

Introduction to Launch Management

Launch management is the profession developed to aid in the process of launching a satellite into earth orbit. The focus of this guide will be the launch process in terms of the satellite and the activities of integrating the satellite to the launch vehicle (rocket). The launch manager is to be defined as the person who monitors and completes satellite acquisition and subsequent satellite launch and works under the direction of the program office. The launch manager works in conjunction with many contractors including the launch vehicle manufacturer for tangible correlations always exist between the needs of the spacecraft and the abilities of the launch vehicle. A launch manager coordinates efforts of the government and civilian contractors to produce a successful launch. It is the duty of the launch manager to insure the entire launch process for the satellite flows smoothly and is completed in a timely manner. A launch manager supports his employer, the program manager, through the entire process. The launch manager explains, demonstrates, and solves a variety of problems from mission requirements for the satellite, to following the contractors of the launch vehicle's process and fabrication, to launch site safety measures, to understanding a multitude of contracts and documents referencing the satellite. A launch manager is knowledgeable of every aspect of the launch including what has been completed, what is being worked on, and what is to be done at a future date for the satellite. A launch manager has an interest in any field relating to the health and launch of the satellite. A launch manager informs the program manager of all launch issues, so that the program manager is able to make the best possible choices concerning the launch of the satellite. A launch manager is the authority in the development of critical documents and milestones. A launch manager integrates the satellite launch; meaning, the manager brings a variety of launch aspects to fruition and to completion. From technical issues to contractual issues, a launch manager integrates the entire procedure for the launch vehicle and space vehicle. A launch manager's focus is on the launch integration side of space vehicle launches.

A launch manager has significant relevance to a rocket launch since through a launch manager actions are taken and decisions are made. A launch manager has the authority to schedule or cancel critical meetings, to add or subtract items from contracts and other documents via contracting departments, and to construct or remove work done on the actual space vehicle. The ultimate authority for any decision pertaining to launch is the program manager; however, a launch manager acts of behalf of the program manager and a program manager will almost always agree with a launch manager's recommendations on courses of action when sufficient levels of detail and understanding have been demonstrated by a launch manager. A launch manager is held responsible for the success of a launch. A major demand of the launch manger's job is to assure the government and/or any customer involved that all steps have been taken toward a successful satellite launch. These steps are detailed in documentation, reports, and technical studies.

An explanation of the Evolved Expendable Launch Vehicle (EELV) program is important. EELV is an Air Force program. The purpose of EELV is to partner with industry to develop two national launch systems: Atlas V and Delta IV. EELV's program objective is to, "Increase the U.S. space launch industry's competitiveness in the international commercial launch services market. Implement acquisition reform

initiatives resulting in reduced government resources necessary to manage system development, reduced development cycle time, and deployment of commercial launch services.” EELV’s purpose is to lower cost of rocket launch by establishing a standard interface plane between payloads and launch vehicles. In other words, one can take a satellite of a specific size and stick it on top of either a Delta IV or Atlas V and the probability of a successful launch would be equal for either. The goal is to create an “assembly” line for rocket production. Variations of rockets are to have a set of standardized parts, like the fuel tanks, so that differing and time-consuming degrees of deviation are eliminated. For the military, the EELV program will be the sole source of future rocket launches.

A launch manager will find him or herself supporting a variety of institutions. For example, the program office chooses a launch manager (the program office being the authority desiring or chosen by the government to procure a launch vehicle and satellite). The launch manager reflects the interest of the spacecraft being developed and works in conjunction with the launch vehicle contractor (EELV) directly and therefore there is a need for only one launch manager, as the launch manager is also the mission integrator, if we define the mission integrator to be the entity that brings the launch vehicle contractor and space vehicle contractor together for a successful launch.

Satellite Acquisition Process Defined

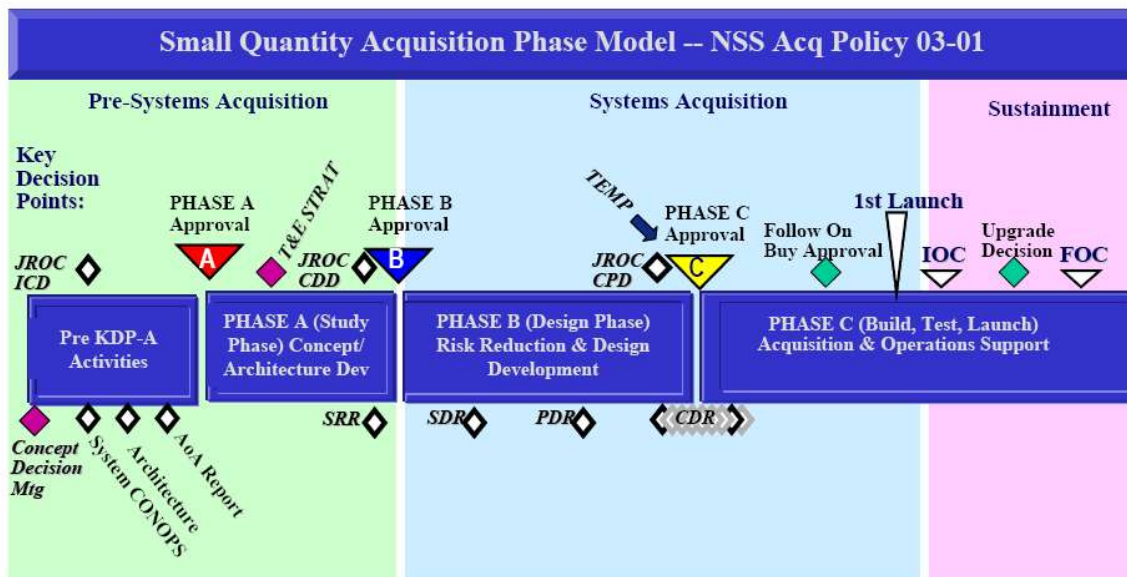


Figure AP1-1: Small Quantity Model

Figure 1: National Security Space Acquisition (NSS) Model. A copy of the NSS is provided in Appendix B.

The above diagram is important since it outlines the entire launch process. The key decision points: A, B, and C, drive the process forward. The DoD Space Milestone Decision Authority (MDA), which is the Undersecretary of the Air Force, is the authority on approving the progress of a launch. For each key decision point, A, B, and C, the DoD Space MDA convenes a Defense Space Acquisition Board (DSAB). The DSAB is lead by the Undersecretary with the Vice Chairman of the Joint Chiefs of Staff being the co-chair.

Other members of the DSAB are representatives from institutions who have an interest in the success of the launch. The program office tasked with establishing a successful launch will present their work to the DSAB before each phase change. If the DSAB is confident in the work done, then it will allow the next phase to begin.

A brief description of the four phases follows.

Pre-Phase A is the start of the launch process. Here actions are taken to define the needs of the military or other institution. For satellites the needs might show that the current network is overtaxed and more satellites are required to maintain stability. With the needs defined, analyses are done to show potential alternatives to solve the problem. Alternatives can include new technology, old ideas, or even a completely new system for solving a problem. There are viable alternatives to satellites when trying to provide communication abilities and it is in this phase that those alternatives are discussed. In this phase the critical documents are the Mission Need Statement (MNS), System Concept Operations (CONOPS), and the Analysis of Alternatives (AoA). Refer to the documents section of this guide for a description of critical documents. The conclusion of this phase comes when the DoD Space MDA decides on the system which will best help solve the problem. Key Decision Point A is when the DoD Space MDA decides on the desired solution.

Phase A is the concept and architecture development phase (CAD). The activities of this phase typically include concept studies, system architecture development, technology maturity assessments, requirements development, support concept trade studies, test and evaluation strategy development, and industrial capability assessments for key technologies and components. An important segment of phase A is devoted to Source Selection. Source Selection is the process whereby a space vehicle and/or launch vehicle is chosen. The program office creates a group of qualified individuals, the launch manager included, whose purpose is to decide which contractor is to create the satellite and/or rocket on which the satellite will fly. Various contractors will have submitted their proposals for phase A in response to the government's request for work to be done. The Source Selection committee will review the proposals and then recommend to the program office which contractor is superior. Once the DoD Space MDA authorizes the program office to choose the contractor, phase A ends with Key Decision Point B being the selection of the contractor(s). There are several critical documents produced in this phase including: Operations Requirements Document (ORD), System Performance Requirements Document (SPRD), and Request for Proposal (RFP).

Phase B is the Risk Reduction and Design Development (RR&DD) phase. With the onset of phase B, the United States Congress operates a program's funding and is the ultimate authority on a program's completion or termination. Early integration tests, which are tests of mathematical models of the space vehicle and launch vehicle, are conducted in this phase. These tests prove what forces (including thermal, vibrations and other stresses—see the documents section of this guide for more information) the spacecraft can withstand and still have a successful launch. Within phase B, progress on the Interface Control Document (ICD) continues. This document, which would begin its preparation in phase A or sometimes before, states all the features of the launch vehicle and the interface that the space vehicle will require to attach safely to the rocket. The Critical Design Review (CRD) is an essential meeting and often occurs at the end of phase B and is associated with being milestone C. However, the CDR does not need to

occur for phase B to end. If the program office can show that an acceptable level of risk reduction, test evaluation, and technology development has transpired, then the DSAB will allow the process to proceed.

Phase C is the build phase. In this phase, the actual satellite and launch vehicle are produced. This phase can be the longest of the three, for in it launch and space vehicles are produced and launched and new contracts for new (follow on) vehicles are awarded if required. Also in this phase are launch site and range safety issues addressed.

The following sections of the launch management guide are meant to describe the deliverables of a launch manager. Deliverables are defined to be work done, documents created, or activities accomplished. Deliverables of a launch manager are often group compilations, meaning the launch manager does not produce the entire document or contract him or herself, but provides input, direction, or follows and reports on the development of the product being addressed. Remember that a launch manager's concern is the safe launch of a satellite into earth orbit. Any activity or action relating to the health of the satellite is of interest to a launch manager. Issues dealing with the launch site, launch vehicle, contractual disagreements, funding, critical and casual meetings, and situations associated with the satellite itself are all important.