Cost Management

INT-09 Target Cost Management Implementation

for Cost Estimators and Analysts

Acknowledgments

- ICEAA is indebted to TASC, Inc., for the development and maintenance of the Cost Estimating Body of Knowledge (CEBoK®)
  - ICEAA is also indebted to Technomics, Inc., for the independent review and maintenance of CEBoK®
- ICEAA is also indebted to the following individuals who have made significant contributions to the development, review, and maintenance of CostPROF and CEBoK®
- Module 16 Cost Management
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CEBoK Unit Index

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Unit II – Cost Analysis Techniques

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Unit IV – Specialized Costing

Unit V – Management Applications

13. Economic Analysis
14. Contract Pricing
15. Earned Value Management (EVM)
16. ***Cost Management***

Cost Management Outline

- Introduction to Cost Management INT-1
- Total Ownership Cost (TOC)
- Cost As an Independent Variable (CAIV) INT-1
- Should Cost INT-1
- Target Costing
- Activity-Based Costing (ABC)
- Resources

Industry Cost Management

- Key Ideas
  - Cost Management Team
  - Cost Estimator/Analyst Role
  - Cultural Change Implementation
  - Optimism/Pessimism Bias
  - Cost & Value of Information
  - System & Tool Integration

- Practical Applications
  - Product and Process Design Decisions
  - Design Trade-offs
  - Cost Reduction Initiatives
  - Business Case Analyses (EA)
  - Continuous Improvement Events

- Analytical Constructs
  - Target Cost Management
  - Benchmarking, QFD and VOC
  - LCC, DTC and DFMA
  - Value Analyses and CAIV
  - Structured Decision Analysis
  - Risk Assessments
  - Activity Based Costing

- Topics for Further Study
  - Recurring themes & initiatives
  - Application of industry initiatives
  - Value Engineering Change Proposals
  - Implementing Cultural Change

Government Perspective

Life Cycle Support

- Performance-Based Logistics (PBL)
- Total Life Cycle Systems Management
- Defense Industrial Base

Acquisition

- Earned Value Management
- CAIV
- Simulation-Based Acquisition (SBA)

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COST MANAGMENT

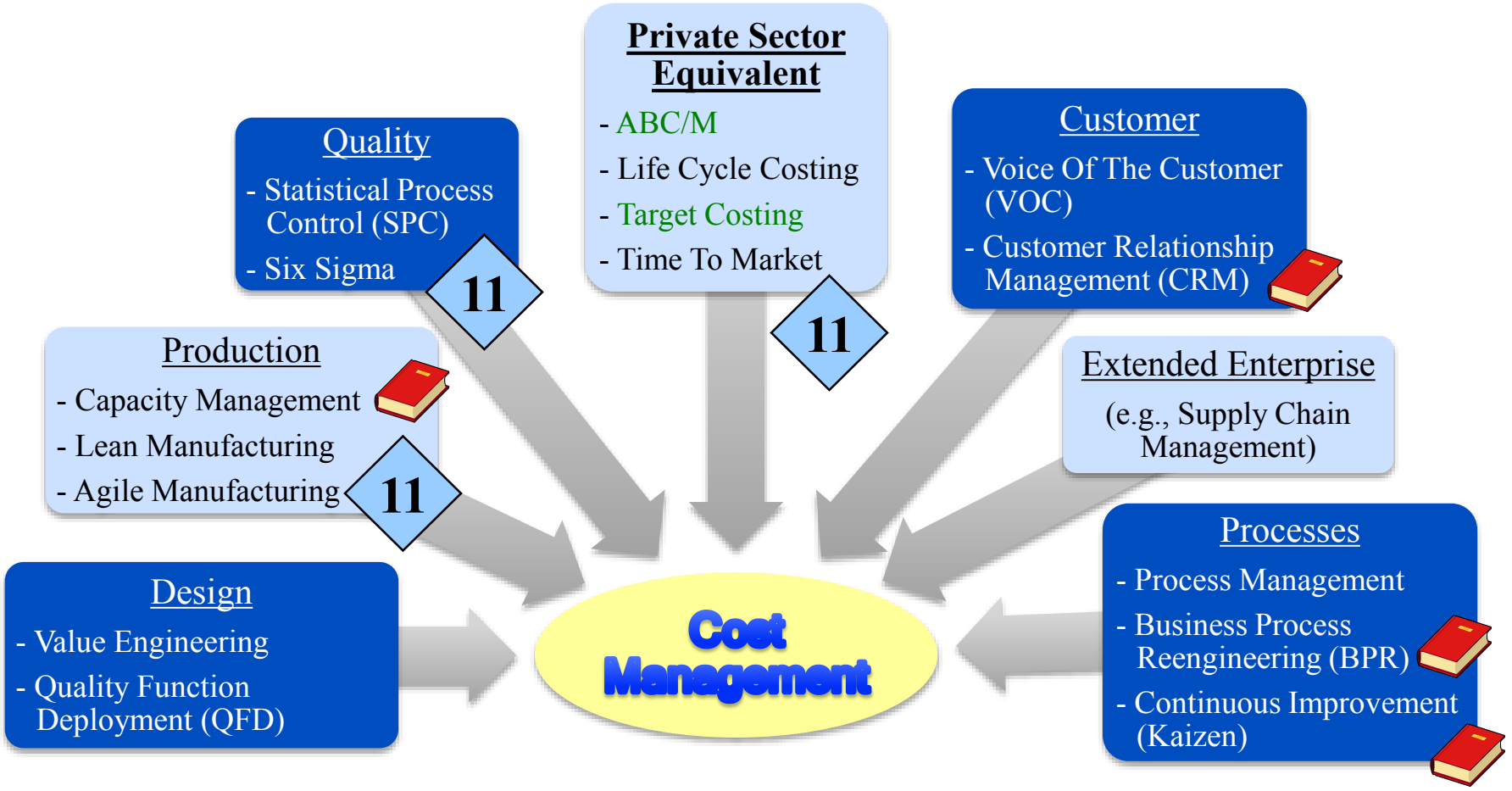
System Design

- Open Systems Architecture (OSA)
- Commercial Off-The-Shelf (COTS) Technology
- Affordability Through Commonality (ATC)
- Reform of Specifications and Standards
- Concurrent Engineering and Supportability Analysis (CESA)
- Integrated Product and Process Development (IPPD)

Business Processes

- Activity-Based Costing and Management (ABC/M)
- Performance and contract incentives
- Outsourcing or Right-sourcing (A-76 studies)

Industry Perspective



Total Ownership Cost

- TOC versus LCC Terminology
- Relevant Scope for TOC Analysis
- Best Practices for Reducing TOC

Total Ownership Cost

- DoD TOC: Sum of all resources necessary to organize, equip, sustain and operate military forces, including:
  - Cost to research, develop, acquire, own, operate, and dispose of systems (LCC)
  - Cost of other equipment and real property
  - Cost to recruit, retain, separate and support personnel (Indirect Support)
  - All other costs of business operations (Enterprise-wide)

Tip: Sometimes called "Big TOC" to distinguish from "Little TOC" or Defense Systems TOC

"Definitions of TOC, LCC, and the Responsibilities of PMs," USD(A&T), 13 Nov 1998

TOC is a DoD term, there are similar concepts in industry

Life Cycle Cost

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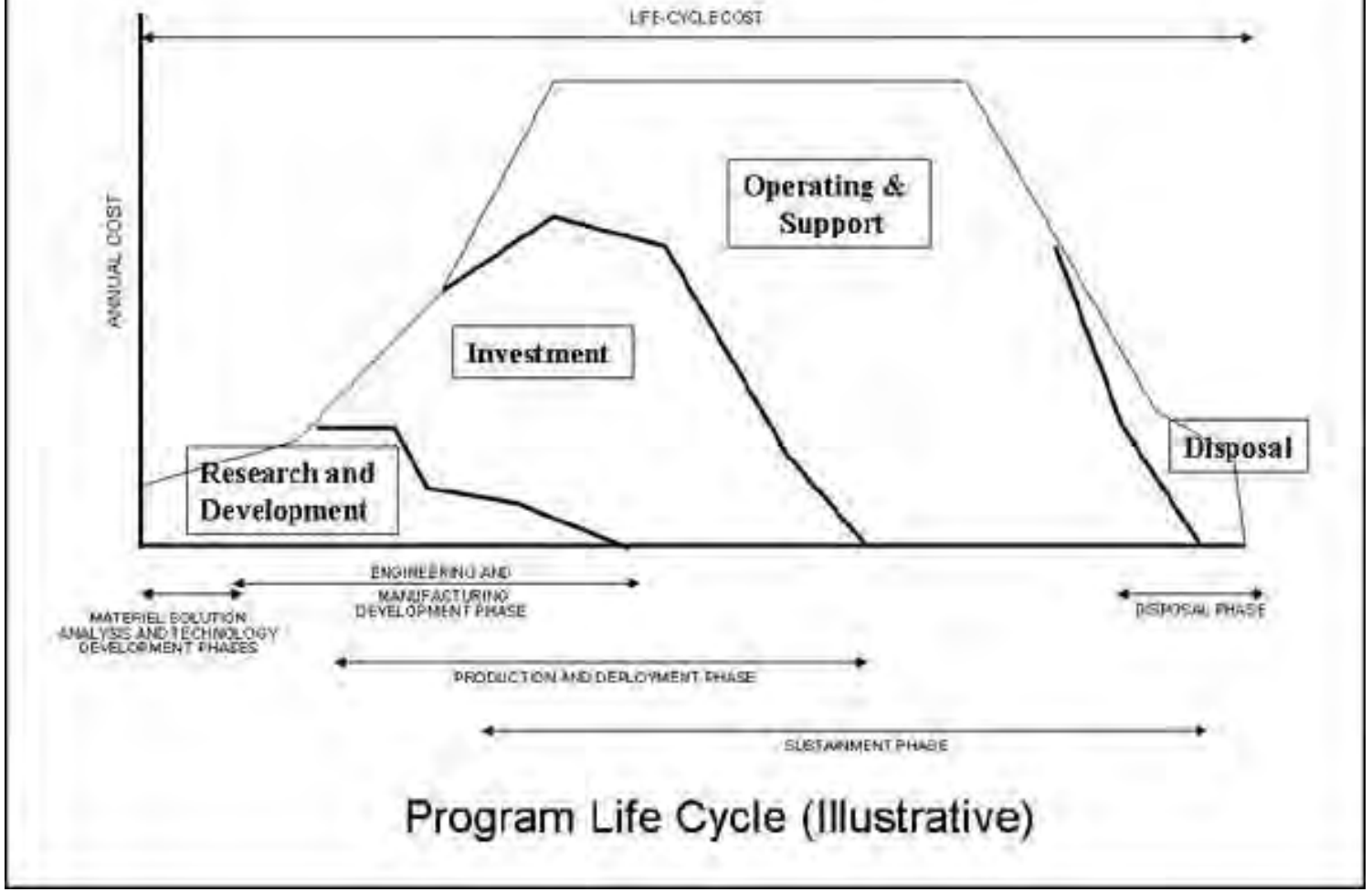
- Defense Systems TOC includes:
  - Acquisition program direct costs
  - Indirect costs attributable to the acquisition program or costs that would not occur if the program did not exist
- Equivalent to Life Cycle Cost (LCC) 
  - Includes research and development (R&D), production, operations and support (O&S), and disposal
    - Commercial definitions are similar
    - Life cycle is often confused with O&S but actually includes all of the above
  - Includes all costs regardless of the funding source

CAIG CSDR Manual
DoD 5000.4-M

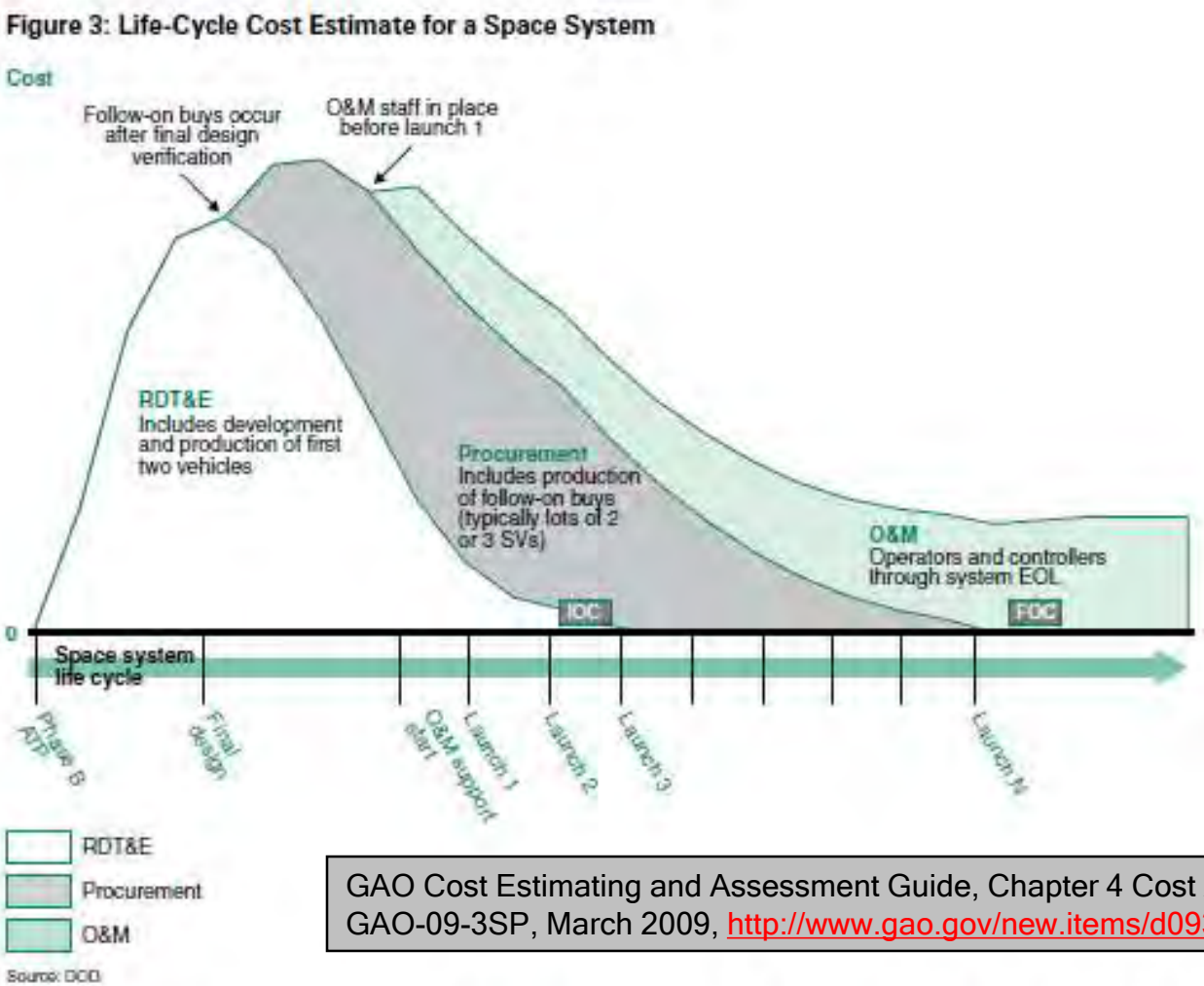
Life Cycle Cost Phases

Defense Acquisition Guidebook (DAG), Section 3.1 Life-Cycle Costs / Total Ownership Costs, Defense Acquisition University (DAU), https://acc.dau.mil/CommunityBrowser.aspx?id=488331.



Program Life Cycle (Illustrative)

Life Cycle Cost Variation



GAO Cost Estimating and Assessment Guide, Chapter 4 Cost Analysis Overview, GAO-09-3SP, March 2009, http://www.gao.gov/new.items/d093sp.pdf.

Relevant Costs

- Include all costs relevant to the decision and comparable to alternatives such as:
  - Fully Burdened Cost of Fuel
  - Indirect Support Costs for Mission Personnel
  - Linked Indirect Costs "attributable to the acquisition program" including:
    - *The infrastructure that plans, manages, and executes a program over its full life*
    - *Common support items and systems*
- Exclude sunk costs

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TOC Cost Definitions

- Detail Design
- Basic Construction
  - Hardware
  - Combat System Installation
  - Engineering Integration
  - Production support
- Change Orders
- Combat System
  - Prime Mission Equipment
  - Government Support
- Other
  - Initial Testing
  - Commissioning
  - Shock Tests
- Initial Outfitting and Post Delivery
- Initial Spares (COSALS)

Sailaway (Initial Procurement) Cost

Plus:

RDT&E
- Feasibility Studies / Contract Design
- Combat System Development
- Sustaining Engineering / Upgrade support

Program Acquisition Cost

Plus:

- Operations and support:
  - Mission Personnel
  - Unit Level Consumption
  - Intermediate Maintenance
  - Ship Overhaul
  - Equipment Rework
  - Naval Aviation Depot Maintenance
  - Contractor Depot Maintenance
  - Fleet Modernization
  - Centrally Provided Material
  - Sustaining Engineering Support
  - Software Maintenance Support
- Disposal

Program Life Cycle Cost
(DAB, CAIG, DAES, SAR)

Plus:

- Indirect manpower
  - Recruiting
  - Acquisition training (cost of training personnel)
  - Medical support

Program Life Cycle Cost + Indirect Manpower

Plus:

- Common support systems cost
- Infrastructure cost for planning, managing, operating, and execution

Total Ownership Cost
(Direct Costs + Indirect Costs Linked to Weapon System)

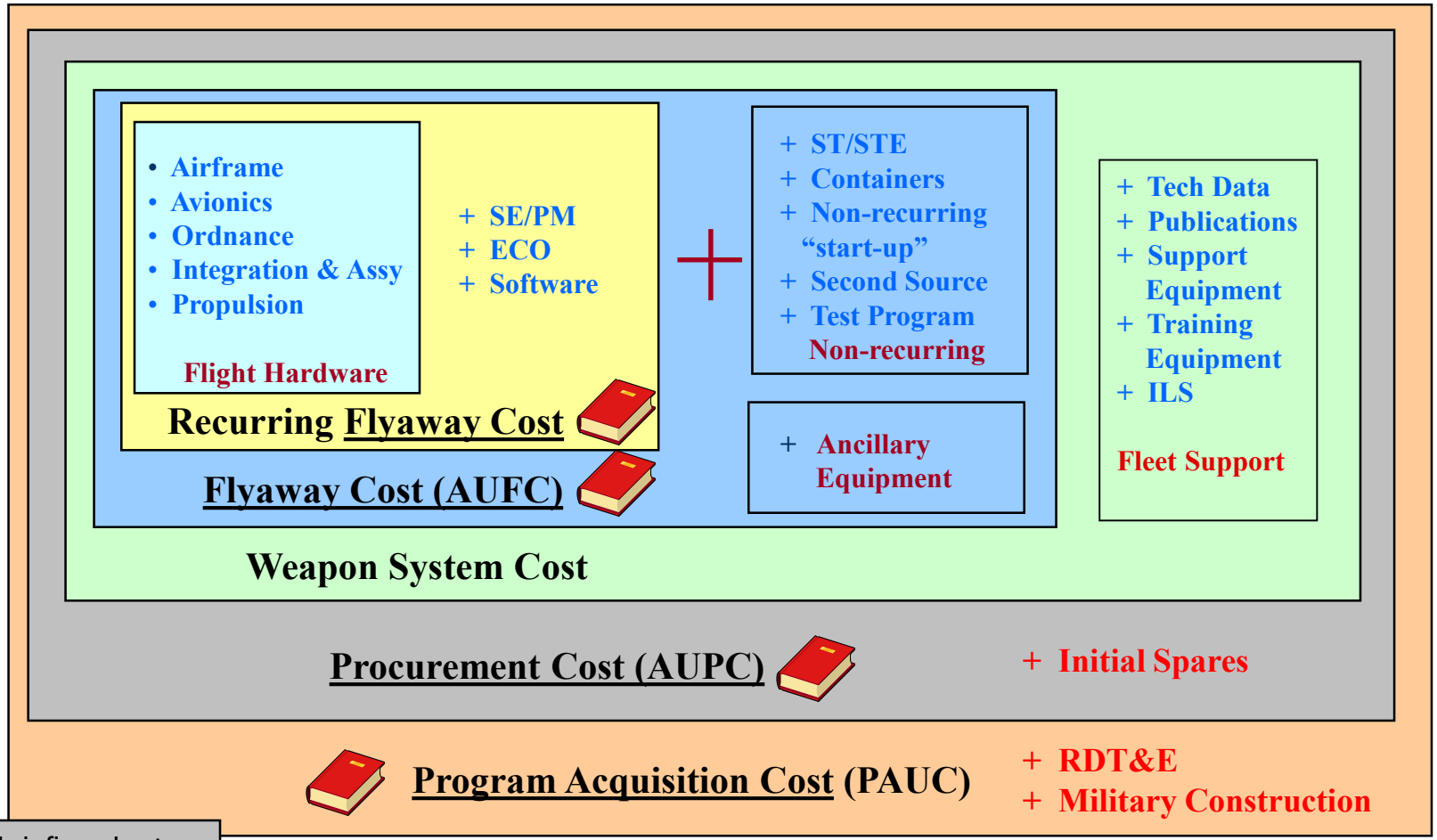
Items:

- Not directly linked to weapon systems
  - Family housing
  - Ceremonial units (e.g. Navy Band)
  - OPNAV staff
  - Shore based training facilities (NPGS, USNA)
  - Hospitals

Non-Associated Costs
(Indirect Costs Not Linked to Weapon System)

Source: DD 21 Metrics briefing, PMS 500 / NAVSEA 017, 09/23/98

Aircraft Life Cycle Costs



Reducing TOC

- Process framework for reducing total ownership costs
  - Establish technical baseline and cost estimate
  - Conduct a cost driver analysis
  - Set cost reduction targets
  - Identify, assess, and fund cost reduction initiatives that seek to change *what* is acquired or *how* the system is acquired and operated
  - Temper optimism bias with lessons learned
  - Track progress using metrics
  - Validate cost savings

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Industry supports R-TOC with Life Cycle Cost analyses and a similar framework

R-TOC Best Practices

- TOC Management Practices
  - Cost Culture, Innovation Teams, Sharing Successes
- TOC Analysis Tools
- Acquisition Practices
  - COTS, Multiyear, CRI, Commercial Practices, EOQ
- Supplier Response Times
- Reliability Improvements
  - Upgrade and Obsolescence Opportunities, VECPs, Reliability Centered Maintenance, Condition Based Maintenance
- Competitive Product Support
  - Performance Based Logistics, Government/Industry Partnerships
- Training Technology Alternatives

CBA Opportunities

Target Costing

- Definition and History
- Principles and Tools
- Benefits

Consortium for Advanced Manufacturing – International
CAM-I

Target Costing Defined

- A system of profit planning and cost management that
  - Reduces costs while increasing customer value
  - Orients products to customer affordability or market-driven pricing
  - Treats product cost as an independent variable
  - Works to achieve target cost during product and process development

Target Costing Overview

- History
  - WWII Value Engineering Roots
  - Japan 1960s Profit Planning and Cost Management
  - Changing business environment
  - Maturation and Global Reach

Target Costing: The Next Frontier in Strategic Cost Management, Shahid Ansari, Jan Bell, et al., CAM-I, 1995

- Tools
  - QFD/VOC
  - Life Cycle Costing
  - DTC and DFMA
  - Value Engineering
  - Decision Analysis
  - Continuous Improvement

- Principles
  1. Price led costing
  2. Customer focused
  3. Design centered
  4. Cross functional
  5. Life-cycle oriented
  6. Value-chain based

- Benefits
  - Product Profitability & Lower Market Entry Cost
  - Market Expectations, Valued Product Features & Mix
  - Design Stability & Time to Market

Target Costing Best Practices Study, CAM-I, Feburary, 1999

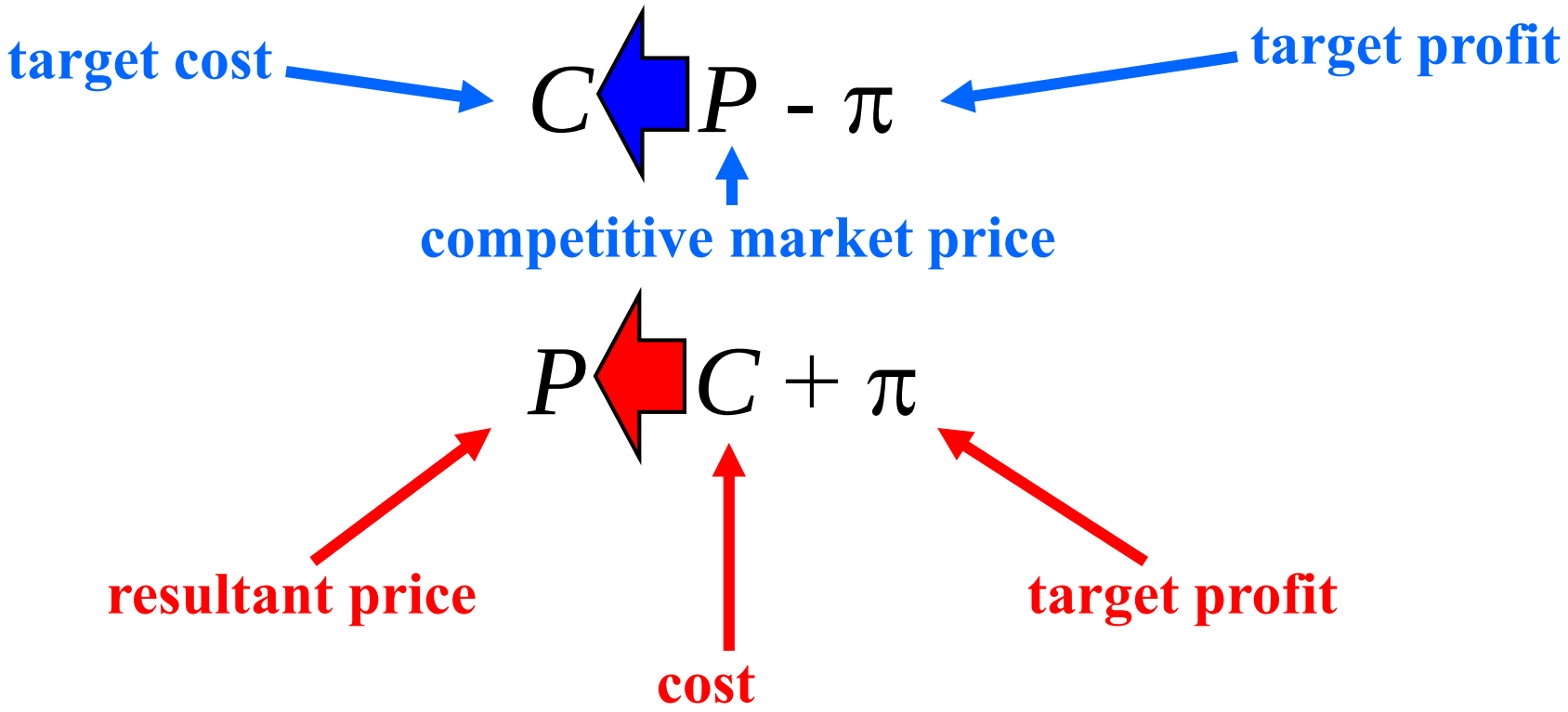
1. Price Led Costing

- Cost targets are set by subtracting the required profit margin from the competitive market price
  - Market prices define product and profit plans
  - The process is driven by active competitive intelligence and analysis

$$C = P - \pi$$

"Cost Plus" vs. "Price Minus"

- Algebra does not imply finance
- Two fundamentally different paradigms



2. Focus on Customers

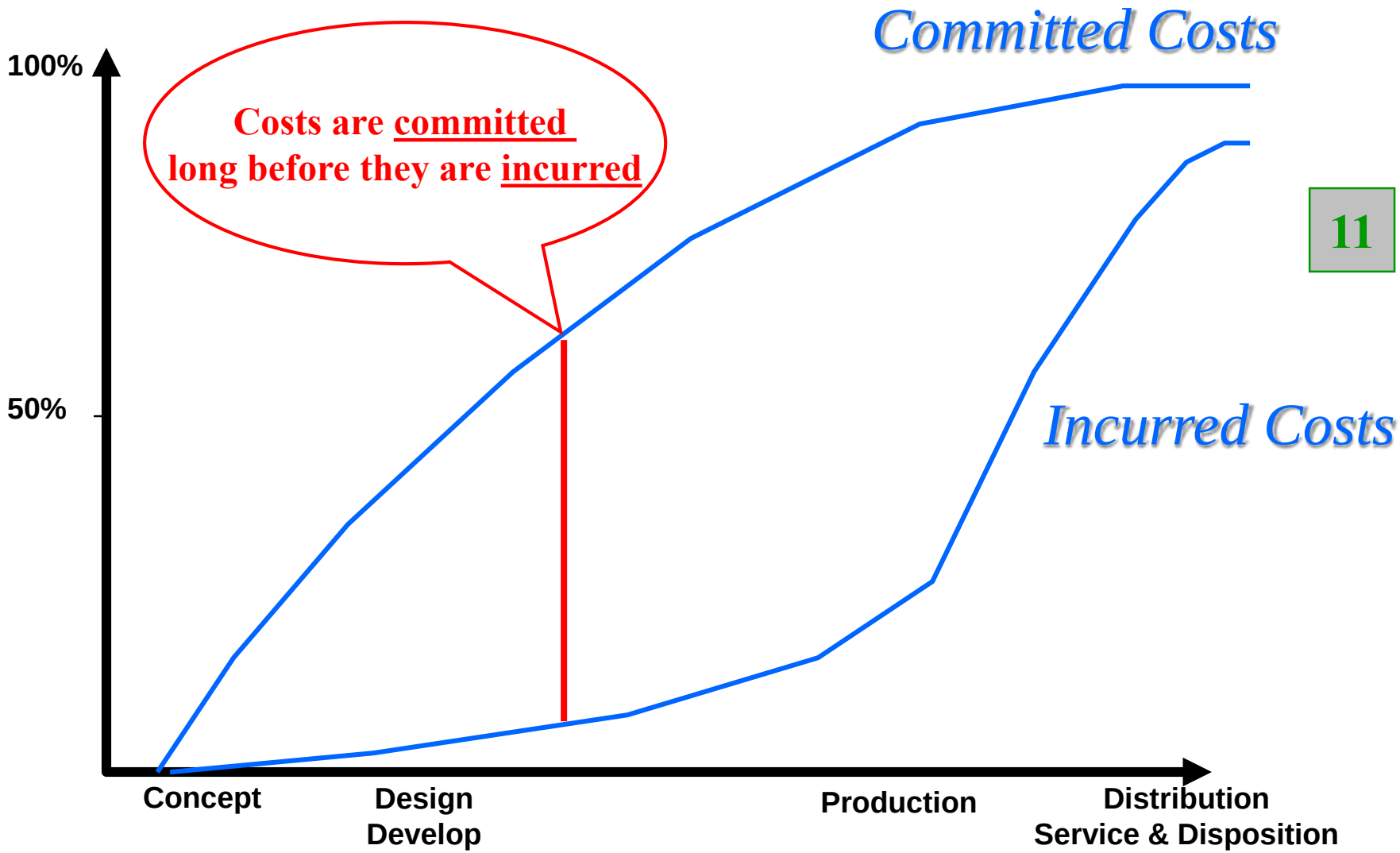
- Voice of the Customer is a structured approach to determining customer requirements
  - Conducted continuously throughout the process
- Quality Function Deployment is a structured approach to transform prioritized requirements into product design characteristics and cost targets
  - Customer requirements for quality, cost, and timeliness are simultaneously incorporated in product and process decisions and guide cost analysis efforts
- Product feature and function enhancements are adopted into the design only if:
  - They meet customer expectations
  - Customers are willing to pay for them
  - The additions enhance market share or sales volume

3. Focus on Design

- Product and process design is key to cost management
  - Manage costs *before* they are incurred
  - Challenge engineers to look at cost impact of designs
    - *"state-of the-market"* technology vs.
    - *"state-of-the-art"* technology
  - All functional representatives should examine designs before production
  - Simultaneous engineering of products and processes
  - Process Management is a relevant tool

…in short, the IPPD approach!

Cost Profiles for Manufacturers



4. Cross-Functional Involvement

- Integrated Product Teams (IPTs)
- Interdisciplinary:
  - Design and manufacturing engineering
  - Production
  - Sales and marketing
  - Materials procurement
  - Cost accounting
  - Service
  - Support
- Include "outside" participants:
  - Suppliers
  - Customers
  - Dealers
  - Distributors
  - Service providers
  - Recyclers
- Supporting infrastructure

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Warning: The most common failing of IPTs is unbalanced representation

5. Life-Cycle Orientation

- Goal is to minimize the life cycle costs for
  - The customer –
    - Buying, operating, using, repairing, disposing
  - The producer –
    - Development, production, marketing, distribution, support, service, disposition

Life Cycle Costing tools follow the RTOC framework

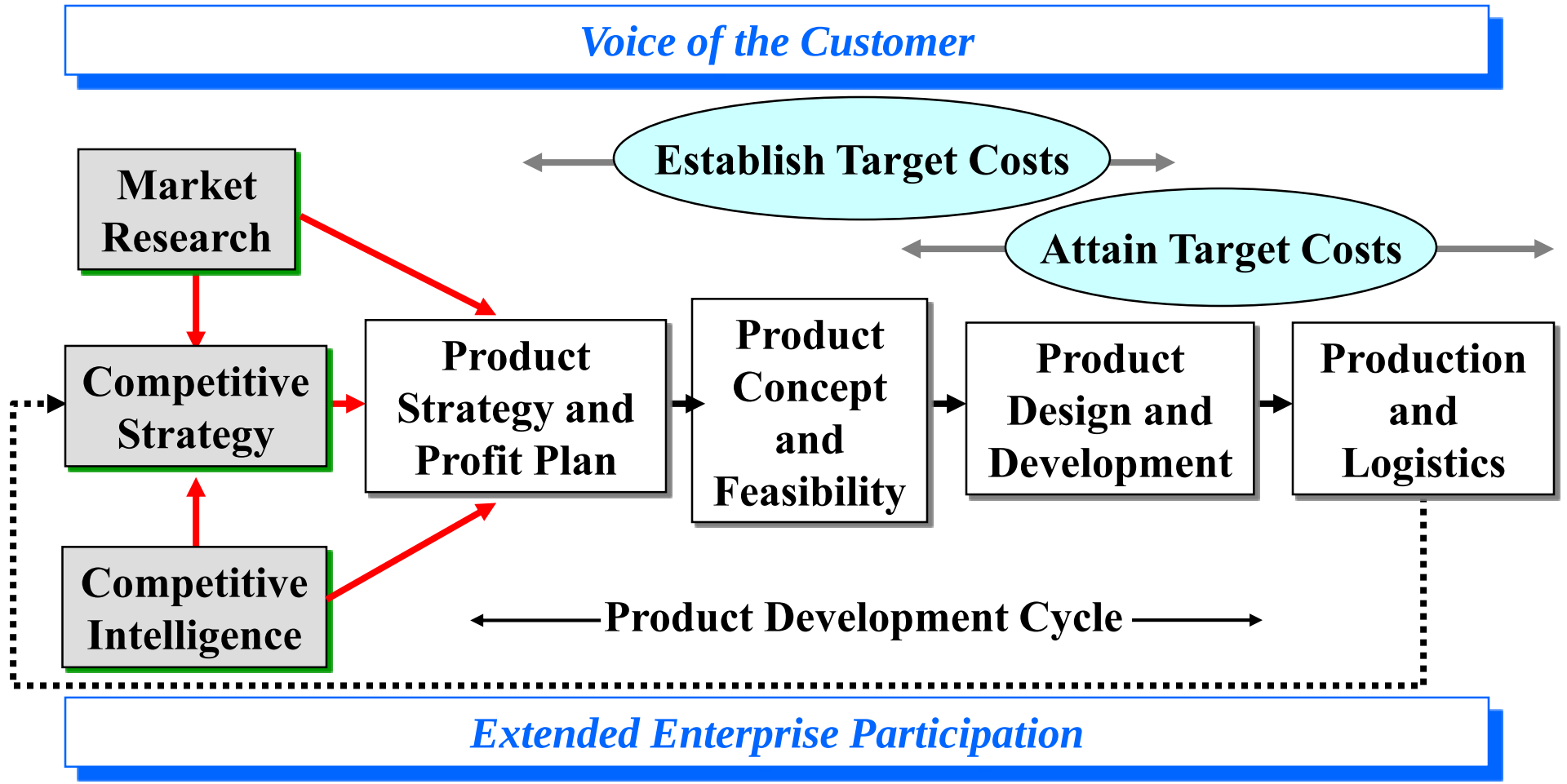
5. Value Chain Involvement

- Diffuse cost reduction efforts throughout the "value chain" [i.e., the full multi-tiered set of suppliers] by developing a collaborative relationship with all members of the "extended enterprise"
- Involve suppliers in design
- Long-term and mutually beneficial relationships

- Characterize the value chain:
  - Nature and number of suppliers
  - Distance from the producer
- Expected Contributions
  - Better focus on customer requirements
  - Provide input and ideas early in the concept formation stage
  - Eliminate non-value-added activities
  - Pursue standardization

TC in the Product Development Process

The Core CAM-I Model



Target Costing Training Seminar, Margaret Weber, CAM-I, December, 1997.

Target Costing Tools

- Design to Cost (DTC)
  - Establishes realistic but difficult cost objectives early
  - Influences design decisions to converge target cost

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- Design for Manufacturability and Assembly (DFMA)
  - Optimizes materials and process selections versus functionality
  - Balances part unitization versus assembly

- Value Engineering (VE)
  - Reviews all product functions to identify lower cost design alternatives that maintain or improve customer value in terms of performance, reliability, or usability

Target Costing Tools

- Decision Analysis
  - Structured approach fares better than unstructured approaches
  - Involves the selection and weighting of criteria and scoring alternatives
  - Criteria may include customer performance design requirements, technology readiness level assessments and risk
- Process Management
  - Business Process Re-engineering, Value Stream Mapping and Kaizen
  - Drives process design to converge on target costs
  - Employs LSS tools, value analyses, business case analyses and metrics
  - Benchmarking investigates and identifies industry “best practices” viewed as standards for comparison and improvement opportunities
- Total Quality Management
  - Focuses the entire organization on achieving better quality

Benefits of Target Costing

As Reported in Best Practices Survey

- Increased overall profitability
- Reduced manufacturing and purchased material cost of new products before manufacturing even begins
- Meet/exceed customer expectations
- Produce features/functions customers value
- Develop more profitable product mix
- Fewer design changes after production begins
- Reduce time to market for new products

Target Costing Best Practices Study, CAM-I, Feburary, 1999

Activity Based Costing

- Activity Based Costing and Management (ACB/M)
- The ABC Model
- ABC Example
- Estimating with ABC
- Benefits of ABC

ABC Overview

- Keys
  - Insight into Cost Allocations
  - Not appropriate for all situations
  - Complete accounting system and/or Managerial analyses
  - Weigh the cost and value

- Applications
  - Product costing
  - Overhead cost reduction
  - Process improvement
  - Government and Industry

- Mechanics
  - Assign resources to activities
  - Assign activities to outputs

- Supports
  - Strategic Decision-Making
  - Operational Decision-Making
  - Planning and Budgeting

ABC and ABM

- Activity-Based Costing (ABC)
  - Method of costing in which activities are the primary cost objects
  - Measures cost and performance of activities and assigns the costs of those activities to other cost objects

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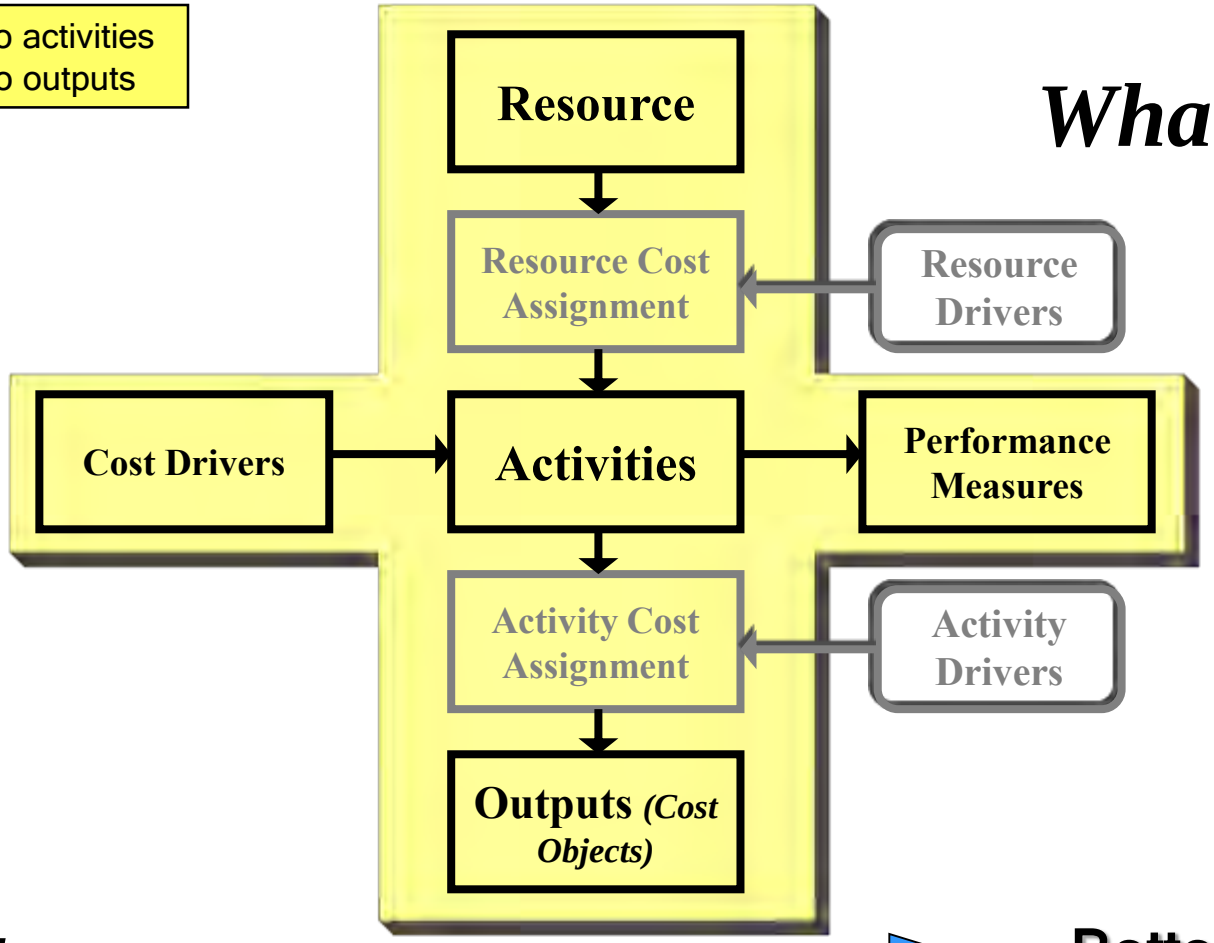
- Activity-Based Management (ABM)
  - Use of activity cost data to manage activities.
  - Purpose
    - To analyze customer value of activities
    - How activities can be performed to maximize customer value
    - Earning more profit by providing more value
  - ABC/ABM work in concert to eliminate non-value-added (NVA) activities

Assign resources to activities
Assign activities to outputs

The CAM-I Cross

Assign resources to activities
Assign activities to outputs



What

Activity Based Costing

Why

Activity Based Management

Better decision making

ABC Example

Traditional View

Personnel	$45,000,000
Software Licenses	2,000,000
Workstations	7,500,000
TDY	250,000
Transportation	95,000
Rent/ Leases	250,000
Utilities	750,000
Network Comms	375,000
Maintenance	1,450,000
Supplies	40,000
Misc. Equipment	50,000
	$57,760,000

Activity View

Conduct Operations	$36,640,000
Acquire Equipment	12,250,000
Support Operations	4,500,000
Develop Budget	350,000
Train Personnel	575,000
Maintain Records	70,000
Operate Comm Center	850,000
Install/Maint Computers	975,000
Help Desk/Tech Support	1,550,000
	$57,760,000

Assign resources to activities
Assign activities to outputs

Benefits of ABC

6

- Supports Strategic Decision-Making
  - Gives economic map of the enterprise
  - Compare process costs to strategic direction
  - Assess impact due to changes in product / service offerings
  - Compare costs of goods and services to prices (competitive benchmarking)
- Supports Operational Decision-Making
  - Identify process improvement opportunities
  - Measure organizational impact of process change
  - Understand resource contribution to processes
  - Leverage process best practices (internal and external benchmarking)
- Improved Planning and Budgeting
  - Correlate budget changes to resources – selective vs broad-brush changes
  - Assist in forecasting required resources for program requirements
  - More effectively report to stakeholders / customers

ABC/M for Cost Estimating

- ABC provides an alternative to traditional estimating methodology
  - Not appropriate for all situations
    - Generally not acceptable for many DoD contractors
    - Useful for internal resource planning and process improvement decisions
  - Provides insight not otherwise apparent when cost allocations obscure visibility
    - Assign resources to activities
    - Assign activities to outputs

Industry Cost Management

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Resources – Government

- TOC
  - "Total Ownership Cost (TOC) Pilot Programs," USD(A&T), 13 April 1998
  - "Definitions of Total Ownership Cost (TOC), Life Cycle Cost (LCC), and the Responsibilities of PMs," USD(A&T), 13 November 1998
  - "Implementation of Total Ownership Cost (TOC) Baselines in the Department of the Navy," ASN(RD&A), 5 May 1998
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  - "Implementing Cost As an Independent Variable," SAF/AQ, 12 March 1997
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  - Circular A-131 "Value Engineering," Office of Management and Budget (OMB), 1993, http://www.whitehouse.gov/omb/circulars/a131/a131.html

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- *Value Quest: Driving profit and performance by integrating Strategic Management Processes*, C.J. McNair et al., CAM-I, 2000
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- *Target Costing Best Practices Study*, CAM-I, Feburary, 1999
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- *An ABC Manager's Primer*, Gary Cokins, Alan Stratton, Jack Helbling, CAM-I, 1995
- *Hitting the Target*, Shahid Ansari, Jan Bell, Dan Swenson, CAM-I, 2006

Resources – Web

- Acquisition Community Connection (ACC), https://acc.dau.mil
- Consortium for Advanced Management – International (CAM-I), http://www.cam-i.org
- Society of American Value Engineers (SAVE), http://www.value-eng.org