

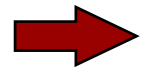
# SSTC 2009

## Software Acquisition Planning: In, Out, Up, and Down

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Computers and Software Division  
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# Outline



- Introduction
- Software Acquisition Activities
  - System Acquisition Activities (Up)
  - Adjunct Interface Activities (Out)
  - Contractor Oversight Activities (Down)
  - Acquisition Program Office Activities (In)
- Software Acquisition Planning
- Summary
- Backup Charts

# Background

- The development of large, complex, software-intensive mission-critical systems is still fraught with problems
  - Performance deficiencies
  - Extensive defects with operational impacts
  - Unanticipated cost and schedule overruns
- Until recently, solutions have focused primarily on the contractor's software process improvement initiatives
- However, the need for improving the acquisition organization's software acquisition processes is now recognized as equally important for addressing these problems

# The Need for Software Acquisition Planning

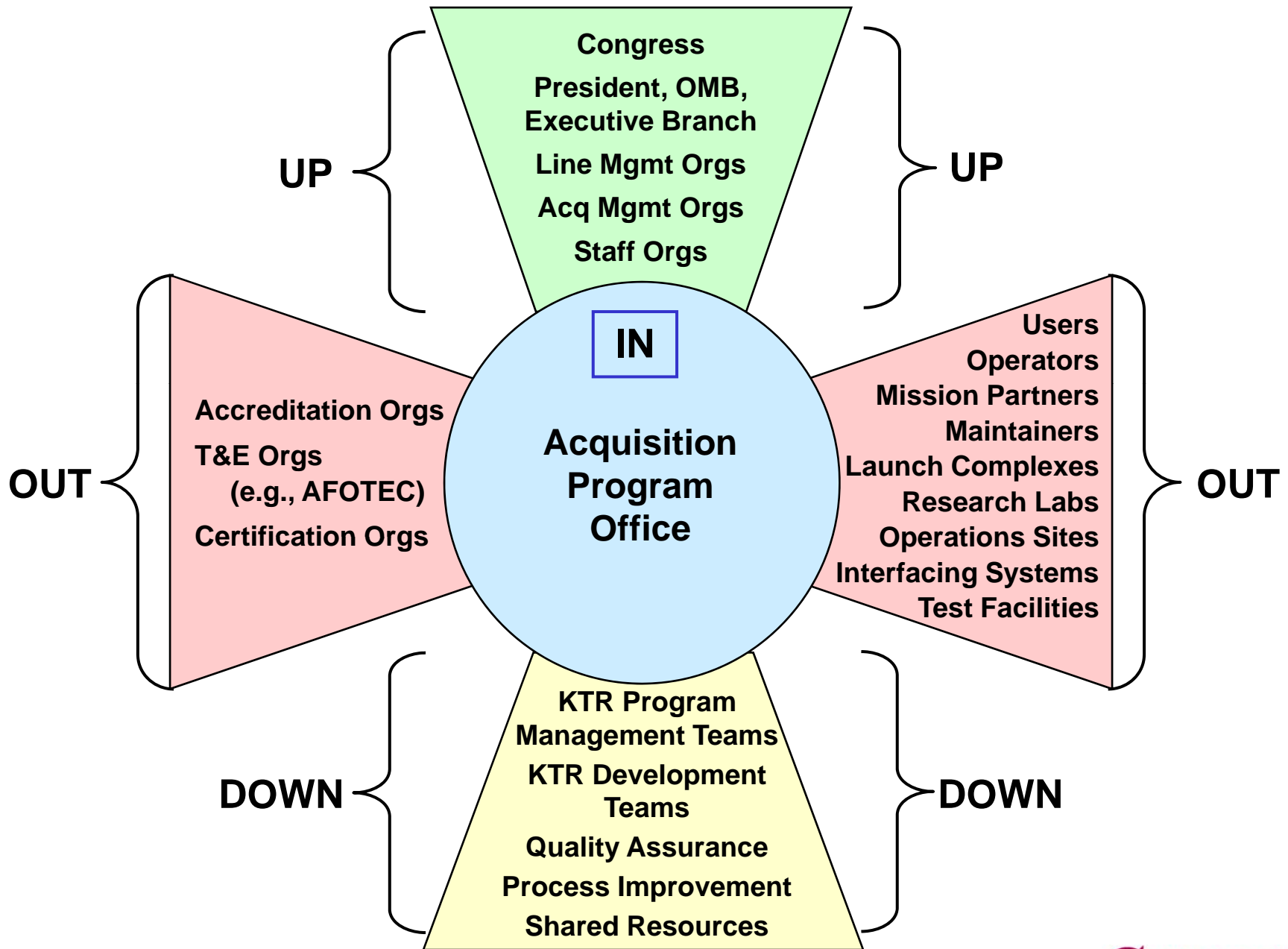
- Planning is the first step in managing any project, and is one of the first steps in process improvement
  - “Plan your work and work your plan”
- Early software acquisition planning helps establish the importance of software in the acquisition
- “Lessons learned” identify software acquisition planning as a best practice of successful programs
- Many independent assessments of troubled software-intensive programs cite inadequate planning as one of the root causes for subsequent software-related problems
- Large, complex, mission-critical software efforts require both
  - Detailed and well documented software development planning, and
  - Detailed and well documented **software acquisition planning**

**“A man who does not plan long ahead will find trouble right at his door.” — Confucius**

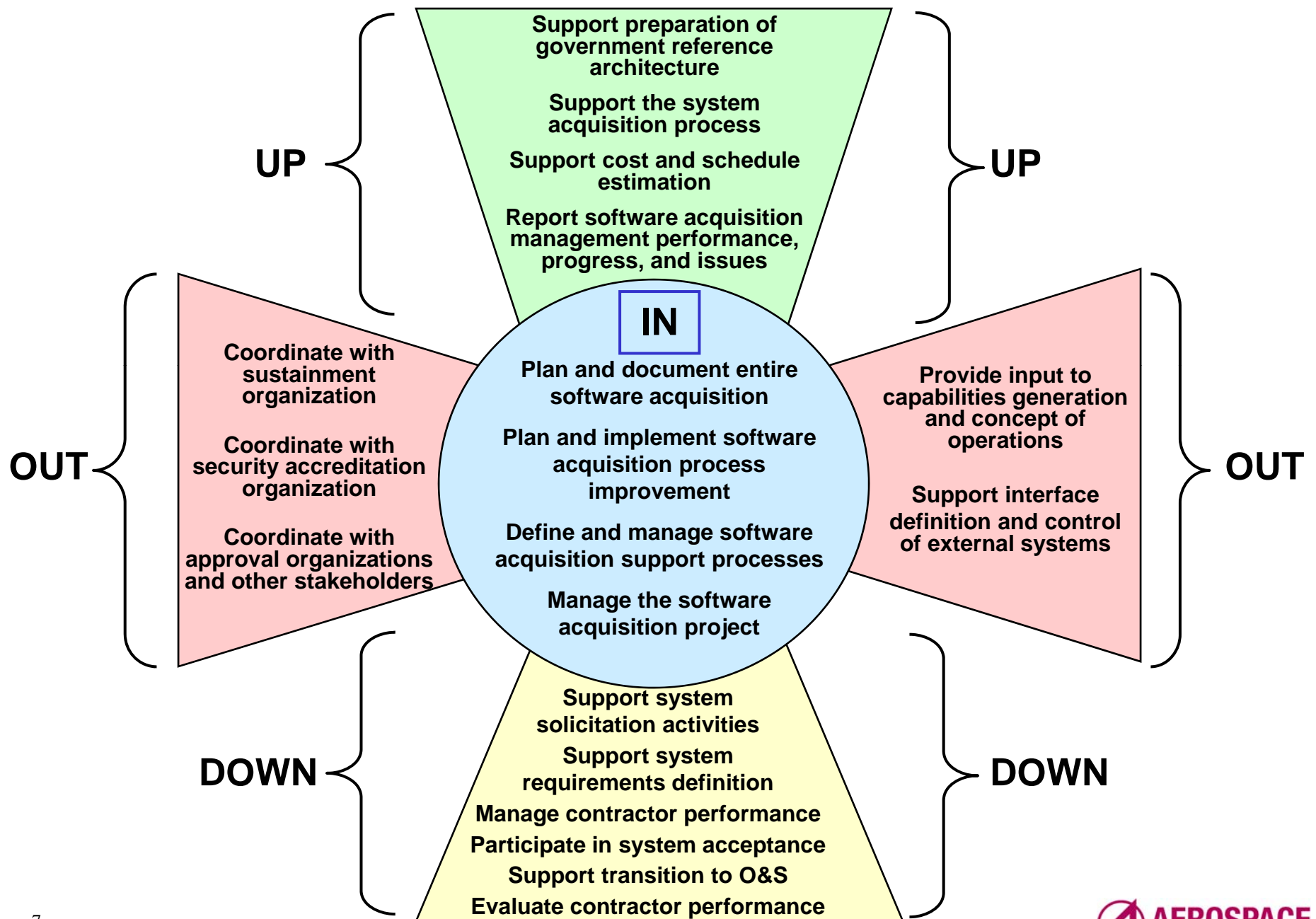
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# Software Acquisition Interfaces – In, Out, Up, Down



# Software Acquisition Activities – In, Out, Up, Down



# System Acquisition Activities (Up) - 1

- Support a **software-inclusive system acquisition process**
  - Identify software-acquisition related risks
  - Participate in the development and review of the system acquisition work products, e.g.,
    - Acquisition Strategy
    - Work Breakdown Structure (WBS)
    - Test and Evaluation (T&E) Strategy
    - Test and Evaluation Master Plan (TEMP)
    - Technology Readiness Assessment (TRA)
  - Prepare software acquisition-related materials for upcoming acquisition milestones, key decision points (KDPs), and independent program assessments (IPAs)
- Support preparation of a **software-inclusive government reference architecture (GRA)**
  - Include software in system architecture trade studies
  - Ensure software is properly incorporated into the DoDAF views



# System Acquisition Activities (Up) - 2

- Perform **independent software cost and schedule estimation**
  - Estimate software size, effort, cost and schedule
    - Support trade studies, what-if analyses, replanning, estimates to complete
  - Prepare software portions of the Cost Analysis Requirements Description (CARD)
  - Support independent cost analyses (e.g., Independent Cost Assessment (ICA) or Independent Cost Estimate (ICE))
  - Provide input to the budgeting process
- Report **software acquisition management performance, progress, and issues**
  - Provide activity and status reports to program management
  - Provide input to:
    - Program Management Reviews (PMRs) and Program Executive Officer (PEO) Reviews
    - Reports to line management, acquisition management, or staff organizations
    - Reports to Congress and the Executive Branch (e.g., Office of Management and Budget(OMB))

# Adjunct Interface Activities (Out) - 1

- Provide **software input to capabilities generation and concept of operations**
  - Interact with user to ensure the evolving required capabilities appropriately include software
    - Initial Capabilities Document (ICD), Capability Development Document (CDD), and Capability Production Document (CPD)
  - Interact with user to ensure feasibility of the user's Concept of Operations (CONOPS) from a software perspective
    - The CONOPS is embodied in the software!
- Support **software-inclusive external interface definition and control**
  - Include interfaces with legacy, current, and future systems, as needed
  - Ensure external interface definitions appropriately include software
    - Participate in development and review of Interface Control Documents (ICDs)
    - Participate in Interface Control Working Groups (ICWGs)

## Adjunct Interface Activities (Out) - 2

- Coordinate with **software sustainment organizations**
  - Plan to obtain information needed for sustainment from the contractors
  - Plan and agree upon the transition criteria, level of support, and training
  - Plan how software changes, enhancements and anomaly resolution will be managed and supported
- Coordinate with **security accreditation organizations**
  - Support preparation of the system security plan, and plan needed security controls
  - Provide input to the systems requirements process for security requirements
  - Support documentation of agreements in the System Security Authorization Agreement (SSAA), and support the certification/accreditation process
- Coordinate with **approval organizations and other external stakeholders**
  - T&E, interfacing systems, safety, and other certification organizations, etc.

**Plan from the beginning to engage the stakeholders!**

# Contractor Oversight Activities (Down) - 1

- Support a **software-inclusive system solicitation**
  - Support new acquisitions: participate in Request for Proposal (RFP) preparation, source selection, and negotiations for software
  - Support contract changes: participate in change request preparation and perform software technical evaluations of responses
- Participate in developing **software-inclusive contractual system requirements**
  - Participate in soliciting needs and software-related requirements from the users
  - Define and document the software-related system requirements in the government contractual system requirements document
  - Review contractor's system specification to ensure it is appropriately software-inclusive before it becomes part of the contract

**Software acquisition must be an integral part of the system solicitation activities.**

## Contractor Oversight Activities (Down) - 2

- Manage **contractor software performance**
  - Participate in Integrated Product Team (IPT) and other meetings
  - Review software-related contractor products
  - Review and appraise contractor software processes (informal reviews and formal appraisals)
  - Participate in contractor formal and informal reviews, milestone reviews, and peer reviews
  - Monitor contractor software risk management
  - Monitor software testing and participate in determining software requirements satisfaction
  - Evaluate software project status including cost, schedule, metrics, technical performance measures (TPMs), and risks
  - Provide input to the award fee or incentive fee evaluation process

**Managing contractor software performance is the largest software acquisition job in effort and duration.**

# Contractor Oversight Activities (Down) - 3

- Participate in **system acceptance testing**
  - Participate in reviewing higher-level test plans, procedures and reports to ensure software testing is integrated into the system testing strategy
  - Participate in monitoring higher-level testing and in determining requirements satisfaction
- Support **system transition to operations and sustainment**
  - Ensure smooth transition of software to the operational environment, including documentation, training, licensing, and data rights
  - Ensure smooth transition of software to the support organization, including documentation, training, licensing, and data rights
- Evaluate and document **contractor performance**
  - Perform a final evaluation of the software contractor performance and provide input to the Contractor Performance Assessment Reporting System (CPARS)
  - Document lessons learned for software acquisition practices

# Acquisition Program Office Activities (In) - 1

- **Plan the entire software acquisition**
  - Address all software acquisition activities (In, Out, Up, Down), for Concept Refinement Phase through program retirement
    - Update the plan with additional information and more detail prior to each subsequent acquisition phase or major milestone
    - Document the plan and obtain needed approvals
      - Unless you write it down, there is no plan!
  - Plan for the unplanned activities that may impact the software acquisition activities
    - Examples: tasks directed by higher management or staff organizations, audits by IG or GAO, independent assessments, special briefings or training
    - As a general rule, reserve 10% of the software acquisition schedule and staffing for unplanned tasks
  - Establish work priorities when resources are constrained
    - Understand that some things just won't get done—Know what is really important!

# Acquisition Program Office Activities (In) - 2

- Plan and implement **software acquisition process improvement**
  - Identify and define the software acquisition process improvement initiatives that will be performed
  - Use independent program appraisals to assess compliance with the software acquisition and program processes
  - Resources spent on process improvement are good investments!
- Define and manage **software acquisition support processes**
  - Software acquisition risk management
    - Identify, assess, handle, monitor and control risks
    - Not all software acquisition risks are contractor risks!
  - Configuration management of software acquisition work products
  - Software acquisition requirements management
  - Software acquisition measurement and analysis
  - Software acquisition corrective action

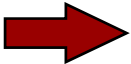


# Acquisition Program Office Activities (In) - 3

- Manage the entire **software acquisition project**
  - Monitor status of all software acquisition activities (In, Out, Up, Down)
  - Ensure quality of software acquisition products produced
  - Ensure communication proceeds effectively
  - Monitor status of software acquisition risk mitigation tasks
  - Collect and analyze software acquisition metrics
  - Perform corrective action when needed

**Apply basic project management principles to all software acquisition activities.**

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# What to Plan?

- Organizational structure of the SW acquisition team within the program
- Work Breakdown Structure for SW acquisition work, containing all software acquisition activities
- For all software acquisition activities (In, Out, Up, Down), plan the tasks needed to be performed for each activity, including:
  - Task inputs, outputs, processes/operating instructions, verifications, tools/techniques, metrics for monitoring
  - Who will perform the task
  - Who else will be involved and to what degree (e.g., external stakeholders)
  - When to perform the task (initially and subsequent iterations), schedules, dependencies
- Resources needed
  - Staffing (including government and government support contractors)
  - Computer resources needed by software acquisition team (hardware, software, tools)
  - Facilities and other resources needed for the software acquisition team
  - Training of the software acquisition team

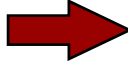
# Software Acquisition Management Plan Outline

1. Introduction
2. References
3. Definitions
4. Overview of the Software Acquisition
5. Software Acquisition Life Cycle (within the System Acquisition Life Cycle)
6. Software Acquisition Activities
- 6.X Acquisition Phase X (Repeat for each relevant acquisition phase)  
(Include tasks with inputs, outputs, processes/work instructions, verifications, tools/techniques, metrics to be used for monitoring)
  - i. System Acquisition Activities (UP)
  - ii. Adjunct Interface Activities (OUT)
  - iii. Contractor Oversight Activities (DOWN)
  - iv. Acquisition Program Office Activities (IN)
7. Schedules and Dependencies
8. Organizational Structure, Roles and Responsibilities
9. Resources (Staffing, Computer Resources, Facilities, Other)

## Annexes:

Software Acquisition Risk Management Plan, including identified risks and risk mitigation plans  
Software Acquisition Measurement Plan  
Software Acquisition Configuration Management Plan  
Software Acquisition Requirements Management Plan  
Software Acquisition Corrective Action Plan  
Software Acquisition Stakeholder Involvement Plan  
Software Acquisition Training Plan

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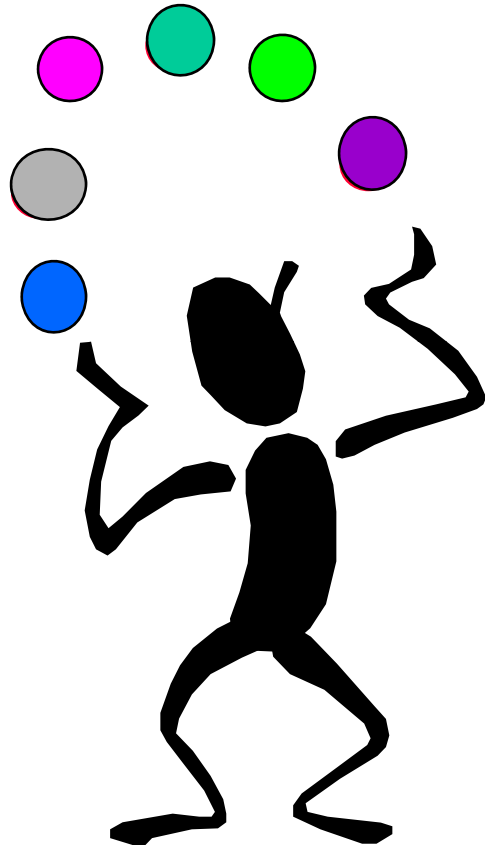
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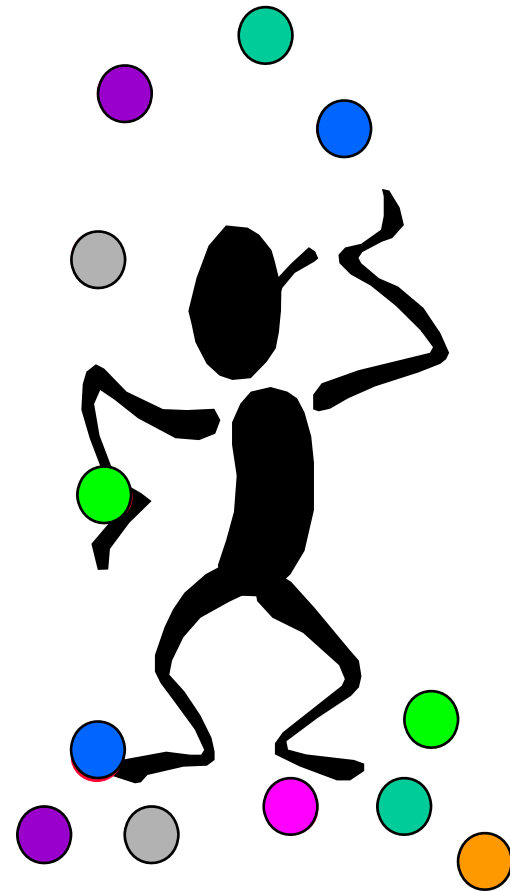
- Software acquisition planning
  - Enables proactive, rather than reactive, management of the program's software acquisition
  - Enables disciplined management of the software acquisition activities throughout the life cycle
  - Establishes the importance of software acquisition to the program
  - Helps hardware-oriented management understand the role of software acquisition personnel on their program
- Using the In-Out-Up-Down framework for software acquisition activities can help ensure **all** needed software-related activities are identified and planned

**Software acquisition planning is a best practice!**

# Software Acquisition Planning: The Foundation for Keeping All the Balls in Air!



**This!**



**NOT This!**

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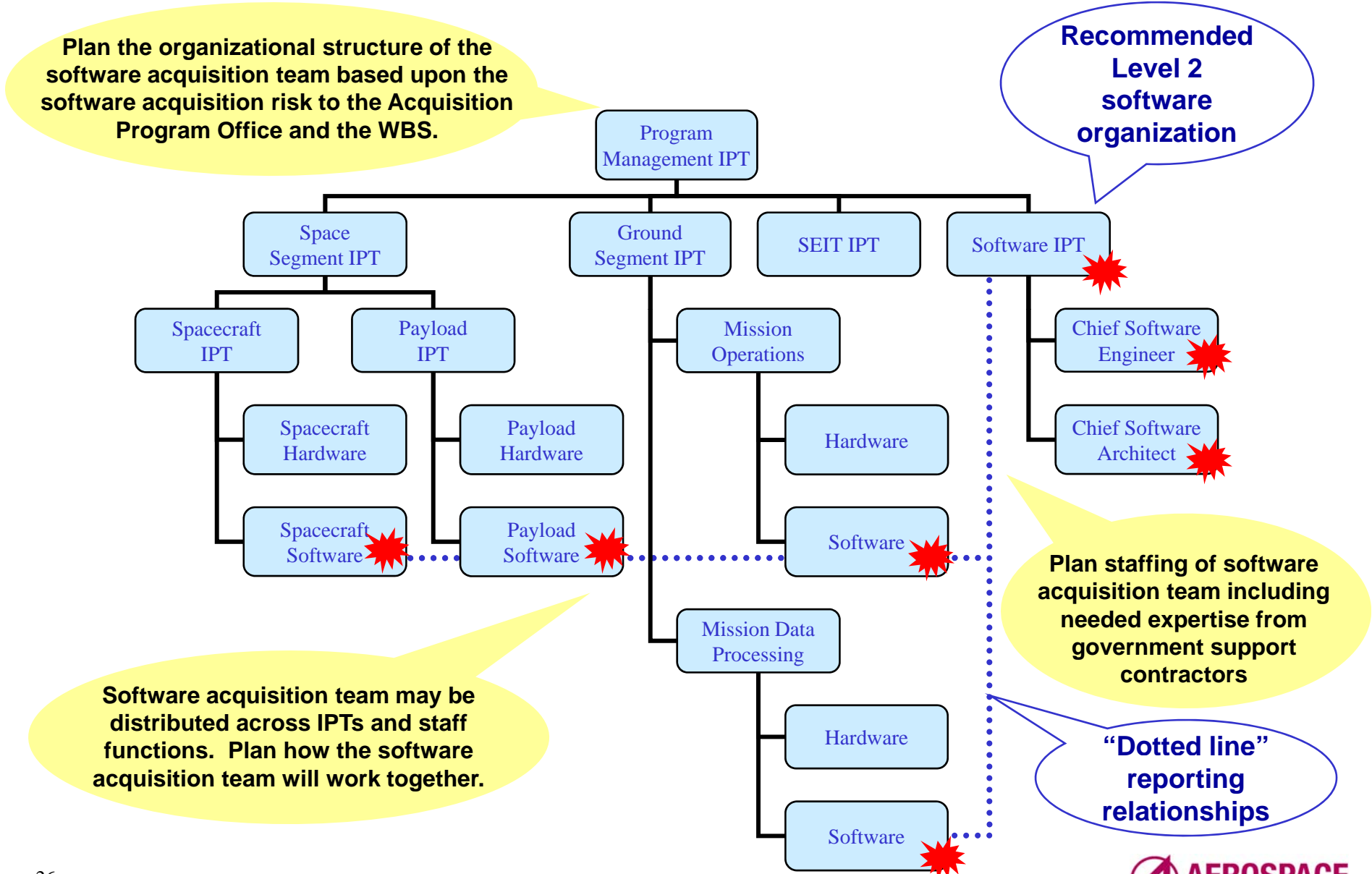
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# Example Software-Related System Requirements (Down)

- Key Performance Parameters (KPPs)
  - Must be feasible from a software perspective
- Requirements derived from CONOPS
- Computer resource margin and growth requirements
  - Processor throughput, memory, storage, communication bandwidth (e.g., bus, networks, I/O channels)
- Scalability, evolvability
- Dependability, reliability, maintainability, availability
- Supportability
- Testability
- Maintenance, modifiability
  - Includes requirements for COTS software supportability
- Interoperability and standardized interfaces
- Net-centricity
- Security (information assurance)
- Safety
- Human Systems Integration (HSI)

# Example Software Acquisition Team Organization (IN)



# Acronyms and Abbreviations

Acq	Acquisition	KPP	Key Performance Parameter
AFOTEC	Air Force Test and Evaluation Center	KTR	Contractor
CARD	Cost Analysis Requirements Document	Labs	Laboratories
CDD	Capability Description Document	Mgmt	Management
CONOPS	Concept of Operations	O&S	Operations and Support
COTS	Commercial Off-the-Shelf	OMB	Office of Management and Budget
CPARS	Contractor Performance Assessment Reporting System	Orgs	Organizations
CPD	Capability Production Document	PEO	Program Executive Officer
DoDAF	Department of Defense Architecture Framework	PMR	Program Management Review
GAO	Government Accounting Office	RFP	Request for Proposal
GRA	Government Reference Architecture	SSSA	System Security Authorization Agreement
HSI	Human Systems Integration	SEIT	Systems Engineering, Integration and Test
ICA	Independent Cost Assessment	SSTC	Systems and Software Technology Conference
ICD	Interface Control Document	SW	Software
ICE	Independent Cost Estimate	T&E	Test and Evaluation
ICWG	Interface Control Working Group	TEMP	Test and Evaluation Master Plan
IG	Inspector General	TPM	Technical Performance Measure
I/O	Input/Output	TRA	Technology Readiness Assessment
IPA	Independent Program Assessment	WBS	Work Breakdown Structure
IPT	Integrated Product Team		
KDP	Key Decision Point		

# Distinguished Engineer

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