Architecture Modeling Approach for Net-Centric Enterprise Services
(C4ISR/C2 Architecture Track, Paper #60)

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**Title:** Architecture Modeling Approach for Net-Centric Enterprise Services (Briefing Charts)

**Abstract:**

The original document contains color images.
Outline

• NCES Mission Threads
• Architecture Modeling Approach
• Sample: Time Sensitive Targeting
• Summary
Purposes of Mission Threads

- Demonstrate that NCES Core Enterprise Services can support Department of Defense missions.
- Validate NCES capabilities (requirements) for mission threads
- Develop Executable Architecture Models to validate NCES Service-Oriented Architecture.
Summary of Approach

1. Formulate activity models for a mission thread.
2. Map the activities to NCES and existing systems.
3. Develop logical deployment architecture with NCES included.
4. Develop logical data models.
5. Construct executable architecture models.
Time-Sensitive Targeting Activity Model

Activity Diagram (OV-5):

Find

Fix

Track

Target

Engage

Assess

Determine if Target is TST

Develop ISR Plan / TST Criteria

Collect ISR

Determine if Target is TST

NonTST Target

Prioritize

Locate Target

Correlate & Fuse Data

Confirm / PID TST

Determine Time Available

Monitor Window of Vulnerability

Update Situational Awareness

Validate Target

Determine Available Attack Assets

Formulate Weapon Target Pairing

Submit Combat Assessment Requirements

Select TST Attack Option

Formulate Engagement Options

Order TST Engagement

Acquire Target

Monitor Engagement

Collect Assessment Data

Correlate & Fuse Data

Determine Effects

Objective Not Achieved

Recommend Restrike

Objective Achieved

Remove From Target List

The TST Manager is updated continuously as new information becomes available.
## Operational Activity Descriptions ("Find" Phase)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop ISR Plan/TST Criteria</td>
<td>Based on JFC TST guidance and initial preparation of battlespace (IPB), develop an Intelligence, Surveillance and Reconnaissance (ISR) plan to deploy sensors to identify potential TSTs.</td>
</tr>
<tr>
<td>Collect ISR</td>
<td>Use all available sensor data to identify, locate, and prioritize emerging targets.</td>
</tr>
<tr>
<td>Determine if Target is TST</td>
<td>Use further ISR to determine if emerging target is a TST. The final decision is made by the TST Cell Chief.</td>
</tr>
</tbody>
</table>
## Operational Activity to System Function (SV-5)

### Activities in the Six Phases

<table>
<thead>
<tr>
<th>Core Enterprise Services &amp; Existing Systems</th>
<th>Activities to Function Mapping for Time-Sensitive Targeting (SV-5)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Human Actor Only</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Human Computer Interface</strong></td>
<td>X</td>
</tr>
<tr>
<td><strong>Core Enterprise Services</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Messaging Services</strong></td>
<td></td>
</tr>
<tr>
<td>Publish/Subscribe/Receive Enterprise Messages</td>
<td>S          S          S          S          S          S          S          P</td>
</tr>
<tr>
<td>Publish/Subscribe/Receive Notifications</td>
<td>P          P          P          P          P          P          P          P</td>
</tr>
<tr>
<td>Configuration &amp; Admin</td>
<td></td>
</tr>
<tr>
<td><strong>Discovery Services</strong></td>
<td></td>
</tr>
<tr>
<td>Content Discovery</td>
<td>P          P          P          P          P          P          M          S</td>
</tr>
<tr>
<td>Service Discovery</td>
<td>P          P          P          P          P          P          P          M</td>
</tr>
<tr>
<td>Metadata Discovery</td>
<td>P          P          P          P          P          P          P          M</td>
</tr>
<tr>
<td>Person Discovery</td>
<td>S          S          S          S          S          S          S          S</td>
</tr>
<tr>
<td>Taxonomy/Ontology Mgmt</td>
<td></td>
</tr>
<tr>
<td>Metadata/Schema Reg &amp; Mgmt</td>
<td></td>
</tr>
<tr>
<td><strong>Collaboration Services</strong></td>
<td></td>
</tr>
<tr>
<td>Establish Collaboration Session</td>
<td>P          P          P          P          P          P          P          P</td>
</tr>
<tr>
<td>Publish/Subscribe/Receive Presence Info</td>
<td>P          P          P          P          P          P          P          P</td>
</tr>
</tbody>
</table>

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Legend:
P=Portlets via Browser, C=Client App (Thick), S=Service-to-Service, M=System-to-Service. 
Cells in gray are common across Operational Activities.

Only Part of the Table is shown.
Notional System Interface Description (SV-1)

Notional To-Be Systems Interface (SV-1) For TST

Clients

Core Enterprise Services

Data Providers

TST COI Service

TST Manager

TST Data Server

HTTP(S) Interface

TST Portlet

Search Portlet

Track Data Provider

RTL Data Provider

Weather Data Provider

IA / Security Service

Enterprise Service Management

Storage Service

Application Service

User Assistance Service

Collaboration Service

Messaging Service

Mediation Service

Discovery Service

Customer

CoI Portal

TST COI Service

COI Portal

Workstation / Thick Client

Browser / Thin Client

TST Col Service

Enterprise Services

Foundational

Discovery Service

Mediation Service

Messaging Service

Collaboration Service
Notional Event-Trace Description (SV-10c)

Systems Event-Trace Description (SV-10c) For TST: Discovery

Core Enterprise Service

Track Data Provider

TST COI Service

Component Commander via Thin Client

COI Portal

Discovery

Messaging

TST Manager

Clients

1. Update TST Data

2. Signal New Info

3. Match Info to Subscriber Profile

4. Send Notification Via Email

5. Retrieve Notification Message

6. Send Content Query

7. Search Persons

Ces

Update TST Data

Request Content Discovery

Return Content Results

Initiate Content Search

Request Person Search

Return Person Results

Return Person Results

Search Persons

Match Info to Subscriber Profile

Trigger Notification
Executable Architecture Model for TST

Only First Three Activities Shown Here

1. Develop ISR Plan / TST Criteria
2. Collect ISR
3. Determine if Target is TST

- TST Guidance
- Non-TST Target
- Not a Target
- Probable TST
Model Execution Timeline (example)

TST Activities

- TST.1 Develop ISR Plan / TST Criteria
- TST.2 Collect ISR data
- TST.3 Determine if Target is TST
- TST.4 Fix through Assess Phases
- TST.5 Locate Target
- TST.6 Correlate & Fuse Data
- TST.7 Confirm / PID TST
- TST.8 Determine Time Available
- TST.9 Track Phase
- TST.10 Maintain Track Continuity on the TST
- TST.11 Monitor Window of Vulnerability
- TST.12 Update Situational Awareness
- TST.13 Target Phase
- TST.14 Validate Target
- TST.15 Determine Available Attack Assets
- TST.16 Formulate Weapon Target Pairing
- TST.17 Formulate Engagement Options
- TST.18 Submit Combat Assessment Requirements
- TST.19 Select TST Attack Option
- TST.20 Engage Phase
- TST.21 Order TST Engagement
- TST.22 Monitor Engagement
- TST.23 Acquire Target
- TST.24 Attack TST
- TST.25 Initiate Assessment
- TST.26 Assess Phase
- TST.27 Collect Assessment Data
- TST.28 Correlate & Fuse Data - Assess
- TST.29 Determine Effects
- TST.30 Remove From Target List
- TST.31 Update TST Manager Tool

Active activities
Operational Mission Threads

Warfighter Mission Areas:
• Time Sensitive Targeting (USJFCOM/SPAWAR/USA G-6)
• Focused Logistics/Deployment (USJFCOM/USTRANSCOM)
• Joint Close Air Support (USJFCOM)
• Global Strike (USAF/USSTRATCOM)
• Blue Force Tracking (USA)

Business Mission Area:
• Personnel/Military Pay (HRM Domain)
# Usage of Core Enterprise Services

<table>
<thead>
<tr>
<th>Mission Threads</th>
<th>TST</th>
<th>Flog/D</th>
<th>JCAS</th>
<th>GS</th>
<th>BFT</th>
<th>MilPay/D</th>
<th>Subtotal</th>
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<td>Messaging Services</td>
<td>9</td>
<td>6</td>
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<td>8</td>
<td>3</td>
<td>4</td>
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<td>0</td>
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<td>14</td>
<td>5</td>
<td>11</td>
<td>8</td>
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<td>Mediation Services</td>
<td>8</td>
<td>7</td>
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<td>3</td>
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<td>0</td>
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</tbody>
</table>

Average number of activities using a service

Shaded area for foundational services
Architecture Modeling Methodology

Conops Picture

Operational Scenario / Activity Diagrams

Activity-Function/Service Mapping

Functions/Services

System Requirements

Logical / Deployment / Network Architecture

Sequence Diagrams

Executable Architecture Model

Logical Data Model

Interface Definition

Data Schema

Performance Model & Results
End of Presentation