Introduction to Cost Analysis
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Approximate Length: 30 minutes


In this lesson you will be presented with the following topics:

- Financial Management Terms
- Life-Cycle Cost
- Program Cost Terms
- Affordability
- Cost as an Independent Variable
Learning Objectives

Upon successful completion of this lesson you should be able to:

- Define the following financial management terms: Concurrent Budget Resolution, Authorization, Appropriation, Budget Authority, Commitment, Obligation, Expenditure and Outlay.

- Define the following cost terms as they apply to defense acquisition programs: Development Cost, Procurement Cost, Program Acquisition Cost, Life-Cycle Cost, and Total Ownership Cost.

- Describe the following ways to present acquisition program life-cycle cost and the stakeholders most interested in each approach: Appropriations, Work Breakdown Structure (WBS), and Cost Categories.

- Describe the basic concepts of affordability and the philosophy of Cost as an Independent Variable (CAIV).
Financial Management Terms

DoD acquisition personnel use a variety of common financial management terms. It is important that you have an understanding of these terms.

Appropriation
Authorization
Budget
Budget Authority
Commitment
Obligation
Expenditure
Outlay

Select each financial management term to learn more
Financial Management Terms, Cont.

A good analogy to the budget authority granted by Congress (i.e., permission derived from an appropriation to act to obligate the federal government to a future outlay of cash from the U.S. Treasury) is your own personal credit card limit. Before you purchase an item with your credit card, the vendor verifies that you have sufficient credit available to be set aside for the purchase. This is analogous to the comptroller's certification of funds availability. When the vendor runs your card through the reader, that is the commitment (the firm administrative reservation of funds by the local comptroller or resource manager, triggered by a spending action request (for example, procurement request, purchase request, etc.) that anticipates a future obligation).

Funds are committed only after certification is made that the spending action request cites the proper appropriation, (i.e., color of money; the correct fiscal year; and availability of the requested amount of funds) of funds for a specific purpose previously authorized by Congress.
Financial Management Terms, Cont.

You incur a legal **obligation** (i.e., an action that legally binds the federal government to a future expenditure and outlay of cash from the U. S. Treasury) when an authorized Federal employee signs a document (such as a contract, travel order, or government credit card transaction) that obligates the government to that future outlay. This is the legal reservation of funds.

When you write a check to the credit card company to pay your credit card statement, this is analogous to the government making an **expenditure** (i.e., by issuing a government payment instrument such as an electronic funds transfer or check.) Expenditure are sometimes called disbursements.

Cash does not actually leave your account until your check is cashed by the credit card and actual cash is put into the company's bank account. Similarly, a government **outlay** occurs when actual cash is withdrawn from the U.S. Treasury and put into the recipient's bank account or the recipient's hands. Note that in an electronic funds transfer, the expenditure and outlay occur simultaneously.

*Note: The terms you are learning about here are used extensively in other lessons in this course.*
Knowledge Review

Which one of the following combination of term and definition is correct?

- Expenditure - Issuance of a government payment instrument (for example, electronic funds transfer or check).

- Appropriation - Act of Congress that permits certain federal programs or activities to exist.

- Budget - Act of Congress that provides Federal agencies with budget authority to be obligated during a specific time period.

- Commitment - Funding profile derived from resource requirements, time-phased according to program schedule and appropriate funding policies.

Check Answer
Life-Cycle Cost

Definition
Life-Cycle Cost (LCC) can be defined as the total cost to the government of an acquisition program over its full life including costs for:

- Research and development (R&D)
- Testing
- Production
- Program unique facilities

- Operations & maintenance (O&M)
- Personnel
- Environmental compliance
- Disposal

Preparation of Life-Cycle Cost Estimates (LCCE)
The Program Manager (PM) of an acquisition program is responsible for preparing a life-cycle cost estimate for the program; that estimate is known as the Program Office Estimate (POE). In addition, there will also be another life-cycle cost estimate prepared at a higher headquarters, which will be done at either the Component level and/or at the OSD level. Each LCCE will be evaluated on its own merits at different points in the acquisition process. There will be more discussions about this evaluation later in the course.

Perspective Groupings
Each of the program's major stakeholders (Congress, program office, and DoD decision-makers) prefers to view life-cycle costs grouped in a way that reflects its particular perspective.

There are three ways to group the LCC of a program:

1. Funding Appropriation Categories
2. Working Breakdown Structure (WBS)
3. Life-Cycle Cost Categories
### Appropriations Categories

<table>
<thead>
<tr>
<th>Categories</th>
<th>Purpose</th>
<th>Stakeholders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research, Development, Test and Evaluation (RDT&amp;E)</td>
<td>Procurement</td>
<td>Military Personnel (MILPERS)</td>
</tr>
<tr>
<td>Operations and Maintenance (O&amp;M)</td>
<td>Military Construction (MILCON)</td>
<td></td>
</tr>
</tbody>
</table>

One method of grouping program LCC is by appropriation categories. Most appropriations DoD receives from Congress fall into these five major categories:

- Research, Development, Test and Evaluation (RDT&E)
- Procurement
- Operations and Maintenance (O&M)
- Military Construction (MILCON)
- Military Personnel (MILPERS)
Work Breakdown Structure (WBS)

WBS is another way of grouping program LCC. At minimum, a WBS typically breaks down the following system products:

- Hardware
- Software
- Services
- Data
- Facilities

### Work Breakdown Structure

<table>
<thead>
<tr>
<th>1.10</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.10.1</td>
<td>Technical Publications</td>
</tr>
<tr>
<td>1.10.2</td>
<td>Engineering Data</td>
</tr>
<tr>
<td>1.10.3</td>
<td>Management Data</td>
</tr>
<tr>
<td>1.10.4</td>
<td>Support Data</td>
</tr>
<tr>
<td>1.10.5</td>
<td>Data Depository</td>
</tr>
</tbody>
</table>
Life-Cycle Cost Categories

<table>
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<th>Categories</th>
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</tr>
</thead>
</table>

Cost Analysis Guidance and Procedures, defines three cost categories:

- Research & Development (R&D)
- Investment
- Operating and Support (O&S)

In addition to these three categories, DoD decision-makers are interested in a fourth category of costs:

- Disposal
The Research and Development (R&D) category includes the costs of all research and development, from program initiation.
This image shows a notional distribution of cost by categories.

**Life Cycle Cost Categories**

Notional % of LCC

- **Program Cost %**
  - R&D Cost
  - Investment Cost
  - Operating & Support Cost
  - Disposal Cost

**Program Initiation**

**EMD**

**Production & Deployment; and Operations & Support**

D
Knowledge Review

The four life-cycle cost categories are Research, Development, Test & Evaluation (RDT&E); Procurement; Operation & Maintenance (O&M); and Military Construction.

- True
- False

Check Answer
Knowledge Review

Which of the following is NOT one of the three major methods of grouping and viewing program life-cycle costs?

- Life-cycle cost categories
- Appropriation categories
- WBS
- Operating and Support (O&S)

[Check Answer]
Acquisition Program Cost

LCC consists of major groups of program costs (as depicted by the ovals in the graphic) based on combination of appropriation types and major WBS elements; a WBS element can be funded by multiple appropriations.

Note: The appropriation types generally used to fund a group are shown in bold at the top of each oval, and the major WBS elements are shown under each appropriation type.
**Development cost** is the cost of all research and development-related activities (contract and in-house) necessary to design and test the **prime mission equipment** and all of its **support items** (for example, unique support equipment, training, etc.). Prototypes and test articles are included in this cost category.

Development costs are funded by **RDT&E** appropriations.

RDT&E funds may be used to build uniquely required facilities solutions, but resource experts must be involved to insure the right type of funds are used appropriately.
Total Ownership Cost (TOC)

Both DoD Directive 5000.01 (The Defense Acquisition System) and DoD Instruction 5000.02 (Operation of the Defense Acquisition System) make reference to life-cycle cost and total ownership cost. The terms are similar in concept but somewhat different in scope and intent. For a defense acquisition program, life-cycle cost consists of research and development costs, investment costs, operating and support costs, and disposal costs over the entire life cycle. These costs include not only the direct costs of the acquisition program but also indirect costs that would be logically attributed to the program. In this way, all costs that are logically attributed to the program are included, regardless of funding source or management control.
Total Ownership Cost (TOC), Cont.

The concept of **Total Ownership Cost (TOC)** is related but broader in scope than life-cycle cost. Total ownership cost includes the elements of life-cycle cost as well as the indirect costs of other infrastructure or business process costs not normally attributed to the program. For example, these indirect costs would include the infrastructure that plans, manages, and executes a program over its full life and common support items and systems associated with the primary weapon system. Further explanation and discussion of TOC may be found in Section 3.1.5 of the Defense Acquisition Guidebook.

As indicated in DoDD 5000.01 (20 Sep 2007), to the greatest extent possible, the Milestone Decision Authority (MDA) of an acquisition program shall identify the total costs of ownership, and, as a minimum, the major drivers of total ownership costs. In turn, the acquisition program manager is responsible for supporting the reduction of TOC through continuous reduction of the program’s LCC.
Knowledge Review

The Knowitall program's financial management office has provided the following information about expected costs over the life of the program:

- Total development cost of system = $720M
- Total cost of procuring prime mission equipment only = $800M
- Total cost of procuring support items only = $280M
- Total cost of procuring initial spares only = $120M
- Total procurement cost of system = $1,200M
- Total cost for facilities unique to the system = $50M
- Total cost for O&S of system = $5,300M
- Total cost for disposal of system = $50M

Given the above information, what is the Life-Cycle Cost?

- $1970M
- $1080M
- $800M
- $7320M

Check Answer
Knowledge Review

The Knowitall program's financial management office has provided the following information about expected costs over the life of the program:

- Total development cost of system = $720M
- Total cost of procuring prime mission equipment only = $800M
- Total cost of procuring support items only = $280M
- Total cost of procuring initial spares only = $120M
- Total procurement cost of system = $1,200M
- Total cost for facilities unique to the system = $50M
- Total cost for O&S of system = $5,300M
- Total cost for disposal of system = $50M

Given the above information, what is the Program Acquisition Cost?

- $1970M
- $1080M
- $800M
- $7320M

Check Answer
Knowledge Review

The Knowitall program's financial management office has provided the following information about expected costs over the life of the program:

- Total development cost of system = $720M
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- Total cost for facilities unique to the system = $50M
- Total cost for O&S of system = $5,300M
- Total cost for disposal of system = $50M

Given the above information, what is the Weapon System Cost?

- [ ] $1970M
- [ ] $1080M
- [ ] $800M
- [ ] $7320M

[Check Answer]
Knowledge Review

The Knowitall program's financial management office has provided the following information about expected costs over the life of the program:

- Total development cost of system = $720M
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- Total cost for facilities unique to the system = $50M
- Total cost for O&S of system = $5,300M
- Total cost for disposal of system = $50M

Given the above information, what is the Flyaway Cost?

- $1970M
- $1080M
- $800M
- $720M

Check Answer
Knowledge Review

Which cost term would include costs for supplies and maintenance for a system once it is fielded?

- [ ] Program Acquisition Cost
- [ ] Weapon System Cost
- [ ] Procurement Cost
- [ ] Operating and Support (O&S) Cost

Check Answer
Knowledge Review

Which cost term includes only the procurement funds for the prime mission equipment and all the supporting items, excluding initial spares?

- Program Acquisition Cost
- Procurement Cost
- Weapon System Cost
- Flyaway Cost

Check Answer
Definition of Affordability

Affordability is the degree to which the life-cycle cost of an acquisition program fits into the long-range investment and force structure plans of DoD and its individual components.

From a cost perspective, program plans should be based on realistic projections of funding availability. Such planning improves the likelihood that program funding will remain stable, enabling the program manager to execute the program as intended.

Similarly, facilities plans should also be realistic projections of funding availability to keep the facilities viable in supporting the mission.
Cost as an Independent Variable (CAIV)

Acquisition programs must balance three major characteristics:

- **Performance** that satisfies operational requirements
- A development and fielding **schedule** that satisfies user needs
- **Cost** that can reasonably be expected to be funded

Each overall characteristic may have multiple system parameters related to it.
Cost as an Independent Variable (CAIV), Cont.

Sufficient resources may not exist completely to achieve the objective levels of all performance, schedule, and cost parameters simultaneously.

In keeping with its current emphasis on affordability DoD requires all acquisition programs to employ the philosophy of **Cost as an Independent Variable (CAIV)** focusing on controlling Total Ownership Cost (TOC). This means performance and schedule parameters may be traded off from their objective levels as necessary to reduce TOC while still achieving required capability.
CAIV Policy Information

DoD acquisition policy articulates the requirements for CAIV implementation. The cost portion of the Acquisition Program Baseline shall include a complete set of TOC objectives:

- Research, Development, Test and Evaluation (RDT&E)
- Procurement
- Military Construction (MILCON)
- Operating and Support (O&S)
- Disposal costs
- Other indirect costs attributable
- Infrastructure costs not directly attributable
CAIV Philosophy

The CAIV philosophy recognizes that the best time to reduce life-cycle costs is early in the acquisition process, since system design decisions tend to drive production and operating and support costs.

For example, reducing the energy of a facility can reduce fuel consumption. Spending a few extra dollars early in the acquisition process to design the system to be maintained more easily and less expensively is another example of CAIV at work.

Cost/schedule/performance trade-off analyses should be conducted continuously to maximize opportunities to reduce cost and schedule.
CAIV and ACAT Programs

A Cost/Performance Integrated Product Team (IPT) led by the PM or PM's representative is assembled to conduct trade-off analyses. The Cost/Performance IPT should include representatives of the user, cost estimating, analysis, and budgeting communities, at minimum, with others participating as required.

The PM has the authority to trade-off among cost, schedule, and performance variables. The PM must remain aware of the stakeholders and the regulatory requirements throughout this tradeoff analysis.
Keys to Making CAIV Work

One of the keys to making CAIV work is to provide incentives (and remove disincentives) to both government and contractor personnel. Contracts should be structured to incentivize the contractor, for example, by equitably sharing CAIV savings between the government and the contractor.

Select each key component to learn more.

Providing Incentives

Removing Disincentives
Knowledge Review

In accordance with the philosophy of Cost as an Independent Variable (CAIV), acquisition programs must balance: (Select all that apply)

- Performance that satisfies operational requirements
- A development and fielding schedule that satisfies user needs
- Cost that can reasonably be expected to be funded
- Technology that is at or near the "cutting edge"

Check Answer
The best time to reduce life-cycle costs is early in the acquisition process.

- True
- False
Knowledge Review

Which of the following would help to improve the chances of a successful CAIV implementation for an acquisition program? (Select all that apply.)

- Sharing savings with program contractors
- Distributing savings to other programs experiencing cost overruns
- Providing awards to government personnel for their contributions
- Accepting occasional failures when risks are taken to achieve potentially large savings

Check Answer
Summary

Congratulations! You have completed the Cost Analysis Terms and Concepts lesson. Take a moment to review the key information that was presented in this lesson.
Lesson Completion

You have completed this module.

Please use your browser window (X) to close out this lesson.

As a reminder, please complete all six precourse modules before taking the final exam in Blackboard.