DoD Enterprise Architecture
Conference

Applied Joint Mission Threads

Christopher Behre
Architecture Integration Division
Architecture Driven Analysis Branch
(757) 203-4424
Objective: Overview status and way forward for applying Joint Mission Threads to meet operational requirements.
JMT Customers

- Conduct a CBA
- Prepare a TEMP
- PM researches business case
- Conduct developmental testing
- Accessing the Portal is key
- JMT Repository
- Assessment of Strategic UAS
- Coalition Operations Planning
- Train to Multiple Scenarios
Providing a Common Lexicon

**JMTs provide operational and system engineering context that supports communication and integration between warfighting and support communities**
Growth in JMT Interest

DoD Community support for Joint-focused, established, certified, re-useable JMTs

Q2 2009
Q3 2009
Q4 2009
Q1 2010
Q2 2010

DoD Participating Organizations

Communities: UJTL Testing Training Net-Ready M&S Experimentation Acquisition Programming

JMTAT WG Formed
ADM McCarthy DOT&E
PEO Exchange (SES Whitehead)
ConOps Draft Initiated
Joint Staff JSIC USA (TRADOC) Navy (NAVAIR) USAF (GCIC,46TS) DISA TRMC
USJFCOM (J7/J9)
JTEM
JWFC
JSSC
JTIC
USAF (JFIIT)
USMC (HQ C4)
Navy (COMOPTEVFOR)
USMC (MCOTEA)

DOD M&S Steering Committee (SES Whitehead)
TSSG ADV Group
AO JSAP 136
VCJCS Topic
JMT Conference*

DOD (CIO)
NORTHCOM
CENTCOM (CCJ4-P)
JMETC
USAF (ACC/A8CI)
USAF (AFMC)
USA (CIO/G6)

O-6 JSAP 136

DOJ (CIO)
CENTCOM (CCJ4-P)
JMETC
USAF (ACC/A8CI)
USAF (AFMC)
USA (CIO/G6)

DACAS JROCM (Dec 23 2009)
USJFCOM IPL (Jan 2010)
JPRA CI (Feb 2010)
FP FCB (Mar 2010)
Draft CGA JROCM (Apr 2010)
C2CIB SSG (May 2010)

* Included:
-- OSD DDRE DJI Opening
-- VCATS brief
-- TRMC brief

Adm McCarthy
DOT&E

SAIC
VCJCS

Topic

Other Significant JMT Events
DACAS JROCM (Dec 23 2009)
USJFCOM IPL (Jan 2010)
JPRA CI (Feb 2010)
FP FCB (Mar 2010)
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C2CIB SSG (May 2010)

Communities: UJTL Testing Training Net-Ready M&S Experimentation Acquisition Programming

DoD Community support for Joint-focused, established, certified, re-useable JMTs
JOINT MISSION THREADS 101
Joint Mission Threads Will:

- Clarify Joint operational and technical requirements to improve interoperability and integration
- Provide operational and technical context for objective Joint analysis, assessment, testing, and training
- Establish common standards to verify operational & technical effectiveness of info exchanges
- Enable improved cross-Joint Capability Area (JCA), cross-portfolio analysis of Joint & coalition capabilities
- Detail the interaction of systems & processes in support of mission engineering at the technical system of systems level (Tier II and III JMTs).

Joint Mission Thread (JMT):
An operational and technical description of the end-to-end set of activities and systems that accomplish the execution of a joint mission. (CJCSI 6212.01E)
JMTs Support to C2 System Testing

- Nat'l Needs
- Missions
  - C2 Strategy
  - C2 UJTs
- Measures of Force Effectiveness, Mission MoEs
- Task and Activity Measures
- Mission MoPs
- Mission Activities
- DOTMLPF Functions
  - Incl. JCSFL
  - Incl. C2 Portfolio
  - Performance Measures e.g.
  KPPs
- Options

JCAS Mission Thread

JFIIT Activity List

C2 Extractions
Developing Reusable JMT Information

A Joint Approach, Based on:

- UJTL information
- Authoritative Doctrine, Policy, Procedures, TTPs
- Service Documentation – JCIDs, METLs, technical specification and standards, Testing data, findings, etc
- JCA Tiers do not map directly to JMT Tiers – a JMT supports multiple JCAs

Operational Sponsor Critical to Success
Range Of Military Operations

Types of Military Operations

- Crisis Response
- Limited Contingency Operations
- Strikes
- Raids
- Military Engagement
- Security Cooperation
- Show of Force
- Deterrence
- Protection of Shipping
- Major Operations
- Combating Terrorism

Many to Many

- Provide Global Strike Capabilities
- Space
- Determine and Report Force Readiness
- Air Assault
- Manage Personnel Recovery
- Humanitarian Assistance
- Synchronize Strategic Attack
- Destroy Enemy Bases
- Coordinate Joint/Multinational Training Events
- Information Warfare

M I S S I O N
A R E A S

M I S S I O N
T H R E A D S

JCAS
Interdiction
JCPR
Countermine
Mine Operations
CWMD
MEDEVAC
Maritime interception
Intel Support
Coalition Support
Prepare Plans
Supply
Analyze COAs
Mission Planning
OPSEC
Air Refueling
CID

ENABLING Universal Joint Tasks

(Operational, Tactical)

(Operational Templates, Strategic National, Strategic Theater)

Many to Many

Joint Fires
JSEAD
CIED
Non-Lethal Attack
Defensive Countermeasures
EW/EA
Amphibious Assault
Tactical Airlift
Counter Drug

(Operational, Tactical)

Theater Missile Defense

Many to Many
## Joint Mission Thread
### Joint Close Air Support

<table>
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**Diagram Notes:**
- **CRC**: Command and Control Center
- **ASOC**: Air Support Operations Center
- **TACP**: Terminal Attack Control Point
- **JTAC**: Joint Terminal Attack Controller
- **Hostile targets**: Targets of Opportunity
- **USA/USMC/COALITION**: Joint Interoperability
- **Systems**: TACP-CASS, STRIKELINK, BAO-KIT, COALITION
- **Accuracy**: > 95%
- **Performance**: > 98.9% PK
- **Cross Service**: Time to Cross Service
  - 5 min
  - 3 min

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**Image Notes:**
- The diagram illustrates the flow of operations from the detection of a target to the assessment of the mission's success.
- Key nodes include the Commander, Unit, TACP, ASOC, CRC, JTAC, and Hostile targets.
- The flowchart highlights the coordination and decision-making processes involved in the joint close air support operations.
**Tier 1 JMT**
High level generic data description – totally reusable architecture-based info sets.

**Tier 2 JMT “Strands”**
Information represents specific documentation required to answer a particular question or solve a problem.

**Tier 3 JMT**
Systems engineering level of detail. Bit-level analysis with enough rigor to inform Test/Eval and Mod/Sim communities.

*Results in Coordinated Implementation*
Tier 1 JMT Priorities

- Joint Close Air Support (JCAS)
- Air and Missile Defense
- Joint Personnel Recovery (JPR)
- Counter IED
- Global Force Management
- EW/EA

Joint Fires
- Dynamic Targeting (TST)
- Integrated Tactical Warning & AA
- CND/CNA/CNE (CYBER)
- HA/DR
- Interagency Interoperability

- Non Combat Evacuation
- Counter Drug
- Tactical Airlift
- Strategic Attack
- Maritime Interception
- DSCA

- Interdiction
- CWMD
- Casualty Management
- Military Information Support Operations
- Non-lethal Capabilities
- Counter Mine

TIER 1 JMT composition funded.
Plan in place to accelerate data-rich out year JMTs per MG Rudesheim’s direction.

FY10 FY11 FY12 FY13 FY14

- Tier 1 complete
- Tier 1/2/3 work
- Tier 1 in progress
JMT Development Products

**Tier 1:**
JMT: AV-1 (High Level), OV-1, OV-2, OV-4, OV-5a, SV-1, Measures, High-Level Executable Architecture (EA) & IV

**Tier 2/3:**
JMT “Strands”: (Additional) AV-1 (Specific), OV-2, OV-3, OV-4, OV-5b, OV-6c, SV-1, SV-3, SV-5a, SV-6, SV-10c, DIV-1, DIV-2, StdV-1, StdV-2, Baseline EA, or documents that show:
- Node/System Pairing
- Message Order
- Distributions
- Timings
- Decision processes
- System attributes
- System Functionality (IAW JCSFL)
- Information Exchange Requirements (IERs)
- Message composition
- Interoperability Matrix
- Data Exchange Requirements (DERs)
- System Capabilities

JMT “Strand” Tier 2 information represents specific documentation required to answer a particular question or solve a problem. JMT Strands are unique JMT segments that will have specific actors for each node, might use a Service-specific set of TTPs or CONOPS, may be AOR-specific or use a unique set of systems and apps – all subset of Tier 1 information (OV-5, SV-1, etc.).

Tool suite will include JACAE, Architecture-Driven Analysis (ADA) EAs, augmented by:
- JDEIS
- JCSFL
- Joint Style Guide (Army’s Joint Test Threads +)
FY-10 Tier 1 JMT
Current Utilization

- CIED Tier 1
- JPR Tier 1
- IAMD Tier 1
- JCAS (JBMC2)
- GFM Tier 1
FY-10 Tier 1 JMT
Current Utilization

- CIED Tier 1
- JPR Tier 1
- IAMD Tier 1
- JCAS (JBMC2)
- GFM Tier 1

- BMD C2 Tier 2 (USN)
- BMD PAA Tier 2 (NORTHCOM)
- ITW/AA Tier 1 (NORTHCOM)
- JDIAMD JT&E (C2) (NORTHCOM)
- OTHER

Fielded Improved & Integrated CAPABILITY
FY-10 Tier 1 JMT
Current Utilization

CIED Tier 1
JPR Tier 1
IAMD Tier 1
JCAS (JBMC2)
GFM Tier 1

JPR Quick Look

2009

2009
NECC C2OTM

2010-2015
JPR Tier 3
ECPs 1-7

2011
AMN JPR

2011-2018
Fielded Improved & Integrated CAPABILITY
**JMT Logical Data Flow**

- **External Service/Data Providers**
  - Related Data Repositories
  - ADS Registry
    - JCAMS
    - UJTL-DB

- **Architecture Data Repositories**
  - Static Architecture Products
  - Direct Import as Required

- **Service Consumers**
  - (External)
    - NECM
    - T&E Tools
    - Architecture Tools
    - E-ISIP
    - C2 Registry

- **External Service Inventories**
  - DM2 Translation Svc
  - Model Generation
  - DM2 XML Validation Svc

- **Web Services**

- **JMTs**
  - “J89” Data Repositories
  - DM2 Services

- **Arch. Tools**
  - JMTs
  - JAFE Web
  - Other USJFCOM
    - Architecture Development Efforts
      - J7
      - J3-4
      - J2
      - J9
      - J6

- **Web Services**

- **NECM-E**
  - DM2 Translation Svc
  - Model Generation
  - DM2 XML Validation Svc
  - Process JMTs/Models/Data

- **ADA Branch Review**
  - Accept/Correct/Convert

- **JMT Repository**
  - Architecture Integration Division
  - JMT Repository

- **Tier I**
  - Architecture
  - Federation

- **Tier II and III**
  - DM2 DB
  - Custom SQL
Process Linkage For JMT Architectures

- **Proposed JMT**
- **UJTL**
- **Phases of Operation**
- **Mission Objectives**
- **Information Preliminary to Measures**
- **Detailed Measures**
- **Activities OV-5b**
- **Systems SV-3**
- **System Function (CSFL)**
- **Operational Performer (OV-2) / (OV-4)**
- **Executable Architecture**
- **Business Process Modeling**

**Groups and Partners**
- **Coalition Partners**
- **Doctrine (e.g. Pubs, TTPs, etc.)**
- **SME’s**
- **JCA’s**

**Utility Diagrams**
- **BPMN**
- **Updates**
- **Configuration Managed**
- **DIV-1**
- **DIV-2**
- **StdV-1**
- **StdV-2**

**Attributes**
- **Discoverable**
- **Reusable**
- **Authoritative**

**Phases of Operation**
- **JMT**
- **MOP**
- **MOE**

**Information Preliminary to Measures**
- **SV-6**
- **SV-5a**
- **SV-4**
- **OV-3**

**Detailed Measures**
- **MOP**
- **MOE**

**Mission Objectives**
- **OV-2**
- **OV-4**

**Proposed JMT**
- **AUTL**
- **MCTL**
- **AFTL**
- **NTTL**

**System Function**
- **SV-1**
- **SV-10c**

**Operational Performer**
- **StdV-1**
- **StdV-2**

**Executable**
- **Business Process Modeling**
- **Architecture**
- **Managed**
JMT Points of Contact:

Mr. Christopher Behre, USJFCOM/J892 Branch Chief
christopher.behre@jfcom.mil  757-203-4424

Mr. Jeff Springer, JMT Government Lead, USJFCOM/J892
Jeffrey.springer@jfcom.mil  757-203-4418

JCAS, CIED, GFM, IAMD, and JPR Tier 1 JMTs can be accessed via JAFE Portal:

JMT Architecture and Testing Working Group documents can be accessed via JKO:
https://www.us.army.mil/suite/page/525239
USE CASE: JCAS
Problem Statement

• Non-standard, non-interoperable, Service-specific digital data exchange capabilities
  • Inhibit digital collaboration when conducting CAS resulting in voice-only as default method
  • Increase potential for human errors
    • JTAC verbally passing target data
    • CAS platform operators manually entering target data
    • Exacerbated by language difficulties
  • Lead to aborted attacks due to inability to positively identify targets on first pass
  • Reduce situational awareness contributing to increased potential for civilian casualties
  • Are identified as contributing factors in several fratricide incidents
### Joint Mission Thread

**Joint Close Air Support**

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**Notes**

- **Cross Service**
  - USAF, USN, USMC, ANG, COALITION
  - > 98.9 % PK
  - > 95% Acrcy

**Systems**

- TACP-CASS
- STRIKE LINK
- BAO-KIT
- COALITION
Current vs. To Be

Basis of Comparison
Current Human functions vs. functionality to be incorporated into the Close Air Support Process.
Complete XCAS Mission
(mission assignment through mission completion)

40-44% Time Savings Using Digital
More Weapons Employed, More Fuel Available
## Digital vs. Voice Analyzed

### 10 Day Operations

<table>
<thead>
<tr>
<th></th>
<th>A-10</th>
<th>F-16</th>
<th>F/A-18</th>
<th>B-1</th>
<th>B-52</th>
<th>AV-8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg number of strikes/section</td>
<td>Voice</td>
<td>Dig</td>
<td>Voice</td>
<td>Dig</td>
<td>Voice</td>
<td>Dig</td>
</tr>
<tr>
<td></td>
<td>5.0</td>
<td>6.0</td>
<td>6.4</td>
<td>8</td>
<td>6.9</td>
<td>12.6</td>
</tr>
<tr>
<td>12 Ship (surge) squadron strikes (10 days)</td>
<td>900</td>
<td>1080</td>
<td>1151</td>
<td>1440</td>
<td>1259</td>
<td>2273</td>
</tr>
<tr>
<td>Days needed to strike same number of targets</td>
<td>10</td>
<td>8.34</td>
<td>10</td>
<td>7.99</td>
<td>10</td>
<td>5.54</td>
</tr>
</tbody>
</table>

*Based on average loiter times & sortie rates

**Results Feed Other Models (EADSIM, JAS, STORM, etc)**
Solution

• Achieve Joint interoperability through coordinated implementation of digital messaging standards
  • Better defined standards to eliminate “soft” options
  • Collaborative development, testing, and verification
  • Block upgrades to manage version control while providing incremental DACAS improvements
• Can be leveraged by Partner Nation CAS participants to ensure coalition interoperability
Service Consumers (External)
- Capability Development Tracking and Management (CDTM) Tool
- Capability Development Framework (CDF)
- C2- CORE
- Authoritative Data Source Registry
- Electronic Information Support Plan (E-ISP)
- Netcentric Systems Test Capability Evaluation Module (NECM)
- Test & Evaluation Tools

Tier I
- DM2 Services
- Architecture
- Services
- DM2 DB
- Custom SQL
- Federation

Tier I
- JMT
- Logical Data Flow
- Arch.
- Tools
- AID JMT
- Publishing Svcs

Division
- JMT Repository
- ADA Branch
- Review
- Accept/Correct/Convert

DM2 Translation Svc
Model Generation
DM2 XML Validation Svc
Process JMTs/Models/Data

JMT Developers Internal/External
BACK-UP
**Scenario:** Will provide future users with a clear understanding of the description of the context in which a series of events, or actions and events are executed. The scenario describes the view of the specific actors (performers) and systems, as well as their relationship to a specific sequence of events. Scenarios, in concert with the associated AV-1 provide the overarching guidance for development of Tier II/III architectures.

**AV-1:** The All View 1 (AV-1) defines the purpose, scope, objectives, and architectural approach desired by all parties involved. Describes intended users, analytical findings, and environment. It will provide future architecture users with a complete outline of the products and a POC

**AV-2:** The Integrated Dictionary (AV-2) provides those reviewing/leveraging the architecture a single authoritative source of definitions for all terms used in products. The products include but are not limited to Performers, Activities, Systems, Messages, Attributes, Desired Effects, Objectives and Conditions.

**OV-1:** The High Level Operational Concept Graphic (OV-1) describes the high level graphical and textual description of operational concept (high level organizations, missions, geographic configuration, connectivity, etc.). Provides those reviewing/leveraging a clear view of the sponsor intent for the project.
**OV-2**: The Operational Node Connectivity Description (OV-2) will provide future users with a clear understanding of Operational Performers (boards, centers, cells, etc.) activities conducted at by each Operational Performer, and connectivity's and information flow between Operational Performers. Serves a great value in understanding who must speak to who and what messages are passed between them.

**OV-4**: The Organizational Relationships Chart (OV-4) depicts the command, control, coordination, and other relationships among organizations within the architecture products. It will provide future architecture users with a complete outline of the organizations in the architecture and their hierarchical relationships.

**OV-5b**: The Operational Activity Model provides those reviewing/leveraging the architecture with a chronological flow of Activities. It will assist in clearly defining the logical flow and help identify critical paths.
**JMT Development Product Description**

**OV-3/SV-6** Combined: Operational Information and Systems/Services Data Exchange Matrix: Provides those reviewing/leveraging the architecture with both Information and system data exchanged between performers and systems. This product focuses on automated information exchanges that are implemented and the system data exchanges. Will serve great value in identifying which exchanges are sent by organizations and their systems. Additionally assists in analyzing redundancy between voice and data transmissions.

**OV-6c/SV-10c** Combined: The System and Operational Event-Trace Description will provide future users with a clear understanding of timing, sequence and flow of activities along with the related performers/systems and the information and data elements exchanged between them. Assists in showing the sequential flow of all activities and the systems utilized by a given performer (board, center, cell, etc.)
SV-1: The Systems/Services Interface Description (SV-1) will provide future users with a clear understanding of the system to system interfaces and, along with the SV-4, the associated system function interactions with another system. Serves a great value in understanding which system speaks to which but additionally the functions that each performs in common. Very useful for identifying gaps in system capability.

SV-3/SvcV-3a: Systems-Systems Matrix (SV-3) or Systems to Service Matrix (SvcV-3a) provides detail on the interface characteristics described in SV-1 arranged in matrix form. It will provide future architecture users with a complete look at the system to system or system to service interoperability to the lowest required level.

SV-4 and SV5a Combined: System Functionality to System to Activity (SV-4 and SV-5a) Combined: The System and Operational Event-Trace Description will provide future users with a clear understanding of the SV-4 and SV5a combined documents system functional hierarchies and system functions, and the system data flows between them. The system functional hierarchy done in a one-to-one mapping combined with the Activity to Systems Function Traceability Matrix assist users by allowing them to view the activities functions and the appropriate system on a single view.
**CV-6:** The CV-6 describes the mapping between the capabilities required and the activities that enable those capabilities.

**DIV-2:** The Logical Data Model allows analysis of an architecture's data definition aspect, without consideration of implementation specific or product specific issues. Another purpose is to provide a common dictionary of data definitions to consistently express models wherever logical-level data elements are included in the descriptions.

**DIV-3:** The Physical Data Model defines the structure of the various kinds of system or service data that are utilized by the systems or services in the Architectural Description. The Physical Schema is one of the models closest to actual system design in DoDAF. DIV-3 is used to describe how the information represented in the DIV-2 Logical Data Model is actually implemented.

**StdV-1:** The StdV-1 defines the technical, operational, and business standards, guidance, and policy applicable to the architecture being described.

**StdV-2:** The StdV-2 contains expected changes in technology-related standards, operational standards, or business standards and conventions, which are documented in the StdV-1 model.
Business Process Model: BPM provides a holistic view of an end to end process and provides the foundation for development of an executable architecture. When criteria and metrics are applied BPM architectures can be executable. Additionally it focuses on aligning all aspects of an organization with its wants and needs. It promotes effectiveness and efficiency while striving for process accountability, flexibility, and integration.

Executable Architecture: Enables the architect to design and model vital operational processes with system and individual resources applied. This allows the sponsor to make informed decisions before deployment through advanced analysis based on modeled and actual data. Simulations are run in a monte-carlo fashion, depicting thousands of runs with many variables in seconds. This allows the customer to visualize and identify bottlenecks and inefficiencies in process, analyze the effects of proposed changes or solutions enabling informed decisions supported by analytical rigor.

Measures: A parameter that provides the basis for describing varying levels of task accomplishment. Assist in identifying the basic questions of who, what, why, and how, and then connects measures to “how capable” is the “who and how” and “how well” is the “what and why.”
Data Collection Matrix: The DCM provides those developing and referencing the architecture with matrix style view of interactions between performers, activities, systems, messages, and at the appropriate level the associated timing. This document provides the backbone to architecture development while ensuring the architectures remain integrated during data collection.

Final Report: The Final Report provides a single document containing the architecture products, a summary of the analysis, findings and proposed solutions.