Leveraging Open Source e-Commerce Tools to Enable Joint Operations

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Acknowledgements

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The Need for Interoperability

- Joint Vision 2010/2020
  - The joint chiefs of staff called for a fusion of US military forces.
- US-JFCOM
  - Won an award last year for developing a framework to allow interoperability. Have you heard of it?
- Transformation to information-based warfare
  - Many computer systems will need to work together
- Future Combat Systems
  - APIs are defined, but what about the infrastructure?

Challenges

- Need interoperability among similar, but competing, organizations (Army, Navy, Air Force, Marines, Coast Guard, Coalition Partners)
- Massive amounts of data
- Need for wide-spread, real-time access
- Need maximum data security
- Mistakes cost lives

Challenges Faced By Banks

- Need interoperability of financial transactions
- Massive amounts of data
- Millions of Point-of-sale terminals that need to work in a few seconds
- Need maximum data security
- Mistakes cost money

How to get Interoperability

- Use a common standard
  - – Everybody speaks the same language!
  - – Who invented the standard? A rival company?
  - – Does the standard meet all the needs of a particular application?
  - – How does the common standard support legacy systems?

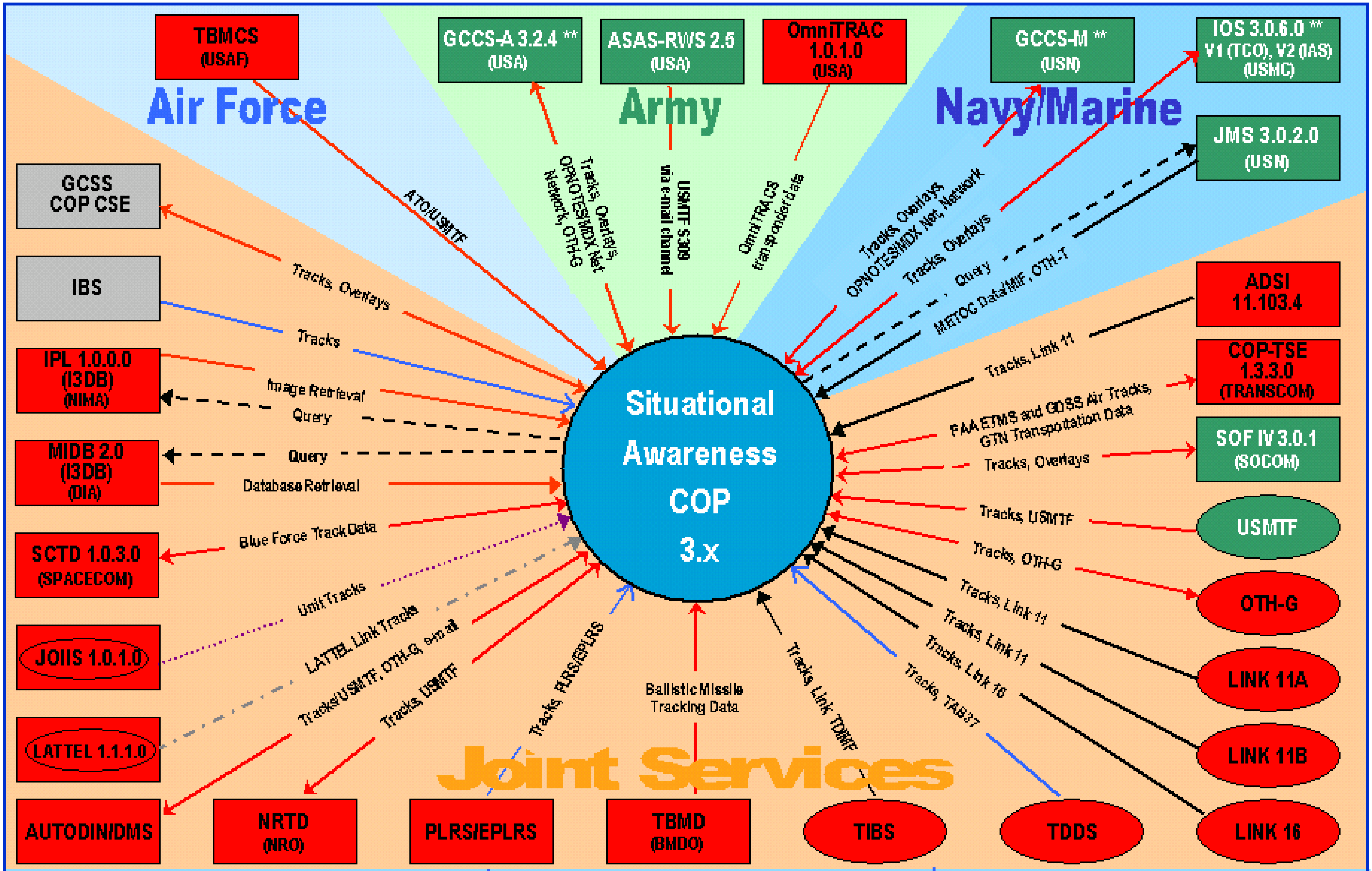
How to get Interoperability

- Create adapters
  – Translate from "yours" to "mine"
  – Such translations may not be possible
  – Although the individual development effort for an adapter is small, the number of adapters needed grows exponentially with the number of stove pipes you need to make interoperate.

JITC

COP EXTERNAL INTERFACES

As of 1/7/02



Situational Awareness COP 3.x

Air Force

Army

Navy/Marine

Joint Services

TBMCS (USAF) – ATO/USMTF

GCCS-A 3.2.4 ** (USA) – Tracks, Overlays, OPNOTES/MDX Net Network, OTH-G

ASAS-RWS 2.5 (USA) – USMTF S309 via e-mail channel

OmniTRAC 1.0.1.0 (USA) – OmniTRACS transponder data

GCCS-M ** (USN) – Tracks, Overlays, OPNOTES/MDX Net, Network

IOS 3.0.6.0 ** V1 (TCO), V2 (IAS) (USMC) – Tracks, Overlays

JMS 3.0.2.0 (USN) – Query; METOC Data/MIF, OTH-T

GCSS COP CSE – Tracks, Overlays

IBS – Tracks

IPL 1.0.0.0 (I3DB) (NIMA) – Image Retrieval; Query

MIDB 2.0 (I3DB) (DIA) – Query; Database Retrieval

SCTD 1.0.3.0 (SPACECOM) – Blue Force Track Data

JOIIS 1.0.1.0 – Unit Tracks

LATTEL 1.1.1.0 – LATTEL Link Tracks

AUTODIN/DMS – Tracks/USMTF, OTH-G, e-mail

NRTD (NRO) – Tracks, USMTF

PLRS/EPLRS – Tracks, PLRS/EPLRS

TBMD (BMDO) – Ballistic Missile Tracking Data

TIBS – Tracks, Link TDIMF

TDDS – Tracks, TAB37

ADSI 11.103.4 – Tracks, Link 11

COP-TSE 1.3.3.0 (TRANSCOM) – FAA ETMS and GDSS Air Tracks, GTN Transportation Data

SOF IV 3.0.1 (SOCOM) – Tracks, Overlays

USMTF – Tracks, USMTF

OTH-G – Tracks, OTH-G

LINK 11A – Tracks, Link 11

LINK 11B – Tracks, Link 11

LINK 16 – Tracks, Link 16

SYSTEMS

🟩	JITC IOP Certified	▨	Future Interface
🟥	In Use, Not Certified	⬭	Interface/formats
⬭	Message Formats	🟨	Pending Certification

INTERFACE TYPES

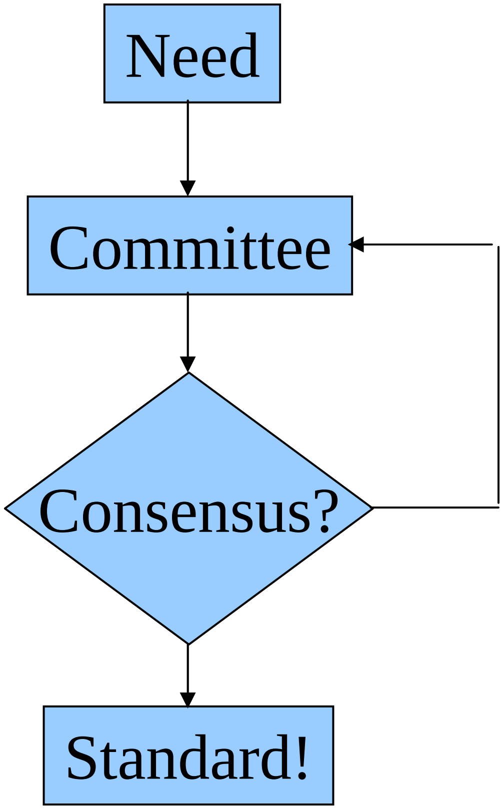
→	SIPRNET	→	ADSI
→	Receiver	⋯▶	FTP/floppy
- · -▶	Serial Channel to Q93		

* Interfaces based on GCCS Requirements Implementation Document (RID) and EPIP, 22 Dec 98; Master Interface Document (ICD), 31 May 01; and other requirement sources. For the latest copy, go to: http://jitc.fhu.disa.mil/gccsiop/

** Full capability not assessed. Certification is limited to the items addressed in the certification letter.

Whence a Common Standard?

The "industry" model (C++)



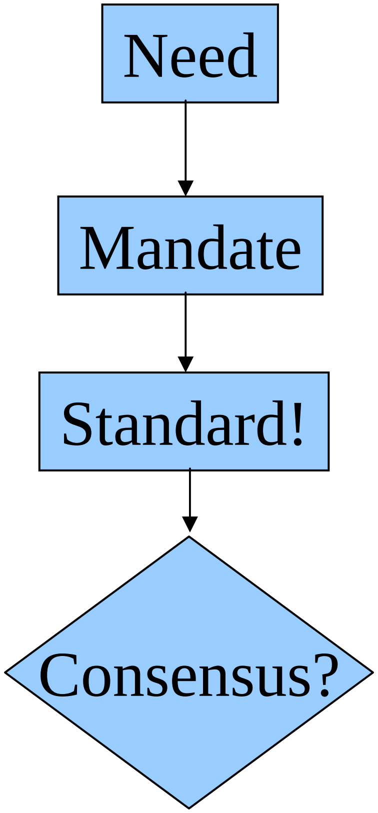
Need

Committee

Consensus?

Standard!

The "government" model (Ada)



Need

Mandate

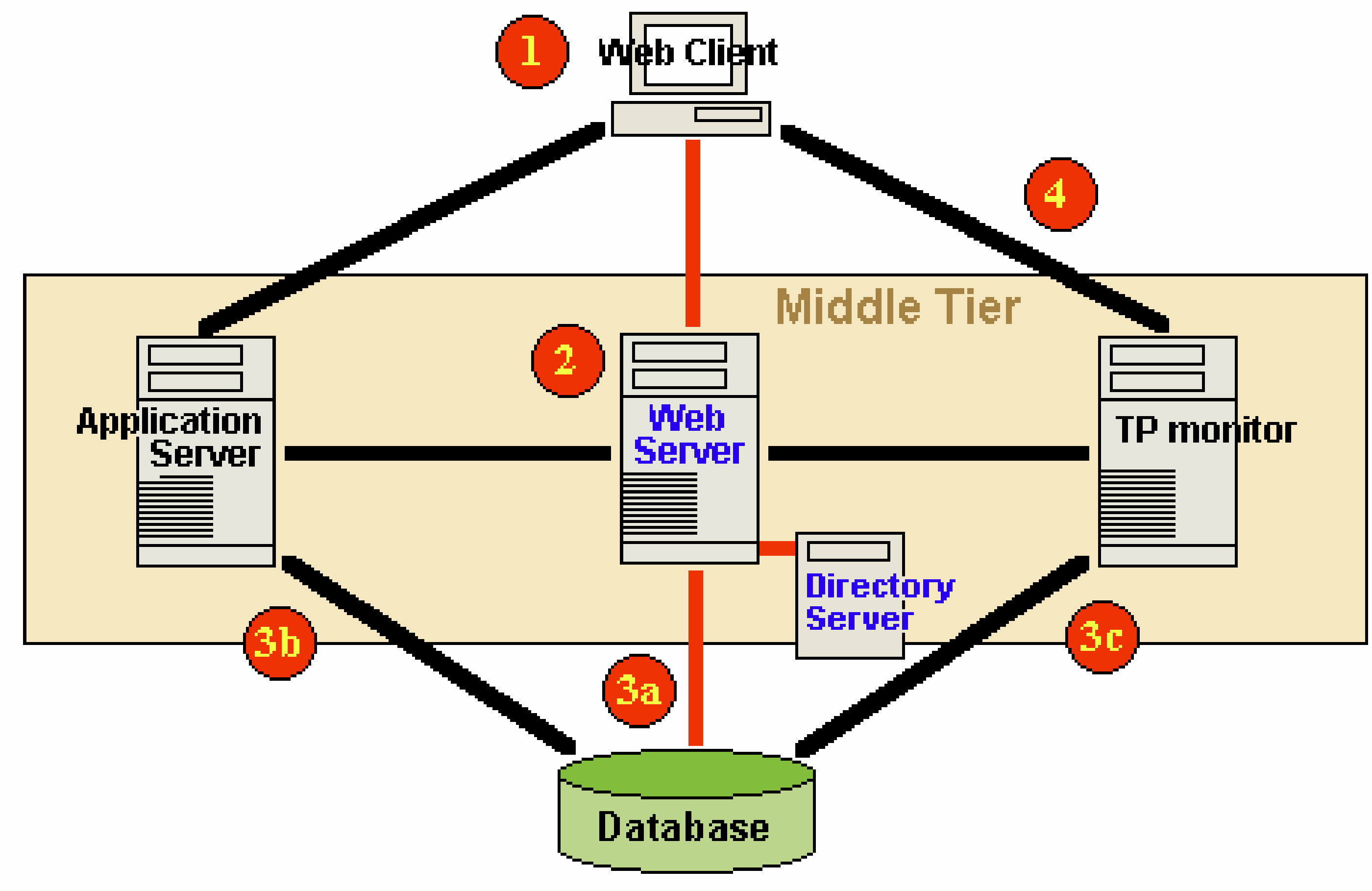
Standard!

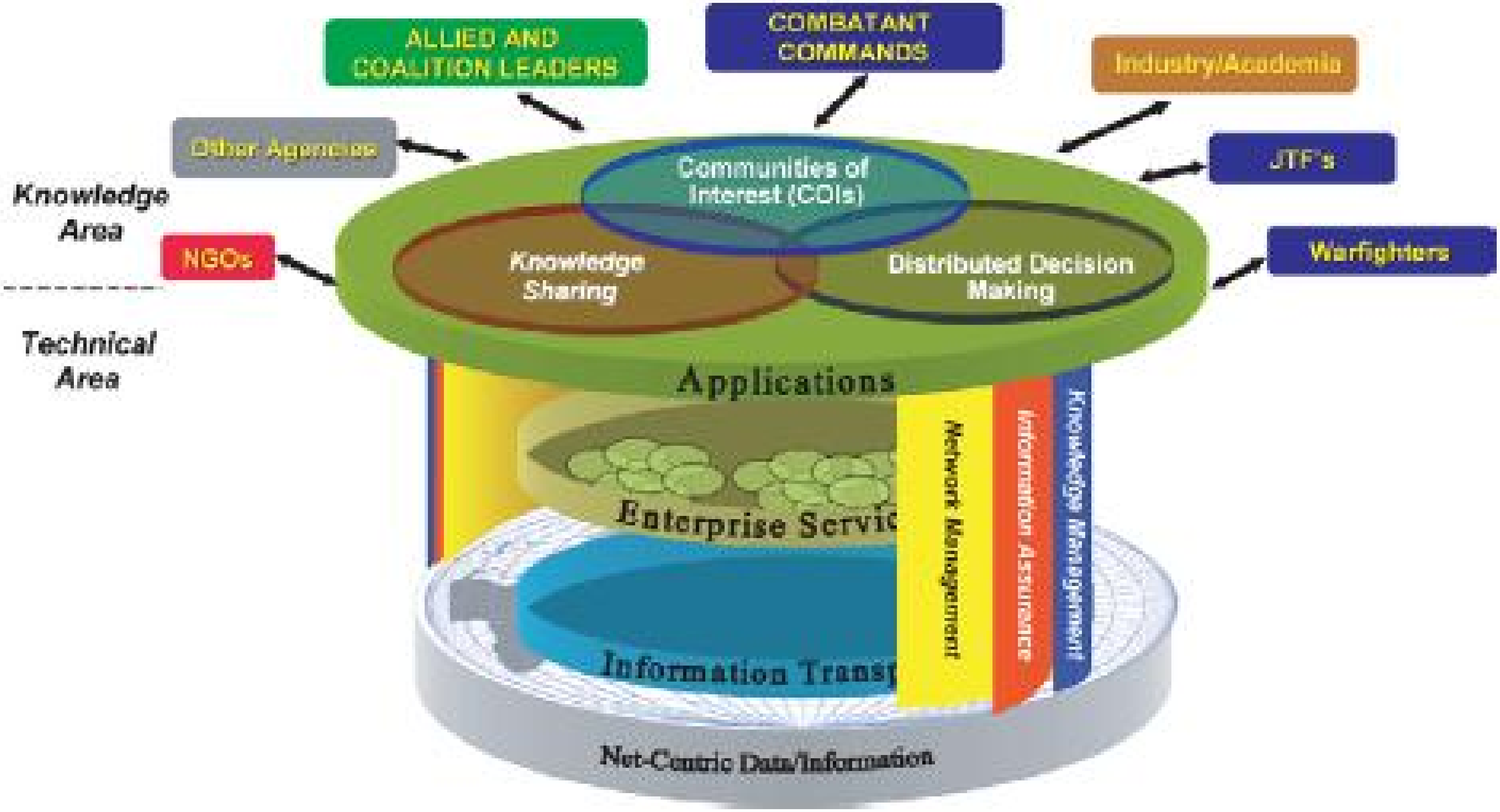
Consensus?

Epiphany

- Why not use COTS software to distribute the data for a military application?

The 3-Tier Solution

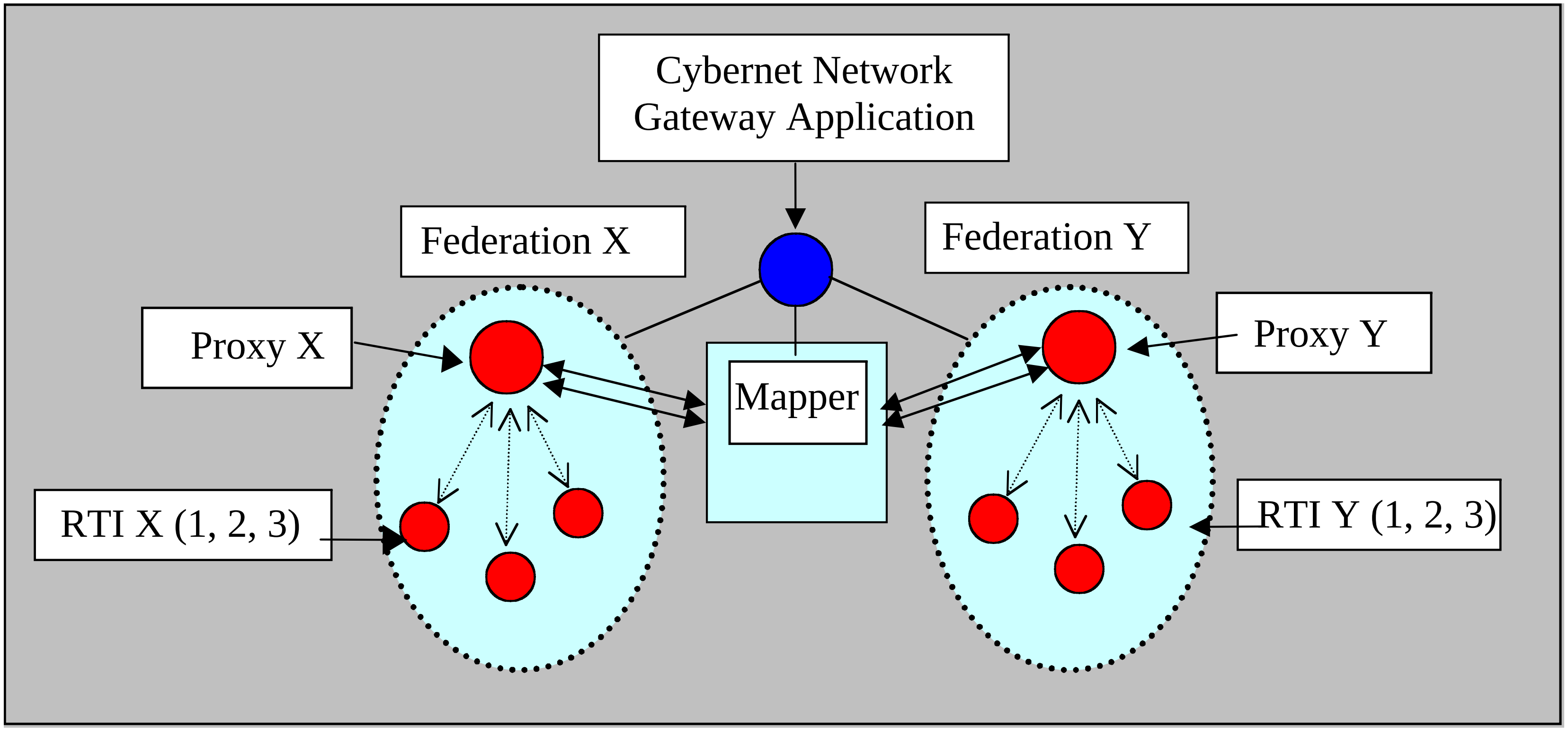



ALLIED AND COALITION LEADERS
COMBATANT COMMANDS
Industry/Academia
Other Agencies
JTF's
Knowledge Area
NGOs
Warfighters
Technical Area
Communities of Interest (COIs)
Knowledge Sharing
Distributed Decision Making
Applications
Enterprise Servic
Information Transp
Network Management
Information Assurance
Knowledge Management
Net-Centric Data/Information

Open Source Solutions

- Web Browser: Mozilla
- JavaScript Library: Dojo
- Application Server: jboss
- Web Server: Apache
- Servlet Server: Tomcat
- Database Server: postgreSQL

Adapter for Legacy Systems



Performance

- Solved by multiple, parallel transaction servers.
- Distribute computation load over many thin (display) clients, many middle-tier logic processing servers, and multiple data servers.
- Distribute network load around congestion to alternative resources.
- Recent developments in browsers (particularly AJAX and COMET) make perceived performance better.

Reliability

- Fault tolerance through multiply redundant resources.
- Transaction management capability provides “all-or-nothing” data modification.

Accuracy

- Fault tolerance built into “business logic”
- Transaction protocol prevents partial answers.
- Transaction protocol notifies sender if message was not received.
- For Open Source Software, many inspectors are examining the code for defects.

Security

- Authentication
- Encryption
- Multi-Layer Architecture
- For Open Source Software, many inspectors are examining the code for defects.

Will the Government Accept Open Source?

- Yes:
  - In 2003, Defense Department CIO John P. Stenbit, freed DOD agencies to use open-source software (OSS) provided security and validation requirements are met
  - Numerous Small Business Innovative Research (SBIR) solicitations from the DOD call for Open Source solutions.
  - "OSS components should be leveraged rather than funding the development of equivalent proprietary components for specific programs." – recommendation to the undersecretary of defense, April 2006.

MITRE says

OSS is a viable long-term solution that merits careful consideration because of the potential for significant cost, reliability, and support advantages. However, these potential benefits must also be carefully balanced with a number of risks associated with OSS approaches and products.

… It typically compares favorably for *server* and *embedded system* implementations that may require some customization, but fares no better than traditional COTS for typical desktop applications.

(Emphasis added) From MP01B0000048 by Carolyn Kenwood, 2001, The Mitre Corporation.

Will Open Source Accept Military?

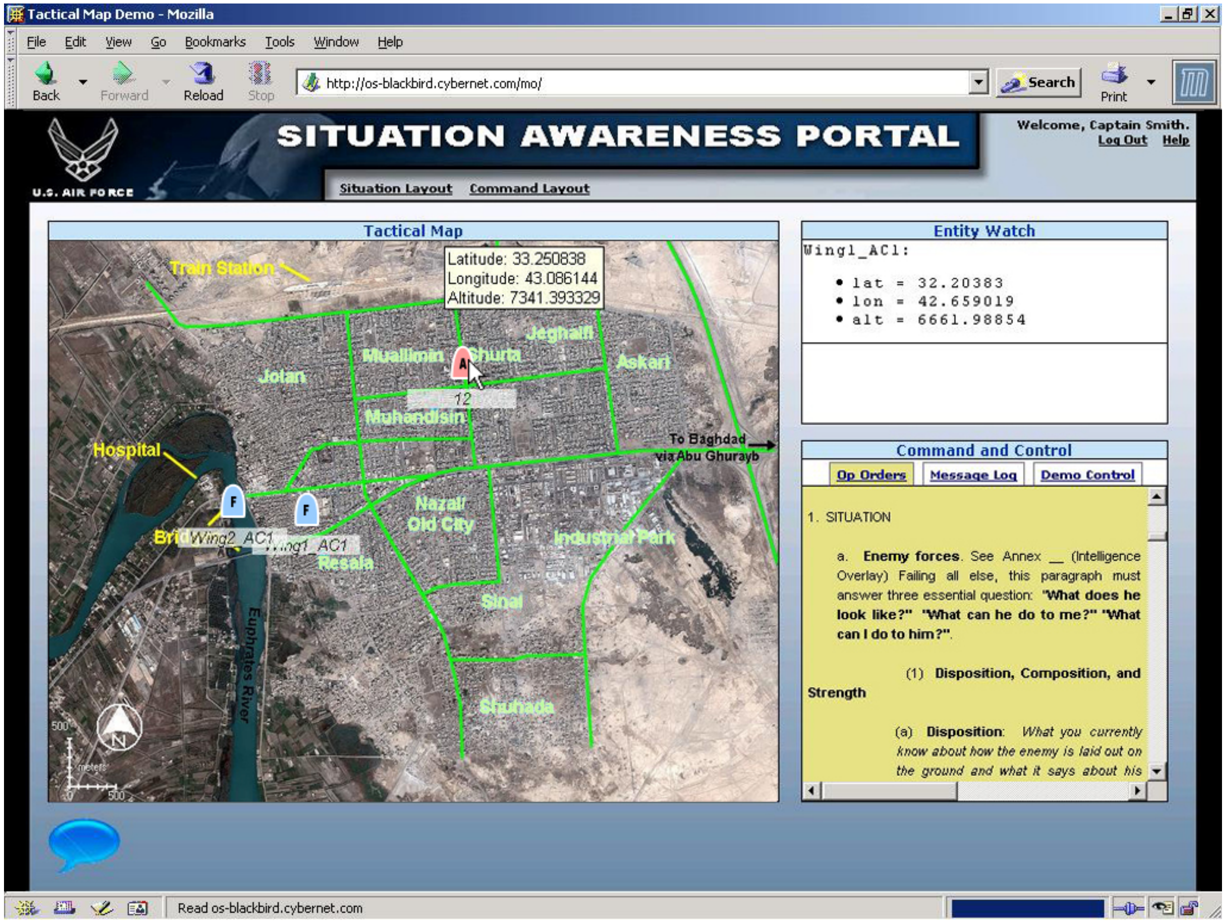
- **Open source project adds "no military use" clause to the GPL**
- **Monday August 14, 2006 (04:01 PM GMT)**
- By: Tina Gasperson

Tiziano Mengotti and Rene Tegel are the lead developers on the GPU project. Mengotti is the driving force behind the license "patch," which says "the program and its derivative work will neither be modified or executed to harm any human being nor through inaction permit any human being to be harmed."
Mengotti says the clause is specifically intended to prevent military use. "We are software developers who dedicate part of our free time to open source development. The fact is that open source is used by the military industry. Open source operating systems can steer warplanes and rockets. [This] patch should make clear to users of the software that this is definitely not allowed by the licenser."

Results

- Cybernet used the Open Source tools listed herein to create a web-based situation awareness application for joint air strike missions.
  - Easier to make changes to the presentation without invalidating the business logic.
  - Cost to implement was small due to configuration rather than development.

Results



Latitude: 33.250838
Longitude: 43.086144
Altitude: 7341.393329

```
Wing1_AC1:

  • lat = 32.20383
  • lon = 42.659019
  • alt = 6661.98854
```

1. SITUATION

a. **Enemy forces**. See Annex __ (Intelligence Overlay) Failing all else, this paragraph must answer three essential question: **"What does he look like?" "What can he do to me?" "What can I do to him?"**.

(1) **Disposition, Composition, and Strength**

(a) **Disposition**: *What you currently know about how the enemy is laid out on the ground and what it says about his*

Future Directions

- Service-Oriented Architectures
  - Will simplify the creation of adapters
- More integration with industry-based standards committees
- More adoption of Open-Source Software

Conclusions

- Industry has similar needs but leaner processes to get those needs met.
- To get interoperability, you need to create new systems that conform to an existing standard, using adapters to reach back to legacy systems.
- Industry has a number of existing standards for data exchange that meet the needs of military, and have widely-used Open Source implementations.

Questions?

- Please address questions to Steve Rowe, srowe@cybernet.com