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# CON7759 - Accelerate Healthcare Integration with Oracle SOA Suite for Healthcare Integration

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San Francisco

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OPEN  
WORLD**

**Steve Schenks, Ascension Health**  
**Joe Finlinson, Intermountain Healthcare**  
**Jay Jenkins, Children Hospital of Philadelphia**  
**Suresh Sharma, Oracle**

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# About the presenters



**Steve Schenks**

Integration Architect,  
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**Joe Finlinson**

IS Director, Business  
Application,  
Intermountain  
Healthcare



**Suresh Sharma**

Product Strategy Director,  
Oracle

# Safe Harbor Statement

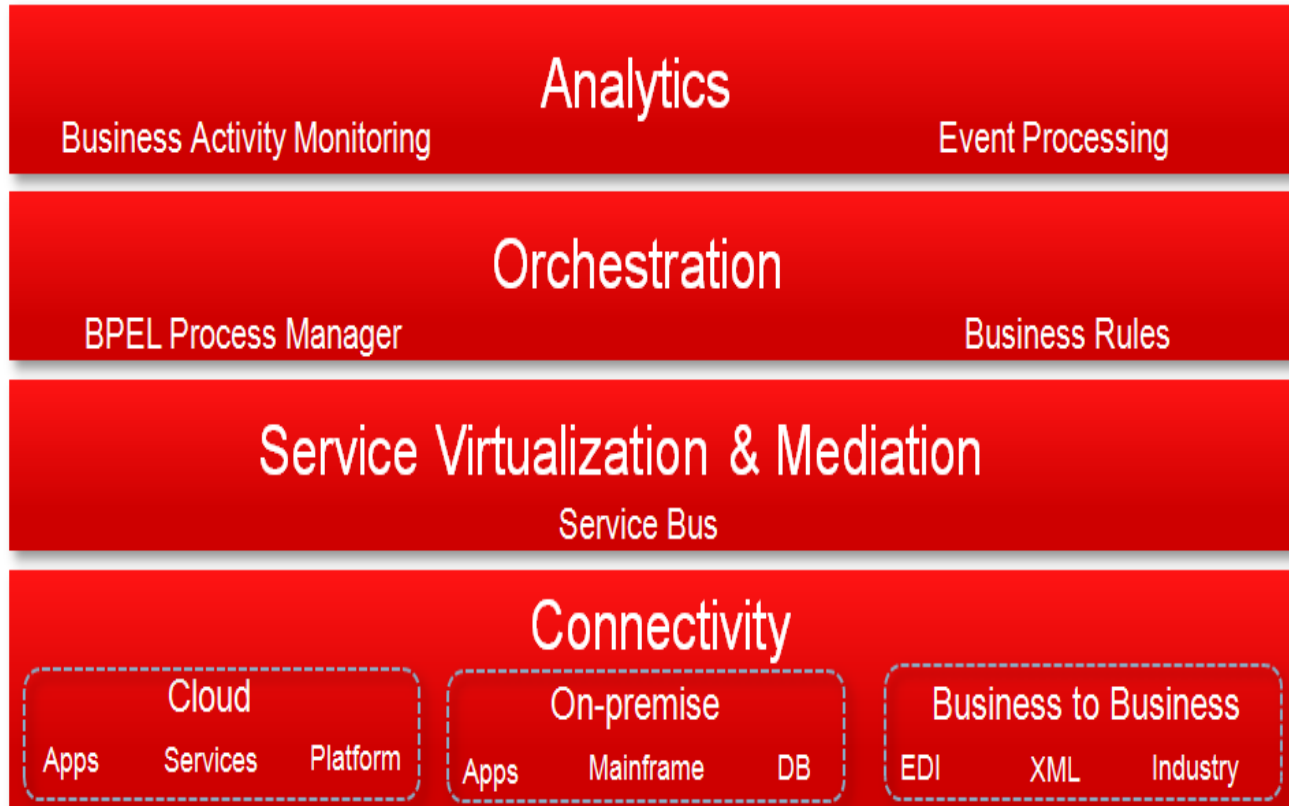
The following is intended to outline our general product direction. It is intended for information purposes only, and may not be incorporated into any contract. It is not a commitment to deliver any material, code, or functionality, and should not be relied upon in making purchasing decisions. The development, release, and timing of any features or functionality described for Oracle's products remains at the sole discretion of Oracle.

# Program Agenda

- Oracle SOA Suite Introduction
- SOA Suite for healthcare integration Overview
- Customer Case Studies
  - Ascension Healthcare
  - Intermountain Healthcare
  - Children Hospital of Philadelphia

# Oracle SOA Suite

Complete, Unified, Standards-based



- **Complete** SOA platform
- **Unified** and consistent tooling for development but also management & monitoring
- **Standards-based** to integrate with your existing IT investments, lowering your upfront costs
- Not just systems but also people – human workflow and business rules
- Complete visibility into enterprise-wide implementations

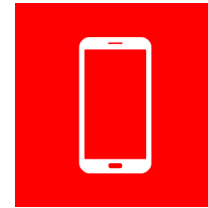
# SOA Suite 12c

## Key Features



Web Scale

- 30 % memory footprint reduction
- Startup acceleration
- Pre-tuned database profiles



Mobile

- First class support for mobile-friendly standards (REST, JSON, ...)
- Automated conversions REST/SOAP



Developer  
Productivity

- One-click install
- Everything in JDeveloper
- Debugger & tester
- **Templates**



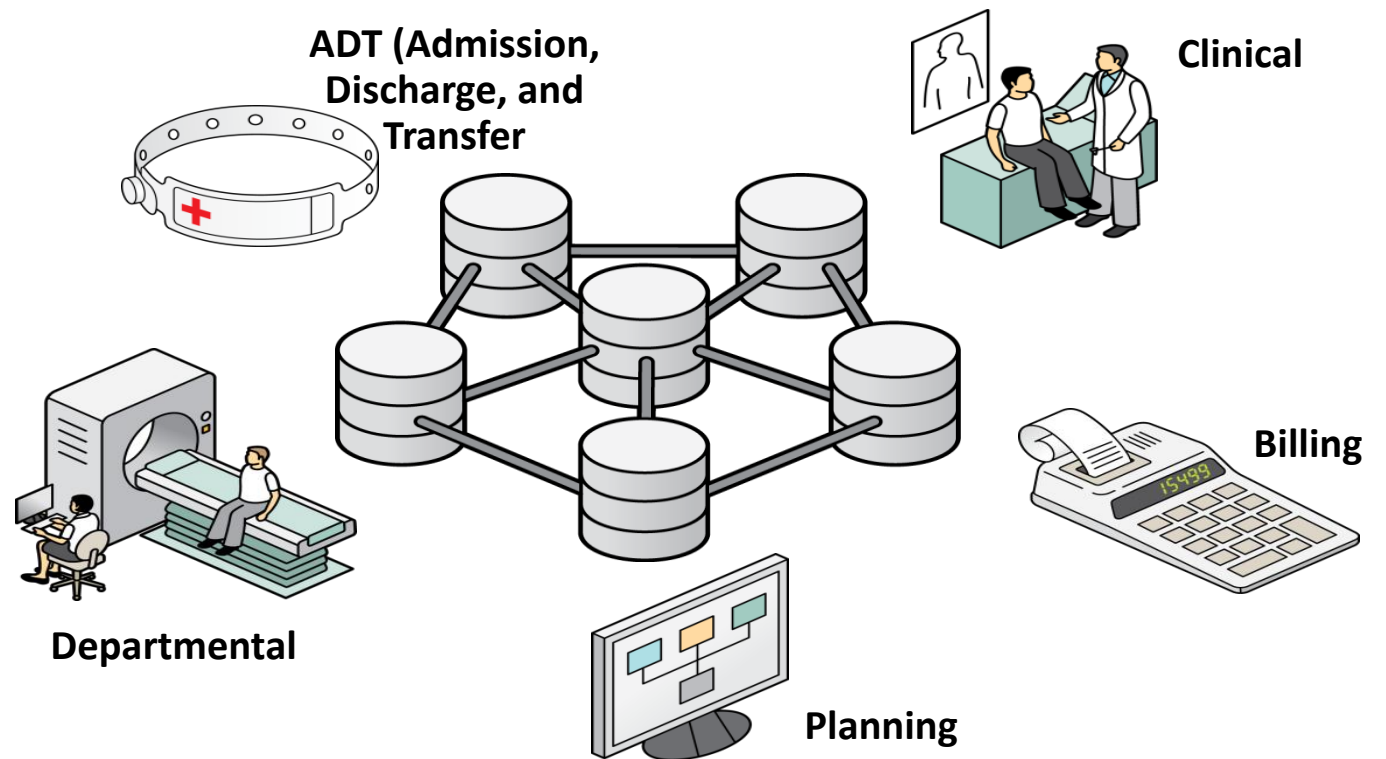
Cloud

- Cloud adapters to simplify on-prem to cloud integration
- **Managed File Transfer (MFT) for file-based integration**
- Certifications on Oracle Public Cloud

# SOA Suite for healthcare integration Solution

## Integration across Information Silos

- Connect the different healthcare systems and departments
  - Between ADT, Clinical, Lab, and Radiology systems



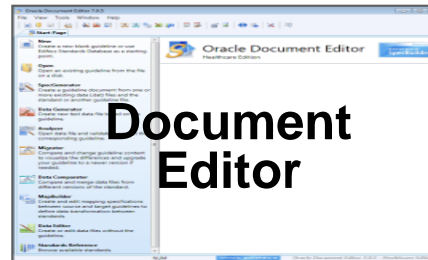


# Oracle SOA Suite for healthcare integration



**Healthcare Console**

**Interface Configuration, Dashboards, Monitor**



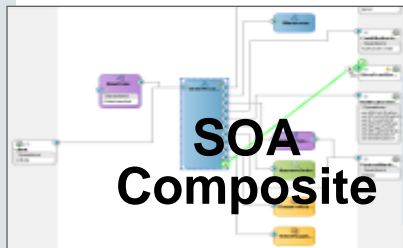
**Document Editor**

**Healthcare Message creation, customization, testing**



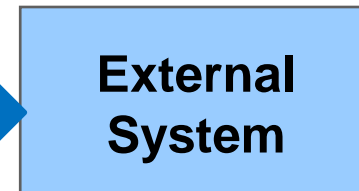
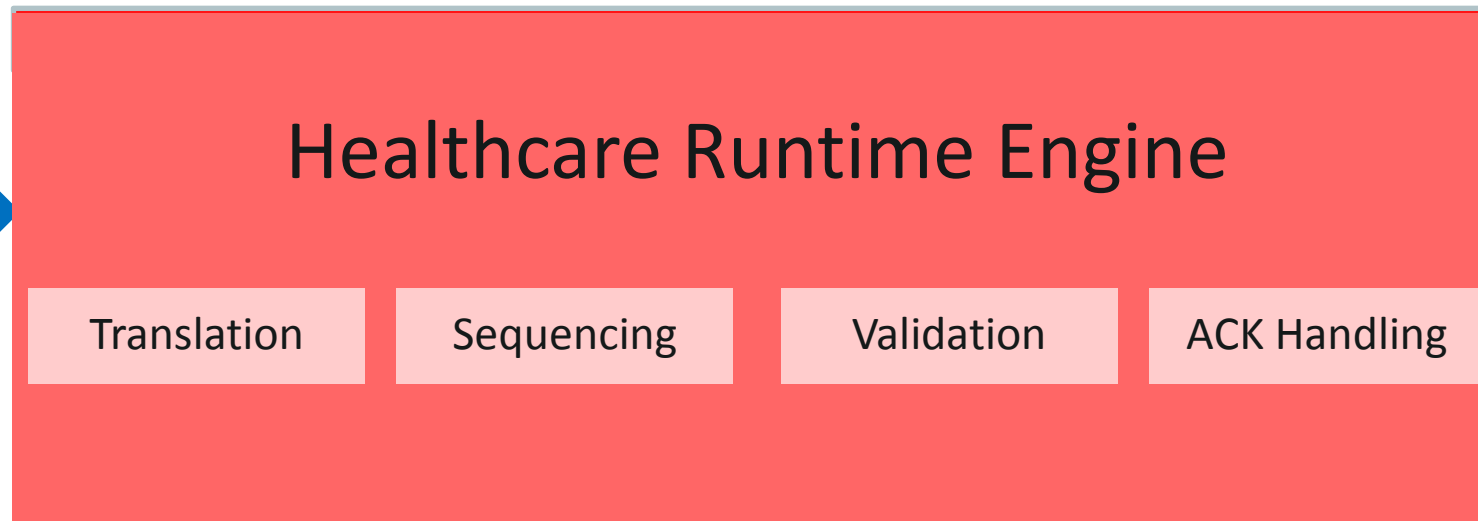
**Enterprise Manager**

**Systems Management**



**SOA Composite**

**Route, Transfer, Integrate**



**External System**



**Database**

# CON7759 : Accelerate Healthcare Integration with Oracle SOA Suite for Healthcare Integration

Presentation by:  
Steve Schenks

# Ascension Health

- Ascension ([www.ascensionhealth.org](http://www.ascensionhealth.org)) is transforming healthcare by providing the highest quality care to all.
- Ascension is directed by the Church to care for those most in need. Our Catholic philosophy permeates our national health ministries and our promise to provide

**Healthcare That Works**

**Healthcare That is Safe**

**Healthcare That Leaves No One Behind**

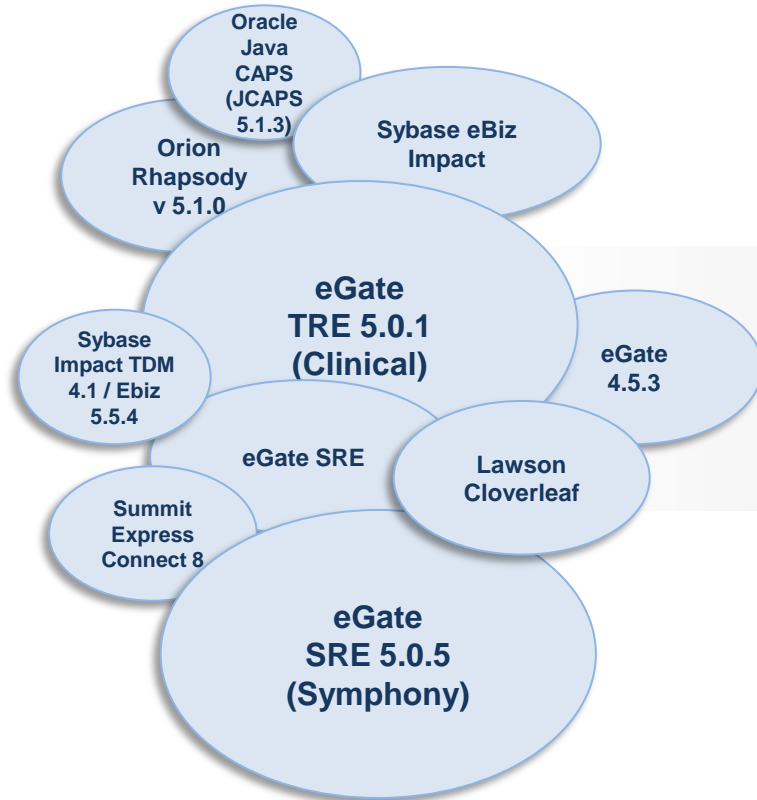
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## Current Environment – Scattered Deployments

- As Ascension Health added hospitals and related health facilities, siloed IT departments were also added in some cases
- The majority of the clinical interfaces (2058) and all the PeopleSoft human resources, finance, supply chain interfaces (1084) are supported by the Ascension Shared Information Services ("SIS") integration team and run in a centralized data center.
- Other interfaces (approximately 1000) are supported by Health Ministries themselves and run locally at the Ministry.

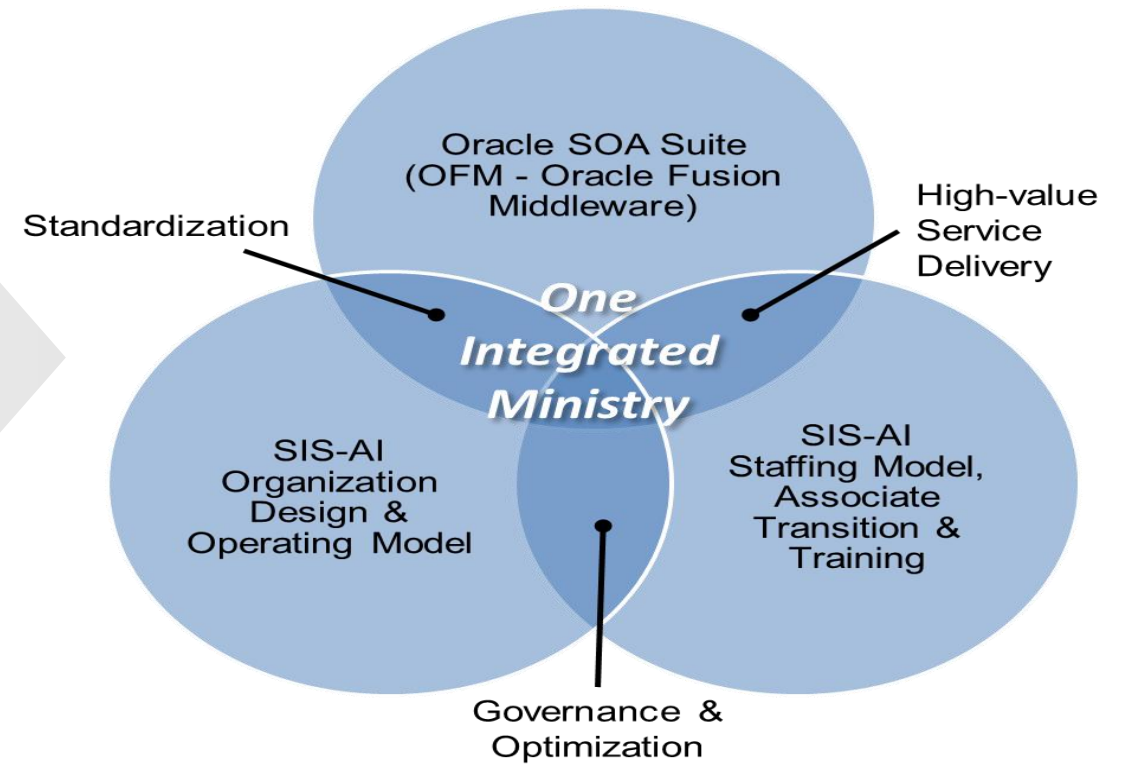
# Moving to Standardization

## Stand-Alone Integration



Shared Integration

## Shared Integration



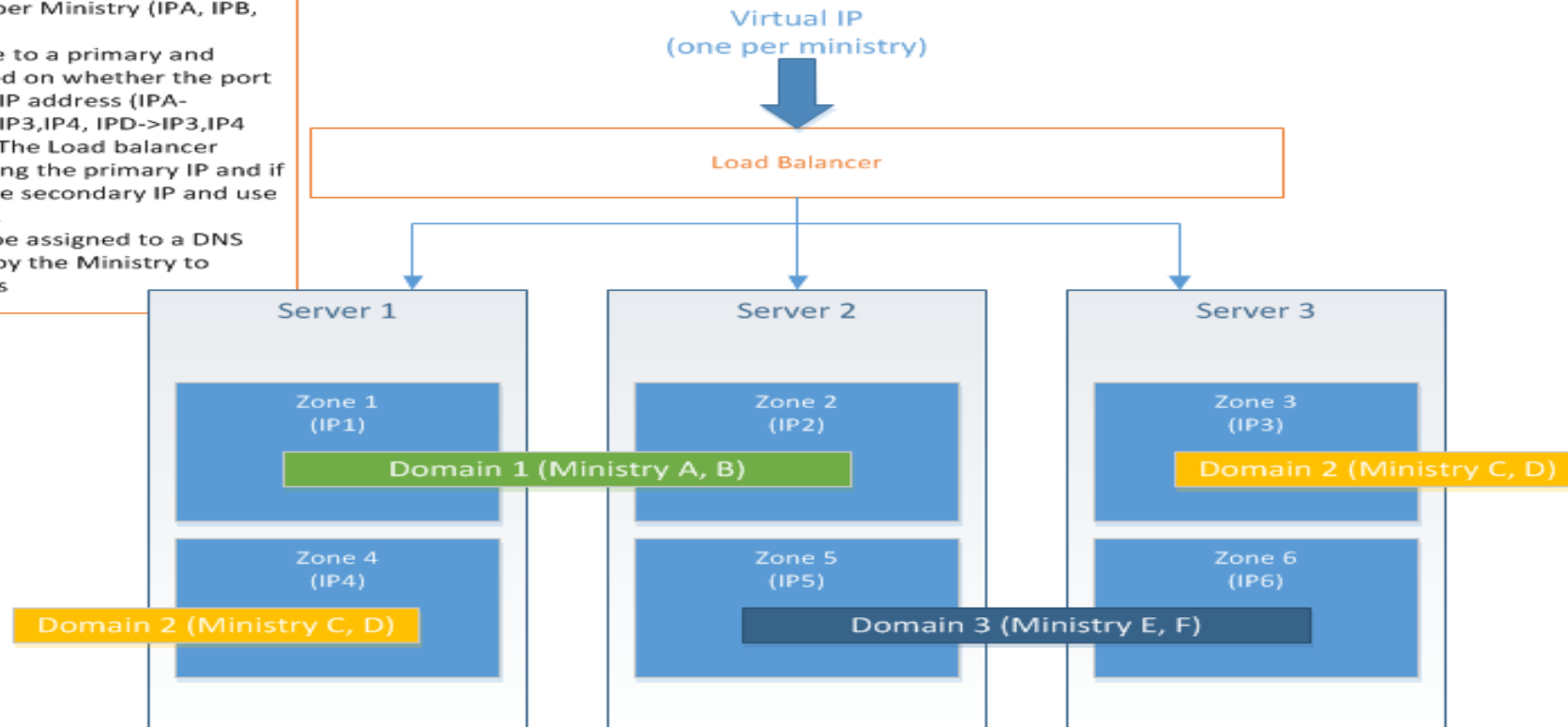
# Schedule

No.	Release	Code	Ministry	Location	Current Support Model	Base-line Quantity of Legs	Begin Discovery Phase	Begin Design & Build Phase	Begin Test Phase	Begin Deployment Cut-over	Complete Deployment Cut-over
1	Alpha	MDBAL	Saint Agnes HealthCare	Baltimore, MD	SIS	42	3/31/2014	6/2/2014	8/11/2014	11/3/2014	11/14/2014
2	Beta	FLJAC	St. Vincent's Healthcare	Jacksonville, FL	Local	95	5/1/2014	7/3/2014	10/20/2014	1/5/2015	1/27/2015
3	Group 1	TXWAC	Providence Healthcare Network	Waco, TX	SIS	100	7/1/2014	10/3/2014	1/1/2015	3/2/2015	3/20/2015
4	Group 1	IDLEW	St. Joseph Regional Medical Center	Lewiston, ID	SIS	6	7/1/2014	10/3/2014	1/1/2015	2/2/2015	2/9/2015
5	Group 1	WIMIL	Columbia St. Mary's	Milwaukee, WI	SIS	175	7/1/2014	10/3/2014	1/1/2015	3/2/2015	3/31/2015
6	Group 1	MIGRA	Genesys Health System	Grand Blanc (Flint), MI	Local	106	10/3/2014	12/1/2014	3/2/2015	5/1/2015	5/28/2015
7	Group 1	TXAUS	Seton Healthcare Family	Austin, TX	SIS	245	11/3/2014	3/2/2015	8/3/2015	11/2/2015	12/23/2015
8	Group 2	INEVA	St. Mary's Health System	Evansville, IN	SIS	130	3/2/2015	7/1/2015	11/2/2015	1/1/2016	1/29/2016
9	Group 2	ININD	St. Vincent Health	Indianapolis, IN	SIS	269	3/2/2015	7/1/2015	12/1/2015	4/1/2016	6/30/2016
10	Group 3	SY-SR	SY-SRE (SIS Symphony SRE)	SIS Evansville, IN	SIS	1084	4/1/2015	9/1/2015	6/1/2016	10/3/2015*	12/23/2016
11	Group 4	DCWAS	Providence Hospital	Washington D.C.	SIS	37	8/3/2015	12/1/2015	3/1/2016	5/2/2016	5/18/2016
12	Group 4	ALMOB	Providence Hospital	Mobile, AL	SIS	94	8/3/2015	12/1/2015	3/1/2016	5/2/2016	5/31/2016
13	Group 4	MIDET	St. John Providence Health System	Detroit, MI	SIS & Local	294	8/3/2015	12/1/2015	5/2/2016	8/3/2016	10/31/2016
14	Group 4	ALBIR	St. Vincent's Health System	Birmingham, AL	Local	317	8/3/2015	2/1/2016	7/1/2016	10/3/2016	12/23/2016
15	Group 4	NYBIN	Our Lady of Lourdes Memorial Hospital	Binghamton, NY	Local	69	8/3/2015	5/2/2016	8/3/2016	10/3/2016	10/24/2016
16	Group 5	WAPAS	Lourdes Health Network	Pasco, WA	Local	34	12/1/2015	7/1/2016	10/3/2016	12/1/2016	12/23/2016
17	Group 5	TNNAS	Saint Thomas Health	Nashville, TN	SIS & Local	240	12/1/2015	4/1/2016	8/1/2016	11/1/2016	12/23/2016
18	Group 5	CTBRI	St. Vincent's Health Services	Bridgeport, CT	SIS	115	12/1/2015	6/1/2016	9/1/2016	11/1/2016	11/30/2016
19	Group 5	MIKAL	Borgess Health	Kalamazoo, MI	Local	124	12/1/2015	6/1/2016	9/1/2016	11/1/2016	11/30/2016
20	Group 5	FLPEN	Sacred Heart Health System	Pensacola, FL	SIS	158	12/1/2015	4/1/2016	8/1/2016	11/1/2016	12/23/2016
21	Group 5	MISAG	St. Mary's of Michigan	Saginaw, MI	SIS & Local	147	12/1/2015	4/1/2016	8/1/2016	11/1/2016	12/23/2016
22	Group 5	MITAW	St. Joseph Health System	Tawas, MI	SIS	20	12/1/2015	7/1/2016	10/3/2016	11/1/2016	11/30/2016
23	Group 6	AZTUC	Carondelet Health Network	Tucson, AZ	SIS	91	TBD	TBD	TBD	TBD	TBD
24	Group 6	NYNIA	Mount Saint Mary's	Lewiston, NY (Niagra Falls)	Local	50	TBD	TBD	TBD	TBD	TBD
25	Group 7	ILARL	Alexian Brothers Health System	Arlington, IL	Local	TBD	TBD	TBD	TBD	TBD	TBD
26	Group 8	MOKAN	Carondelet Health	Kansas City, MO	SIS	TBD	TBD	TBD	TBD	TBD	TBD
27	Group 9	OKTUL	St. John Health System	Tulsa, OK	Local	TBD	TBD	TBD	TBD	TBD	TBD
28	Group 9	KSWIC	Via Christi Health	Kansas City, MO	Local	TBD	TBD	TBD	TBD	TBD	TBD
29	Group 9	WIAPP	Ministry Health Care	Milwaukee, WI	Local	TBD	TBD	TBD	TBD	TBD	TBD

\* To be confirmed

# IP Virtualization Strategy

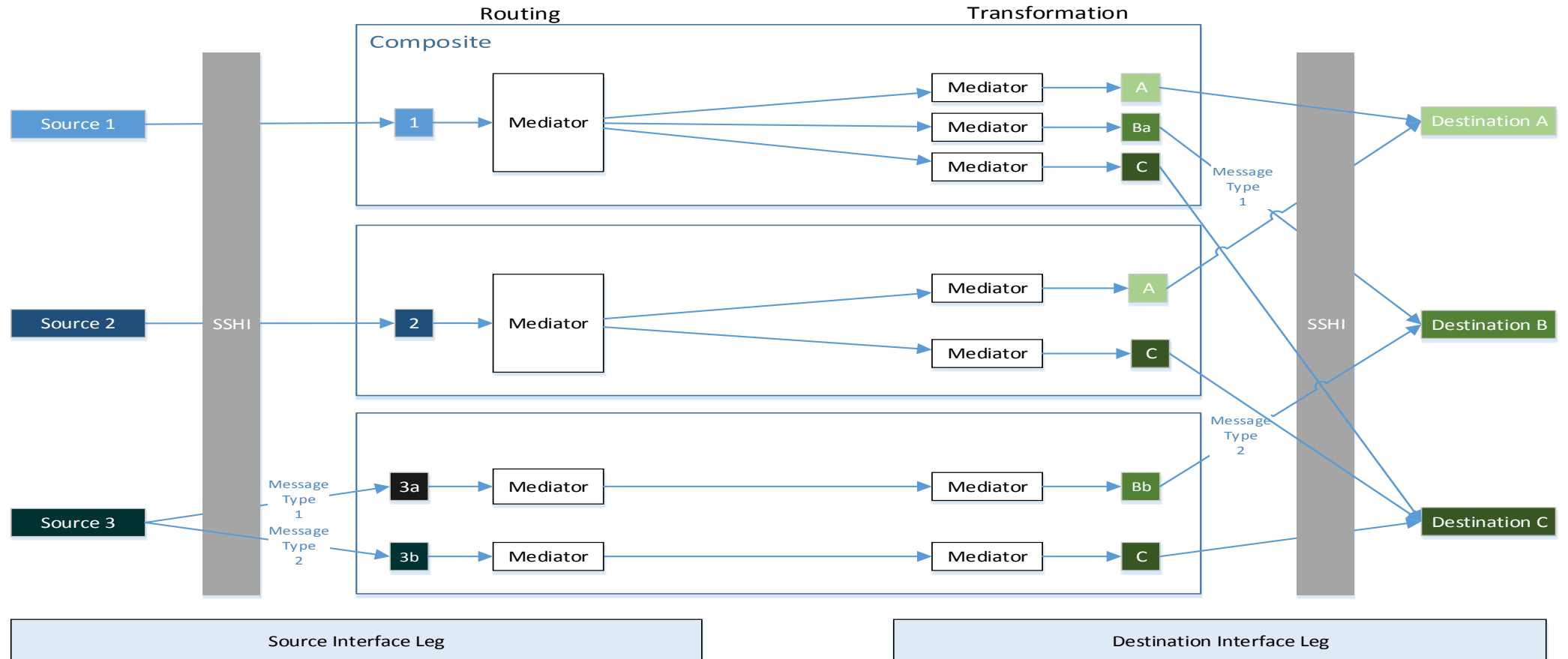
1. One Virtual IP assigned per Ministry (IPA, IPB, IPC, IPD, IPE, IPF)
2. Each VIP would translate to a primary and secondary IP address based on whether the port is active on the respective IP address (IPA->IP1,IP2 IPB->IP1,IP2 IPC->IP3,IP4, IPD->IP3,IP4 IPE->IP5,IP6 IPF->IP5,IP6). The Load balancer needs to try to connect using the primary IP and if unsuccessful should use the secondary IP and use it for subsequent requests.
3. Each of the VIPs would be assigned to a DNS name that would be used by the Ministry to configure their applications



## Assumptions:

1. None of the ministries would be deployed in two domains. In other words, all the interfaces of a ministry would be deployed on the same domain
2. The inbound ports for all the ministries are unique. No two ministries would have the same inbound port number for any of their endpoints

# Integration Flow – High Level

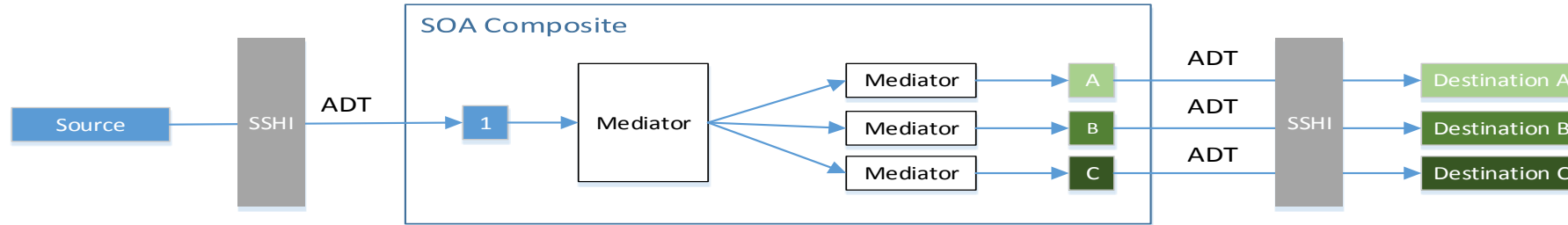


**\*Primary constraint is FIFO. Must be maintained by source.**

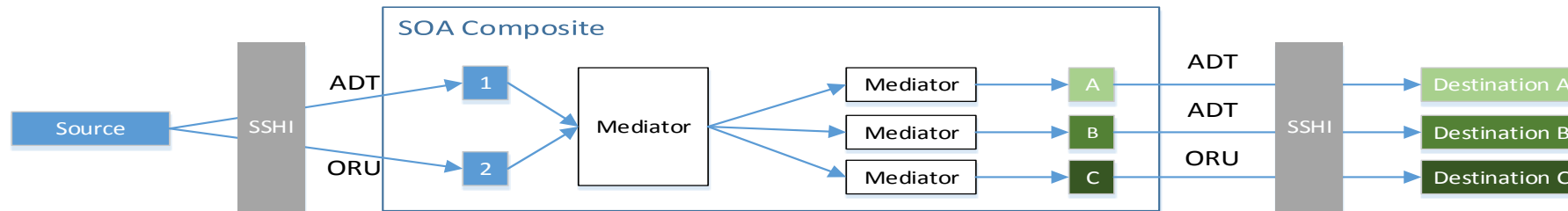


# Integration Flow - Scenarios

## Source with Single Message Format

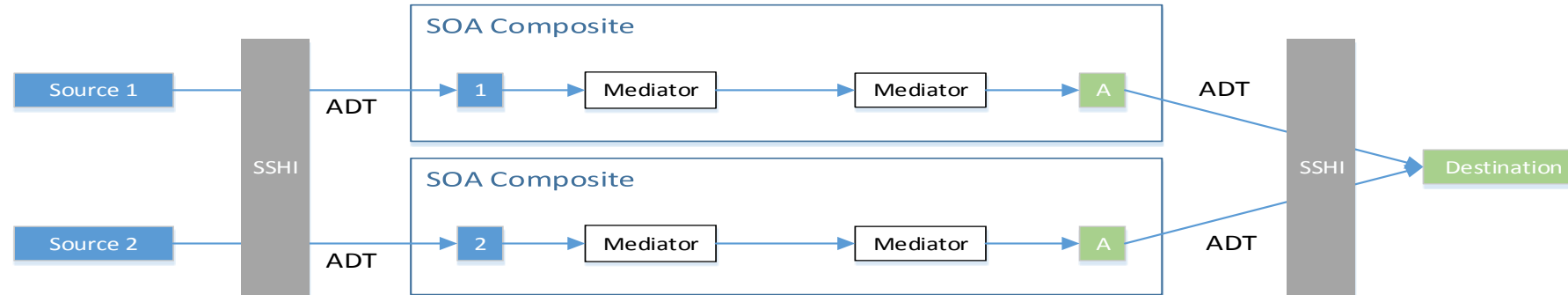


## Source with Multiple Message Formats

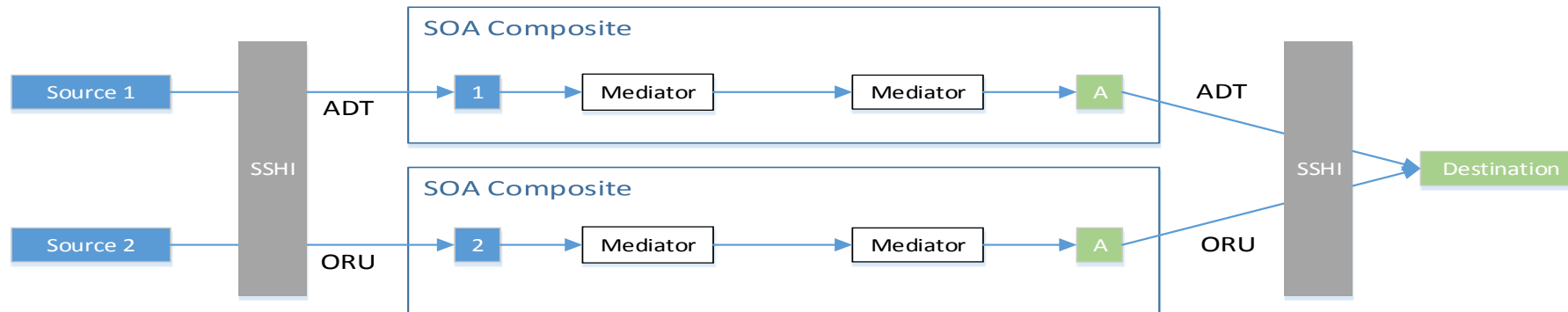


# Integration Flow - Scenarios

## Destination with Single Message Format

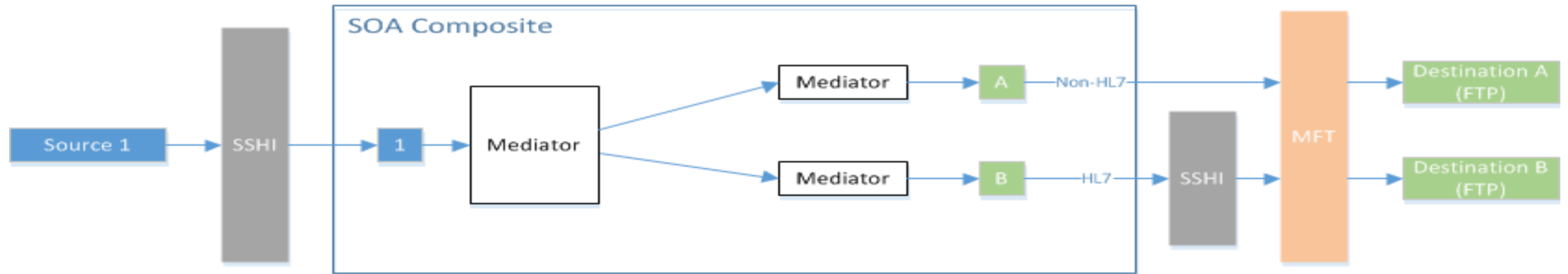


## Destination with Multiple Message Formats



# Integration Flow - Scenarios

## HL7 and Non-HL7 Batch File



**Non-HL7 Batch File** – Utilizes SOA Suite File Adapter

**HL7 Batch File** – Utilizes SOA Suite HealthCare Adapter and SSHI Endpoint

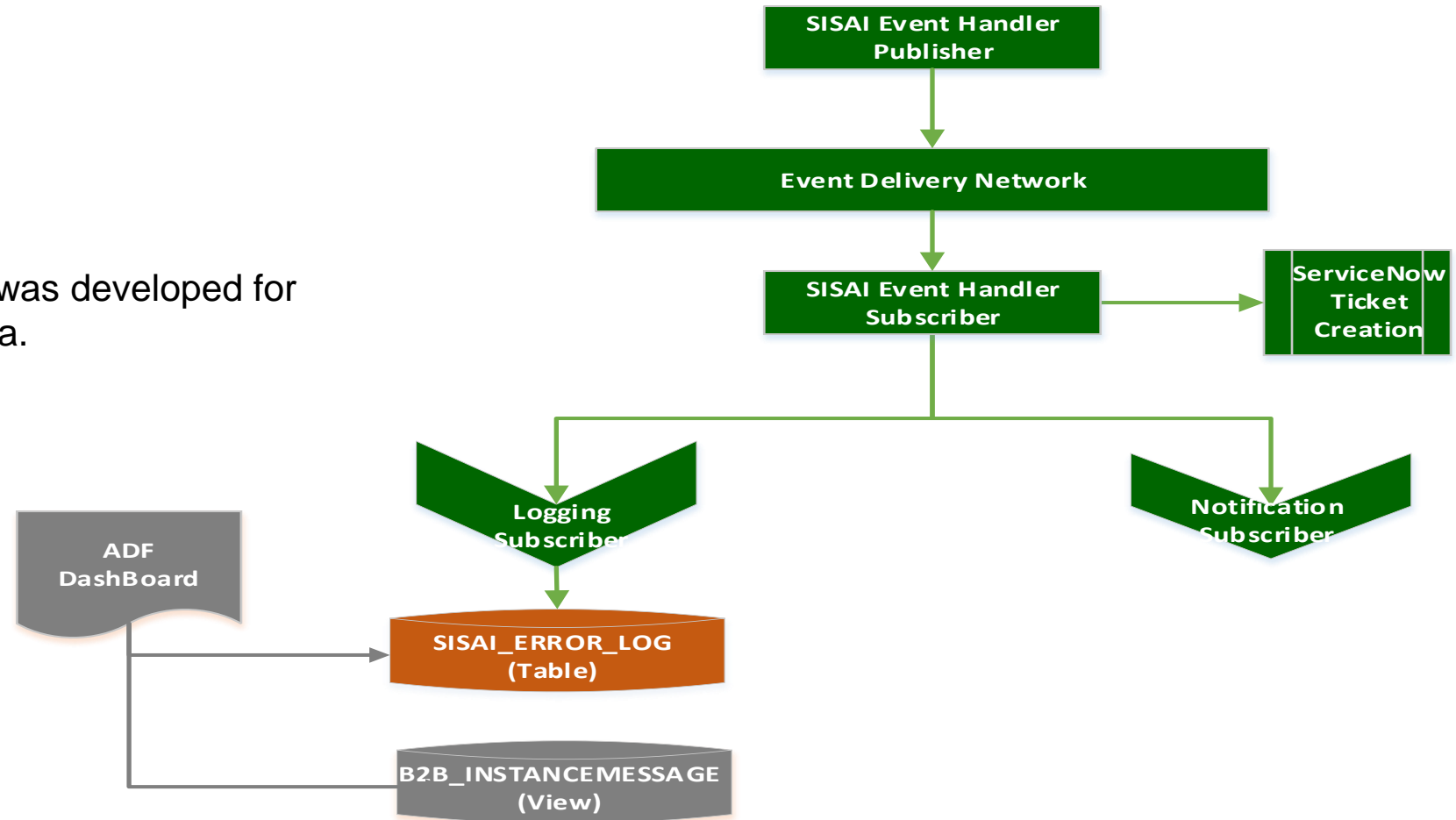
**MFT Solution** – Short-term: Accenture developed AFPO MFT solution  
 – Long-term: Oracle SOA Suite 12c MFT

# Exception Handling Framework

## Consists of the following:

- Logging
- Exception Handling
- Notifications

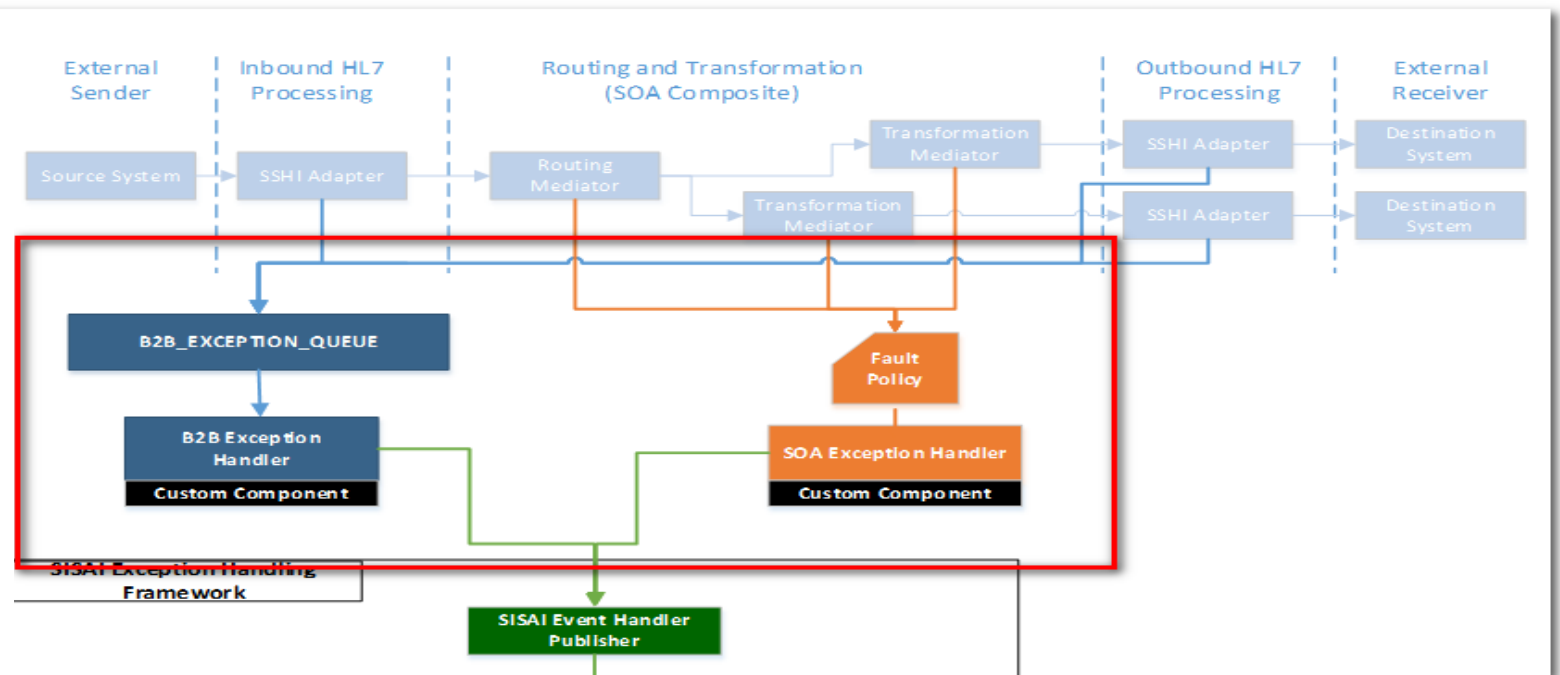
Custom Operations Dashboard was developed for viewing errors and message data.



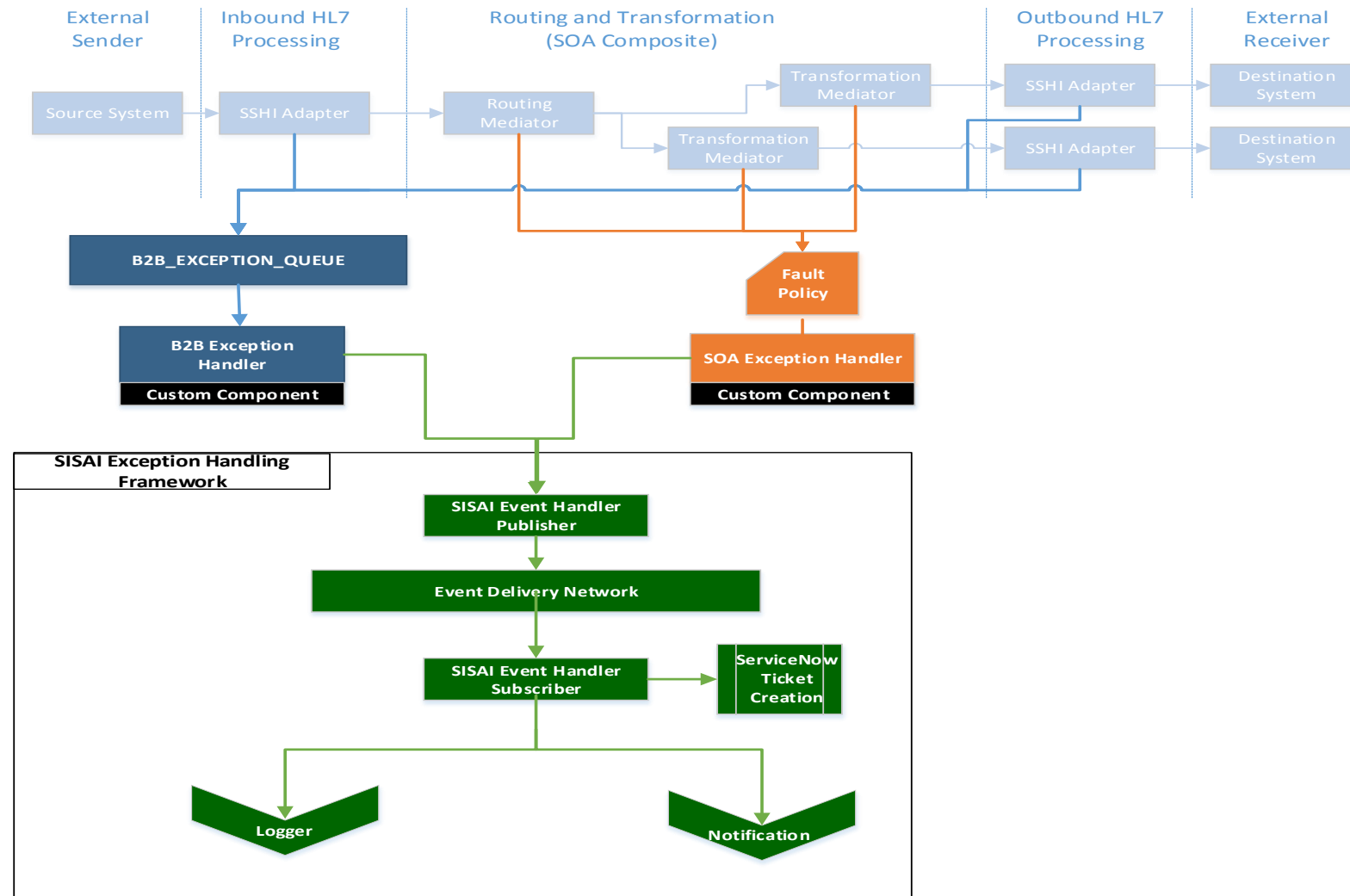
# Exception Handling Framework

**SSH/B2B layer:** Any exception in the SSH layer like the unavailability of the End Points, TCP/MLLP/FTP protocol error, Document translation error etc. results in an exception thrown by the SSH layer.

**SOA Composite layer:** Any exception related to routing and transformations occurring in the Mediator component would result in an exception thrown by the Composite layer.



# Exception Handling Framework



# Custom Operations Dashboard

## Problem

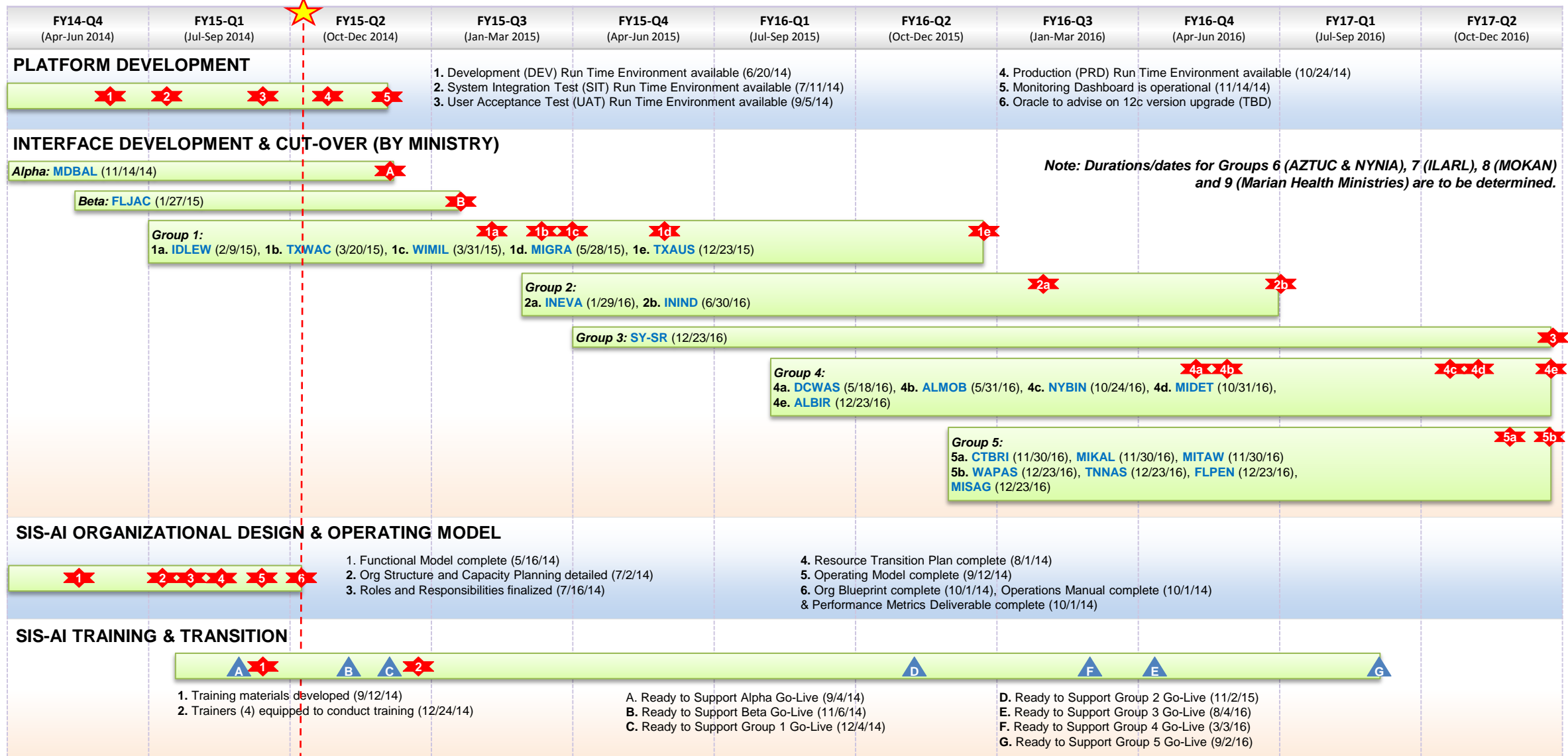
Ascension Health has approximately 2750 endpoints spread across 26 Health Ministries. The number of endpoints dictates that multiple SSHI domains must exist – current implementation plan includes 6 domains.

## Solution

In order to effectively monitor and get a complete picture of the Healthcare transactions and endpoints across the multiple domains, Ascension in partnership with Accenture is developing a Custom Operations Dashboard that will provide the single view across all Healthcare endpoints. The Operations Dashboard will include the following functionality:

- **Endpoint Dashboard:** allows for a 'rollup' status by Ministry. This dashboard utilizes the B2B\_InstanceMessage view as well as a custom table used to store the errors / notifications produced by SOA and SSHI.
- **Errors:** allows for the searching and viewing of errors that occur in any of the domains.
- **Messages:** allows for the searching and viewing of transactions that are received or sent via any of the domains

# Milestones Timeline





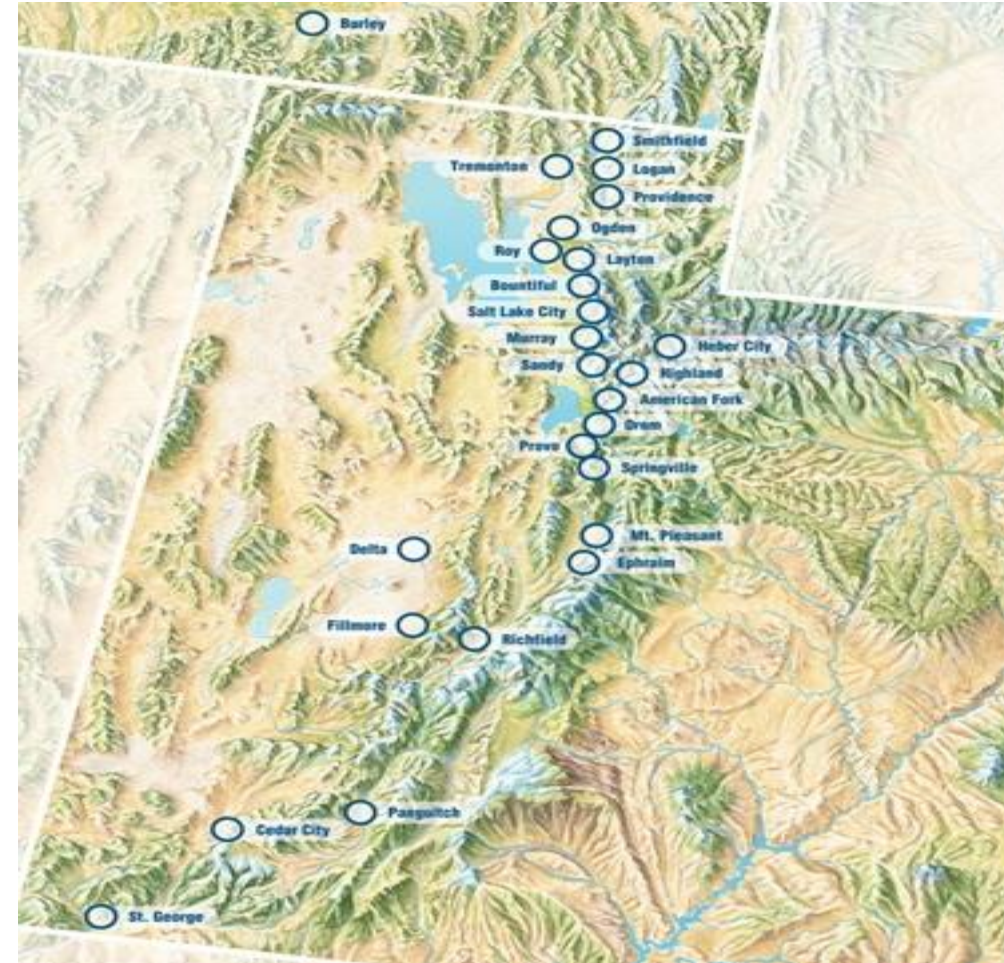
# Intermountain Healthcare

Joe Finlinson  
IS Director, Business Applications  
Oracle Open World 2014

# About Intermountain Healthcare



- Headquarters in Salt Lake City, Utah
- Largest employer in the state – 31,000 employees
- Created in 1975 as LDS Church “gifts” hospitals to the community
- Hospital network
  - 24 Hospitals
  - 2,500 + Licensed Beds
- Medical Group
  - 1,000 Employed Physicians
  - 130 Clinics
- SelectHealth – health plan
  - Direct Subscribers– 550,000
- \$3.6 billion in Net Patient Services Revenue
- \$5.0 billion in Assets
- AA+ Standard & Poor’s Aa1 Moody’s
- *Only System to receive highest ratings from both S&P and Moody’s*



# Our Aspirations

## *Our Mission*

- Excellence in the provision of healthcare services to communities in the Intermountain region.

## *Our Values*

- Mutual Respect, Accountability, Trust, Excellence

## *Our vision*

- Our vision is to be a model healthcare system by continually learning and providing extraordinary care in all of its dimensions

# The Dimensions of Care



# Our Integration Challenge

*Building a flexible, resilient interface strategy with...*

- ~200 interfaces across HR, SCO, and Finance
- ~60 conversions
- More than 500 EDI Exchanges!
  - ~30 Maps
  - ~230 Vendors
- Relentless ongoing routine maintenance
- Reduced cost for ongoing management, support, and maintenance

# Business Case for FMW SOA Suite

- ▶ Long term goal of faster delivery for integration
- ▶ Decreased development cost, complexity, and risk
- ▶ Increased focus on business processes
- ▶ More than 500 EDI exchanges
- ▶ More than 250 interfaces
- ▶ Initiative to reduce cost for ongoing management, support, and maintenance

# Why Oracle SOA Suite ?

## *Delivers the following benefits:*

- Service On-Off Ramp
- Abstraction Layer to PeopleSoft, OBIEE, and E-Business Suite
- Pre-built Canonical integration models (AIA)
- Healthcare Adapter for HL7 use cases
- EDI Processing Engine (Healthcare Adapter and B2B)
- Framework that is easy to develop, manage, and upgrade
- Transition path to Fusion
- General purpose J2EE container and DB in On Demand

# Architectural Pillars

## Canonical Data Model

The introduction of the canonical model in the integration landscape introduces a common language for all systems and integration components.

## Service Adapters for Existing Software Artifacts

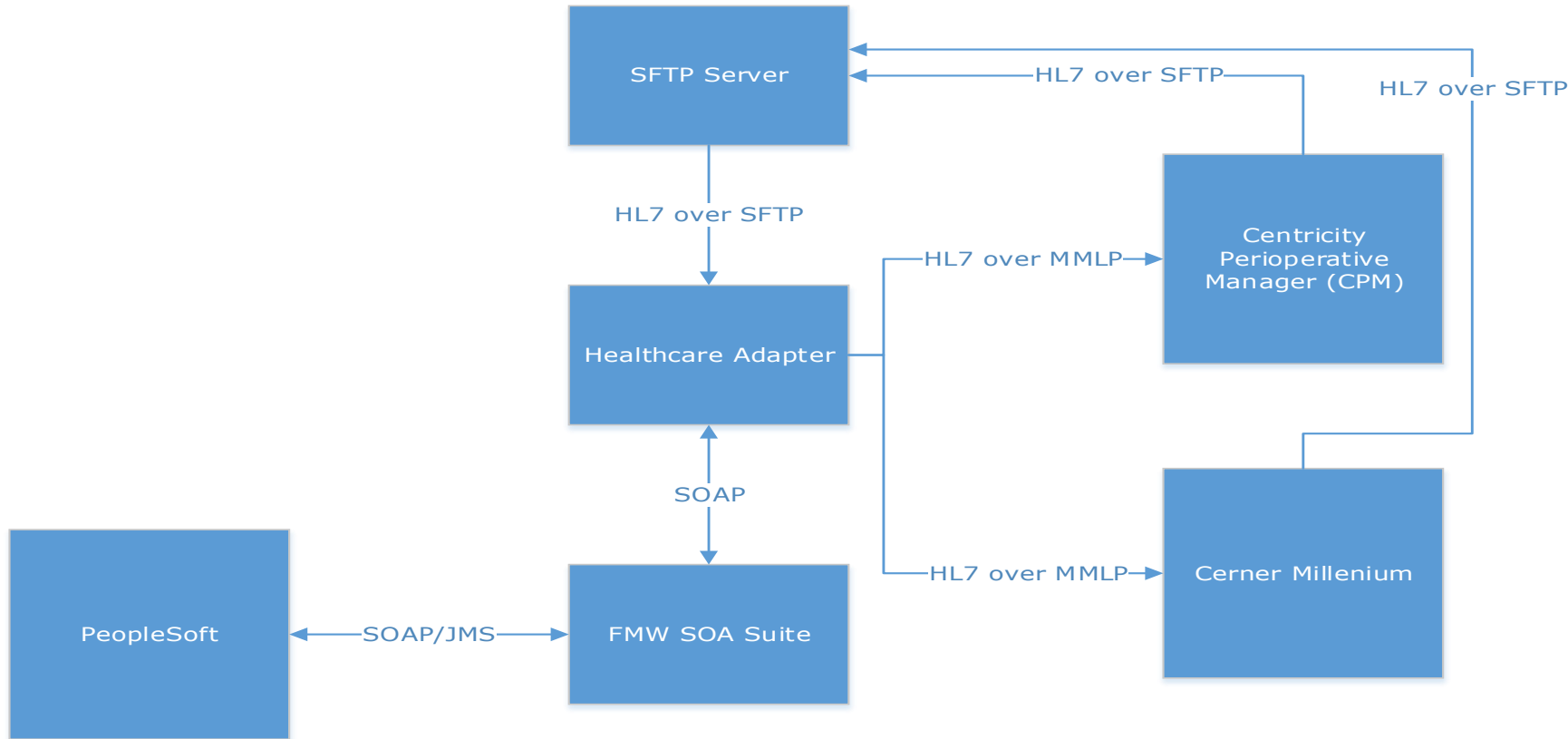
Creating a Web Services facade for these existing resources increases the number of potential consumers of these applications which is the first step to achieve reuse.

## Event Driven Architecture

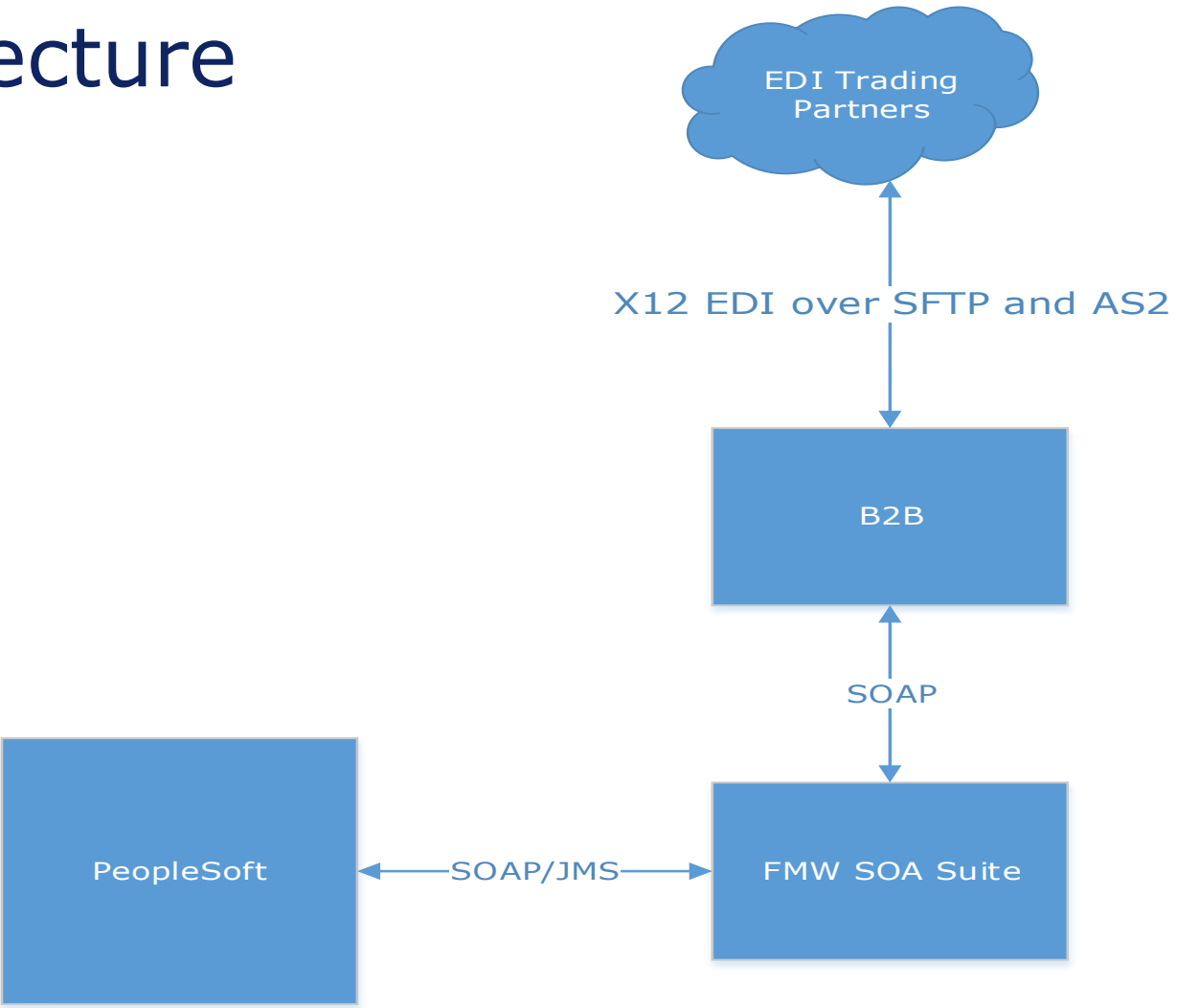
A design pattern that takes a publish-subscribe approach to integration. Event producers are fully decoupled from consumers and this decoupling is further enhanced by making use of the Canonical Data Model pattern.



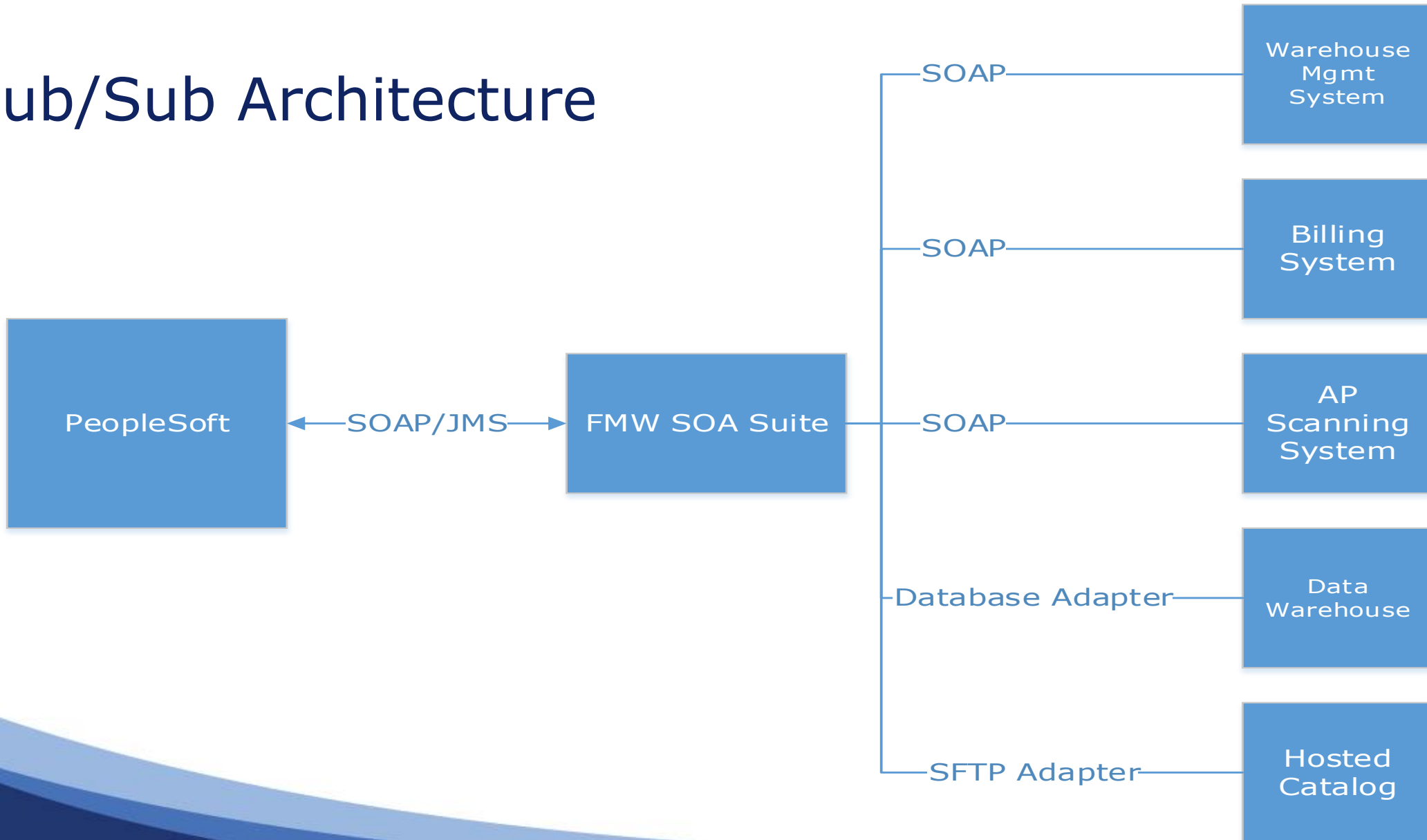
# HealthCare Adapter Architecture



# B2B Architecture



# Pub/Sub Architecture



# FMW SOA Statistics

## *Transactional*

- 70 – 100K composite instances daily
- 734 transactions per second at peak
- 2.7 million transactions per month

## *Deployment*

- HealthCare Adapter, B2B, Pub/Sub, Web Services
- Approximately 200 composites

## *Use Cases*

- MMLP/SFTP to clinical systems
- X12 EDI – 11 documents, 21 maps, SFTP/AS2
- Pub/Sub 43 publishers / 59 subscribers
- Synchronous Web Services

# Observations

## *Physical Architecture: Cluster by use case*

- One admin server per case
- Multiple managed servers per case

## *Implementing Security for Web Services*

- Plan ahead, have dedicated resources for security
- Comprehensive Security Design in Tandem with Interface Design

*Favor the right heft of development framework for your requirements*

# CHOP's EIE Replacement Project SOA Suite for Healthcare Integration





The Children's Hospital of Philadelphia®

Hope lives here.

# CHOP – Who We Are

- ~ 500 pediatric inpatient beds
- ~ 28,000 inpatient admissions in FY2013
- ~ 1,200,000 Outpatient, ED, Day Surgery visits
- ~ 50 CHOP Care Network Locations
- ~ 155,000 Patient days
- "Best in the United States" – US News and World Report prestigious 2012-2013 honor roll
- Patient Care, Research and Education





- High Volume
  - Complex Functions
  - Data Validation & Enrichment
  - Data-Driven Actions
  - Proactive
- (our goal: Complete Error-Checking)





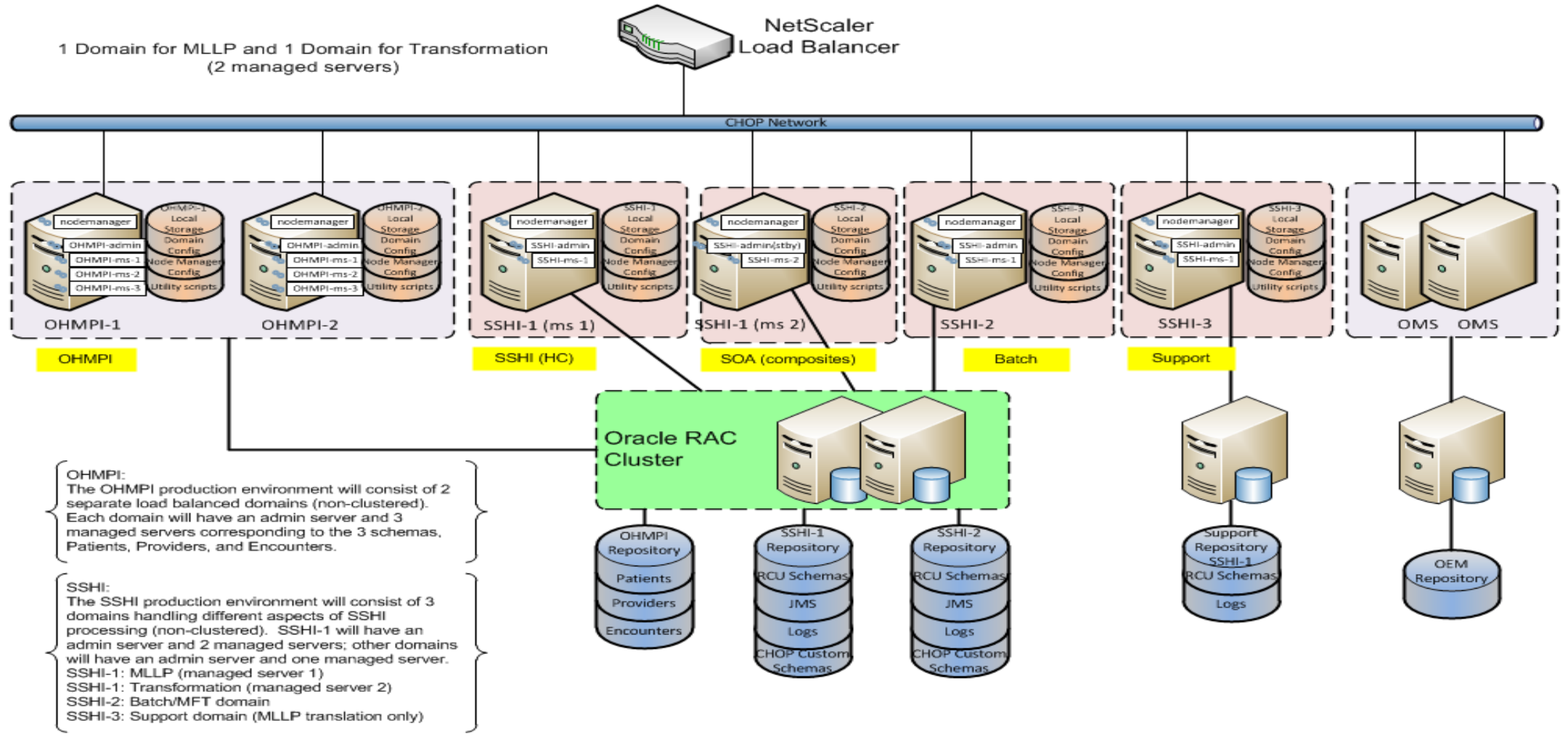
- Determined Strategy

*The strategy was a whole project by itself – outcome: this a key solution in the enterprise, and needs to be future-focused*

- Documented Use Cases
- Submitted RFPs
- Developed Selection Criteria
- Evaluated most of the “healthcare” solutions



# Architecture



WebLogic Process/Instance



- H/W & S/W Design – (driven by Use Cases)
- Development
- Migration Planning – DEV, TEST and PROD can be all different
- Training – Informal (internal brown-bags) and formal
- Prod-Ready
- Full Steam Ahead! (existing SDLC process)



# Timelines of Projects

- Evaluation began Nov 2011
- Selection by Jul 2013
- System Design & Build Sep'13-May'14
- Software Design & Build on-going
- Prod-Ready by Oct 2014
- Migration through Feb 2016



- System Design – lots of options=lots of choices
- Design patterns - lots of options=lots of choices
- Development Foundation -
- Data Management – journaling, logging and archiving for support and auditing
- Getting PROD-Ready



- Be INNOVATIVE (the challenge from our CEO)
- Re-engineer (rather than “upgrade”)
- Use Cases -> Design Patterns
- Architecture flexibility was daunting. Engaging Oracle and our implementation partner was key to overcoming this obstacle.
- Thinking differently than we did before. We are more than traditional healthcare interfaces. We integrate applications
- Bleeding Edge can be bloody
- “a teaching hospital ~ a teaching IS”



- Actively training entire team.
- Intelligently pick some low hanging fruit.
- Implementation of the support domain.
- Migration of Existing Interfaces.



## Moving Beyond Traditional Healthcare...

### An Enterprise Solution to Address Other Needs

- Salesforce, Cardiology, Radiology, ParEx, Research, Lawson, and Web apps



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