



Managing a Verification & Validation Program

The Contractor's Perspective

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Agenda

- Forming the team and writing the proposal
- The contract vehicle
- Responding to the Task Orders
- Working with the JWARS V&V Oversight Groups
- Fulfilling Task Order SOW actions
- Preparing the Deliverables
- Recommendations



Responding to the JWARS V&V RFP

- Two Small Businesses – one Veteran-Owned and one Service Disabled Veteran Owned
- 20+ years simulation development, User Group, V&V experience
 - Combination of experience qualified the Joint Venture for the contract
 - THUNDER, RSAS, JSIMS-Maritime, JSAF, CMMS/FDMS
- IMC proposed to manage the joint venture (JWARS V&V)
- Email, FTP, synched Access database will enable BMH to fully support the effort from Norfolk VA
- CPFF awarded in September 1997





JWARS ORD – V&V

- JWARS ORD

- (2) **Verification and Validation.** JWARS shall demonstrate and enable the correct representation of doctrine, system and unit performance, the environment and balance among joint warfare functions for U.S. forces, Allied coalition partners and potential

We didn't have the ORD when we wrote the proposal in early 1997 – we modified our activities to fit the ORD when it arrived in 1998

Fortunately, we guessed right and our emphasis was on warfare representations and traceability – two Key Performance Parameters identified by the Joint Requirements Oversight Council (JROC).

Note 1. The ORD Appendix C provides JWARS Warfare Functionality and is a refinement of the list of tasks at Appendix B (JWARS Prioritized UJTL Tasks) and contains descriptions of warfare functionality for JWARS releases 1 and 2 (Limited IOC and Full IOC respectively) that are constrained by cost and technical feasibility.



Key Performance Parameters (KPPs)

- **Traceability**
 - Cause and effect relationships
 - Tracking of data sources
- **Verification and validation (V&V)**
 - Correct representation of doctrine, performance environment
 - Balance across joint warfare functions
- **Utility**
 - Study execution
 - ⇒ Includes *warfare functionality*
 - Stochastic modes
 - Multiple levels of resolution
 - Execution speed ⇒ *1,000 times real time*

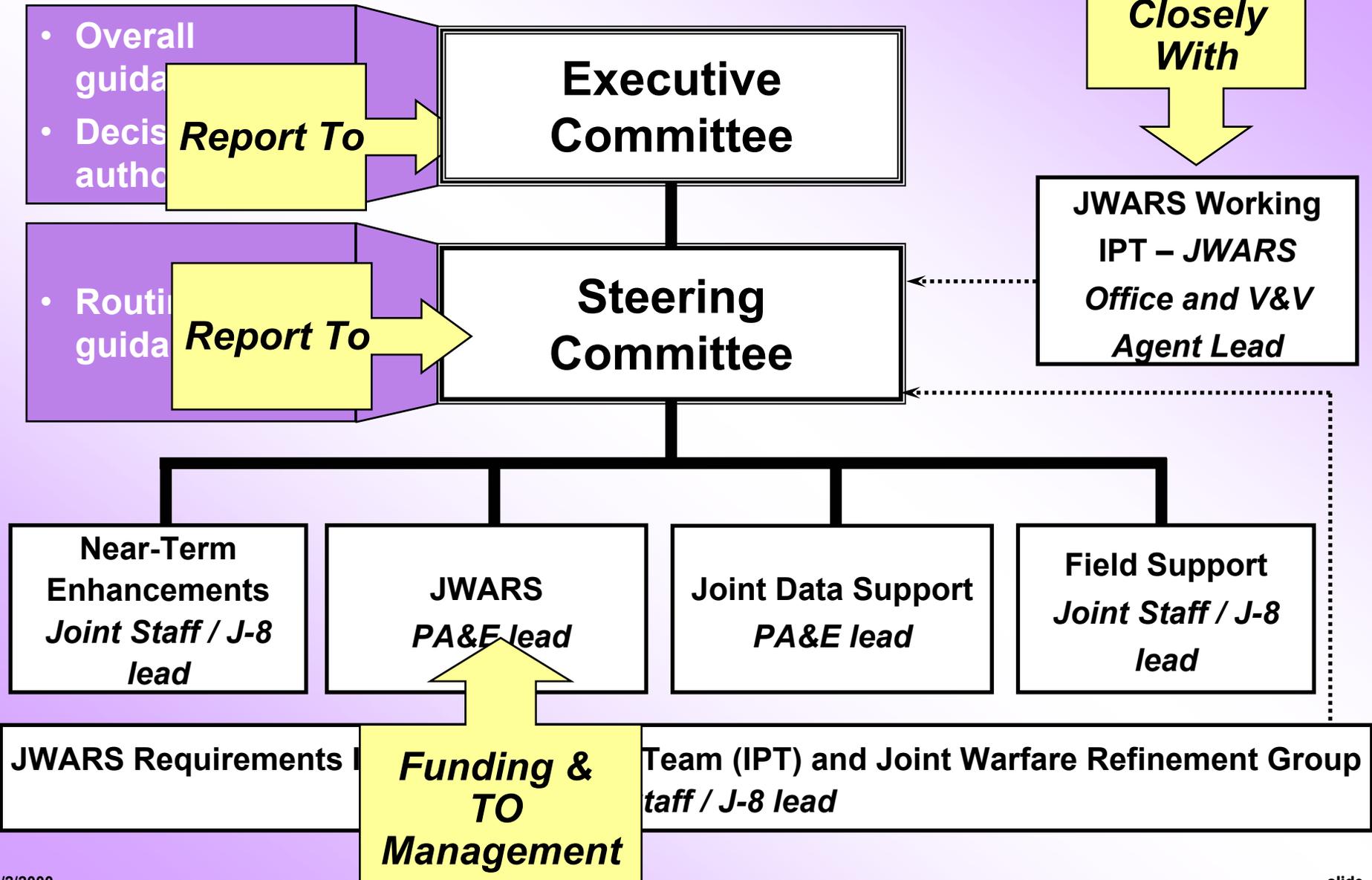
Traceability
(from requirements through code and output)

Pre-design artifact Validation

Reference: JWARS ORD, 27 August 1998



Joint Analytic Modeling Improvement Program (JAMIP) Management



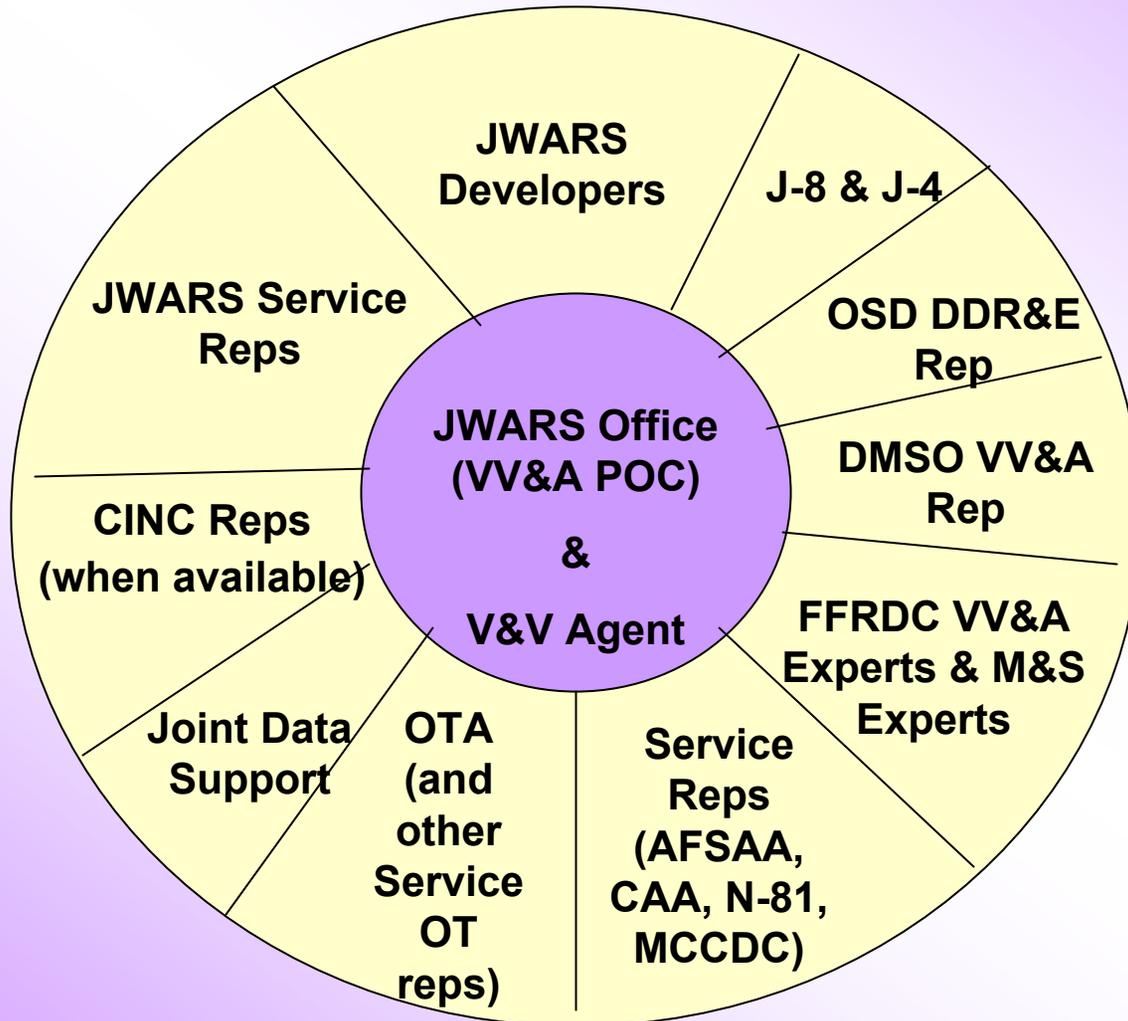


The V&V Oversight Group

- **JWARS V&V (BMH-IMC) proposed, and the JWARS Office accepted, concept of JWARS V&V IPT**
- **Early October 1997 established JWARS Oversight Group**
 - **Members included**
 - **JWARS Developers**
 - **JWARS Office representatives**
 - **Joint Staff (J-8 and J-4)**
 - **DMSO VV&A Technical Director**
 - **FFRDC (IDA, Mitre)**
 - **Service Analysis Organizations**
 - **V&V Agents**
 - **Initially led by V&V Agent**



JWARS V&V Oversight Group





JWARS V&V Oversight Group

(continued)

- First Task – developing the JWARS V&V Process
 - Guidance from the RFP and JWARS Office
 - Compatible with the JWARS Simulation Development Process
 - No deliverables solely for V&V
- Second Task – writing the JWARS V&V Plan
 - Based on the JWARS V&V Process
 - Limited by resources available (NTE \$2.5M over 5 years)
 - Identify how the JWARS V&V Process would be executed
- Third Task – coordinate the JWARS V&V Plan with the users
- Fourth Task – monitor and support the process and receive/coordinate V&V Reports and Findings

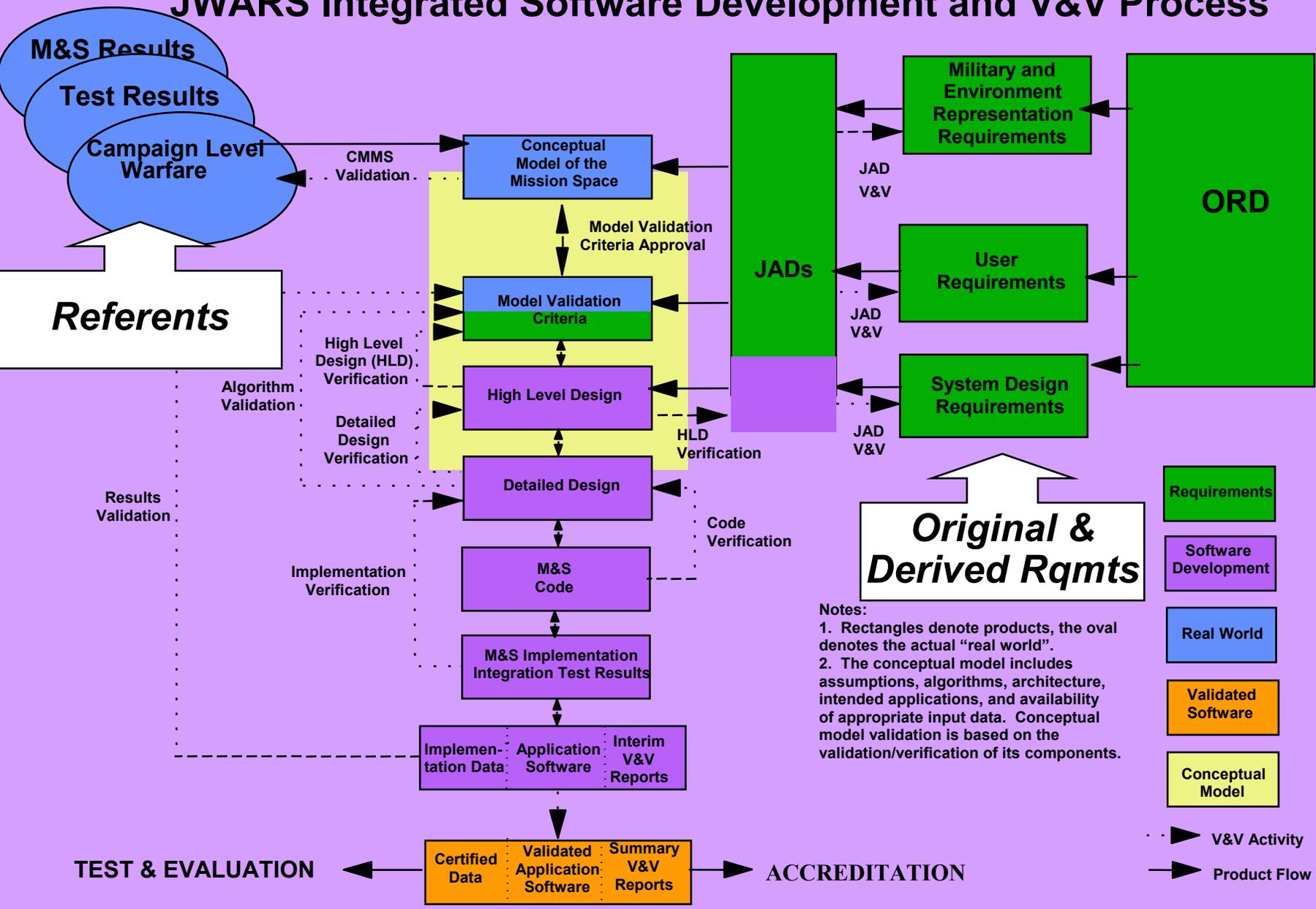


JWARS V&V Oversight Group

(continued)

- Oversight Group Evolution
 - Directed by Joint Analytic Modeling Improvement Process Steering Committee to include Test and Evaluation process
 - Developer Testing added to agenda
 - Became JWARS V&V – T&E Working IPT
- Later became JWARS Working IPT with addition of
 - JWARS External Support (JWARS Developers, TRAC Leavenworth, and J-8 JASP Contractors)
 - JWARS Life Cycle Management (J-8)
 - JWARS User Group Support (J-8 and TRAC Leavenworth)
- Focus on V&V activities continually decreasing
- Became the vehicle for communication from the JWARS Office to the users, support organizations, oversight groups

JWARS Integrated Software Development and V&V Process





JWARS V&V Plan

- **Written to execute the V&V Process**
- **Submitted in draft for review**
- **Many changes made in response**
- **Coordinated with WIPT members**

The screenshot shows a Microsoft Internet Explorer browser window with the address bar displaying <https://ca.dtic.mil/vvte/pdf/lib/vvplan13.pdf>. The browser's menu bar includes File, Edit, View, Go, Favorites, and Help. The toolbar contains icons for Refresh, Home, Search, Favorites, History, Channels, Fullscreen, Mail, and Print. The address bar shows the file name 'plan13.pdf' and links for Product News, Today's Links, and Web Gallery. The document content is displayed in a large frame, showing the title page of the 'Joint Warfare System Verification and Validation Plan'. The page is marked 'UNCLASSIFIED' at the top and bottom. The text on the page reads: 'Office of the Secretary of Defense, Director for Program Analysis and Evaluation, The Joint Warfare System Office, August 13, 1998'. At the bottom of the page, it says 'Prepared by: RMH-DMC, Contract No: DSAW1-97-D-0136, Delivery Order: 01'. The status bar at the bottom of the browser shows 'Page 1 of 45', '45%' zoom, and '8.5 x 11 in'. The Windows taskbar at the bottom shows the Start button, Internet Explorer icon, and several open applications: 'https://ca...', 'Exploring - C:\...', 'Microsoft Pow...', and 'Acrobat Reader'. The system clock shows '10:25 AM' and the date '6/2/2000' is visible in the bottom left corner of the slide.



Managing the Statement of Work

- We responded to each modified Delivery Order SOW with what we believed was the most appropriate LOE and activities to get the job done
- Managed the Joint Venture Team (IMC and BMH) to maximize the appropriate strengths of each group contractors to monitor each delivery orders tasks, schedule, and deliverables
- Made modifications when JWARS Simulation Development Process changed
- Made modifications based on Steering Committee or WIPT directions/suggestions



V&V Deliverables

- Began with JWARS V&V Plan as the means to execute the V&V processes
- Initial focus was on the V&V process results for each JWARS Iteration (originally planned for 9)
- Changed focus to concentrate on total V&V effort for each JWARS Release (.5 for alpha testing, 1.1, 1.2, 1.3, 1.4 for beta testing)
- Changed deliverables to match the changes in the JWARS simulation development process



JWARS V&V Plan, Process and Reports Documents

<p>UNCLASSIFIED</p> <hr/> <p>Office of the Secretary of Defense Director for Program Analysis and Evaluation The Joint Warfare System Office</p> <p>August 13, 1998</p>		<p>UNCLASSIFIED</p> <p>JWARS/VERIFICATION AND VALIDATION PROCESS REPORT NUMBER ZD110 MARCH 2001</p> <hr/> <p>Office of the Secretary of Defense Director for Program Analysis and Evaluation The Joint Warfare System Office</p> <p>March 10, 2001</p>
<p>•Required to use JWARS format and CM process</p> <p>•Based on DoD VV&A RPG</p>		
<p>UNCLASSIFIED</p> <p>Prepared by: BMH-DMC Contract No: DSAW01-97-D-0136 Delivery Order:</p>	<p>Joint Warfare System Release 1.1 Verification and Validation Report (Draft)</p>	<p>Prepared by: BMH-DMC Contract No: DSAW01-97-D-0136 Delivery Order: 04</p> <p>Distribution authorized to U.S. Government Agencies and their contractors, Software Documentation, March 10, 2001. Other requests for this document shall be referred to Office of the Secretary of Defense, Director for Program Analysis and Evaluation, The Joint Warfare System Office.</p>
	<p>UNCLASSIFIED</p>	

System
Validation
Report
Revision 2.0
CONTAINS INFORMATION
EXEMPTIONS APPLY



JWARS V&V Database

- **Customized tool to support entire JWARS V&V process**
 - Provides a means of traceability from ORD through conceptual model products through design to code
 - Contains all Universal Joint Task Force (UJTF) measures
 - Manages application of validation and verification (V&V) measures
 - Provides mechanism to trace High Level Requirements (HLR) to detailed requirements
 - Contains detailed textual and graphical algorithms
- **Developed in Microsoft Access 2000**
 - Provides synchronization of replicated databases over the Internet
 - Supports multi-user secure access to encrypted database

***Critical to providing the
“body of evidence”
required by future
accreditors***



JWARS V&V Database

Opening Form : Form (Replicated)

Joint Warfare System (JWARS) V&V Data Base

Tasks	ORD	IPTs
Iterations	Thread Report	Metrics
Algorithms	JADs	Instruments
JST Report Formats	Results Validation	Reports
JAD Design Objects	Work Packages	JWARS Docs



The JWARS V&V New Plan and Process Guide

**Office of the Secretary of Defense
Director for Program Analysis and Evaluation
The Joint Warfare System Office**

1 August 2002

Joint Warfare System Verification and Validation Plan (Revision 3.0) (Change 1)

" FOR OFFICIAL USE ONLY. THIS DOCUMENT CONTAINS INFORMATION
EXEMPT FROM MANDATORY DISCLOSURE UNDER FOIA, EXEMPTION 3 APPLIES "

Prepared by: BMH-IMC
Contract No: DSAW01-97-D-0136
Delivery Order: 05

**Office of the Secretary of Defense
Director for Program Analysis and Evaluation
The Joint Warfare System Office**

1 August 2002

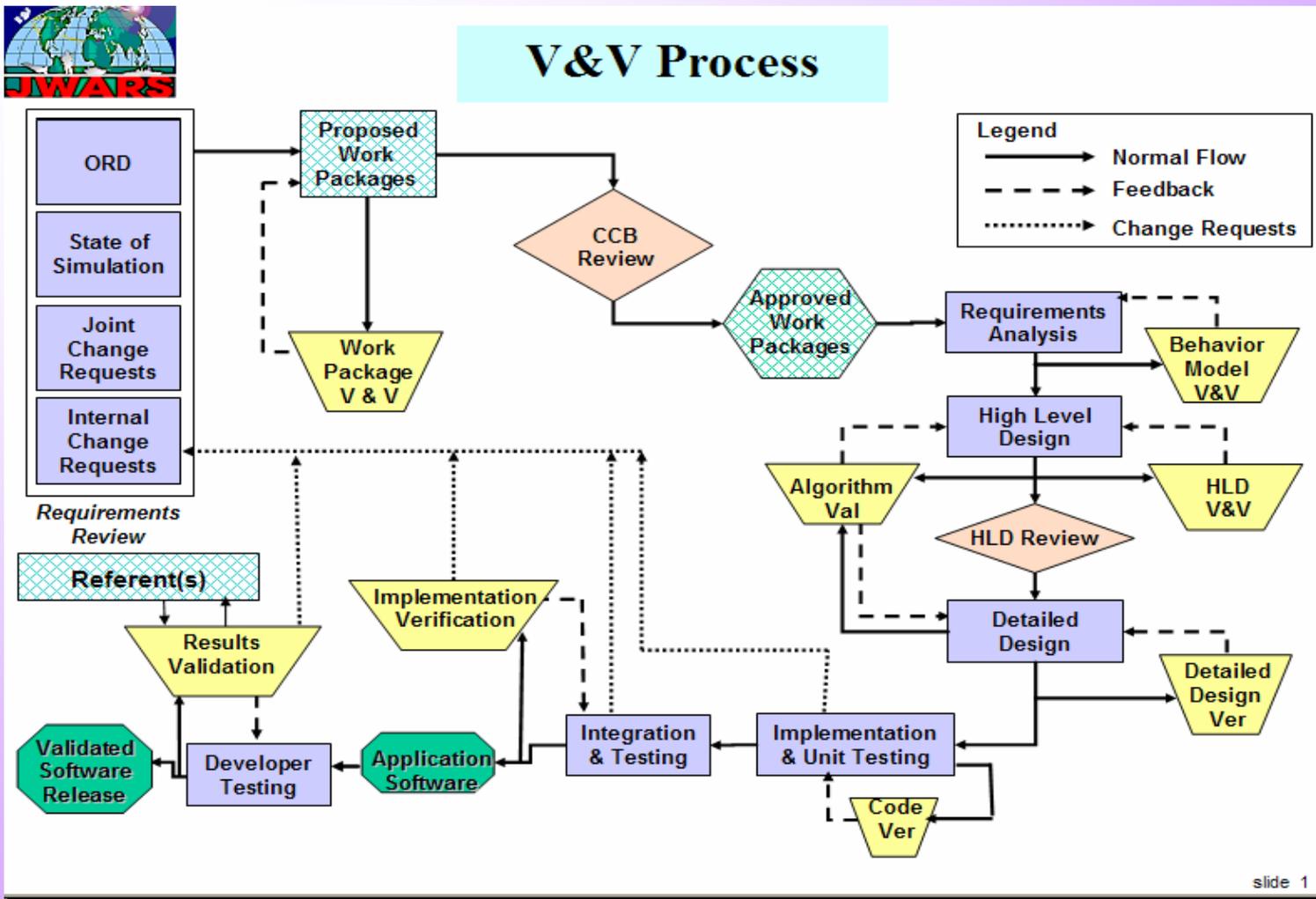
Joint Warfare System Verification and Validation Processes, Practices, and Procedures Guide Version 2.0 (w/ Change 1)

(Previous versions were titled:
"Joint Warfare System Verification and Validation Processes Report")
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Prepared by: BMH-IMC
Contract No: DSAW01-97-D-0136
Delivery Order: 06



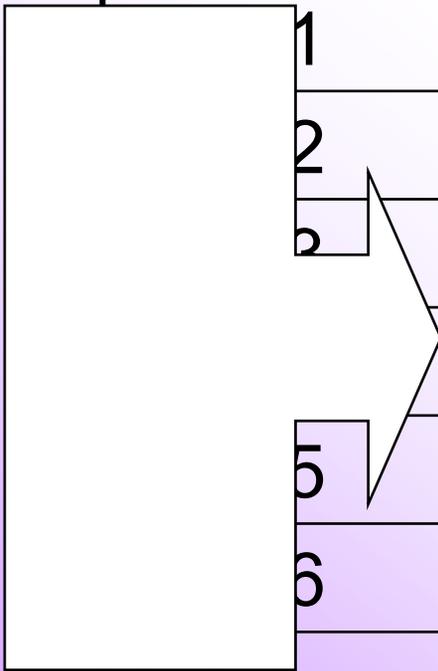
JWARS V&V Revised Process





JWARS Delivery Orders (Scheduling and Funding)

DO #	Start	End	Value
1	30 Sept 97	9 Aug 98	\$279,254
2	10 Aug 98	9 Aug 99	\$489,674
2	10 Aug 99	9 May 00	\$387,348
2	10 May 00	11 Mar 01	\$494,566
5	12 Mar 01	12 Nov 01	\$363,099
6	13 Nov 01	12 Nov 02	\$557,050
Total			\$2.57M





Other Costs of the JWARS V&V Effort (estimates)

- **JWARS Office Technical Direction**

- GM-15 Task Monitor
- Navy 0-5 V&V Program Coordinator
- GS-13 COR

Task Order Management and Reporting

Required Day-to-Day Coordination

- **JWARS Developer Coordination**

- Thousands of hours to work with V&V Agent to create and review development artifacts, explanations

Critical Activity

- **WIPT Member Effort**

- Thousands of hours (DoD civilians, military officers, contractors) preparing for and attending the V&V working action items

Critical Activity



Recommendations

- Educate your customer on what V&V is and what V&V isn't
- Use the DMSO managed *DoD VV&A RPG* plus any applicable Service guidance
- Propose the use of an oversight group/IPT to support the V&V process and include as many of the stakeholders in the simulation as possible, including future users
- Keep your focus on the current task or delivery order and let the sponsor know if you need changes
- Work hard to stay independent of the Developers to avoid being captured by their process and metrics



Recommendations (cont'd)

- Avoid attempts to group your effort with that of the Quality Assurance (QA) and Configuration Management (CM) processes
- Cooperate closely with the testers (Developer and Operational) and use their work to supplement yours
- If the Users are involved (a good idea) work closely with them
- Ask the Sponsor to provide a single point of contact for you within their organization and provide the same to them
- Tell the Developer about problems before you tell the Sponsor and work toward solutions



Recommendations (cont'd)

- Work hard to develop a relationship with the Developers to facilitate artifact collection and risk reduction
- Make sure you produce your deliverables on time and make them widely available
 - Risk reduction requires that feedback to Developers be in time to allow changes – don't wait until the final report
 - Don't assume that everyone on the Developer Team gets your products
 - Use the Developers Change Request Process
- Save and document everything