System of System Common Operating Environment (SOSCOE): “Changing the Game” of Service Oriented Architecture for the Army

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System of System Common Operating Environment (SOSCOE): 'Changing the Game' of Service Oriented Architecture for the Army

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Agenda

• Problem Statement
• Army’s Approach
• What is SOSCOE?
• Key capabilities of SOSCOE
• The SOSCOE Approach
• SOSCOE Benefits
• Summary
Problem Statement

• The current environment for the acquisition and development of Army tactical applications involves many challenges:
  
  – Reduced schedules and budgets.
  – Evolving hardware, OS, and networks.
  – Integration of increasing amounts of software.
  – Unique operational requirements.
  – Addressing system “stovepipes”.
Army’s Approach to Layered, Networked Architecture

Command BCT system elements are commonly developed to integrate FCS platforms into a larger geographically dispersed yet Functionally integrated machine.

Battle Command incorporates C2, Intelligence, Surveillance, and Reconnaissance (ISR), Embedded Training, and Sustainment.

Net ready information management element of service based architecture.

Heterogeneous transport layer enables robustness.

Networked battle command, embedded training, and supportability developed Technical View (TV-1) integrated into SoS level TV-1 standards supporting integration.

Integrated Architecture Provides Design-Phase Flexibility and Tactical Adaptability For The Networked BCT-Modernization.
What is SOSCOE?

• SOSCOE is a services layer (including middleware) that provides isolation between application services and Operating System (and Computer hardware)
  – Makes Applications easier to develop and maintain, reducing life cycle costs
• SOSCOE provides a single development and deployment environment for the Tactical Domain, similar to how Microsoft provides a total environment for the Enterprise/Operational Domain
• SOSCOE supports and aids all phases of Tactical software Applications:
  – Development
  – Operational Use
  – Maintenance
SOSCOE Offers Key Capabilities

- Information Assurance
- Discovery
- Quality of Service
- Orchestration
- Interoperability with Current Force
- Interoperable with GIG
- Collaboration
- Extensive COTS/OSS use
- Commercial Help Desk and documentation
- Isolation of systems from hardware and operating system
- Safety and Mission Critical support
By basing the SOSCOE APIs on standards (DISR, WSTAWG, OMG, etc.), the Battle Command Services are isolated from any dependence on the computer HW, OS and COTS products.

This allows applications to take advantage of newer HW, OS and COTS with Minimal impact and cost
SOSCOE Benefits

• SOSCOE “tactical” mission execution enablers:
  – Configured/managed secure communications over bandwidth constrained, ad-hoc communications networks
  – Vertical and horizontal flow of C2 messaging and SA as appropriate
  – Interoperability with systems external to the BCT (e.g., FBCB2, NCES)
  – Collaboration via instant messaging, email, or whiteboard
  – Individual “role based access” changes and unit reconfiguration “on the fly”
  – Discoverable services allow remote processing, scalability and fault tolerance
  – A uniform network configuration capability for the BCT

• SOSCOE provides software developers:
  – Common components and tools for rapid Battle Command software development
  – Documentation and Industry Standard interfaces to support software development
  – Abstracts Battle Command software from technical evolution of the Hardware via standardized APIs
  – Extensive training, documentation, customer support and help desk

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Summary

• SOSCOE is a tailorable software toolkit to support legacy and SOA applications for the Tactical Domain
  – Designed to exist in a Bandwidth and Computer constrained environment
  – Supports net centric tenets
  – Product Line approach allows for a Scale-able application and maintenance
• Provides critical Information Assurance
• Reduces Enterprise life cycle costs
• Enables a loosely coupled system with “Plug and Play” of new hardware and software applications
• Allows the user to establish an “Investment Strategy” for evolutionary and incremental change
SOSCOE Provides “Composable, Discoverable, and Orchestratable Services” to Tactical Applications

Library of BC Software Services
(Battle Command Product Line)

“New Capability” required for Changing Threat

New BC
Operational
Requirements

New Investment:
• New Required Software Services
• Goes into the Library for future use
• New capability for BC product line

Reuse Previous Investment:
• Existing Software Services
• Existing “look and feel”
• Common architecture
• Common middleware
• Inherent interoperability
• Known Integration Risk
• Existing support framework
• Existing lessons learned
• the list is near endless

New BC Version
for “New Capability”

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SOSCOE Infrastructure Components and Tools Address the Needs of SOA in the Tactical Domain

SOSCOE Software developer toolkit (SDK) includes

- Runtime software
  - Executable processes
  - Run time libraries
- Developer tools
  - Code generators
  - TDD editor
  - Administrative tools
- Documentation
  - Programmer’s reference manual
  - Developer’s user guide
- Installation and field upgrade tools
- Configuration examples

Use of a single toolkit significantly reduces maintenance costs, promotes reuse of applications and guarantees interoperable solutions

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Commercial-grade Documentation and Support Make Development and Maintenance of Applications Easier

A cohesively designed set of software and information components developed to guide developers’ interactions with SOSCOE products

- Interfaces include appropriate information and features to support developer tasks
- Reference and training materials address needs for just-in-time information as well as reflective learning
- Pointers to dynamic sources of information support use of SOSCOE products throughout their lifecycles
- COTS industry standard development environment and tools

The right interaction for the right user at the right time

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SOSCOE is a collection of product lines associated with scalable Editions

**SOSCOE Product Line**

**Tactical COE Foundation:** Discovery and dissemination of services/data in a secure and trustable manner for the tactical environment

**Systems Management:** Uniform configuration and process management and customization for the tactical environment. Includes support for the maintenance of complex multi blade deployments, field update/versioning

**Interoperability:** Extensible and secure interoperability of data and services with external systems to include current force, enterprise services (NCES), and JIMI

**Collaboration:** Instant messaging, whiteboard, and email capabilities supporting tactical users including seamless collaboration to enterprise users

**Workflow Automation and Policy:** Complete environment for automating and orchestrating operational task sequences for SOA-based applications

**Information and Knowledge Services:** Data management, mining, and search for the tactical environment including semantic interchange

**User Experience:** Comprehensive source of user documentation, guidance, examples, and tutorials for solution developers and integrators

**Multiple products and editions allow SOSCOE to meet performance, scalability, portability, composability, and interoperability requirements of platforms**

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Information Assurance has been integrated into the base fabric of user and application interactions

1. Client calls RMI API

2. Request signed authorization

3. For the specified RBAC session and action create a signed authorization which includes the authorization indicator, and signature of the authorization server who signed the authorization.

4. Signed authorization

5. Send signed authorization

6. Verify signature on authorization, validity of the nonce, and the check authorization indicator before permitting access.

7. If access is granted call implementation code.

Information Assurance is built in to the System from the Start
Discovery allows the network to only move required information between producers and consumer lowering bandwidth needs

- Discovery
  - Provides applications the ability to register and lookup offers independent of network location
  - Sub-Components
    - Discovery Proxy
      - Application client hook to the Discovery Server
    - Discovery Server
      - Front end for Discovery Server application. Receives, performs, and responds to Discovery requests
    - JXTA
      - Backend Technology for Discovery Services.
      - Handles automatic Discovery infrastructure network formation, replication of offers, and dissemination of queries.
      - Integrated SOSCOE Pluggable Transports

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**SOSCOE Discovery enables the construction of powerful, fault-tolerant service-based architecture in a tactical environment**

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SOSCOE provides interoperability between NCES/GES Web Services and the Tactical Edge
The SOSCOE Development Environment

Application SW Development - SOSCOE

Components and Tools for Tactical Systems

- SOSCOE STUDIO available via WindRiver
- Common Infrastructure Components
  - Software Libraries
  - Software shared Objects
  - Executables (Collaboration, Interoperability)
- Management / Monitoring tools
- Standards based-interfaces
  - JDBC, ODBC, OMG, SOAP, HTTP, C++, Java
- Security Infrastructure
- COTS, GOTS tools with licenses

Application SW Development - Microsoft

Microsoft .Net Framework

- Visual Studio
- Common Infrastructure Components
  - Windows Communications Framework (WCF)
  - ADO.Net, SQL Server
  - Internet Information Services (IIS)
- Management / Monitoring tools
- Standards based-interfaces
  - WSDL, SOAP, HTTP, ADO, C#, Visual Basic
- Code Access Security (CAS), WS-Security
- Microsoft Licenses

SOSCOE + Domain Developers + Quality Architecture = Tactical Network Software

MS Tools + Java Support + Security + safety critical support + Quality Architecture = Deployable Software Systems

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Collaboration Services Design
Chat Software Component Overview

- Provides multi-server chat services
- Sub-components
  - Chat Stream API
    - Client interface to Chat Server
  - Chat Server (Collaboration Server)
    - Presence Mgmt Support
    - Instant Messaging
    - Create and Delete chat room
    - Manage chat participants
    - Manage message exchange (XMPP)
    - Archive messages
- B 10.2 Updates
  - Add support for XMPP data types
  - Update Status Code
  - Remove dependence on Policy Services
  - Enable Cross-Domain routing
- Note: Chat uses Directory API from Admin Services
  - Create, Delete, Update, and Search Chat Users

Chat interacts with Directory Services from Admin Services