Guide

- Provides a checklist of expected best practices to be implemented and artifacts to be produced by the project manager
- Project managers should use this checklist to record the date activities were accomplished
- The QA function, or objective verifier, should use this checklist to verify usage of the PM Guide
- Refer to the appropriate section in the PM Guide for detailed explanations of expected functions and activities

APPENDIX A. PROJECT MANAGEMENT CHECKLIST

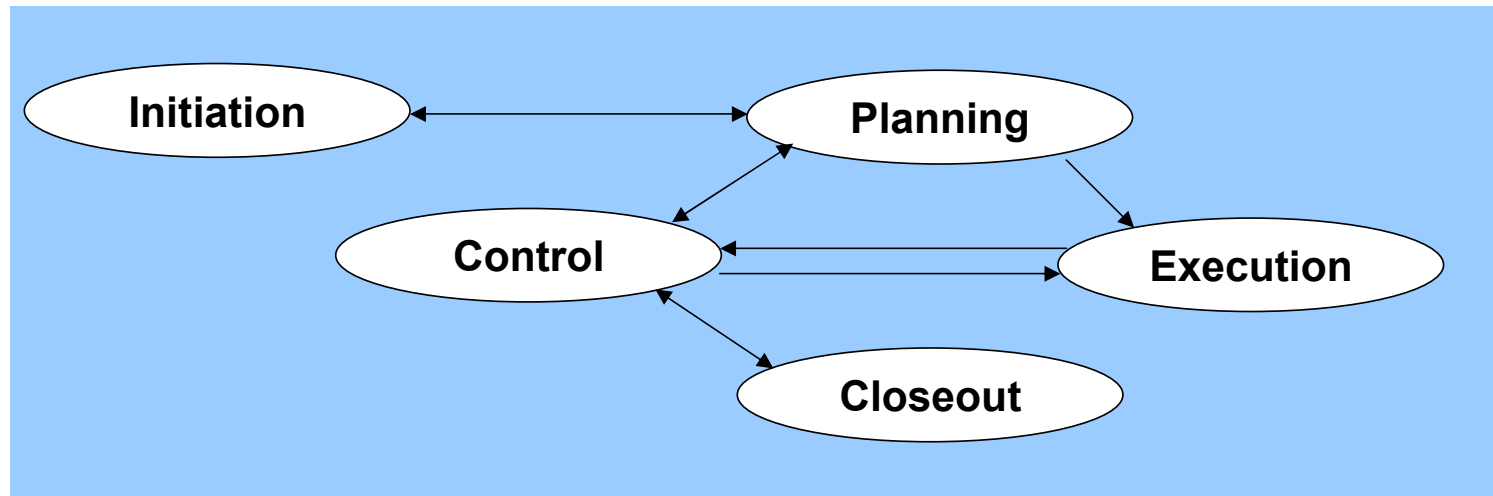
The following checklist is an abstract of expected best practices to be implemented and artifacts to be produced by the project manager, according to the project type as listed in Section 1.3 and Table 1-1 of the Guide. In concert with line management, project managers should select the appropriate project type (Tier I or Tier II) and then use this checklist to record the date activities were accomplished. Line management shall review and verify the correct designation and assignment of projects to these categories. The QA function, or objective verifier, should use this checklist to verify usage of the Guide. Refer to the appropriate section in the Guide for detailed explanations of expected functions and activities.

FUNCTION/ Activity	Sub-activity	Tier I ¹ Minimum Actions/ Artifacts	Tier II ² Additional Actions/ Artifacts	Date of PM Completion	Date of Objective Verification
2. INITIATION					
2.1 Establish the Project or Phase	a. Determine initial customer needs and requirements.	Document purpose and scope; perform initial planning and cost estimation; document assumptions and constraints; rudimentary proposal created	Detailed cost and technical proposal; detailed project planning begun		
	b. Determine SSC San Diego needs.	Confer with line management; document project structure in ERP	SSC SD Strategic Plan, Intranet, PAL, policies reviewed		
	c. Document management and team responsibilities.	Document and clarify project responsibilities and skill sets	Define reporting relationships; define preliminary needs for facilities and tools		
3. PLANNING					
3.1 Clarify and Define Project Requirements	a. Gather candidate requirements.	Understand and capture requirements, needs, issues	Requirements documented in SOW, OCD, etc.; and documents <u>baselined</u>		

What is the PMBOK?

- **PMBOK stands for “The Project Management Body of Knowledge”**
- **PMBOK developed and maintained by the Project Management Institute (PMI) (<http://www.pmi.org>)**
- **PMBOK is an internationally recognized standard for project management best practices**

The 5 Project Management Functions*



Initiation: Establishing the project or phase.

Planning: Defining a plan, refining objectives, and selecting the best of the alternative courses of action to attain the objectives of the project.

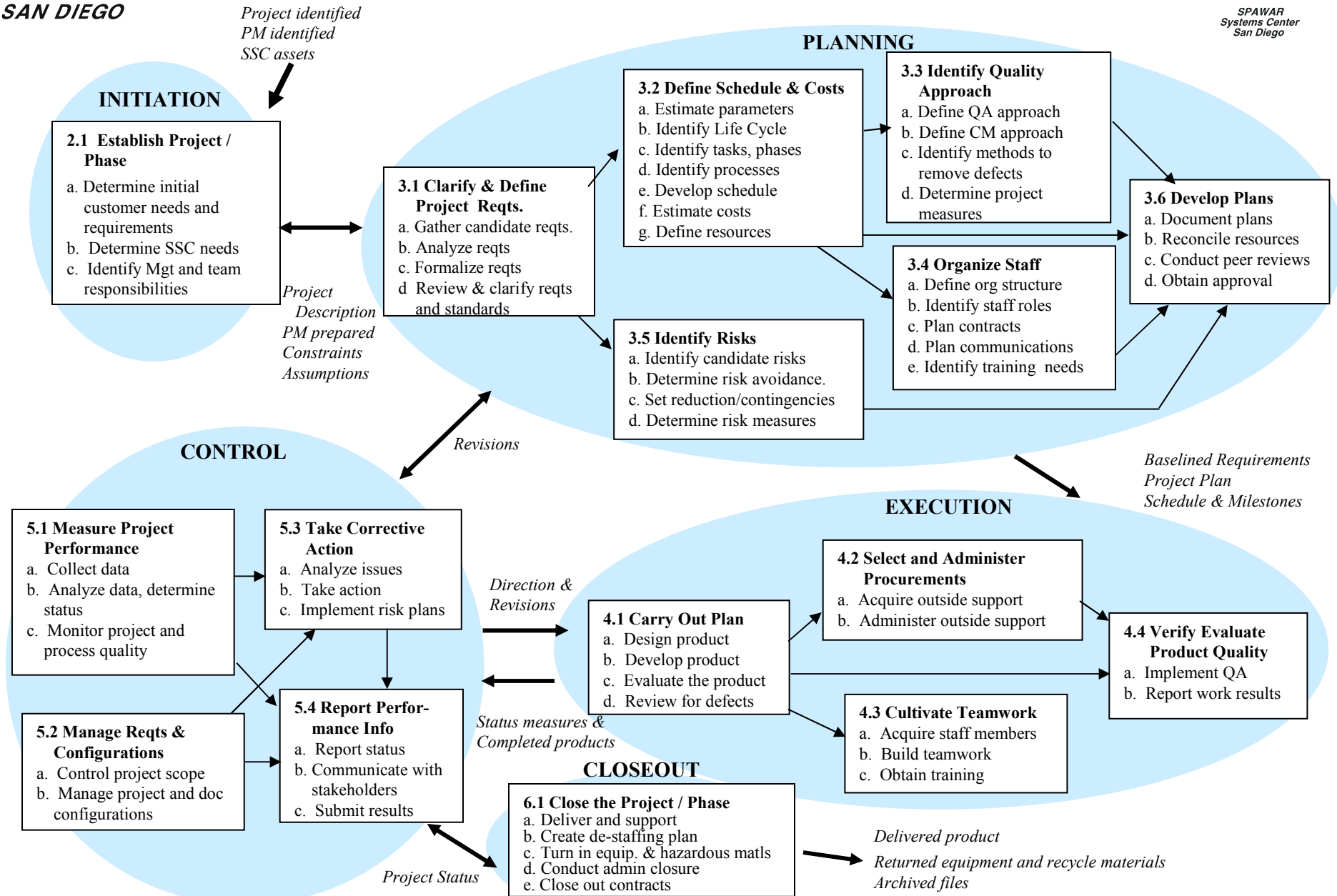
Execution: Coordinating people and other resources to carry out the plan.

Control: Ensuring the project objectives are met by monitoring and measuring progress regularly to identify variances from plan so that corrective action can be taken when necessary.

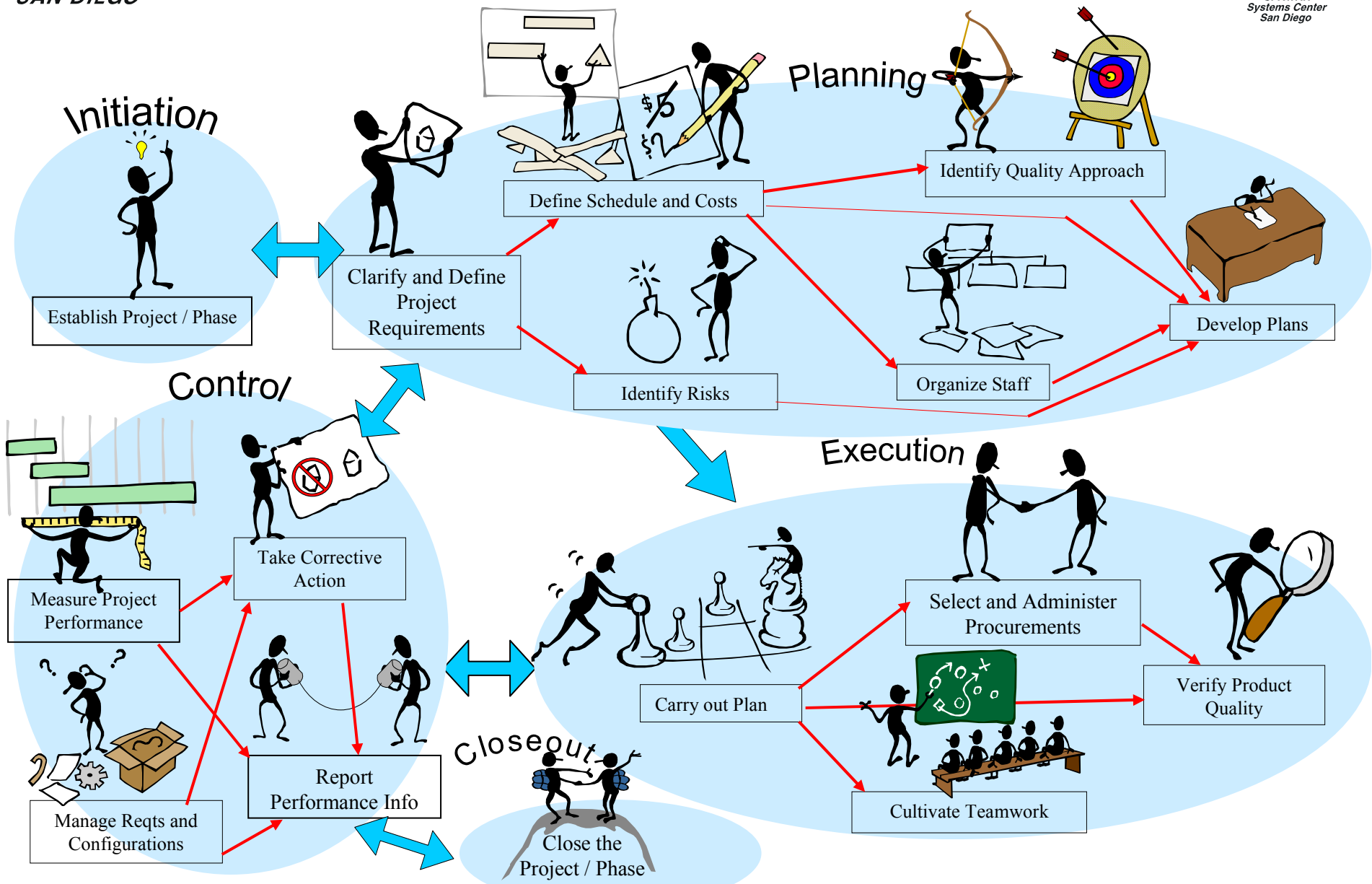
Closeout: Formalizing acceptance of the project or phase and bringing it to an orderly end.

** based on the Project Management Body of Knowledge (PMBOK)*

PM Guide's 58 Subactivities



PM Core Course Course Map



PM Core Course (PMCC) Topic Areas

<u>Function</u>	<u>Topics</u>
Initiation	1. Establish the project or phase
Planning	1. Clarify and define project requirements 2. Define schedule and costs 3. Identify risks 4. Identify quality approach 5. Organize staff 6. Develop plans
Execution	1. Carry out the plan 2. Select and administer procurements 3. Cultivate teamwork 4. Verify product quality
Control	1. Monitor project performance 2. Manage requirements and configurations 3. Take corrective action 4. Report performance information
Closeout	1. Close the project or phase

Based on PMBOK, PMG, CMMI, ISO/IEEE 12207,
ISO/IEC 15288, EIA- 632 and other best practices!!

PM Guide Rollout Strategy (1)

- Identify and conduct pilots of the PM Guide
- Evaluate pilots and update PM Guide based on feedback received; and updated best practices and work products contribution
- Every project can begin implementing the best practices in the PM Guide once the PM Guide is approved
- **PMs who have attended the PM Core Course will be expected to comply with the PM Policy and Guide**
- SEPO will conduct 6-7 PM Core classes, each with ~25 students, a year depending on demand

PM Guide Rollout Strategy (2)

- Assumption is that total number of Center “projects” that will be required to follow the PM Guide will be reduced from ~996 to ~600 or ~700 through the redefinition of “project” (i.e. very small efforts may be treated as tasks as opposed to projects)
 - There are no exemptions based on size
 - May be a part of a group of tasks to become a project, or be a project itself
- SPI Agents will coach and consult with projects to help them tailor and implement the PM Guide
- Experienced PMs will mentor and coach other PMs
- Additional training and support will be developed and provided

Lessons Learned

- Management commitment and involvement is critical to the success of any process improvement effort
- Involving project managers throughout the organization in peer reviews of project management documentation, while difficult, facilitated buy-in for these documents
- PM Guide does not cover all of CMMI Level 2
 - Preliminary mapping indicates about 60% coverage
 - More detailed mapping to be performed
- Any large organizational cultural change takes time – so be patient!

Summary

- Transition to CMMI has caused a rethinking of our entire process improvement approach and philosophy
- Focusing on implementing “best practices” vs. implementing CMMI
- Many issues to be worked out; we have started to address some
- We believe the end result will be improved products and services across the organization



Brian Groarke
SSC San Diego
E-mail: “brian.groarke@navy.mil”
<http://sepo.spawar.navy.mil>
Phone:(619)553-6248



Acronyms

- **C4ISR: Command, Control, Communication, and Computers, Intelligence, Surveillance, and Reconnaissance**
- **CMMI: Capability Maturity Model Integration**
- **PMBOK: Project Management Body of Knowledge**
- **PMC: Project Management Council**
- **PMAC: Project Management Advisory Council**
- **PMG: Project Management Guide**
- **PM Guide: Project Management Guide**
- **QA: Quality Assurance**
- **RDT&E: Research, Development, Test, and Evaluation**
- **SEPO: Systems Engineering Process Office**
- **SPIWG: Systems Process Improvement Working Group**
- **SSC San Diego: Space and Naval Warfare Systems Center, San Diego**