



# PROVIDING INCENTIVES FOR SPIRAL DEVELOPMENTS: AN AWARD FEE PLAN

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This article describes a set of award fee criteria and an award fee process and plan that enable buyers to provide suppliers with incentives for using evolutionary acquisition and spiral development approaches when developing large-scale, software-intensive systems per DoD Directive 5000.1 and DoD Instruction 5000.2. Most Senior Program Managers agree that spiral development is a good idea. However, many quickly become confused when trying to provide contractual incentives for large system acquisitions. To reduce confusion, the authors have developed an award fee plan that Program Managers can use to stimulate on budget, schedule and technical performance by supplier teams who are pursuing system development and deployment under contract to the government or a Lead System Integrator.

**C**urrent and future software-intensive system acquisitions need more flexibility to adapt to rapid change than current contracting instruments provide. On the other hand, they need to retain sufficient discipline to keep the acquisition under control. This is particularly true for large acquisitions with multiple subcontractors who need incentives for flexible and disciplined collaboration rather than low-cost delivery to a fixed statement of work.

The model Award Fee Plan below has been developed by the University of Southern California (USC) to provide a means to reward contractors/subcontractors for using modern flexible software engineering techniques on large software-intensive development efforts. It identifies the following seven critical success factors for successful contractor/subcontractor performance:

1. Schedule preservation,
2. Continuous integration support,
3. Cost containment,
4. Technical performance,
5. Architecture and Commercial Off-the-Shelf (COTS) Compatibility,
6. Program management, and
7. Risk management.

This plan provides candidate evaluation scales and weights for assessing relative contractor/subcontractor performance based on the seven factors. It also provides a set of candidate operating procedures for the subcontractor evaluation and award fee process. It is not a “plug-and-play instrument.” Instead, the plan intends to provide buyers of systems with large software content with a tailorable contractual instrument that accommodates various sources of subcontract variation.

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The terms “buyer” and “supplier” are used throughout the article to convey respective roles and responsibility of the parties to this agreement. The “buyer” refers to the organization contracting or subcontracting work to a “supplier” organization, typically a contractor or Lead System Integrator (LSI) in today’s jargon. It is not meant to refer to the contracting officer who is responsible for managing the contract/subcontract terms and conditions.

## THE CHALLENGE

The publication of DoD Directive 5000.1 and DoD Instruction 5000.2 on May 12, 2003, signaled that the Department of Defense (DoD) had moved to a new way of doing business. Instead of continuing its policies of strict adherence to regulations,

these revisions signaled a move towards increased flexibility as the DoD endorsed the following five governing principles for these revised governing policy statements.

## **FLEXIBILITY**

The DoD recognized that there is no one best way to structure an acquisition program. In response, Program Managers (PMs) were directed to tailor their program management strategies, including documentation of program information, acquisition phases, the timing and scope of decision reviews, and decision levels, to fit the particular conditions of that program, consistent with applicable laws and regulations and the time sensitivity of the need.

## **RESPONSIVENESS**

The PMs were also directed to integrate advanced technology into producible systems in the shortest time practicable. They were instructed to match their time-phased capability needs with available technology and resources because they enabled evolutionary acquisition strategies.

## **INNOVATION.**

Throughout DoD, acquisition professionals were instructed to continuously develop and implement initiatives to streamline and improve the way that they do business. The PMs were told to mine and, as appropriate, adopt innovative practices (including best commercial practices and electronic business solutions) that reduced their cycle time and cost, and encouraged teamwork.

## **DISCIPLINE**

The PMs were directed to manage programs in a disciplined manner consistent with both statute and the regulatory requirements specified in the Directive. As part of this approach, they should establish the minimum number of cost, schedule, and performance parameters that describe the program over its life cycle. They should then use their approved program baseline parameters to control objectives and assess programmatic progress.

## **STREAMLINED AND EFFECTIVE MANAGEMENT**

Responsibility for the acquisition of systems shall be decentralized to the maximum extent practicable. The PMs were to be given authority commensurate with their responsibilities to ensure that they were empowered to get their jobs done.

Probably the biggest change endorsed by the revision of the Directive was the transition to evolutionary acquisition. Because the acquisition methods endorsed by the Directive were new to most PMs, there was much confusion over what the terms meant and what the Program Management Office had to do to be compliant. There is almost always confusion over what changes are needed to the processes and procedures that large acquisition programs use to manage its own and contractor workforces.

**TABLE 1. EVOLUTIONARY ACQUISITION (EA) VARIANTS AND INVARIANTS**

INVARIANTS	VARIANTS
Accommodates evolving requirements	<ul style="list-style-type: none"> <li>• Degrees of flexibility employed</li> <li>• Degrees of time phasing utilized</li> </ul>
Multiple deployments to the field supported	<ul style="list-style-type: none"> <li>• Overlapping versus non-overlapping increment deliveries</li> <li>• O&amp;M versus RDT&amp;E funds used</li> </ul>
Considerations in each cycle...PLUS technology insertion opportunities	<ul style="list-style-type: none"> <li>• Choice of development process</li> <li>• Choice of contract vehicle and type</li> <li>• Nature of incentives used to stimulate performance</li> <li>• Choice of risk resolution techniques</li> </ul>
Emphasis is on total life cycle	<ul style="list-style-type: none"> <li>• The variety of tasks included in the life cycle</li> </ul>
Decision point at the end of each increment involves multiple stakeholders	<ul style="list-style-type: none"> <li>• Choice of decision-making method employed (risk-based funding, etc.)</li> </ul>
Content of deployment is driven by risk consideration (market, operational, etc.)	<ul style="list-style-type: none"> <li>• Trade space used for deciding what to deploy</li> </ul>
Managing stakeholder life cycle commitment is done via anchor points	<ul style="list-style-type: none"> <li>• How teamwork issues are managed</li> </ul>

The USC held a workshop in 2000 at the request of DoD to help resolve the confusion over what was meant by evolutionary acquisition. At the workshop, participants reached consensus on an approach that described the process using the invariants (required elements for evolutionary acquisition) and variants (things that vary as a function of program requirements) listed in Table 1. Since then, this list has been circulated within the Department. The list also has become the nucleus of some of the guidance published by the Software Engineering Institute and others to help better explain what the term means.

## THE SOLUTION

Evolutionary acquisition is defined by DoD Directive 5000.1 as: “The preferred approach that fields an initial operationally useful and supportable capability in as

short a time as possible with the explicit intent of delivering the ultimate capability in the future through one or more increments. The two approaches most often used to implement evolutionary acquisition within the DoD are: (1) incremental and (2) spiral.

With the incremental approach, a desired capability and end state requirements are known at program initiation, and these requirements are met over time by the development and fielding of increments as technology maturity permits. Increment capabilities can be developed in phases that can be overlapped to accentuate a steady build-up of desired functional and performance capabilities. Capabilities can be demonstrated incrementally as increments are delivered and partial capabilities can be fielded to support operational requirements.

With the spiral approach, a desired capability has been identified, but end state requirements are not entirely known at program initiation. Each increment of a spiral program provides the user with the best available capability at that time and then future requirements are developed and refined over time based on demonstration, risk management, and continuous user feedback. Spiral development is the preferred approach to evolutionary acquisition.

Based on our analysis of successful spiral implementations, we have identified the following seven critical success factors for use of the evolutionary acquisition method:

1. Schedule Preservation
2. Continuous Integration Support
3. Cost Containment
4. Technical Performance
5. Architecture and COTS Compatibility
6. Program Management
7. Risk Management

Because most acquisitions that use the spiral model are large and complex, incentives are needed to stimulate superior performance by the supplier team that is typically led by some LSI. The award fee rewards contractors using the seven critical success factors described above. Towards these ends, USC has developed an award fee plan that can be used to provide the LSI with incentives to deliver increments on time and budget with acceptable functionality and performance (Reifer & Boehm, 2003).

## PROVIDING INCENTIVES: THE AWARD FEE PLAN

The award fee plan provides the PM acquiring the system (the buyer) with processes and guidelines for evaluating performance based on the seven critical success factors. Along with a set of candidate operating procedures for the subcontractor evaluation and award fee process, it provides detailed evaluation guidelines for assessing performance. The plan was not developed to be a plug-and-play instrument. Instead, it intends to provide buyers of systems with large software content with a tailorable contractual instrument that accommodates the sources of subcontract variation identified by the variants and invariants listed in Table 1.

The terms “buyer” and “supplier” are used throughout the plan to convey respective roles and responsibility of the parties involved in software development. The buyer refers to the Program Management organization contracting or subcontracting the work to a supplier organization. It is not meant to refer to the contracting officer who is responsible for managing the contract/subcontract terms and conditions. The term “Lead System Integrator (LSI)” is used to identify the organization assigned primary integration responsibilities for the system.

The purpose of the award fee plan is to provide the buyer with a basis for evaluating supplier performance. To achieve this goal, the plan provides the criteria and procedures to be used to both assess supplier performance and determine the amount of award fee earned.

### AWARD FEE PLAN ORGANIZATION

The award fee team consists of: the Fee Determining Official (FDO); an Award Fee Review Board (AFRB) which consists of a chairperson, the contracting officer, a recorder, other functional area participants, and advisor members; and the performance monitors. The roles and responsibilities of the key members of the team are summarized as follows:

**Fee Determining Official.** The FDO approves the award fee plan and any significant changes. The FDO reviews the recommendation(s) of the AFRB, considers all pertinent data, and determines the earned-award fee amount for each evaluation period.

**Award Fee Review Board.** The AFRB members review performance monitors’ evaluation of the supplier’s performance, consider all information from pertinent sources, prepare interim performance reports, and arrive at an earned-award fee recommendation for the FDO.

**The AFRB Recorder.** The AFRB recorder is responsible for coordinating the administrative actions required by the performance monitors, the AFRB, and the FDO.

**Procuring Contracting Officer.** The PCO is the liaison between the supplier and buyer personnel and is responsible for the preparation and distribution of the supplier agreement and/or contract modifications which awards any fee authorized by the FDO.

**Performance Monitors.** Performance monitors maintain written records of the supplier's performance in their assigned evaluation area(s) so that a fair and accurate evaluation is obtained.

**Supplier Representative.** Supplier representatives provide the buyer with a single point of contact within the supplier organization. They provide input/information during the interim and end-of-period evaluations and make recommendations to the AFRB.

## AWARD FEE DETERMINATION PROCESS

The five step process that follows is recommended for determining and dispensing the award fee based on supplier performance once the contract/subcontract has been issued:

**Available Award Fee Amount.** The team first determines the amount of award fee available, using the contract as its basis. The earned award fee will be paid based on the supplier's performance during each evaluation period.

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**Evaluation Criteria.** The team then reviews the evaluation criteria and weights. If the PCO does not give specific notice in writing to the supplier of any change to the evaluation criteria prior to the start of a new evaluation period, then the same criteria listed for the preceding period will be used in the following award fee evaluation period. The supplier must be notified of any changes that are made to evaluation criteria.

**Scoring and Award Fee Percentage.** The team will next assess the supplier's performance using the applicable criteria. The supplier will earn a percentage of the award that falls within the corresponding scoring range as adjusted by the area weighting factors. The exact percentage of award fee is at the discretion of the FDO. However, it may be influenced by the supplier either during negotiations for products and services (e.g., might be increased based upon a progressive discount offered as part of the original agreement with the supplier) or as part of the feedback received as scoring takes place.

**Interim Evaluation Process.** The AFRB Recorder next notifies AFRB members and performance monitors to submit their evaluation reports before the midpoint of the evaluation period. The AFRB then determines the interim evaluation results and identifies the supplier's strengths and weaknesses for the current evaluation period. The interim evaluation is typically documented in form of a narrative or briefing. It may

be coordinated through the FDO prior to distributing it to the supplier, depending on the content. Once approved, the PCO sends the interim evaluation to the supplier via official correspondence. The interim evaluation does not contain any fee determination or rating. Its aim is to inform the supplier of areas where corrective action can be taken in sufficient time to correct these deficiencies prior to the FDO’s award fee amount determination. As part of this process, the AFRB will entertain any change recommendations to this award fee plan for recommendation to the appropriate approval authority.

**End of Period Evaluations.** The Recorder of the AFRB next notifies board members and performance monitors as to the schedule for the end of period evaluation. The board evaluates the performance monitors’ reports/briefings once they are submitted. The supplier may submit a written self-assessment to the AFRB Chairman prior to the close of the evaluation period. The FDO and/or the AFRB Chairman may invite the supplier to brief its assessment during the award fee determination process. This written assessment of the supplier’s performance throughout the evaluation period may also contain any information that may be reasonably expected to assist the AFRB in evaluating the supplier’s performance.

Using the information supplied, the AFRB will evaluate the findings, supplier self-assessment if submitted, and other pertinent information to develop a recommended earned award fee amount for the FDO. This recommendation will be presented in either a report or briefing. The AFRB will also determine if changes to the award fee plan are warranted and will also make these recommendations to the FDO.

The AFRB will present their recommendations of award fee and any significant changes to the award fee plan to the FDO. The briefing will also include a discussion of the supplier’s strengths and weaknesses. The supplier will not be present at this briefing.

Within forty-five calendar days after the close of the award fee evaluation period, the FDO determines the amount of the earned award fee and signs the determination letter. The determination considers the AFRB recommendations along with other factors that may be outside of the supplier’s control (e.g., government-furnished equipment

**TABLE 2. TYPICAL TIMELINES AND AWARD FEE AMOUNT**

EVALUATION PERIOD	FROM	TO	AVAILABLE AWARD FEE*
First	Upon Contract Award	25% of Development Schedule	25%
Second	25% of Development Schedule	50% of Development Schedule	25%
Third	50% of Development Schedule	75% of Development Schedule	25%
Fourth	75% of Development Schedule	End of CPAF period of performance	25%
<b>TOTAL</b>			<b>100%</b>
* The buyer may unilaterally revise the distribution of the remaining award fee dollars among subsequent periods within the constraints of fiscal law.			

was delivered late, etc.). The determination letter will be clear and concise, informing the supplier of the earned award fee amount and the major strengths and weaknesses of the supplier for that award fee evaluation period. As the final step in the process, the Contracting Officer (CO) for the acquisition will follow up by issuing a unilateral supplier agreement and/or contract modification to authorize payment of any award fee amount.

The award fee earned by the supplier will be determined at the completion of example evaluation periods shown below. The percentages and dollars shown corresponding to each period is the maximum available-award fee amount that can be earned during that particular period (dates to be negotiated as part of the contract). Table 2 provides an example illustrating typical timelines and award fee amounts per evaluation periods.

## AWARD FEE EVALUATION FACTORS

The evaluation guidelines that we have developed are included in this article. To use these criteria effectively, the factors need to be weighted to reflect the buyer's relative priorities. For an acquisition, schedule preservation and cost containment are typically the most important factors on the project. As Table 3 illustrates, that is why these two factors receive forty percent of the weighting. This doesn't mean that the other less traditional critical success factors are not important. As shown, they have a large influence on the total score.

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***Program Managers can stress the importance of one factor over another by weighting what they believe to be the more important factor accordingly.***

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Contractor performance for the criteria continuous integration support and architecture and COTS compatibility receive fifteen percent of the fee each because they are rated as equally important. The remaining three factors, technical performance, program management, and risk management, receive ten percent of the fee. All of these factors are important. Program Managers can stress the importance of one factor over another by weighting what they believe to be the more important factor accordingly. For example, should they wish to emphasize technical performance, they could raise its weight to 0.20 by taking points away from other factors.

**TABLE 3.**  
RATING GUIDE FOR SEVEN SOFTWARE CRITICAL SUCCESS FACTORS

CRITERIA	SCORE	WEIGHT	WEIGHTED SCORE
Factor I – Schedule Preservation		0.20	
Factor II – Continuous Integration Support		0.15	
Factor III – Cost Containment		0.20	
Factor IV – Technical Performance		0.10	
Factor V – Architecture and COTS Compatibility		0.15	
Factor VI – Program Management		0.10	
Factor VII – Risk Management		0.10	
<b>TOTAL SCORE</b>			

**TABLE 4.**  
INTEGRATION COMPONENTS DEFINITIONS AND CHARACTERISTICS

Integration Component	Typical Content	Typical Frequency of Release
Builds	The product of a contract/subcontract is an integral component of a software increment (e.g., radar processing output for air traffic control [ATC]).	Daily
Increments	The product of multiple contracts/subcontracts is integrated together to provide an integral part of the system to be delivered (e.g., sensor data processing system for ATC).	Monthly
Releases	A release of the system that provides interim capabilities needed for integration and test (e.g., ATC capabilities delivered incrementally for integration and testing) or for demonstrating risk reduction.	Quarterly
Versions	A full-up release of the system that has been integrated and tested and is placed under configuration control (may or may not be the delivered capability).	Annually

## AWARD FEE FACTOR RATING GUIDELINES

The following guidelines are offered for three of the seven factors listed in Table 3. We have limited our discussion to just two factors due to space limitations.

### RATING FACTOR I: CONTINUOUS INTEGRATION SUPPORT

For this factor, it is assumed that software versions used during integration are composed of builds, increments, releases, and versions. These integration components used on a large acquisition are defined and characterized in Table 4. If this assumption is correct, the following rating scheme could be used to provide suppliers with contractual incentives to satisfy their commitments and deliver products on time.

#### Unsatisfactory

1. Does not participate in the LSI-led continuous integration activities.
2. Does not support generation of daily builds by the LSI at their integration facilities.
3. Does not deliver increments to the integration facility per the agreed-to release plans.
4. Fails to rectify problems identified during the build/release cycle in their software within the required time period.
5. Fails to interface with and use the LSI's configuration management system (tools, processes, and procedures) to manage the contents of and changes to builds. This system, which is a part of the LSI's software engineering environment, (1) uniquely identifies builds and contents, (2) establishes baselines, (3) enables users to input, retrieve, and change baseline contents, (4) provides audit trails, and (5) provides reports about the current composition of all baselined builds.
6. Fails to interface with and use the LSI's common software problem identification and reporting system. This system, which is also a part of the LSI's software engineering environment, supports compilation, analysis, and reporting of software problems that are reported by those participating in the continuous integration and daily build processes.

#### Satisfactory

1. Actively participates in the LSI-led continuous integration activities.
2. Actively supports the generation of daily builds by the LSI at their integration facilities.

3. Delivers specified increments to the integration facility per agreed-to release plans.
4. Rectifies problems identified during the build/release cycle with their software within the required time period.
5. Interfaces with and uses the LSI's configuration management system to manage the contents of and changes to the builds.
6. Interfaces with and uses the LSI's common software problem identification and reporting system to resolve software trouble reports in a timely manner.

### Very Good

1. Meets the requirements of "Satisfactory," plus:
2. Provides leadership for the LSI-led continuous integration activities.
3. Captures and analyzes software defect metrics during testing. Uses the results of the analysis to identify and repair error-prone modules and to order refactoring activities.
4. Identifies and communicates significant emerging program-wide integration risks and candidate strategies for addressing them as part of their risk management process.

### Excellent

1. Meets the requirements of "Very Good," plus:
2. Captures and analyzes software design defects. The results of the analysis are then used to repair defects in the design pro-actively before they can propagate during the continuous integration activities.
3. Performs root cause analysis when analyzing and repairing defects.
4. Proactively manages integration risks, taking steps to rectify the problem's root cause.

## RATING FACTOR II: ARCHITECTURE AND COTS COMPATIBILITY

Program Managers realize that a stable architecture embracing the use of Commercial Off-The-Shelf (COTS) components, both hardware and software, is a prerequisite to success when practicing evolutionary acquisition. They therefore provide incentives to stabilize the system's architecture as early in the development as possible.

## Unsatisfactory

1. Fails to understand the complexities of the open architecture and the requirements established for integrating their software, especially if it is COTS and open-source software, into the system.
2. Does not budget adequate time and effort to integrate their deliverables into the architecture and demonstrate they satisfy all of the allocated requirements.
3. Fails to trace allocated requirements (functional, performance, quality of service, etc.) to architectural components that were supplied, including COTS and open-source items.
4. Fails to address testing specified operational concepts as it integrates and builds the system.
5. Does not demonstrate adequate progress in integrating their components into the architecture as delivery schedules and build contents dynamically change.
6. Fails to provide adequate evidence that integration and testing of their components satisfies contractual requirements.
7. Fails to provide the documentation needed to develop any *glue code* and/or *wrappers* that are needed to interface their products to the architecture and take advantage of the services it provides its users without degrading functionality or performance.
8. Fails to develop and execute plans for in-process COTS upgrades to avoid delivery of products with obsolete and unsupported COTS releases.

## Satisfactory

1. Demonstrates an understanding of the technical requirements and complexities required to integrate the components of the overall architecture.
2. Budgets sufficient time and effort to integrate their deliverables into the architecture and demonstrate that they satisfy all of the allocated requirements.
3. Traces allocated requirements to architectural components that were supplied, including COTS and open-source items.
4. Adequately tests operational concepts as it builds and integrates the system.
5. The PO provided with evidence that they are making sufficient progress as they integrate their components into the architecture as the delivery schedules and build contents change dynamically.

6. Provides evidence that integration and testing of their components is satisfying contractual requirements.
7. The integrity of the architecture preserved, making recommendations for improvement only when warranted.
8. Sufficient documentation provided for development of any glue code or wrappers that are needed to interface their products to the architecture without any degradation in functionality or performance.
9. Develops in-process COTS upgrade plans (i.e., to address the COTS software refresh and renewal cycles that are often not in synch with the Program's build and release plans) and executes them sufficiently well to avoid deliveries with obsolete and unsupported COTS releases.
10. Provides support for maintaining the standards that provide the foundation for the project's open system implementation.

### Very Good

1. Meets the requirements of "Satisfactory," plus:
2. Actively participates as a member of those Integrated Product Teams who are preparing the architectural requirements and operational concepts.
3. Tests their designs to ensure architectural compliance to the operational architecture, first employing simulations and then "use cases" and/or "usage" scenarios to demonstrate achievement of the desired functionality and end-to-end performance goals.
4. The LSI provided with access to their glue code and wrappers documentation so that they can maintain the interface once the software has been delivered.
5. Identifies and communicates significant emerging program-wide risks associated with the architecture and use of COTS and candidate strategies for addressing them as part of their risk management process.

### Excellent

1. Meets the requirements of "Very Good," plus:
2. Benchmarks employed to demonstrate that their products do not degrade performance and add complexity into the system.

3. Provides the LSI with their source code and documentation so that they can ensure that the software that they build or integrate into the system, as is the case for COTS and open source, performs as expected.
4. Proactively manages the risks associated with the architecture and use of COTS, taking steps as part of their risk management process to rectify the problem's root cause.

## FUTURE PLANS

Several of our affiliates are evaluating whether or not to implement our recommended award fee approach. They are beginning to gather the knowledge base of experience needed to determine whether the idea is working and what modifications are needed. Because the contracts involved are large, it is believed that the potential for incentives will get the supplier teams' attention. As the approach is adopted and acquisitions unfold, the criteria used will undoubtedly be modified to reflect the current situation. As we do so, we plan to publish our "journey," both pro and con, and let the acquisition community in on our experiences.



**Dr. Barry W. Boehm** is the developer of the spiral model and one of the nation's leading figures in the fields of software and systems engineering. Currently he is the Director of the Center for Software Engineering at the University of Southern California. He served as Director of the DARPA Information Science and Technology Office and DDR&E Software and Computer Technology Office from 1989 to 1992. He is a fellow of the ACM, AIAA, IEEE, and INCOSE and is a member of the National Academy of Engineering.

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## AUTHOR **BIOGRAPHY**

## END NOTES

1. See the following web site for definitions of key DoD Direction 5000.1 terms:  
<http://dod500.dau.mil>

## REFERENCES

Reifer, D. J., & Boehm, B. (2003, April). *A model contract/subcontract award fee plan for large, change-intensive software acquisitions*. Los Angeles: University of Southern California.

Under Secretary of Defense (Acquisition, Technology and Logistics). (2003, May 12). *The Defense Acquisition System* (DoD Directive 5000.1). Washington, DC: Author.

Under Secretary of Defense (Acquisition, Technology and Logistics). (2003, May 12). *Operation of the Defense Acquisition System* (DoD Instruction 5000.2). Washington, DC: Author.

University of Southern California. (February, 2000). USC-CSE and CMU-SEI Spiral Development Experience and Implementation Challenges Workshop.