DAU PROGRAM MANAGERS TOOL KIT

Thirteenth Edition (Ver 2.0)
February 2004

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PREFACE

This 13th Edition (ver 2.0) of the "Tool Kit" contains a graphic summary of acquisition policies and managerial skills frequently required by DoD program managers. It is a current version of a "Tool Box" that was first developed by Mr. Charles F. Schied of PMC 92-1. For convenience, it is sized for insertion into a 3-hole, 5-1/2" x 8-1/2" "Day Runner." The information was extracted from Defense Acquisition University (DAU) course material and is based on DoDD 5000.1(12 May 2003), DoDI 5000.2 (12 May 2003), and the Interim Defense Acquisition Guidebook (IDAG) (30 October 2002). Material from the DAU Acker Library & Learning Resource Center was also used.

Users of the "Tool Kit" are reminded that this summary is a guide only and should not be used as a substitute for official policy guidance. Periodic review of official policy guidance is recommended.

ACKNOWLEDGMENTS

As Sponsor of the "Tool Kit" I wish to recognize the following members of the Defense Acquisition University (DAU) faculty and staff for their input to this 13th Edition: Maj Norman Patnode, USAF and Maj Jim Ashworth, USAF, of the Program Management and Leadership Department (PML) on the Capital/Northeast Regional Campus, who, along with Mr. Bill Bahnmaier, formerly of DAU, coordinated the input and editing of material from various DAU departments; Mr. Eduard Boyd of the Visual Arts Department for his support in preparing and editing drafts for printing, and Ms. Debbie Gonzalez and Ms. Frances Battle of the same Department for their detailed proofing of the final drafts and coordination of printing details. Other significant contributors were Mr. John Kelley, PML Department; Ms. Leslie Deneault, CM Department; Ms. Roberta Tomasini, Ms. Siobhan Tack, Ms. Liz Carroll, Mr. Robert Carlson and Ms. Miriam Cohe of the BCEFM Department; Mr. Richard Kwatnoski, formerly of the Executive and International Department; Mr. John Claxton, Dr. John Snoderly and Mr. George Prosnik of the Curricula Development Support Center; Maj Mark McNabb, USAF, and Dr. Bob Lightsey of the Technology and Engineering Department, and Mr. Larry Heller of the Logistics Management Department. I also want to thank Mr. Tim Shannon, Dean of the Capital/Northeast Regional Campus for both his encouragement and support for this effort.

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Program Management

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I
ACQUISITION MANAGEMENT

• Things that make you go “Hmmm?...”

“The only thing most auditors fix is the blame.”

“Experience is something you got just after you needed it.”

“People are smarter than they look; listen to them.”

“The last 10 percent of the performance sought generates one-third of the cost and two-thirds of the problems.”

“Never open a can of worms unless you want to go fishing.”

“Those who believe it cannot be done will you please get out of the way of those who are busy doing it.”

• Things we should always remember.

“Be honest in everything you say, write and do.”

“Be good to your people, and they will be good to you.”

“Forgiveness is easier to obtain than permission.”

“Keep everyone informed; when in doubt, coordinate.”

“Be the first to deliver bad news.”

“Bad news does not get any better with time.”

“If you are sitting at your desk, you are not managing your program.”

THE PROGRAM MANAGER'S BILL OF RIGHTS AND RESPONSIBILITIES

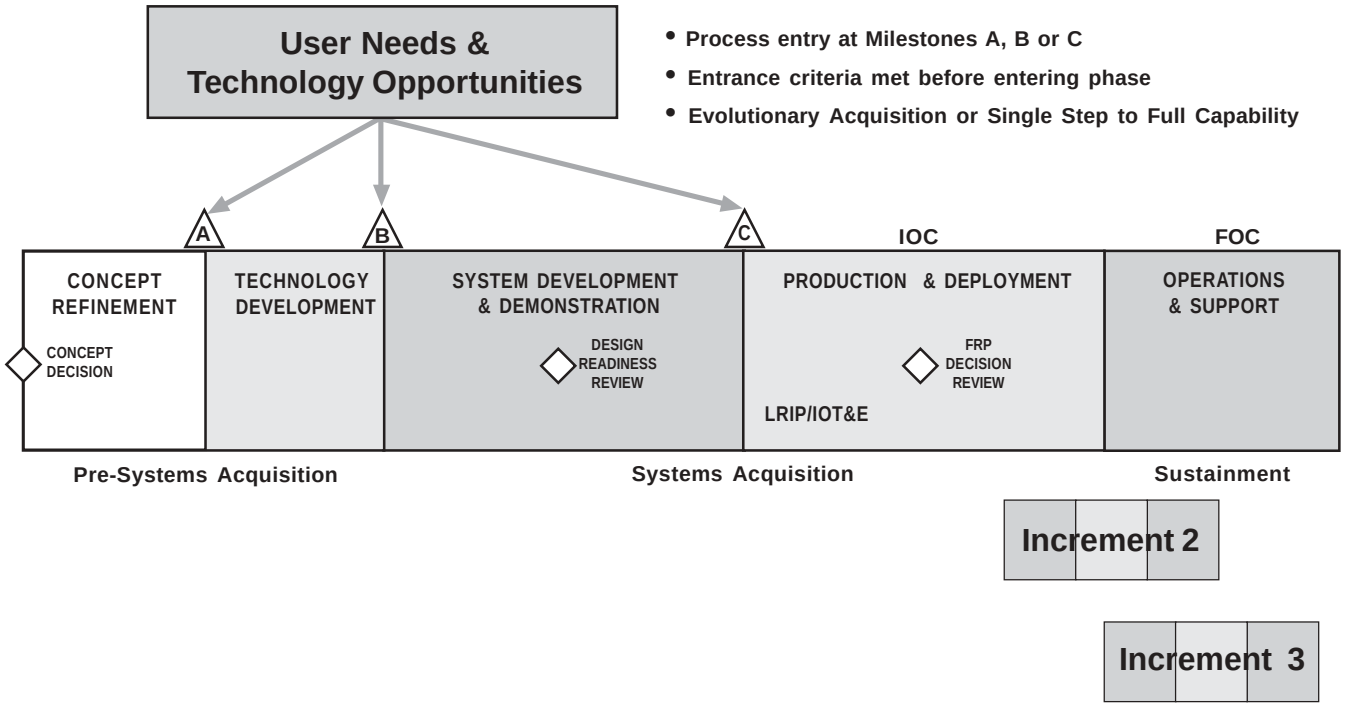
***RIGHTS*:**

Program Managers have the RIGHT to:
- A single, clear line of authority from the Defense Acquisition Executive.
- Authority commensurate with their responsibilities.
- Timely decisions by senior leadership.
- Be candid and forthcoming without fear of personal consequences.
- Speak for their program and have their judgments respected.
- The best available training and experience for the job.
- Adequate financial and personnel resources.

RESPONSIBILITIES:

Program Managers have the RESPONSIBILITY to:
- Accept program direction from acquisition executives and implement it expeditiously and conscientiously.
- Manage their programs to the best of their abilities within approved resources.
- Be customer-focused and provide the user with the best, most cost-effective systems or capabilities.
- Innovate, strive for optimal solutions, seek better ways to manage, and provide lessons-learned to those who follow.
- Be candid about program status, including risks and problems as well as potential solutions and likely outcomes.
- Prepare thorough estimates of financial and personnel resources that will be required to manage the program.
- Identify weaknesses in the acquisition process and propose solutions.

DEFENSE ACQUISITION DECISION REVIEWS & PHASES



- Process entry at Milestones A, B or C
- Entrance criteria met before entering phase
- Evolutionary Acquisition or Single Step to Full Capability

ACQUISITION CATEGORIES (ACAT)

Major Defense Acq Pgms	**ACAT 1D:**	• DAB Review • Designated by DAE • Decision by DAE	$365M RDT&E or $2.190B Procurement (FY00 Constant $)
	ACAT IC:	• Component Review • Designated by DAE • Decision by Svc Sec/CAE	
Major AIS Acq Pgms	**ACAT IAM:**	• ITAB Review * • Designated by ASD(NII)** • Decision by ASD(NII)	$378M Life Cycle Cost or $126M Total Prog. Cost or $32M Prog. Cost in any single year (FY00 Constant $)
	ACAT IAC:	• Component Review • Designated by ASD(NII) • Decision made by Svc Sec/CAE	
Major Systems	**ACAT II:**	• Does Not Meet ACAT I Criteria • Designated by Svc Sec/CAE • Decision by Svc Sec/CAE	$140M RDT&E or $660M Procurement (FY00 Constant $)
All Others (except for Navy, USMC)	**ACAT III:**	• Does Not Meet ACAT I, IA or II Criteria • Designated IAW Component policy • Decision at lowest appropriate Level	No Fiscal Criteria
Navy USMC	**ACAT IV:**	• Not otherwise designated ACAT I, IA, II or III • Designated IAW Component Policy • Navy/USMC ACAT IVT/IVM • Decision at lowest appropriate level	SECNAVINST 5000.2_

* Information Technology Acquisition Board
** ASD, Networks & Information Integration (NII); formerly ASD (C3I)

ACQUISITION STRATEGY ELEMENTS

Interim Defense Acquisition Guidebook, 30 Oct 2002

- Requirements
  - Approved Source Docs
  - Status of In-process Source Docs
- Program Structure
- Acquisition Approach
- Risk Management/Assessment
- Program Management
  - Resources
    - Advance Procurement
    - PMO Staffing & Support
  - Info Sharing & DoD Oversight
  - Integrated Digital Environment (IDE)
  - DCMA/Tech Reps at KTR Facilities
  - Government Property In Possession of Contractors
  - Planning for Simulation-Based Acquisition and Modeling & Simulation
  - Tailoring & Streamlining
    - Requests for Relief or Exemption
    - Applying Best Practices
  - Independent Expert Review of Software Intensive Programs
- Design Considerations
  - Tech Transition; Commercial/NDI
  - Open Systems
  - Interoperability
    - Information Interoperability
    - Other-than Info Interoperability
  - IT Supportability
  - Protection of Critical Program Info & Anti-Tamper Provisions
    - Information Assurance
- Support Strategy
  - Product Support
    - Management Planning
    - Integration
  - Affordability Improvements
  - Source of Support
    - Contractor Log Support
    - Acq Cross-Servicing Agreements
  - Human Sys Integration
    - Training
  - Environ Safety & Occupational Health
  - Demil & Disposal
  - Life Cycle Support Oversight
  - Post Deployment Evaluation
- Business Strategy
  - Competition
    - Fostering a Competitive Environment
      - Competition Advocates
      - Ensuring Future Competition
    - Building Competition Into Strategies
      - Acquisition Phases
      - Evolutionary Acquisition
      - Industry Involvement
    - Potential Obstacles
      - Exclusive Teaming
      - Sub-Tier Competition
    - Potential Sources
      - Market Research
      - Commercial & NDI
      - Dual-Use Tech & Comm Plants
      - Industrial Capability
      - SBIR Technologies
  - International Cooperation
    - Cooperative Strategy
    - Interoperability
    - Testing Required for International Programs
  - Contract Approach
    - Major Contracts Planned
    - Contract Types
    - Contract Incentives
    - Performance Mgmt
    - Integrated Baseline Reviews
    - Special Terms & Conditions
    - Warranties
    - Component Breakout
    - Leasing

DoDI 5000.2 (12 May 2003)

- Competition analysis (depot-level maint)
- C4ISP issues summarized
- Core Logistics Analysis/Source of Supply Analysis

ACQUISITION EXCELLENCE INITIATIVES
(Examples)

- Update/streamline the DoD 5000 Acquisition Process
- Integrated Product and Process Development and Integrated Product Teams
- Movement from Detailed Design Specifications and Process Standards to Performance and/or Commercial Specifications
- Single Process Initiative
- DoD Cost/Schedule Control System Criteria Replaced by Industry Standard Guidelines for Earned Value Management System (EVMS)
- Commercial and Non-Developmental Item Acquisition and Practices
- Cost As an Independent Variable (CAIV)
- Open Systems Design and Interoperability
- Acquisition Knowledge Sharing System (AKSS)
- Defense Acquisition Pilot Programs
- Implementation of Federal Acquisition Streamlining Act (FASA), Federal Acquisition Reform Act (FARA) and Information Technology Management Reform Act (ITMRA);
  (latter two are now known as Clinger-Cohen Act)
- Electronic Commerce/Electronic Data Interchange
- Collection and Use of Past Performance Information
- Advanced Concept Technology Demonstrations (ACTD)
- Acquisition Reform Benchmarking Initiative
- Acquisition Workforce Personnel Demonstration Program
- Contract Administration Reform
- Procurement Process Reform
- Performance Based Service Contracting
- Logistics Transformation/Performance-Based Logistics
- Alternative Disputes Resolution
- Price Based Acquisition
- Total Ownership Costs (TOC)

PLANNING TO SUPPORT ACQUISITION PROCESS

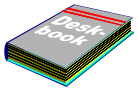
- Planning to support the acquisition process is accomplished within the Integrated Product and Process Development (IPPD) environment.
- Program plans are for use by the PM and the integrated product teams (IPTs) that support the PM and are discretionary.
- There are four exceptions where specific plans are required: Acquisition Plan required by the FAR/DFARS; Program Protection Plan; and TEMP are required by DoDI 5000.2. and the Information Support Plan (ISP)* is required by CJCSI 6212.01C.
- Typically, the following areas will require some level of program office planning:

- Acquisition Strategy (Toolkit, pg 5)
- Systems Engineering
- Logistics Support/Post Prod Spt
- Program Protection
- Training Development
- Technology Assessment & Control
- Risk Management
- Computer/Software Devel/**PDSS
- Human Systems Integration
- Deployment/Fielding
- Manufacturing
- Integrated Testing

*Replaces C4ISP ** Post Deployment Software Support

ACQUISITION, TECHNOLOGY, AND LOGISTICS (AT&L) KNOWLEDGE SHARING SYSTEM (AKSS)

The Following Quick Links and Information Browsers can be found on the AKSS Web Site: **http://akss.dau.mil**



Legacy Deskbook

Frequently Accessed Links: DoDD 5000.1, DoDI 5000.2, DCMA One Book, Interim Defense Acquisition GuideBook, FAR & DFARS, DCAA Manual Vol. 1, DCAA Manual Vol. 2 and FMS Manual.

Collaborate & Share: Acquisition Community Connection (ACC) (http://acc.dau.mil); includes: Systems Engineering, Program Management, Contract Management, Risk Management, Logistics and Facilities Engineering.

Link to Other AT&L Sites
Education & Training
DoD Forms Program
Ask a Professor
Manage Your Documents
Order CD

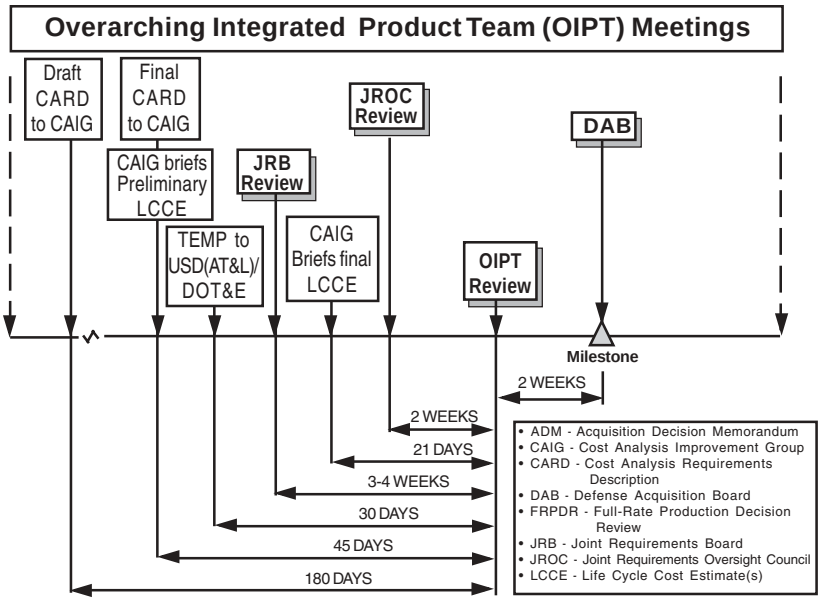
Policy Documents: DoD, Army, Navy, Air Force, Marines, etc.

Special Interest Areas: *ESOH, Total Ownership Cost, Spectrum Compliance, Info Technology, Perf-Based Sys Acq, Acq Research.

Career Fields: PM, Procurement, PQM, Acq Logistics, T&E, etc.

* Environmental, Safety, and Occupational Health

DAB TIMELINE MILESTONES B, C & FRPDR



MILESTONE DECISION INFORMATION — A POSSIBLE CONSTRUCT

1 *WHY ?*
- Threat
- Capability

2 *WHAT ?*
- Requirement
- Analysis of Alternatives

3 *HOW ?*
- Acquisition Strategy

4 *RISKS ?*
- Risk Mgmt Plan
- T&E Plan
- T&E Results

5 *COST ?*
- CAIV Objectives
- LCCE
- ICE

6 *MANAGEMENT ?*
- PMO Structure
- IPT Structure
- WIPT - OIPT Structure

7 *AGREEMENT ?*
- APB
- ADM
- Exit Criteria

- **Have I Presented All Necessary Information ?**
- **Does the Info Flow Logically ?**
- **Is the Info Clear and Accurate ?**
- **Is it Concise, Executive-Level ?**

INFORMATION FOR DECISION REVIEWS

Required Information	Milestone/Review					
	CD	A	B	DRR	C	FRP
Acquisition Decision Memorandum (ADM) ***(Note 5)***	X	X	X	X	X	X
Acquisition Program Baseline (APB) ***(Note 5)***			X		X	X
Acquisition Strategy ***(See page 5) (Note 5)***			X		X	X
Affordability Assessment			X		X	
Analysis of Alternatives (AoA) ***(Note 3 & 5)***		X	X		X	X
AoA Plan	X					
Benefit Analysis & Determination (bundled acquisitions) ***(Note 1 & 8)***			X			
Beyond LRIP Report ***(Note 2)***						X
Capabilities Development Document (CDD) ***(Note 5)***			X			
Capabilities Production Document (CPD)					X	
Certification of Compliance with Clinger-Cohen ***(Note 7)***		X	X		X	X
Certification of Compliance with BEA (FM MAIS only) ***(Note 7)***		X	X		X	X
Clinger-Cohen Act Compliance (MS A-MAIS only) ***(Note 5 & 7)***		X	X		X	X
Competition Analysis (depot-level maintenance rule) ***(Note 1 & 8)***			X		X	
Compliance with Strategic Plan						X
Component Cost Analysis (MAIS; optional MDAP) ***(Note 5 & 9)***			X		X	
Consideration of Technology Issues		X	X		X	
Cooperative Opportunities ***(Note 1)***			X		X	
Core Logistics/Source of Repair Analysis ***(Note 1 & 8)***			X			
Cost Analysis Requirements Description (MDAP & MAIS) ***(Note 5 & 9)***			X		X	X
Economic Analysis (MAIS) (at MS A may be combined w/AoA)		X	X			X
Exit Criteria ***(Note 5)***		X	X	X	X	X
Industrial Capabilities (n/a AIS) ***(Note 1)***		X	X		X	X
Independent Cost & Manpower Estimate (MDAPs; n/a MAIS)			X		X	X
Independent Technology Assessment (ACAT ID only)(DDR&E Option)			X		X	
Information Support Plan (***Note 1 & 5)***			X		X	
Initial Capabilities Document (ICD) ***(Note 4 & 5)***	X	X	X		X	
J-6 Interoperability & Supportability Certification			X		X	
J-6 Interoperability & Supportability Validation						X
Live Fire T&E Waiver (covered systems)***(Note 2)***			X			
Live Fire T&E Report (covered systems)***(Note 2)***						X
LRIP Quantities (n/a AIS)			X			
Market Research		X	X			
Operational Test & Evaluation of OT&E Results			X		X	X
Post Deployment Performance Review						X
Program Protection Plan ***(Note 1)***			X		X	
Pgm Environ, Safety & Ocup Health (w/NEPA schedule) ***(Note 5)***			X		X	X
Registration of Msn Critical & Msn Essential Info Sys ***(Note 5 & 7)***			X		X	X
Spectrum Certification Compliance ***(Note 3)***			X		X	
System Threat Assessment ***(Note 5 & 6)***			X		X	
Technology Development Strategy		X	X		X	
Technology Readiness Assessment ***(Note 5)***			X		X	
Test & Evaluation Master Plan (eval strategy due at MS A)		X	X		X	X

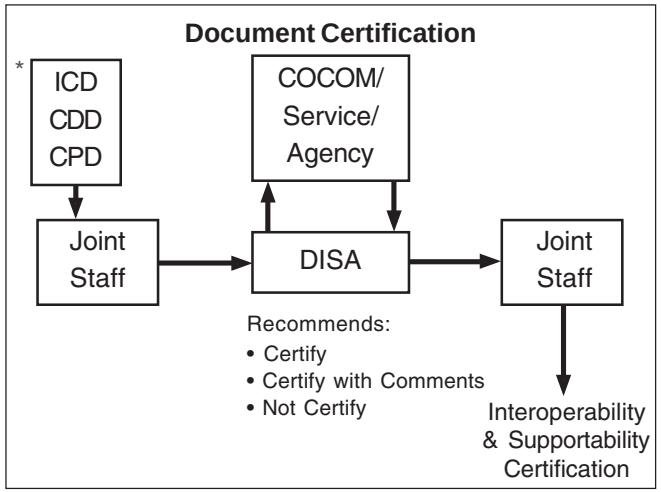
Note 1. Also summarized in acquisition strategy
Note 2. OSD T&E Oversight programs only
Note 3. MDAP A, B, C; For MAIS A, B & FRPDR
Note 4. Milestone C if program initiation
Note 5. Program Initiation for ships
Note 6. Validated by DIA for ACAT ID; AIS use Capstone Info Ops Sys Threat Assessment
Note 7. Milestone C if FRP decision
Note 8. Milestone C, if no Milestone B
Note 9. MAIS: whenever an econ analysis is required

C4ISR INTEROPERABILITY

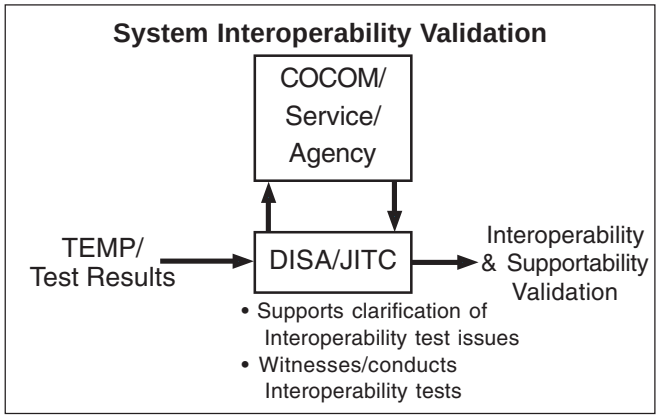
DoD Policy: (CJCSI 6212.01C)

- All C4I systems developed for use by U.S. forces are considered to be for Joint use.
- All C4I requirements shall be reviewed/updated at every milestone.
- Joint Staff will certify all requirements documents for conformance with Joint C4I Policy & Doctrine, architectural integrity, and Interoperability standards.

Certification

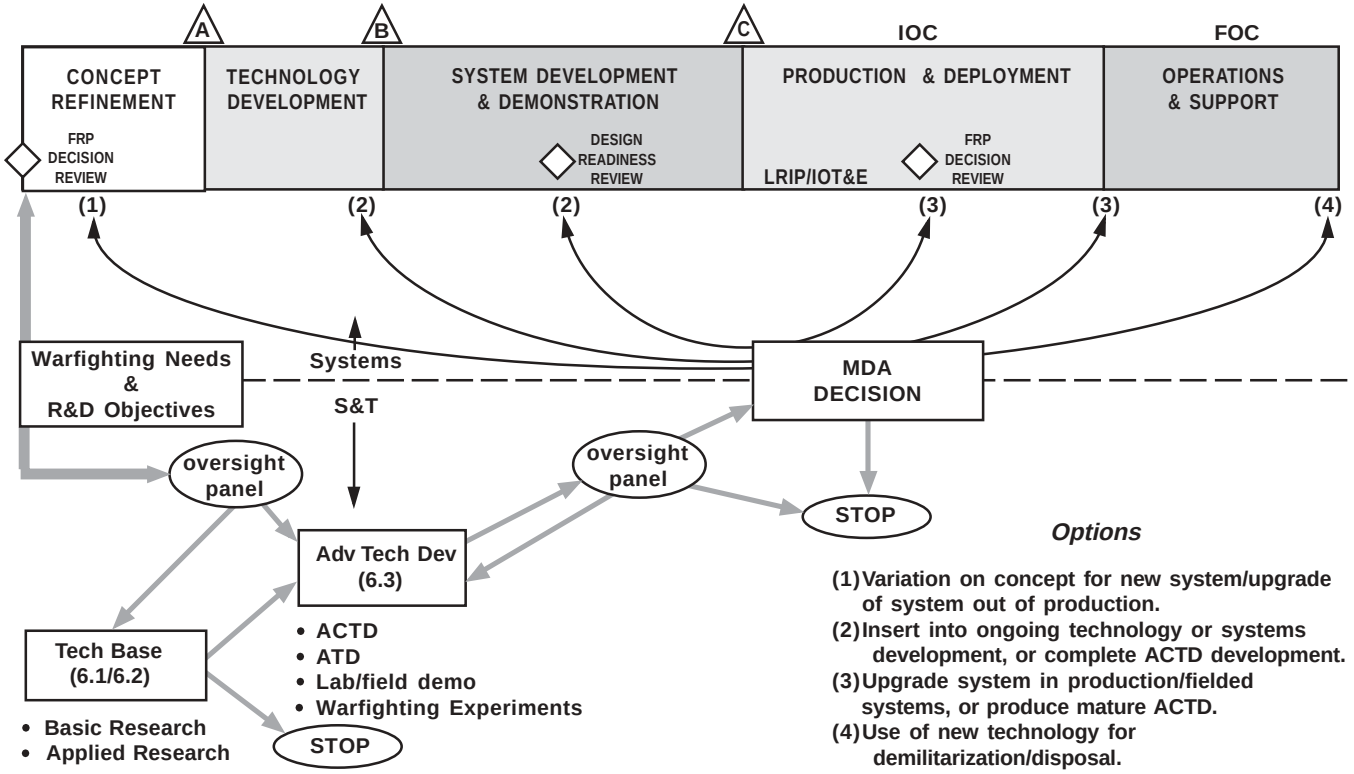


* these documents replaced the MNS and ORD

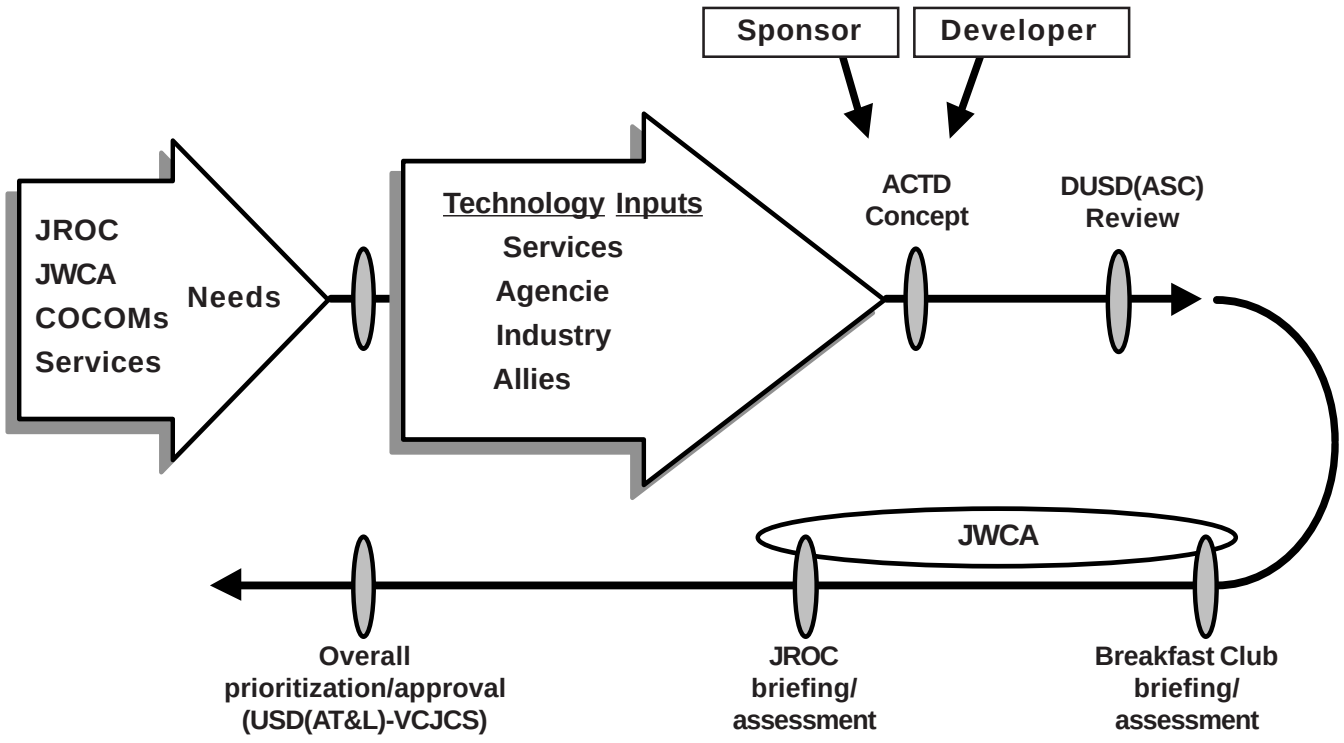


ICD: Initial Capabilities Document
CDD: Capability Development Document
CPD: Capability Production Document
DISA: Defense Information Systems Agency
JITC: Joint Interoperability Test Command
COCOM: Combatant Commander

S&T LINKAGE TO DEFENSE ACQUISITION PROCESS



ACTD INITIATION PROCESS

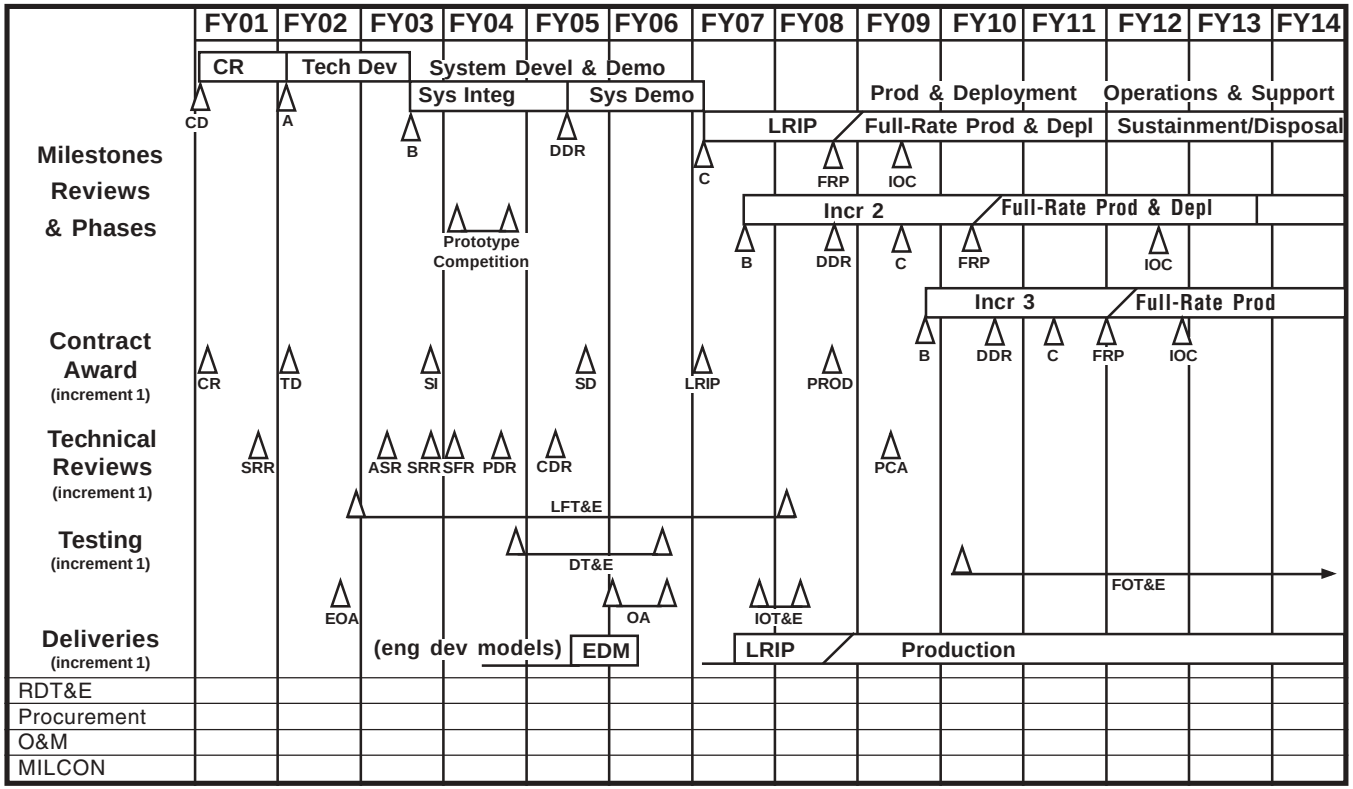


ACQUISITION PROGRAM VS. ATD & ACTD

	Acquisition Program	Advanced Technology Demonstration (ATD)	Advanced Concept Tech Demonstration (ACTD)
Motivation	• Develop, produce and field system • Cost, schedule, performance	• Demonstrate feasibility and maturity • Reduce technical risks and uncertainties at relatively low cost	• Gain understanding of and evaluate utility prior to acquisition decision • Develop concepts of operation and doctrine
Requirement	ICD/CDD/CPD	not required	user sponsor & JROC prioritization
Oversight	Milestone Decision Authority	labs/R&D centers	DUSD(ASC) Oversight Panel (Breakfast Club)
Funding	fully FYDP funded	RDT&E	RDT&E (2 yrs in field)
ACAT	all ACATs	not ACAT effort	not ACAT effort
Configuration & Testing	system/subsystem prototypes DT/OT	technology demonstrations	tech demonstrations in field environment with users
Rules	DoD 5000 Series/FAR	informal/FAR/OTA	implementation directive/FAR/OTA
Role of User	max involvement	some involvement	max involvement

ACAT: Acquisition Category
DT/OT: Developmental/Operational Testing
DUSD(AS&C): Deputy Under Sec Def (Advanced Systems & Concepts)
FAR: Federal Acquisition Regulation
FYDP: Future Years Defense Program
ICD: Initial Capabilities Document
CDD: Capability Development Document
CPD: Capability Production Document
OTA: Other Transition Authority
RDTE: Research, Development, Test & Evaluation (appropriation)

PROGRAM STRUCTURE/SCHEDULE (EXAMPLE)



DoD INTERNATIONAL ARMAMENTS COOPERATION POLICY

SECDEF Memorandum 23 March 1997

"It is DoD policy that we utilize International Armaments Cooperation to the maximum extent feasible, consistent with sound business practice and with overall political, economic, technological, and national security goals of the United States."

THE SCOPE OF DEFENSE COOPERATION

RDT&E	***Production & Procurement***	***Follow-on Support***
Information Exchanges	Foreign Military Sales	Cooperative Logistics Supply Support
Engineer & Scientist Exchanges	Direct Commercial Sales Exchanges	Mutual Support
Cooperative R&D	Cooperative Production (Joint Funds)	Logistics Support
Comparative or Joint Testing	Coproduction/Licensing (ForeignFunds)	Host Nation Support Defense Industrial Base
Standardization	Reciprocal Procurement	

The Program Manager's Focus

DEFENSE SALES VS. COOPERATIVE ACQUISITION

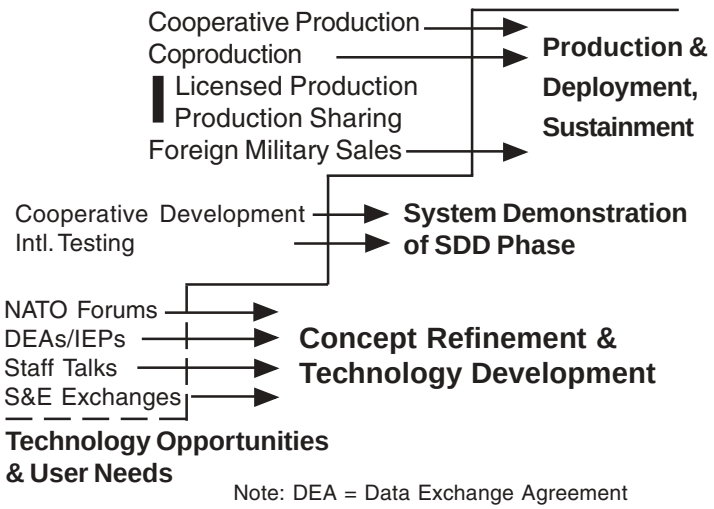
They are Different

- Defense Sales
  - Any Nation
  - U.S. Contracts (FMS)
  - U.S. Manages (FMS)
  - Production & Support
  - DoS or DoC
    + DoD - USD (Policy)
  - Foreign Initiated
  - Foreign Funds (or U.S. Credit/Grants)

- Cooperative Acquisition
  - Allied or Friendly
  - U.S., Ally or NATO
  - Jointly Managed
  - All Acquisition
  - DoD - USD (A&T)
    + DoS and DoC*
  - U.S. and/or Foreign
  - Foreign + U.S. Funds

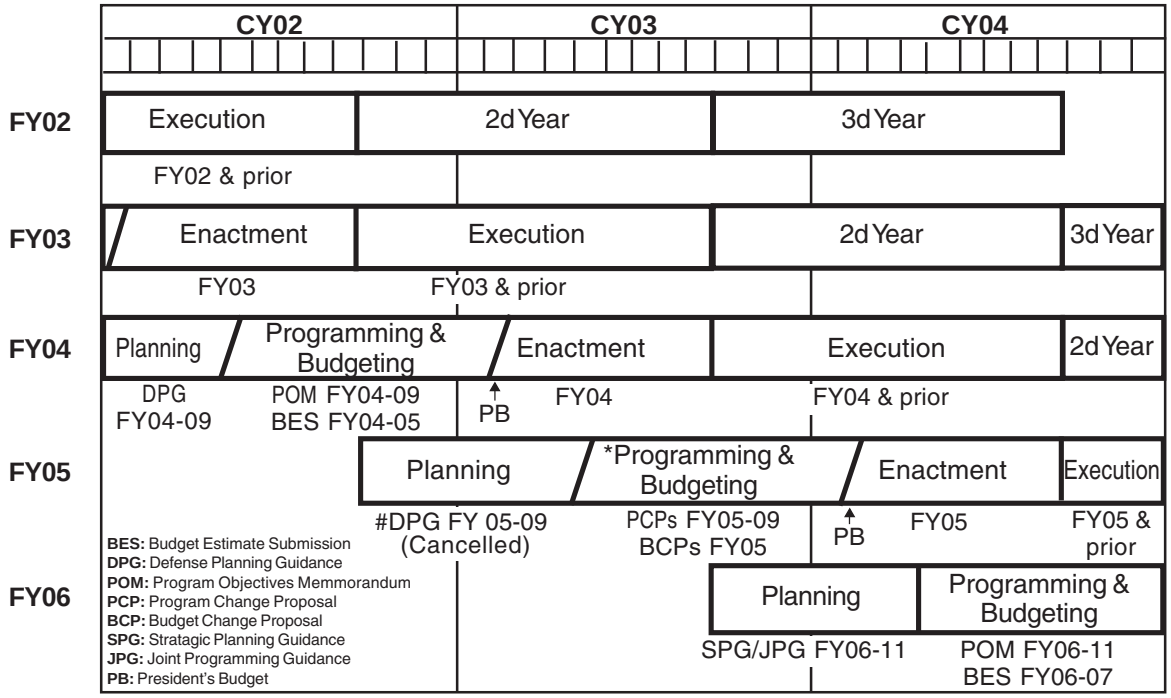
* Dept of State & Dept of Commerce

INTERNATIONAL ACTIVITIES ASSOCIATED WITH DEFENSE ACQUISITION PHASES



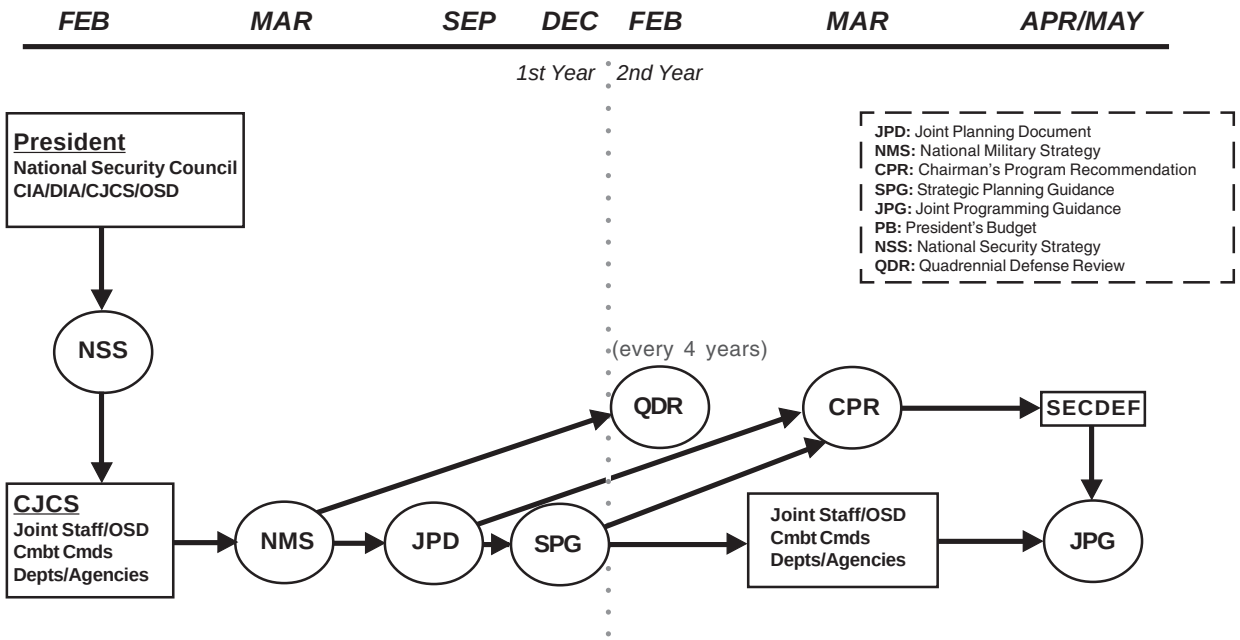
Note: DEA = Data Exchange Agreement
IEP = Information Exchange Project

RESOURCE ALLOCATION PROCESS - OVERLAP
COMPRESSED POM/BUDGET CYCLES



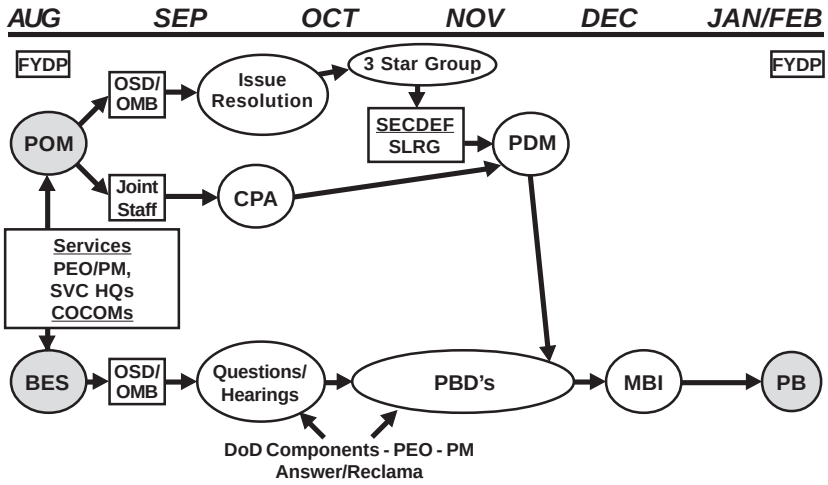
*Previously a sequential programming/budgeting process
FY04-09 DPG carried forward

PPBS - PLANNING PHASE



NOTE; In 1st year of a new administration the NSS is due 150 days after President takes office. QDR starts after NSS is issued; QDR report is due concurrently with President's Budget to Congress.

PPBE ON-YEAR CONCURRENT PROGRAM/BUDGET REVIEW
(Even Year)

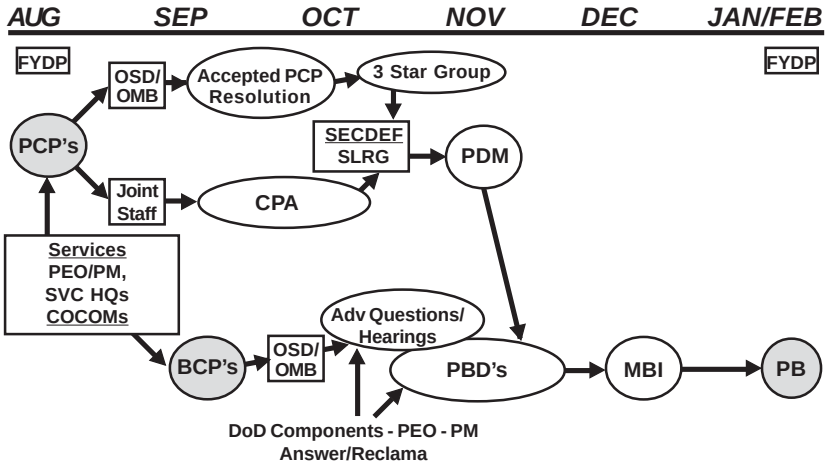


Common Acronyms

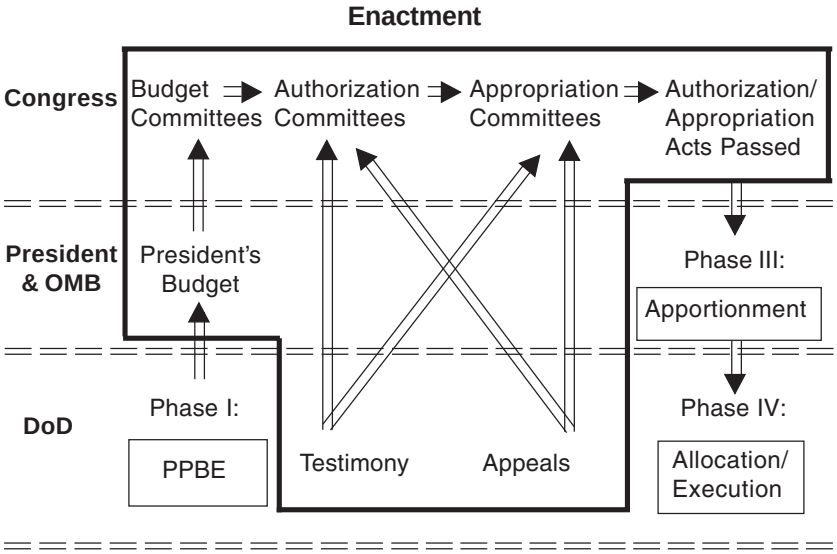
COCOM: Combatant Commander	**PDM:** Program Decision Memorandum
POM: Program Objectives Memorandum	**PCP:** Program Change Proposal
BES: Budget Estimate Submission	**BCP:** Budget Change Proposal
CPA: Chairman's Program Assessment	**PPBE:** Planning, Programing, Budgeting & Execution
PBD: Program Budget Decision	**SLRG:** Senior Leadership Review Group
MBI: Major Budget Issues	**OMB:** Office of Management & Budget
PB: President's Budget	

Notes: 3-Star Group replaces Program Review Group (PRG)
SLRG replaces Defense Resources Board (DRB)

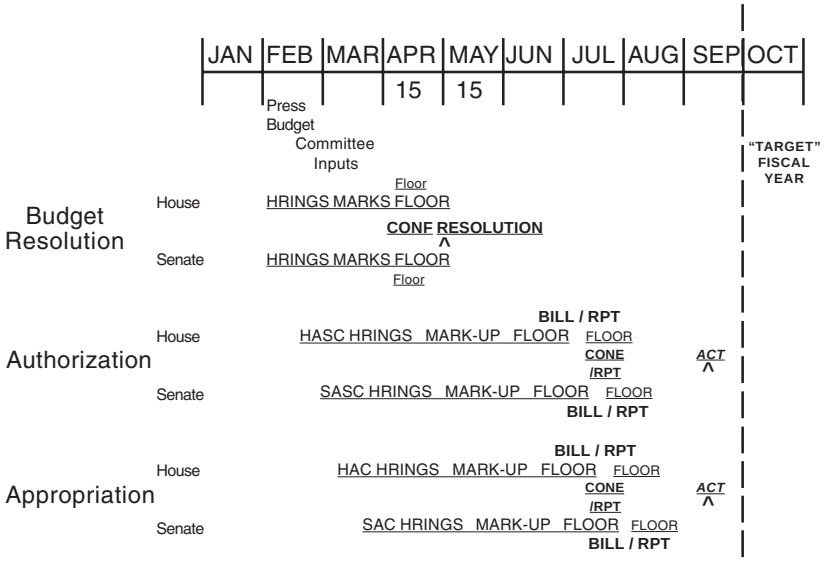
PPBE OFF-YEAR PROGRAM/BUDGET REVIEW
(Odd Year)



RESOURCE ALLOCATION PROCESS



CONGRESSIONAL ENACTMENT TIMETABLE



PROCUREMENT APPROPRIATIONS
(ACCOUNT NUMBERS AND BUDGET ACTIVITIES)

Appropriation		*Budget Activity*
Army (21 -)		
Aircraft	- 2031	1. Aircraft 2. Modification of Aircraft 3. Spares & Repair Parts 4. Support Equipment & Facilities
Missile	- 2032	1. Other Missiles 2. Modification of Missiles 3. Spares & Repair Parts 4. Support Equipment & Facilities
Weapons	- 2033	1. Track Combat Vehicle 2. Weapons & Other Combat Vehicles 3. Spares & Repair Parts
Ammo	- 2034	1. Ammo 2. Ammo Production Base Support
Other	- 2035	1. Tactical & Support Vehicle 2. Commo & Electronics Equipment 3. Other Support Equipment 4. Spares & Repair Parts
Navy (17 -)		
Aircraft	- 1506	1. Combat Aircraft 2. Airlift Aircraft 3. Trainer Aircraft 4. Other Aircraft 5. Modification of Aircraft 6. Aircraft Spares & Repair Parts 7. Aircraft Support Equipment & Facilities
Weapons	- 1507	1. Ballistic Missiles 2. Other Missiles 3. Torpedoes & Related Equipment 4. Other Weapons 5. Not Used 6. Spare & Repair Parts
Ammo	- 1508	1. Ammo, Navy 2. Ammo, Marine Corps
Shipbuilding & Conversion	- 1611	1. Fleet Ballistic Missile Ships 2. Other Warships 3. Amphibious Ships 4. Mine Warfare & Patrol Ships 5. Auxiliary, Craft & Prior Year Costs
Other	- 1810	1. Ship Support Equipment 2. Commo & Electronics Equipment 3. Aviation Support Equipment 4. Ordnance Support Equipment 5. Civil Engineer Support Equipment 6. Supply Support Equipment 7. Personal & Command Support Equipment 8. Spares & Repair Parts
Marine Corps (17 -)		
Procurement	- 1109	1. Not Used 2. Weapons & Combat Vehicles 3. Guided Missiles & Equipment 4. Commo & Electronics Equipment 5. Support Vehicles 6. Engineering & Other Equipment 7. Spares & Repair Parts

PROCUREMENT APPROPRIATIONS
(ACCOUNT NUMBERS AND BUDGET ACTIVITIES)
(Continued)

Appropriation		*Budget Activity*
Air Force (57 -)		
Aircraft	- 3010	1. Combat Aircraft 2. Airlift Aircraft 3. Trainer Aircraft 4. Other Aircraft 5. Modification of In-Service Aircraft 6. Aircraft Spares & Repair Parts 7. Aircraft Support Equipment & Facilities
Missile	- 3020	1. Ballistic Missiles 2. Other Missiles 3. Modification of In-Service Missile 4. Spares & Repair Parts 5. Other Support
Ammo	- 3011	1. Ammo 2. Weapons
Other	- 3080	1. Not Used 2. Vehicular Equipment 3. Electronics & Telecommunications Equipment 4. Other Base Maintenance & Support Equipment 5. Spares & Repair Parts
Defense (97 -)		
Defense-Wide	- 0300	1. Major Equipment 2. Special Operations Command 3. Chemical/Biological Defense
National Guard & Reserve Equipment	- 0350	1. Reserve Equipment 2. National Guard Equipment
Defense Production Activity Purchase	- 0360	1. Defense Production Activity Purchases
Chemical Agents & Munitions Destruction	- 0390	1. Chemical Agents & Munitions Destruction-RDT&E 2. Chemical Agents & Munitions Destruction-Procurement 3. Chemical Agents & Munitions Destruction-O&M

RDT&E APPROPRIATIONS
(ACCOUNT NUMBERS)

Appropriation	*Account Number*
RDT&E, Army	**21 - 2040**
RDT&E, Navy	**17 - 1319**
RDT&E, Air Force	**57 - 3600**
RDT&E, Defense Wide	**97 - 0400**
Development T&E, Defense	**97 - 0450**
Operational T&E, Defense	**97 - 0460**

RDT&E APPROPRIATIONS
Relationship Between MFP 6 (Research and Development) Categories and RDT&E Appropriations Budget Activities

MFP 6 R&D Category	*RDT&E Budget Activity*	*RDT&E Budget Activity Title*
6.1	BA 1	Basic Research
6.2	BA 2	Applied Research
6.3	BA 3	Advanced Technology Development
6.4	BA 4	Advance Comp Development & Prototypes
6.5	BA 5	System Development & Demonstration
6.6	BA 6	RDT&E Management Support
---	BA 7	Operational System Development

* NOTE: Although similar, titles of the Major Force Program (MFP) 6 Categories (which are not shown above) are not exactly the same as titles of the RDT&E Appropriation Budget Activities. In addition, the “Operational System Development” Budget Activity for RDT&E BA 7, is not considered MFP 6. While correctly funded with RDT&E dollars, these efforts do not fall under a MFP 6 Category; rather, for MFP purposes, the efforts are considered part of the Major Force Program within which the fielded operational system falls.

SAMPLE
NAVY APPROPRIATIONS AND BUDGET ACTIVITIES

MFP 6 R&D Category	RDT&E Budget Activity Number and Title	Below Threshold Reprogramming Rules Max In *	Max Out * [At Program Element Level]	Years Available For Obligation Purposes	Funding Policy
6.1	BA 1 Basic Research	$10M**	Lesser of $10M or 20% of amount appropriated	2	Incremental
6.2	BA 2 Applied Research				
6.3	BA 3 Advanced Tech. Devel.				
6.4	BA 4 Adv Comp Dev & Proyotypes				
6.5	BA 5 Sys Dev & Demo				
6.6	BA 6 RDT&E Mgmt Supp (T&E Ranges) (Civilian Salaries)				
	BA 7 Operational Systems Devel. (Post-Production)				

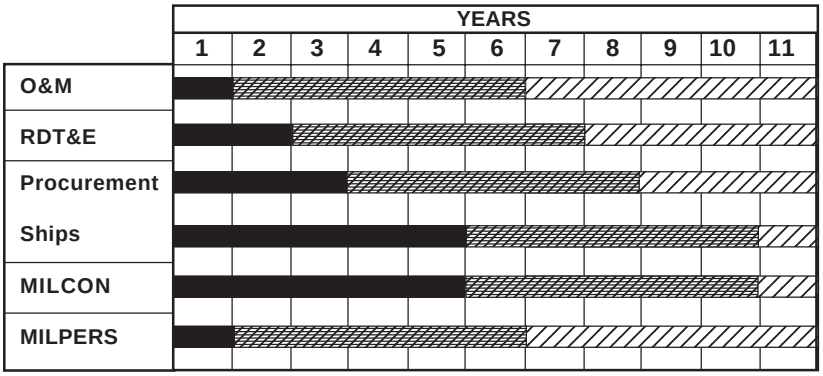
Procurement Budget Activity	Buget Activity Description	Below Threshold Reprogramming Rules Max In	Max Out [At Line Item Level]	Years Available for Obligation Purposes	Funding Policy
PROCUREMENT					
SCN-1	Ship Conv - FBM Ships	$20M**	Lesser of $20M or 20% of amount appropriated	5	Full
SCN-2	Ship Conv - Other Warships				
SCN-3	Ship Conv - Aphib Ships				
SCN-4	Ship Conv - Mine & Pat Ships				
SCN-5	Ship Conv - Aux, Craft & PY Costs				
WPN-1	Weapons Proc. - Bal. Msl			3	
WPN-2	Weapons Proc. - Other Msl				
WPN-3	Weapons Proc. - Torp & Eq.				
WPN-4	Weapons Proc. - Other Wpn				
WPN-5	Weapons Proc. - Other Ord.				
WPN-6	Weapons Proc. - Spares & Repair Parts				
OPN-1	Other Proc. - Ship SE				
OPN-2	Other Proc. - Comm/Elec Eq				
OPN-3	Other Proc. - Aviation SE				
OPN-4	Other Proc. - Ordnance SE				
OPN-5	Other Proc. - Civil Engr SE				
OPN-6	Other Proc. - Supply SE				
OPN-7	Other Proc. - Pers & Com SE				
OPN-8	Other Proc. - Spares & Repair Parts				
APN-1	Aircraft Proc. - Combat				
APN-2	Aircraft Proc. - Airlift				
APN-3	Aircraft Proc. - Trainer				
APN-4	Aircraft Proc. - Other				
APN-5	Aircraft Proc. - Mods				
APN-6	Aircraft Proc. - Spares				
APR-7	Aircraft Proc. - SE & Fac.				

Other Appropriations / Titles		Below Threshold Reprogramming Rules Max In	Max Out	Years Available for Obligation Purposes	Funding Policy
O&M, N	Operations & Maintenance	$15M	No Congressional Restriction	1	Annual
MILPER, N	Military Personnel	$10M	No Congressional Restriction	1	Annual
MILCON, N	Military Construction	Lesser of +$2.0M or 25% Appropriated	No Congressional Restriction	5	Full

* Below Threshold Reprogramming (BTR) amount limits are cumulative over entire period of time the specific fiscal year appropriation is available for obligation purposes (i.e., 1, 2, 3 or 5 years).

** RDT&E changed to $10M and procurement changed to $20M for FY03 -- per 15 May 2003 OSD Comptroller memo. Changes apply to FY04 as well per Conference Report accompanying Public Law 108-7.

APPROPRIATION LIFE



Current Period: Available for new obligations, obligation adjustments, expenditures, and outlays

Expired Period: Available for obligation adjustments, expenditures, and outlays

Cancelled: Unavailable for obligations, obligation adjustments, expenditures, and outlays

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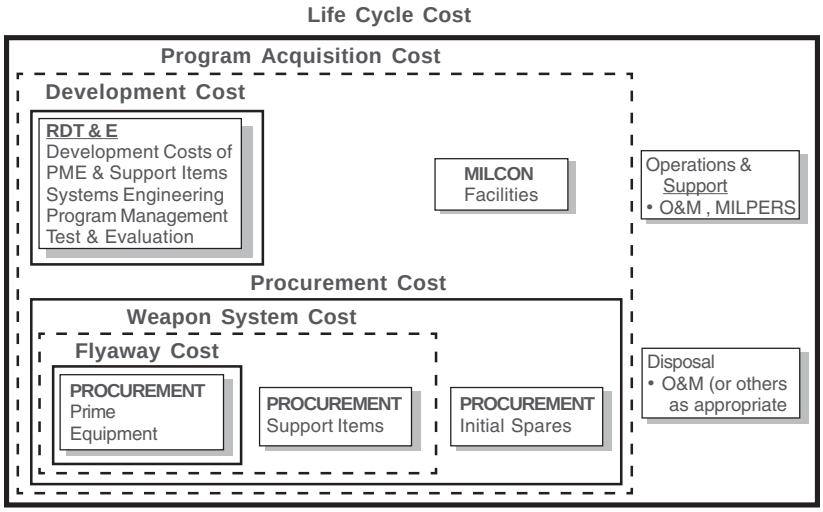
BELOW THRESHOLD REPROGRAMMING ACTIONS

Amounts are Cumulative Over Entire Period of Obligation Availability

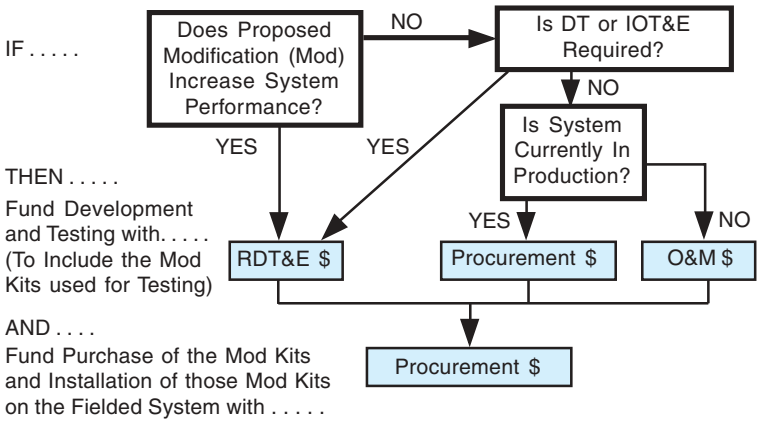
APPN	MAX INTO	MAX OUT	LEVEL OF CONTROL	OBL AVAIL
RDT&E	+ $ 10M*	LESSER OF - $ 10M - 20 %	PROGRAM ELEMENT	2 YEARS
PROC	+ $ 20M*	LESSER OF - $ 20 M - 20 %	LINE ITEM	3 YEARS (SCN: 5 YEARS)
O&M	+ $ 15M	NONE, UNLESS OTHERWISE SPECIFIED	BUDGET ACTIVITY SOME BA 1 SUB- ACTIVITY LIMITATIONS ON DECREASES (OPERATING FORCES)	1 YEAR
MILPERS	+ $ 10M	NO SPECIFIC CONGRESSIONAL RESTRICTION	BUDGET ACTIVITY	1 YEAR
MILCON	LESSER OF + $ 2M + 25%	NO SPECIFIC CONGRESSIONAL RESTRICTION	PROJECT	5 YEARS

* RDT&E changed to $10M and Procurement changed to $20M for FY03 & FY04 -- per 15 May 2003 OSD Comptroller memo.

LIFE CYCLE COST COMPOSITION



PRODUCT IMPROVEMENTS
Funding Decision Tree



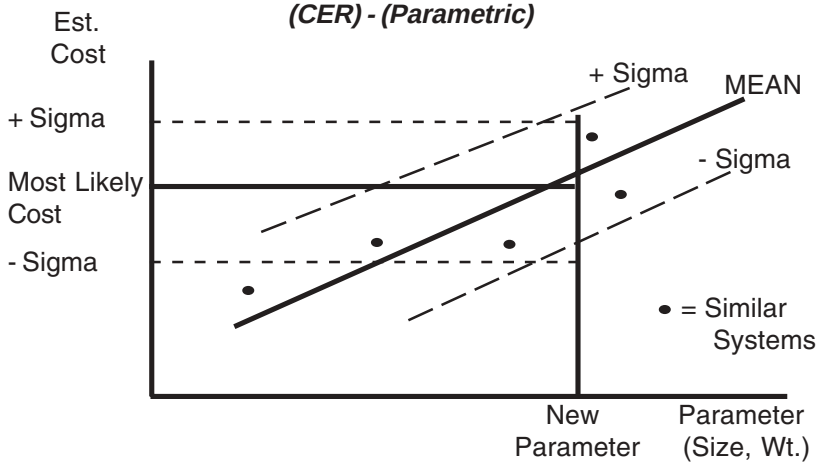
COST ESTIMATING

Estimate Methods	*Comments*
Analogy -	Comparison to one similar existing system; based on judgments. Little or no data available; Relatively quick, easy, flexible. Used in early phases (e.g., Concept Refinement & Tech Dev).
Parametric -	Comparison to many similar existing systems; based on statistical analysis. Determine primary cost drivers and Establish Cost Estimating Relationships (CERs) Used in early to mid-phases (e.g., Concept Refinement & Tech Dev, and System Dev & Dem).
Engineering or "Bottoms-Up"	Summation of "all" individual items in the system. Uses WBS structure for estimating purposes. Used in mid-phases (e.g., System Dev & Dem.
Extrapolation -	Comparison to historical cost of same system. Based on extrapolation from actuals. Uses Learning Curve Theory Used in late phases (e.g., production and replenishment spares).

Guidelines

1. Make sure cost data is relevant and homogeneous. Caution: Watch out for historical data in times of change. Prior actuals may include uncompensated overtime or were priced as a "buy-in."
2. Focus on cost drivers.
3. Test sensitivities and data relationships.

COST ESTIMATING RELATIONSHIPS (CER) - (Parametric)



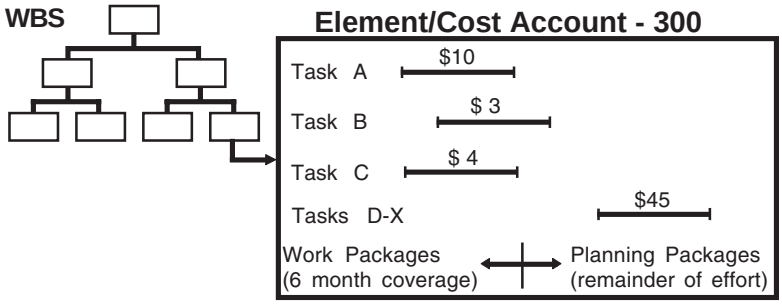
PERFORMANCE MEASUREMENT

COST & SCHEDULE PERFORMANCE MEASUREMENT

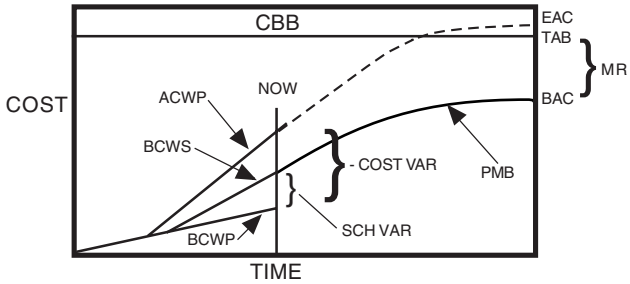
1. Define the work (WBS)
2. Schedule the work
3. Allocate budgets

} Cost Account

Defining, Planning and Budgeting



4. Prepare and monitor performance profiles



TERMINOLOGY

BCWS - Budgeted Cost of Work Scheduled
BCWP - Budgeted Cost of Work Performed
ACWP - Actual Cost of Work Performed
MR - Management Reserve
EAC - Estimate at Completion (Govt)
NCC - Negotiated Contract Cost
BAC - Budget at Completion
CBB - Contract Budget Base (NCC+AUW)
TAB - Total Allocated Budget
PMB - Performance Measurement Baseline
AUW - Auth Unpriced Work

VARIANCES

Cost Variance: $CV = BCWP - ACWP$

Schedule Variance: $SV = BCWP - BCWS$

Cost Variance %: $CV\% = \frac{BCWP - ACWP}{BCWP}$

Schedule Variance %: $SV\% = \frac{BCWP - BCWS}{BCWS}$

Variance at Completion: $VAC = BAC - EAC$

PERFORMANCE INDICES

Cost Performance Index $CPI = \frac{BCWP}{ACWP}$

Schedule Performance Index $SPI = \frac{BCWP}{BCWS}$

Percent Complete $= \frac{BCWP_{(cum)}}{BAC}$

Percent Spent $= \frac{ACWP_{(cum)}}{BAC}$

ESTIMATE AT COMPLETION

EAC (Lowest Est.) $= \frac{BAC}{CPI_{(cum)}}$

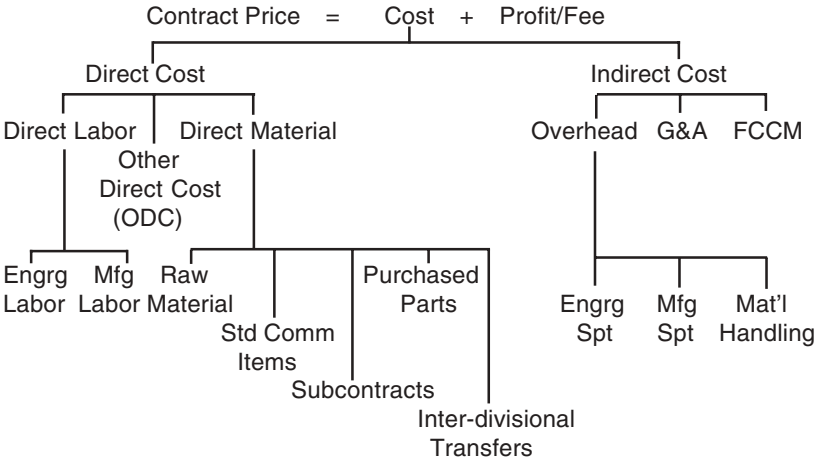
EAC (Highest Est.) $= ACWP_{(cum)} + \frac{BAC - BCWP_{(cum)}}{\{CPI_{(cum)} * SPI_{(cum)}\}}$

TO COMP PERFORMANCE INDICES

$TCPI_{(eac)} = \frac{BAC - BCWP_{(cum)}}{EAC - ACWP_{(cum)}}$

CONTRACTING

COMPONENTS OF CONTRACT PRICE



TYPICAL CONTRACT TYPE BY PHASE

CR	TD	SDD/SI	SDD/SD	PROD
CPFF, FFP	CPFF,FFP	CPFF, CPIF	CPIF, CPAF	FPI(F), FFP

TYPES OF CONTRACTS

Cost Family: Appropriate when product not well defined; high risk; contractor provides best efforts; Government pays all allowable costs. Fee varies by type.

Cost Plus Fixed Fee (CPFF) - Fee same regardless of actual cost outcome.

Cost Plus Incentive Fee (CPIF) - Actual fee earned computed by applying share ratio to over/under run, subject to min/max fee limits.

Fixed Price Family: Product well defined, low risk; contractor must deliver product.

Firm Fixed Price (FFP) - Price fixed regardless of actual cost incurred.

Fixed Price Incentive Firm Target [FPI(F)] - Final price computed by applying share ratio to over/under run,subject to ceiling price limitation.

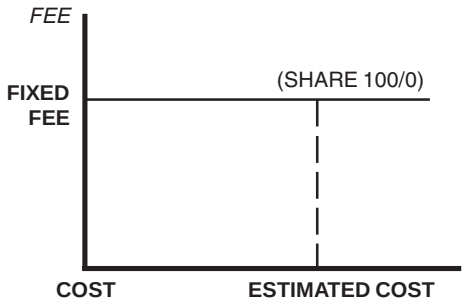
Award Fee (AF) - Either stand alone Cost Plus Award Fee (CPAF) or combined with cost or fixed price types. AF unilaterally determined by government based on subjective evaluation of contractor's performance.

Fee Limits: CPFF - Fee limited to 15% for R&D; 10% for Production and services. No statutory or FAR/DFARS regulatory limitation on other contract types.

CONTRACT TYPE FEATURES

	FIXED PRICE	COST REIMBURSEMENT
Promise	Delivery	Best Efforts
Contractor Risk	High	Low
Cash Flow	Delivery	As Incurred
Progress Payments %	75/90/95	N/A
Administration	Low	High
Fee Limit %	None	15/10/6 on CPFF

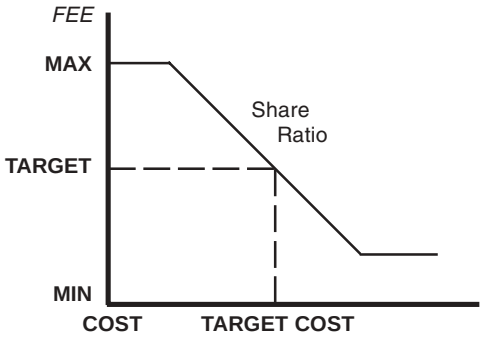
CPFF



PRICE = COST + FIXED FEE

Risk Highest to the Government
Obtains Fee Regardless of Cost

CPIF

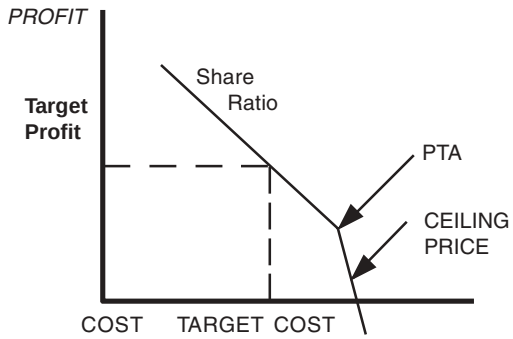


(Target) PRICE = (Target) COST + (Target) FEE

All Reasonable Cost Paid
Shared Risk Between Min/Max Fee

CONTRACT TYPE FEATURES
(Continued)

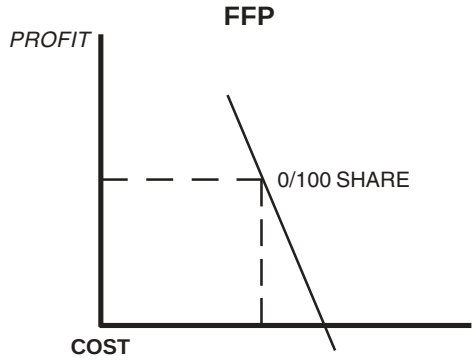
FPI(F)



(Target) PRICE = (Target) COST + (Target) Profit

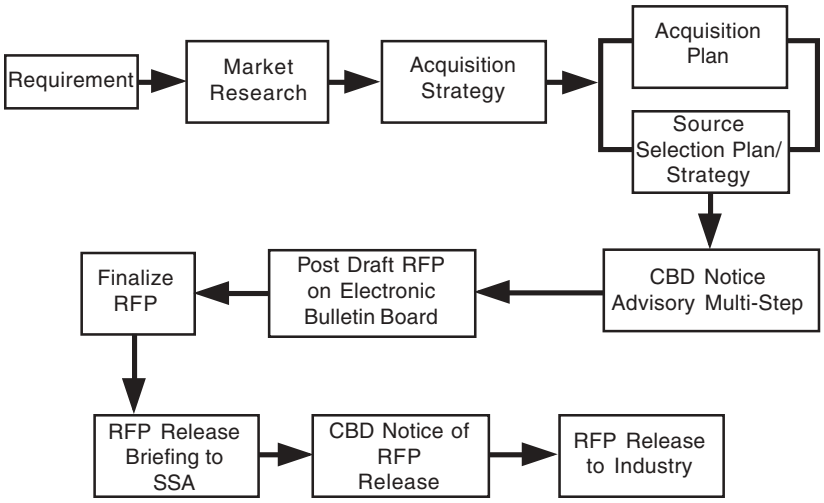
$$\text{Point of Total Assumption (PTA)} = \frac{\text{CEILING PRICE - TARGET PRICE}}{\text{GOVERNMENT SHARE}} + \text{Target Cost}$$

FFP

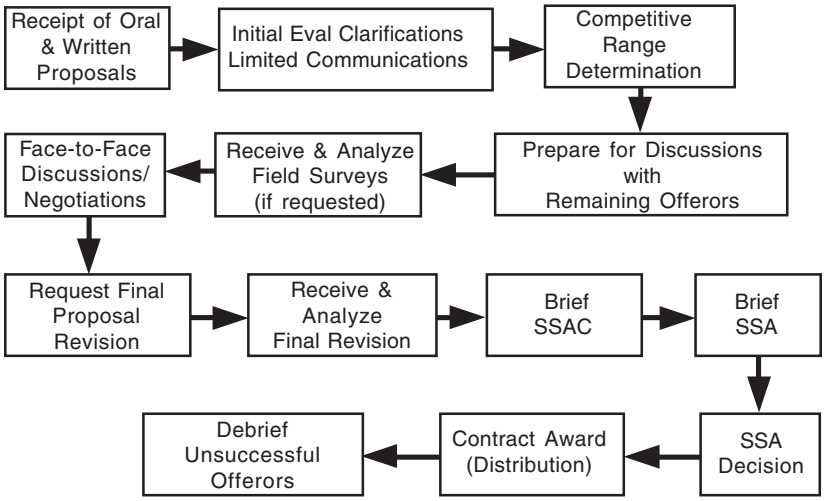


PRICE = COST + PROFIT

PRE-SOLICITATION PROCESS



POST-SOLICITATION PROCESS



OTHER WAYS TO BUY

- **GSA Multiple Award Schedules (MAS)**
  - ***General Services Administration contracts for both products and services–available to all agencies.***
- **Government–Wide Agency Contract (GWACs)**
  - ***similar to MAS but more restricted in products and services available.***
- **Indefinite Delivery/Indefinite Quantity Contracts**
  - ***Task orders (services) & Delivery Orders (products) issued under omnibus umbrella contract.***
- **Other Transactions (OT)**
  - ***Defined:*** *Vehicles used for basic, applied and advanced research projects and prototype development. OTs are not Contracts, Grants, or Cooperative Agreements.*
  - ***Objective:*** *Attract commercial companies and consortia that historically have not done business with the Department of Defense because of statutory and/or regulatory requirements. OTs are not subject to the Federal Acquisition Regulation. Designed to increase DoD access to dual use Technologies.*
  - ***Research Projects:***
    - *Where practical, government cost share should not exceed cost share of other parties.*
    - *Use OT when standard Contract, Grant or Cooperative Agreement is not appropriate.*
  - ***Prototype Projects:***
    - *Must be directly relevant to weapons or weapon systems proposed to be acquired or developed by DoD.*
  - ***Constraints:***
    - *At least one non-traditional contractor participating.*
    - *If no non-traditional contractor participates, 1/3 of cost paid by parties other than federal government, or, senior procurement executive justifies transaction*
  - ***OT Guide for Prototype Projects,*** *January 2001.*

CONTRACTOR PROFITABILITY RATIOS

The basic concept of profitability ratios is to measure income against revenue or against the investment required to produce it. There are three principal profitability ratios with which you should be familiar. They are:

1. Return on Sales which shows what percentage of dollars are left after the company has paid for all costs, interest, and taxes. It is expressed as:

$$\text{Return on Sales} = \frac{\text{Net Income}}{\text{Sales}}$$

2. Return on Total Assets which looks at the efficiency with which management has used its resources, the company's assets, to generate income. It is computed as:

$$\text{ROA} = \frac{\text{Net Income}}{\text{Total Assets}}$$

As noted, ROA addresses how well management utilizes the assets of the firm in generating income. The ROA formula reflects the combined result of Return on Sales and the total asset turnover ratio (sales/ total assets), broken down as follows:

$$\text{ROA} = \frac{\text{Net Income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Total Assets}}$$

3. Return on Common Stockholder's Equity measures the rate of return on the owners' investment—their equity in the company. This is also known as Return on Equity (ROE).

$$\text{ROE} = \frac{\text{Net Income - Preferred Dividends}}{\text{Common Stockholders' Equity}}$$

ROE can also be broken into two components: these being return on assets adjusted for preferred dividends and financial leverage (a ratio reflecting the relationship of creditor to owner financing—expressed as total assets/ common stockholders equity). This is shown by:

$$\text{ROE} = \frac{\text{Net Inc. - Pref. Div.}}{\text{Total Assets}} \times \frac{\text{Total Assets}}{\text{Common Stockholder's Equity}}$$

These profitability ratios give three different viewpoints concerning the "bottom line" on the income statement—how much net profit is being made on each sale, how much is being made for the assets that are employed, and how much is being made for the company owners. From an owner's perspective, another profitability ratio you may be aware of is Earnings Per Share (EPS):

$$\text{Earnings Per Share} = \frac{\text{Net Income Minus Preferred Dividends}}{\text{Number of Shares of Common Stock Outstanding}}$$

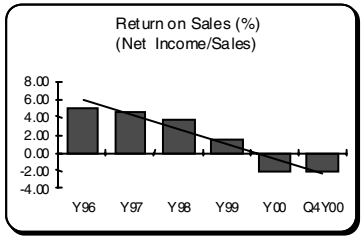
FINANCIAL ANALYSIS SHEET
(EXAMPLE)

LOCKHEED MARTIN CORP
LMT

SIC: 3760 GUIDED MISSILES & SPACE VEHC
Fiscal Year End: 12

DUPONT ANALYSIS

		Return on Sales %	X	Tot. Asset Turnover	=	Return on Assets %	Return on Assets %	X	Equity Multiplier	=	Return on Equity%
	Y96	5.01		0.92		4.60	4.60		4.27		19.65
	Y97	4.63		0.99		4.58	4.58		5.48		25.12
	Y98	3.81		0.91		3.48	3.48		4.68		16.31
	Y99	1.50		0.85		1.27	1.27		4.72		6.01
	Y00	-2.05		0.83		-1.71	-1.71		4.24		-7.25
12 mo. trailing	**Q4Y00**	-2.05		0.83		-1.71	-1.71		4.24		-7.25



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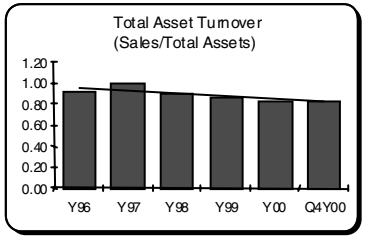

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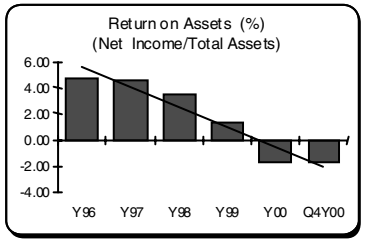

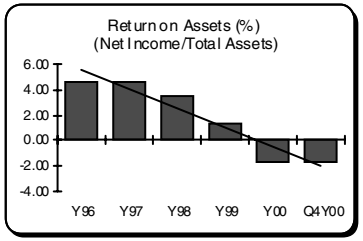

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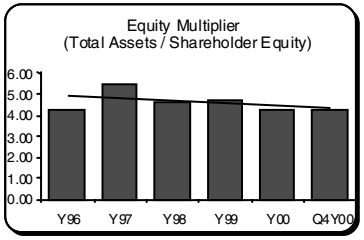

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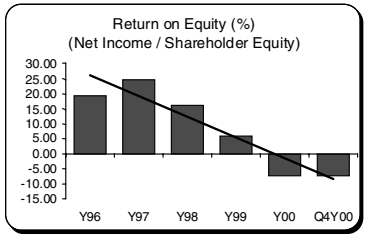
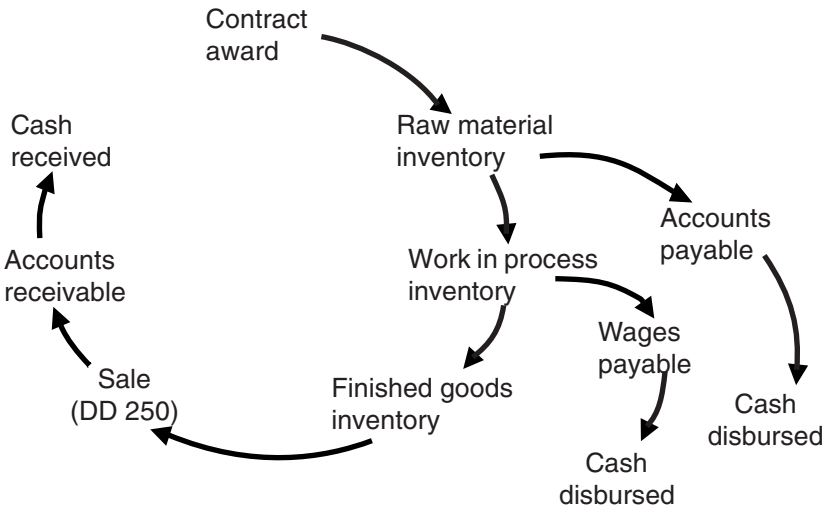
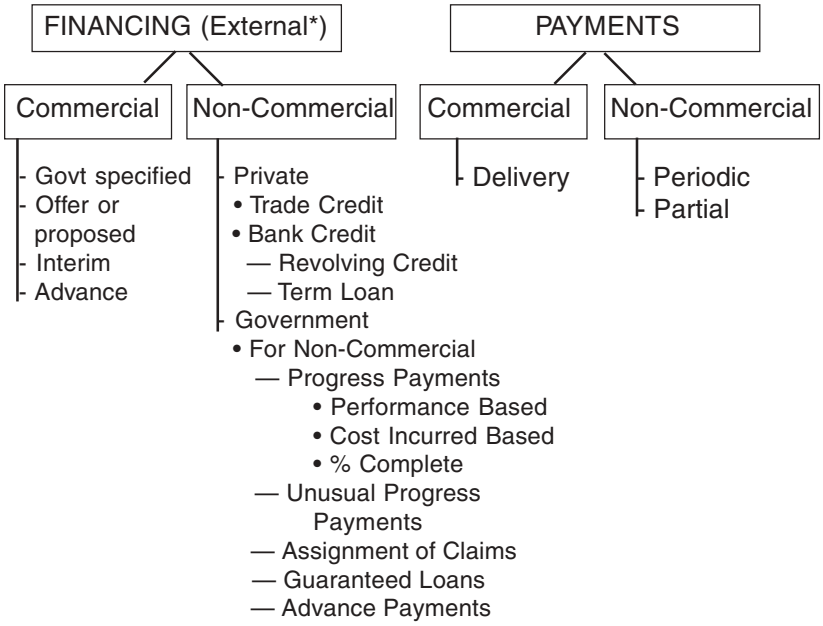


CASH CYCLE



CONTRACTOR FINANCING AND PAYMENTS

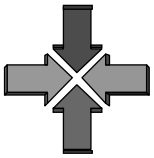


* Internal Contractor Financing
— Retained Earnings

DIRECT AND INDIRECT COSTS

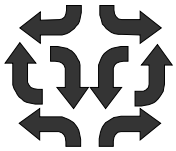
Direct costs

- **Costs that can be traced to a single cost object.**
- **Examples: material and labor to assemble an aircraft**

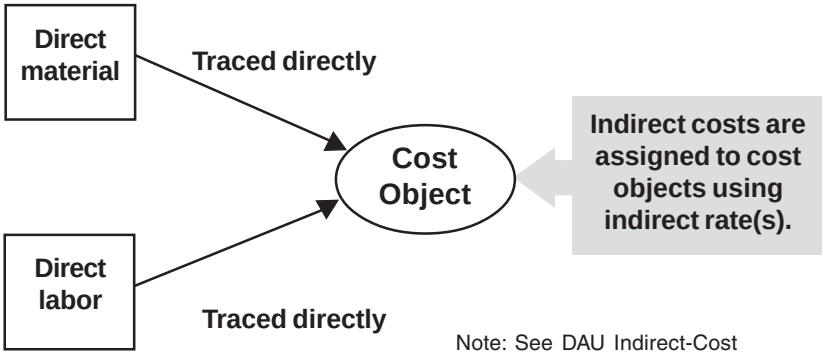


Indirect costs

- **Costs that can't be traced to a single cost object because they are associated with multiple cost objects.**
- **Example: electricity for the company's facilities**



ASSIGNING INDIRECT COSTS

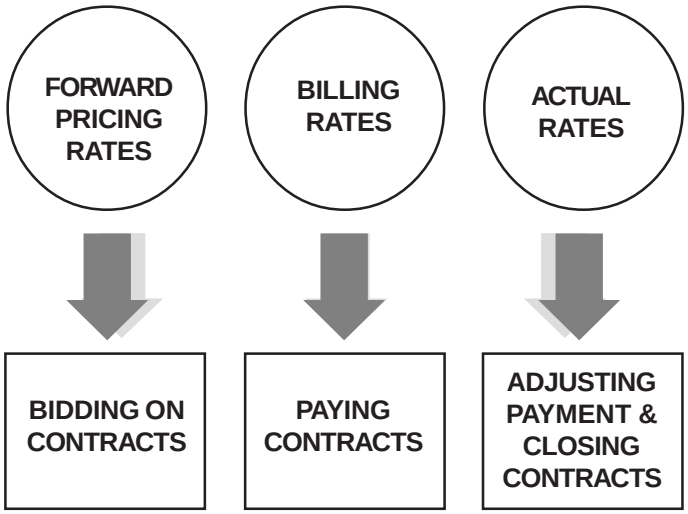


Note: See DAU Indirect-Cost Management Guide at www.dau.mil/pubs/gdbks

CALCULATION OF INDIRECT RATES

$$\text{RATE} = \frac{\text{Indirect Cost Pool}}{\text{Allocation Base}}$$

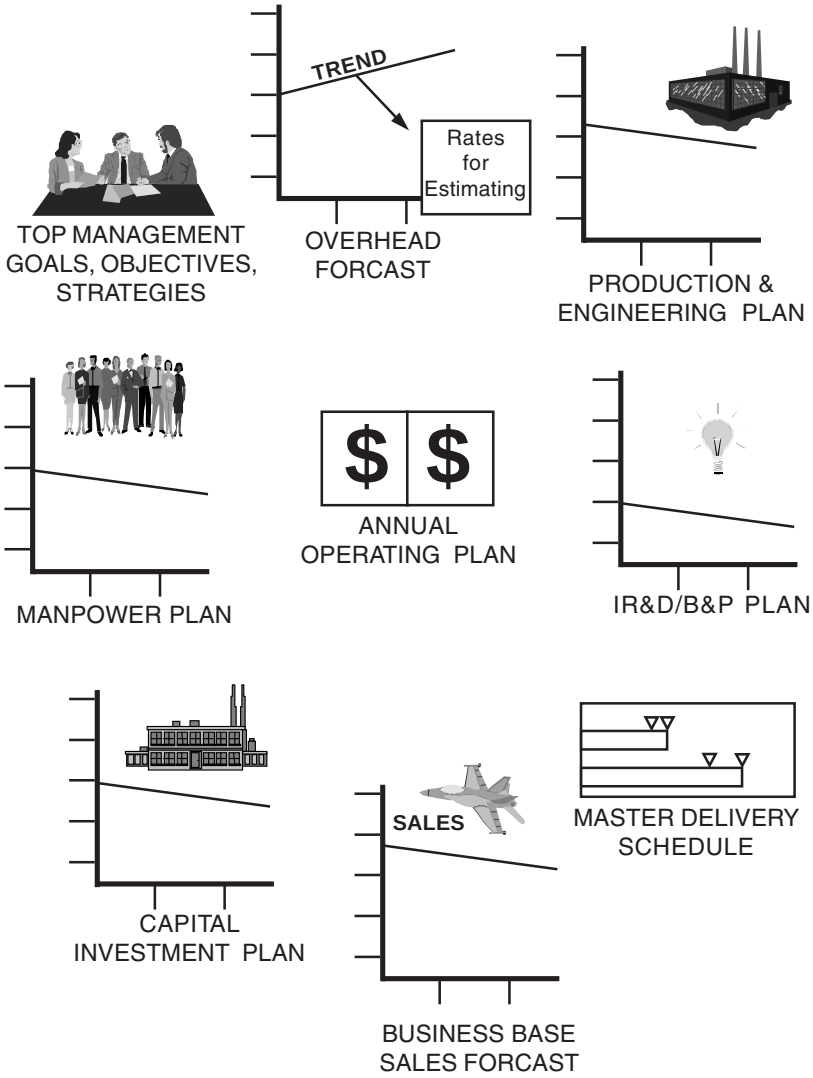
LIFE CYCLE OF INDIRECT COST RATES



CONTRACTOR'S COST PROPOSAL
EXAMPLE

Direct material	$ 40,000
Material handling 10%	4,000
Direct engineering labor	6,000
Engineering overhead 100%	6,000
Direct manufacturing labor	12,000
Manufacturing overhead 150%	18,000
Other direct costs	6,000
Subtotal	92,000
General and administrative 25%	23,000
Total cost	115,000
profit 15%	17,250
Cost of money for facilities capital employed	1,500
Price	$133,750

CONTRACTOR BUSINESS PLANNING PROCESS OUTPUTS



PRINCIPAL ACQUISITION LOGISTICS GOALS/OBJECTIVES

- Influence product design for supportability
- Design the support system
- Concurrently deploy system (includes support infrastructure)
- Maintain readiness and Improve affordability

LOGISTICS MANAGEMENT PROCESS NOTES

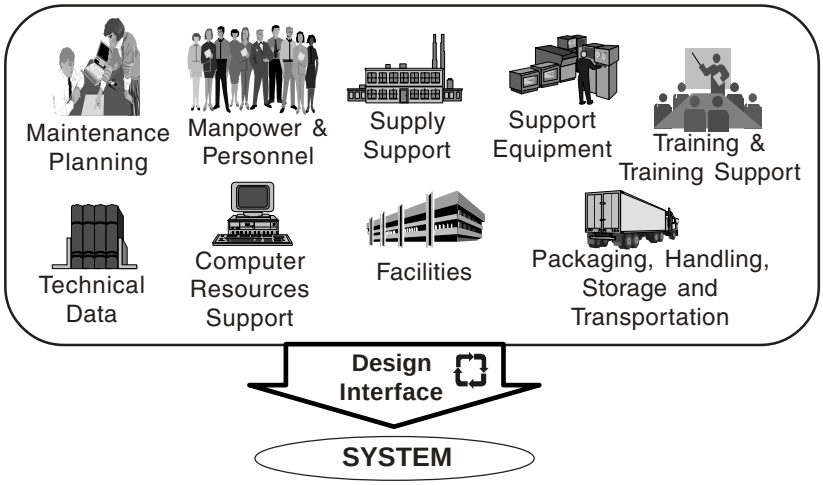
- **Support Strategy** is part of the acquisition strategy and an integral part of the systems engineering process. The support strategy shall address life-cycle sustainment and continuous improvement of product affordability, reliability, and supportability, while sustain ing readiness.

- **Supportability Analyses** is a set of analytical tools, conducted as an integral part of the systems engineering process, to determine how to most cost effectively support the system throughout the system life-cycle and form the basis for related design requirements included in the system performance specification and logistics support plan.

- **Product Support Management Plan** is a life-cycle plan that includes actions to assure sustainment, and continually improve product affordability. This plan is used throughout initial procure ment, reprocurement, and post-production support. The plan documents an integrated acquisition and logistics strategy for the life of the system.

- **Performance-Based Logistics** is the output performance parameters to ensure a system ready capability, the assignment of responsibilities and implementation of incentives for the attainment of the goals associated with these performance parameters, and the overall life-cycle management of system reliability and sustainment, and total ownership cost.

BEST PRACTICE: Support Elements



SUPPORT ELEMENT DEFINITIONS

Maintenance Planning – establishes maintenance concepts and requirements.

Manpower & Personnel – identification of personnel skills, grades and quantity required to support operation and maintenance of system.

Supply Support – determine requirements to acquire and manage spares and repair parts.

Support Equipment – identify all equipment required to support operation and maintenance of the system.

Technical Data – scientific and technical information used to support systems acquisition.

Training & Training Support – determine requirements to acquire training devices and conduct training of operators and maintenance personnel.

Computer Resources Support – identification of facilities, hardware, software and support tools to operate and support embedded computer systems.

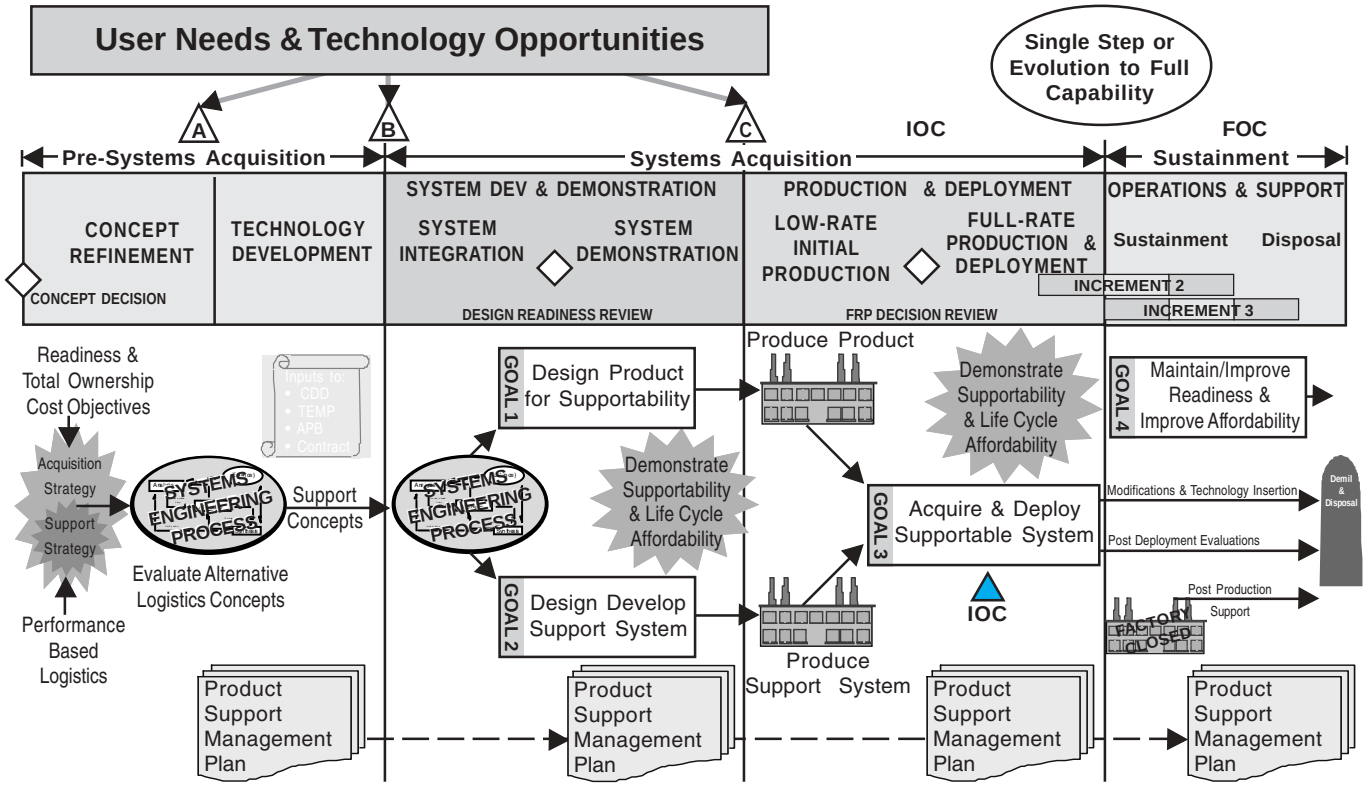
Facilities – identify real property required to support system.

Packaging, Handling, Storage and Transportation – identify designs and methods to ensure the system is preserved, packed, stored, handled and transported properly.

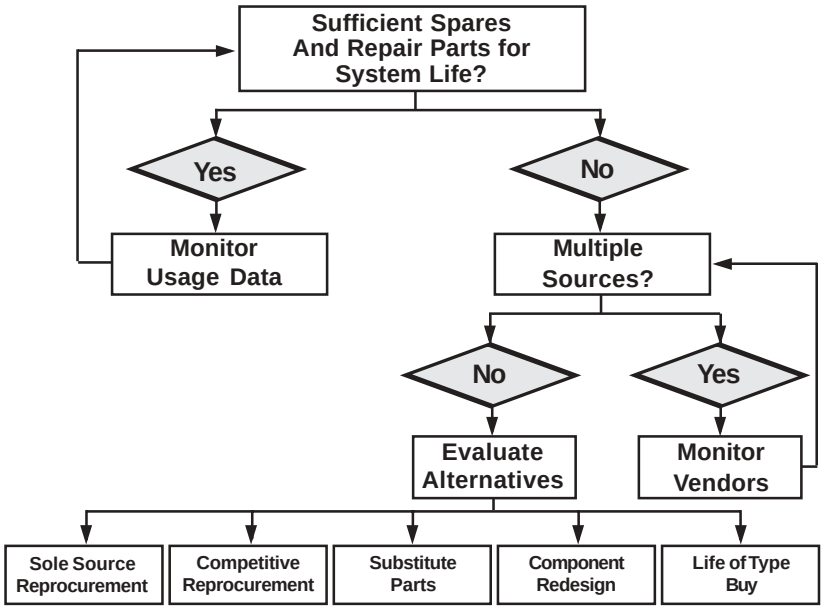
Design Interface – relationships of logistics related design parameters to readiness and support resources requirements; influence design for supportability.

Note: Under Performance-Based Logistics (PBL), Support Elements are still valid even though Government is buying results and solutions, not specific resources or processes.

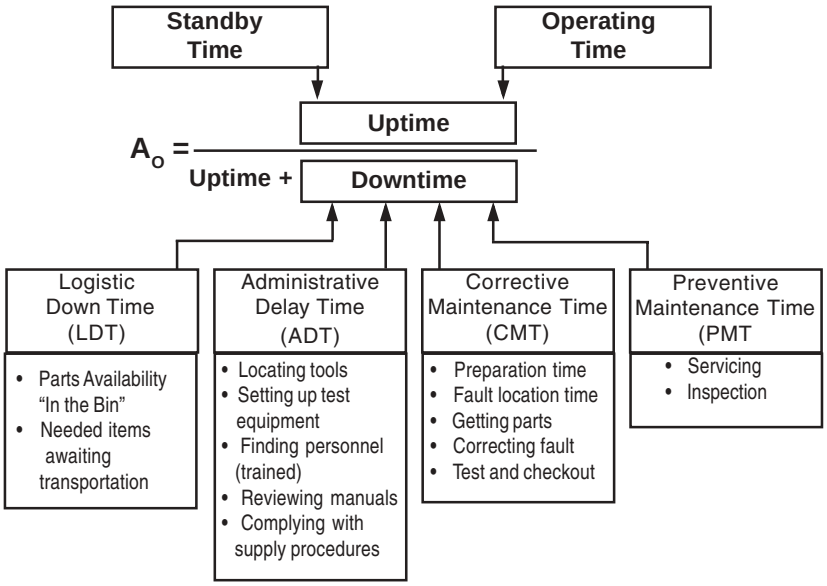
SYSTEMS ENGINEERING (SE) LINKAGE TO DEFENSE ACQUISITION PROCESS



POST-PRODUCTION SUPPORT DECISION PROCESS

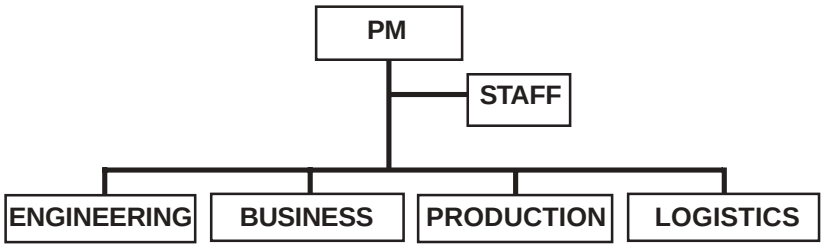


OPERATIONAL AVAILABILITY

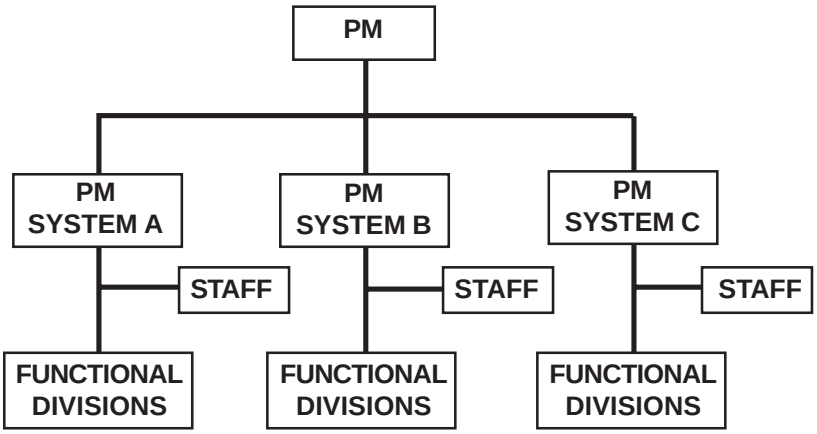


PROGRAM OFFICE ORGANIZATION STRUCTURES
(Examples)

Functional Structure

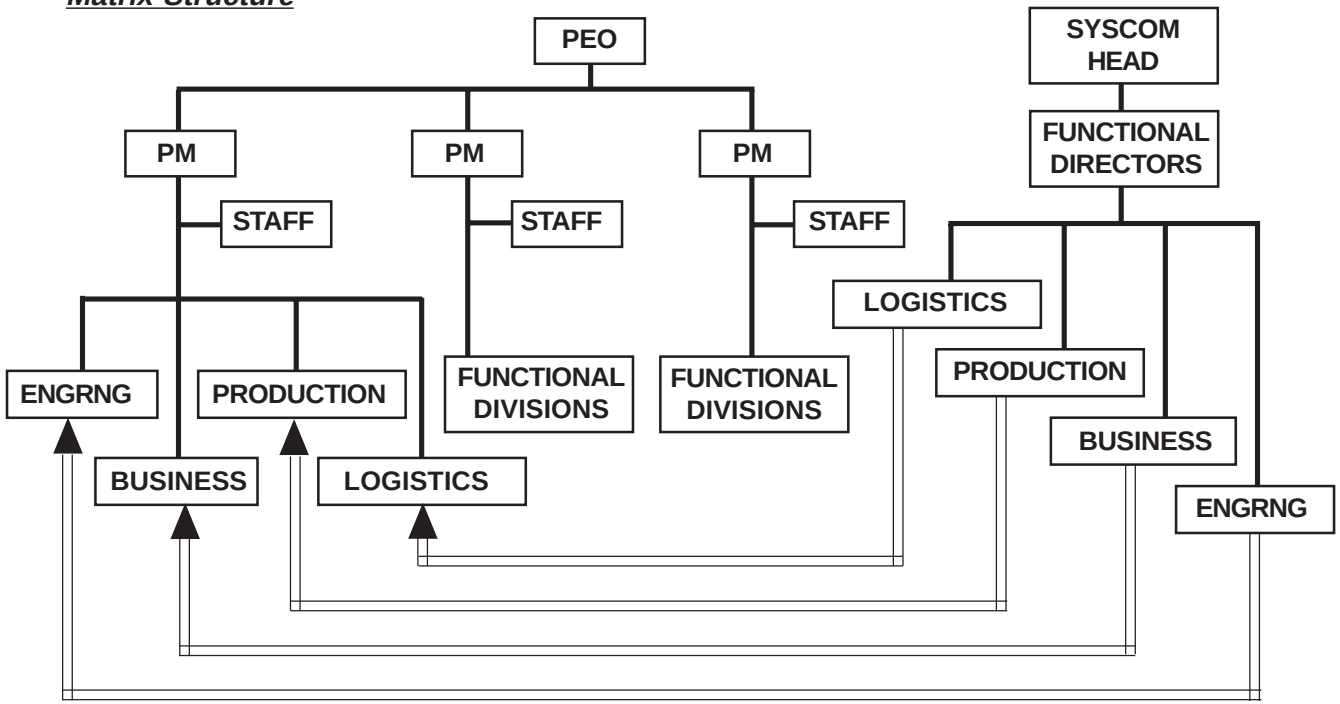


"Pure" Product Structure



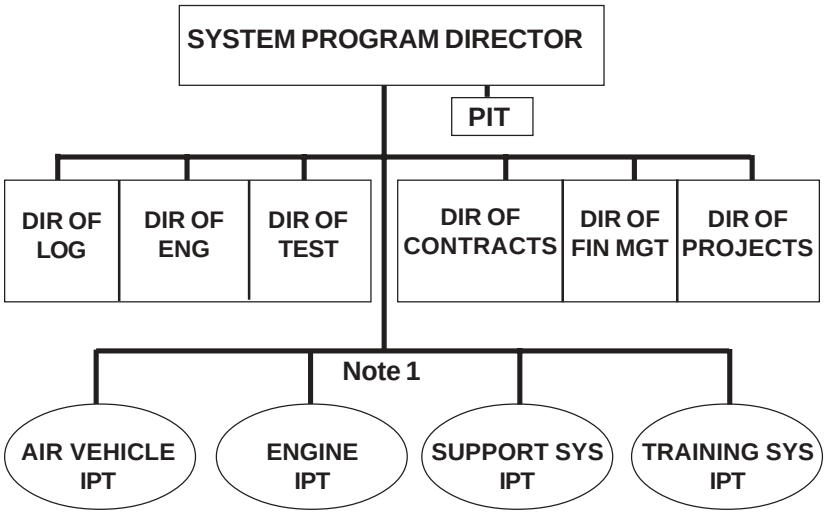
PROGRAM OFFICE ORGANIZATION STRUCTURE
(Continued)

Matrix Structure



PROGRAM OFFICE ORGANIZATION STRUCTURE
(Continued)

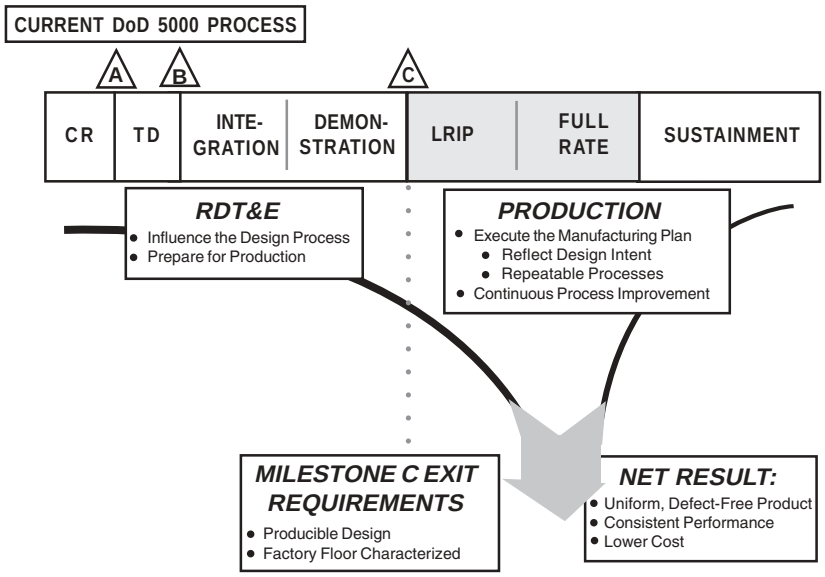
INTEGRATED PRODUCT TEAMS



IPT = Integrated Product Team
PIT = Program Integration Team

Note 1: IPTs mirror Work Breakdown Structure

THE ROLE OF MANUFACTURING IN THE ACQUISITION PROCESS



COMMON PRODUCTION RISKS THAT GREATLY IMPACT COST, SCHEDULE & PERFORMANCE

- Unstable requirements/engineering changes
- Unstable production rates and quantities
- Insufficient process proofing
- Insufficient materials characterization
- Changes in proven materials, processes, subcontractors, venders, components
- Producibility
- Configuration management
- Subcontractor management
- Special tooling
- Special test equipment

PRODUCIBILITY

DEFINITION:

The measure of relative ease of manufacturing a product. The product should be easily and economicaly fabricated, assembled, inspected and tested.

**** The PM is responsible for Producibility ****

PRODUCIBILITY

Interim Defense Acquisition Guidebook, 30 Oct 2002
C5.2.3.5.1 Producibility, C5.2.3.5.3 Quality

- Producibile system design ***shall be a development priority***
- Design/engineering ***shall focus on;***
  - Producibile design
  - Capable manufacturing process
  - Necessary process controls
  - Minimizing manufacturing costs
- Full rate production ***shall require;***
  - Stable systems design
  - Proven manufacturing process
  - Available production facilities and equipment
- Quality management process ***shall;***
  - Establish capable process,
  - Continuously improve the process
  - Monitor and control critical processes and product variation
  - Establish mechanisms for feedback of field product performance;
  - Implement an effective root cause analysis and corrective action system

QUALITY MANAGEMENT SYSTEMS

Interim Defense Acquisition Guidebook, 30 Oct 2002, C5.2.3.5.3 Quality

"The PM shall allow contractors to define and use a preferred quality management process that meets required program support capabilities. The PM shall not require third party certification or registration of a supplier's quality system."

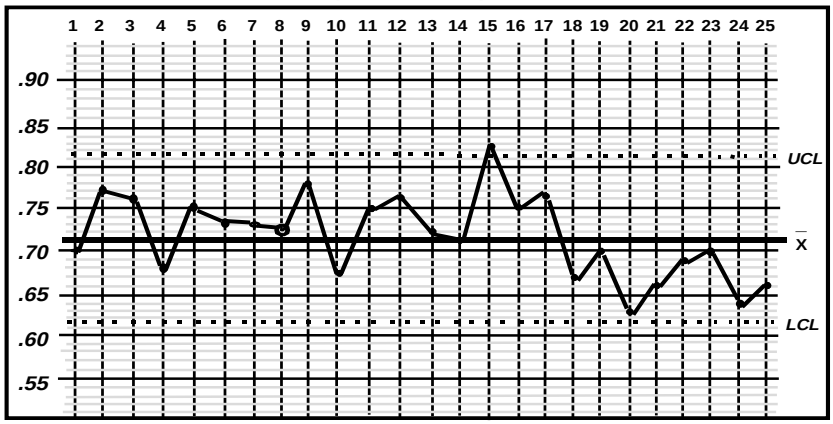
Note: ISO 9000 Series International Quality Standard is considered a Basic Quality System --focus is mainly on "Document what you do, and do what you document"

Advanced Quality Systems (AQS) such as Boeing's D1-9000, Motorola's Six Sigma, and others, focus on Customer Satisfaction, Key Processes Identification and Control, Metrics, Flow-down to Suppliers, and many other advanced process-oriented techniques.

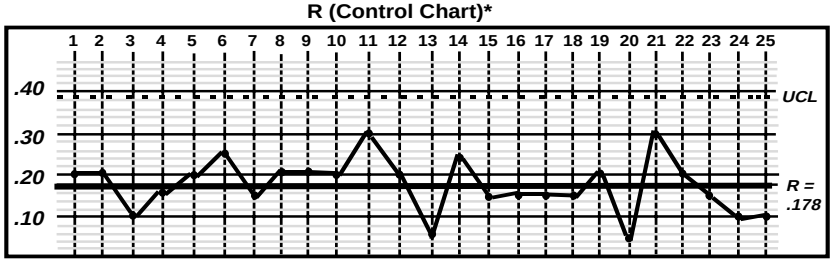
VARIABILITY CONTROL

- GOAL: Minimize and control manufacturing variation on key product characteristics
- WHY: Direct correlation between deviation from nominal value on key characteristics and product quality and functionality
- TOOLS: QFD, DOE, Process control chart (Statistical Process Control, see below)

$\bar{X}$ (Control Chart)



$\bar{R}$ (Control Chart)*



***Note: No lower control limit for R Chart for sample size below 7.**

PRODUCTION READINESS REVIEWS (PRRs)

"WHY WE DO THEM"

- Identify program risks, issues and opportunities ***Early***
- Assess capibility of contractor (and sub-contractor) to deliver on-time, within cost
- Assess actual contractor performance (metrics?)
- Assess effectiiveness of contractor's corrective actions
- Measure improvement of contractor's performance

"HOW TO DO THEM"

- Get a Charter that the PMO and contractor both understand
- Coordinate with DCMA/CAS - use them
- Establish areas of Assessment with Metrics
  - Producibility
  - ECOs/design stability
  - Sub-contractor management
  - Cost of scrap, rework and repair
  - Manufacturing process control
  - Tooling status
- Ask questions, touch things, talk to shop floor workers
  - ***See what is actually happening on the factory floor***

ADDITIONAL INFORMATION SOURCES

- DAU's Advanced & Electronic Manufacturing Resources (A&EMR) website:
  - Go to www.dau.mil, then click on performance support, then acquisition speciality Information
  - Contains references to DoD Manufacturing Requirements, and Best Business Practices such as Lean Production, e-Commerce, Six Sigma, Basic and Advanced Quality Systems, and Supply Chain Management
- Best Manufacturing Practices Center of Excellence
  - www.bmpcoe.org
- Lean Aerospace Initiative (LAI)
  - http://web.mit.edu/lean/index.html

TEST & EVALUATION (T&E)

Developmental T&E (DT&E)/Operational T&E (OT&E) Comparisons:

DT&E	***OT&E***
• Tech. perf. measurment	• Operational effective/suitable
• Dev. agency rsp. (PM)	• Operational Test Agency (OTA) resp.
• Technical Personnel	• "Typical" User Personnel
• Ltd. test articles/each test	• Many test articles/each test
• Controlled environment	• "Combat" environment/Threats
• All types of Test Articles	• "Production Rep" Test Articles
• Contractor involved	• Contractor may not be allowed

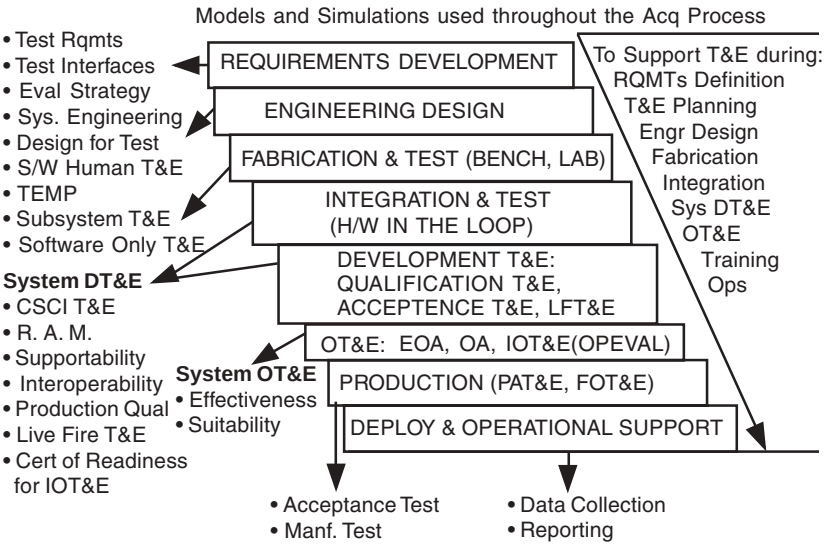
T&E Required before going Beyond Low Rate Initial Production

Production Qualification T&E - Verify Design Article meets Spec/PM responsible Performed by Contractor &/or Government/DPRO assistance valuable. Readiness for IOT&E.

• **Live Fire T&E (LFT&E) -** Vulnerability and Lethality/Dev'l Agency fund and execute. DOTE oversight, approval and Congressional reporting for ACAT I, II and selected programs.

• **Initial Operational T&E (IOT&E)-** Operational Effectiveness and Suitability/ Independent Svc OTA plan and manage. DOTE oversight, approval, and Congressional reporting for ACAT I and selected systems.

T&E Tasks & Events



Use Combined DT/OT - single integrated Contractor/Gov't DT and OT Team; shared test events & test data; independent data analysis & reporting.

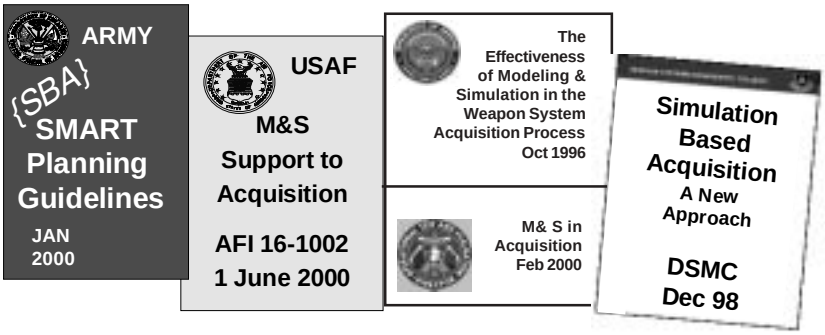
ACAT I & II Programs - require an independent, dedicated IOT&E to proceed Beyond Low Rate Initial Production.

AGONIZE OVER THRESHOLDS!

M & S PLANNING

- ACCESS YOUR SERVICE CENTERS OF M&S EXPERTISE
- Establish a simulation coordinating group; the EARLIER the better
- Design long term M&S applications and the Integrated Digital Environment through the acquisition strategy, TEMP, STEP, SSPs
- CONTINUOUS PLANNING ⇔ PROGRAM PLANNING

TEMP



HOW DO WE PLAN? - A NOTIONAL APPROACH

IDE Planning

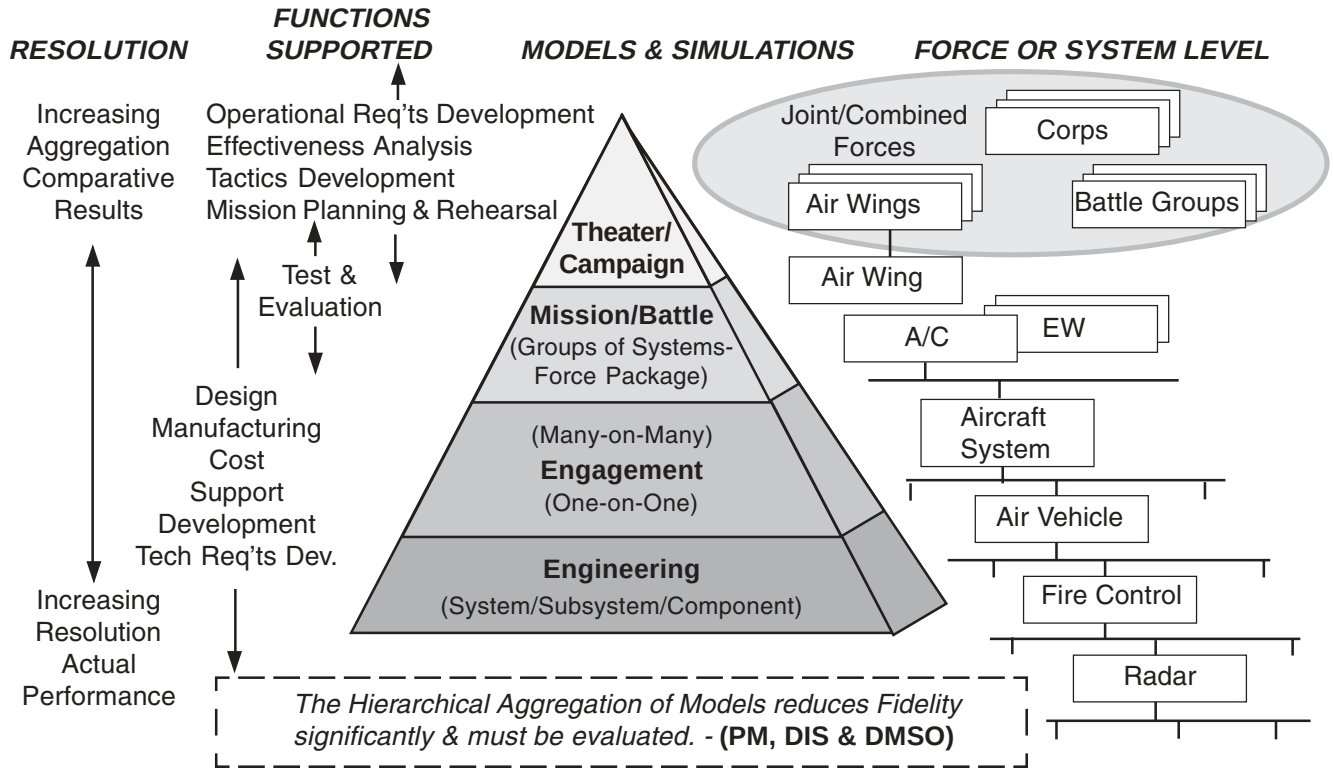
- Establish a business process improvement team
- Identify High Payback Process Areas
- Identify potential legacy systems and data repositories
- Identify user base including remote sites
- Capacity of PC workstations
- Bandwidth of communication lines
- Where servers are/will be located
- Identify legacy system host platforms

SBA Planning

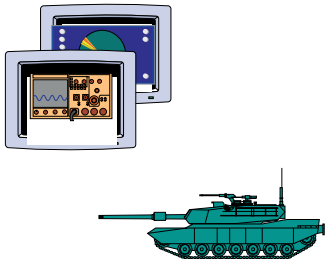
- Establish a simulation & VV&A planning process
- Identify High Payback Process Areas
- Identify potential legacy systems, Service/Joint-standard simulations, Architectures and data repositories
- Identify where user and simulators are / will be located
- Capabilities & Architectures of Existing Simulations
- Network Bandwidth Requirements
- IDE utilization opportunities
- Interoperability / Interface / Immersion Requirements
- Required Capability Gap
- Design SBA Architectures
- Establish long term plan, budget, DOCUMENT & implement
- Manage it, update, evolve, reiterate

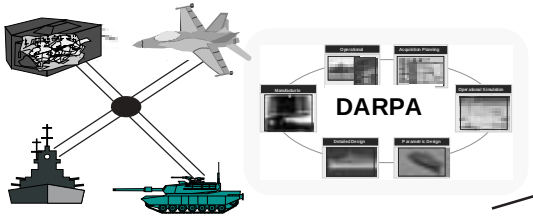
Simulation Support Plan (A,MC), Single Acquisition Mgt Plan (AF), Acquisition Strategy, TEMP

HIERARCHY OF MODELS AND SIMULATIONS



THE EVOLUTION OF MODELING & SIMULATION



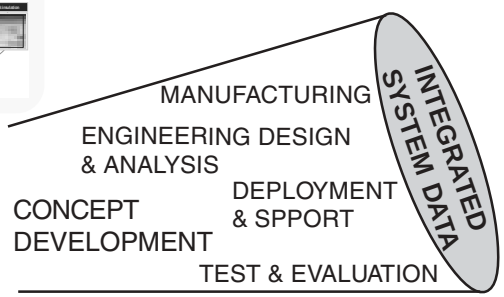


CAD
CAM
CAE
CADAM

Full System Prototypes

Distributed Interactive Simulation (DIS)

Simulation Base Design (Virtual Prototyping with mfg design, risk/cost analyses, mat'l designation)



VIRTUAL PROTOTYPE

PHYSICAL MOCK-UP

FINAL PRODUCT

Simulation Based Acquisition

The Advancing Computer & Communications Technology Revolutions

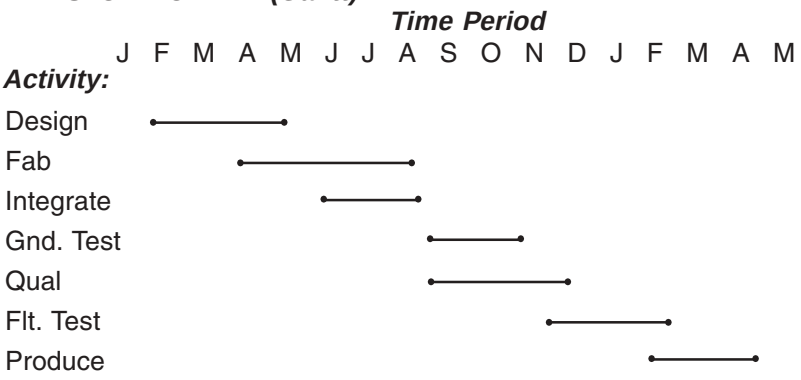
PLANNING AND CONTROL

TYPICAL TIMES FOR PROGRAM ACTIVITIES

Event	***Time (months)***
Procurement Request Development Time	6 - 9
Contract Lead-time	9 - 12
DAB Lead-time	6 - 8
SI Design, Fab and Test	24 - 30
SD Design, Fab and Qual	30 - 36
Test Readiness Review Lead-time	2 - 3
DT&E	9 - 12
OT Readiness Review Lead-time	2 - 3
OT&E	6 - 12
OT Report Preparation	3
Production Lead-time	18 - 30

TYPES OF PLANING CHARTS

MILESTONE CHART (Gantt)



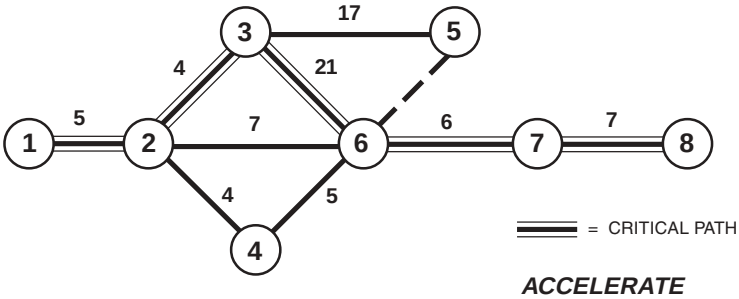
- Advantages: Simple

- Disadvantages: Difficult to show dependencies between activities unless computer-constructed chart.

(ADD'L TYPES OF PLANNING CHARTS ON NEXT 5 PAGES)

PLANNING AND CONTROL
(Continued)

NETWORK CHART

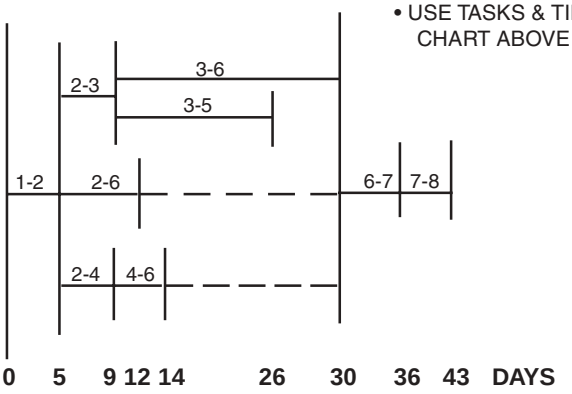


TASK	*TASK #*	*TIME*	*COST*	*ACCELERATE COST*	*ACCELERATE TIME*
Brief	1-2	5	2,200	-	5
Transport	2-3	4	15,000	500	3
Ship GFE	2-6	7	2,500	600	4
Ship system	2-4	4	4,600	750	2
Inspect	4-6	5	0	-	5
Train maint.	3-6	21	28,000	800	14
Train oper.	3-5	17	23,000	800	12
Integ. sys.	6-7	6	13,500	-	6
Dry Run	7-8	7	9,000	400	5

- Advantages: Shows dependencies; computes critical path
- Disadvantages: Complex; computerized support required to maintain
  Does not provide any chronology

SWAN CHART

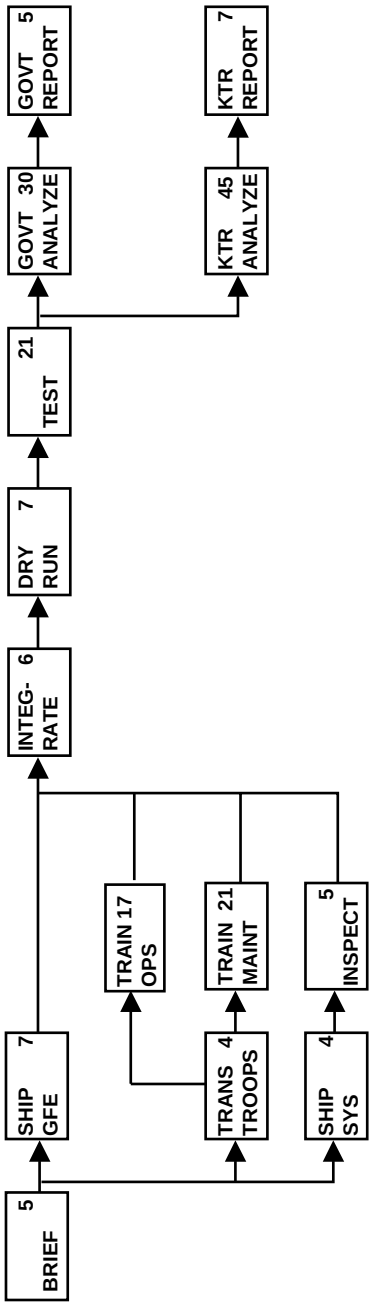
- USE TASKS & TIMES FROM CHART ABOVE



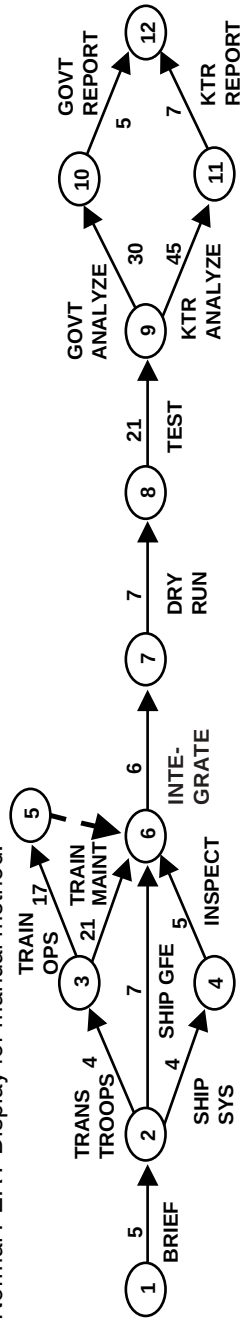
- Advantages: Shows chronology and dependencies (“Swan-like”)
- Disadvantages: Complex; computerized support required to maintain

PERT* NETWORK CHARTS

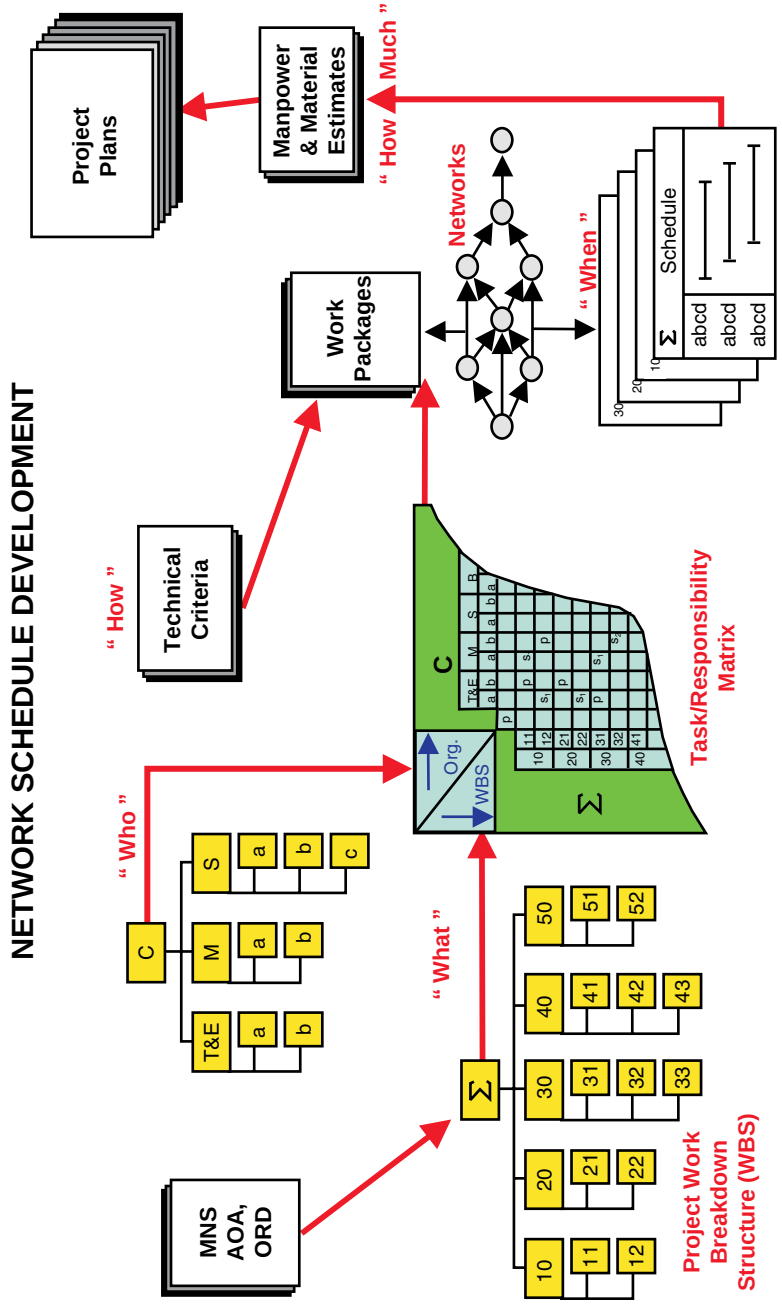
Most widely-used PERT Display using scheduling software:



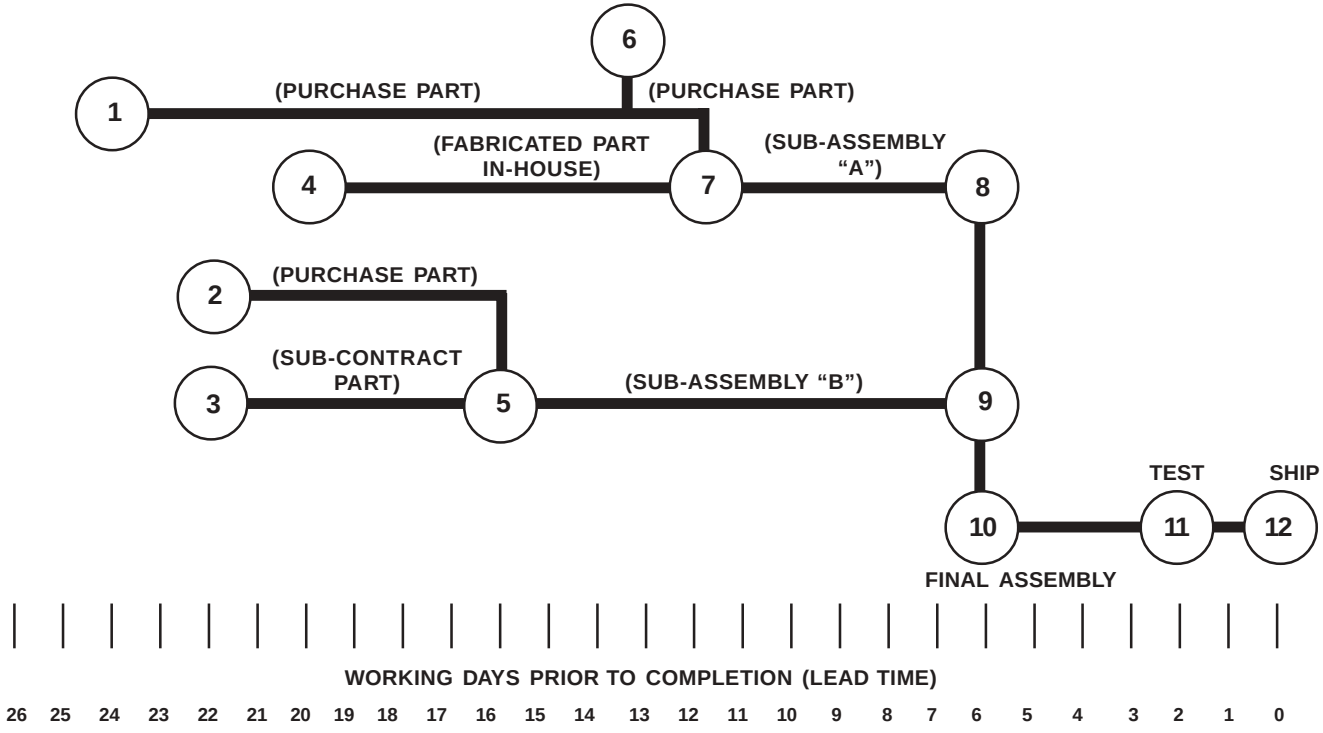
Normal PERT Display for manual method:

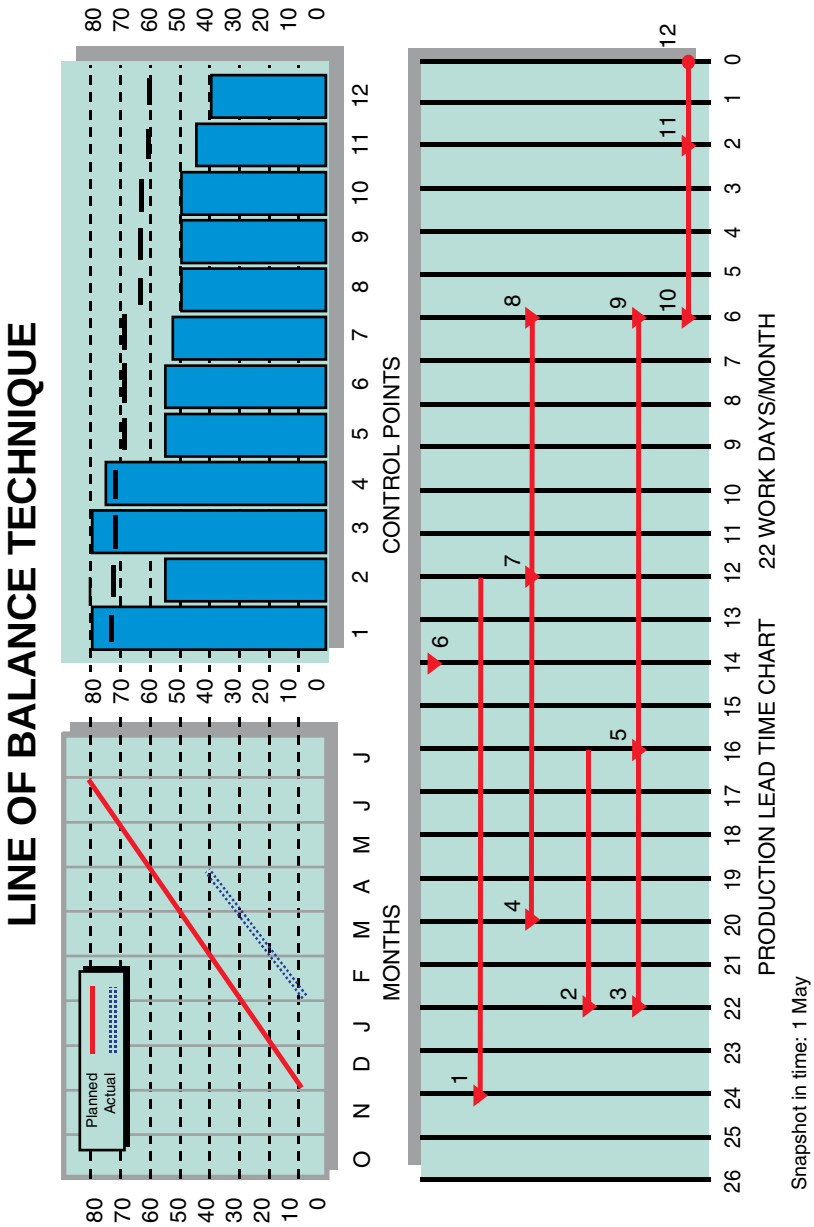


* PERT = Program Evaluation & Review Techniques

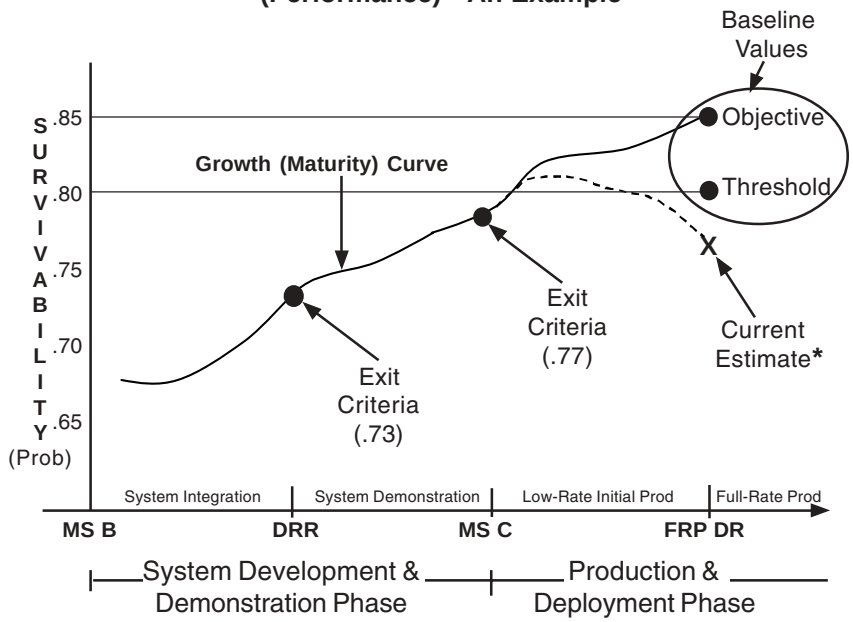

NETWORK SCHEDULE DEVELOPMENT
Project Plans
Manpower & Material Estimates
" How Much "
Technical Criteria
" How "
Work Packages
Networks
" When "
Schedule
abcd
abcd
abcd
Σ
C
T&E
M
S
Org.
WBS
Task/Responsibility Matrix
" Who "
C
T&E
M
S
a
b
c
" What "
MNS AOA, ORD
Σ
10
20
30
40
50
11
12
21
22
31
32
33
41
42
43
51
52
Project Work Breakdown Structure (WBS)

LEAD TIME CHART



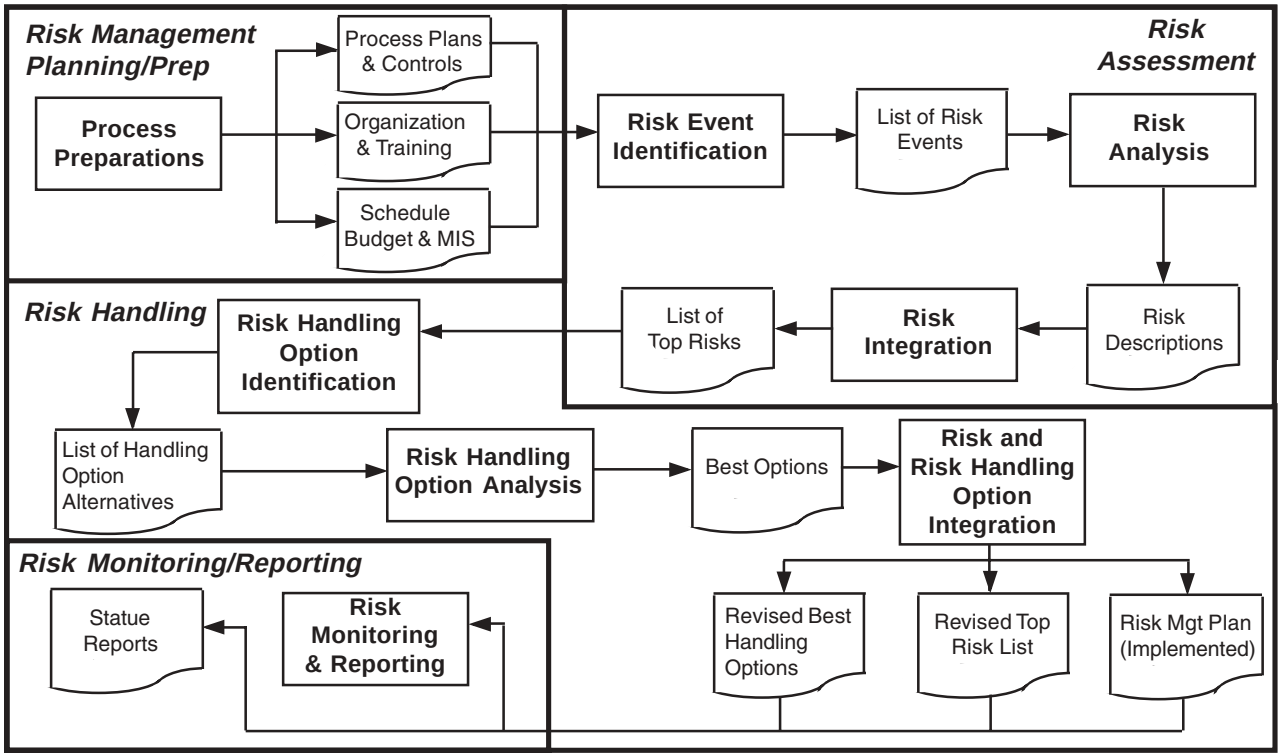

LINE OF BALANCE TECHNIQUE
Planned
Actual
80
70
60
50
40
30
20
10
0
O N D J F M A M J J
MONTHS
1 2 3 4 5 6 7 8 9 10 11 12
CONTROL POINTS
1 2 3 4 5 6 7 8 9 10 11 12
26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
PRODUCTION LEAD TIME CHART
22 WORK DAYS/MONTH
Snapshot in time: 1 May

ACQUISITION PROGRAM BASELINE
(Performance) - An Example



*** in this example the current estimate falls below the threshold - this represents a baseline breach of performance.**

RISK MANAGEMENT PROCESS MODEL



RISK & TRADE-OFF ANALYSIS

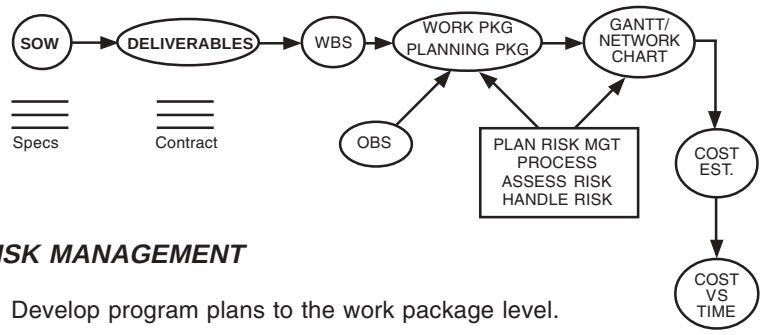
Risk Management
Risk Assessment

Risk Planning
Risk Mgmt Plan
(The Process)

Risk ID
Technical
Cost
Schedule
Lessons learned
WBS

Risk Analysis
Networks
Simulation
Watch lists
Templates

Risk Handling
Avoidance
Control
Assumption
Transfer
Research



RISK MANAGEMENT

1. Develop program plans to the work package level.
2. Assess risk at the lowest work package/WBS level.
3. Manage the highest risk work packages; most others will work out.

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*TRADE-OFF ANALYSIS**

1. Identify alternative solutions
2. Select evaluation criteria/factors & MOEs;
   i.e. cost, schedule, performance criteria
3. Weight evaluation criteria
4. Develop utility functions for each factor
5. Conduct evaluation (weighted utility summary table where
   weight is multiplied by utility function value)
6. Perform sensitivity check
7. Select highest scored alternative

***With Cost As an Independent Variable (CAIV), aggressive cost objectives are established as a result of trading performance and schedule for cost.**

PROGRAM MANAGER'S CHECKLIST FOR REVIEW OF TRADE-OFF PLANNING AND STUDIES

1. ARE ALL VIABLE ALTERNATIVES BEING EXPLORED?

- Is each alternative clearly defined?
- Have the alternatives been prescreened? How?
- Are affordability limits established?
- Can all of the screened-out alternatives be defended?

2. ARE SELECTION CRITERIA IDENTIFIED?

- Are all significant criteria identified?
- Do the criteria discriminate between alternatives?
- Are the criteria measurable?
- Have the criteria been pre-approved?

3. IS THE CRITERIA WEIGHTING SYSTEM ACCEPTABLE?

- Are rationales for criteria weights explained?
- Are criteria weights consistent with guidance?
- Are criteria weights consistently distributed in the tree?

4. ARE UTILITY (SCORING) CRITERIA DETERMINED?

- Is defensible rationale established for each criterion?
- Are criteria developed from operational measures of effectiveness where possible?
- Do all plans use the same numerical scale?
- Is the location of the "zero point" explained?

5. ARE EVALUATION METHODS DOCUMENTED?

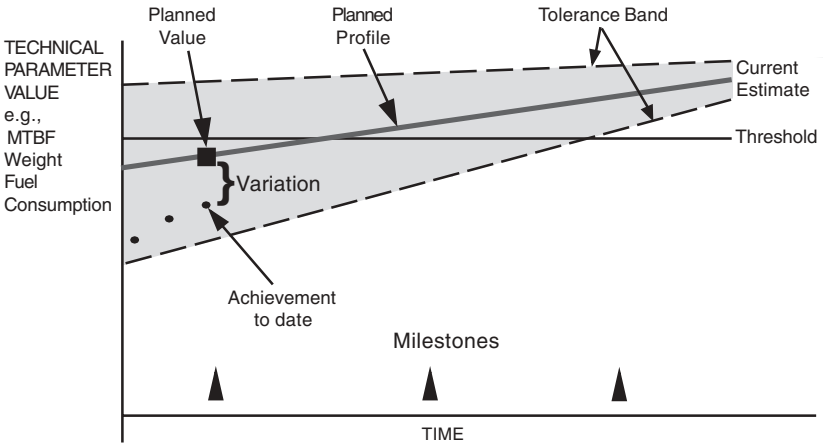
- Are test data reliability estimates (confidence levels) incorporated?
- Are models validated? When? Who?

6. HAS SENSITIVITY BEEN ESTIMATED?

- Are error ranges carried through with worst-on-worst case analysis?
- Have the effects of changes in the utility curve shapes been examined?
- Have rationales for the limits been developed?

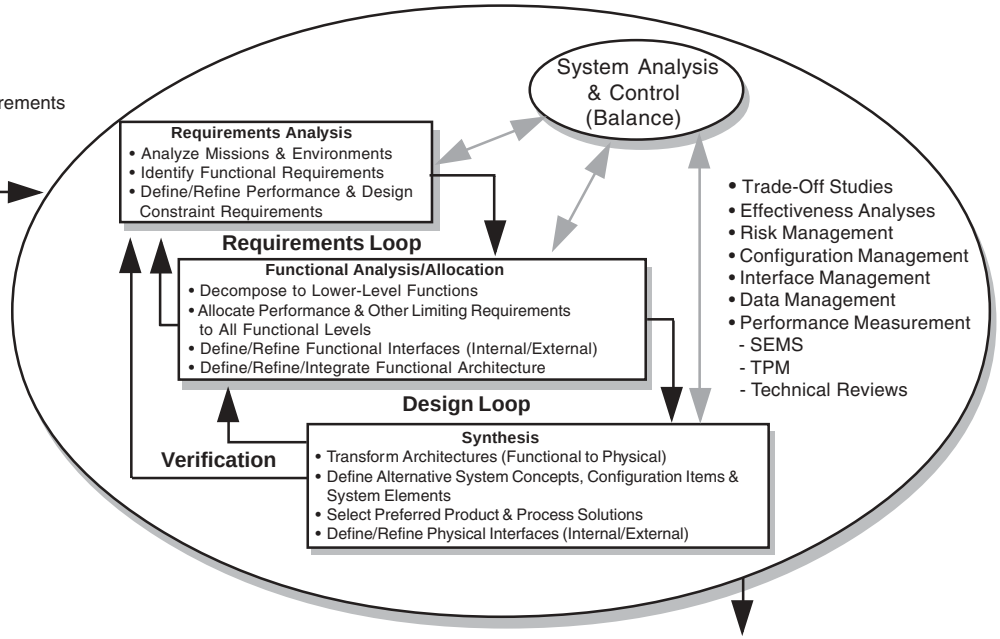
TECHNICAL PERFORMANCE MEASUREMENT

THE CONCEPT



SYSTEMS ENGINEERING PROCESS

PROCESS INPUT
- Customer Needs/Objectives/Requirements
  - Missions
  - Measures of Effectiveness
  - Environments
  - Constraints
- Technology Base
- Output Requirements from Prior Development Effort
- Program Decision Requirements
- Requirements Applied through Specifications and Standards



RELATED TERMS
- **Customer = Organizations Responsible for Primary Functions**
- **Primary Functions = Development, Manufacturing, Verification, Deployment, Operations, Support, Training, Disposal**
- **System Elements = Hardware, Software, Personnel, Facilities, Data, Material, Services, Techniques**

PROCESS OUTPUT
- Development Level Dependent
  - Decision Data Base
  - System/Configuration Item Architecture
  - Specifications & Baselines

REQUIREMENTS ANALYSIS QUESTIONS

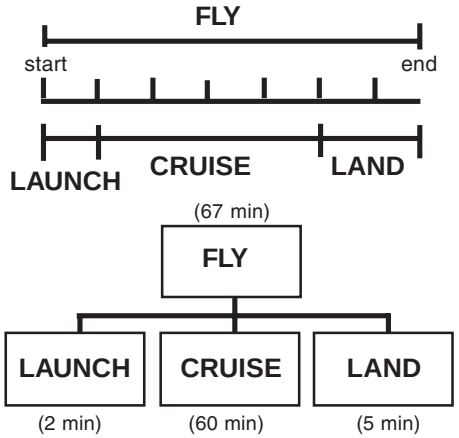
- What are the reasons behind the system development?
- What are the customer expectations? How will they measure the performance of the system?
- Who are the users and how do they intend to use the product?
- What do the users expect of the product?
- What are their level of expertise?
- With what environmental characteristics does the system have to comply?
- What are existing and planned interfaces?
- What functions will the system perform, expressed in customer language?
- What are the constraints – hardware, software, economic, procedural – with which the system must comply?
- What will be the final form of the product – model, prototype, mass production?

ATTRIBUTES OF A WELL – DEFINED REQUIREMENT

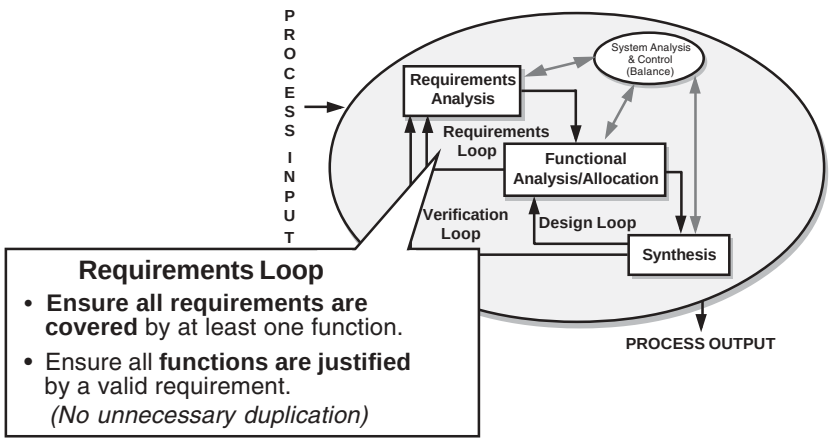
- **Specific, Clear and Unambiguous:** Contains no vague terms
- **Understandable:** Stated with sufficient detail in everyday language
- **Concise:** Contains no unnecessary words
- **Consistent:** Top-to-bottom consistency with identical usage of terms and conformance to standards
- **Stable:** Baselined and under configuration control
- **Traceable:** Derived from the mission profile or the contractor's design policies
- **Verifiable:** Determine whether the product is satisfying the requirement
- **Feasible:** Can achieve, produce, and maintain the requirement

FUNCTIONAL ANALYSIS/ALLOCATION (THE CONCEPT)

- **Allocate Functions**
  - **Decompose Higher Functions**
- **Allocate Performance**
  - **From Higher to Lower Functions**
- **Functional Descriptions**
  - **Functional Flow Block Diagrams**
  - **Time Line Analysis**
  - **Functional Architecture**



REQUIREMENTS LOOP

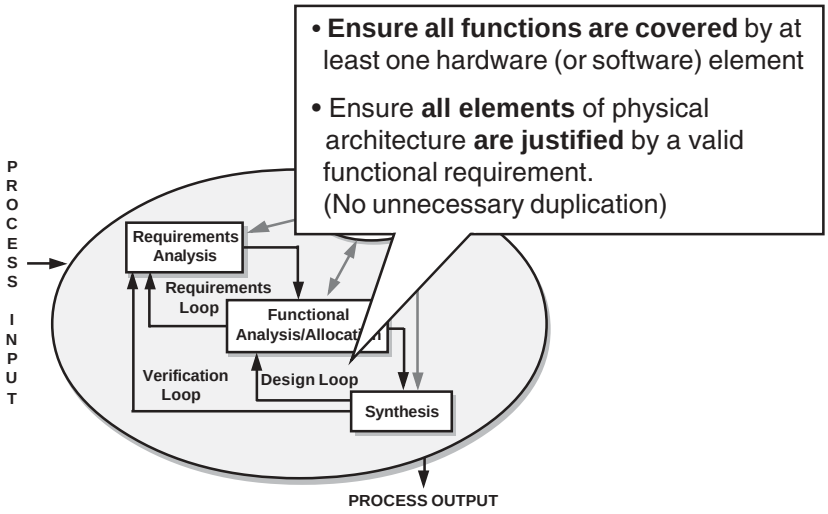


Requirements Loop

- **Ensure all requirements are covered** by at least one function.
- Ensure all **functions are justified** by a valid requirement.
  (No unnecessary duplication)

Requirements	***Functions***						
	Transport	**Load**	**Start**	**Carry**	**Stop**	**Unload**	**Communicate**
Transport Troops	X	X	X	X	X	X	
Squad Level	X	X		X		X	
50 KM	X			X			
90 Minutes from Transporter Arrival	X	X	X	X		X	
Constant Communication							X

DESIGN LOOP



AUDIT TRAIL, DECISION DATABASE, ITEM SPECIFICATIONS, ETC.

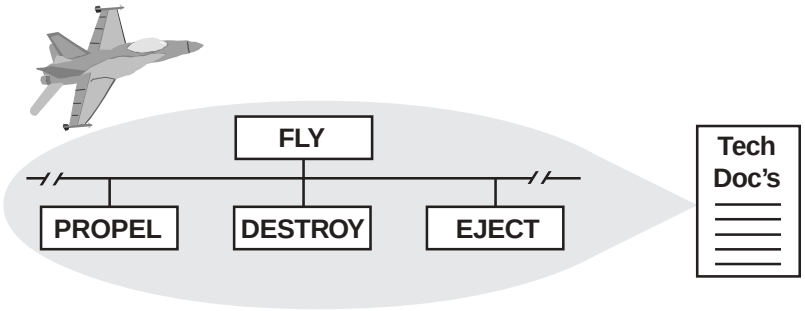
PHYSICAL ARCHITECTURE

FUNCTIONAL ARCHITECTURE

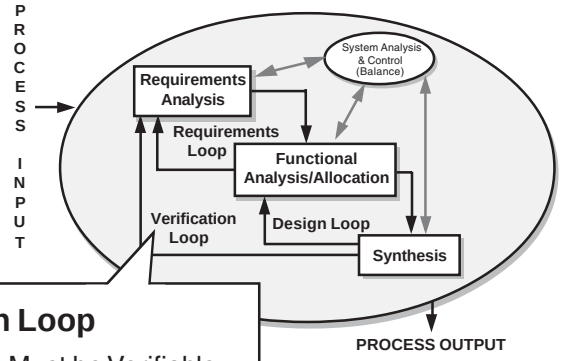
Function Performed	Aircraft				
	Air Frame	Engine	Communications	Nav System	Fire Control
Preflight Check	X	X	X	X	X
Fly					
Load	X				
Taxi	X	X	X		
Take-Off	X	X	X		
Cruise	X	X	X	X	
Recon	X	X	X	X	
Communicate			X		
Surveillance			?	?	?

SYNTHESIS

- Defines the Physical Architecture
  - Each Part Must Meet At Least One Functional Requirement
  - Any Part Can Meet More Than One Requirement
- Justify Architecture by Trade Studies & Effectiveness Analyses
- Document All Process Information in Database
- Generate Documents from Database



VERIFICATION LOOP



Verification Loop

- Each Requirement Must be Verifiable
  Section 4 of Specification
- Verification Evaluates whether Solution Meets Requirements
- 4 Types of Verification
  - Examination
  - Demonstrations
  - Simulations / Analysis
  - Test

SYSTEM ANALYSIS AND CONTROL

(MGMT TOOLS)

HOW DO I MAKE DECISIONS ? →	TRADE STUDIES
WILL IT DO JOB/WORTH THE $$? →	EFFECTIVENESS ANALYSIS
ARE WE DOING THE RIGHT THING ? →	RISK MGMT
HOW DO I KNOW IT WORKS? →	TECHNICAL PERF MEASURES
WILL IT MEET THE PERFORMANCE CRITERIA? →	MODELING & SIMULATION
WILL IT ALL WORK TOGETHER ? →	TECH PERF MEAS
DO WE KNOW WHAT WE HAVE ? →	CONGFIG MGMT
ARE WE READY TO GO ON ? →	TECHNICAL REVIEWS
HOW DO I RUN THIS PROGRAM ? →	INTEGRATED PLANNING

SPECIFICATIONS AND STANDARDS

A New Way of Doing Business (Acquisition Reform)
(Sec Def Memo of 29 June 1994)

1. Use **Performance**-Based Specifications

2. Cancel/**Convert** Manufacturing and Management Standards to **Performance** or Nongovernment Standards (NGSs)

3. Encourage Contractors to Submit **Alternative Solutions** to Military Standards/Specifications

4. **Prohibit** Use of Military Specifications/Standards **Except** when **Authorized** by SAE or Designee

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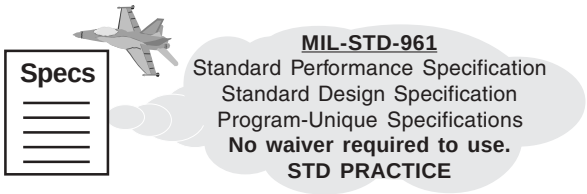
PERFORMANCE VS. DETAIL SPECIFICATIONS

	PERFORMANCE	DETAIL / DESIGN
Design/Fab	Require desired outcomes or functions, Specific design to KTR	Specify **exact** parts and components
Processes	Few, if any	Specify **exact** processes
Physical Characteristics	Give specifics **only** for interfaces, environment, or human factors	Specify **more** physical characteristics, **than needed** for int, env,etc.
Interface Reqmts	Detail interface data does **NOT** solely make a perf. spec a detail spec.	Detailed interface data
Materials	Leave specifics to KTR	Require specific materials
Test & Eval	State performance need; KTR picks test procedure	Prescribed testing process

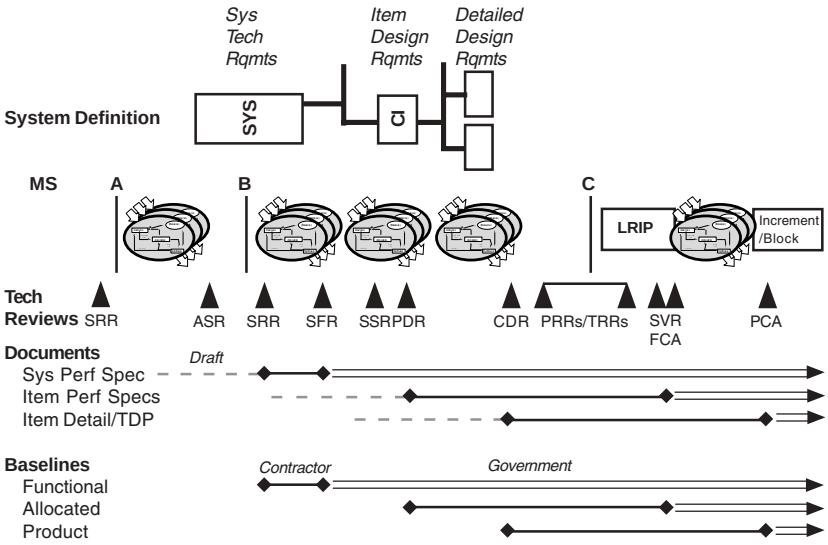
PROGRAM-UNIQUE SPECIFICATIONS



- Program Unique Specifications advantages:
  - Help **avoid** duplication and inconsistencies.
  - Enables **good** estimates of necessary work and resources.
  - Provides consistent **communication** among players as people rotate.
  - Can be used to **prepare** test plans.
  - Can be used a long time **after** the system has been put into operation.
  - Serves as an **interface** between customers, developers and designers.
- Can act as negotiation and reference document for **engineering changes**.

Specification	Content	Baseline
System	• Defines mission/technical performance requirements. Allocates Requirements to functional areas. Defines interfaces.	Functional (“**System**”)
(HW or SW) Item Performance	• Defines performance characteristics of CI’s (form, fit, function). Details Design Requirements only to meet interfaces. “**DESIGN TO**.”	Allocated (“**Design to**”)
(HW or SW) Item Detail	• Includes “how to” and specific design requirements. Usually includes specific processes and procedures. “**BUILD TO**.”	Product (“**Build to**”)
Process	• Defines process performed during fabrication.	Product
Material	• Defines production of raw materials or semi-fabricated material used in fabrication.	Product

SYSTEMS ENGINEERING MANAGEMENT in Acquisition



SYSTEM REVIEW DEFINITIONS

ASR - Alternative Systems Review	- Preferred System Solution meets needs
SRR - Systems Requirements Review	- Preliminary Functional Requirements
SFR - Systems Functional Review	- Approve functional requirements - Review preliminary allocated requirements
SSR - Software Specification Review	- Approve S/W allocated requirements
PDR - Preliminary Design Review	- Approve allocated requirements - Establish allocated baselines
CDR - Critical Design Review	- Preliminary product requirements - Ready for fabrication
PRR - Production Readiness Review(s)	- Assess producibility/manuf readiness
TRR - Test Readiness Reviews(s)	- Assess test readiness - Approve test plans
FCA - Functional Configuration Audits	- Verify CIs perform to spec
SVR - System Verification Review	- Verify CIs perform to system spec
PCA - Physical Configuration Audit	- Verify the product baseline

CONFIGURATION MANAGEMENT

Non-Government Std: *EIA Standard-649*

Also see MIL HNBK 61

"A management process for establishing and maintaining consistency of a product's performance, functional and physical attributes with its requirements, design and operational information throughout its life."

- **Identify** and **document** the functional and physical characteristics of configuration items.
- **Control** changes to configuration items and their related documentation.
- **Record (or Status Accounting in DoD terms)** and report information needed to manage configuration items effectively, including the status of proposed changes and implementation status of approved changes.
- **Audit** configuration items to verify conformance to specifications, drawings, interface control documents, and other contract requirements.

- Adopted by DoD, 22 Nov 96

CONFIGURATION MANAGEMENT PLANNING

- The decisions on
  - **Which baselines the government should eventually control**
  - **The data needed**
  - **When that control should be established**

  ...are strategic management decisions that involve
  - **Acquisition strategies - sources, competition, etc.**
  - **Logistics support plans - repair levels, data needs, open systems, etc.**
  - **Technology insertion - stable vs rapidly moving technologies, etc.**

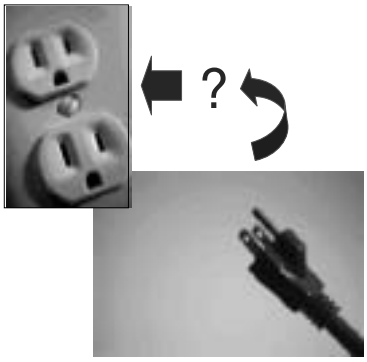
- Government should control the Functional Baseline (documents system level requirements)

- DoD PMO's increasingly choose to leave Allocated Baselines under contractor control until late in development. (Documents the Configuration Item (CI) level design requirements.)
  - **Promotes contractor design flexibility**
  - **Relieves PMO from administrative burdens of managing design ECPs**
  - **Requires effective implementation of IPPD**

- When and if to control baselines is dependent on support philosophy and acquisition management strategy.

INTERFACE MANAGEMENT

Will it all work together?



- The Government PMO:
  - Identifies External Interfaces
  - Establishes interface standards (baselines)
  - Maintains interface stability
- The Contractor:
  - Manages Internal Interfaces
  - Establishes Interface
    - Requirements to Include
    - Internal & External Interfaces
  - Controls Interfaces to Ensure
    - Accountability & Timely
    - Dissemination of Changes

The government increasingly chooses to manage interfaces leaving design details to contractors

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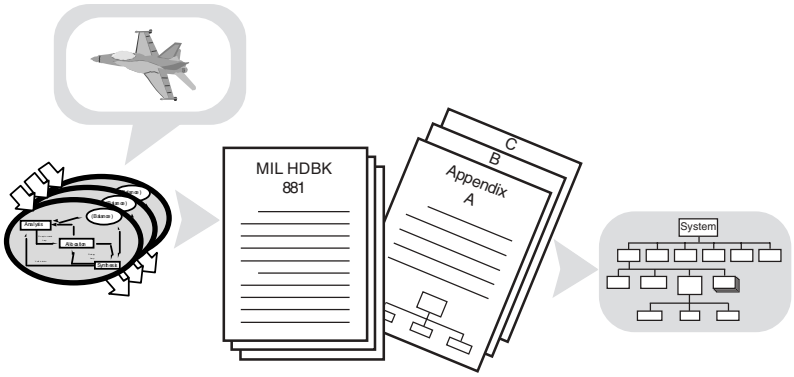
INTERFACE CONTROL CONCEPT

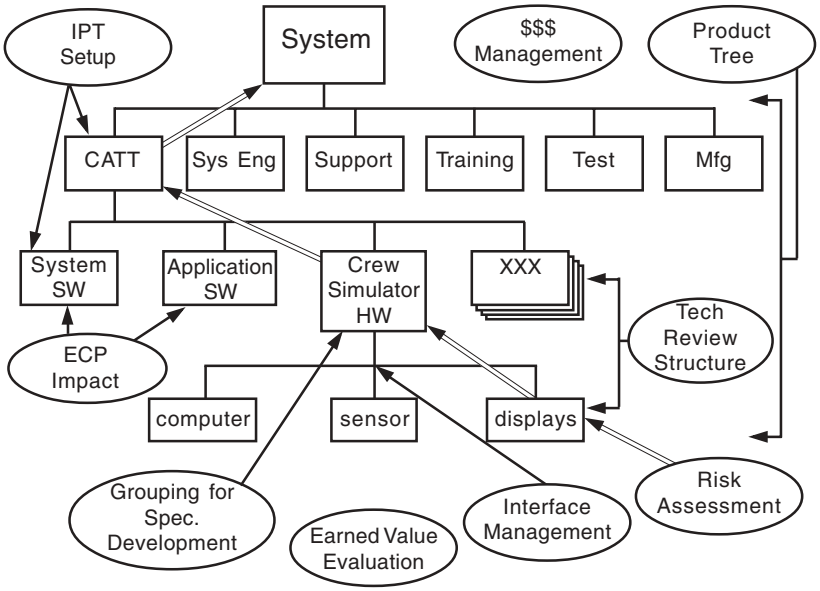
- Identifies, documents, & controls all functional and physical characteristics.
- Interfaces, what?
  - Common boundary.
  - Types: Mechanical, Electrical, Operational, Software.
  - Functional & Physical characteristics.
- Where?
  - Within one contractor's design.
  - Between contractor's items and GFE.
  - Between multiple contractors' items.
  - Between systems
- Controlled by Interface Control Working Group.
- Documented in Interface Control Documents.

HOW TO CREATE A WORK BREAKDOWN STRUCTURE



Define the Product | **Tailor (supporting processes)** | **Create and refine as design matures**

BASIC PURPOSES OF WBS



SOFTWARE MANAGEMENT

- Nine Principal Best Practices to Improve Software Development, Reduce Costs, and Increase User Satisfaction*

  - Formal Risk Management
  - Agreement Interfaces
  - Peer Reviews/Inspections/Walk-throughs
  - Metric-Based Scheduling and Management
  - Binary Quality Gate, at Inch-Pebble Level
  - Program-wide Visibility of Project Progress vs. Plan
  - Defect Tracking Against Quality Targets
  - Configuration Management
  - People-Aware Management Accountability

- Nine Project "Breathalyzer " Questions to provide "Quick Look" at Software Project Health**

  - Do you have a current, credible activity network supported by a work breakdown structure (WBS)?
  - Do you have a current, credible schedule and budget?
  - Do you know what software you are responsible for delivering?
  - Can you list the current top 10 project risks?
  - Do you know your schedule compression percentage?
  - What is the estimated size of your software deliverable? How was it derived?
  - Do you know the percentage of external interfaces that are not under your control?
  - Does your staff have sufficient expertise in the project domains?
  - Have you identified adequate staff to allocate to the scheduled tasks at the right time?

*"Little Yellow Book of Software Management Questions" (Software Program Managers Network)
**"Project Breathalizer Questionnaire Software Health"; Software Program Managers Council

//
LEADERSHIP & MANAGERIAL SKILLS

• More things that make you go “Hmmm?... ”

“An authority is a person who just happens to know the source.”

“A conservative is a person who believes nothing should be done the first time.”

“Diplomacy is the art of hearing all parties arguing in a dispute and nodding to all of them without ever agreeing with any of them.”

“The meeting raised our confidence that the contractor can actually accomplish the task and that it will occur in our lifetime.”

“This is the earliest I've been late.”

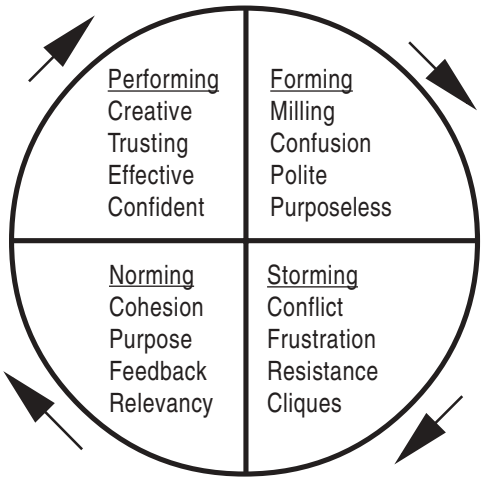
“The world would be a much better place if people weren't allowed to have children until they've proven they can successfully manage a DoD program.”

“Everyone is bound to bear patiently the results of his/her own example.”

“The superior person is firm in the right way, and not merely firm.”

WORKING GROUPS

TEAM DEVELOPMENT WHEEL



RECOGNIZE WHICH PHASE OF TEAM DEVELOPMENT YOU ARE IN AND TAKE POSITIVE ACTION TO WORK THROUGH

Note: These can be an additional phase – "Adjourning" – when the team disbands, says good bye, and reflects on lessons learned. This is a "celebration" phase.

TYPICAL WORKING GROUPS

- Logistics Support Management Team (LSMT)
- Test & Evaluation Working Group (TEWG)
- Computer Resources Working Group (CRWG)
- Requirement Interface Working Group
- Interface Control Working Group (ICWG)
- Technology Assessment Working Group
- "Tiger" Team
- Process Action Team
- Integrated Product & Process Teams

WORKING GROUPS
(Continued)

Group Consensus - a general agreement by all team members that they can live with, and be commited to a particular course of action. Until you have this agreement, you don't have consensus. Guidelines for achieving:

1. Avoid arguing for your own opinion.

2. Go for "win-win" solutions.

3. Do not change your mind to avoid conflict.

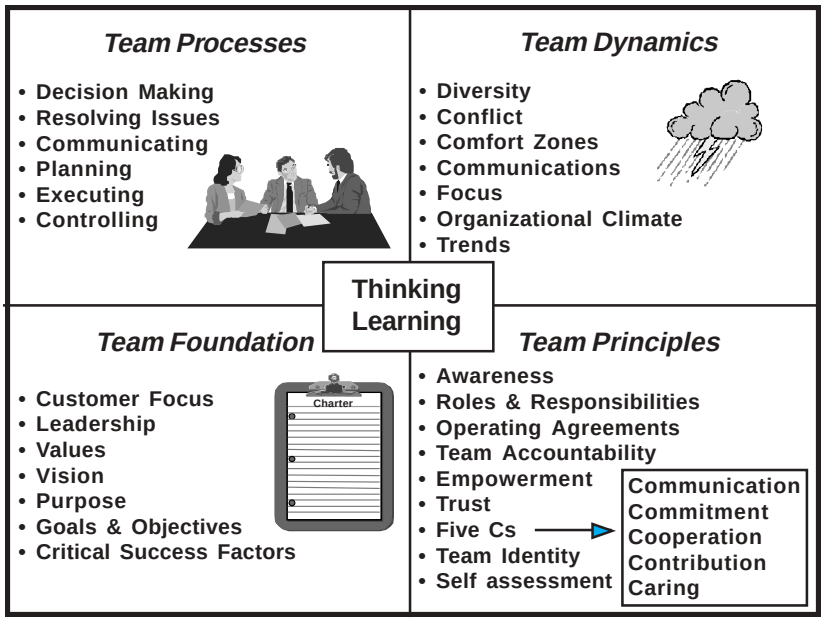
4. Avoid majority vote, coin-flipping, horse-trading.

5. Expect differences of opinion.

MANAGEMENT TRADE-OFFS FOR WORKING GROUPS

Advantages	***Disadvantages***
• More ideas & solutions	• Takes more time
• Consensus positions	• Hard to terminate
• Strong commitments	• Paralysis by analysis

TEAM PERFORMANCE MODEL



DELEGATION

REASONS FOR DELEGATING

1. Improve manager's time management
    a. Increase manager's span of control
    b. Increase time allocated to long range planning
    c. Increased management efficiency
2. Assure tasks performed by most qualified
3. Build organizational depth
4. Improve employee motivation
5. Increased teamwork (IPTs/TQM)
6. Maximize resources
7. Appropriate organizational responsibility

---

12 STEPS FOR DELEGATING

1. Set clear objectives and task statements
2. Select "Delegate"; check qualifications
3. Provide training, if necessary
4. Solicit input from Delegate
5. Assign task and deadline
6. Provide any relevant guidance
    a. Critical information required to do tasks right
    b. Potential approaches - only as suggestions!
    c. Describe results desired
7. Makes a delegation "contract" (see next page)
8. Establish controls
9. Maintain controls
10. Provide feedback
11. Identify lessons learned
12. Evaluate performance

DELEGATION
(Continued)

(SAMPLE) DELEGATION RECORD	
Description of Action:	Date:
Person Assigned:	
Authority Level (specify): 1 - Take action; do not report back 2 - Take action; report back (see Frequency) 3 - Prepare plan; proceed upon approval 4 - Do only as directed below	*Frequency of Contact (specify):* 1 - daily 2 - weekly 3 - monthly 4 - other _____
Delegation Guidance/Agreements:	
Suspense Action:	Suspense Date:
Performance Assessment:	

EFFECTIVE MEETINGS

PRE-MEETING

A. Establish type of meeting
   1. Information (quick, crisp)
   2. Planning/Strategizing (slow, deliberate)
   3. Problem solving (divergent/convergent)
   4. Decision (deliberate)
   5. Staff/Conference (repetitive, short)
   6. Feedback/Evaluation (slow, contemplative)
   7. Training (smooth, flowing)
   8. Social (rambling)

B. Select participants
   1. Based on purpose; relevant; decision auth.
   2. Size: 4-7 ideal; 10-12 tolerable; >13 unsat.

C. Circulate agenda (3-5 days in advance)
   1. Type, purpose, date, place, start/finish times
   2. Topics, time allocated (minutes), speakers
   3. Assign recorder

CONDUCTING MEETING

A. Opening
   1. Start on time
   2. Repeat type and purpose of meeting

B. During
   1. Facilitate the meeting
   2. Encourage openness and communication
   3. Develop cohesion
   4. Use active listening
   5. Stick to agenda

C. Closing
   1. Set time and date of next meeting
   2. Summarize agreements, actions, decisions
   3. Close on time or before

AFTER MEETING

A. Review minutes with recorder

B. Publish minutes

PERSONAL COMMUNICATIONS

COUNSELING

DIRECTIVE
- Give advice
- Evaluate
- Motivate
- Explain
- Reassure

Advantages
- Effective with inexperienced personnel
- Quick
- Take charge attitude

Disadvantages
- Perceived insulting
- Does not support delegation
- Manager keeps responsibility

NON-DIRECTIVE
- Don't display authority
- Listen carefully
- Don't advise
- Facts only; no opinions
- Employee find solution

Advantages
- Develops commitment
- Good training
- Employee responsible
- Supports delegation

Disadvantages
- Takes time
- Skill/patience required
- Ineffective with inexperienced personnel

COUNSELING PROCESS

1. Set up interview - private, confidential, unhurried
2. Encourage discussion - open questions, active listening
3. Help employee think it through - deal with facts, no opinions or own views
4. Let them find the solution - *their* solution to *their* problem

PERSONAL COMMUNICATIONS
(Continued)

WIN-WIN NEGOTIATIONS

FOCUS: Defeat the problem; not the person

APPROACH:
- Resolve conflict
- Reach agreement
- Normalize relationships
- Combine efforts

GOAL:
- Acceptable gains by both parties

INTER-PERSONAL NEGOTIATIONS

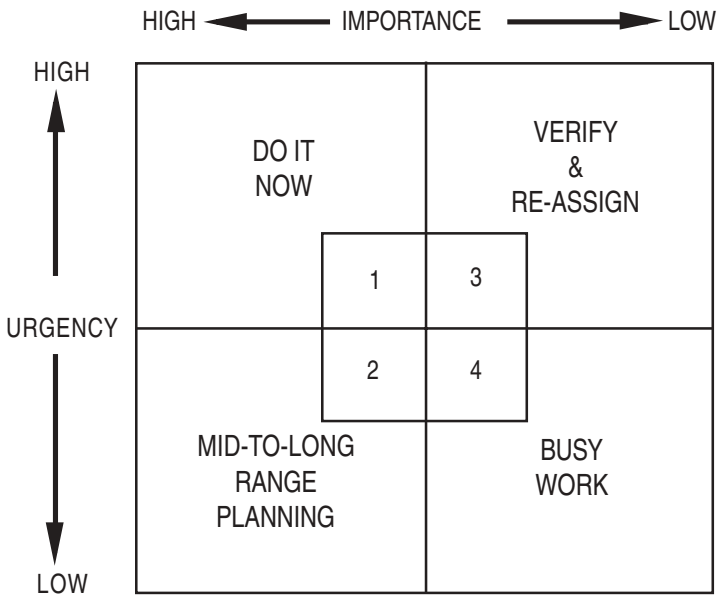
1. Separate people and emotions from the problem
2. Focus on interests, not positions
3. Generate options for mutual gain
4. Insist on objective criteria

TIME MANAGEMENT

TIME ROBBERS AND AVOIDANCE TECHNIQUES

1. Incoming telephone calls	- Screen for importance - Limit to 2 minutes
2. Outgoing telephone calls	- Do all at one time - Itemize topics before calling - Don't socialize
3. Unscheduled visitors	- Screen for importance - Do not invite into office - Remain standing
4. Improper delegation	- Re-delegate
5. Poorly conducted meetings	- Stay focused on subject area and on schedule

TIME MANAGEMENT
(Continued)



1. List all tasks.
2. Categorize tasks using matrix.
3. Review quadrant 3 items; re-assign as 1, 2, or 4 as appropriate.
4. Do quadrant 1 tasks first; consider delegating!
5. Strive to maximize time for quadrant 2 tasks (be proactive!).
6. When all 1 and 2 tasks are complete, do quadrant 4 tasks.

KEEP A "TO DO" LIST

1. List all goals and tasks.
2. Categorize as A - High value
   B - Medium value
   C - Low value
3. Prioritize within each category (e.g. A-1, A-2, etc.).
4. Accomplish all A tasks, then all B. Do C if time permits.
5. Review list and priorities daily.

DECISION BRIEFING

Elements of a Decision Briefing

- Purpose - Issues
- Outline - Agenda
- Background
- Assumptions
- Alternatives Identified
- Evaluation Criteria
- Analysis of Alternatives
- Recommendation
- Implementation Plan

Things to Expect (from Briefee)

- Challenges to assumptions, definitions, methodology
- Does it comply with or change policy?
- Is the situation sensitive to change?
- Issues with analysis, tradeoffs, recommendations, implementation
- Open/closed questions

MANAGEMENT TOOLS & TECHNIQUES

1. **Activity-based Management (ABM).** Uses detailed economic analyses of important business activities to improve strategic and operational decisions. ABM increases the accuracy of cost information by more precisely linking overhead and other indirect costs to products or customer segments. Traditional accounting systems distribute indirect costs using bases such as direct labor hours, machine hours, or material dollars. ABM tracks overhead and other indirect costs by activity, which can then be traced to products or customers.

2. **Balanced Scorecard.** Defines what management means by "performance" and measures whether management is achieving desired results. The Balanced Scorecard translates mission and vision statements into a comprehensive set of objectives and performance measures that can be quantified and appraised. These measures typically include: financial, customer value, internal business process, learning and growth, and employee performance.

3. **Cycle Time Reduction.** Decreases the time it takes a company or program to perform key activities throughout its value chain. Cycle Time Reduction uses analytic techniques to minimize waiting time, eliminate activities that do not add value, increase parallel processes, and speed up decision processes within an organization. Time-based strategies often emphasize flexible manufacturing, rapid response and innovation in order to attract the most profitable customers.

4. **Groupware.** Refers to a broad range of technologies that allow people in organizations to work together through computer networks. These products range from sophisticated electronic mail packages to applications that link offices and employees. Organizations use such technology-aided communications to better inform strategic and financial decisions and to more effectively and economically bring together working groups. (DAU has a Groupware capability in its Management Decision Center, which is used for management decision making by offices and agencies throughout DoD.)

MANAGEMENT TOOLS & TECHNIQUES
(Continued)

5. **Outsourcing.** Occurs when a company or Government agency uses third-parties to perform non-core business activities. Contracting third-parties enables a company or agency to focus its efforts on its core competencies. Many companies find that outsourcing reduces cost and improves performance of the activity. Third-parties that specialize in an activity are likely to be lower cost and more effective, given their scale. Through outsourcing, a company or agency can access the state of the art in all of its business activities without having to master each one internally.

6. **Business Process Reengineering.** Involves the fundamental redesign of core business processes to achieve significant improvements in productivity, cycle times, and quality. In Business Process Reengineering, companies start with a blank sheet of paper and rethink existing processes to deliver more value to the customer. They typically adopt a new value system that places increased emphasis on customer needs. Companies and/or Government agencies reduce organizational layers and eliminate unproductive activities in two key areas. First, they redesign functional organizations into cross-functional teams. Second, they use technology to improve data dissemination and decision making.

7. **Strategic Planning.** Is a comprehensive process for determining what a commercial business or Government agency should become and how it can best achieve that goal. It appraises the full potential of a business and explicitly links the business objectives to the actions and resources required to achieve them. Strategic Planning offers a systematic process to ask and answer the most critical questions confronting a management team – especially large, irrevocable resource commitment questions.

III
PROBLEM SOLVING TOOLS

BRAINSTORMING

PURPOSE: To stimulate the free flow of ideas.

METHOD: Group members take turns generating ideas. One idea stimulates another and then another. Freewheeling of ideas is encouraged. Brainstorming stops when all group members run out of ideas. See the back of this page for questions that may suggest new ideas for you.

GROUND RULES:

Put judgment aside. Remember, all ideas can be thought of as starters.

No criticism allowed. This is not the time to judge an idea. Don't criticize other ideas no matter how ridiculous they may seem. The ideas can be discussed in detail later; now, the objective is to generate more ideas.

Welcome free-wheeling or blue-skying. Let those wild ideas come out—otherwise you may conceal your creative process. The impractical ideas may trigger other ideas that are possible to use.

Strive for quantity, not quality. The more ideas brought out, the better the chance of a great solution.

Combine and rearrange ideas. Single ideas aren't the only way to make a suggestion. You can make additions or combinations of previously suggested ideas to create still better ideas.

Record all ideas exactly as expressed. This keeps the mind free of remembering what was said and allows you to build on previous ideas.

BRAINSTORMING
(Continued)

Why does it work?

Some of the reasons why brainstorming enhances a group's creativity are that it:

- Increases involvement and participation.

- Produces the most ideas in the shortest time.

- Reduces the need to give the "right" answer.

- Frees up the group; allows the members to have fun and is interesting.

- Reduces the possibility of negative thinking.

QUESTIONS TO STIMULATE YOUR BRAIN CELLS:

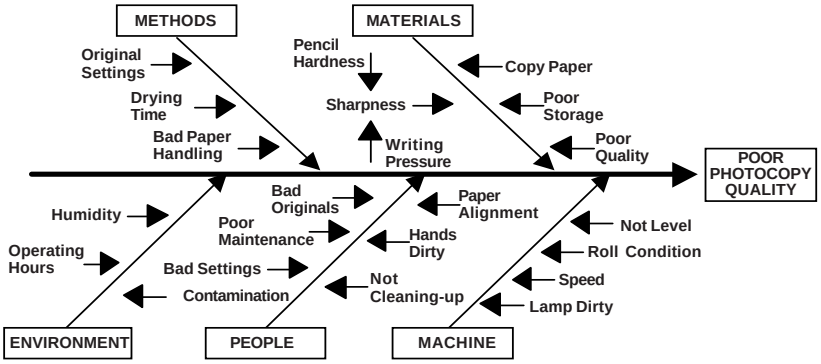
1. Can we use this idea elsewhere? As is? With changes?
2. If we change it,; Is there anything else like it? Any related issues?
3. Modify? Change? Rearrange? Meaning, color, motion, sound, odor, taste, form, shape, layout, etc.?
4. Magnify? Add what? More, stronger, larger, new?
5. Minimize? Subtract what? Eliminate, smaller, lighter, slower, split?
6. Substitute? Who, what, when, where?
7. Reverse? Opposite, backwards, upside down, inside out?

CAUSE AND EFFECT DIAGRAM

The cause and effect diagram is a graphical illustration of the relationship between a problem or goal (the effect) and its potential contributors (the causes). Sometimes called the "fishbone" or Ishikawa diagram.

Used for analyzing problems, a cause and effect diagram can help:

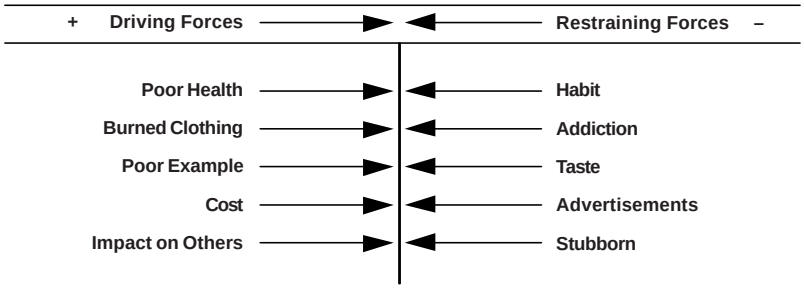
- Determine root causes of a given effect;
- Identify areas where there is a lack of data.



FORCE FIELD ANALYSIS

A Force Field Analysis illustrates the relationship and significance of factors that may influence the problem or goal. This analysis helps us better understand driving and restraining forces.

GOAL: Stop Smoking



Used for making decisions, <u>force field analysis</u> can help:

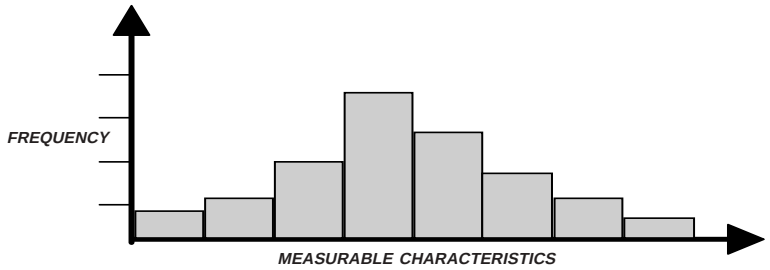
- Identify realistic improvement opportunities;
- Develop systematic action plan for problem resolution; and
- Create criteria for evaluating effectiveness of improvement actions.

HISTOGRAM

The histogram chart displays the distribution of a measurable characteristic (for example: weight, length, speed, etc.). A histogram shows what the variability of the data is in a graphical or pictorial manner.

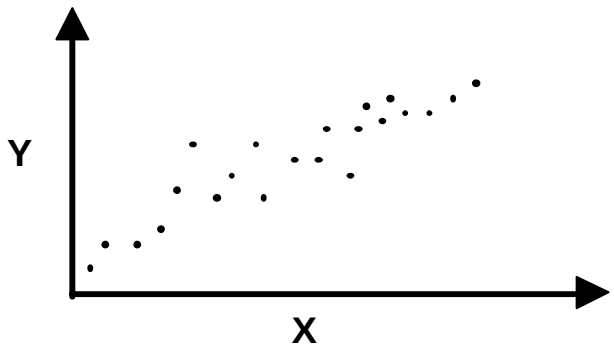
Used for data analysis, a histogram can help:

- Present a picture of how the process is operating;
- Compare actual process measurements with an expected distribution;
- Observe patterns in the data; and
- Investigate process stability.



SCATTER DIAGRAM

A scatter diagram depicts the correlation between two variables (X and Y).



Used for data analysis, a scatter diagram can help:

- Confirm a hypothesis that two variables are related.
- Provide both visual & statistical means to test the strength of a potential relationship.

SURVEYS

A Survey is used to collect data from a variable number of items or people for a comparative study. They are used when a new project is planned, to prove the need and the demand of the customer.

Surveys can be used anywhere in the organization to find out specific information which is necessary to make improvements in a process.

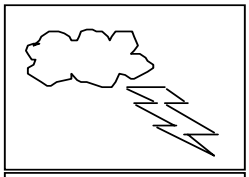
Surveys:

- Are an inexpensive way to test a system or product.
- Can be used with a large number of people or a small group.
- Can give you an overall view, determined by the questions you ask.
- Show if an organization is meeting its quality goals.
- Help identify satisfied and dissatisfied customers or employees.

Survey Process

1. Determine the group to be studied.

2. Determine what questions will be asked.



Brainstorming

SURVEY

1.
2.
3.
4.

Note: Train your data collectors thoroughly. Everyone must know how to ask the questions, who to approach, and how to approach them.

3. Compile your results in chart form using a Pareto chart, histogram, and other tools that will give you clarification.

4. Use the compounded data to form a base for improvement.

5. Continue to take data to monitor improvements, and make sure the improvements you have made are working.

Caution!

Data must be collected honestly and consistently.

An untrained collector can skew the data to reflect personal biases.

A poor, inconsistent survey will give you invalid data.

Make sure there is enough time allowed for the collecting process.

AFFINITY DIAGRAM

An affinity diagram is a technique for organizing verbal information into a visual pattern. An affinity diagram starts with specific ideas and helps you work toward broad categories. This is the opposite of a cause and effect diagram, which starts with the broad causes and works toward specifics. You can use either technique to explore all aspects of an issue.

Affinity diagrams can help you:

- Organize and give structure to a list of factors that contribute to a problem.

- Identify key areas where improvement is most needed.

How to do it:

1. ***Identify the problem.*** Write the problem or issue on a chalkboard or flip chart.

2. ***Generate ideas.*** Use an idea-generation technique to identify all facets of the problem. Use index cards or sticky-back notes to record the ideas.

3. ***Cluster your ideas (on cards or paper) into related groups.*** Use questions like “Which other ideas are similar?” and “Is this idea somehow connected to any others?” to help group the ideas together.

4. ***Create affinity cards.*** For each group, create an affinity card, a card that has a short statement describing the entire group of ideas.

5. ***Cluster related affinity cards.*** Put all of the individual ideas in a group under their affinity card. Now try to group the affinity cards under even broader groups. You can continue to group the cards until your definition of “group” becomes too broad to have any meaning.

6. ***Create an affinity diagram.*** Lay out all of the ideas and affinity cards on a single piece of paper or a blackboard. Draw outlines of the groups with the affinity cards at the top of each group. The resulting hierarchical structure will give you valuable insight into the problem.

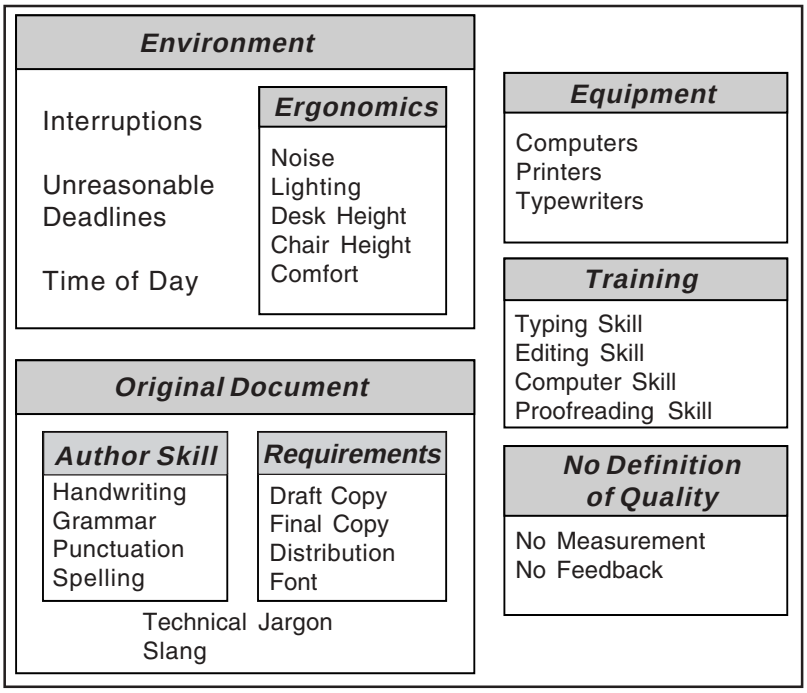
AFFINITY DIAGRAM EXAMPLE

A publication team wanted to reduce the number of typographical errors in their program's documentation. As part of a first step, they conducted a brainstorming session that produced the following list of factors that influenced errors.

Computers
Proofreading Skill
Unreasonable Deadlines
Lighting
Chair Height
Desk Height
Technical Jargon
Handwriting
Slang
Draft Copy
Distribution
Final Copy
Computer Skill
No Measurements
No Feedback
Printers
Noise
Typewriters
Comfort
Time of Day
Interruptions
Grammar
Spelling
Punctuation
Font
Editing Skill
Typing Skill

The following affinity diagram helped them to focus on areas for further analysis.

Typographical Errors



Affinity Diagram

PAIRWISE RANKING

Pairwise ranking is a structured method for ranking a small list of items in priority order.

Pairwise Ranking can help you:

- Prioritize a small list.
- Make decisions in a consensus-oriented manner.

How to do it:

1. ***Construct a pairwise matrix***
   Each box in the matrix represents the intersection (or pairing) of two items. If your list has five items, the pairwise matrix would look like this, with the top box representing idea 1 paired with idea 2:

	1			
2		2		
3			3	
4				4
5				

2. ***Rank each pair.*** For each pair, have the group (using a consensus-oriented discussion) determine which of the two ideas is preferred. Then, for each pair, write the number of the preferable idea in the appropriate box. Repeat this process until the matrix is filled.

	1			
2	2	2		
3			3	
4				4
5				

1 and 2 compared
2 is better

	1			
2	2	2		
3	1		3	
4				4
5				

1 and 3 compared
1 is better

...and so on
untill...

	1			
2	2	2		
3	1	2	3	
4	1	2	3	4
5	5	5	5	5

4 and 5 compared
5 is better

3. ***Count the number of times each alternative appears in the matrix.***

Alternative 5
ranks 1st overall

Alternative	1	2	3	4	5
Count	2	3	1	0	4
Rank					

4. ***Rank all items.*** Rank the alternatives by the total number of times they appear in the matrix. To break a tie (where two ideas appear the same number of times), look at the box in which those two ideas are compared. The idea appearing in that box receives the higher ranking.

Alternative 5 appears
4 times in the matrix

Alternative	1	2	3	4	5
Count	2	3	1	0	4
Rank	3rd	2nd	4th	5th	1st

PAIRWISE RANKING EXAMPLE

A program team was asked to recommend a site for testing a unique portion of a system. A feasibility study produced a list of six possible locations. The team then used pairwise ranking to determine that Nellis AFB was best suited for this particular test.

1. Fort Huachuca
2. Edwards AFB
3. Kirkland AFB
4. Nellis AFB
5. Eglin AFB
6. Hanscom AFB

	1	2	3	4	5
2	2	2			
3	1	3	3		
4	4	4	4	4	
5	5	5	5	4	5
6	1	6	6	4	5

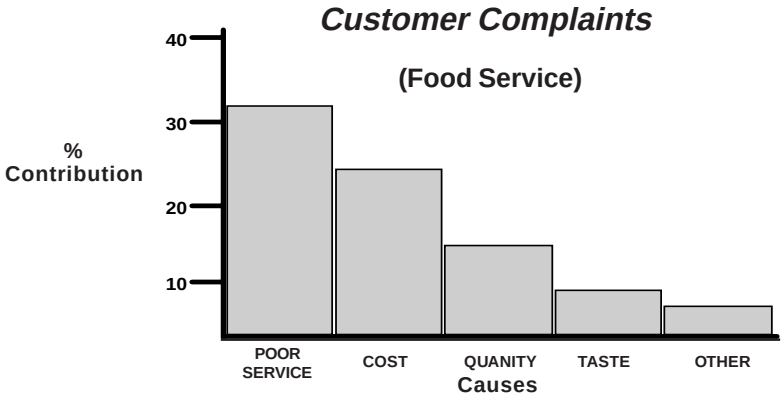
Site	1	2	3	4	5	6
Count	2	1	1	5	4	2
Rank	3rd	6th	5th	1st	2nd	4th

PARETO CHART

A bar chart which arranges contributing factors/causes to a problem in order with respect to their degree of contribution to the problem.

Used for analyzing problems, a <u>Pareto chart</u> can help:

- Select improvement opportunities;
- Identify root causes with greatest impact from a cause and effect diagram;
- Check results of improvement efforts by comparing Pareto charts before and after action is taken.



BENCHMARKING

Benchmarking is the process of measuring products, services, and practices against the toughest competitors or those known as leaders in their field. Benchmarking can help you:

- Understand how you compare with similar organizations.
- Identify areas for process improvement.

How to do it:

Identify the process to be benchmarked. Select a process (as opposed to a product) that is important to both your organization and your customers. Be sure the process in your organization is similar to, and measured in the same manner, as the one it's being compared to.

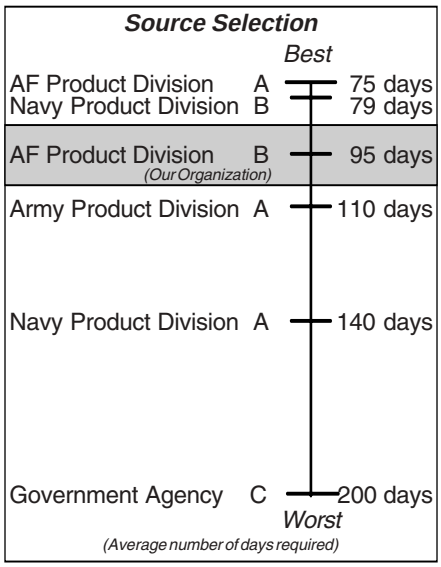
Study other organizations. Develop a list of organizations with comparable products and services. Determine what specific processes the organization performs. Based on this information, rank the organizations from best to worst.

Compare and evaluate. Compare your process to the best and worst cases, and list the important differences. These differences can suggest potential improvements to your process.

Benchmarking Example

Using inputs their customers provided, the executive leaders at AF Product Division B decided that their source selection process needed improvement. As part of the initial analysis, they wanted to see how their process compared with others. They determined that the average number of days required for source selection was an important process measure.

As a result of this analysis, representatives visited AF Product Division A and Navy Division B and studied their source selection procedures.

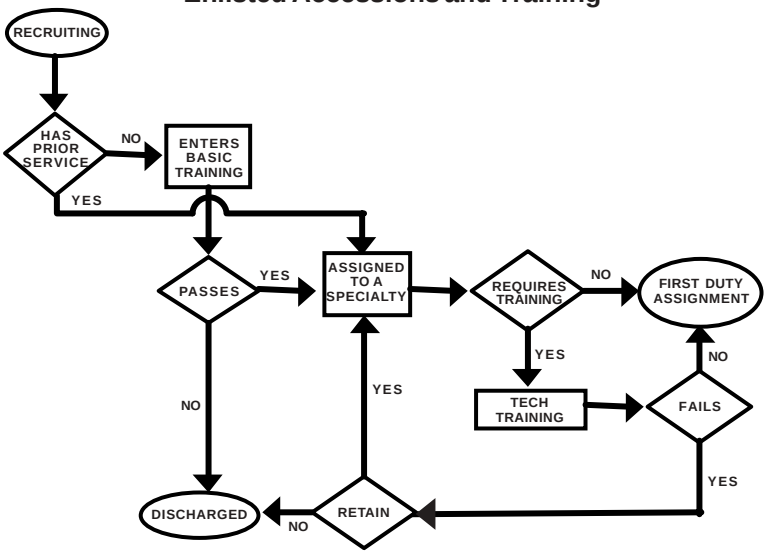


Note: Benchmarking is *not* replicating a process from an organization that excells. (Unless your goal is to be 2nd best.) It *is* studying the process, clearly understanding the theory behind the process and then restudying your own process to determine improvements.

FLOWCHARTING

A flowchart is a graphic representation of the steps of a process. Flowcharts help us understand the process by mapping out the steps in as much or as little detail as needed.

Enlisted Accessions and Training

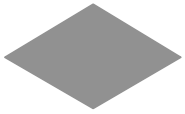
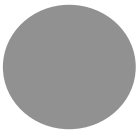
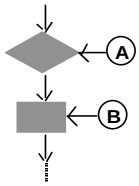


Used for analyzing a process, a <u>flowchart</u> can help:

- Understand the existing process;
- Locate improvement areas in a process;
- Document changes to a process;
- Show relationships between different steps in a process; and
- Identify critical stages of a process.

There are standard flowchart symbols. When you are developing a flowchart, especially in a group environment, the goal is to chart the process. Don't waste time debating which shape a symbol should be. A flowchart that doesn't use the standard symbols can be just as useful as a chart that does use them.

STANDARD FLOWCHART SYMBOLS

This Symbol...	Represents...	Some Examples:
	Start/Stop	Recieve Trouble Report Machine operable
	Decision Point	Approve/Disapprove Accept/Reject Yes/No Pass/Fail
	Activity	Drop off travel voucher Open access panel
	Document	Fill out trouble report
	Connector (to another page or part of the diagram)	

DEPLOYMENT FLOWCHARTS

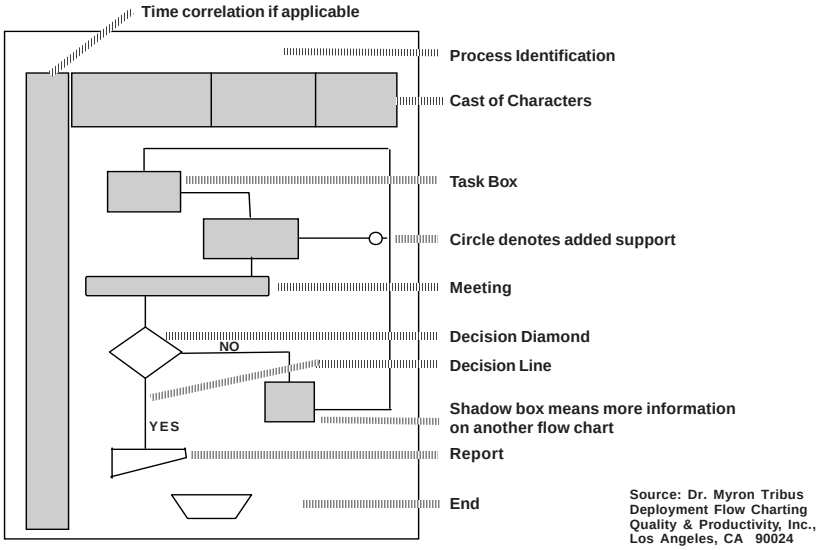
A deployment flowchart shows the process flow and the work groups involved in each step. It provides a graphic representation of a given process or system work groups, or individuals responsible for each activity.

A deployment flowchart is used anytime individuals or groups need to analyze a process in order to improve a system.

Deployment flowcharts are used for various functions such as training agenda, daily schedule, meeting analysis, emergency procedures, purchasing process, communication procedures, maintenance process, etc.

Deployment Flowcharts:

- Identify involvement in a process, as it relates to the whole process.
- Define work processes, and identify existing loops through people or departments.
- Visualize a process or system.



Source: Dr. Myron Tribus
Deployment Flow Charting
Quality & Productivity, Inc.,
Los Angeles, CA 90024

Deployment Process

1. Select a process or system to analyze.
2. Identify the cast of characters (people involved in the process).
3. Document the existing process using the flowchart symbols.
4. Discuss changes to be made in the process with all those involved with the process.
5. Update the deployment flowchart with the proposed changes and implement the new process
6. Study the effectiveness of the change and return to step #1 above.

NOMINAL GROUP TECHNIQUE (NGT)

Ranking of consensus

Why?

Allows a team to come to consensus on relative importance of issues, problems, or solutions by combining individual importance rankings into a team's final ranking.

What?

- Builds commitment to the team's choice through equal participation in the process
- Allows every team member to rank issues without being pressured by others
- Puts quiet team members on an equal footing with more dominant members
- Makes a team's consensus (or lack of it) visible; the major causes of disagreement can be discussed.

How to do it:

1. Generate the list of issues, problems, or solutions to be prioritized

In a new team with members who are not accustomed to team participation, it may feel safer to do written, silent brainstorming, especially when dealing with sensitive topics.

2. Write statements on a flipchart or whiteboard

3. Eliminate duplicate and/or clarify meanings of any of the statements

As a leader, *always* ask for the team's permission and guidance when changing statements.

4. Record the final list of statements on a flipchart or whiteboard

Example: Why does faculty have inconsistent output?

A Lack of training
B No documented process
C Unclear quality standards
D Lack of cooperation with other departments in developing standards
E High turnover

Use letters rather than numbers to identify each statement so that team members do not get confused by the ranking process that follows.

5. Each team member records the corresponding letters on a piece of paper and rank orders the statements

Example: Larry's sheet of paper looks like this:

A	4
B	5
C	3
D	1
E	2

This example uses "5" as the most important ranking and "1" as the least important. Since individual rankings will be later combined, this "reverse order" minimizes the effect of team members leaving some statements blank. Therefore, a blank (value = 0) would not, in effect, increase its importance.

6. Combine the rankings of all team members

	John	Paul	George	Ringo	Mary		Total
A	4	5	2	2	1	=	14
B	5	4	5	3	5	=	22
C	3	1	3	4	4	=	15
D	1	2	1	5	2	=	11
E	2	3	4	1	3	=	13

"No documented process," B, would be the highest priority. The team would work on this first and then move through the rest of the list as needed.

Variation:

Weighted Multivoting

Each team member *rates, not ranks*, the relative importance of choices by distributing a value, e.g., 100 points, across the options. Each team member can distribute this value among as many or as few choices as desired.

Example:

	John	Paul	George	Ringo	Mary		Total
A	20		10			=	30
B	40	80	50	100	45	=	315
C	30	5	10		25	=	70
D		5	10		20	=	35
E	10	10	20		10	=	50

With large numbers of choices, or when the voting for the top choices is very close, this process can be repeated for an agreed upon number of items. Stop when the choice is clear.

CREATIVE PROBLEM SOLVING

PROCESS STEPS

1. List perceived problems
2. Gather relevant data
3. Define actual problem
4. Determine alternative solutions
5. Analyze and evaluate alternatives
6. Select solution
7. Validate solution

*DIVERGENT THINKING**

1. Accept all ideas and alternatives
2. Defer judgment or evaluation
3. Discuss, combine, hitchhike, improve ideas
4. When exhausted, move to converge

*CONVERGENT THINKING**

1. Establish categories of alternatives
2. Develop evaluation criteria
3. Avoid premature closure
4. Keep eye on objective
5. List strengths and weaknesses
6. Select best alternative or idea

*Used sequentially during all problem-solving steps

KNOT CHART

The Knot Chart is useful for:

- Initially sorting the wheat from the chaff
- Organizing/coordinating the next steps of the problem solving process

Know	**N**eed to know	**O**pinion	**T**hink we know

As you work your way thru the problem, everything should move into the left column – Know.

QUALITATIVE PROBLEM SOLVING
(Kepner - Tregoe)1/

Deviation Statement: (Describe the actual performance vs. should performance)

	Is	Is Not	What is distinctive about "Is" *vs.* "Is Not"?	Does the distinction suggest a change?
Specifying Question What? (Identify) Where? (Location) When? (Timing) Extent? (Magnitude)				
Possible Causes:				
Most Likely Cause:				

1. Define deviation.
2. Describe what deviation IS and IS NOT.
3. List distinctions between what deviation IS and IS NOT.
4. Do distinctions indicate or suggest a change?
5. Determine possible causes based on distinctions and changes.

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GANTT CHART

A Gantt Chart is used for planning schedules and managing projects. It is a method for basic planning and work instruction.

How to do it:

1. The Gantt Process begins by listing the activities of a project in order of execution.

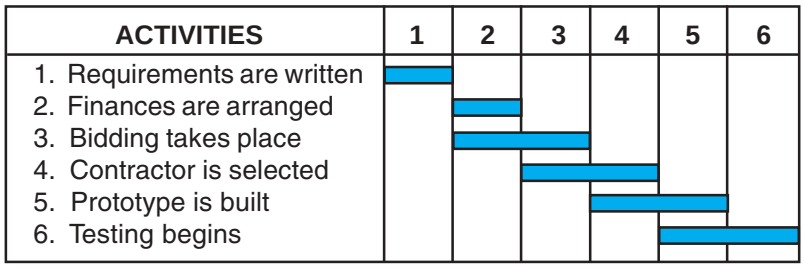
ACTIVITIES
1. Requirements are written
2. Finances are arranged
3. Bidding takes place
4. Contractor is selected
5. Prototype is built
6. Testing begins

2. Place the number of each activity across the top of your chart. Time duration such as days, weeks, years, etc., can replace activity numbers if appropriate.

3. Draw vertical lines across the chart for each item.

4. Starting with number 1 begin comparing the activities. Can number 1 be done at the same time as number 5 or 6?

5. Draw horizontal lines to indicate which activities can be done simultaneously.



6. You now have an overview of your project giving you a starting point, and time saving measures to help you complete the project on time.

Notes