Industrial View on Interoperability Issues

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The Interoperability Issue

Interoperability
“The ability of systems, units, or forces to provide services to and accept services from other systems, units or forces and to use the services so exchanged to enable them to operate effectively together.” excerpt from JV2020

True interoperability means sharing not only information but also services

You cannot predict how services or information will be combined and used in the future
Architectural Evolution for the Future

**Yesterday**
- Capabilities
- Accessible only on the Stovepipe System

**Today**
- Capabilities available only to systems that have been integrated together
- Client/Server
- Predominantly Procedural & RDBMS Based
- Platform Specific

**Tomorrow**
- Capabilities available anywhere on the network, even on non-integrated systems
- Network Centric
- Service-Based
- Peer-to-Peer
- Platform Independent
Achieving Interoperable Systems: Where do we start?

- Understand the operational environment
- Define a robust rule set for an open architecture

Get these wrong and we build systems wrong
Foundational Issues

Two keys to achieving systems designed for interoperability

- **Intended Use – Definition of Operational Concepts**
  - Breadth of understanding drives systems scalability / adaptability
  - Sets context for efficient development
  - Key to system design suitability for intended usages
  - Include policy *and* where policy *may* go
    - Will constrain architecture & solutions – e.g. *Doctrine, Security*
Foundational Issues (con’t)
Two keys to achieving systems designed for interoperability

2. Openness of Systems

• How we define the rules drive:
  • Adaptability and dynamics of change and growth
  • Flexibility and scalability in usage
  • Complexity of architecture and implementations
• Key to system longevity and System-of-Systems interoperability
• Allowing freedom for exploitation of technology evolution
Operational Understanding Issues:  
*Operational Concepts and Scenarios*

- **Not part of solution – but key to solving**  
  - Provides context for validating solutions
- **Not every scenario – but breadth of coverage**  
  - Drives to abstract versus point solution  
  - Should cover the vision for evolution
- **Critical Constraints**  
  - Define critical timelines  
  - Establish system availability needs  
  - Don’t constrain to present policies and doctrines
- **Military – Contractor cooperation**
- **Design validation by users and stakeholders**
Open Systems Definition

• An abstract rule set – not a design
  • A logical architecture
    • Must avoid a point design
  • Interface standards vice standard designs
  • Service Exchange standards
  • Data transport/interchange standards
Open System Frameworks for Net-centric Operations

- Distributed deployment of services and data
- Platform independence
  - Processing platforms
  - Operating systems
  - Clustering
- Dynamic versus static integration
  - Discovery
  - Published Service Proxies
  - Field re-configurable
- Real-time Data Dissemination
- Policy Based Management
- Security
An example of what industry is doing for open interoperable systems

A Service-based architecture offers a true, distributed computing architecture for future systems design

- **Benefits**
  - Simplified Development
  - Increased Interoperability
  - Self-Forming/Self-Healing Systems
  - Simplified Administration & User Interfaces
  - Increased Reliability & Availability
  - Integrated Security Model
  - Multi-Platform support
SBA Applied to Meet the Vision of the Future

Components

Plug-and-Play Hardware & Software

Component Perspective
Plug-n-Play hardware & software

Element Perspective
Increased interoperability in a system of systems environment

Global Perspective
Global access to services via network

Elements

A Deployable, Modular, Scaleable System

Scalable and Modular to Meet Mission Needs

Global

Network Centric, Distributed, Globally Interoperable System of Systems