Weapon System Technical Architecture Working Group

Curt Adams
WSTAWG, Chairperson
Army Materiel Command
U.S. Army Tank-Automotive RD&E Center (TARDEC)
Vetronics Technology Area (AMSTA-TR-R, Mailstop 265)
Warren, MI 48397-5000
(810) 574-6160 / DSN 786-6160
Fax (810) 574-5008
Email: adamsca@cc.tacom.army.mil

February 15, 1996
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<td>Adams, Curt ;</td>
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<td>Open Systems Joint Task Force (OSJTF)</td>
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<tr>
<td>1931 Jefferson Davis Highway</td>
</tr>
<tr>
<td>Crystal Mall 3, Suite 104</td>
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Agenda

- Background

- Weapon Systems Technical Architecture Working Group
  - Organization and Principals.
  - Scope and Activities.
  - Process
  - Sub Domain Update

- WSTAWG Comments on ATA.
  - Common Operating Environment
  - Contracting

- Summary

- Path Forward
The Three Architecture

- **Operational Architecture** is missions, functions, tasks, information requirements, and business rules.
- **System Architecture** is a physical implementation of the OA, the layout and relationship of computers and communications.
- **Technical Architecture** is the “building code” upon which systems are based.
Scope Of The Army Technical Architecture

- The ATA applies to all systems that produce, use, or exchange information electronically. The target audience is anyone involved in the development of new or improved systems.

- Within the Army, the Vice Chief of Staff, Army and the Army Acquisition Executive have jointly made each Milestone Decision Authority (MDA), Program Executive Officer (PEO), and Program/Product Manager (PM), Advanced Technology Demonstration (ATD) Manager, and Advanced Concept and Technology Demonstration (ACTD) Manager responsible for incorporating the specification of the ATA into their respective programs and products.

- Materiel developers will use the ATA to ensure that products meet interoperability performance and sustainment criteria.

- Combat developers will use the ATA in developing requirements and functional descriptions.

- Battle Labs will use the ATA to ensure that the fielding of their "good ideas" are not unduly delayed by the cost and time required for wholesale reengineering to meet specifications.
# Army Technical Architecture Objectives

<table>
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<tr>
<th><strong>OBJECTIVE</strong></th>
<th><strong>MECHANISM</strong></th>
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<tr>
<td>Interoperability</td>
<td>Minimal Set of Mandated <em>Standards</em></td>
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<td>Reduce Cost,</td>
<td>SW Reuse - Common</td>
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<td>Speed Fielding</td>
<td>Operating Environment &amp; Individual Standards</td>
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<td>Influence Technology R&amp;D</td>
<td>Publish ATA</td>
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Organization of the WSTAWG

Weapon Systems Domain
Chairperson: Mr. Christopher Ostrowski
TARDEC

Missile Sub-Domain
Lead: Mr. R. Summers
MRDEC

Ground Vehicle Sub-Domain
Lead: Mr. S. Grevemeyer
TARDEC

Soldier Sub-Domain
Lead: Mr. J. Monroe
NATICK

Aviation Sub-Domain
Lead: Mr. C. Mudd
AVRDEC

Army Materiel Command
Mr. E. Nidhiry

Army System Engineering Office
Mr. R. Delcoure
DISC4
Ms. A. McCullough-Graham
ARMY WEAPON SYSTEM DOMAINS

DOMAINS:
• GROUND VEHICLE
• AVIATION (ROTORCRAFT)
• MISSILES
• SOLDIER

WEAPON SYSTEM DOMAINS

INTRAOPERABILITY

C3I DOMAIN
HORIZONTAL INTEROPERABILITY
SCOPE of the WSTAWG

- The WSTAWG mission is to expand the Army’s C4I Technical Architecture (TA) to accommodate the unique real-time, embedded requirements of Army weapon systems.
- This TA expansion must provide value-added to weapon systems, consistent with DOD policies for open system approaches to acquisition, and adaptable to future technologies.
- The TA expansion will either be implemented as part of the existing Army C4I TA document or as a separate weapon systems technical architecture document with references or interfaces to its C4I counterpart.
- This TA expansion will be done in close liaison with the OSD OS-JTF and Industry.

- Phase I Report to ADO/DISC4
  Mr. Donald Sarna, 26 May 95.
WSTAWG Activities

- **28 Apr 95**  ADO/DISC4 meeting with PEO’s and RDEC Tech Directors calling for WSTA.
- **2 May 95**  ADO/DISC4 tasking to AMC.
  - AMC tasking to TACOM. POC: Mr. Don Sarna.
- **18 May 95**  First WSTAWG meeting.
- **26 May 95**  Phase I Report.
  - Sent through AMC to ADO & DISC4.
  - Scope, Technical Approach, Responsibilities.
- **7 Jun 95**  Advanced Program Briefing to Industry.
- **13 Jun 95**  Second WSTAWG Meeting.
- **28 Jun 95**  Phase II WSTAWG Report.
  - Course of action, Schedule, and Cost.
- **27 Jun 95**  Council of Colonels meeting.
  - ADO, DISC4, AMC, TARDEC.
WSTAWG Activities (cont..)

- 28 Jul 95    Army Science Board Briefing.
- 15 Sep 95    Memorandum to ADO (MG Rigby) from WSTAWG Chair (Mr. Sarna) requesting funding.
- 28 Sep 95    Third WSTAWG Meeting.
- 26 Oct 95    Meeting with ATA Chapter Authors.
  - Attended and submitted comments.
- 05 Dec 95    User Workshop #1.
  - Attended and submitted comments.
- 04 Jan 96    User Workshop #2.
  - Attended and submitted comments.
- 11 Jan 96    Council of Colonels for ATA.
- 17 Jan 96    General Officer Steering Committee.
Proposed WSTAWG Development Plan

- WSTAWG Phase II Report, Mr. Donald Sarna, 31 Aug 95

15 Feb 96
Define WS Domains

Define WS Reference Model

Perform Domain Analysis

Reassess Domain Definitions

Generate Composite Profile

Verification of Profile

Incorporate into Policy

Reassess with Technology Changes

WSTAWG Systems Engineering Process
Domain Analysis Process

- Identify Platforms and group.
- Identify major platform group functionality.
- Identify inter/intra interfaces for each group.
  - Apply data modeling techniques.
- Perform engineering analysis of each platform.
  - Standards currently in use, planned to be used.
  - Evaluate operational and technical requirements.
Domain Analysis Process (cont.)

- Generate Domain Standards Profile.
  - Coordination with other domains.
  - Extensions, expansions, exceptions to higher level domain standards.

- Verification and Validation of Domain Profile.

- Reassess individual platform membership within a domain.

- Consolidate Domain Standards
  - Common standards.
  - Alternate approach standards.
Ground Vehicle Sub-Domain

Team Involved
- TARDEC (lead) Mr. Steven Grevemeyer
- ARDEC Mr. Wayne Sherer
- ERDEC Mr. William Ginley

Accomplishments
- Industry Day held at TACOM, 7 Dec 95.
  - Vetronics Real-Time Operating Services (VRTOS) API.
  - Vetronics Graphical User Interface (VGUI) API.
- Project AH18, Armament research has ATA focus.
- Paladin and Mortar Systems converted to ATA implementation efforts.
- PEO-ASM active in ATA activities.
Aviation Sub-Domain

Team Involved
- AVRDEC (lead) Mr. Clemence Mudd
- PM AEC Mr. Eric Samuda
- PEO Aviation Electronic Center

Accomplishments
- Aviation System of Systems Architecture (ASOSA).
- CH-47 Intra-platform Architecture Study (system taxonomy).
  - Contract to Maner Systems.
  - Contract to Battelle Memorial Institute.
- Task Force XXI compliance.
- SAE Generic Open Architecture Committee involvement.
Missile Sub-Domain

Team Involved
- MRDEC, Huntsville, AL (lead)    Mr. Rod Summers
- PEO Missile Defense             COL Philip White
- PEO Tactical Missile            COL Dan Prescott

Accomplishments
- Creation of a generic missile architecture and support tools.
  - ARPA Domain Specific Software Architecture
  - ARPA Evolvable Designs for Complex Software
- Creation of the Real-Time Executive for Missile Systems (RTEMS) and RTEMS API.
Soldier Sub-Domain

■ Team Involved
  - NATICK (lead) Mr. John Monroe
  - PM Soldier MAJ Mark Collins

■ Accomplishments
  - Land Warrior contract has an ATA focus.
  - Domain analysis ongoing.
The WSTAWG was successful in creating a domain-based HCI concept.

- Top-level style guides replace by more specific domain-specific style guides.
- Tight coupling of look and feel between systems in the same domain.

Contracting.

- “ATA standards as contractual requirements conflict with ‘performance-based’ contracting”.
- ATA references standards and specifications that conflict with streamlined acquisition.
  - Standards can not reference other standards.
- ATA standards scheduled to be updated every six months.
WSTAWG supports the COE “concept”.
- There is only one DII COE concept, process, and approach.
- The ATA envisions the tailoring of software components and infrastructure within a hierarchy of implementations of the COE.
  - ATA Version 4.0 Section 1.2.1.
- Common reusable software and products are inherited downward and either used as is, or replaced or augmented with more specialized software modules.
- Reuse of Application software within the Weapons Domain is supported.
DII COE CONCEPT

Provides rules and guidance for integrating different applications on a single workstation.

Treats Mission Applications as “shrink-wrap” products.

“COE is not a system but a foundation for building an open system…”

- DII COE I&RTS: Rev 2.0 10/23/95

Based on client/server workstation technology.

Provides common “look and feel” to end users and system administrators.

DII COE

Weapons

C3I

Modeling/Simulation

Sustaining Base Office Automation
Software Reuse Process

- APIs, Standards, Library Software
- DII COE
  - DII COE APIs
  - DII COE Software Products & API Implementations
- Weapon System Domain
  - DII COE APIs
  - Domain Extensions
  - Domain-specific Software Products & API Implementations
- Adapted or New Reusable Software
- Mission Software
  - DII COE APIs
  - DII COE Software
  - Domain Extensions
  - Domain Software
- Weapon System Developer
Summary

- The WSTAWG has been instrumental in representing the needs of the varied weapon systems community within the Army.
  - Significant influence in support of ATA Version 4.0
  - Weapon System Domain creation and coordination.
  - Individual sub-domain analysis and activities.

- Individual WSTAWG sub-domains have ongoing technical architecture-related development efforts underway.

- Contact us at: wstawg@vtc.tacom.army.mil
Path Forward

- WSTAWG Meeting 27-28 Feb 96, Huntsville, AL.
- Evaluation of the DII COE APIs and software as it becomes available.
- Completion of individual domain analyses.
- Submit candidate Weapon Systems APIs to COE library.
- Support Joint Technical Architecture.
- Web page enhancement and maintenance.
Background Issues
Funding Issues

15 Sep 95  Memo to ADO (MG Rigby) from AMC (BG Beauchamp).
   Subject: Revised development approach for ATA.

05 Oct 95  Memo to AMC (BG Beauchamp) from ADO (MG Rigby).
   Subject: Revised development approach for ATA.

30 Nov 95  DISC4 Unfunded Requirement Form.
   Subject: Weapon System Technical Architecture Development
   Total Funding:  4.525M
   Available:     2.825M
   Unfunded:      1.700M

13 Dec 95  Memo to ADO from AMC.
   Subject: FY96 Funding requirement for WSTAWG.

06 Feb 96  WSTAWG funding requirement lumped with ASEO.
   98-03 POM PE0604805.
Weapon System Interoperability

“The only practical way to achieve interoperability is to use exactly the same software, written to appropriate standards, for common functions across applications.”

DII COE I&RTS Rev 2.0, page 1-12.

Interoperability requirements are derived from USER REQUIREMENTS.

The cornerstones of interoperability are STANDARDS and TESTING.

- Testing removes interpretation from standards documents.

Weapon systems must interface with C3I systems at defined interoperability points:

- The interface is owned by the C3I domain.
- The implementation of the interface is owned by the weapon system domain.