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

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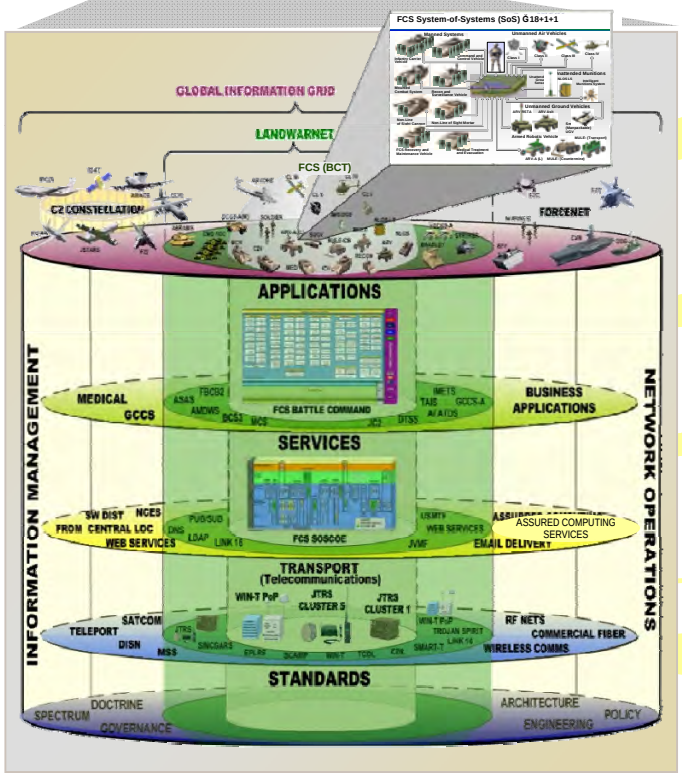
Agenda

- 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

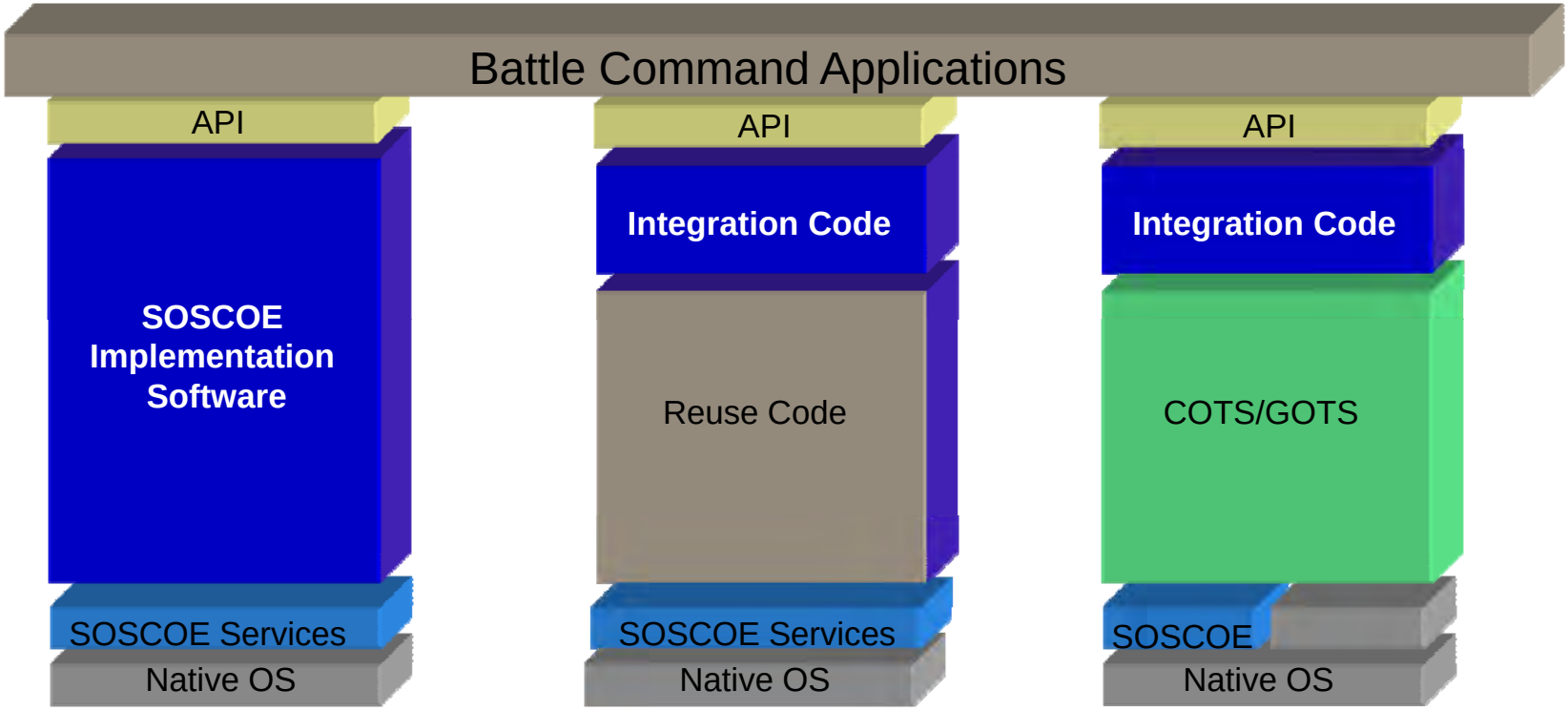
What is SOSCOE?

- 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

The SOSCOE Approach



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

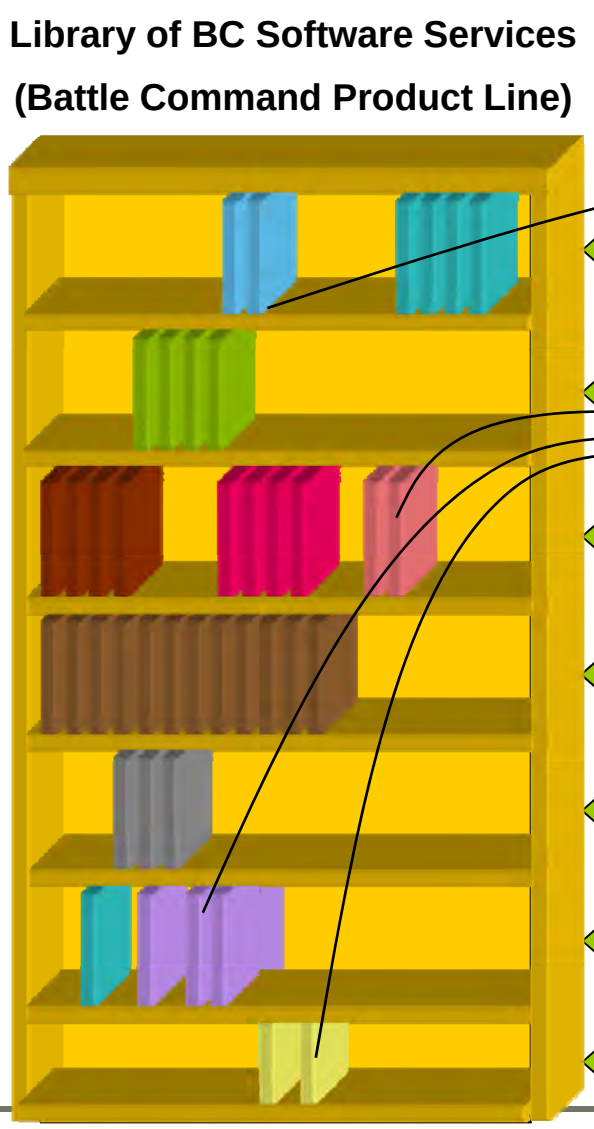
- SOSCOE “tactical” mission execution enablers:
  - Configured/managed secure communications over bandwidth constrained, ad-hoc communications networks
  - Vertical and horizontal flow of C2 messaging and SA as appropriate
  - Interoperability with systems external to the BCT (e.g., FBCB2, NCES)
  - 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

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

Backup

SOSCOE Provides "Composable, Discoverable, and Orchestratable Services" to Tactical Applications



"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**

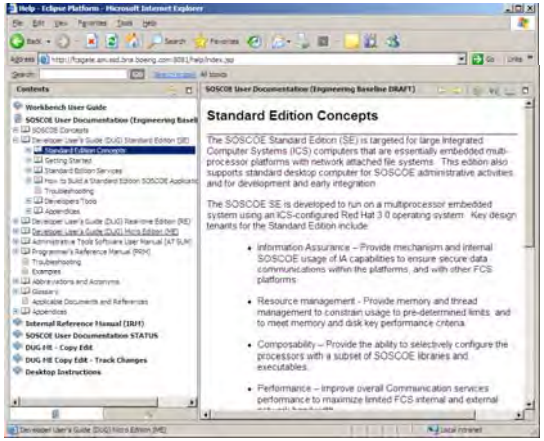
New BC Version for "New Capability"

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

User Documentation



Developer Tools

Deployed Executables

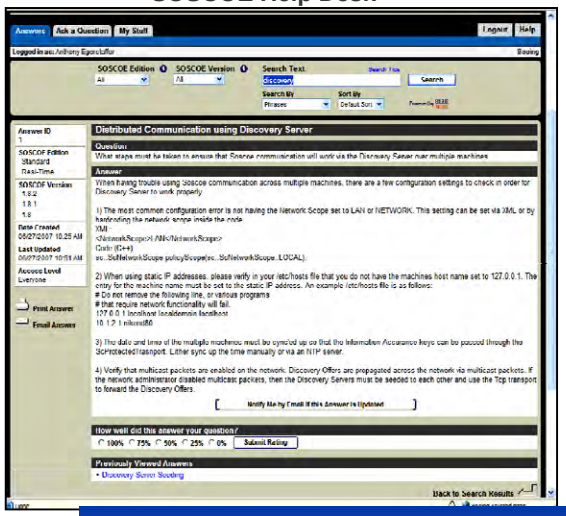
Use of a single toolkit significantly reduces maintenance costs, promotes reuse of applications and guarantees interoperable solutions

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

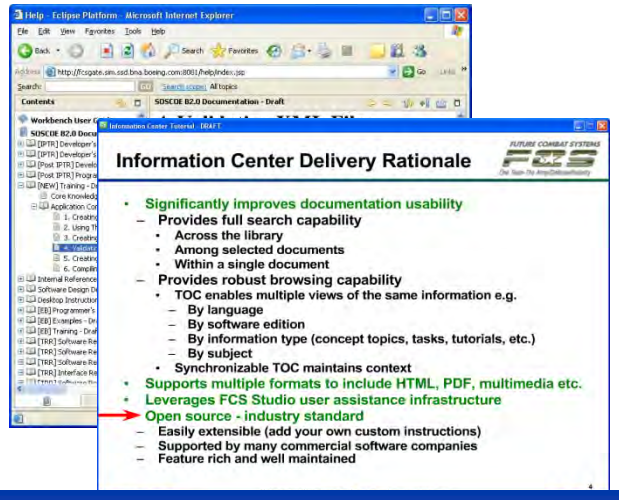
A cohesively designed set of software and information components developed to guide developers' interactions with SOSCOE products

- 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 to

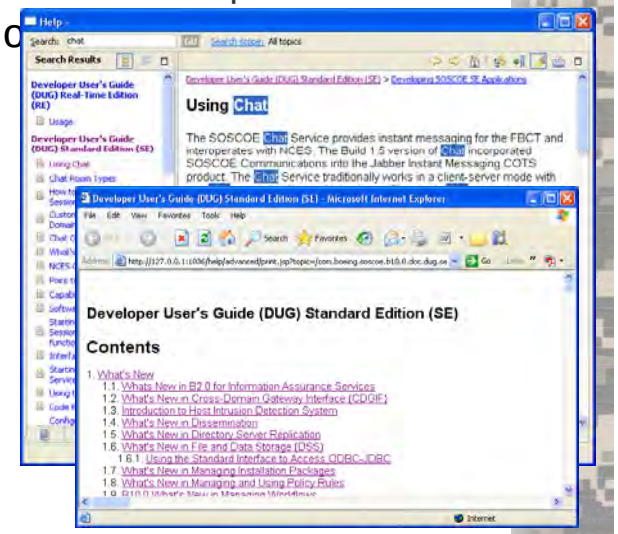
SOSCOE Help Desk



SOSCOE information Center



Developers User's Guide



The right interaction for the right user at the right time

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

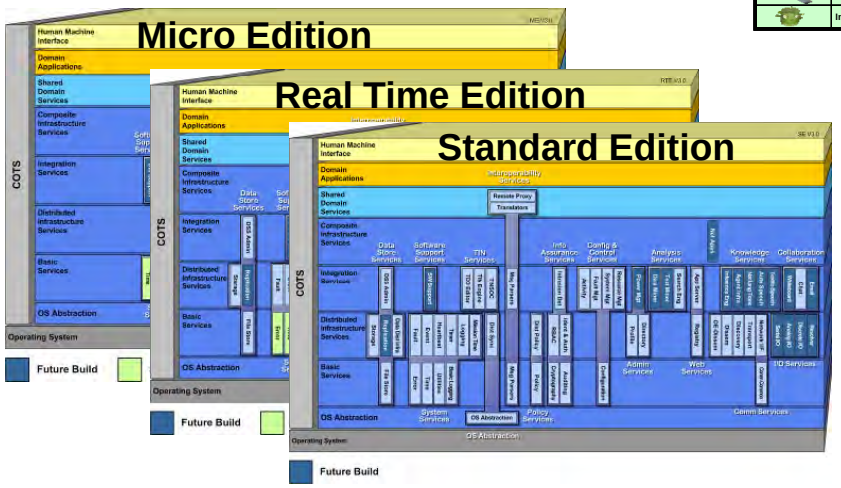
Collaboration: Instant messaging, whiteboard, and email capabilities supporting tactical users including seamless collaboration to enterprise users

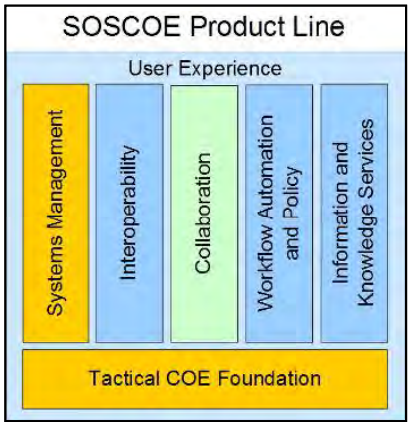
Workflow Automation and Policy: Complete environment for automating and orchestrating operational task sequences for SOA-based applications

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

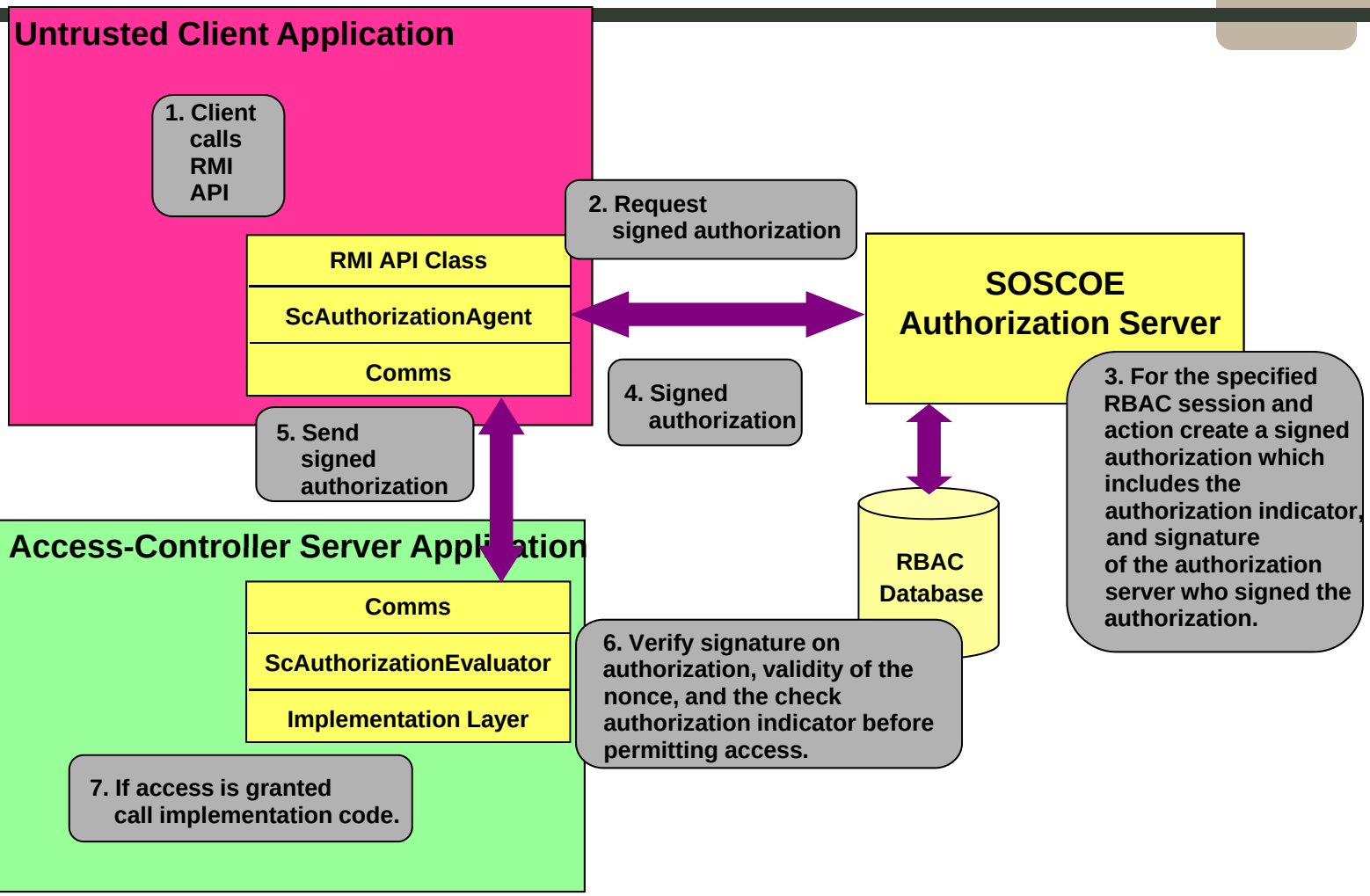
	SOSCOE Deployments	Standard Edition	Real-time Edition	Micro Edition		1.8	2.0	2.5	3.0	3.5
	Class I Unmanned Air Vehicles (UAV)		✓					✓	✓	✓
	Class IV Unmanned Air Vehicle (Fire Scout)	✓	✓					✓	✓	✓
	Non Line of Sight – Launch System (NLOS-LS)		✓			✓	✓	✓	✓	✓
	Small Unmanned Ground Vehicle (SUGV)		✓					✓	✓	✓
	Multifunctional Utility Logistics Equipment Vehicle (MULE)	✓	✓							
	Unattended Ground Sensors (UGS)			✓		✓	✓	✓	✓	✓
	Soldier Systems	✓								
	Command and Control Vehicle (C2V)	✓	✓				✓	✓	✓	✓
	Reconnaissance and Surveillance Vehicle (RSV)	✓	✓				✓	✓	✓	✓
	Infantry Combat Vehicle (ICV)	✓	✓				✓	✓	✓	✓
	Mounted Combat System (MCS)	✓	✓				✓	✓	✓	✓
	Non-Line-Of-Sight Cannon (NLOS-C)	✓	✓			✓	✓	✓	✓	✓
	Non-Line-Of-Sight Mortar (NLOS-M)	✓	✓							
	Medical and Evacuation Vehicle (MedEvac)	✓	✓				✓	✓	✓	✓
	Maintenance and Recovery Vehicle (MRV)	✓	✓				✓	✓	✓	✓
	Centralized Controller	✓					✓	✓	✓	✓
	B-Kit	✓				✓	✓	✓	✓	✓
	Objective and Additional Systems									
	Armed Robotic Vehicle (ARV)	✓	✓							
	Class II Unmanned Air Vehicles (UAV)		✓							
	Class III Unmanned Air Vehicles (UAV)		✓							
	Intelligent Munitions System (IMS)			✓						





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

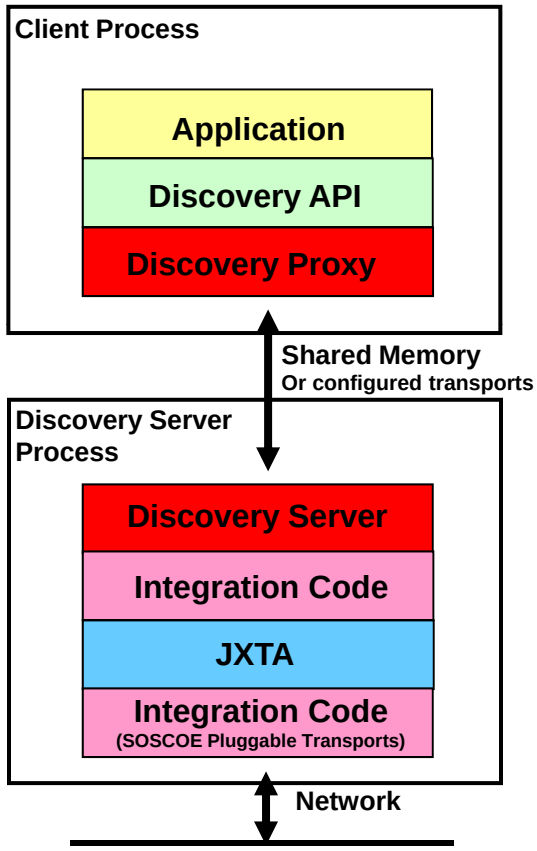
Information Assurance has been integrated into the base fabric of user and application interactions



Information Assurance is built in to the System from the Start

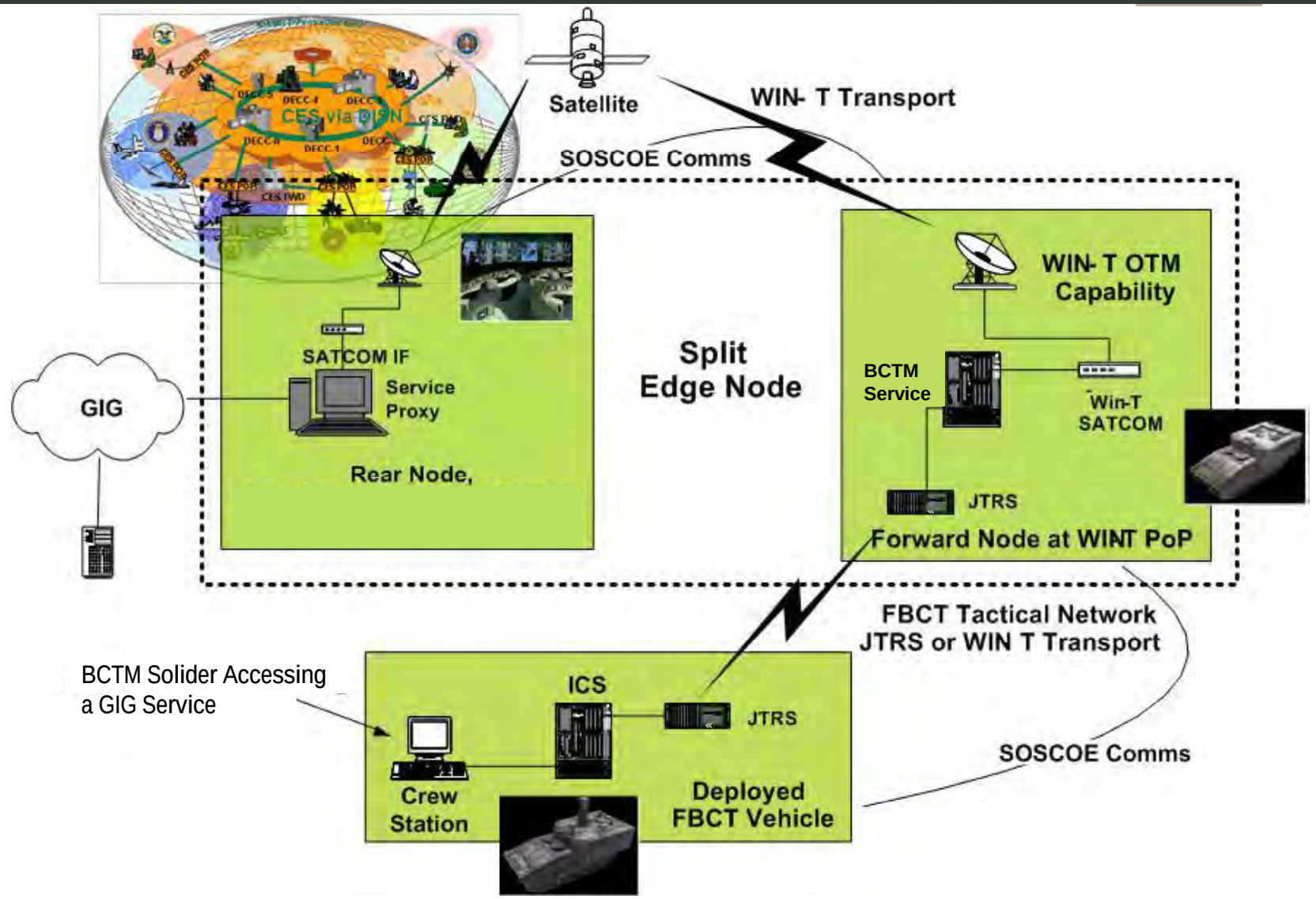
Discovery allows the network to only move required information between producers and consumer lowering bandwidth needs

- 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



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

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

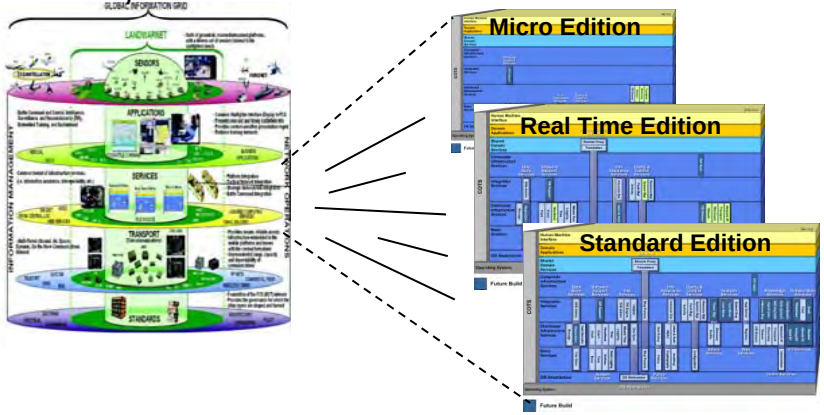


The SOSCOE Development Environment

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

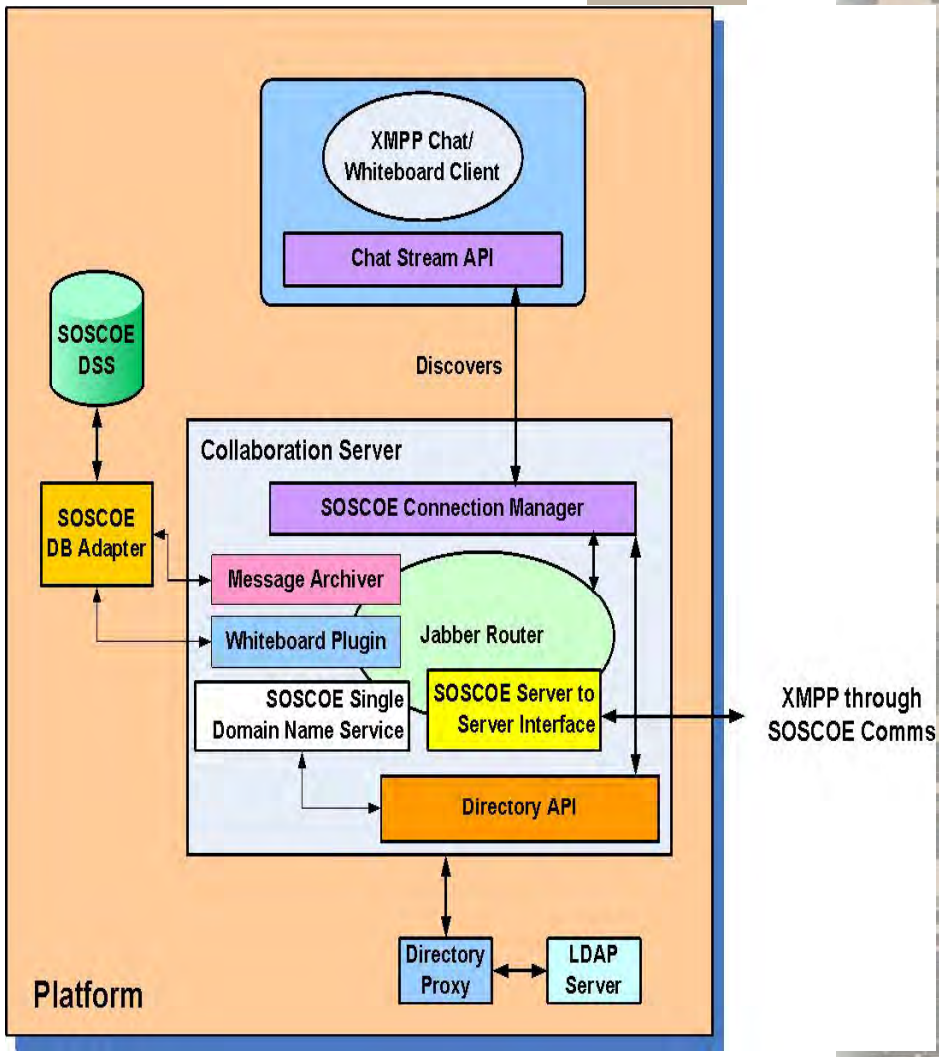
- **Visual Studio**
- **Common Infrastructure Components**
  - Windows Communications Framework (WCF)
  - ADO.Net, SQL Server
  - Internet Information Services (IIS)
- **Management / Monitoring tools**
- **Standards based-interfaces**
  - WSDL, SOAP, HTTP, ADO, C#, Visual Basic
- **Code Access Security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

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