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Net-Centric Enterprise Services (NCES) Program & Piloting

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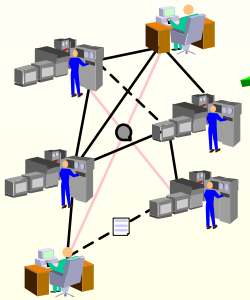
Feb 3, 2004

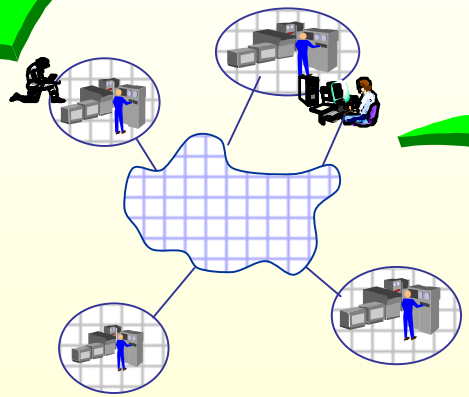
On the Road to Network Centric Warfare

Pre-Web. . .



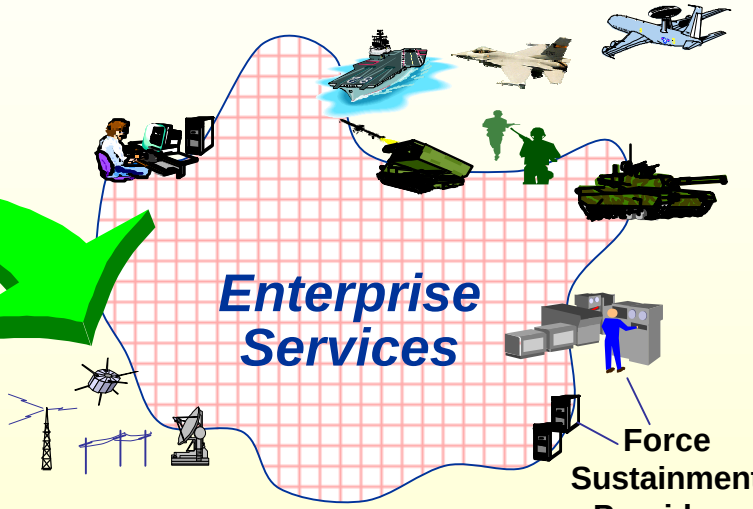
- *Stovepipe systems*
- *Little or no interoperability*
- *Some network connections*

. . .Today. . .



- *More networks*
- *Some web services*
- *Various directory & security services*
- *Uncoordinated Service/Functional transformations*
- *Few authoritative data sources*

. . . Joint / Enterprise



- *Pervasive networks*
- *Mission-effective apps & applets*
- *Assured, interoperable enterprise services*
- *Dynamically composable architectures*
- *Robust & reliable edge computing*
- *Accurate, timely & relevant info*
- *Improved Quality of Service (QOS) with centrally managed infrastructure*

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2013 Net-Centric Vision

	Characteristics	Technical View	Business and Warfighter Benefit
Application Convergence	•Net-based functionality •Reliable, highly predictable global performance •Componentization of reusable software •Dynamically connected components	*Core Services Enable 1000s of DoD Content and Service Providers* Business | Warfighter | Intelligence Core Services	•Improved battlespace and operational awareness •Ubiquitous service access •Enable faster optempo – improve speed of command •Focusing combat power
Data Convergence	•TPPU – raw data available •Data tagged with metadata •Forward data hosted on highly connected garrison resources	*Data Descriptors enable Discovery and Use* Core Layer: Security Descriptors; Resource Descriptors; Summary Content Descriptors; Format Descriptors + Extensible Layer: COI/Domain-specific descriptors; Provides ability to define mission - specific metadata fields; Can extend any of the core layers as needed	•User driven data access/delivery •Data fusion is enabled - Information superiority •Innovation: data is combined in novel ways allowing self-synchronization
Network Convergence	•IPv6 End-To-End Transport •Enable traffic priorities and policy •Security inherent in the IP layer •Supports large growth in edge devices •Single backbone supporting all security levels	*Ubiquitous IP* TCS JTI JTRS Tactical Radio A Tactical Radio B GIG-Expansion	•Full reach-back to garrison resources •Network-based capabilities available at the forward edge •Enhanced Performance

Service Oriented Architecture

Service Produc

Data and applications available for use, accessible via services. Metadata added to services based on producer's format.

- **Describes** content using metadata
- **Posts** metadata in catalogs for discovery
- **Exposes** data and applications as services

Service Consumer

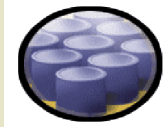
Automated search of data services using metadata. Pulls data of interest. Based on producer registered format and definitions, translates into needed structure.

- **Searches** metadata catalogs to find data services
- **Analyzes** metadata search results found
- **Pulls** selected data based on metadata understanding

Enabled Inf

Service Registries

Messaging Services



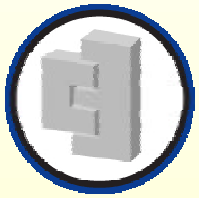
Data Services

Transformation Services

Why a SOA and Web Services?

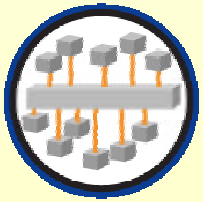
Discoverable

- Better reuse of software components
- Enables service assembly
- Better return on investment



Highly Interoperable

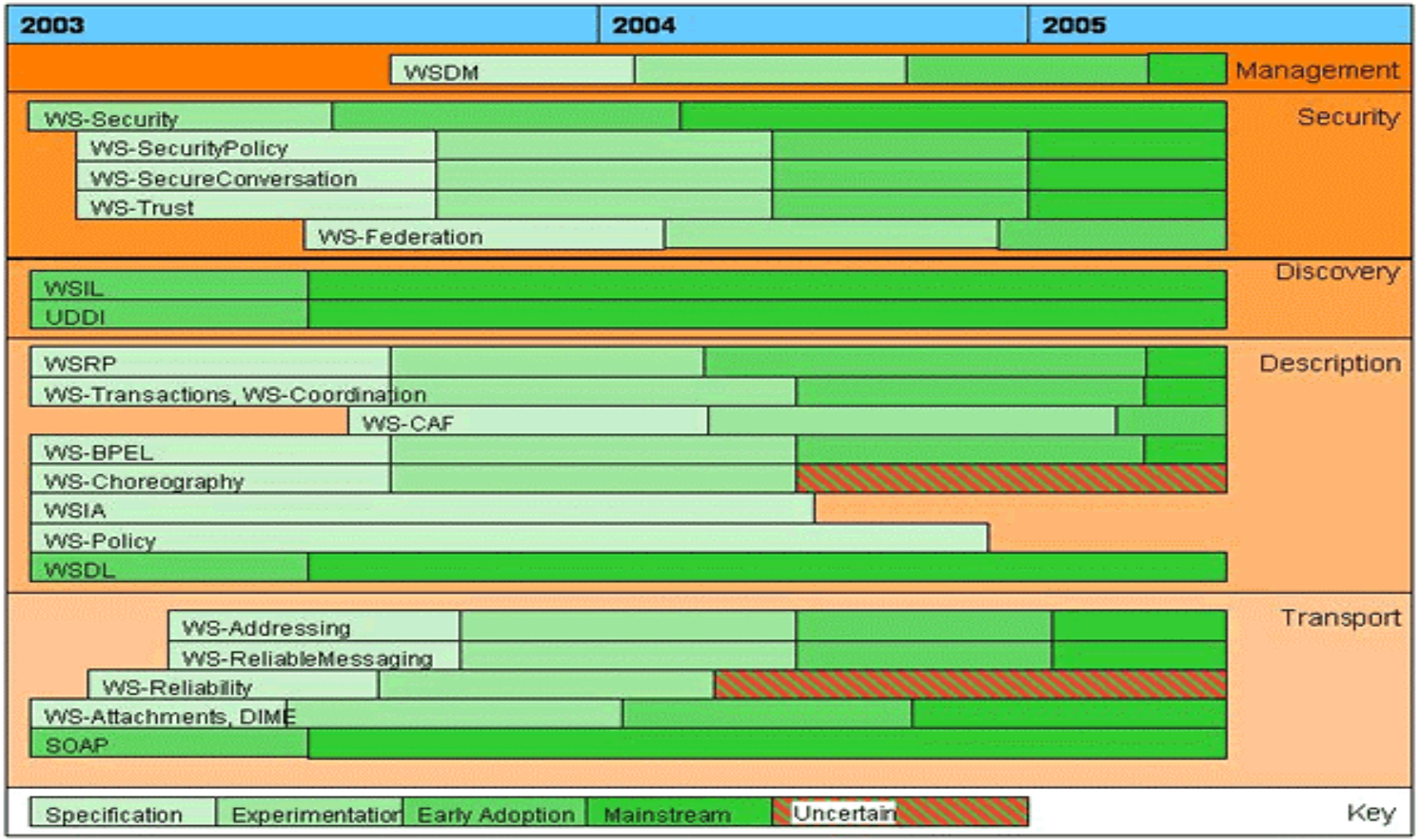
- Platform and language independent
- Leverage existing IT investments



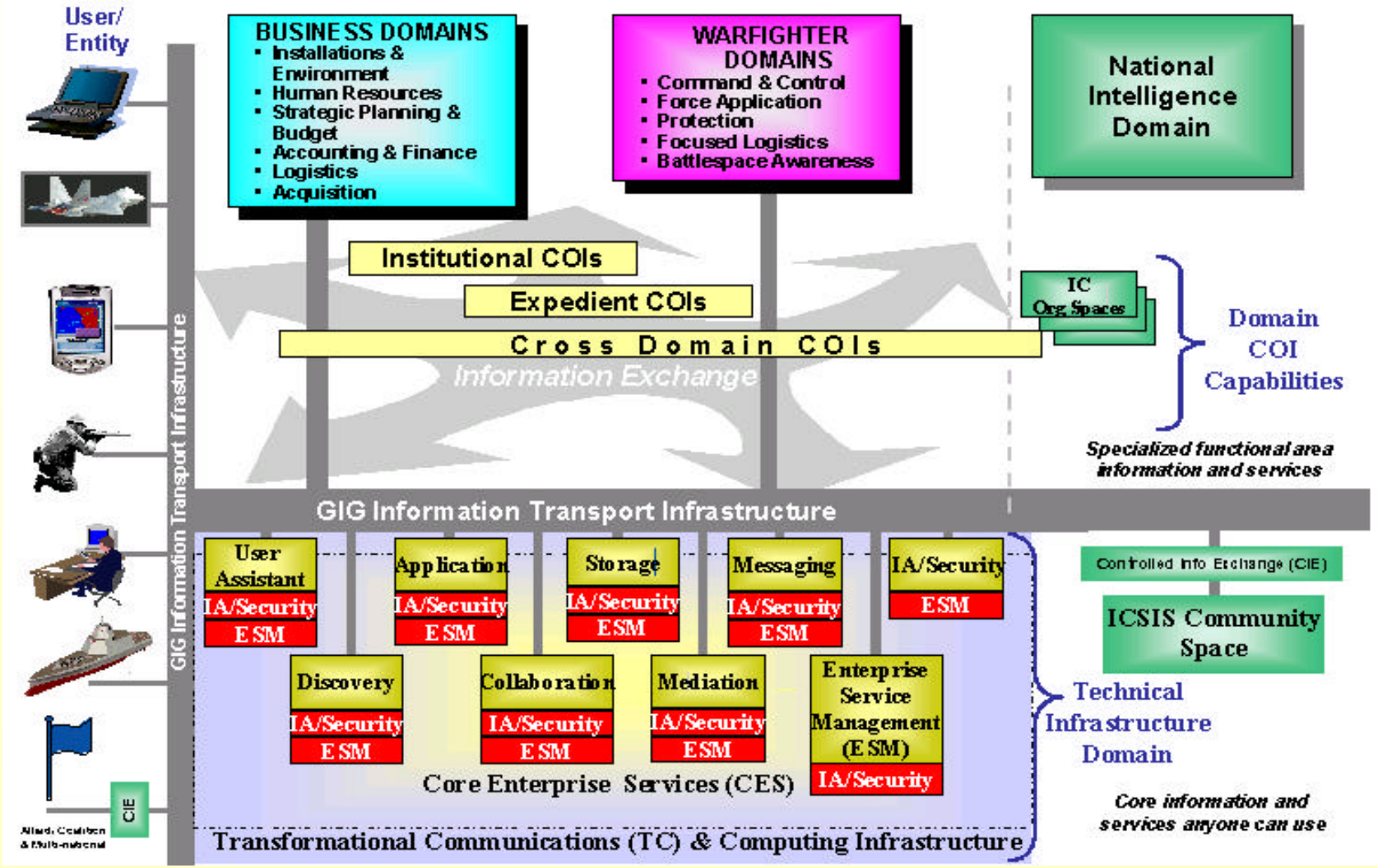
Loosely Coupled and Decentralized

- Location transparency
- High availability
- Emphasis on business logic and less on plumbing

Evolving Web Service Standards



NCES - Holistic View



NCES Increment 1 Content

JUN04	OCT04	MAY05	DEC05	MAR06
	Spiral 1	***Spiral 2***	***Spiral 3***	***OT/ST&E***

GES Portal
Identity management infrastructure
Collaborative S/W Development
Metadata Management
WS Registry
WS Monitoring

◆ **MS B Approval**

C2&I SIPRNet Portal
UDOP Info Mgmt Infrastructure
eBus Mediation
WS Management
WS Reliability
Real-time collaboration
SABI XML/WS Guard (NIPR/SIPR)
Web Content Management
WS Security Services
ID Federation

IOC Capability
NIPR/SIPR "Internet Style" Business Framework Richly Populated and Utilized to Support Key DoD Processes*

Enterprise Content Management
Service Orchestration
Real-Time Event Service
Event Correlation
Transaction Translation (Mediation)

▲ **GIG-BE IOC**
Spiral 1 Capability

▲ **API Freeze**

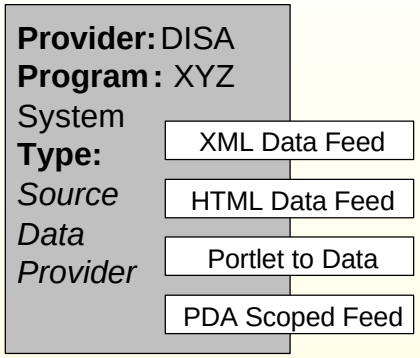
Nine Product Families in CES

- Application (Hosting)
- Collaboration
- Discovery
- Enterprise Systems Management
- Information Assurance/Security
- Mediation
- Messaging
- Storage
- User Assistance

Common Service Categories

Example Types:

- **Data Service**
  - **Provides data content in a structured format for consumption by a consumer**
  - **Good examples use XML for data structure**
- **UI Service**
  - **Provides direct interaction with end-user**
  - **Examples: HTML content or graphical portlet as the output of the service**
- **Conversion Service**
  - **Translating, filtering, combining, or fusing data sources**
- **Business Process Management**
  - **Maintains state across multiple services**



A single system can support many types of services on the network

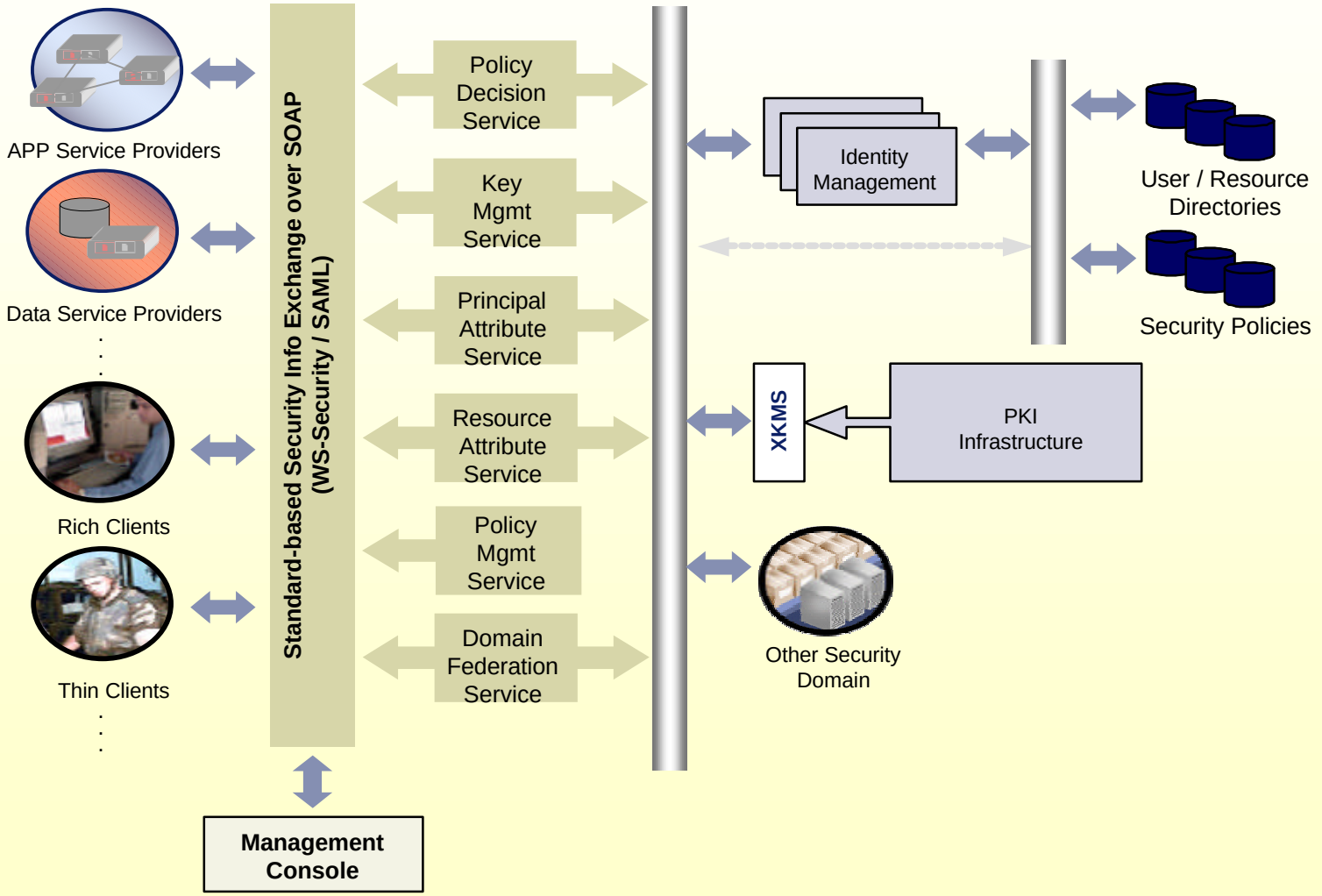
NCES: Service Standards (Near Term)

Standard Category	Current NCES Standards
Security	*PKI, SSL, SAML*
Discovery	*UDDI 2.0+ compliant*
Application Server	*J2EE-compliant*
Description	*WSDL (Doc Literal)*
Transport	*SOAP (Doc Literal), WS-Attachments, DIME, HTTP, FTP*
Portlet	*JSR-168 Java Specific*
Data	*XML (XML Registry), LDAP, ODBC, JDBC, ANSI-SQL*
Management	*SNMP*

Evolving Standards NCES would like to use when mature

Developing Standards	Standard Definitions
WSRP – Web Services for Remote Portals	*Defines the interface and semantics and provides a Web service standard for content sources with portals and other web applications*
XKMS – XML Key Management Specification	*Interface to PKI enabling Web services to register and manage cryptographic keys used for digital signatures and encryption*
XACML – Extensible Access Control Markup Language	*XML schema designed for creating and automating policies to control applications access on a network*
UDDI 3.0	*Expands UDDI 2.0 to include registry-to-registry interaction between both public and private registries*
IPv6 – Internet Protocol version 6	*Next generation internet protocol designed by the IETF to replace the current IPv4*

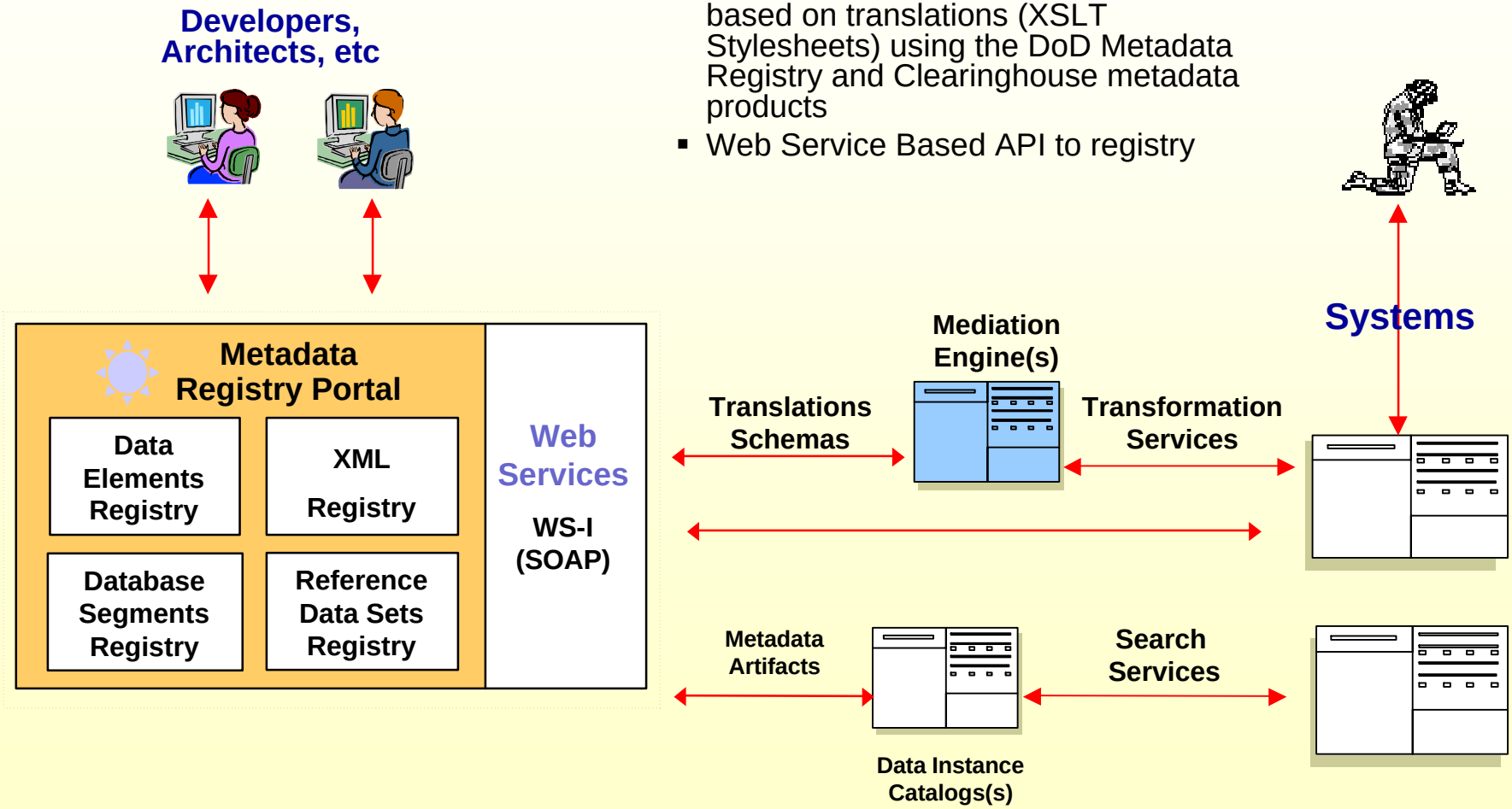
Security Services



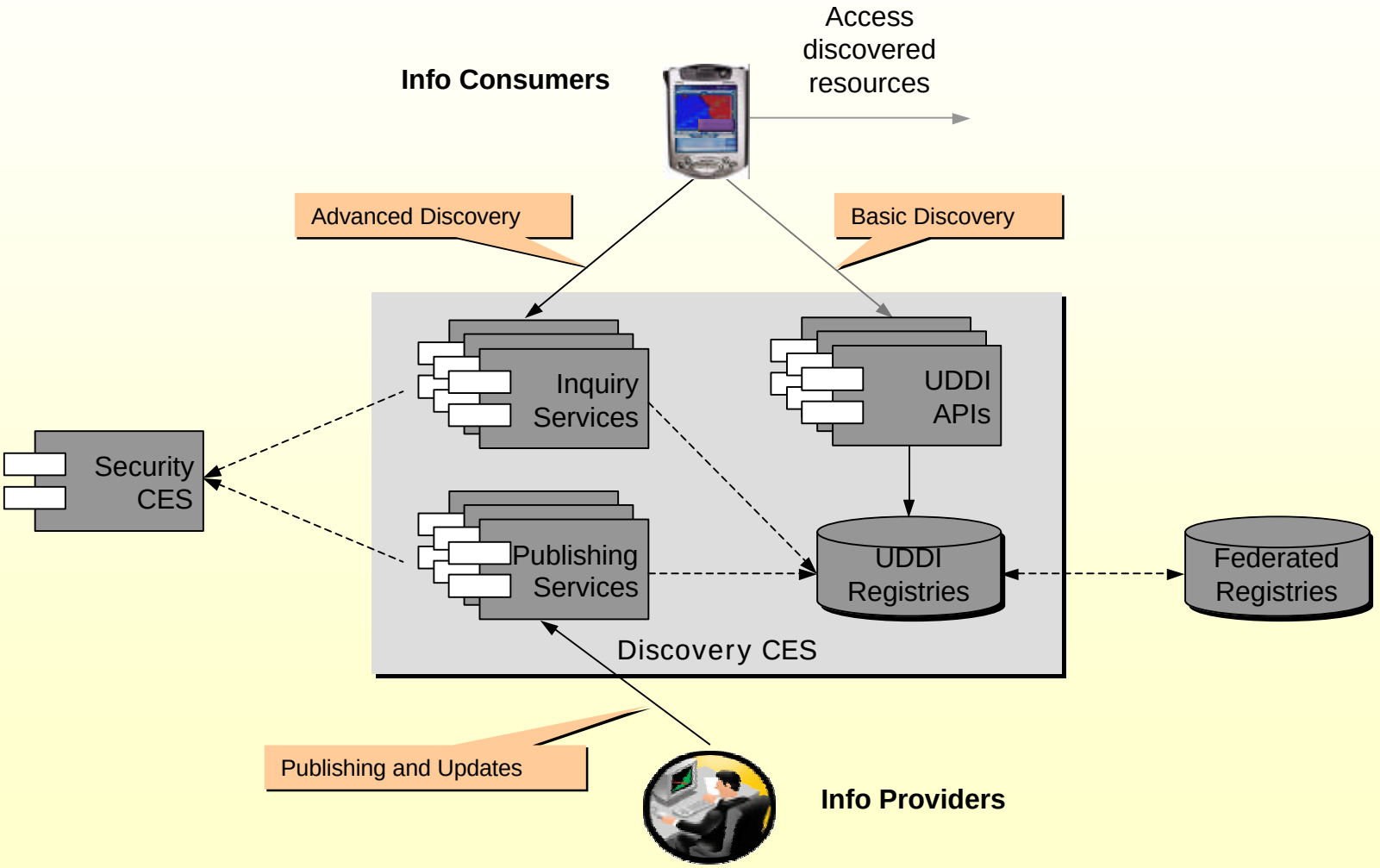
Mediation Services

CORE Services

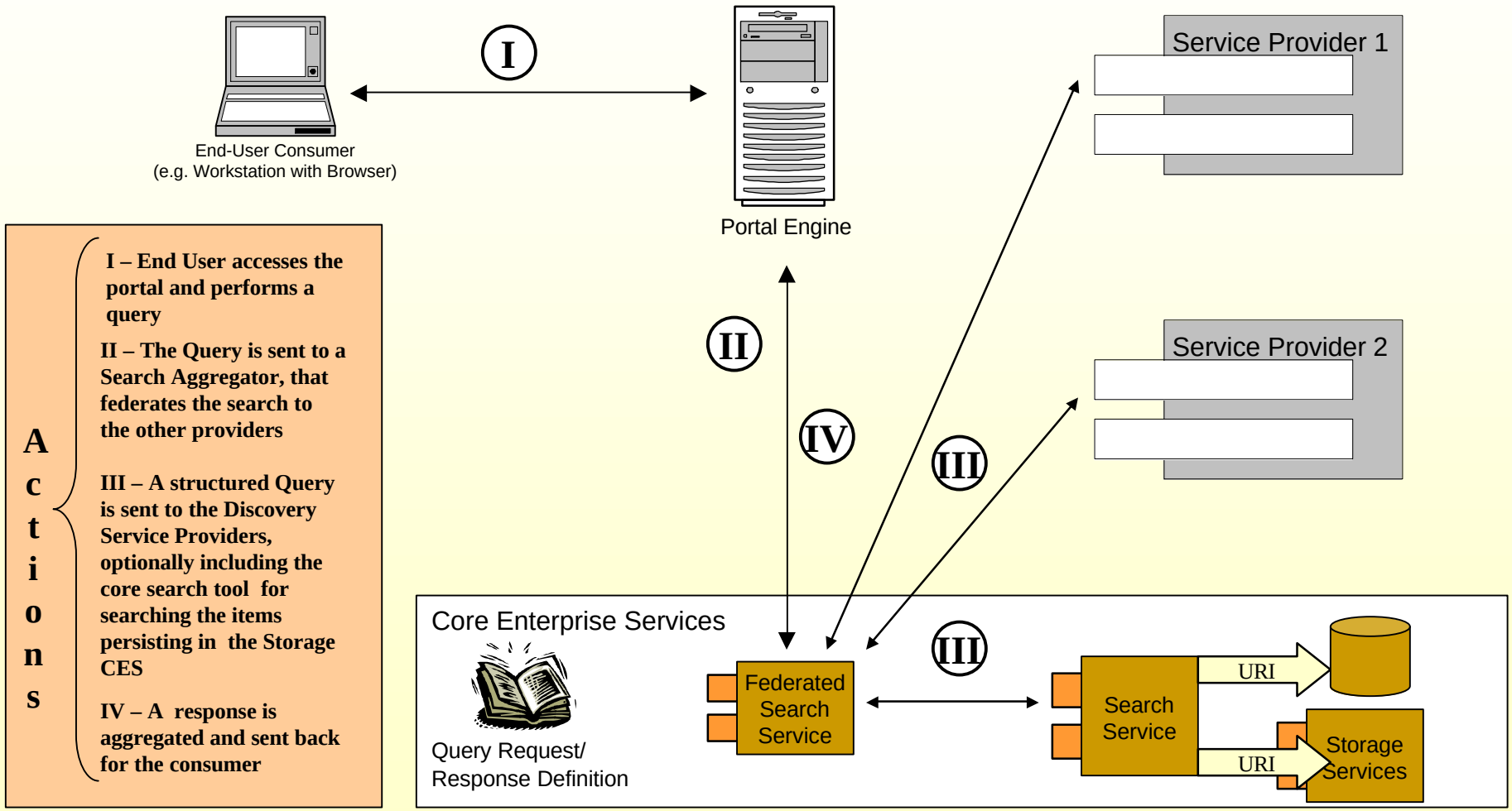
- Provides an XML translation service based on translations (XSLT Stylesheets) using the DoD Metadata Registry and Clearinghouse metadata products
- Web Service Based API to registry



Service Discovery Architecture



Content Discovery: Use Case



Actions

I – End User accesses the portal and performs a query

II – The Query is sent to a Search Aggregator, that federates the search to the other providers

III – A structured Query is sent to the Discovery Service Providers, optionally including the core search tool for searching the items persisting in the Storage CES

IV – A response is aggregated and sent back for the consumer

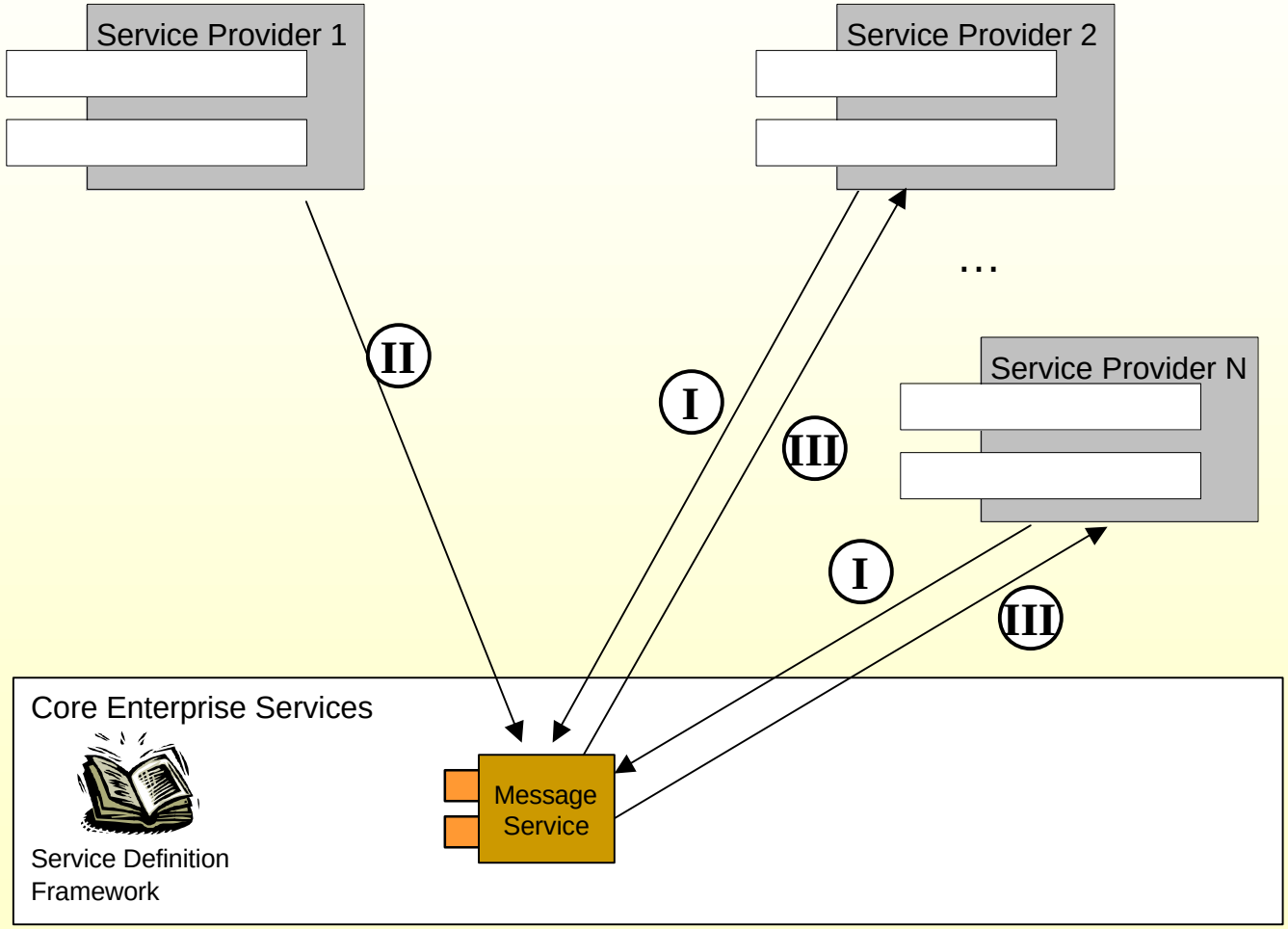
Messaging Service

Actions

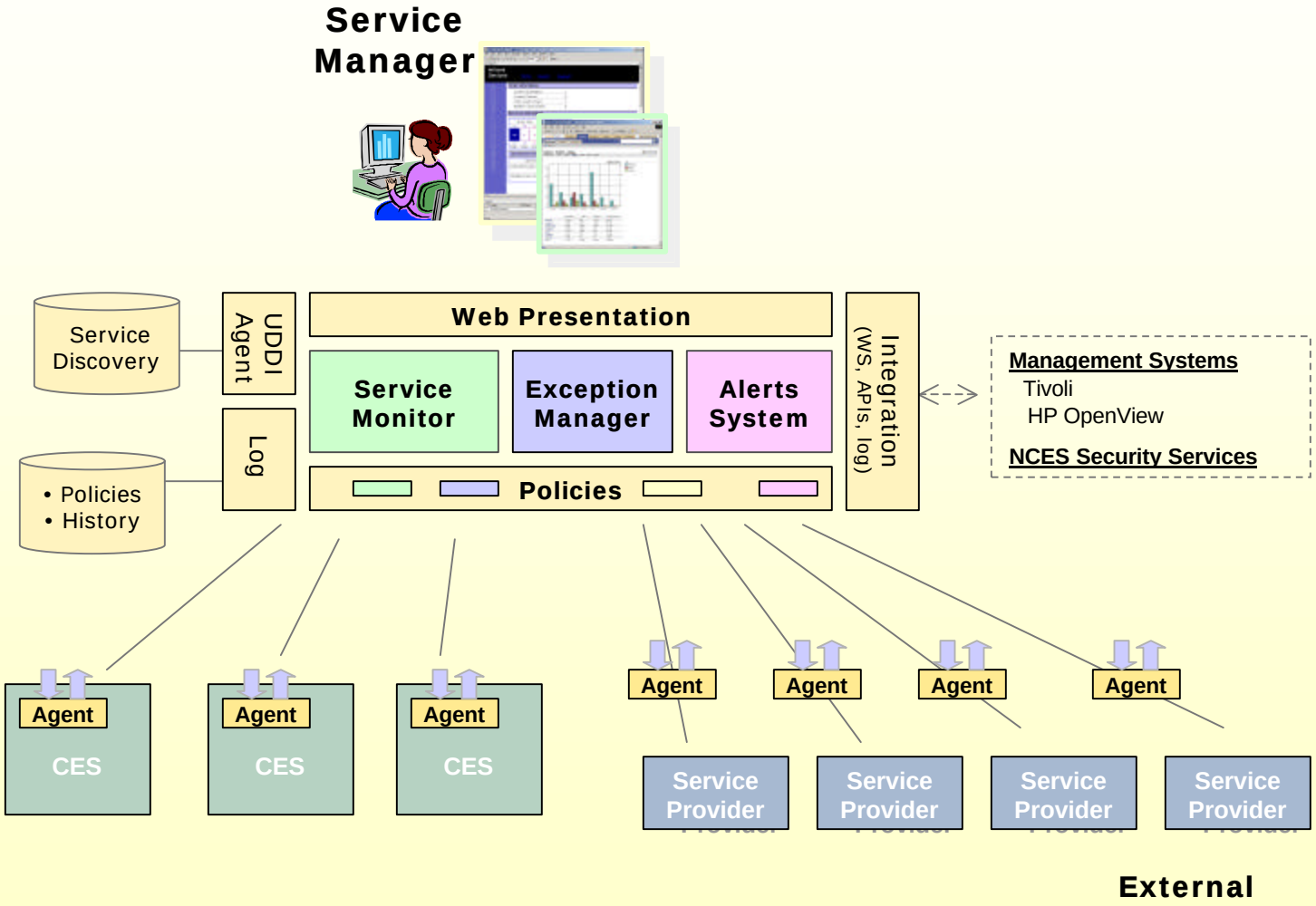
I – Service Providers register interest in specific message topics or formats. The message service tracks the registrations.

II – A Service provider publishes a message utilizing defined format or topic.

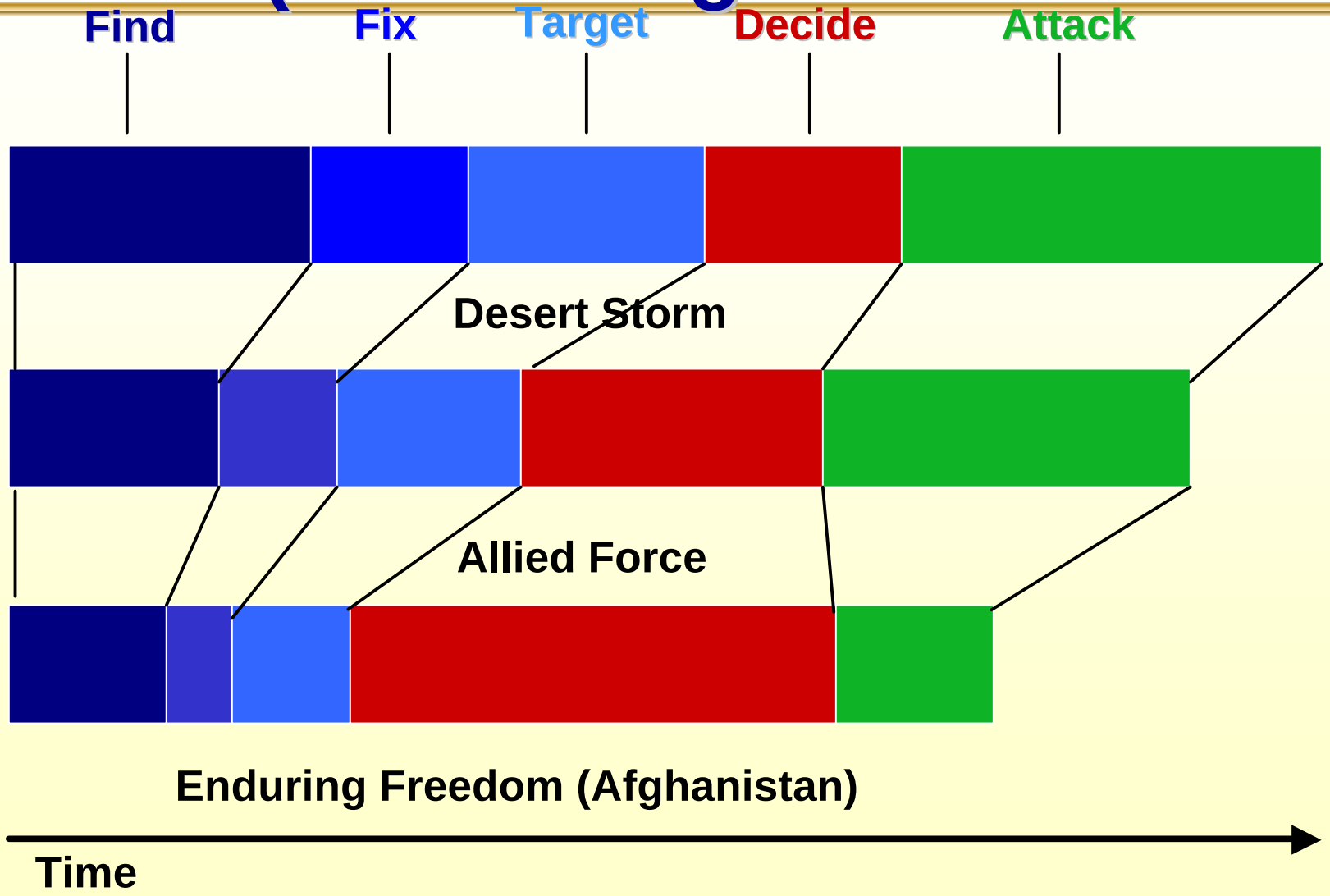
III – Message service determines which service providers to provide message based on prior registrations.



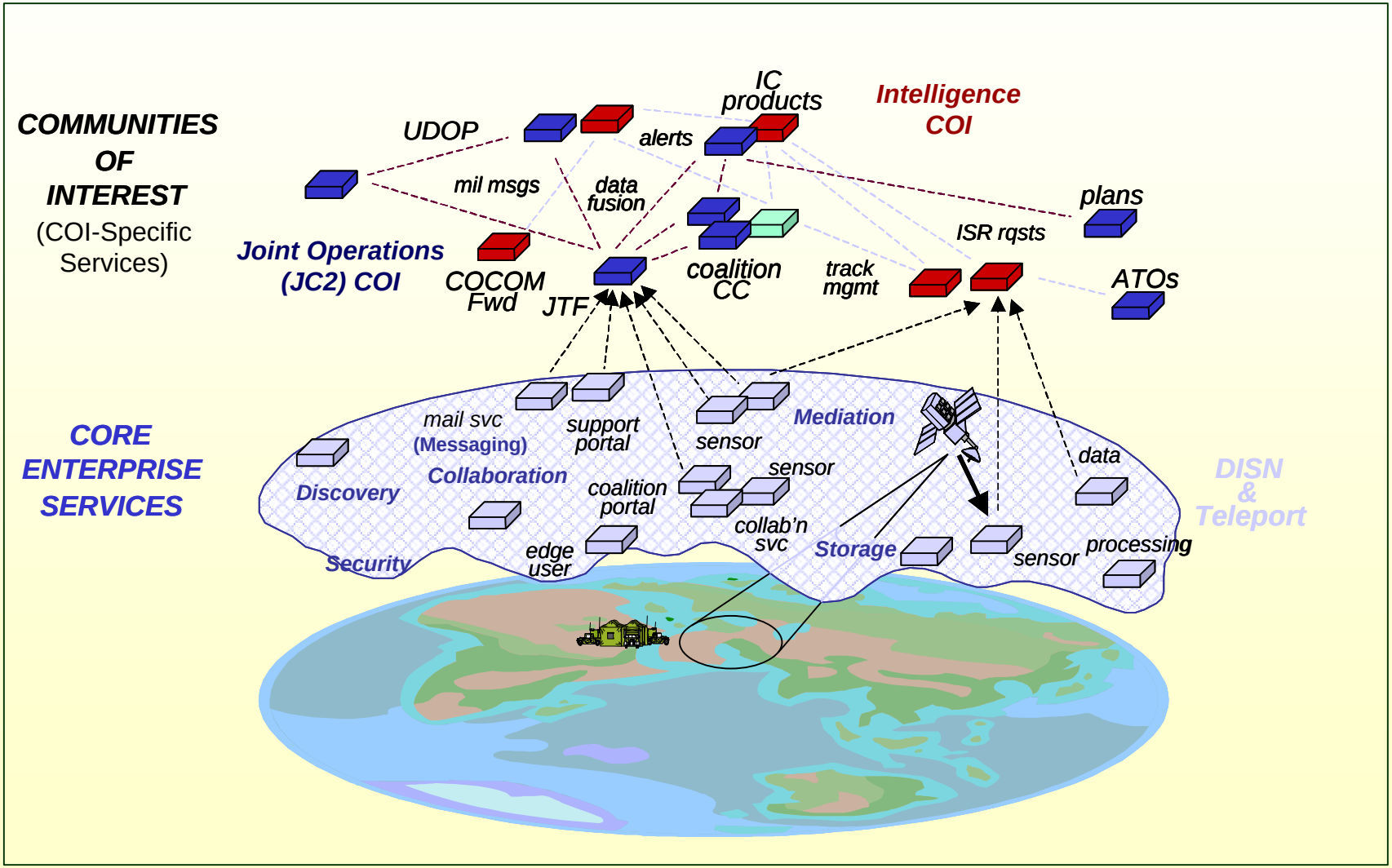
ESM Services



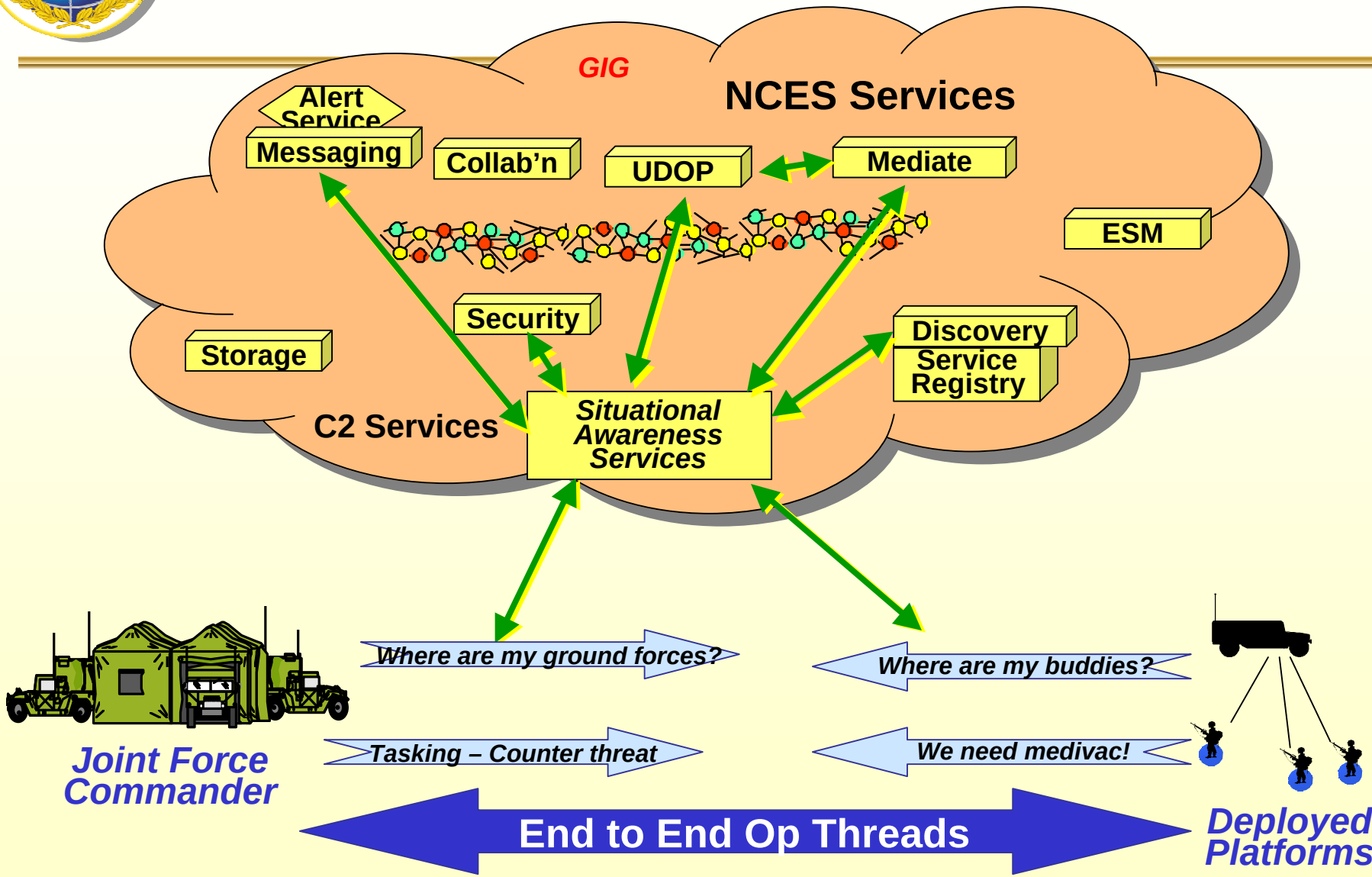
Operational Thread Significance (The Warfighter's Problem)



GES Operational Pilots



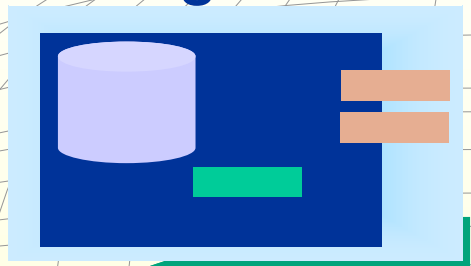
Operational Thread Context

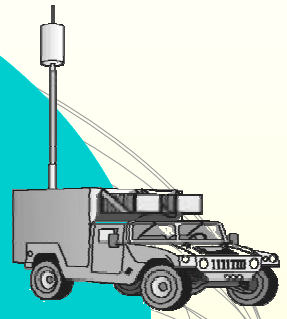


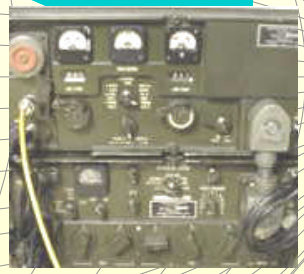
Post Before Process Supports Early Receipt of Data

Posted SIGINT data

Storage



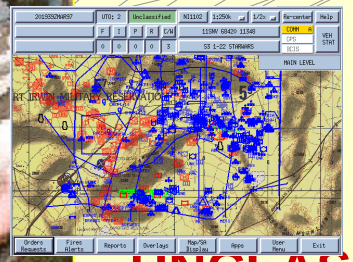




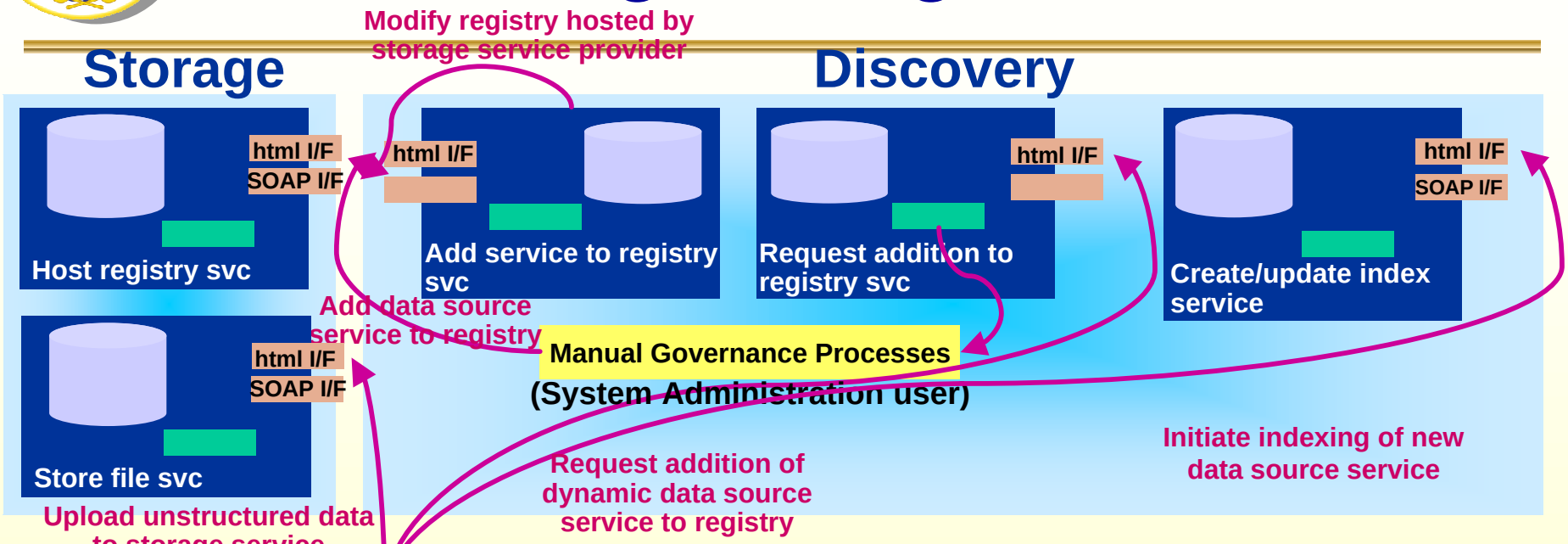
Possible enemy emitter detected at specific geo location

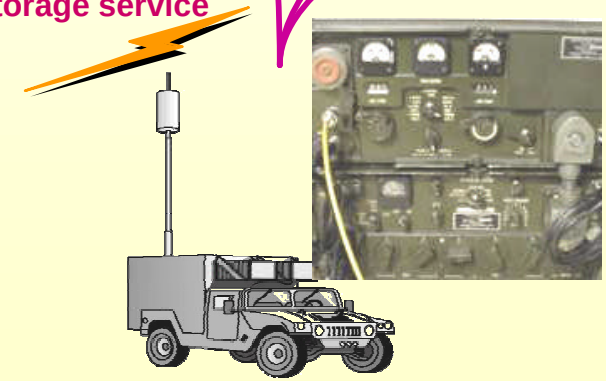
Alert

View with option to pull



Use Case: Registering a Data Service

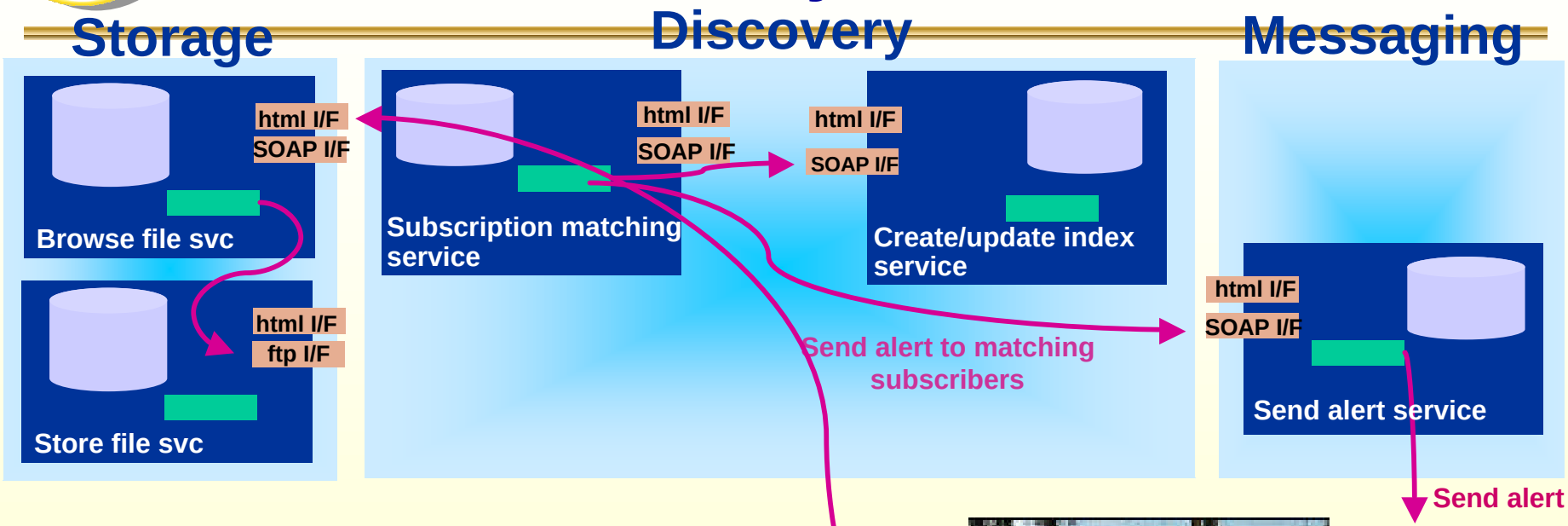




SIGINT ground processing station
(Data service provider)

- SIGINT ground processing station initiates process to register a new data service for SIGINT hits in the Bde area of operations
- Since disk storage and connectivity are limited at the van, the watch officer takes advantage of the regional storage service provider and uploads his info products (e.g., files)

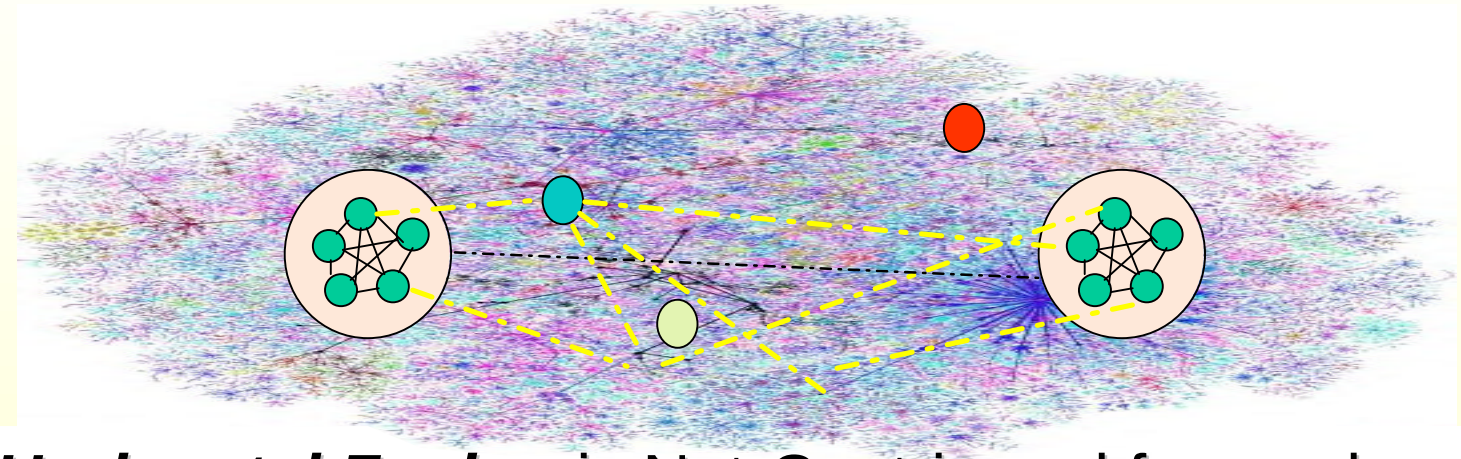
Use Case: Alerting Edge User about Dynamic New Content



- Subscription matching service periodically checks available indices to learn about new contents; matches new SIGINT hits with MAJ Smith's subscription
- Send alert to MAJ Smith
- MAJ Smith browses the data source; with an option of downloading the report (file)

What Is Horizontal Fusion?

Federated and Integrated Operations



Horizontal Fusion is Net-Centric and focused on:

- Data and cross-functional posting
- Ad hoc access to and fusion of data created by operations which are both integrated and federated
- Making sense of that data

Supports Standing and Ad Hoc COIs

QL1 Lessons Learned:
Net-Centricity

- Heavy clients are still needed and can be net-centric
- Web portals aren't necessarily net-centric
  - Need for portlet interoperability standards
- Our networks aren't 100% reliable
  - Bandwidth is still an issue
  - Need full visibility across the WANs, MANs, LANs
- Success of net-centric approach will require integration of network monitoring, services/system monitoring, and business process automation/management

QL1 Lessons Learned:
Technologies

- **Web Services were effective**
  - **Short ramp-up time and low cost**
  - **Powerful integration capabilities**
  - **Not perfect in every situation**
    - **WS RPC vs JMS for asynchronous event driven data (e.g., COP track updates, alerts**
- **SOAs will require new processes and procedures**
  - **Offering a service vs running a system**
  - **Impacts development, testing, and operations**

QL1 Lessons Learned:
Development

- Collaboration support critical to net-centric systems development
  - Shared work spaces
  - S/W version control and configuration management
  - Bug reporting and tracking
  - News groups
  - Repositories for shared software and data specifications
    - XML schemas, data standards, WSDL,
- Standardization vs Mediation
  - Both are needed
- Change management is critical
- Best practice -- Use EJBs wrapped with a WS layer to protect against immaturity of WS standards
- Testing
  - Need unclassified testing facilities
  - Unclassified data set need with S/W delivery

QL1 Lessons Learned:
Operations

- Service and network monitoring needed
- End-2-end SLA monitoring and management
  - Shared responsibility for meeting end-users service level requirements
  - Service provider vs infrastructure provider, who's responsible?
- Need common standards
  - Error reporting
  - Security/IA
  - ESM/NetOps
  - Application services
- Delivering CES on different security domains to different user communities will alter alternative costs, priorities and weighting factors
- Net-Centricity will require a high degree of coordination, centralization and shared infrastructure

Quantum Leap 2

- Pilot fielding on initial NCES services
- Enhancements to initial pilot services offered in QL1
- Migration from simple point-to-point SOAP over HTTP web services to managed services and robust messaging
- Focus on
  - WS security services
  - WS management and integration with traditional ESM tools
  - WS discovery and content discovery
  - Mediation

Summary

- Piloting of initial CES offerings will minimize development and production risk for NCES
- Operational threads are necessary to bring meaning to the CES's (use of C2 and Logistics threads planned in first couple spirals)
- CES offerings to be made available to community upon completion of first NCES spiral
- Web Service standards are maturing in parallel with NCES efforts