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

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June, 2005
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

- Develop ISR Plan / TST Criteria
- Collect ISR
- Determine if Target is TST
- Prioritize
- Not a Target
- Discard
- Determine if Target is TST
- Locate Target
- Probable TST
- Update TST Manager Tool
- Correlate & Fuse Data
- Confirm / PID TST
- Determine Time Available
- Maintain Track Continuity
- Monitor Window of Vulnerability
- Update Situational Awareness
- Validate Target
- Determine Available Attack Assets
- Formulate Weapon Target Pairing
- Formulate Engagement Options
- Submit Combat Assessment Requirements
- Select TST Attack Option
- Order TST Engagement
- Acquire Target
- Attack TST
- Collect Assessment Data
- Determine Effects
- Correlate & Fuse Data
- Objective Not Achieved
- Recommend Restrike
- Objective Achieved
- Remove From Target List

Determine if Target is TST
### 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>
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<tr>
<td><strong>Core Enterprise Services</strong></td>
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</tr>
<tr>
<td><strong>Messaging Services</strong></td>
<td></td>
</tr>
<tr>
<td>Publish/Subscribe, Receive, Enterprise Messages</td>
<td>S</td>
</tr>
<tr>
<td>Publish/Subscribe, Receive, Alerts by Topic</td>
<td>P</td>
</tr>
<tr>
<td>Publish/Subscribe, Receive, Notifications</td>
<td>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</td>
</tr>
<tr>
<td>Service Discovery</td>
<td>P</td>
</tr>
<tr>
<td>Metadata Discovery</td>
<td>P</td>
</tr>
<tr>
<td>Person Discovery</td>
<td>S</td>
</tr>
<tr>
<td>Taxonomy/Ontology Mgmt</td>
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</tr>
<tr>
<td>Metadata/Schema Reg &amp; Mgmt</td>
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<tr>
<td><strong>Collaboration Services</strong></td>
<td></td>
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<tr>
<td>Establish Collaboration Session</td>
<td>P</td>
</tr>
<tr>
<td>Publish/Subscribe, Receive, Presence Info</td>
<td>P</td>
</tr>
</tbody>
</table>


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 Data Server

Browser / Thin Client

Workstation / Thick Client

HTTP(S) Interface

TST Portlet

Search Portlet

TST Manager

TST Data Provider

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

IA / Security Service

Enterprise Service Management

Storage Service

Application Service

User Assistance Service

Customer

CLO Portal

TST COI Service

Core Enterprise Services

Foundational

IA / Security Service

Enterprise Service Management

Storage Service

Application Service

User Assistance Service

Discovery Service

Messaging Service

Mediation Service

Collaboration Service
Notional Event-Trace Description (SV-10c)
Executable Architecture Model for TST

Only First Three Activities Shown Here

- TST Guidance
- Develop ISR Plan / TST Criteria
- Collect ISR
- TST Data
- Determine if Target is TST

- Non-TST Target
- Not a Target
- Probable TST
TST Activities

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

Model Execution Timeline (example)
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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</tbody>
</table>

Shaded area for foundational services

Average number of activities using a service
Architecture Modeling Methodology

Conops Picture
- OV-1

Operational Scenario / Activity Diagrams
- OV-5
- OV-6c

Activity-Function/Service Mapping
- SV-5
- SV-4

Functions/Services

System Requirements

Logical / Deployment / Network Architecture
- SV-1
- SV-2
- SV-10c

Sequence Diagrams

Executable Architecture Model

Logical Data Model
- Interface Definition
- Data Schema
- Performance Model & Results
- SV-6
- SV-11
- OV-7
- SV-7
End of Presentation