MIL-HDBK-881

DoD Handbook -- Work Breakdown Structure

2 January 1998

Superseding: MIL-STD-881B *Work Breakdown Structures for Defense Materiel Items* 25 March 1993

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Foreword

1. This handbook is approved for use by all Departments and Agencies of the Department of Defense.

2. This handbook is for guidance only. This handbook cannot be cited as a requirement. If it is, the contractor does not have to comply.

3. A work breakdown structure (WBS) provides a consistent and visible framework for defense materiel items and contracts within a program. This handbook offers uniformity in definition and consistency of approach for developing the top three levels of the work breakdown structure. The benefit of uniformity in the generation of work breakdown structures and their application to management practices will be realized in improved communication throughout the acquisition process.

4. This handbook addresses mandatory procedures for those programs subject to DOD Regulation 5000.2-R. It also provides guidance to industry in extending contract work breakdown structures.

5. This handbook is a conversion of MIL-STD-881B, *Work Breakdown Structures for Defense Materiel Items*, with no substantive changes in work breakdown structure definition. MIL-STD-881B was based on the cooperative efforts of the military services, with assistance from industrial associations.

6. Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: OUSD(A&T)API/PM, 3020 Defense Pentagon, Room 3E1025, Washington, DC 20301-3020 by using the self-addressed Standardization Document Improvement Proposal (DOD Form 1426) appearing at the end of this document or by letter.

Acronyms

A

ACAT	Acquisition Category

C

CARD	Cost Analysis Requirements Description
CCDR	Contractor Cost Data Reporting
CDRL	Contract Data Requirements List
CPR	Cost Performance Reports
CFSR	Contract Funds Status Reports
CLIN	Contract Line Item Number
CSCI	Computer Software Configuration Item
C/SSR	Cost/Schedule Status Reports

E

ESWBS	Extended Ship Work Breakdown Structure
EVMS	Earned Value Management System

M

MIL-STD	Military Standard

R

R&D	Research and Development
RFP	Request for Proposal

S

SOW	Statement of Work
W	
WBS	Work Breakdown Structure

Chapter 1:

General Information

1.1 -- Handbook Purpose and Structure

This handbook presents guidelines for preparing, understanding, and presenting a work breakdown structure (WBS). After the general purpose of work breakdown structures is discussed in Chapter 1, the handbook provides instructions on how to develop a program work breakdown structure (Program WBS) in Chapter 2. Chapter 3 offers guidance for developing and implementing a contract work breakdown structure (Contract WBS). Chapter 4 examines the role of the work breakdown structure in contract negotiation and award and in post-contract performance. The appendices present definitions of work breakdown structures for specific applications. The handbook's primary objective is to achieve a consistent application of the work breakdown structure. The information it contains is intended to provide guidance to contractors and direction to government project managers.

1.2 -- Support Documentation

The foundation for work breakdown structures is contained in DoD Directive 5000.1 and DoD Regulation 5000.2-R. These documents identify responsibilities in the acquisition process from the Office of the Secretary of Defense to the Department of Defense (DoD) component field activities. Preparing a work breakdown structure is generally discussed in the context of planning and monitoring a defense materiel system program.

1.3 -- Intended Use of Handbook

This handbook is directed primarily at the preparation of a work breakdown structure for a defense materiel item. This includes all materiel items or major modifications established as an integral program element of the Future Years Defense Program or otherwise designated by the DoD component or the Under Secretary of Defense (Acquisition and Technology).

The guidance is appropriate for use with any work breakdown structure developed at any phase -- Concept Exploration, Program Definition and Risk Reduction, Engineering and Manufacturing Development, or Production -- during the acquisition process.

The handbook clearly delineates the overlapping responsibilities of DoD program managers and contractors relative to work breakdown structures.

1.4 -- What Does a Work Breakdown Structure Accomplish?

1.4.1 -- Applications

This handbook addresses two fundamental and interrelated types of work breakdown structures -- the Program WBS and the Contract WBS. The Program WBS provides a framework for specifying the objectives of the program. It defines the program in terms of hierarchically related product-oriented elements. Each element provides logical summary points for assessing technical accomplishments and for measuring cost and schedule performance.

The Contract WBS is the government-approved work breakdown structure for reporting purposes and its discretionary extension to lower levels by the contractor, in accordance with government direction and the contract work statement. It includes all the elements for the products (hardware, software, data, or services) which are the responsibility of the contractor.

Further, the work breakdown structure serves as a coordinating medium. Through the Program WBS and the Contract WBS, work is documented as resources are allocated and expended. Technical, schedule, and cost data are routinely generated for reporting purposes. The work breakdown structures summarize data for successive levels of management and provide the appropriate information on the projected, actual, and current status of the elements for which they are responsible. The WBS keeps the program's status constantly visible so that the program manager, in cooperation with the contractor, can identify and implement changes necessary to assure desired performance.

1.4.2 -- Benefits

The work breakdown structure assists in several ways during the life of a program. A WBS:

- Separates a defense materiel item into its component parts, making the relationships of the parts clear and the relationship of the tasks to be completed -- to each other and to the end product -- clear.
- Significantly affects planning and the assignment of management and technical responsibilities.
- Assists in tracking the status of engineering efforts, resource allocations, cost estimates, expenditures, and cost and technical performance.
- Helps ensure that contractors are not unnecessarily constrained in meeting item requirements.

1.4.3 -- Challenges

The primary challenge is to develop a work breakdown structure which defines the logical relationship between all the elements of the program and its natural extension with the contract.

Defining the Contract WBS to the third level of indenture does not constrain the contractor's ability to define or manage the program and resources. However, if the government considers elements of the program to be high cost or high risk, the system may be defined to a lower level of the WBS. This is reasonable as long as the product-oriented logical extension is maintained. In any event the contractor should extend all other elements to the level and form that the contractor desires based on the way the system is developed, produced, or managed.

A second challenge is to balance the program definition aspects of the WBS with its data-generating aspects. Using available data to build historic files to aid in the future development of similar defense materiel items is a very valuable resource. Remember, however, that the primary purpose of the work breakdown structure is to define the program's structure, and the need for data should not distort or hinder the program definition.

1.5 -- How is the WBS Related to Other Contract Requirements?

The work breakdown structure provides the basis for communication throughout the acquisition process. It is the common link which unifies the planning, scheduling, cost estimating, budgeting, contracting, configuration management, and performance reporting disciplines. Through consistent communications it permits the government and industry managers to evaluate progress in terms of contract performance.

The work breakdown structure forms the basis for reporting structures used for contracts requiring compliance with the Earned Value Management System (EVMS) Criteria and reports placed on contract such as Contractor Cost Data Reporting (CCDR), Cost Performance Reports (CPR), Contract Funds Status Reports (CFSR), and Cost/Schedule Status Reports (C/SSR).

1.6 -- Definitions

The definitions provided in the following paragraphs are intended to improve continuity throughout the acquisition process and support a common understanding of program expectations.

1.6.1 -- Program Element

This term -- the basic building block of the Future Years Defense Program -- describes the mission to be undertaken and lists the organizational entities identified to perform the mission assignment. A program element may consist of forces, manpower, materiel (both real and personal property), services, and associated costs, as applicable.

1.6.2 -- Defense Materiel Item

This term identifies a system or item usually established as an integral program element or identified as a project within an aggregated program element.

1.6.3 -- Work Breakdown Structure

This term is defined as:

- A product-oriented family tree composed of hardware, software, services, data, and facilities. The family tree results from systems engineering efforts during the acquisition of a defense materiel item.

- A WBS displays and defines the product, or products, to be developed and/or produced. It relates the elements of work to be accomplished to each other and to the end product.

- A WBS can be expressed down to any level of interest. However the top three levels are as far as any program or contract need go unless the items identified are high cost or high risk. Then, and only then, is it important to take the work breakdown structure to a lower level of definition.

Work breakdown structures apply to seven specific categories of defense materiel items. Summaries of those categories are provided below; complete definitions are included as Appendices A-H. Just as the system is defined and developed throughout its life cycle, so is the work breakdown structure. The WBS will be developed and maintained based on the systems engineering efforts throughout the system's life cycle.

1.6.4 -- Common Elements

This term identifies the elements that are applicable to all seven major systems. Common elements are:

- integration, assembly, test, and checkout efforts
- systems engineering and program management
- training
- data
- system test and evaluation
- peculiar support equipment
- common support equipment
- operational and site activation
- industrial facilities
- initial spares and repair parts

In addition to these common elements, each defense system has a unique complex of equipment (hardware and software) which defines the capability or end product of that system.

- ***aircraft system*** -- applies to fixed or movable wing, rotary wing, or compound wing manned/unmanned air vehicles designed for powered or unpowered (glider) guided flight

- ***electronic/automated software system*** -- applies to electronic, automated, or software system capability

- ***missile system*** -- applies to a weapon in an operational environment which produces a destructive effect on selected targets

- ***ordnance system*** -- applies to all munitions (nuclear, biological, chemical, psychological, and pyrotechnic) and the means of launching or firing them

- ***ship system*** -- applies to naval weapons, or performing other naval tasks at sea

- ***space system*** -- applies to developing, delivering, and maintaining mission payloads in specific orbit placement, operation, and recovery of manned and unmanned space systems

- ***surface vehicle system*** -- applies to navigation over the surface

1.6.5 -- Level Identification

The top three levels are specified in a work breakdown structure.

- Level 1 is the ***entire defense materiel item;*** for example, an electronic system. An "electronic system" might be a command and control system, a radar system, a communications system, an information system, a sensor system, a navigation or guidance system, or an electronic warfare system. Level 1 is usually directly identified as a program or a sub-element of a program.

- Level 2 elements are the ***major elements*** of the defense materiel item; for example, a fire control system or an automatic flight control system. These prime mission products include all hardware and software elements, aggregations of system level services (like system test and evaluation, or systems engineering and program management), and data.

- Level 3 elements are ***elements subordinate*** to level 2 major elements. For example, a radar data processor, a signal processor, an antenna, a type of service (like development test and evaluation, contractor technical support, or training services), or a type of data (like technical publications) would be typical level 3 elements for an electronic system. Lower levels follow the same process.

1.6.6 -- Program WBS

The Program WBS is the structure that encompasses an entire program. It consists of at least three levels of the program with associated definitions and is used by the government program manager and contractor to develop and extend a Contract WBS. The Program WBS has uniform terminology, definitions, and placement in the product-oriented family tree structure.

1.6.7 -- Contract WBS

The Contract WBS is the complete work breakdown structure for a contract. It includes the DoD-approved Program WBS extended to the agreed contract reporting level and any discretionary extensions to lower levels for reporting or other purposes. It includes all the elements for the products (hardware, software, data, or services) which are the responsibility of the contractor. This comprehensive work breakdown structure forms the framework for the contractor's management control system.

1.7 -- WBS Evolution

Throughout the life cycle of any system, the systems engineering function takes the lead in system development. This includes the development of system specifications, functional specifications, or a set of configuration items. The systems engineering process impacts requirements analysis, functional analysis and allocation, synthesis and systems analysis, and controls. Satisfying total systems cost, schedule, and performance requirements at an acceptable level of risk is the important factor. The purpose of these efforts is to define and design system product and process solutions in terms of design requirements that satisfy the functional architecture, and then to define and integrate the system as a physical architecture. The DoD program manager plays a key role in this process, and as the system is defined and developed throughout the life cycle, the program manager can better understand the work breakdown structure. Figure 1-1 provides an illustration of the system life cycle. The work breakdown structure follows the same path.

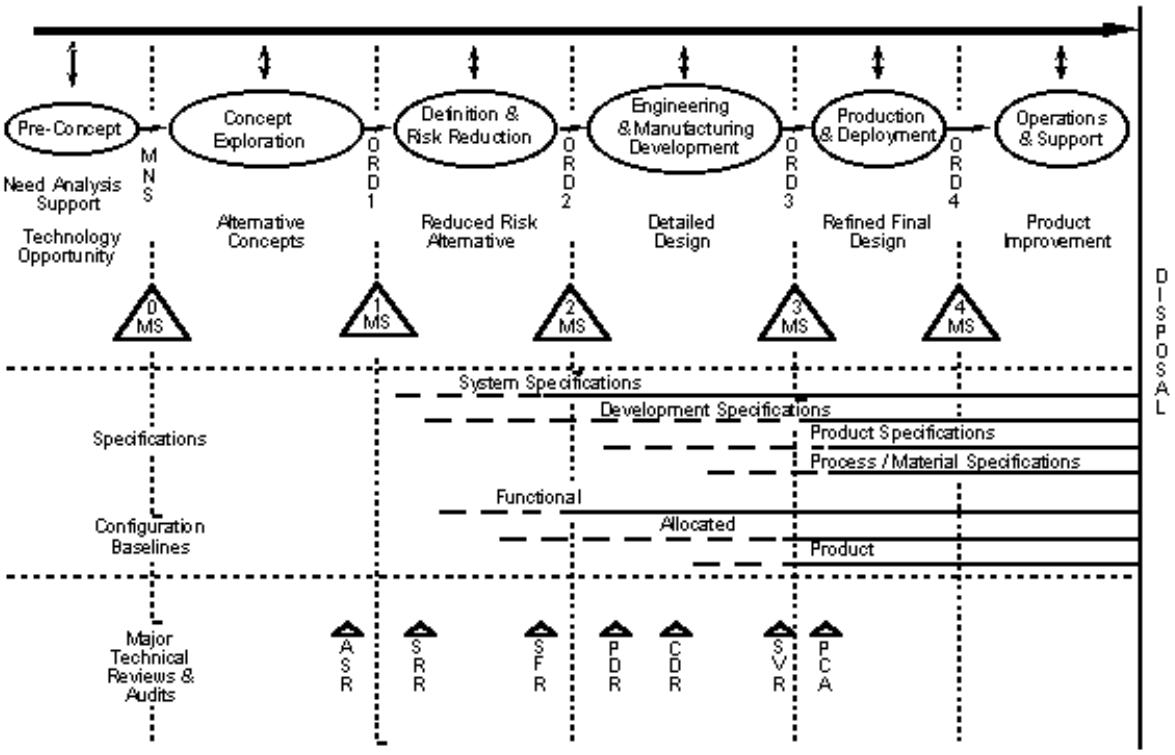

Figure 1-1: -- System Life Cycle

Through the conceptual phase, program work breakdown structures are usually in an early stage of development. Since the system is mainly a concept, it is not until the Program Definition and Risk Reduction phase that the system is described in terms of its specifications, and -- if the program is large enough -- contract work breakdown structures could be defined. In this phase, configuration items that describe the program work breakdown structure are first identified and contracts approved to develop these items. By the end of development, the work breakdown structure is fully defined to its lowest levels, and contract work breakdown structures are

extended to those levels that best define the system. Figure 1-2 displays the evolution of this process

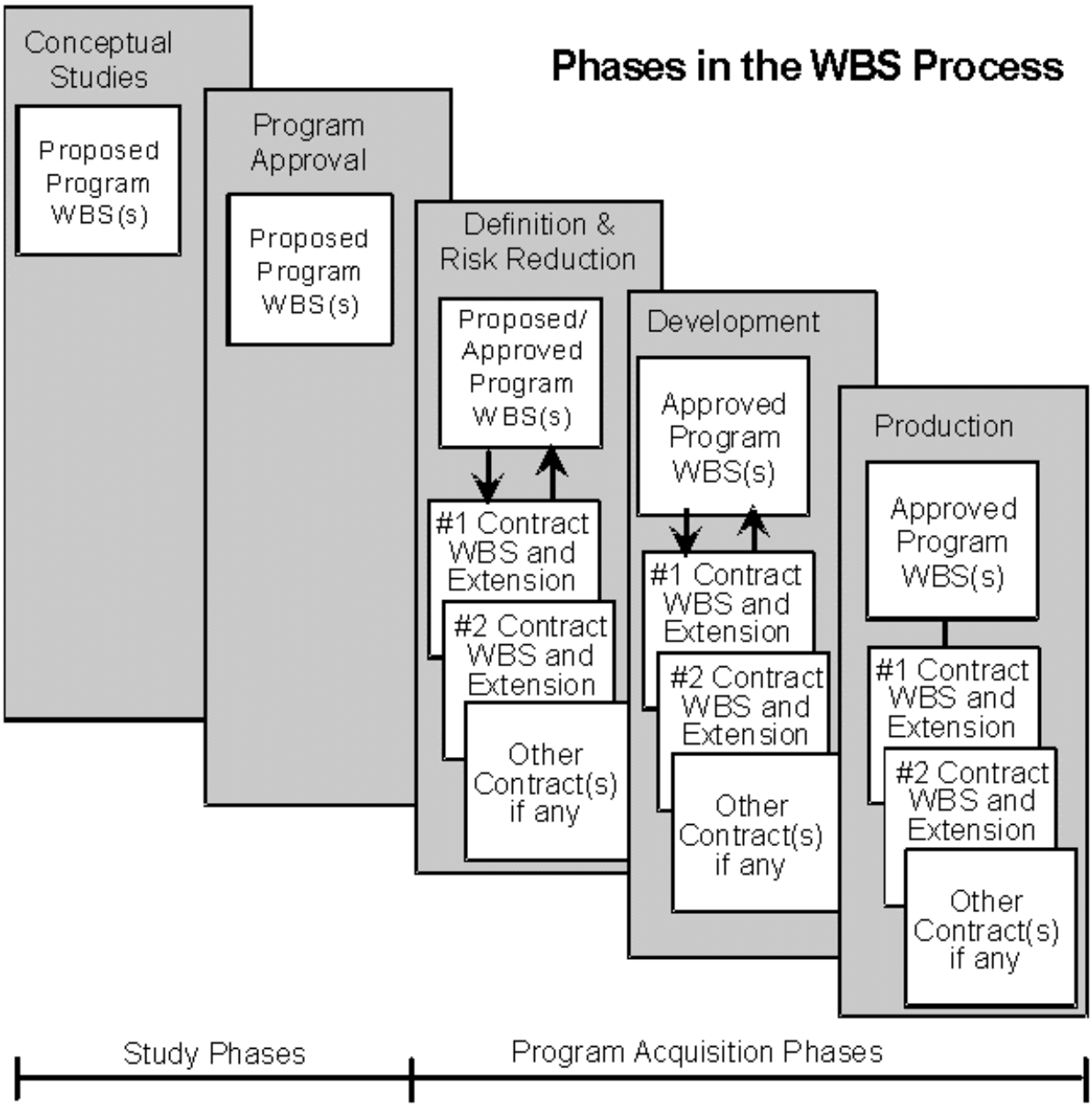

Figure 1-2: -- WBS Evolution

After the Program WBS has been approved, contract work breakdown structures may then be extended to lower levels by the contractor to define the complete contract scope. When it is integrated with the Program WBS, the extended Contract WBS forms a complete work breakdown structure which will be used throughout the acquisition cycle. Figure 1-2 displays this process in the Definition and Risk Reduction, Development, and Production blocks.