



TECHNICAL REPORT

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Configuration and Data Management Training Course

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FOREWORD

This EIA Bulletin No. CMB6-9 "Configuration and Data Management Training Course", is presented by the Electronic Industries Association G-33 Data and Configuration Management Committee. It has been prepared to provide materials for teaching a configuration/data management in-house training course.

The intent of this document is to provide the foundation material for a training program. It should be augmented by company procedures and tailored for the business environment within which your company operates as well as your organizational structure.

Appreciation is extended to Donald Snowden, IBM Systems Integration Division and John Poore, Allied Signal Aerospace Company, Fluid Systems Division, for extensive research and valuable assistance in preparing this material.

The figures in this package were provided by a number of defense contractors and by the Department of Defense. The writers of this material wish to acknowledge the contributions of these sources; without their help it would have been difficult to generate the degree of detail provided.

The appearance of a reference in this Bulletin does not necessarily imply endorsement by the EIA.

CONFIGURATION/DATA MANAGEMENT

AN OVERVIEW

WHAT IS CONFIGURATION?

DEFINITION

THE FUNCTIONAL AND/OR PHYSICAL
CHARACTERISTICS OF
HARDWARE/SOFTWARE AS SET FORTH IN
TECHNICAL DOCUMENTATION AND
ACHIEVED IN A PRODUCT.

WHAT IS CONFIGURATION MANAGEMENT?

. DEFINITION

A DISCIPLINE APPLYING TECHNICAL AND ADMINISTRATIVE DIRECTION AND SURVEILLANCE TO (A) IDENTIFY AND DOCUMENT THE FUNCTIONAL AND PHYSICAL CHARACTERISTICS OF A CONFIGURATION ITEM, (B) CONTROL CHANGES TO THOSE CHARACTERISTICS, AND (C) RECORD AND REPORT CHANGE PROCESSING AND IMPLEMENTATION STATUS.

WHY NEEDED?

- ▶ TO KEEP THE DESIGN, DEVELOPMENT, TEST AND PRODUCTION TEAMS IN STEP AND COMPLIANT WITH REQUIREMENTS
- ▶ TO CONTROL CHANGES IN AN ORDERLY WAY
 - CONTRACTOR-ORIGINATED...RESULT OF DESIGN AND IMPLEMENTATION PROCESS
 - CUSTOMER-ORIGINATED...NEW OR MODIFIED REQUIREMENTS
- ▶ TO ENSURE THAT THE DELIVERED PRODUCT MEETS REQUIREMENTS AND IS CONSISTENT WITH ITS ENGINEERING DOCUMENTATION

EVOLUTION OF CM AS A FORMAL DISCIPLINE

- ▶ DOCUMENTING TECHNICAL DESIGNS IS A LONG-STANDING ENGINEERING PRACTICE
 - DRAWINGS
 - SPECIFICATIONS
 - BILLS OF MATERIALS
 - IDENTIFICATION NUMBERS
 - CHANGE CONTROL PROCEDURES
- ▶ FORMAL CM PROCESSES EMERGED IN 50s/60s TO MANAGE INCREASINGLY COMPLEX AIRCRAFT, WEAPONS, AND SPACE SYSTEMS
 - LOTS OF PEOPLE ○ LOTS OF DATA
 - LOTS OF DOLLARS ○ LONG LIFE CYCLES
- ▶ EVOLVED TO COVER GROWING IMPORTANCE OF SOFTWARE
- ▶ CURRENTLY MANDATED ON ALL GOVERNMENT PROGRAMS
- ▶ NO LESS IMPORTANT ON COMMERCIAL PROGRAMS!

... EVEN THOUGH THE FULL RIGOR OF MIL STDs MAY NOT BE MANDATORY

BENEFITS?

...CONSIDER THE CONSEQUENCES OF INADEQUATE CM

▶ FIELDIED SYSTEMS/HARDWARE/SOFTWARE

- INABILITY TO MAINTAIN
- INABILITY TO MODIFY
- INABILITY TO BUY MORE OF SAME

▶ NEWLY PRODUCED SYSTEMS

- INABILITY TO DEMONSTRATE FUNCTIONALITY

- INABILITY TO ENGINEER UPGRADES

▶ SYSTEMS STILL IN DEVELOPMENT

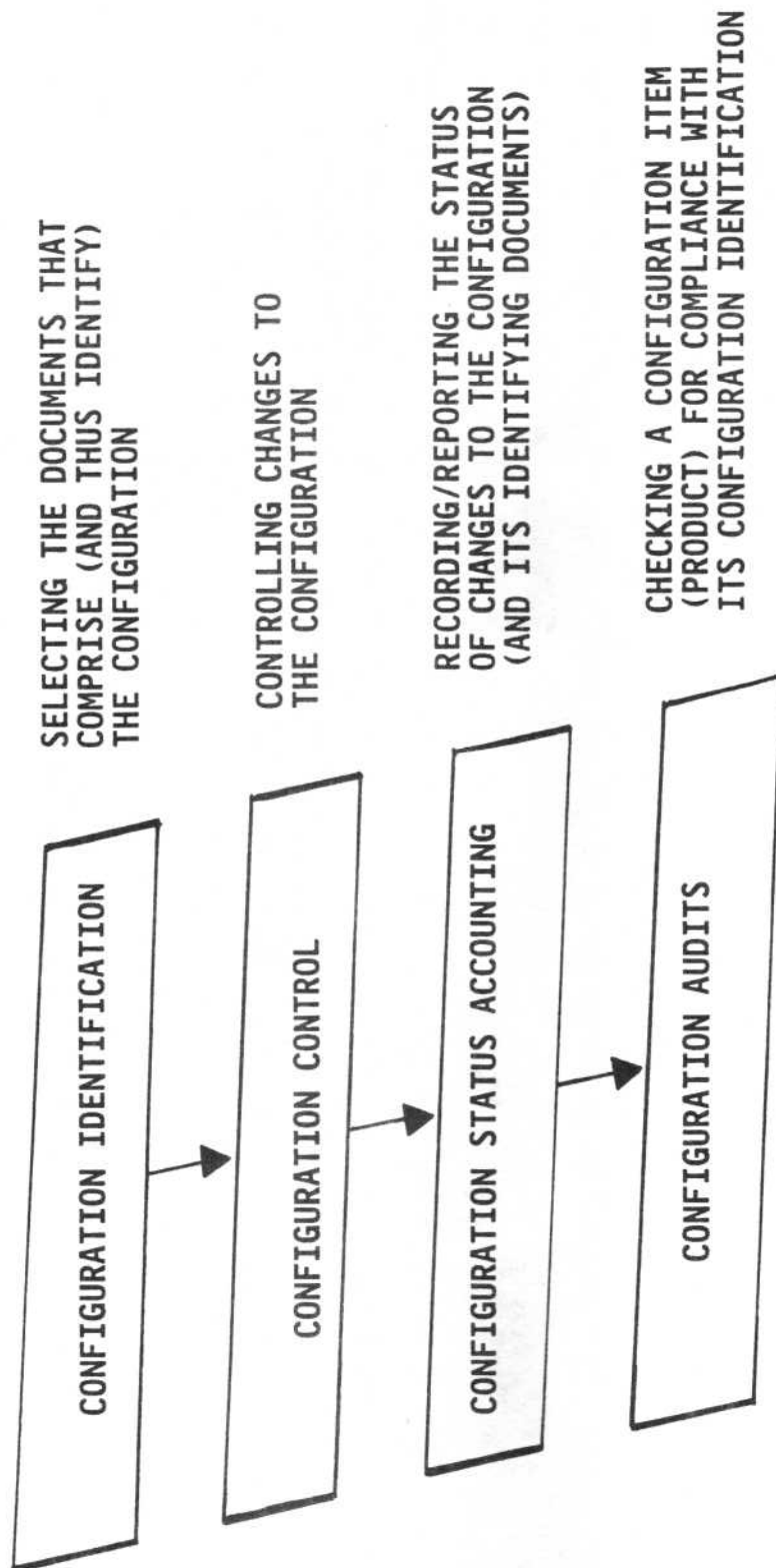
- MISDIRECTION OF DEVELOPMENT EFFORT

- CONTRACT SHORTFALLS
 - PERFORMANCE
 - SCHEDULE
 - COST

- CUSTOMER DISSATISFACTION

- TEAM MORALE PROBLEMS

THE FOUR CLASSICAL CM FUNCTIONS



CONFIGURATION IDENTIFICATION

. DEFINITION - (FORMAL)

THE CURRENT APPROVED OR CONDITIONALLY APPROVED TECHNICAL DOCUMENTATION FOR A CONFIGURATION ITEM (CI) AS SET FORTH IN SPECIFICATIONS, DRAWINGS AND ASSOCIATED LISTS, AND DOCUMENTS REFERENCED THEREIN.

. DEFINITION - (SIMPLE)

THE DOCUMENTS THAT IDENTIFY THE PRODUCT CONFIGURATION (BASELINE).

CONFIGURATION CONTROL

. DEFINITION - (FORMAL)

THE SYSTEMATIC EVALUATION, COORDINATION, APPROVAL OR DISAPPROVAL, AND IMPLEMENTATION OF ALL APPROVED CHANGES IN THE CONFIGURATION OF A CI/CSCI AFTER FORMAL ESTABLISHMENT OF ITS CONFIGURATION IDENTIFICATION.

. DEFINITION - (SIMPLE)

CONTROLLING CHANGES TO THE CONFIGURATION (BASELINE).

CONFIGURATION STATUS ACCOUNTING

. DEFINITION - (FORMAL)

THE RECORDING AND REPORTING OF THE INFORMATION THAT IS NEEDED TO MANAGE CONFIGURATION EFFECTIVELY, INCLUDING A LISTING OF THE APPROVED CONFIGURATION IDENTIFICATION, THE STATUS OF PROPOSED CHANGES TO CONFIGURATION, AND THE IMPLEMENTATION STATUS OF APPROVED CHANGES.

. DEFINITION - (SIMPLE)

RECORDING AND REPORTING THE STATUS OF CHANGES TO THE CONFIGURATION AND ITS DOCUMENTATION.

REVIEWS AND AUDITS

DEFINITION (FORMAL)

TECHNICAL MEETINGS TO DETERMINE THE ADEQUACY OF THE CONTRACTOR'S TECHNICAL DOCUMENTATION OF A CI OR THE CI ITSELF AND TO DETERMINE THE CONTRACTOR'S READINESS TO PROCEED TO THE NEXT MAJOR LIFE-CYCLE MILESTONE.

DEFINITION (SIMPLE)

A FORMAL TECHNICAL MEETING TO REVIEW OR VALIDATE FUNCTIONAL AND PHYSICAL CHARACTERISTICS AND STATUS.

OBJECTIVES OF CM

- ▶ ENSURE THAT EVERYONE ON THE PROPOSAL AND PERFORMANCE TEAM KNOWS:
 - WHAT WE PROPOSE TO BUILD
 - WHAT WE ARE SUPPOSED TO BUILD
 - WHAT WE ARE BUILDING
 - WHAT WE HAVE BUILT
- ▶ ENSURE THAT THE CUSTOMER:
 - GETS WHAT'S WANTED
 - KNOWS PRECISELY WHAT HE/SHE GETS
 - CAN MODIFY AND MAINTAIN THE PRODUCT AND GET MORE OF THE SAME

WHEN?

- . BEGINS WITH RFP**
- . PROGRAM LIFE CYCLE**

CM TERMINOLOGY

- ▶ **CONFIGURATION** .. THE FUNCTIONAL AND PHYSICAL CHARACTERISTICS OF A PRODUCT/SYSTEM, AS DESCRIBED IN ITS TECHNICAL DOCUMENTATION (SPECIFICATION, DRAWINGS, DATA, ETC.)
- ▶ **SPECIFICATION TREE** .. THE HIERARCHY OF SPECIFICATIONS OF THE SYSTEM AND ITS MAJOR HARDWARE (HW) AND SOFTWARE (SW) ELEMENTS.
- ▶ **CONFIGURATION ITEM** .. A MAJOR, SEPARABLE PART OF THE PRODUCT/SYSTEM DESIGNATED FOR FORMAL CONFIGURATION MANAGEMENT
 - o HARDWARE CONFIGURATION ITEM (CI OR HWCI)
 - o COMPUTER SOFTWARE CONFIGURATION ITEM (CPCI OR CSCI)
- ▶ **BASELINE** .. APPROVED SET OF DOCUMENTATION DESCRIBING THE PRODUCT/SYSTEM AT A SPECIFIC POINT IN THE LIFE CYCLE
- ▶ **DESIGN REVIEW** .. FORMAL STEP IN PROCESS OF OBTAINING CUSTOMER UNDERSTANDING AND APPROVAL OF BASELINES AND AUTHORIZATION OF SUBSEQUENT WORK
- ▶ **AUDITS** .. FORMAL INSPECTIONS OF CONFIGURATION ITEMS TO VERIFY COMPLIANCE OF "PRODUCT" WITH "DOCUMENTATION"

PRINCIPAL CM MECHANISMS

- ▶ CONFIGURATION CONTROL BOARDS
- ▶ DESIGN REVIEWS AND AUDITS
- ▶ STATUS ACCOUNTING TOOLS
- ▶ CM PLAN

CM PLANS

. DEFINITION (FORMAL)

THE CONFIGURATION MANAGEMENT PLAN DEFINES THE IMPLEMENTATION (INCLUDING POLICIES AND METHODS) OF CONFIGURATION MANAGEMENT ON A PARTICULAR PROGRAM/PROJECT. IT MAY OR MAY NOT IMPOSE CONTRACTOR REQUIREMENTS DEPENDING ON WHETHER IT IS INCORPORATED ON THE CONTRACT.

. DEFINITION (SIMPLE)

A PLAN DESCRIBING THE ORGANIZATIONS' RESPONSIBILITIES AND PROCEDURES THAT WILL BE USED TO MEET CONTRACTUAL CONFIGURATION MANAGEMENT REQUIREMENTS. WHEN APPROVED, THE CM PLAN SERVES AS THE VEHICLE OF UNDERSTANDING BETWEEN THE PROCURING ACTIVITY AND THE CONTRACTOR AS TO HOW THE CM PROGRAM WILL BE IMPLEMENTED AND RUN.

CONTENT OF A TYPICAL CM PLAN

- ▶ APPLICABLE CM REQUIREMENTS, TAILORED TO CONTRACT
- ▶ CM ORGANIZATION, RESPONSIBILITIES, AND INTERFACES
 - CM MANAGER
 - NUMBER, SCOPE, AND MEMBERSHIP OF CCBS
 - RELATIONSHIP OF CM AND ASSOCIATED FUNCTIONS
 - DEVELOPMENT & TEST
 - DATA MANAGEMENT
 - ENGINEERING RECORDS
 - QUALITY ASSURANCE
 - CONTRACTS
- ▶ PROCESSES AND TOOLS
 - ECP FORMATS
 - STATUS ACCOUNTING SYSTEM
 - REPORTING FORMATS
- ▶ TYPICAL CM DIDS: DI-E-2035B (DOD)
DI-HAP-B030 (FAA)

CM MEANS BASELINE CONTROL

