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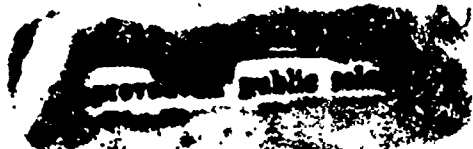
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MIL-STD-498
SOFTWARE DEVELOPMENT AND
DOCUMENTATION

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MIL-STD-498 SOFTWARE DEVELOPMENT AND DOCUMENTATION

SPC-94032-CMC

VERSION 01.00.00

JULY 1994

Perry R. DeWeese

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ABSTRACT

MIL-STD-498 SOFTWARE DEVELOPMENT AND DOCUMENTATION

PERRY R. DEWEESE

LOCKHEED AERONAUTICAL SYSTEMS COMPANY

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.



LOCKHEED AERONAUTICAL SYSTEMS COMPANY

MIL-STD-498
SOFTWARE DEVELOPMENT AND
DOCUMENTATION

"REENGINEERING THE SOFTWARE
DEVELOPMENT PROCESS?"

PRESENTED BY:
PERRY R. DEWEESE



AGENDA

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



BACKGROUND

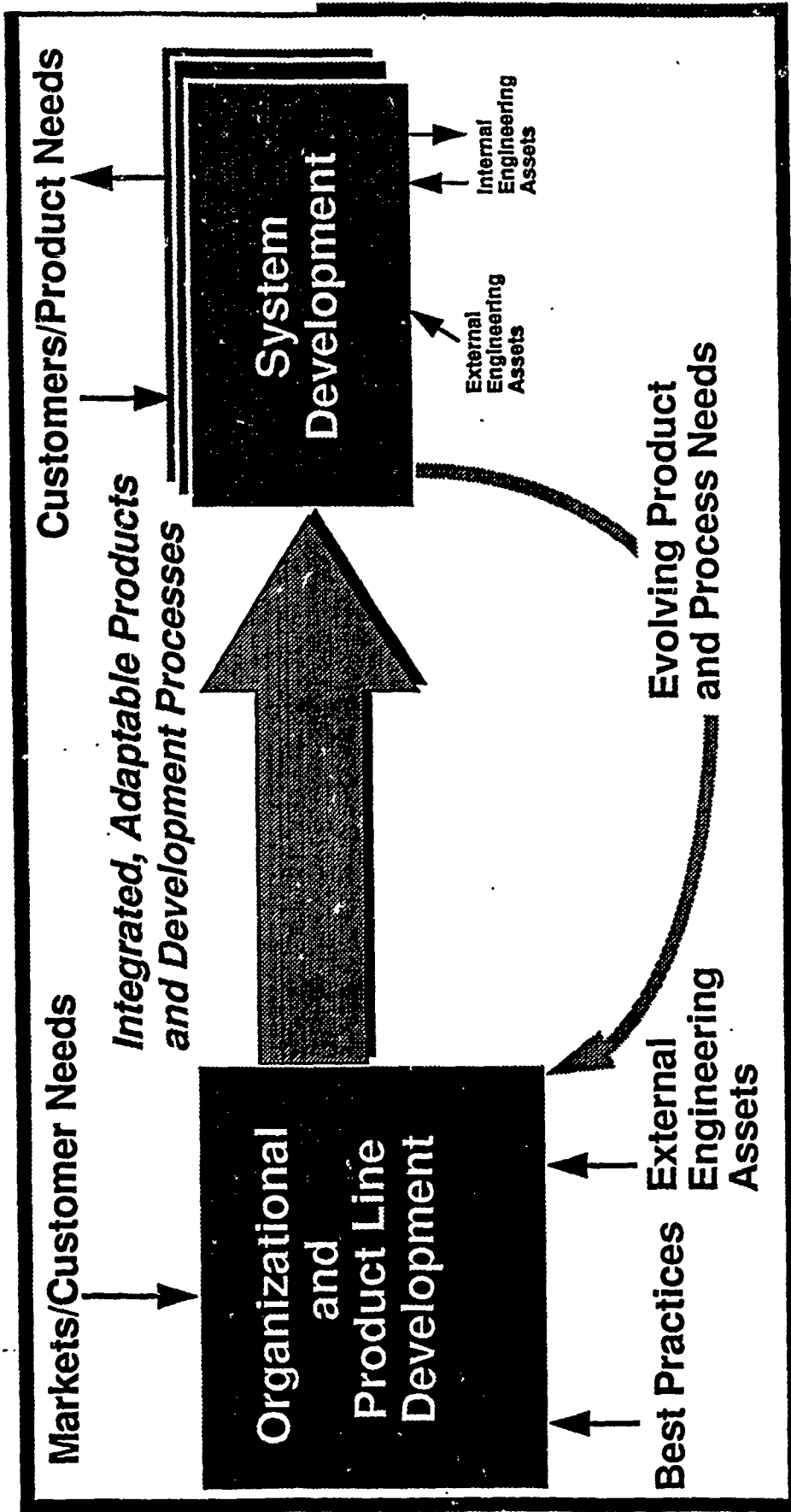
- WHY MIL-STD-498?
- SUPERSEDED STANDARDS
- STATUS



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



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



LOCKHEED AERONAUTICAL SYSTEMS COMPANY

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

- DEFAULT LIFECYCLE AND METHODS
- DEFAULT DOCUMENTATION AND FORMAL REVIEWS
- REUSABLE SOFTWARE
- CASE TOOLS
- POST DEPLOYMENT SOFTWARE SUPPORT
- SOFTWARE QUALITY ASSURANCE



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

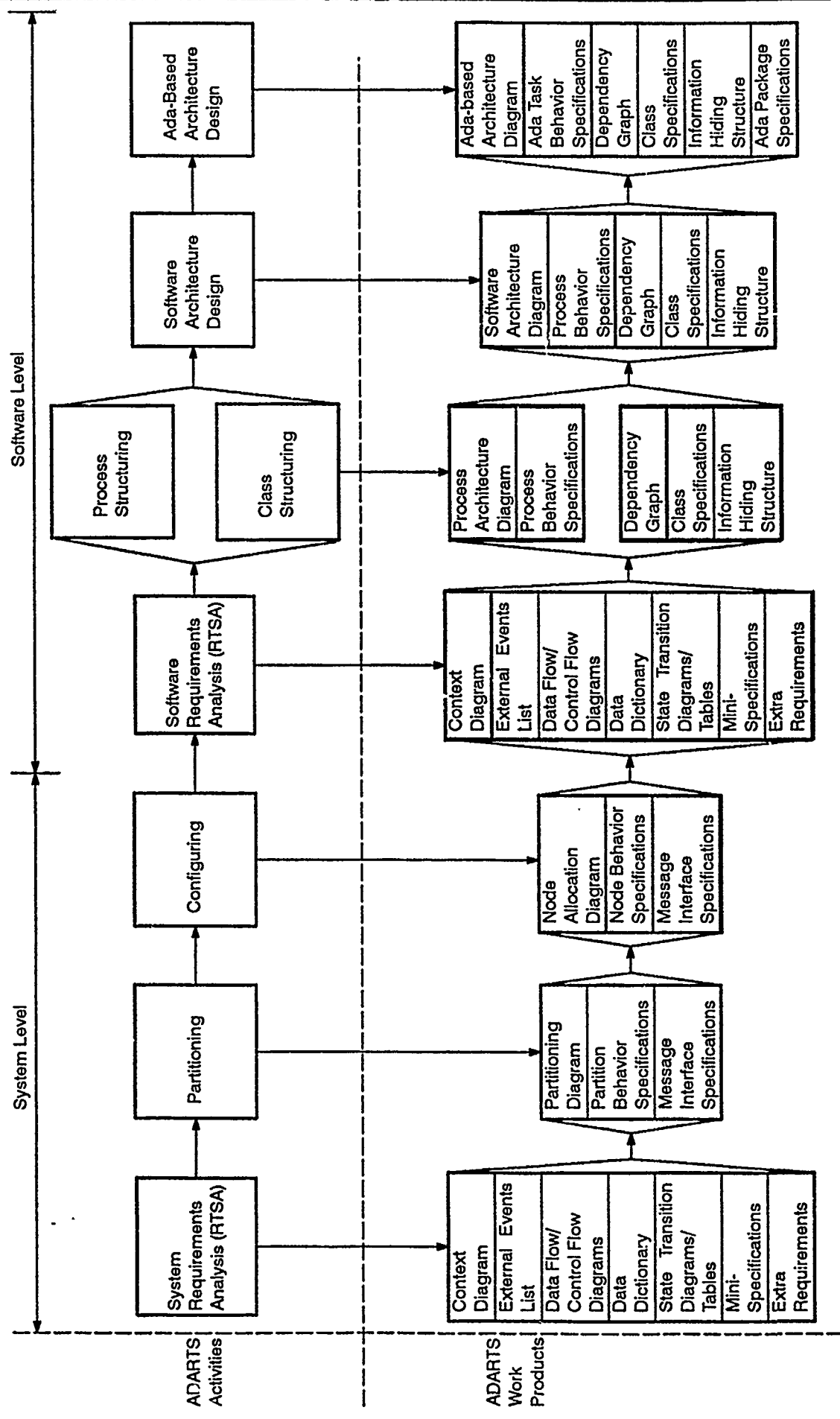
- DEFAULT LIFECYCLE AND METHODS
- REMOVES IMPLIED WATERFALL MODEL
- REMOVES IMPLIED FUNCTIONAL DECOMPOSITION METHOD
- REMOVES SOFTWARE PARTITIONING REQUIREMENT
- PROVIDES STRUCTURE TO CREATE A LIFECYCLE MODEL FOR A SOFTWARE PROJECT



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**

ADARTS Activities and Products





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

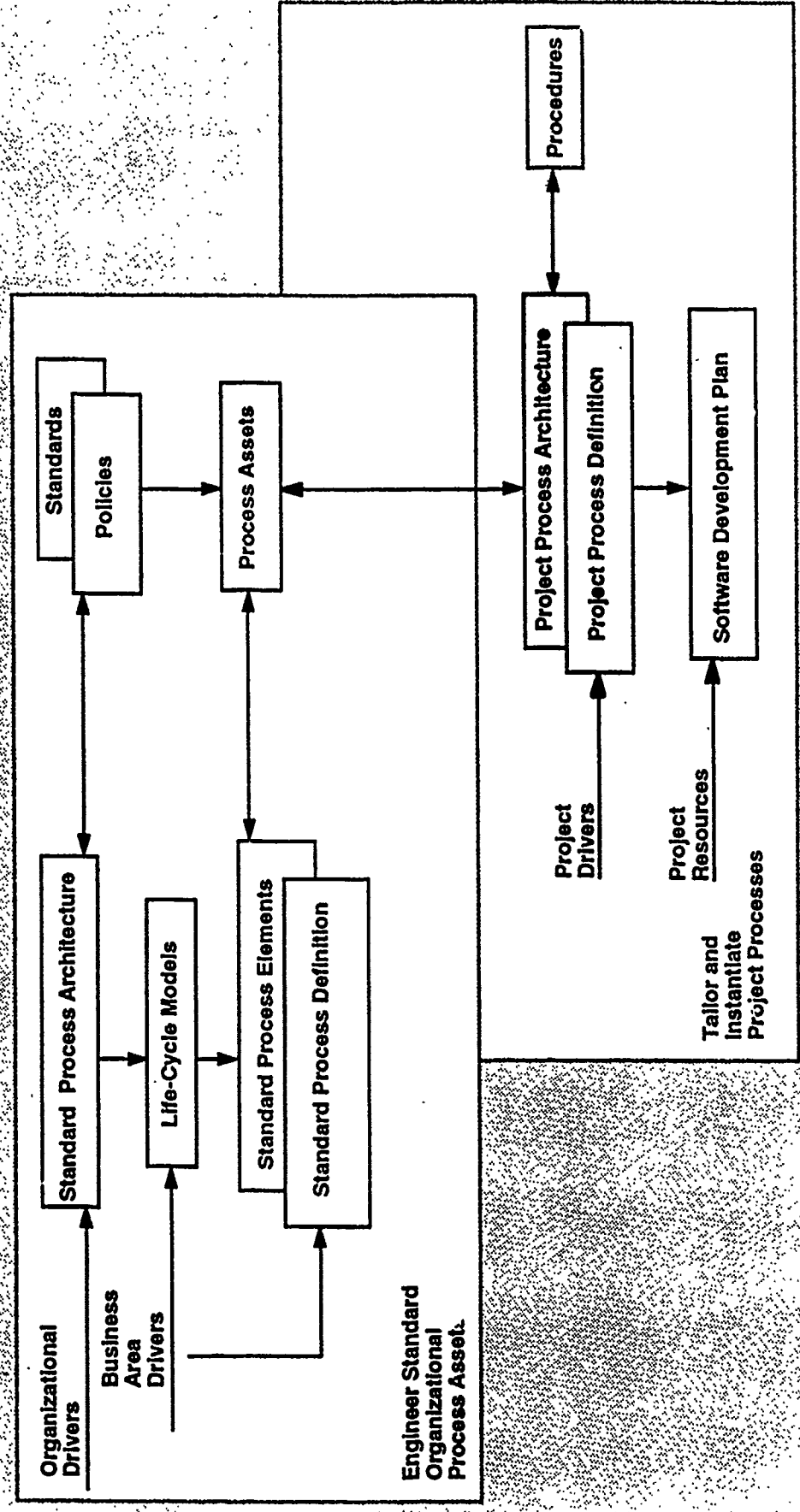
- REUSABLE SOFTWARE
- ELIMINATES DISTINCTION REGARDING SOURCE, ie COTS, GOTS, NDI, ETC., CLASSIFICATION
- IDENTIFIES CRITERIA IN EVALUATING REUSABLE SOFTWARE
- REQUIRES INCORPORATION CRITERIA
- PROVIDES GUIDANCE INTERPRETING MIL-STD-498 ACTIVITIES AND DELIVERABLES



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





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 ENGINEERS 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, ie
 - SOFTWARE PRODUCT EVALUATIONS
 - SOFTWARE QUALITY ASSURANCE
 - CORRECTIVE ACTION
- HOWEVER, THE ORGANIZATION FREEDOM REQUIREMENTS ARE SIMILAR TO THE "TESTING" REQUIREMENTS



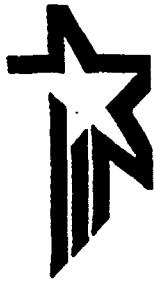
RELATIONSHIP WITH OTHER STANDARDS

- 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

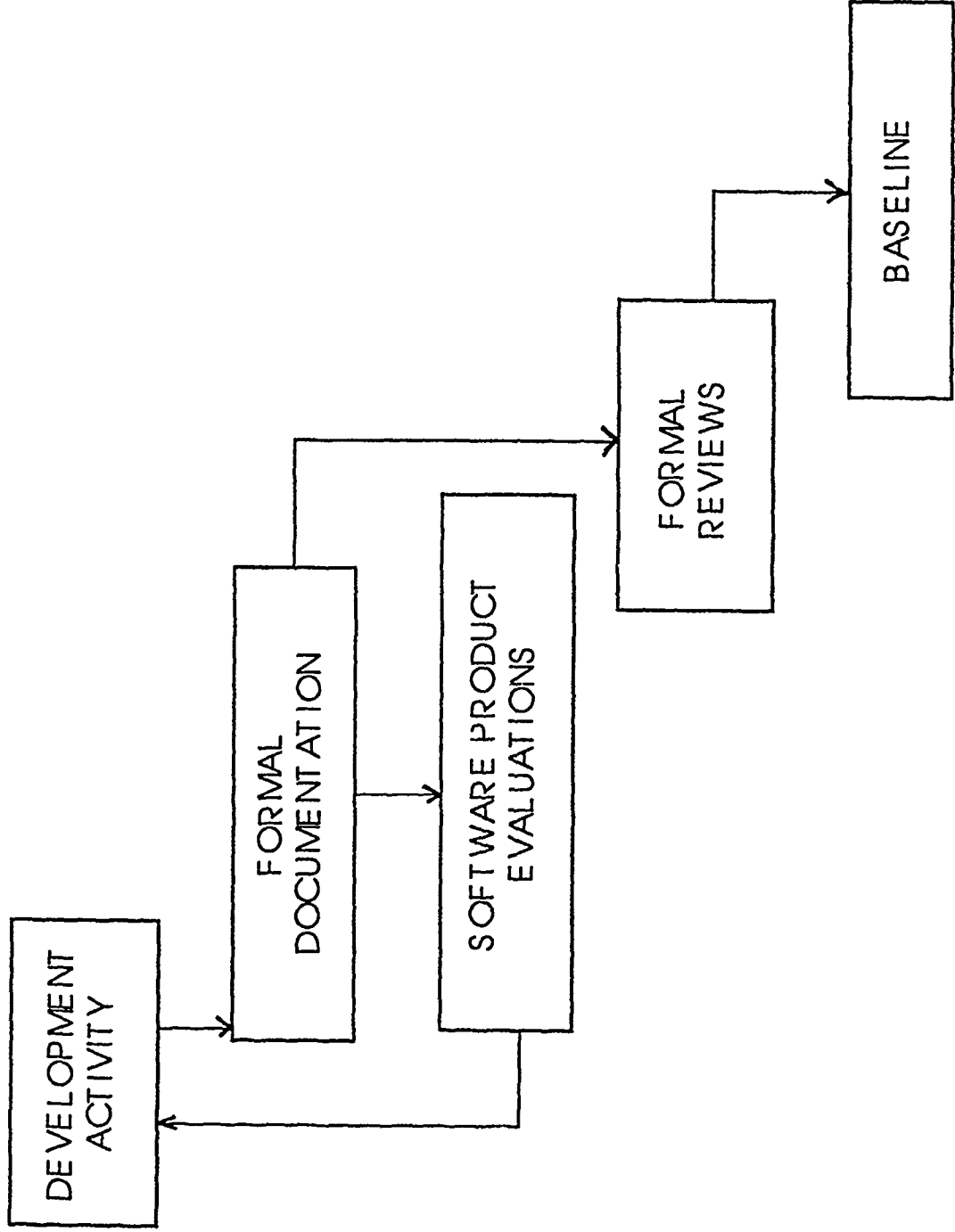


IMPACT OF MIL-STD-498

- **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"**

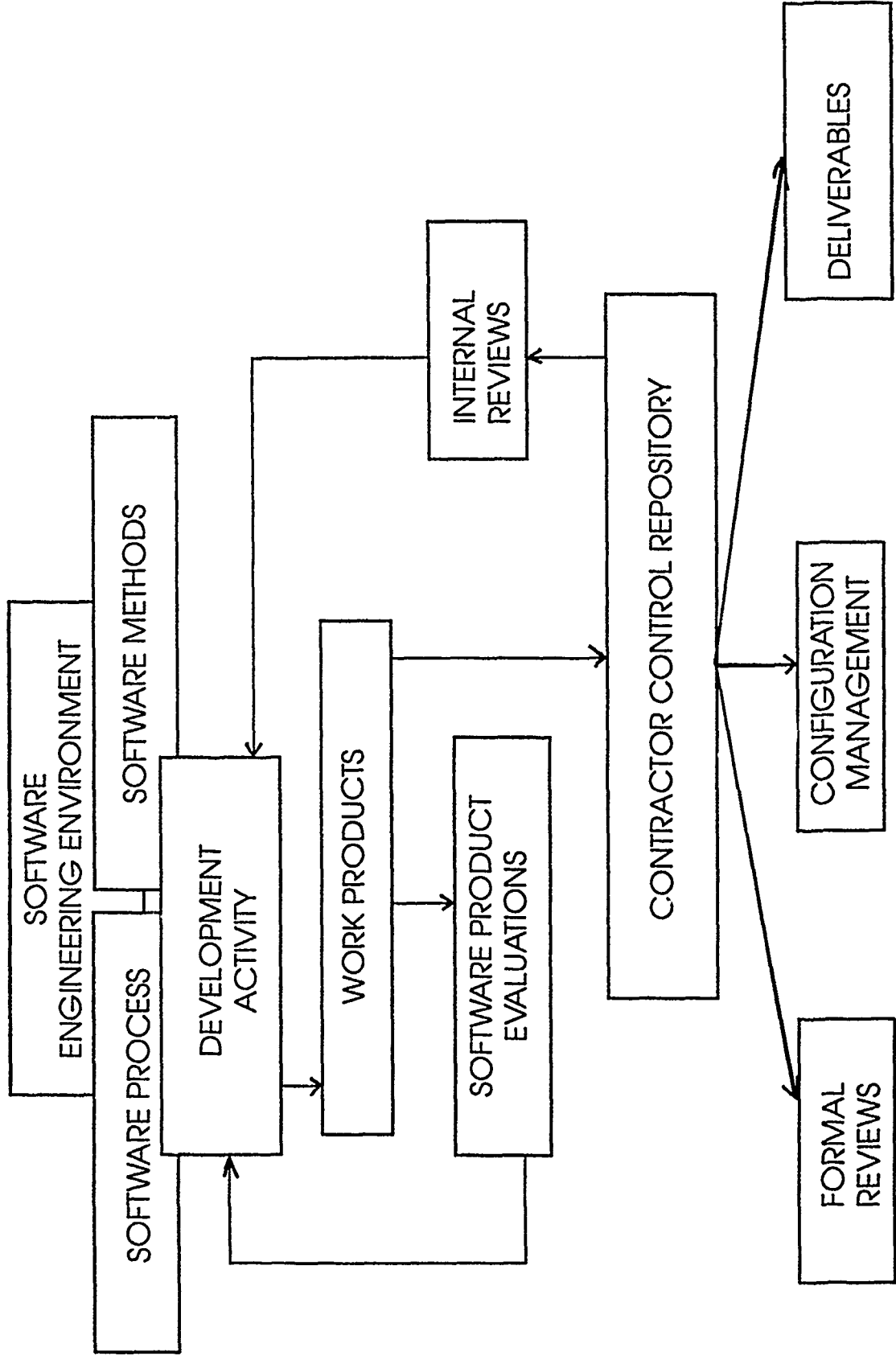


CURRENT "REQUIREMENTS"





MIL-STD-498 REQUIREMENTS





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

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