Net Centric Demos/Prototypes Technical Interchange

Federal Aviation Administration

SWIM Program Update

ITWS/CIWS SWIM Prototypes

Service Container Update

Presented to: Exchange Participants

By: SWIM

Date: June 3, 2009

Agenda

- Key Players
- SWIM PMO Updates
- Participating Programs' progress
- Major Milestones/Goals
- ITWS/CIWS SWIM Prototypes
- Service Container Updates

Key Players

- Ahmad Usmani, SWIM PM
- Mike Hritz, Evolution and Coordination
- Jeffery Hobbs, Implementation Lead
- Jim Robb, Requirements and Governance Lead
- Paul Jackson, Requirements and Governance
- Deborah Young, Program Control
- Rhonda Thomas, Acquisition

SWIM PMO Updates

- **Defining "SWIM compliance"**
  - Added information on www.swim.gov for use by organizations that want to be SWIM Compliant
  - Working with various NAS projects and NAS related projects on appropriate nomenclature
- **Four FAA standards developed: XML Namespaces, Web Services Profile Specification, Service Registration, Service Taxonomies**
- **Continuing to evaluate programs using the SOA Suitability Checklist**

SWIM PMO Updates (Cont'd)

- **SWIM Registry, Phase 1, established**
  - Publication Registry: A service registry for all services that are proposed, in development, and in testing (pre-production).
  - Discovery Registry: A service registry for all services that have been approved for operation (production).
- **Initial publication of SWIM Governance Plan out for FAA review**
  - Policies include strategic, runtime/operational, and SOA/Service design
  - Specific procedures are under development
- **Next SWIM Newsletter due out summer 2009**
- **Segment 1 JRC activities on-going**

SWIM PMO Updates (Cont'd)

- **Segment 2 Definition**
  - The purpose of Segment 1 is to evolve toward a net-centric NAS in order to get to NextGen. Segment 1 is a federated, standards based approach. The program baseline for Segment 1 will end in 2015 and enter sustainment mode.
  - The vision for Segment 2 is a net-centric infrastructure with a SWIM Core that includes the SOA, IT, and ISS infrastructures. Segment 2 development is scheduled to begin in 2012 and capabilities will be added over the following five years.
  - Segment 2 JRC planned for Summer 2010

Technical Progress by Segment 1 Participants

- **ERAM Prototype efforts confirm Fuse products work and save code; work on-going for initial Flight Information Services**
  - ERAM Prototype evaluated two alternatives: 1) Oracle WebLogic Server and 2) FUSE ESB 4 with FUSE Mediation Router and FUSE Services Framework.
  - Team found that Fuse is a more lightweight product that is message centric. Scalability and failover were better in FUSE.
- **TFM Prototype efforts just starting**
- **AIM focus has been on the GUI that will support creation of new SUAs and SAAs**
- **Terminal Data Distribution System award announced in January; work on the TDDS Proof of Concept is starting and will be followed by a TDDS Prototype activity**
- **Weather Programs (status provided in later briefings)**

Major Milestones/Goals

- **Segment 1B JRC: August 2009**
- **Segment 2 JRC: August 2010**
- **Completion of CIWS Prototype Service: Fall 2009**
- **Completion of Governance Policies and Procedures: on-going**
- **Completion of Segment 2 requirements: August 2009**
- **Completion of AIM SUA Service: September 2010**
- **Completion of CIWS Weather Service: September 2010**

SWIM ITWS Prototype

SWIM ITWS Prototype Goals

- **FAA tasked Volpe to develop an SOA-based prototype**
  - Convert (4) weather products to industry standard format (XML)
  - Use SOA technology to make weather data available to other FAA programs and industry
- **Reduce risk to the full SWIM implementation by developing a working prototype**

SWIM ITWS Prototype Milestones

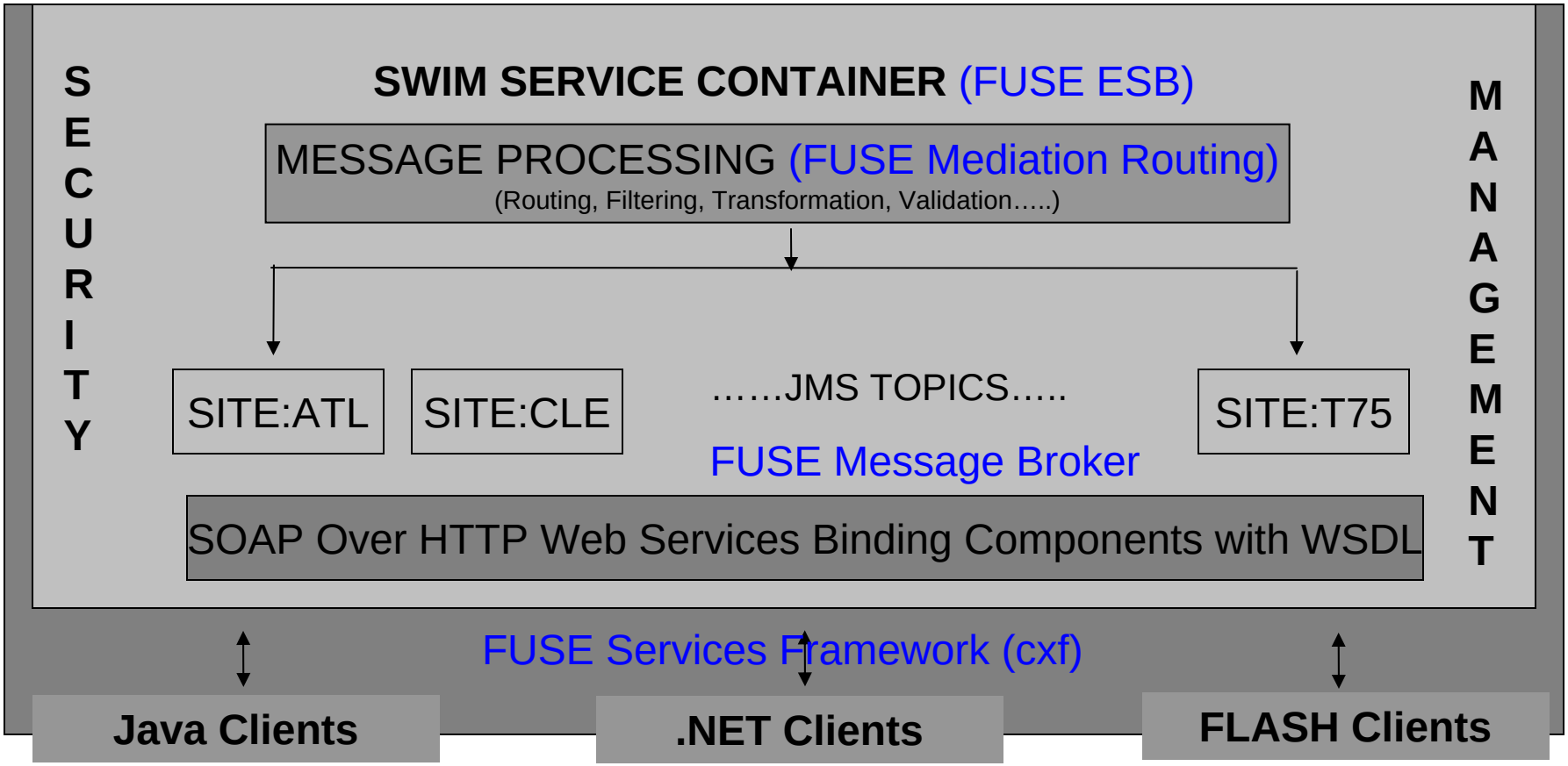
- **09/3/08: Volpe delivered working prototype to FAA**
- **10/6/08: FAA began to distribute live, XML weather data (Microburst, Gust Front, Terminal Text and Configured Alerts)**
  - FAA selected United Parcel Service (UPS) as the 1st registered SWIM-ITWS prototype user
  - UPS plans to integrate this weather data into their decision support tools

SWIM ITWS Prototype Status

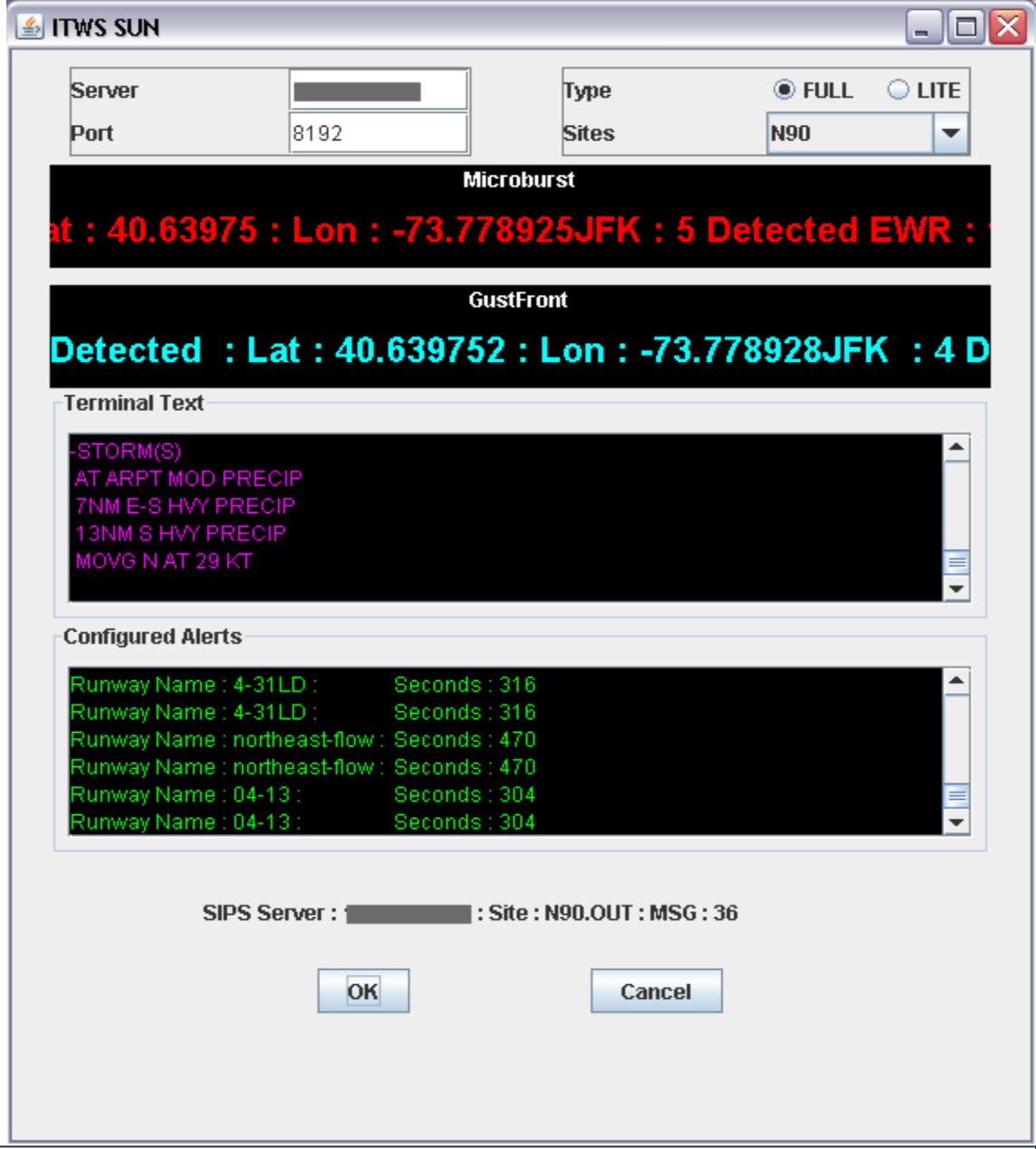
- **FedEx and NWA have signed Memorandums of Agreement (MOAs) necessary for receipt of ITWS SWIM Prototype Service products.**
  - Air Force is in signature process for MOA
  - The Philadelphia Airport Authority is looking at the MOA.
  - The MOA has been modified slightly for WSI Corporation (a weather service provider), Flight Explorer, and ARINC. Coordination is on-going.
- **Five additional weather products will be available to ITWS SWIM Prototype Service users: tornado detection, airport lightning warning, storm extrapolated position, forecasts (contours, image, accuracy), and wind profile**

Service Oriented Architecture (SOA)

Provides interoperable services to allow different applications to exchange data with one another using an industry standard format



Display of SWIM-ITWS weather products delivered to the FAA



ITWS SWIM Prototype: “Lessons Learned”

- Use an “Agile” development approach
- Get sample data flowing very soon
- Develop a full-featured graphical client – this helps in debugging and testing
- Exploit the native Fuse functionality (configure, don’t code)
- Have one person responsible for doing all the data/schema/naming conventions
- Have a tight schedule

SWIM ITWS Service: Future Work

- Convert the remaining weather products to XML
- Continue with the expansion and performance tuning of the SOA design
- Begin the design and development phase of SWIM Segment 1 architecture

SWIM CIWS Prototype

CIWS Prototype Status

- **Work began in March 2009**
- **Goal is to have a CIWS Prototype Service by Fall 2009, with an initial client**
  - SWIM will post a notice of intent to seek a client on the www.swim.gov website, later this summer
  - SWIM will also work with the CDM Community, through Mark Libby, to identify interested parties
  - Initial participants will be selected based on their ability to participate this Fall, and on criteria to be included in the notice
- **Team is led by Mike McKinney, and supported by the MIT LL team and the CIWS WJHTC Team**

CIWS Prototype Goals

- **Develop and deploy an initial prototype of the CIWS Data Distribution Service (CDDS) via ED-8 gateway in FY09**
  - Subset of CIWS products
  - Small number of airline clients
- **Demonstrate use of SWIM infrastructure (Progress Software FUSE software)**
- **Demonstrate use of international standards for both service and information models**
- **Complete the engineering of the prototype in FY10 (adding remaining products and service features, updating service implementations where necessary to align with NNEW)**
- **Transition prototype to an operational SWIM capability**

Lincoln tasking: By the end of FY10, create an operational CIWS Data Distribution Service for SWIM Segment 1 that leverages ongoing work of both NNEW and CIWS.

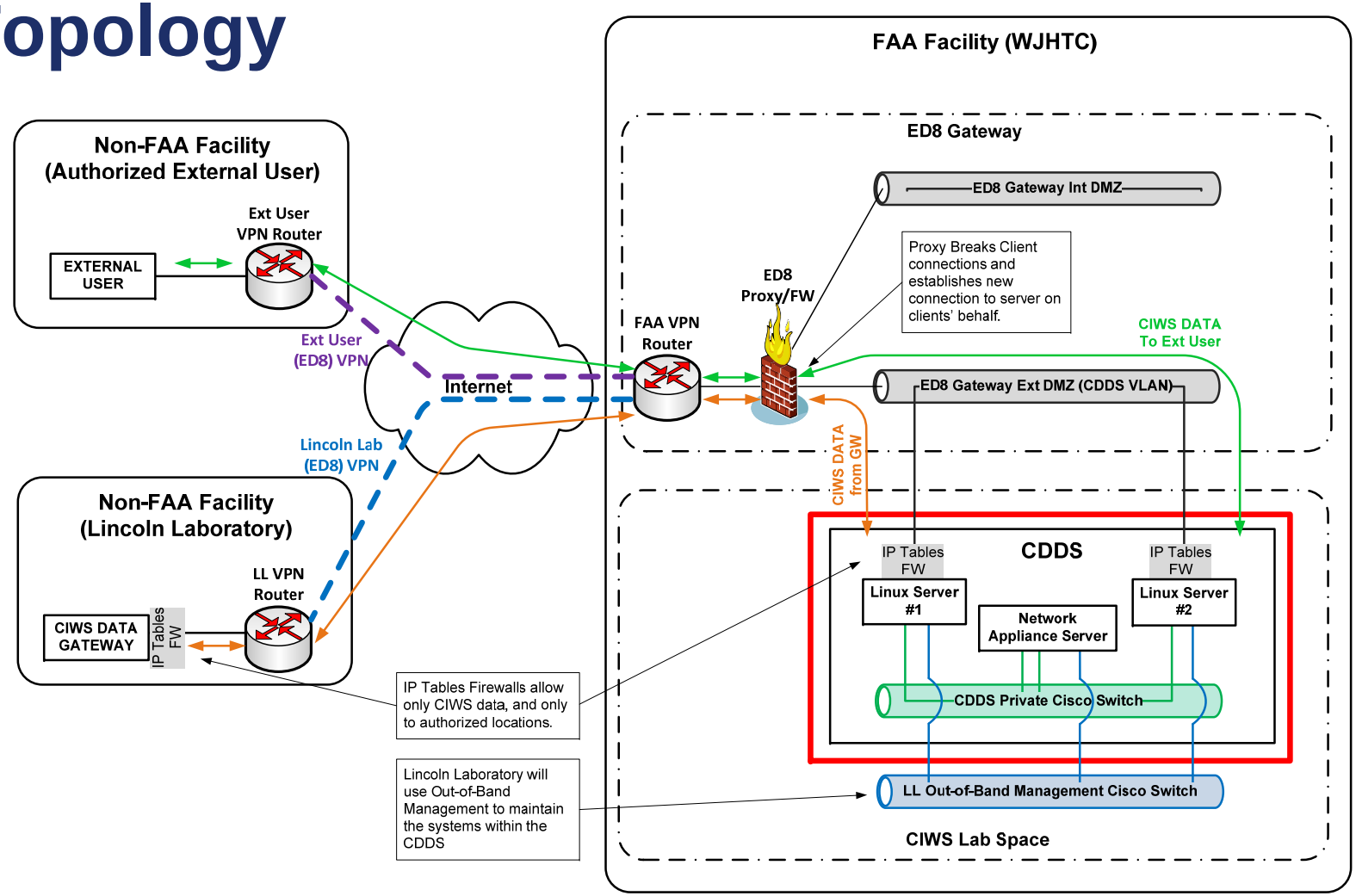
Products

Product Name	Interval (Secs)	Max Product Size (Bytes)	Latency to User
VIL Mosaic	150	3,083,359	1 Min
VIL Forecast	300	38,802,040	4 Min
Echo Tops Mosaic	150	917,480	1 Min
Echo Tops Forecast Mosaic	300	9,595,373	4 Min
Satellite Mosaic	900	7,201,469	4 Min
Storm Info : Echo Top Tags	150	7,999	1 Min
Storm Info : Leading Edges	150	46,899	1 Min
Storm Info : Motion Vectors	150	4,453	1 Min
VIL Contours (Standard Mode)	300	86,636	1 Min
VIL Contours (Winter Mode)	300	573,211	1 Min
Echo Tops Contours	300	64,058	1 Min
Growth & Decay Contours	150	36,066	1 Min
Forecast Accuracy : Echo Tops	300	2,883	4 Min
Forecast Accuracy: Standard Precipitation	300	3,028	4 Min
Forecast Accuracy: Winter Precipitation	300	3,204	4 Min
Lightning	60	16,476	30 Sec

Gridded Products (FY09 System)

Non-gridded products (added in FY10)

System Architecture / Environment Topology



SWIM Service Container

Service Container Updates

- **Latest Fuse Products release is OSGI compliant, will support RESTful services development, and will have improved clustering over JMS as well as master-slave failover capabilities**
- **COTS Repository established**
  - Distribution is to Segment 1 Participants
  - Repository managed by WJHTC SWIM Team
- **SWIM Implementation Team holding monthly Architecture Working Group (AWG) meetings and COTS Working Group meetings with SIPs**
  - AWG provides a forum for working out architectural details
  - COTS WG tracks Vendor “Road Maps”, coordinates the SIP roadmaps, and tracks product issues

Product Inventory - Functional

SWIM Products	Open Source Software	COTS (Proprietary) Software
WS Stack	FUSE Services Framework	Artix ESB
SC Enterprise Integration Tools (EIT)	FUSE Mediation Router, FUSE ESB	
Message Oriented Middleware (MOM)	FUSE Message Broker	
Enterprise Service Bus (ESB)	FUSE ESB	
System Management Subsystem (SMS)		FUSE HQ, Artix Enterprise Management Service Plug-in
OSGi Runtime Endpoint Management Tool		ARTIX Reg/Rep
Information Grid		Data eXtend Semantic Integrator (DXSI)
COTS Product Repository	Nexus Repository Management Tool	
Security		Artix Connect for WCF, Artix Security, XML Gateway (QVL)
Registry/Repository		Systinet 1
Development Tools/Environment	Eclipse IDE, Ant, Maven	Artix Data Services Designer Actional Team Server, Actional Diagnostics
Test Tools	soapUI	iTKO Lisa

General Goals of Standardization

- **Minimize integration risk**
- **Minimize interoperability risk while allowing flexibility in selection of technology**
- **Reduce total cost of ownership to FAA**
- **Reduce development time**
- **Execute established SWIM strategy of decoupling risk**
  - Technology risk in SWIM Segment 1
  - Program risk in SWIM Segment 2
- **Promote enterprise manageability for Segment 2**

Product Policy

Product	Governance Policy	Comment
Fuse Service Framework	**Mandated**	
Fuse Message Broker	**Mandated**	
Fuse Mediation Router	**Either FMR or Fuse ESB**	**Use** *Selecting a SWIM Integration Platform* **guidance**
Fuse ESB	**Either FMR or Fuse ESB**	**Use** *Selecting a SWIM Integration Platform* **guidance**
FuseHQ	**Either Fuse HQ or Other Service Monitoring**	

Product Selection Rules

1. If the service is a new application and has modest compute intensive requirements and modest , then use Fuse ESB as an application server.
2. If the service is a new application and is _*extremely*_ compute intensive consider using SWIM Embedded Information Stack with the app server of choice (e.g. WebLogic)
3. If the service is a legacy app on a non-Java platform use Fuse ESB as a separate integration server. Typically a native AMQ client can be run on the legacy server, or a native library can be used to implement a WS on the platform to provide the connectivity to the legacy platform.
4. If the service is a legacy app on a Java platform that does not have very tight latency requirements use Fuse ESB as a separate integration server.
5. If the service is a legacy app on a Java platform with tight latency requirements consider using SEIS directly on the existing legacy Java business server. It may also be possible to use Fuse ESB directly on the existing legacy Java server, but serialization costs may be slightly higher.

Fuse ESB versus SEIS Decision Tree