Analysis and approach for Army Interoperability

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Seamless C4ISR - Core to Edge

GDC4S will be a key Integrator of the Global C4ISR Information Grid
Communications and Networking

Information Assurance

Command and Control

Intelligence, Surveillance, Reconnaissance (ISR)

Space Systems and Services

GENERAL DYNAMICS
C4 Systems

Ruggedized Computing and Displays

Platform Integration

Ground-Based Satellite and Wireless Communication Products

RF Networking

Homeland Security
Key Architectures in the Army

- System of Systems Common Operating Environment (SoSCOE)
- Army Battle Command Systems 6.4
- Distributed Common Ground System – Army
- Network Centric Enterprise Services
- Land Warrior/Future Force Warrior

NCES/JC2
ABCS 6.4+
DCGS-Army
Land Warrior/Future Force Warrior
FCS/SoSCOE
FCS Interoperability Approach

- Current Battlefield Systems (Closed)
- Current Force Systems (Open)
- Current System SBI enabled
- Current System Integrated through FCS Interoperability Services

Diagram showing interoperability between systems:
- JC2
- DCGS-A
- FCS
- 10.2 DIB
- FCS SOSCOE
- NCES
- Pt-to-Pt Interface

Message Exchange

Service Protocols
Service Discovery
Interoperability Services
Analysis: SoS-COE & NCES Interop

- Key communications and protocol level interoperability provided by Interoperability Service of SoS-COE
- Mission Performance and QoS drives interactions with all CES but the key drivers are highlighted in blue

Core Enterprise Services (CES)

= required interoperability with SoS-COE
Interoperability Focus Areas

- **Presentation**
  - Integration into presentation layers

- **Workflows**
  - Workflow Model

- **Services**
  - Service Model

- **Data**
  - Models
  - Storage

- **Communications**
  - Connectivity
  - Discovery
  - Communications
  - Security
  - Network Impacts

Our primary focus is here.
### What are each supporting?

<table>
<thead>
<tr>
<th>Aspect</th>
<th>NCES</th>
<th>SoS COE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focus</td>
<td>DoD Enterprise</td>
<td>Army Tactical C2</td>
</tr>
<tr>
<td>C2ISR</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Security</td>
<td>Primarily Intra Enclave Security</td>
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</tr>
<tr>
<td>Real Time, Safety Critical Weapons</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Portability</td>
<td>Important. Very Java centric</td>
<td>Primarily C++, Difficult portability</td>
</tr>
<tr>
<td>Scalability / Availability</td>
<td>Designed to provide highly available services to many users</td>
<td>Decentralized, autonomous operations in many vehicles. Scale by adding vehicles</td>
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<tr>
<td>Performance/QOS</td>
<td>Focused on QoS at a location (i.e. guaranteed video)</td>
<td>Focused on sending most relevant data over limited bandwidth</td>
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<tr>
<td>SBA Focus</td>
<td>Open/COTS Based SBA – Web Enabled, Web Service Enabled, Published Metadata</td>
<td>Custom Developed SBA – Custom discovery, transport, dissemination, workflows, etc.</td>
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## NCES/SOSCOE Interoperability Issues

<table>
<thead>
<tr>
<th>#</th>
<th>Area</th>
<th>Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Discovery</td>
<td>Different discovery metadata and mechanisms prevent service discovery.</td>
</tr>
<tr>
<td>2</td>
<td>Encryption</td>
<td>Different encryption prevents service interoperability.</td>
</tr>
<tr>
<td>3</td>
<td>Identity / RBAC</td>
<td>Different identity and RBAC schemes prevent authentication / authorization.</td>
</tr>
<tr>
<td>4</td>
<td>Workflow</td>
<td>Different workflow models prevent workflows of services from NCES and SOSCOE.</td>
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<tr>
<td>5</td>
<td>Transport</td>
<td>Different transport mechanisms prevent service interoperability.</td>
</tr>
<tr>
<td>6</td>
<td>Interface Lang</td>
<td>Different service interface languages prevent service communication.</td>
</tr>
<tr>
<td>7</td>
<td>Metadata</td>
<td>Different languages for data and lack of SOSCOE metadata prevents data interoperability.</td>
</tr>
<tr>
<td>8</td>
<td>Data Models</td>
<td>Different data models require translators for interoperability.</td>
</tr>
<tr>
<td>9</td>
<td>Network Protocols</td>
<td>Non-standard SOSCOE network protocols prevent email, chat, and collaboration interoperability.</td>
</tr>
<tr>
<td>10</td>
<td>QoS</td>
<td>Compliance to the WIN-T / JTRS QoS scheme by FCS and non-FCS systems is required for effective bandwidth utilization.</td>
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</table>
Designing for Interoperability

Services addressed in the Core Service Framework
- Security
- Discovery
- Data Storage & Mediation
- Visualization
- Messaging
- Workflow
- Alerts

Applications

Core Service Framework
- SOSCOE
- DIB
- NCES
- ABCS 6.4
- Warrior

Applications
Managed Connectors

SBA Approach (Service UI) – ($)

Producer

Private Protocol

Consumer

Provided by producer

Consumer does NO development

GUI

Driver

App SW

Tradition Approach – ($$$)

Significant interface testing / integration testing

Consumer has to create a driver to communicate with the producer

SBA Approach (Service) – ($)

Provided by producer

Consumer does NO development

GUI

Driver

App SW
Example Frameworks
System Framework

- **System User Interface Components**
  - Provided by devices as they are inserted into the system
  - Provides system level control panels & Applications

- **System UI Controller**
  - Detects and registers GUI services
  - Provides the interface for an operator to launch GUIs

![MTI Sensor](image1)

![Video Sensor](image2)

![Published Services](image3)

![Control GUI](image4)

![UAV Video Application](image5)
Visualization Framework

- **GIS Plug-In Components**
  - Mobile components that provide the ability to display geo-referenced information
  - Understands the data and how it should be represented

- **GIS Plug-In Controller**
  - Detects and registers GIS Plug-In components
  - Translates the “normalized” calls into the appropriate calls for the GIS

Published Services

MTI Sensor

Video Sensor

COTS/GOTS Visualization Package
Distributed Services

DCGS-A

Visualization Service Framework

MTI

UAV

Mobile Graphical Components

AFATDS

COTS/GOTS Visualization Package

Targeting Interface Provided by AFATDS

UAV Viewing App Provided by CGS

ABCS - AFATDS
Summary

- Interoperability needs to encompass more than just data
  - Other factors such as Discovery, Security, Messaging and Workflow need to be considered as well

- Managed connectors and Service Frameworks are a viable mechanism for achieving application interoperability and portability
THANK YOU