



Conducting Software Reviews Prior to Certification: *Assessing RTCA/DO- 178B Compliance*

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Objectives of Tutorial

- Use the Software Job Aid for Performing Software Reviews
 - Describe the Tasks, Processes, & Activities Outlined in the Job Aid
 - Explain the 4 Stages of Involvement
 - Identify How to Tailor the Job Aid for Different Projects
 - Describe How Findings/Observations are Documented

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Tutorial Overview

- Background Information & Job Aid Layout
- Section I - Introduction
- Section II - Overview of the Review Process
- Section III - Getting Started
- Section IV & V - Review Tasks/Activities/Questions
- Desk-top Review Considerations
- Tailoring the Job Aid
- Summary

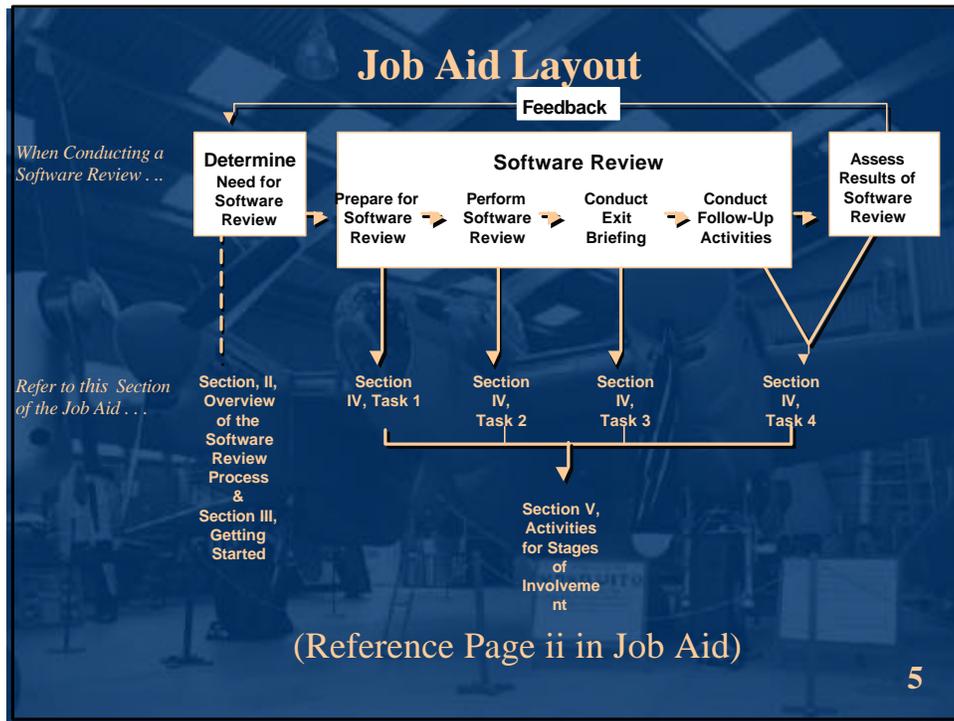
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Background Information

- The DO-178B Review
 - Section 9.2 and 10.3
- Notice & Job Aid Relationship
 - N8110.81 is “WHAT” Document
 - Job Aid is “HOW” Document
 - N8110.81 is Policy
 - Job Aid is a Training Tool



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Section I - Introduction

- Purpose of the Job Aid
- Some Considerations
- Stakeholders

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Purpose of the Job Aid

- Standardize the Software Review Approach
- Provide a Tool for Engineers and Inspectors to Perform the Software Review (as a team)
- Improve the Quality of Software Reviews
- Inform Applicants of the FAA's Approach

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Some Considerations When Using the Job Aid

- Do Not Use as a "Checklist"
- Use with DO-178B
- Tailor as Needed
- Use for TC/STC/ATC and TSOA Projects
- Provide Feedback for Future Updates

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Stakeholders



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Section II - Overview of the Review Process



- Definition/Purpose/Type of Reviews
- Delegation Considerations
- Four Stages of Involvement

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Definition of "Review"

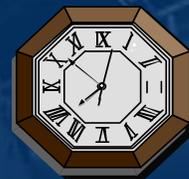


- Process of Examining Software Life Cycle Data, Project Records, and Other Evidence to Determine if DO-178B Objectives are Satisfied

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Purpose of Software Review

- Address Technical Issues In A Timely Manner
- Examine Compliance Data -- Visibility
- Verify Adherence to Plans and Procedures
- Monitor Designees



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Types of Reviews



On-site



Desk-top

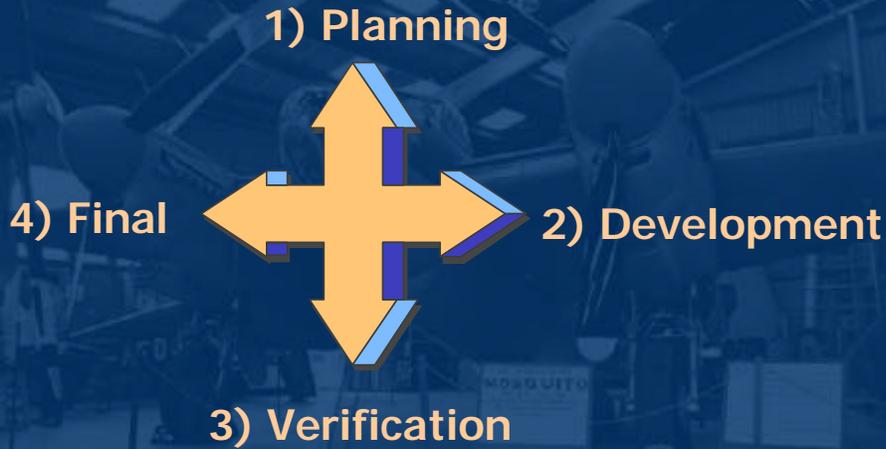
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Delegation Considerations

- Majority of Reviews will be Delegated
- Delegate to Designees with Good History
- Inform Designees of FAA Expectations
- Do Not Delegate if Policy Issues or Unique Aspects Exist

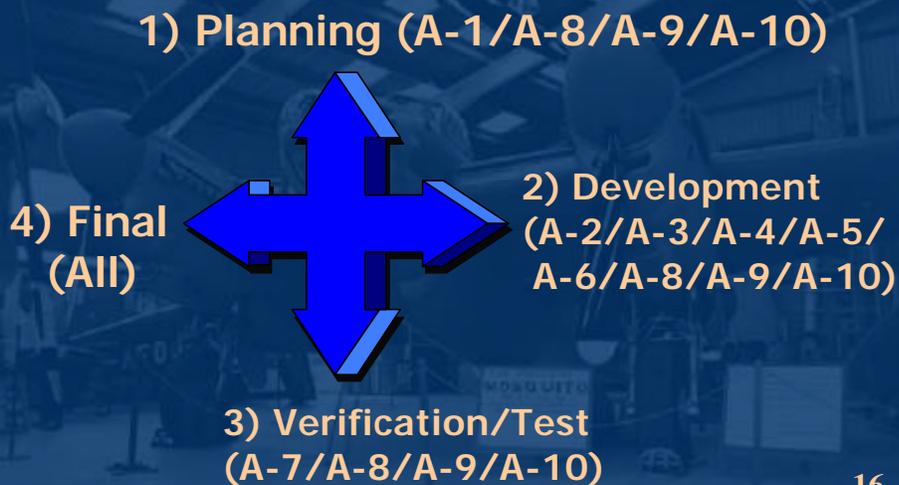
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Four Stages of Involvement



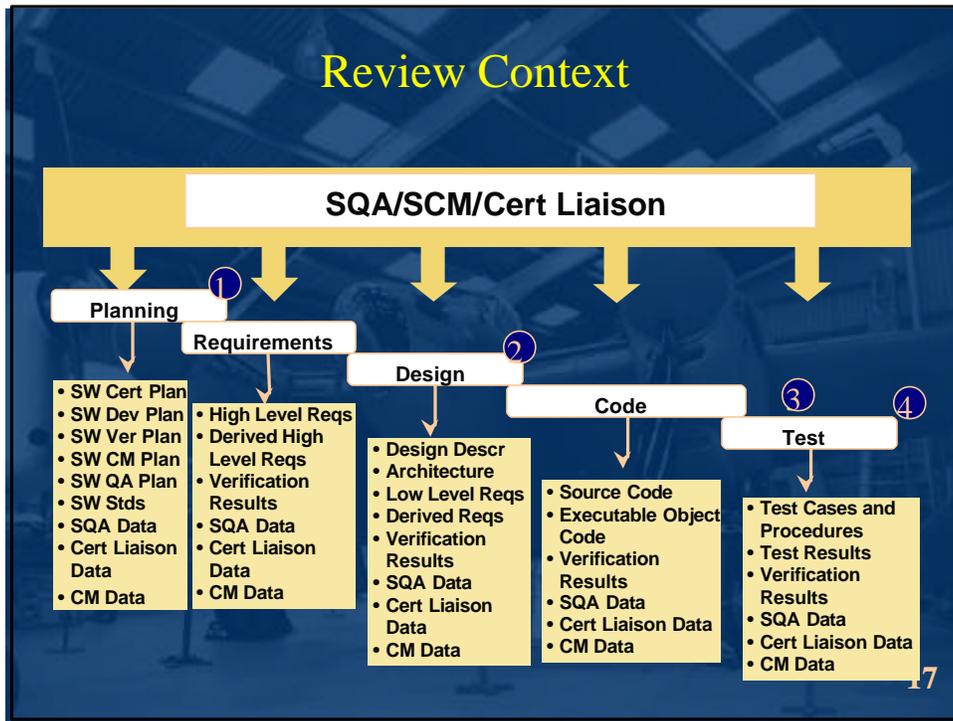
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Four Stages of Involvement & Relationship to DO-178B

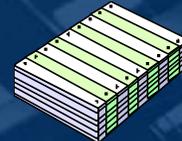


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Review Context



1. Software Planning Review - 1/2



- Occurs When Applicant Has Completed Planning Life Cycle
- Typically Occurs:
 - When Plans/Standards Have Been Completed and Placed Under Change Control, and
 - After Applicant's QA Review of Plans

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1. Software Planning Review - 2/2

- Data To Review - See Table 1 in N8110.81
- Review Data to Assess Compliance to the Following DO-178B Objectives:
 - Table A-1: All Objectives
 - Table A-8: Objectives 1-4
 - Table A-9: Objective 1
 - Table A-10: Objectives 1-2



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2. Software Development Review 1/3



- Occurs When Applicant is Well into Development Process
- Some Test Cases May Already be Started

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2. Software Development Review - 2/3

- Criteria to Determine Readiness/ Maturity of the Project for Review:
 - High-level Requirements are Complete and Trace to Systems Requirements
 - Software Architecture is Complete
 - Low-level Requirements are Complete and Trace to High-level Requirements
 - Source Code is Complete and Traces to Low-Level Requirements

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2. Software Development Review - 3/3

- Data To Review - See Table 2 in N8110.81
- Review Data to Assess Compliance to DO-178B Objectives:
 - Table A-2: Objectives 1-6
 - Table A-3 & A-4: All Objectives
 - Table A-5: Objectives 1-6
 - Table A-8: Objectives 1-4, 6
 - Table A-9: Objectives 1-2
 - Table A-10: Objective 3



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3. Software Verification Review

1/3

- Occurs When Applicant is Well into Verification/Test Process
- Assesses:
 - Implementation of Applicant's Verification Plans;
 - Completion of QA & CM Tasks;
 - Verification of Development Activities; and
 - Structural Coverage Analysis (if required)

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3. Software Verification Review - 2/3

- Criteria to Determine Readiness/ Maturity of the Project for Review:
 - Development Data is Complete and Under Configuration Control
 - Test Cases and Procedures are Documented, Reviewed, and Under Configuration Control
 - Testing is Completed or Well Under Way
 - Test Results are Documented, Per Plan
 - Testing Environment is Documented and Controlled

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3. Software Verification Review - 3/3

- Data To Review - See Table 3 in N8110.81
- Review Data to Assess Compliance to DO-178B Objectives:
 - Table A-1: Objective 3
 - Table A-5: Objectives 7
 - Tables A-6, A-7, and A-8: All Objectives
 - Table A-9: Objectives 1-2
 - Table A-10: Objective 3

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4. Final Certification Software Review 1/3



- Address All Open Items
- Assure Compliance to All DO-178B Objectives

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4. Final Certification Software Review - 2/3

- Occurs When:
 - Software Conformity Review Completed
 - Software Accomplishment Summary and Configuration Index Completed
 - All Software Life Cycle Data Completed and Placed Under Configuration Control

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4. Final Certification Software Review - 3/3

- Data To Review - See Table 4 in N8110.81
- Review Data to Assess Compliance to All DO-178B Objectives
- Assure That All Problem Reports, Action Items, and Certification Issues Have Been Addressed



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Section III - Getting Started



- Determine Level of FAA Involvement
- Overview of Common Tasks
- Teaming of Engineers & Inspectors

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Determine Level of FAA Involvement (LOFI)

- Determine LOFI Early in the Project
- Determine When and How Many Reviews the FAA Will Perform
- LOFI Criteria Will Be Documented in a Notice
- LOFI Should Be Documented for Each Software Project

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Stages versus Levels

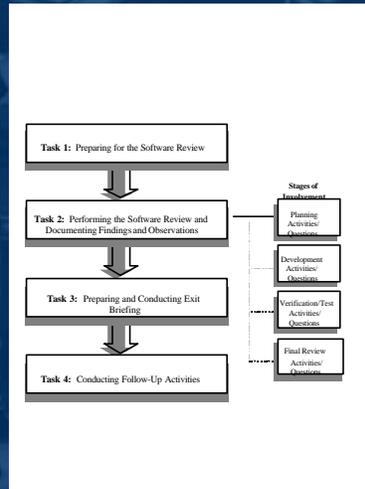


Examples of Levels of FAA Involvement

- High: Critical system, little DER support, new to DO-178B. (3-4 reviews)
- Medium: Critical system, experienced DERs, experience with DO-178B, a few novel concepts. (2-3 reviews)
- Low: Level D system, good DER support. (0-1 review)

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Overview of Common Tasks



(Reference Page III-2 in Job Aid)

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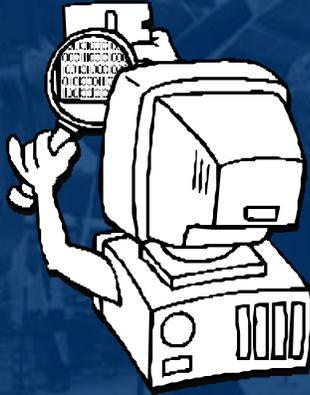
Teaming of Engineering and QA/CM



Working Together In the Software Review Process

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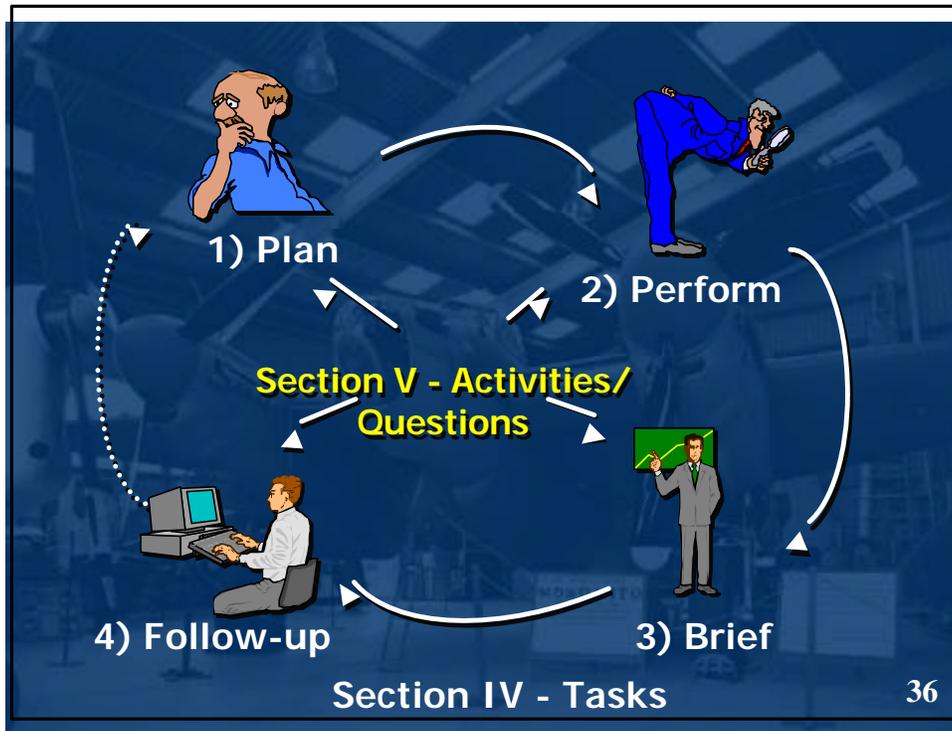
Sections IV & V - Review Tasks, Activities, & Questions



Overview of Tasks

- 1) Preparing for Review
- 2) Performing the Review
- 3) Preparing & Conducting Exit Brief
- 4) Conducting Follow-Up Activities

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Task #1 - Preparing for the Review



Task 1/Step 1: Coordinate with Certification Team

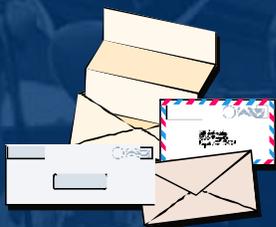
- Project Manager
 - Systems Personnel
 - Principal Inspector or DMIR/DAR
 - Flight Test
 - Other ACOs/MIDOs/Designees
 - Non-US partners
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Task 1/Step 2: Organize Review Team



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Task 1/Step 3: Notify Applicant



- Notification Letter
 - Specify Date of the Review
 - Provide Agenda
 - Specify Required Data
 - Specify Stage of Involvement & DO-178B Objectives to be Assessed
- Sample Letter & Agenda - Appendix A

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Task 1/Step 4: Coordinate Review

- Send Data to Team Members
- Assign Responsibilities to Team Members
- Use Section V to Prepare for the Review
- Request Team Members to Prepare Questions Based on Review of Documents, Prior to Review

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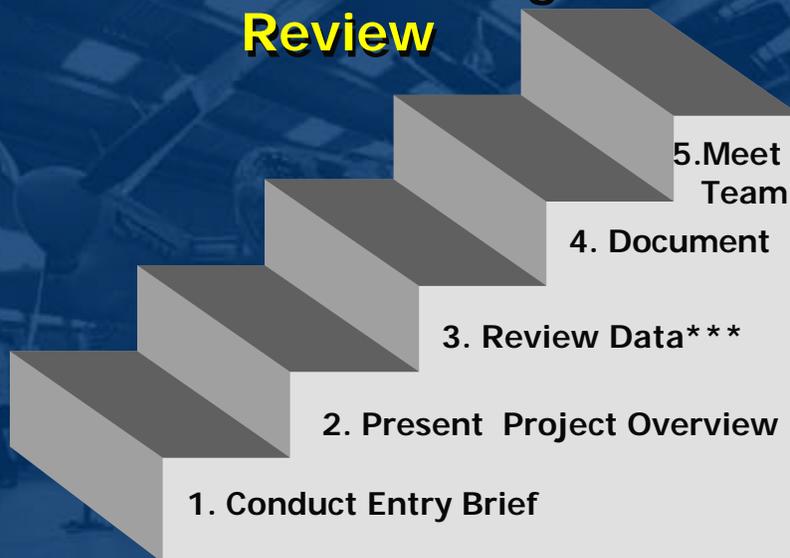
Task 1/Step 5: Meet With Review Team

- Meet with Review Team Members
- Discuss Concerns
- Discuss Approach
- Discuss Responsibilities



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Task #2 - Performing the Review



Task 2/Step 1: Conduct Entry Brief

- Introduce the Review Team
 - Meet the Applicant's Team
 - Explain Plans, Agenda, Expectations
 - Encourage Cooperation
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Task 2/Step 2: Applicant Presents Project Overview (1/2)

- Become Familiar with the Project
- Become Familiar with the Company's Organizational Structure
- Strive to Understand the "Big Picture" of the Project
- Strive to Understand the Software, Systems, and Safety Links

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Task 2/Step 2: Applicant Presents Project Overview (2/2)

- Strive to Understand the CM, QA, and Development Processes
- Ask Questions
- Keep on Schedule



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Task 2/Steps 3 & 4: Review and Document

- Perform Steps Simultaneously
- Use Section V Activities and Questions Appropriate to the Stage of Involvement



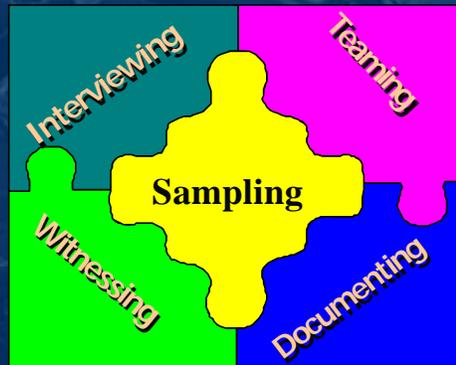
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Items Needed for the Review

- Notebook or Computer for Documentation
- Colored Sticky Tabs
- Job Aid Section V Activities/Questions Tables
- DO-178B
- Applicant/Developer's Documentation
- Appropriate Applicant/Developer Personnel

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Typical Review Activities



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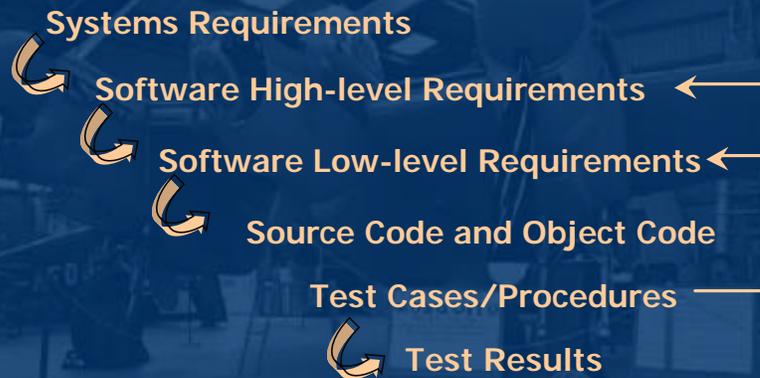
Sampling

- Select Representative Software Life Cycle Data to Analyze Compliance to DO-178B Objectives

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Examples of Sampling - 1/2

- TRACEABILITY EXAMINATION



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Examples of Sampling - 2/2

- Review Safety Assessment Tie to Software Level
- Examine Structural Coverage Analysis
- Examine Software Quality Assurance and Configuration Management Records

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Divide and Conquer



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Example Situation

- Applicant is Finishing Coding & Starting Testing (i.e., SOI #2)
- Engineer/Inspector Use Section V Activities & Questions for SOI #2
- Engineer/Inspector Use DO-178B
- Engineer Performs Activity 2.1
- Inspector Performs Activity 2.9

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Example of Engineer Activity

- Engineer Performs Trace(s) to Assess 2.1
- Uses Trace Matrix/Tool
- Strives to Understand the Data and How it Fits Together
- Asks Questions of Developers
- Uses Sticky Tabs to Mark Places
- Uses Job Aid Section V as a Guide (0/0 *)
- Keeps Notes

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Note Taking Tips (Engineer)

- Record Document Numbers
- Record Document Rev. Levels
- Record Specific Requirements Traced
- Record Page Numbers
- Document Trace Matrix/ Tool Usability
- Be Specific

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Example of Inspector Activity

- Inspector Looks at QA Data to Assess 2.9
- Reviews QA Plans
- Interviews QA Personnel
- Looks at QA Records
- Questions Review Team Members
- Uses Job Aid Section V as a Guide (☒/☒*)
- Keeps Notes

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Note Taking Tips (Inspector)

- Record Document Numbers
- Record Document Rev. Levels
- Record Page Numbers
- Document Names of Interviewees
- Document Questions/Concerns

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Review Tips

- **Communicate with Team Members**
- **Work Efficiently**
- **Be Considerate and Cooperative**
- **Be Flexible**
- **Allow the Data to Speak for Itself**

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Task 2/Step 5: Conduct "End of Day" Team Meeting

- **Meet with Review Team**
- **Discuss Findings/Observations**
- **Record and Summarize Results**
- **Prepare for Next Day's Activities**
- **Begin "Summary of Compliance Findings/Observations" Tables, if time permits**

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After "End of Day" Meeting

- Inform Applicant of Next Day's Plans
- Repeat Task 2/Steps #3 - #5, as required

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Task #3 - Preparing & Conducting Exit Briefing



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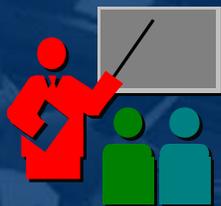
Task 3/Step 1: Prepare Exit Briefing



- Meet with Team Members
- Determine Who Will Deliver Exit Briefing
- Determine Points to be Presented
- Prepare a Summary of Certification Issues
- Organize the Exit Briefing

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Task 3/Step 2: Conduct Exit Briefing



- Thank the Applicant/Developer
- Present Findings/Observations
- Summarize Certification Issues
- Summarize Future Actions Required
- Inform Applicant of Report and FAA's Expectations

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Task #4 - Conducting Follow-Up Activities



Task 4/Step 1: Prepare Report

- Summarize Review Process and Notes
 - Report Findings/Observations
 - Map Findings Observations to DO-178B Objectives, Using Summary of Compliance Findings/Objectives tables
 - Report Clearly and Concisely
 - Coordinate Report with Review Team
 - Complete as Soon as Possible
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Task 4/Step 2: Coordinate Preliminary Report with Applicant

- **Provide a Preliminary Copy of Report to the Applicant**
- **Discuss the Report with the Applicant**
- **Resolve Discrepancies and Errors in the Report**

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Task 4/Steps 3-5

- **Step 3: Determine Future Activities**
 - More Reviews?
 - Delegation?
 - Resubmission of Data?
- **Step 4: Submit Final Report**
 - Submit Report with a Transmittal Letter Summarizing Required Actions
- **Step 5: Coordinate with Cert Team**

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Desk-top Review Considerations

- Job Aid Focused on On-Site Reviews
- “Special Considerations” for Desk-top Review Following Each Task
- Examples of “Special Considerations”:
 - Notification Different
 - Request More Data
 - Can’t Interview Personnel as Easily
 - Exit Briefing may be via Telecon

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Desk-top Reviews can Provide High Quality Assessment



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Tailoring the Job Aid (1/2)



- Prior to Review, Evaluate Activities/ Questions
- Delegate Activities/ Questions to Designees, as Appropriate
- Add Activities/Questions, as Appropriate
- Delete Activities/Questions, as Appropriate

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Tailoring the Job Aid (2/2)

- During the Review, the Situation May Lead to a Change in Direction
- Job Aid is Designed For Flexibility
- Job Aid is **NOT A CHECKLIST**



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Summary

Job Aid:

- Is a Tool
- Promotes Teaming
- Allows for Flexibility
- Used for "Prior to Certification" Work
- For FAA, Designees, and Developers

Please Forward Comments/Questions Via E-mail.

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Job Aid is Available on FAA Web-Site

Software Home:

<http://av-info.faa.gov/software>

Video May Be Ordered from
Opportunity Productions

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