Welcome to Management Process

This lesson addresses the Life Cycle Logistician's (LCL) role in various analytical stages and integration phases that should be outlined in the Life Cycle Sustainment Plan (LCSP) updated during the Engineering and Manufacturing Development (EMD) phase. During the Integrated System Design (ISD) effort of EMD, a successfully documented and acceptable Critical Design Review (CDR) represents baselining the weapons system for production. The LCSP should be used as a management tool for the Program Manager. The LCSP will help manage the program's efforts and sustaiment-related risk profile while focusing on implementation of the Product Support Package.

Objectives

Upon completion of this lesson, you will be able to:

- Identify the sustainment activities/processes the LCL focuses on during the EMD phase.
- Identify how the Life Cycle Sustainment Plan evolves during the EMD phase.
- Describe the sections of a Life Cycle Sustainment Plan.
- Identify the LCL's role in implementing human systems integration (HSI) to enhance supportability.
- Identify the three types of requirements that are addressed in human factors engineering.
- Identify the LCL's role and risks involved in defining the product support strategy for evolutionary acquisition (where employed).

This lesson will provide you with information regarding the LCL's role in the Management Processes associated with the LCSP.

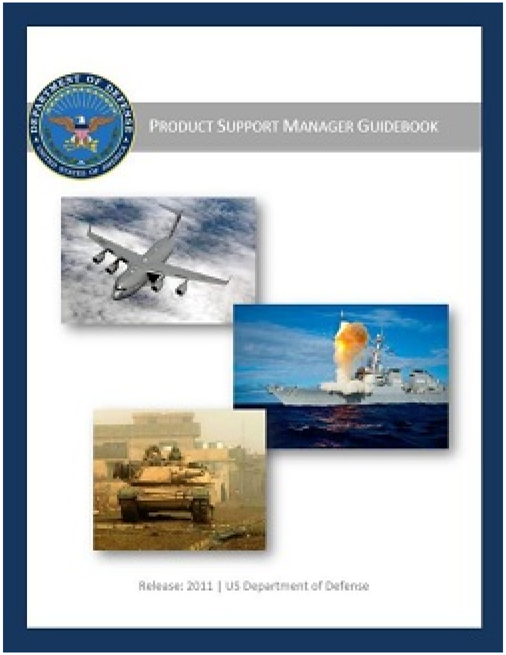
Engineering and Manufacturing Development

The purpose of the Engineering and Manufacturing Development (EMD) phase is to develop a detailed integrated design and ensure producibility and operational supportability. At this point in the acquisition cycle, prototyping and analysis should have been applied to discover and resolve any issues that would deem the design as immature and not be able to achieve cost, schedule, and sustainment constraints.

As the LCL focusing on the sustainment perspective, you should be paying particular attention to reducing the logistics footprint; implementing Human System integration; designing for supportability; and ensuring affordability, integration with the supply chain, interoperability, and safety.

LCL Focus During EMD

- Developing the requirements for long-term performance based support concepts;
- Refining the critical sustainment metrics and incentives for eventual performance-based support contracts and/or performance-based agreements;
- Refining the support concept and potential support providers;
- Assessing alternative contracting approaches based on cost, benefit, and performance outcomes;
- Establishing a strong foundation for budgetary requirements;
- Providing the definitive cost and performance base to be used for contract negotiations;
- Providing the cost/performance baseline to be used to measure effectiveness;
- Quantifying the benefits to be realized.



Knowledge Review

Which of the below statements is "True" concerning the LCL's focus during the EMD phase?

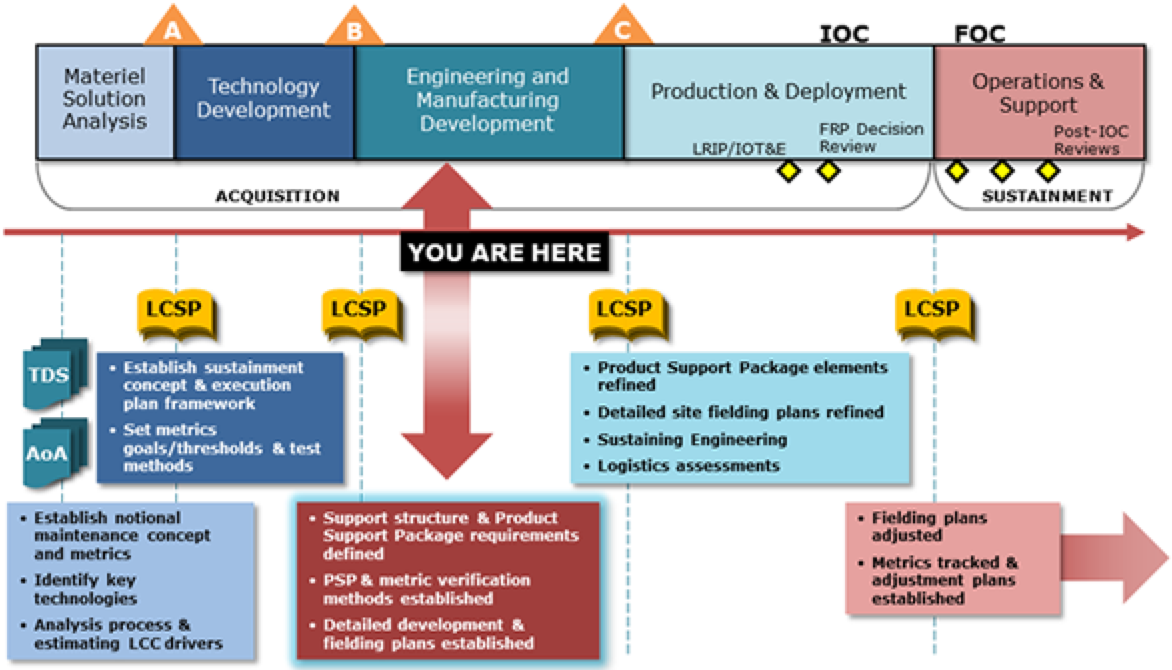
- [x] Refining the critical sustainment metrics and incentives for eventual performance-based support contracts.
- [ ] Developing the requirements for short-term non-performance based support concepts.
- [ ] Refining the sustainment concept and potential support contractors.
- [ ] Establishing a tentative foundation for budgetary requirements.

Check Answer

Refining the critical sustainment metrics and incentives for eventual performance-based support contracts is the true statement.

Life Cycle Sustainment Plan

The LCSP expands on the product support package implementation strategy, maintenance concept (including the depot maintenance requirements and implications of core requirements), and the technical data required to accomplish maintenance by providing a description of what is expected for each of the stakeholders. As the LCSP moves through the acquisition process, it evolves over the phases. While the LCSP consists of 12 major sections, at this point the LCL should focus on the sustainment related areas of the LCSP.



Life Cycle Sustainement Plan, Cont.

The twelve sections of the LCSP are listed below:

1. Introduction
2. Product Support Performance
3. Product Support Strategy
4. Product Support Arrangements
5. Product Support Package Status
6. Regulatory/Statutory Requirements That Influence Sustainment
7. Integrated Schedule
8. Funding
9. Management
10. Supportability Analysis
11. Additional Sustainment Planning Factors
12. LCSP Annexes

More information on the LCSP format can be found here: Outline Sections

Popup Text

Introduction

This section must answer the following questions:

1. What is the specific purpose, scope, focus and objective for the version?
2. Who will use the Life-Cycle Sustainment Plan (LCSP)?
3. How will the LCSP be updated and the criteria for doing so including:
    - Timing of updates?
    - Updating authority?
    - Approval authorities for different types of updates?
4. What revisions have been made since the last ASD(L&MR) review, if required?

Product Support Performance

Provide a table that lists the sustainment requirements that are integrated into the design process. Identify where each requirement is satisfied in product support arrangements (contractor and/or organic processes) and the corresponding performance metrics.

Provide a table that breaks down the system-level metrics to the level of detail required to develop the product support plan and deliver the product support package.

For each sustainment metric provide a table of sustainment assessments and tests including: Operational Assessments, Development Tests, Operational Evaluations, Reliability Growth Tests, and Logistics Demonstrations. Data in this table must map to the Test and Evaluation Strategy (TES), Test and Evaluation Master Plan (TEMP) and SEP.

Product Support Strategy

Provide the product's standard reference design concept showing major subsystems and features. The figure must be consistent with the program's work breakdown structure. More than one drawing may be needed to illustrate the major features affecting product support.

Provide a table listing the following sustainment strategy elements:

- Sustainment concept, (maintenance (including software support) and other major supply chain elements)
- Roles and responsibilities
- Plans for acquisition of technical data rights

Product Support Arrangements

Provide a table of the sustainment related contract efforts, in place or planned, as part of the product support package. Data in the table must map to the Acquisition Strategy and provide sustainment specific provisions.

List the Performance Based Arrangements in place or planned, including the performance incentives, in a table.

Product Support Package Status

Provide a table that identifies all reviews (e.g. Preliminary Design Review, Critical Design Review) in which the product support team participates, the open and in-work findings from the reviews, as well as corrective action and completion dates.

Provide a table of assessment results for the product support package. Include the plan for resolving each of the issues identified in the Logistics Assessment, identify the individual responsible for resolving the issue, and specify the steps and schedule for closing each unresolved issue, Significant tasks required to resolve product support issues shall be captured in the Product Support Schedule (Section 7).

Regulatory/Statutory Requirements That Influence Sustainment

Include a table that lists all statutory and regulatory requirements that impact the sustainment of the program's system, and potentially affect sustainment performance.

Integrated Schedule

Provide a detailed, integrated, life-cycle system schedule that is consistent with the integrated master schedule, and that emphasizes the next acquisition phase. Schedule items shall include, but are not limited to:

- Planned significant program activities
- Major logistics and sustainment events for each of the product support elements with specific emphasis on the materiel and data development and deliveries. Include dependencies on key sustainment planning documents (e.g. Product Support Business Case Analysis, Maintenance Plan, Core Assessment).
- Major activation activities for sites in the supply chain required to support the system, to include maintenance sites (including depot maintenance core capabilities stand-up), software support, and training sites. Include events for interim contractor support, hardware (including support and test equipment, trainers, etc.).

Funding

Identify the life-cycle sustainment logistics requirements for all appropriations. Funding must be traceable to the "Investment Program Funding and Quantities" Chart in Section 8 of the program's Acquisition Strategy template. Identify the program's major sustainment funding requirements, the documentation of those requirements (e.g. program office estimate, Service cost estimate, independent cost estimate), and the current budget documentation (e.g. program objective memorandum, President's Budget).

In addition to inclusion in the various estimates, it's important that sustainment requirements are also included and updated in the affordability requirement, Will Cost/Should Cost estimates, and updated to reflect on going, fact-of-life changes, such as design changes, reliability growth, and budget and funding cycles. Additionally, after Milestone C as the system is tested (IOT&E), fielded, and operated, update to reflect data-driven changes or modifications to the system (i.e. design changes, ECPs) or the product support strategy.

Management

Provide the following:

1. Planned program office organization structure with expanded detail on the Product Support function.
2. Summary of the program's product support staffing plan showing the number of required full-time equivalent (FTE) positions (e.g., organic, matrix support, and contractor) by key program events (e.g., milestones and technical reviews).
3. Break out of the positions by numbers (both authorized and assigned), position type, and major functions performed.
4. Diagrams of the contractor(s) program office organization and staffing plans.
5. A figure showing all government personnel and contractors (when available) assigned to sustainment related IPTs, working IPTs, and working groups. The figure must show the vertical and horizontal interrelations among the groups listed. Identify the government and contractor(s) leadership for all teams.

List the interfaces, deliverables and dependencies that the PSM and logistics staff must coordinate with other functional areas to ensure sustainment is aligned with program design, program management (including risk management and configuration management) and test reviews. List the program processes through which the PSM must integrate design and program decisions with sustainment considerations, referencing the relationships identified in Section 3. Provide the program's unique delineation of the PSM's specific roles, responsibilities, and authorities.

Specify the process through which the Program will manage sustainment-specific risks, within the context of the overall Program risk management process.

Supportability Analysis

Failure Modes, Effects, and Criticality Analysis (FMECA) – For each of the major or critical subsystems provide details from the systems engineering FMECA in a table with an 'as-of date'.

Provide a table that lists the results of the systems engineering analysis efforts. The information must link with the current Reliability Growth Plan.

List the major supportability trade studies that have been completed and planned since the last LCSP update in a table.

In a table identify information for each of the Technical Reviews identified in the SEP including sustainment participants and focus.

In a table identify the supportability analysis methods and tools (including the product support business case analysis) used to define the elements that comprise the product support package.

In a table list the tools that will be used to monitor the performance of the product support package.

Additional Sustainment Planning Factors

List additional sustainment issues or risks that cross functional lines that could adversely impact sustainment or sustainment support across the system's life cycle that are not included elsewhere in the LCSP. If the topic is addressed in another document (e.g., the Systems Engineering Plan, etc.) provide a short summary and reference the source.

Provide a list of precious metals requiring recovery, items that are classified, export controlled, pilferable, or require special handling.

LCSP Annexes

The following annexes must be included:

- Product Support Business Case Analysis (DODI 5000.02)
- Logistics Assessment and Corrective Action Plan (DODI 5000.02)

- System Disposal Plan (DODI 5000.02; DOD 4160.21-M)
- Preservation and Storage of Unique Tooling (DODI 5000.02).
- Core Logistics Analysis (DODI 5000.02)
- Source of Repair Analysis (DODI 5000.02)
- Service-Specific Requirements, including detailed system Product Support Plan/integrated product support elements

Human Systems Integration

As you will see, two categories that were mentioned in "Fielding the Product Support Package", Manpower/Personnel and Training, will be addressed as part of HSI. It is possible to look at these two elements independently, but when put into practice in the field these two logistics elements are closely related and their impacts to supportability become evident.

As an example, Manpower/Personnel and Training will ensure that maintainers and operators with the right physical and mental attributes will have the technical knowledge (i.e., training) necessary to maintain/operate the weapon system. However; if considered independently, they might not ensure aircraft maintenance personnel have the stamina to maintain the aircraft while exposed to temperatures in excess of 110 degrees while deployed to the desert, or maintaining the aircraft while deployed above the Arctic Circle in the North Atlantic Ocean. A pilot might be trained for jet aircraft, but due to their height, might be too tall for specific jet aircraft. They might fit into an F-15, but not in an F-16 fighter.

HSI focuses on the requirements that personnel will need to operate and maintain the weapons system as if they are an integral component of the weapons system.

Human Systems Integration, Cont.

DoDI 5000.02 requires every program manager have a comprehensive plan for HSI in place early in the acquisition process to optimize total system performance, minimize total ownership costs, and ensure that the system is built to accommodate the characteristics of the user population that will operate, maintain, and support the system.

Planning for human systems integration is summarized in the acquisition strategy and should also be addressed specifically in the LCSP. Thus, the LCL needs to understand the HSI elements and how they specifically relate to the life cycle sustainment planning effort.

The total system includes not only the prime mission equipment, but also the people who operate, maintain, and support the system; the training and training devices; and the operational and support infrastructure.

The LCL is the program manager's agent for ensuring that HSI requirements are addressed during system design and development; the HSI requirements result from the user's concept of operations and proposed support strategy.

HSI Domains

Below are the various domains of HSI. Select each to read a description.

Click each category for further information.

HUMAN FACTORS ENGINEERING	MANPOWER & PERSONNEL	HABITABILITY	TRAINING	ENVIRONMENT SAFETY & OCCUPATIONAL HEALTH	SURVIVABILITY

Popup Text

Human Factors Engineering

Human factors engineering ensures that cognitive engineering (e.g., a human factors engineer, a human-computer interaction specialist, or a systems engineer who is knowledgeable about human-centered design) is employed during systems engineering over the life of the program to provide for effective human-machine interfaces and to meet HSI requirements. Where practicable and cost effective, system designs shall minimize or eliminate system characteristics that require excessive cognitive, physical, or sensory skills; entail extensive training or workload-intensive tasks; result in mission-critical errors; or produce safety or health hazards.

Manpower and Personnel

Personnel defines the human performance characteristics of the user population based on the system description, projected characteristics of target occupational specialties, and recruitment and retention trends. Manpower determines the most efficient and cost-effective mix of DoD manpower and contract support in advance of contracting for operational support services. One significant program management goal is to explore design options that reduce manpower requirements.

Habitability

Habitability establishes requirements for the physical environment (e.g., adequate space and temperature control) and, if appropriate, requirements for personnel services (e.g., medical and mess) and living conditions (e.g., berthing and personal hygiene) for conditions that have a direct impact on meeting or sustaining system performance or that have such an adverse impact on quality of life and morale that recruitment or retention is degraded.

Training

Training develops options for individual, collective, and joint training for operators, maintainers and support personnel and, where appropriate, base training decisions on training effectiveness evaluations.

Environment, Safety and Occupational Health

Environment, Safety and Occupational Health prevents ESOH hazards where possible, and manages ESOH hazards where they cannot be avoided. The acquisition strategy shall incorporate a summary of the Programmatic ESOH Evaluation (PESHE), including ESOH risks, a strategy for integrating ESOH considerations into the systems engineering process, identification of ESOH responsibilities, a method for tracking progress, and a compliance schedule for NEPA. During system design, the PM shall document hazardous materials used in the system, a plan for the system's demilitarization and disposal, and a schedule for complying with National Environmental Policy Act requirements.

Survivability

Survivability addresses personnel survivability issues including protection against fratricide, detection, and instantaneous, cumulative, and residual nuclear, biological, and chemical effects for systems with missions that might require exposure to combat threats; the integrity of the crew compartment; and provisions for rapid egress when the system is severely damaged or destroyed. The PM shall address special equipment or gear needed to sustain crew operations in the operational environment.

Human Factors Engineering (HFE) as it Relates to Supportability

There are three types of requirements that are addressed in HFE: cognitive requirements, physical requirements, and sensory requirements. (Select each category for further information.) A major element of HFE is the design consideration for maintenance. LCLs need to ensure that human factors engineering is continually addressed as a key design consideration. For example, with the F/A-22 Asymmetry Brake - a design change lowered flap asymmetry brake access from over 12 hours to 55 seconds. The Logistics Test and Evaluation maintainers proposed the addition of a 1/4-inch hole in the panel with a screw installed, allowing screw removal and brake reset to be accomplished in 55 seconds.

Another element of HFE for supportability as it relates to cognitive requirements is the use of prognostics and diagnostics for maintenance. Consideration of maintainers' cognitive abilities and their roles in troubleshooting, formulation/implementation of repair strategies, available resources and operational demand is crucial in writing personnel, training, human factors, and other system requirements.

Popup Text

Cognitive Requirements

Cognitive requirements address the human's capability to evaluate and process information. Requirements are typically stated in terms of response times and are typically established to avoid excessive cognitive workload. Operations that entail a high number of complex tasks in a short time period can result in cognitive overload and safety hazards. The Capability Development Document should specify whether there are human-in-the-loop requirements. This could include requirements for "human in control, “manual override," or "completely autonomous operations.

Physical Requirements

Physical requirements are typically stated as anthropometric (measurements of the human body), strength, and weight factors. Physical requirements are often tied to human performance, safety, and occupational health concerns. To ensure the average user can operate, maintain, and support the system, requirements should be stated in terms of the user population. For instance, when the user requires a weapon that is "one-man portable," weight thresholds and objectives should be based on strength limitations of the user population and other related factors (e.g., the weight of other gear and equipment and the operational environment). For example, it may be appropriate to require that "the system be capable of being physically maintained by the 5th through 95th percentile soldiers wearing standard battle dress, or arctic and MOPP IV protective garments inside the cab," or that "the crew station physically accommodate a female/ male population, defined by the 5th -95th anthropometric female/ male soldier, for accomplishment of the full range of mission functions.

Sensory Requirements

Sensory requirements are typically stated as visual, olfactory (smell), or hearing factors. The Capability Development Document should identify operational considerations that affect sensory processes. For example, systems may need to operate in noisy environments where weapons are being fired or on an overcast moonless night with no auxiliary illumination.

Knowledge Review

Which of the below statements is "True" concerning the Human Factors Engineering?

- [ ] Sensory Requirements – Requirements are typically stated as anthropometric (measurements of the human body), strength, and weight factors.
- [ ] Physical Requirements – Addresses the human's capability to evaluate and process information.
- [ ] Cognitive Requirements – Requirements are typically stated as visual, olfactory (smell), or hearing factors.
- [x] All are not correct.

Check Answer

None of the above statements concerning the Human Factors Engineering are true.

Personnel Issues Related to Life Cycle Sustainment Planning

There are several personnel issues related to life cycle sustainment planning. Below are the three categories that account for these issues.

Click each category for further information.

Personnel Factors

Officials

Skill Level

Popup Text

Personnel Factors

Personnel factors are those human aptitudes (i.e., cognitive, physical, and sensory capabilities), knowledge, skills, abilities, and experience levels that are needed to properly perform job tasks. Personnel factors are used to develop the military occupational specialties (or equivalent DoD component personnel system classifications) civilian job series of system operators, maintainers trainers, and support personnel.

Officials

Personnel officials contribute to the Defense acquisition process by ensuring that the program manager pursues engineering designs that minimize personnel requirements, and keep the human aptitudes necessary for operation and maintenance of the equipment at levels consistent with what will be available in the user population at the time the system is fielded.

Skill Level

Given the technological advances in weapon systems (such as stealth technology and sophisticated electronics), and the application of technology to enable maintenance, it is important that LCLs consider the level of knowledge and skills of the logistics organizational/ field level personnel tasked to support the operational units.

Another area for consideration in the development of Life Cycle Sustainment Plans relates to the knowledge and skill requirements of program office staff to manage performance based logistics efforts, including that of the product support integrator. There may be new skills that are required. This issue should be identified and discussed in the Life Cycle Sustainment Plan.

Habitability Consideration in Life Cycle Sustainment Planning

The LCL should address habitability planning in the support plan and identify habitability issues that could negatively impact morale, safety, health, comfort, personnel performance, unit readiness, or cause recruitment or retention problems. While a system, facility, and/or service should not be designed solely around optimum habitability factors, habitability factors cannot be systematically traded-off in support of other readiness elements without eventually degrading mission performance.

Habitability may be a consideration when considering any special working conditions for the support or maintenance of systems, subsystems or components. Any such issues should be identified and managed to mitigate any risk.

Manpower Issues Central to Life Cycle Sustainment Planning

When reviewing support activities, the LCL needs to work with manpower and functional representatives to identify process improvements, design options, or other initiatives to reduce manpower requirements, improve the efficiency or effectiveness of support services, or enhance the cross-functional integration of support activities.

The LCSP should document the approach used to provide for the most efficient-effective mix of manpower and contract support and identify any cost, schedule, or performance issues that could impact the program manager's ability to execute the program. The LCL should coordinate with the program manager to ensure that inherently governmental and exempted commercial functions are not contracted out.

This area of manpower, which includes operators and maintainers, is of particular importance given the transition to performance based logistics and the design efforts to improve the reliability of systems and reduce the demand for logistics. Many operational communities are reluctant to plan for significant manpower reductions until they develop confidence in the system's projected reliability and the responsiveness of a performance based logistics enterprise.

Additionally, the LCL must consider that the size of the military is not increasing. If the new system is replacing a legacy system, manpower can transfer from the old system to the replacement system. If the new system is not a replacement, finding the needed manpower becomes a more difficult issue. The LCL should ensure that the LCSP addresses this issue.

Training, A Key Element in Life Cycle Sustainment Planning

Training is the process by which personnel individually or collectively acquire or enhance predetermined job-relevant knowledge, skills, and abilities by developing their cognitive, physical, sensory, and team dynamic abilities. The training/instructional system integrates training concepts and strategies and elements of logistic support to satisfy personnel performance levels required to operate, maintain, and support the systems. It includes the tools used to provide learning experiences such as computer-based interactive courseware, simulators, and actual equipment (including embedded training capabilities on actual equipment), job performance aids, and Interactive Electronic Technical Manuals.

Training is a key element of the LCSP. Training for both the operators and the maintainers should be addressed. Any new and innovative approaches to training should be fully tested and demonstrated during Engineering and Manufacturing Development.

There should also be risk mitigation strategies to address any potential failures or embedded training deficiencies. Resource requirements for training should also be addressed.

Environment, Safety and Occupational Health Considerations In Life Cycle Sustainment Planning

Safety and health hazard parameters should address all activities inherent to the life cycle of the system, including test activity, operations, support, maintenance, and final demilitarization and disposal. Early in the program the LCL should address environment, safety, and occupational health (ESOH) hazard concerns inherent to all activities anticipated through the life cycle of the system.

This analysis covers test, operations, support, maintenance, and final demilitarization and disposal activities.

Select each category for further information.

Support Plans

Environmental Issues

Popup Text

Support Plans

Support plans should address ESOH issues whether the activities are performed by government or industry/contractor personnel. The LCL reviews the system design and proposed maintenance procedures, and then ensures a plan is developed to manage ESOH concerns throughout the life cycle.

Environmental Issues

Environmental issues may be a significant cost driver that may require maintenance tradeoff analysis during the BCA. The presence of a repair facility that has already dealt with a similar environmental issue/concern may have benefits (especially in terms of cost) over one that has not.

Survivability Considerations In Life Cycle Sustainment Planning

Personnel survivability factors consist of those system design features that reduce the risk of fratricide, detection, and the probability of being attacked; and enable the crew to withstand man-made hostile environments without aborting the mission or suffering acute or chronic illness, disability, or death.

The LCL should summarize plans for personnel survivability in the LCSP and address personnel survivability risks and mitigation plans. Prognostics and diagnostics may enhance survivability if they are effective enough to accurately project when critical systems or sub-systems will fail.

Life Cycle Sustainment Plans Should Identify HSI Risk Mitigation Approaches, As Necessary

Program risks related to cost, schedule, performance, supportability, and/or technology can negatively impact program affordability and supportability. The program manager should prepare a "fall-back" position to mitigate any such negative effect on HSI objectives.

For example, if the proposed system design relies heavily on new technology or software to reduce operational or support manning requirements, the program manager should be prepared with design alternatives to mitigate the impact of technology or software that is not available when expected.

Knowledge Review

Which of the following is the human systems integration (HSI) element that ensures that cognitive engineering is employed during systems engineering over the life of the program to provide for effective human-machine interfaces and to meet HSI requirements?

- [ ] Habitability
- [ ] Survivability
- [x] Human Factors Engineering
- [ ] Environment, Safety and Occupational Health

Check Answer

Human Factors Engineering ensures that cognitive engineering is employed during systems engineering over the life of the program to provide for effective human-machine interfaces and to meet HSI requirements

Knowledge Review

Which of the following is the human systems integration (HSI) element that addresses personnel issues including protection against fratricide, detection, and instantaneous, cumulative, and residual nuclear, biological, and chemical effects for systems with missions that might require exposure to combat threats?

- [ ] Human Factors Engineering
- [x] Survivability
- [ ] Habitability
- [ ] Environmental, Safety and Occupational Health

Check Answer

Survivability addresses personnel issues including protection against fratricide, detection, and instantaneous, cumulative, and residual nuclear, biological, and chemical effects for systems with missions that might require exposure to combat threats.

Evolutionary Acquisition

Evolutionary acquisition is the preferred DoD strategy for rapid acquisition of mature technology for the user. An evolutionary approach delivers capability in increments, recognizing up front, the need for future capability improvements. The objective is to balance needs and available capability with resources, and to put capability into the hands of the user quickly.

The success of the strategy depends on phased definition of capability needs and system requirements, and the maturation of technologies that lead to disciplined development and production of systems that provide increasing capability over time. The approaches to achieve evolutionary acquisition require collaboration between the user, tester, and developer. In this process, a needed operational capability is met over time by developing several increments, each dependent on available mature technology. Technology development preceding initiation of an increment shall continue until the required level of maturity is achieved, and prototypes of the system or key system elements are produced. Successive Technology Development phases may be necessary to mature technology for multiple development increments.

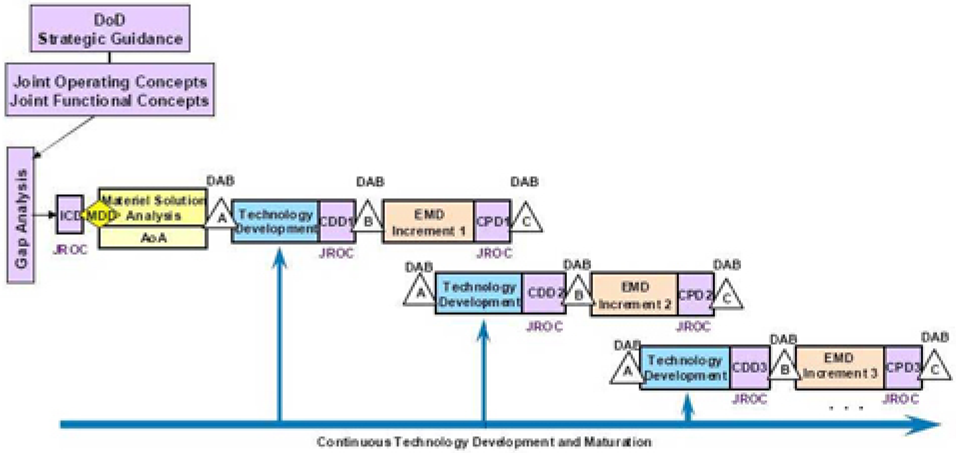
Each increment is a militarily useful and supportable operational capability that can be developed, produced, deployed, and sustained. Each increment will have its own set of threshold and objective values set by the user. Block upgrades, pre-planned product improvement and similar efforts that provide significant increase in operational capability and meet an acquisition category threshold specified in this document shall be managed as separate increments.

Evolutionary Acquisition and Collaboration

Evolutionary acquisition requires close collaboration among:

- The acquirers who leverage technology, minimize or manage risk, and get a capability delivered sooner;
- The LCLs who tailor product support for each spiral/increment to ensure support performance;
- The warfighters who get the state-of-the-art capability sooner; and
- The comptrollers—the investors— who get a return for their investment sooner rather than later.

The iterative requirements, development and production process is illustrated in the figure below.



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Long Description

Concept of Evolutionary Acquisition, from DoDI 5000.02, Enclosure 2, Page 13, Figure 2 Requirements and Acquisition Flow. The chart shows the relationship between Milestones A, B, and C, the Initial Capabilities Document (ICD), the Capabilities Development Document (CDD), the Capabilities Production Document (the CPD) and the increments of an evolutionary acquisition. For the first incremental delivery, Gap analysis produces an ICD which will result in the Material Development Decision. Increment 1 then enters into the Material Solution Analysis phase with the Analysis of Alternatives and results in a Milestone “A” decision. Technology Development begins with Milestone A and the ICD. Technology Development phase ends with the CDD at MS “B”. Then the first incremental delivery progresses through the EMD phase culminating in a CPD for the increment. For each subsequent increment, the acquisition phase starts at Milestone “A” and then progress through the rest of the acquisition cycle the same as the first increment. Using this iterative approach, at the end of Increment N 100% of the design concept is attained.

Challenges of Evolutionary Acquisition

Evolutionary acquisitions create unique challenges for the LCL in terms of managing an evolving Life Cycle Sustainment Plan. The product support strategy for the evolutionary acquisition will remain the same, but the implementation of the strategy may need to be tailored for increment of delivered capability.

Management, development, and support as outlined below can help the LCL to manage the Life Cycle Sustainment Plan.

Click each category for further information.

Management | Development | Support

Popup Text

Management

Managing two or more system configurations in the most cost effective fashion while meeting performance requirements.

Development

- Developing a weapon system information system – integrated digital environment – that provides configuration as built.
- Developing a product support strategy that is flexible and adaptable.
- Managing two or more system configurations in the most cost effective fashion while meeting performance requirements.

Support

- Ensuring that the BCA of support alternatives is easily updated based on evolving systems increments.
- Ensuring that the investment funds, as required, are available to refine the support enterprise

Key Elements of the Evolving Life Cycle Sustainment Planning and Delivery

The LCL plays a key role in continually planning and refining the delivery of product support in an evolutionary acquisition. Key elements of the evolving life cycle sustainment planning and delivery include the following categories.

Click each category for further information.

- REQUIREMENTS
- PRODUCT SUPPORT INTEGRATION
- KNOWLEDGE MANAGEMENT
- LOGISTICS RESOURCES
- TRAINING
- BUSINESS APPROACH

Popup Text

Requirements

- Warfighter performance-based agreements may change based on system increments/spirals.
- Support performance (availability, mission reliability, logistics footprint) metrics may stay the same, but the level of performance may change based on improved increments of capability.

Product Support Integration

- The criteria for the selection of a product support integrator should include their ability to effectively manage change.
- A key element across all product support functional element alternatives should be the ability to manage multiple configurations.
- Interoperability and compatibility of any logistics features that are unique to a specific increment or spiral must be tested and demonstrated.

Knowledge Management

- Integrated data environment (information systems and data management) must be effectively implemented across all industry and government organizations of all increments/spirals.
- Configuration management is essential for logistics planning across various increments/spirals.
- Industrial base issues (such as diminishing manufacturing sources).

Logistics Resources

- Spares management must achieve the right balance for each increment/spiral.
- Prognostics/diagnostics may have different levels of reliability for different configurations.
- Portable maintenance aids/other tools must be able to accommodate system evolutions.
- Support equipment should be designed to meet the requirements of all increments/ spirals.
- Manpower requirements must be carefully managed with insights as to reductions in manpower

requirements as R&M is improved through different increments.

Training

- Changes in the system based on increments/spirals will place an increased demand on training requirements that must be planned for and funded.

Business Approach

- BCA will need to be updated based on increments/spirals.
- Funds management may require a much more active approach to keep abreast of the schedules for initial operational capabilities for each increment/spiral.
- Contracting approaches need to stay focused on performance requirements while building in the ability to cost-effectively accommodate changes.
- Statutory and regulatory boundaries will be impacted by the amount of support workload that is increased and or decreased due to the introduction of new increments/spirals.

Benefits to Logistics

The logistics support for evolutionary acquisitions can benefit from:

- Early and continuous design involvement and investment (R & M)
- Flexible, robust design—"design out logistics"
- Use of mature, proven technologies
- Open systems—physical modularity and functional partitioning (easily upgraded or modified)
- Buy support performance, not spares/repairs
- Business commitments—preserve funding streams to meet time-phased support requirements
- Backward compatibility
- Robust configuration management
- Collaboration; and
- Expectation management

Opportunities for the LCL in Evolutionary Acquisitions

Evolutionary acquisition presents new challenges, and potential benefits, to the PM in both acquisition and sustainment activities. The obvious challenge is the potential cost and configuration control problems that can arise with multiple configurations of end-items as well as the support system. This must be addressed early in development and evolution of the acquisition strategy. If planned correctly, this can provide the LCL the opportunity to observe and evolve the success of tentative support strategies.

Opportunities for the LCL in Evolutionary Acquisitions, Cont.

Especially when dealing with a new technology, one of the important aspects of building a successful performance-based support strategy is development of a cost baseline from which to negotiate a meaningful performance contract or set of performance agreements. Evolutionary acquisition provides opportunity, during system development, to collect cost and maintenance data on a smaller scale than is possible in single step to full capability acquisition programs.

This can result in an additional benefit by providing for the creation of a partnership environment between the support provider, the user, and the PM, thus potentially providing for a win-win support relationship and strategy. This kind of partnership between the PM team and the user is most critical for the development and sustainment of a rapid deployment and product support strategy for all configurations of fielded systems.

Knowledge Review

Which of the below statements is "True" concerning the LCL's focus during the EMD phase in an Evolutionary Acquisition environment?

- [x] Training
- [ ] Systems Engineering
- [ ] Survivability
- [ ] Total Systems Approach

Check Answer

Training is an LCL's focus during the EMD phase in an Evolutionary Acquisition environment.

Management Process Summary

You have completed Management Processes and should now be able to:

- Identify the sustainment activities/processes the LCL focuses on during the EMD phase.
- Identify how the Life Cycle Sustainment Plan evolves during the EMD phase.
- Describe the sections of a Life Cycle Sustainment Plan.
- Identify the LCL's role in implementing human systems integration (HSI) to enhance supportability.
- Identify the three types of requirements that are addressed in human factors engineering.
- Identify the LCL's role and risks involved in defining support strategy for evolutionary acquisition (where employed).

Lesson Completion

You have completed the content for this lesson.

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