MIL-STD-498
SOFTWARE DEVELOPMENT AND DOCUMENTATION
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ABSTRACT

MIL-STD-498
SOFTWARE DEVELOPMENT AND DOCUMENTATION

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BACKGROUND: In October 1991 the JLC/CRM established a DOD Harmonization Working Group to:
- Merge DOD-STD-2167A and DOD-STD-7935A
- Resolve the issues associated with the use of these standards
- Ensure compatibility with recent changes with in DOD directives, instructions, standards, and handbooks

OVERVIEW: MIL-STD-498 will provide the DOD a single standard for software development, it will cover both MCCR and AIS software, and is expected to be completed by 30 June 1994. For the first time in DOD's history, all software acquisition and development related requirements will be in one place. MIL-STD-498 will also provide a customer/supplier consensus based standard that will provide a transition to commercial software standard. DOD and industry are working with ISO to ensure the consistency with ISO 12207 Information Technology-Software Life Cycle Process.

DISCUSSION: MIL-STD-498 is a standard for the software development process. It is applicable throughout the system acquisition cycle and any life-cycle process model. The standard establishes uniform requirements for acquiring, developing, modifying, and documenting software in weapon systems and automated information systems. The basic requirements of the standard are that the software development contractor establish a software development process consistent with contract requirements, that reliable and systematic methods be chosen to perform the development activities, and that a software engineering environment be used that supports the processes and methods. The standard further requires the contractor to determine the work products that will result from the development process and that the development process be integrated with the support processes. This briefing to the SPC TAB/TAG should provide insight to the member companies regarding possible changes to their software development process.
MIL-STD-498
SOFTWARE DEVELOPMENT AND DOCUMENTATION

"REENGINEERING THE SOFTWARE DEVELOPMENT PROCESS."

PRESEN'TED BY:
PERRY R. DEWEES
AGENDA

- BACKGROUND
- CHANGES FROM DOD-STD-2167A
- FEATURES OF MIL-STD-498
- RELATIONSHIP WITH OTHER STANDARDS
- RELATIONSHIP TO YOUR SOFTWARE DEVELOPMENT PROCESS
BACKGROUND

- WHY MIL-STD-498?
- SUPERSEDED STANDARDS
- STATUS
WHY MIL-STD-498?

- SINGLE SOFTWARE PROCESS STANDARD FOR THE DOD
- RESOLVES ISSUES FROM DOD-STD-2167A
- INCORPORATES REQUIREMENTS OF DODI 5000.2
- PROVIDES A SOFTWARE PROCESS STANDARD THAT INCORPORATES THE "BEST" PRACTICES
How They Should Be Changed

Integrated, Adaptable Products and Development Processes

Markets/Customer Needs

Organizational and Product Line Development

Best Practices

External Engineering Assets

Evolving Product and Process Needs

Customers/Product Needs

System Development

External Engineering Assets

Internal Engineering Assets

Systematic Process Improvement
SUPERSEDED STANDARDS

- DOD-STD-2167A "DEFENSE SYSTEM SOFTWARE DEVELOPMENT"
- DOD-STD-7935A "DOD AUTOMATED INFORMATION SYSTEMS DOCUMENTATION STANDARDS"
- DOD-STD-1703(NS) NSA SOFTWARE DEVELOPMENT
STATUS

- RELEASE REVISED STANDARD 31 MAY 1994
- QUICK REVIEW BY DOD HARMONIZATION WORKING GROUP (HWG)
- SUBMITTAL FOR OSD SIGNATURE 30 JUNE 1994
CHANGES FROM DOD-STD-2167A (CONT'D)

- DEFAULT LIFECYCLE AND METHODS
  - REMOVES IMPLIED WATERFALL MODEL
  - REMOVES IMPLIED FUNCTIONAL DECOMPOSITION METHOD
  - REMOVES SOFTWARE PARTITIONING REQUIREMENT
  - PROVIDES STRUCTURE TO CREATE A LIFECYCLE MODEL FOR A SOFTWARE PROJECT
CHANGES FROM DOD-STD-2167A (CONT'D)

- DEFAULT DOCUMENTATION AND FORMAL REVIEWS
  - REMOVES DOCUMENTATION AS THE DEVELOPMENT PRODUCT
  - SEPARATES PLANNING AND ENGINEERING ACTIVITIES FROM PREPARATION OF DELIVERABLES
  - EMPHASIZES THAT DEVELOPMENT AND RECORDING OF INFORMATION AS INTRINSIC TO SOFTWARE DEVELOPMENT
  - REMOVES FORMAL REVIEWS AND CONTRACTUAL BASELINES
CHANGES FROM DOD-STD-2167A (CONT'D)

- REUSABLE SOFTWARE
  - ELIMINATES DISTINCTION REGARDING SOURCE, i.e COTS, GOTS, NDI, ETC., CLASSIFICATION
  - IDENTIFIES CRITERIA IN EVALUATING REUSABLE SOFTWARE
  - REQUIRES INCORPORATION CRITERIA
  - PROVIDES GUIDANCE INTERPRETING MIL-STD-498 ACTIVITIES AND DELIVERABLES
CHANGES FROM DOD-STD-2167A (CONT'D)

• CASE TOOLS

  • REMOVES BARRIERS TO USING CASE WORK PRODUCT OUTPUT
  • PERMITS REPRESENTATIONS FROM CASE TOOLS IN RECORDING INFORMATION
  • PROVIDES DIDs AS A CHECKLIST FOR DETERMINING "APPLICABLE" WORK PRODUCTS
Process Engineering Architecture

Organizational Drivers
- Business Area Drivers

Standard Process Architecture
- Life-Cycle Models
- Standard Process Elements
- Standard Process Definition

Standards Policies

Process Assets

Engineer Standard Organizational Process Assets.

Project Process Architecture
- Project Process Definition
- Software Development Plan
- Procedures
- Project Drivers
- Project Resources
- Tailor and Instantiate Project Processes

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CHANGES FROM DOD-STD-2167A (CONT'D)

- POST DEPLOYMENT SOFTWARE SUPPORT
  - INCLUDES SPECIFIC REQUIREMENTS FOR SUPPORT
  - PLANNING
  - INCLUDES SPECIFIC PRODUCT INFORMATION
  - REQUIRES SUPPORT SUITABILITY DEMONSTRATION
CHANGES FROM DOD-STD-2167A (CONT'D)

- SOFTWARE QUALITY ASSURANCE
  - ELIMINATES THE SEPARATION OF SQA FROM THE SOFTWARE DEVELOPMENT PROCESS
  - INCLUDES SQA AS AN INTEGRAL PROCESS
  - INTERPRETS THE APPLICABLE CLAUSES OF MIL-Q-9858, ANSI Q91, AND ISO 9001
  - INCLUDES ACTIVITY AND PRODUCT PROCESS EVALUATIONS
FEATURES OF MIL-STD-498

- EMPHASIS ON SOFTWARE DEVELOPMENT PROCESS
- EMPHASIS ON WORK PRODUCTS
- USE OF SOFTWARE DEVELOPMENT METHODS
- USE OF A SOFTWARE ENGINEERING ENVIRONMENT
- SUPPORTS INTEGRATED PRODUCT TEAMS
- SUPPORTS PROBLEM RESOLUTION
- INTEGRATES SUPPORTING PROCESSES
FEATURES OF MIL-STD-498 (CONT'D)

• EMPHASIS ON SOFTWARE DEVELOPMENT PROCESS

• REQUIRES THE ESTABLISHMENT OF A SOFTWARE DEVELOPMENT PROCESS CONSISTENT WITH CONTRACT REQUIREMENTS

• PROVIDES GUIDANCE ON APPLYING THE STANDARD TO VARIOUS LIFECYCLE MODELS, eg
  • GRAND DESIGN
  • INCREMENTAL
  • EVOLUTIONARY
  • REENGINEERING
  • REVERSE ENGINEERING
FEATURES OF MIL-STD-498 (CONT'D)

- EMPHASIS ON WORK PRODUCTS

- ESTABLISHES THAT THE DEVELOPMENT AND RECORDING OF PLANNING AND ENGINEERING INFORMATION IS AN INTRINSIC PART OF THE DEVELOPMENT PROCESS

- THESE WORK PRODUCTS RESULT FROM THE IMPLEMENTATION OF THE CONTRACTORS PROCESSES, ENVIRONMENT AND METHODS SELECTED TO SATISFY THE CONTRACT REQUIREMENTS

- ONLY THOSE WORK PRODUCTS APPLICABLE TO THE DEVELOPMENT ACTIVITY ARE REQUIRED
FEATURES OF MIL-STD-498 (CONT'D)

- USE OF SOFTWARE DEVELOPMENT METHODS
  - REQUIRES WELL DOCUMENTED AND SYSTEMATIC METHODS
  - WELL DOCUMENTED INCLUDES CONTRACTORS IMPLEMENTATION AND USE
  - METHODS MUST BE PROVEN SUFFICIENT TO SUPPORT THE ACTIVITY
FEATURES OF MIL-STD-498 (CONT'D)

- USE OF A SOFTWARE ENGINEERING ENVIRONMENT
  
  - REQUIRES THE CONTRACTOR TO ESTABLISH, CONTROL, AND MAINTAIN A SOFTWARE ENGINEERING ENVIRONMENT TO SUPPORT THE SOFTWARE ENGINEERING EFFORT
  
  - SOFTWARE ENGINEERING ENVIRONMENT SUPPORTS THE PROJECT PROCESSES, METHODS, AND ACTIVITIES OF THE SELECTED LIFECYCLE MODEL
FEATURES OF MIL-STD-498 (CONT'D)

- SUPPORTS INTEGRATED PRODUCT TEAMS
  - DEFINES REQUIREMENTS FOR SOFTWARE TO PARTICIPATE IN SYSTEMS DEVELOPMENT ACTIVITIES
  - REQUIRES THAT SOFTWARE BE MANAGED AS AN INTEGRAL PART OF THE OVERALL SYSTEM DEVELOPMENT
  - THE STANDARD IS APPLICABLE ACROSS THE TOTAL DEVELOPMENT LIFECYCLE
  - DOD HAS DECIDED THAT MIL-STD-498 IS A TOP-LEVEL PROCESS STANDARD LIKE MIL-STD-499B
FEATURES OF MIL-STD-498 (CONT'D)

- SUPPORTS PROBLEM RESOLUTION
  - STRUCTURED TO RESOLVE PROBLEMS IN THE DEVELOPMENT ACTIVITY WHERE THEY OCCURRED
  - JOINT REVIEWS ARE STRUCTURED TO RESOLVE TECHNICAL AND MANAGEMENT AT THE LOWEST PRACTICAL LEVEL
FEATURES OF MIL-STD-498 (CONT'D)

- INTEGRATES SUPPORTING PROCESSES
  - SUPPORTING PROCESSES ARE INTENDED TO BE INTEGRATED INTO THE SOFTWARE DEVELOPMENT PROCESS
  - THERE IS NO IMPLIED ORGANIZATIONAL STRUCTURE
  - CERTAIN INTEGRAL PROCESSES REQUIRE ORGANIZATION FREEDOM TO ENSURE PRODUCT INTEGRITY, i.e.
    - SOFTWARE PRODUCT EVALUATIONS
    - SOFTWARE QUALITY ASSURANCE
    - CORRECTIVE ACTION
  - HOWEVER, THE ORGANIZATION FREEDOM REQUIREMENTS ARE SIMILAR TO THE "TESTING" REQUIREMENTS
RELATIONSHIP WITH OTHER STANDARDS

- MIL-STD-499B
- ISO 12207
- ISO 9000
RELATIONSHIP WITH OTHER STANDARDS (CONT'D)

- MIL-STD-499B SYSTEMS ENGINEERING
  - STRENGTHENS THE ROLE OF SOFTWARE ENGINEERING IN THE SYSTEMS ENGINEERING PROCESS
  - ADDS CSCI INTEGRATION TESTING BEFORE SYSTEMS TESTING
  - SOFTWARE IS RECOGNIZED AS A MAJOR COMPONENT IN MIL-STD-499B
RELATIONSHIP WITH OTHER STANDARDS (CONT'D)

- ISO 12207 INFORMATION TECHNOLOGY-SOFTWARE LIFECYCLE PROCESS
  - MIL-STD-498 IS AN ELABORATION OF THE ISO 12207 SOFTWARE DEVELOPMENT PROCESS NODE
  - MIL-STD-498 WILL NEXT BE RELEASED AS AN ANSI/ISO STANDARD
RELATIONSHIP WITH OTHER STANDARDS (CONT'D)

- ISO 9000 QUALITY MANAGEMENT AND QUALITY ASSURANCE STANDARDS

- MIL-HDBK-9000 USE OF ISO/ANSI STANDARDS IN LIEU OF -9858 AND -2168

- ISO 9000-3 GUIDELINES FOR THE APPLICATION OF ISO 9001 TO THE DEVELOPMENT, SUPPLY AND MAINTENANCE OF SOFTWARE
RELATIONSHIP TO YOUR "SOFTWARE DEVELOPMENT PROCESS"

- IMPACT
- RECOMMENDATIONS
IMPACT OF MIL-STD-498

- If your current development process is based on:
  - Formal documentation
  - Formal reviews
  - Waterfall model
  - Functional decomposition
  - Tool point solutions
  - Contract specific instantiations
- Plan on "Reengineering your software engineering process"
CURRENT "REQUIREMENTS"

1. Development Activity
   - Formal Documentation
     - Software Product Evaluations
       - Formal Reviews
         - Baseline
RECOMMENDATIONS FOR IMPLEMENTATION

- SELECT SOFTWARE DEVELOPMENT PROCESSES THAT SUPPORT YOUR LOB's
- SELECT METHODS THAT IMPLEMENT THE DEVELOPMENT METHODS WITHIN THE PROCESS
- SELECT SOFTWARE ENGINEERING ENVIRONMENT THAT SUPPORTS THE PROCESS AND METHODS
- DETERMINE THE WORK PRODUCTS THAT RESULT FROM THE PROCESS-METHODS-ENVIRONMENT
- INTEGRATE SUPPORTING PROCESSES AND ENSURE THE FUNCTIONS ARE DEFINED
- TRAIN-TRAIN-TRAIN
- DOCUMENT AND ESTABLISH A CPI PROCESS