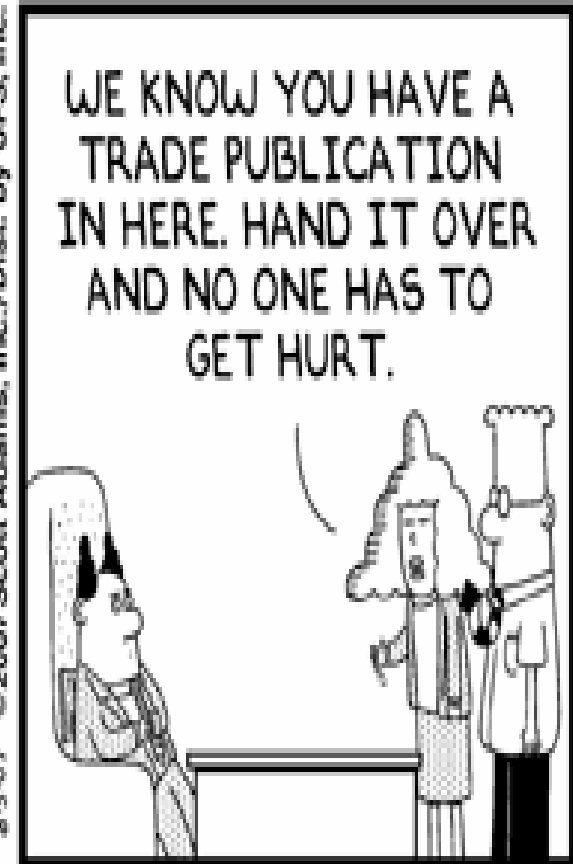
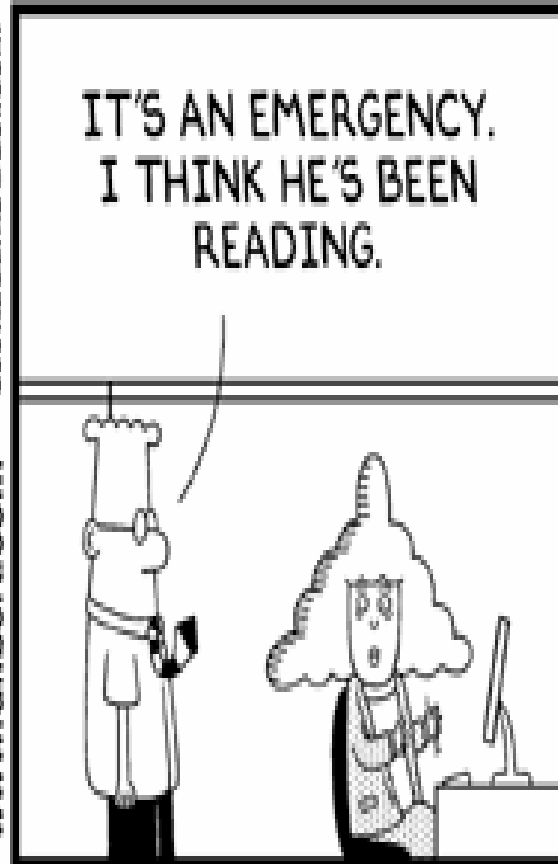
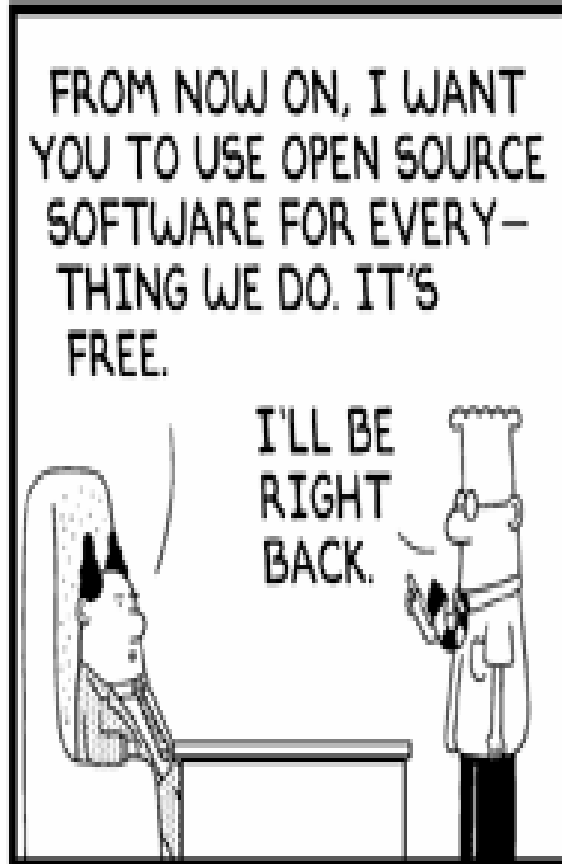


# Modernizing Your Enterprise with Open Source

University of Minnesota  
MIS Research Center  
Minneapolis, MN  
November 9, 2007

Uwe Vieille  
Open Source Strategic Program Office

# An initial thought ... How true it is!



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# Agenda

- Architecture Driven Modernization
- Service Oriented Architecture
- Application Platform Modernization
- Infrastructure Modernization
- Open Source Open Standards
- Applying Open Source to Enterprise Modernization
- Case Studies

# Architecture Driven Modernization

# Introduction to Architecture Driven Enterprise Modernization

- Definitions
- Business Drivers
- Benefits and Risks

# ADM covers a broad scope

**Architecture-Driven Modernization is the process of understanding & evolving existing assets for purposes of:**

- application portfolio management
- code improvement
- programming language transformation
- integration
- platform migration
- data migration
- Consolidation
- Virtualization
- data warehousing
- reuse
- package selection
- service-oriented architecture
- model-driven architectures

**The terms “ADM”, “Enterprise Modernization”, “Enterprise Asset Modernization”, “Legacy Modernization” and “IT Modernization” are used as synonyms**

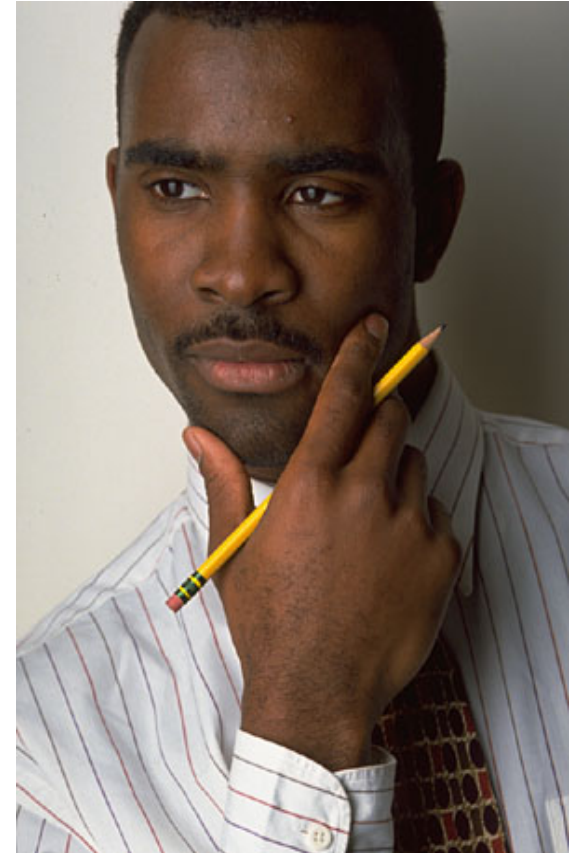
# ADM Definition

**Architecture Driven Modernization (ADM) is a discipline concerned with**

- evolving existing systems to meet future needs
- identification of the gap between existing system and enterprise's current requirements
- preserving investments in existing systems (including proven business logic and expertise of current staff)
- understanding existing software and other IT assets

# Why are businesses considering IT modernization?

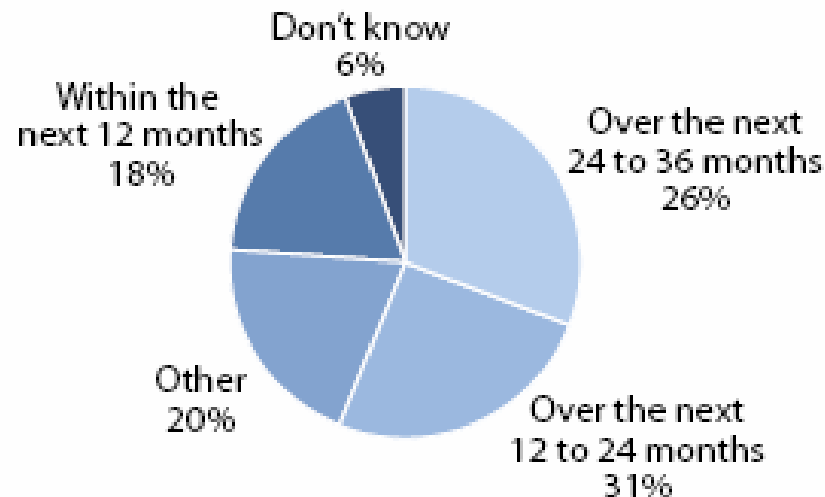
- **Agility**
  - Existing systems do not support new business models
  - Modification of existing systems is too risky and expensive
- **Intellectual Property**
  - People with business and IT process knowledge are retiring
  - Functional knowledge hidden in application code
- **Total Cost of Ownership**
  - Operational cost of legacy systems is too high
  - Complexity drives maintenance and support cost of existing software
  - Skill sets are rare and too expensive



# Driving Modernization Demand...

**Figure 1** IT Spending On Maintenance And Ongoing Operations Is Growing Steadily

**2-3** "Over what time frame do you plan to eliminate or reduce your COBOL applications?"



Base: 347 decision-makers  
(companies with 100 IT employees or less filtered out from the initial base of 911)  
(percentages may not total 100 because of rounding)

Source: Forrester's Business Technographics® November 2005 North American And European Enterprise Software And Services Survey

40221  
40221

Source: Forrester Research, Inc.  
Source: Forrester Research, Inc.

# ADM benefits

- Increases **COMPETITIVE AGILITY** by supporting business vision and simplified business processes
- Ensures **UNINTERRUPTED OPERATIONS** by allowing old and new applications to coexist during an evolutionary transition period
- Provides **COST REDUCTION** for operation, support and maintenance by modernizing, consolidating and simplification of legacy applications and IT infrastructure
- Provides **RISK REDUCTION** associated with legacy systems including loss of legacy skills
- Discovers and preserves **INTELLECTUAL PROPERTY** hidden in existing applications and enables its **REUSE**
- Provides a **COMPREHENSIVE END-TO-END SOLUTION** by leveraging and integrating proven innovative technologies from Unisys and its partners

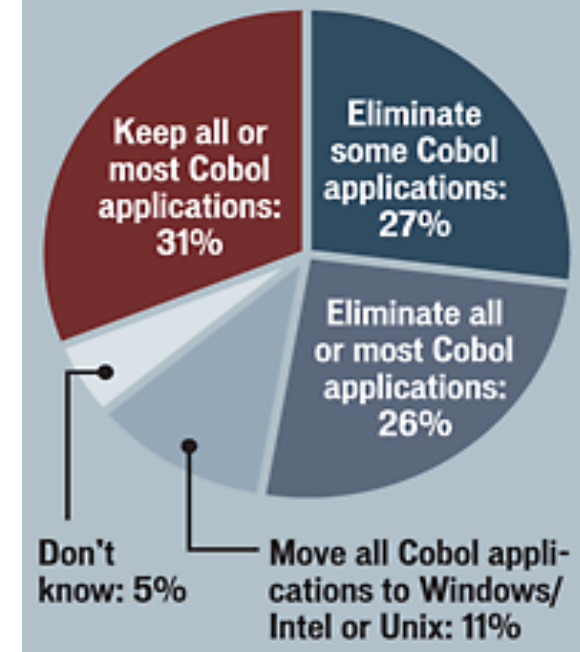
# Benefits, risks, and estimated costs

Approach	Benefits	Risks	Estimated Cost
Traditional (Manual)	<ul style="list-style-type: none"> <li>➤ High quality</li> </ul>	<ul style="list-style-type: none"> <li>➤ Expensive</li> <li>➤ Labor intensive</li> <li>➤ Business model – extra cost</li> <li>➤ Requires heavy support from Subject Matter Expert</li> </ul>	\$10-20 per line of code (Baseline cost)
Translation (“Short Horseshoe”)	<ul style="list-style-type: none"> <li>➤ Quick turnaround</li> <li>➤ Least expensive</li> </ul>	<ul style="list-style-type: none"> <li>➤ May require extensive “legacy remediation” before the process</li> <li>➤ May require extensive “refactoring” after the process</li> <li>➤ May not work well for complex or poor quality application code</li> <li>➤ May have high maintenance cost</li> </ul>	\$3-6 per line of code (Roughly 1/3 <sup>rd</sup> the baseline cost)
Knowledge-Based (“Tall Horseshoe”)	<ul style="list-style-type: none"> <li>➤ High Quality</li> <li>➤ Produces business model (vocabulary, rules, processes)</li> <li>➤ Generates automated test cases</li> <li>➤ Generates usable documentation, including training documents</li> <li>➤ Deploy target applications from business model</li> <li>➤ Low maintenance cost</li> </ul>	<ul style="list-style-type: none"> <li>➤ More expensive than Translation (“Short Horseshoe”) method</li> <li>➤ Requires validation support from Subject Matter Experts</li> </ul>	\$8-12 per line of code (Roughly 2/3 <sup>rd</sup> the baseline cost)

# What the Analysts Say...

- *“By 2010 80% of smaller mainframe environments will migrate off the platform, while large environments will SOA-enable and remain on this platform”*  
– Gartner
- *“Migrate away from Legacy Databases”*  
*“...IDMS and Datacom in next 5 years”*  
*“...IMS and ADABAS in next 10 years”*  
– Gartner
- *“Open Source has emerged as one of the most important IT trends in this young century”*  
- Forrester

## What are you doing with your Cobol applications?

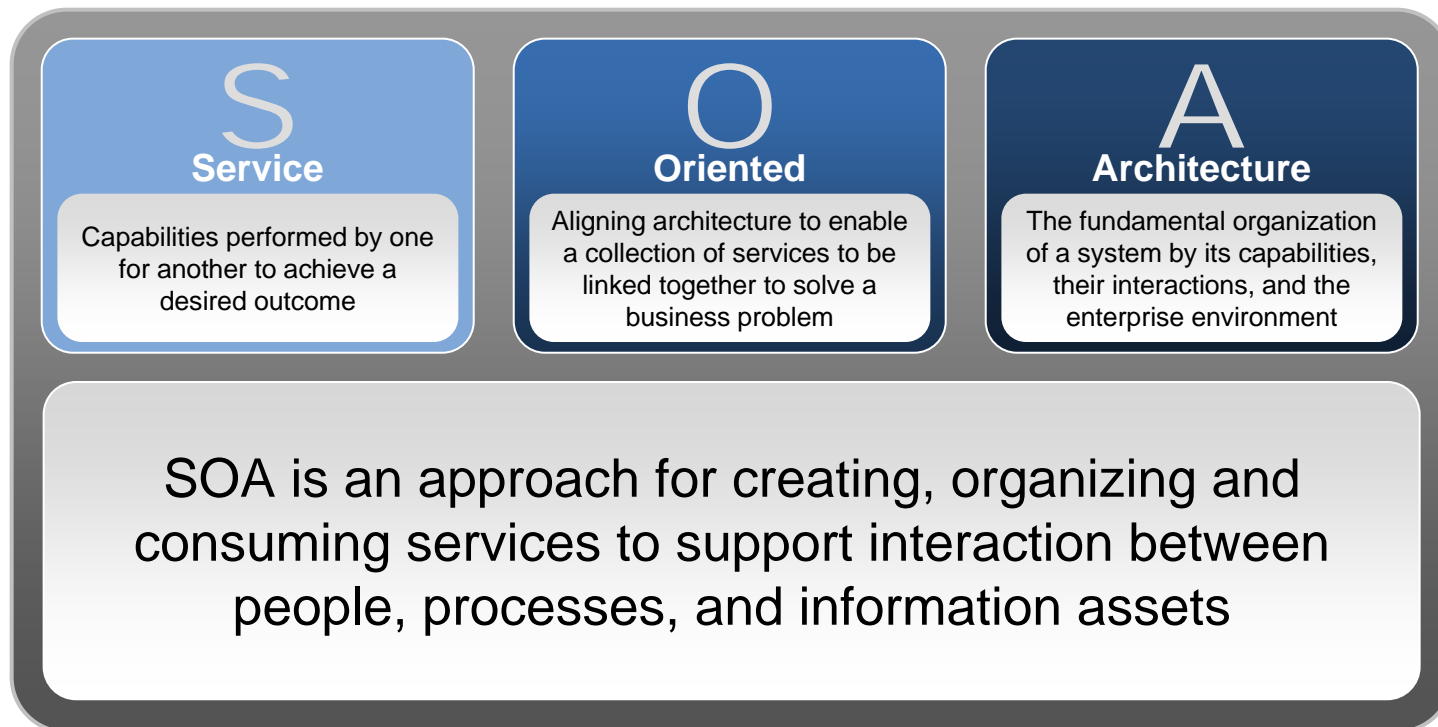


ComputerWorld  
April 2006

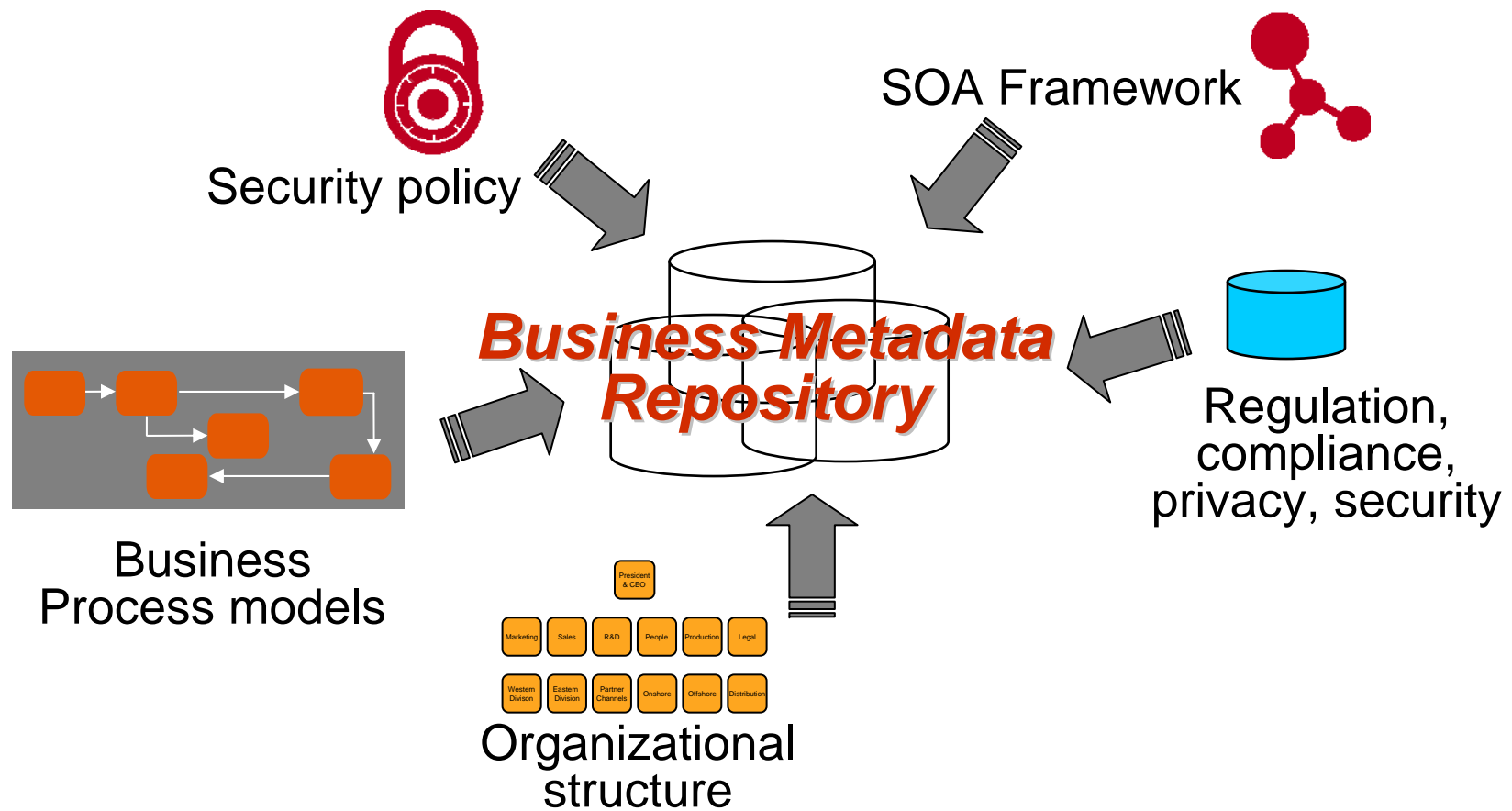
# Service Oriented Architecture

# SOA MAY Be Defined As:

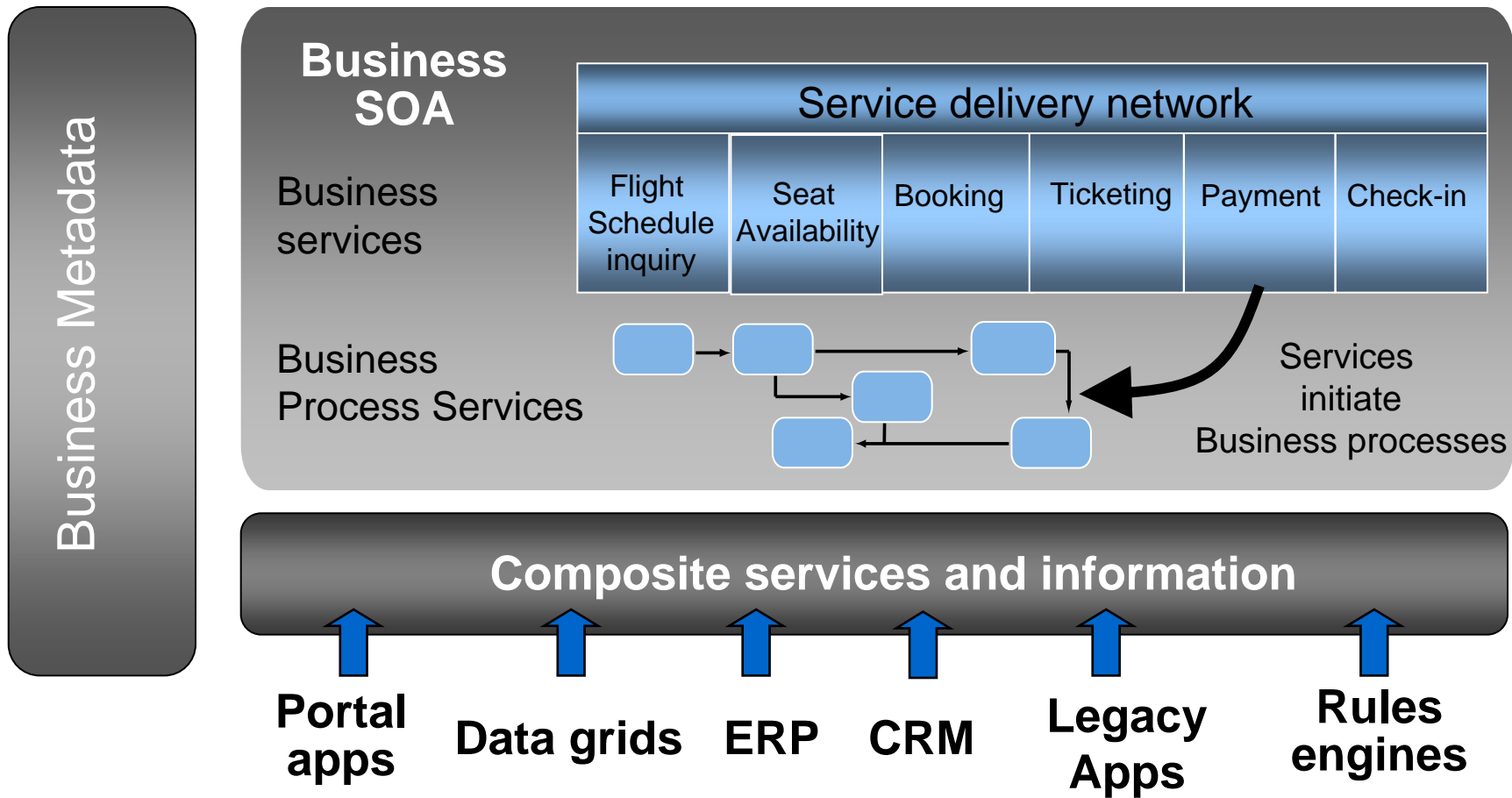
*“The policies, practices, frameworks that enable business functionality to be provided and consumed as sets of services published at a granularity relevant to the service consumer. Services can be invoked, published and discovered, and are abstracted away from the implementation using a single, standards-based form of interface.”*



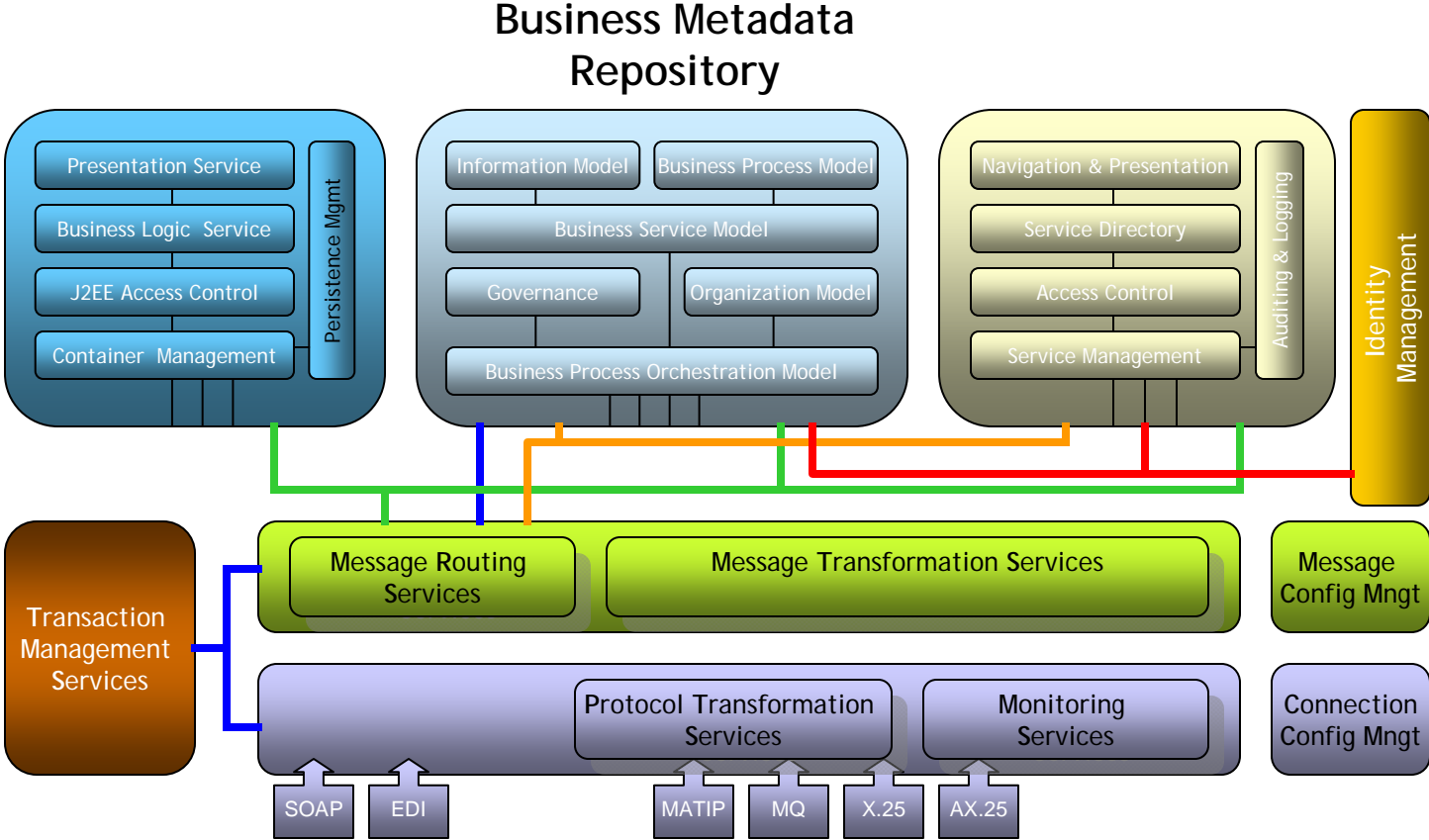
# Business Architecture Focus: Metadata



# Business services drive the agile Enterprise



# The SOA IT Infrastructure Model



# The Mental Model Shift

Overall	<b>From:</b> First design your business, then design systems to support it	<b>To:</b> Concurrently design your business and the systems that embody it
Business applications	<b>From:</b> Application code to serve specific business functions	<b>To:</b> Create re-usable business service capabilities orchestrated for agile business functionality
User interfaces	<b>From:</b> Creating application specific user interfaces	<b>To:</b> Optimized endpoints to connect business processes to users & devices
Communications & collaboration	<b>From:</b> Single, fits all network on which to deliver a message	<b>To:</b> Multi function collaborative, cross-channel network
IT infrastructure	<b>From:</b> Hosting applications on specific servers	<b>To:</b> Allocate real resources in a virtual environment to orchestrated business processes

# What do you need to do to implement the model?

STOP	START
<b>STOP</b> writing isolated IT requirements documents.	<b>START</b> joint business-IT solution development of business problems.
<b>STOP</b> building single use applications for specific business functions.	<b>START</b> building process-ready business service capabilities.
<b>STOP</b> designing user interface screens.	<b>START</b> creating re-usable business process service endpoints.
<b>STOP</b> using architecture merely for cost-saving standardization.	<b>START</b> using architecture as the basis for strategic business agility.
<b>STOP</b> treating business and IT as two different worlds.	<b>START</b> cross-boundary process governance, policies and rules.

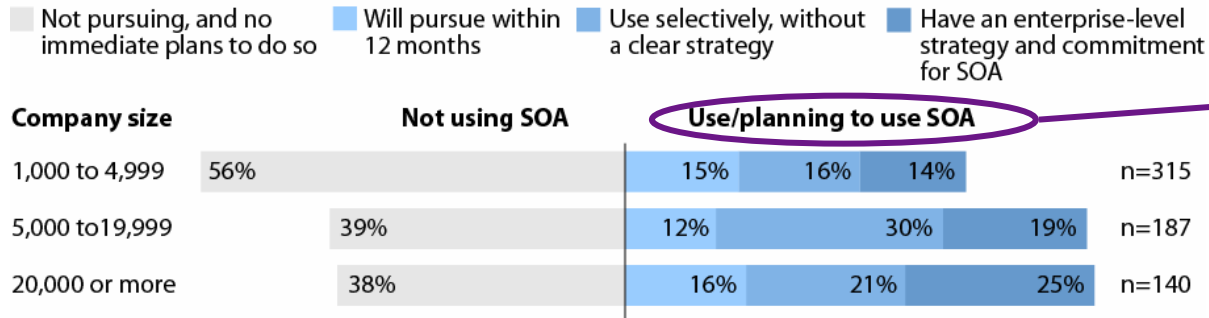
# So, SOA is the answer, right?

- Adoption of SOA is strong. But even more notably, SOA users are quite happy with it and expect it to make a big impact on their enterprises.
- Among the largest enterprises — those with 40,000 or more employees - 67% will be using SOA by the end of 2006. Among the smallest organizations - SMBs with fewer than 1,000 employees — 44% report that implementing an SOA is a high or critical priority.
- Nearly 70% of enterprise SOA users say they will increase their use of SOA,
- Nearly half of all large enterprises using SOA use it for strategic business transformation. What does all this add up to? SOA is a critical foundation for IT's future ability to meet the strategic needs of the business, and firms are asking how to invest in it.

Forrester, May 19, 2006, SOA Investment Strategies  
Case Studies On How Enterprises Are Paying For SOA

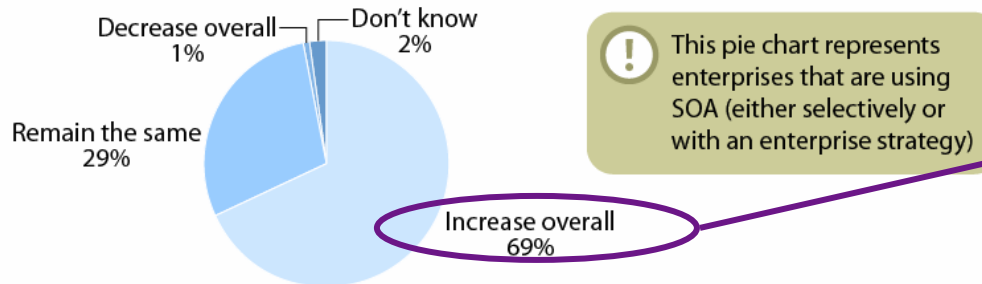
# Level of SOA Penetration

“Which of the following best describes your firm’s approach to or status of SOA?”



*The majority are using SOA*

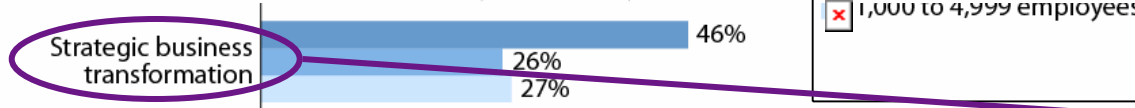
“How do you expect your SOA usage to change in the next 12-24 months?”



! This pie chart represents enterprises that are using SOA (either selectively or with an enterprise strategy)

*They are quite happy and doing more SOA*

“How are you currently using SOA?”



*They look for it to have a big impact*

\*Base: 65 North American and European software and services decision-makers  
 †Base: 93 North American and European software and services decision-makers  
 ‡Base: 94 North American and European software and services decision-makers (multiple responses accepted)

Source: Forrester’s Business Technographics® November 2005 North American And European Enterprise Software And Services Survey

# What is so different about this?

Think you have seen this before? Didn't CORBA, DCOM, or Java RPC promise this also?

There are some important updates to the story this time: Changes in the IT industry and business domains show that SOA has made a paradigm shift that cannot afford to be missed:

- The groundwork has been laid with nearly universal adoption of protocols such as TCP and HTTP
- A stable infrastructure agnostic information exchange foundation based on XML
- All the big infrastructure players are deeply involved creating a robust open standards based interoperability platform
- An open standards based development environment that leverages re-use through orchestration

# Missteps That Can Result in SOA Strategy Failure

## Stage 1 — Initial Excitement

- **Recommendation:** Set reasonable expectations about Web services development that recognize Web services as mechanisms that operate within an SOA, not SOA's in and of themselves.

## Stage 2 — Hype “Buy-In”

- **Recommendations:** Focus on debunking hype rather than believing it. Evaluate products based on requirements as well as features.

## Stage 3 — Underestimating Complexity

- **Recommendation:** Consider Web services frameworks as an initial investment need for a Web services based SOA.

## Stage 4 — Overestimating Maturity

- **Recommendations:** Conceptually separate the use of opportunistic Web services from the implementation of an SOA. Use opportunistic Web services for tactical success while designing a complete SOA strategy.

# Missteps That Can Result in SOA Strategy Failure

## Stage 5 — Disenchantment and Abandonment

- **Recommendations:** Spend time evaluating SOA platforms and frameworks at the outset. Generate a corporate SOA strategy before buying into a vendor's SOA strategy.

## Stage 6 — The “Tool-of-the-Month Club”

- **Recommendation:** Focus on standards and strategic technologies rather than tactical features when crafting an SOA vision. This will help in following the evolution of the strategy toward long term usability.

### Bottom Line

- Through 2008, 70 percent of IT organizations will fail to successfully select and implement an SOA strategy on the first try (0.7 probability).
- These organizations must be prepared to use software services tactically while planning for strategic evolution of their architectures.

Analytical source: Daryl C. Plummer,  
Gartner Research

# Application Platform Modernization

# Two Sides of Legacy Systems

## It's an asset!

- Functional
- Customized
- Well-tuned
- Supports mission critical operations
- Robust
- Secure

## It's a liability!

- Uses legacy technology
- Requires hard-to-find skills
- Lacks documentation
- Is difficult to maintain
- Resists change, integration, and replacement
- Inhibits organizational agility
- Is Unsupported

ADM preserves the asset value while eliminating the liabilities.

# ...but what to do...

## BEST PRACTICES

### Where to begin...

**No company should expect to implement a single modernization strategy across the entire portfolio.** For many applications, the modernization approach is to eliminate them. For others, replacement with packaged solutions may be more appropriate. In some cases, SOA can provide an approach to leveraging the inherent business value in these applications, while opening up access to the business functionalities in these systems to new constituents.<sup>2</sup>

### Think strategic, act tactical

Organizations can get experience exposing existing applications as services for a particular project. However, **focusing solely on the success of the immediate project does not position the organization for SOA as a long-term modernization strategy<sup>1</sup>.**

- **Define the role of the current IT infrastructure in future SOA architecture**
- **Build a reuse culture and technology infrastructure**
- **Use code understanding / inventory / restructuring tools to improve service granularity<sup>3</sup>**

<sup>1</sup>Gartner, Dale Vecchio, *Best Practices for Mainframe SOA*, January 23, 2006

<sup>2</sup>Gartner, Dale Vecchio, *Leverage Your Mainframe Applications With SOA*, October 25, 2005

<sup>3</sup>Gartner, Dale Vecchio, *Best Practices for Mainframe SOA*, January 23, 2006

# ...and where to start...

1

...begins with mining of knowledge from existing infrastructure...

Understanding legacy in all its complexity is a key to secure legacy transformation, Web enablement and SOA re-architecture. Enterprises should implement legacy analysis. We recommend automating that process<sup>1</sup>

2

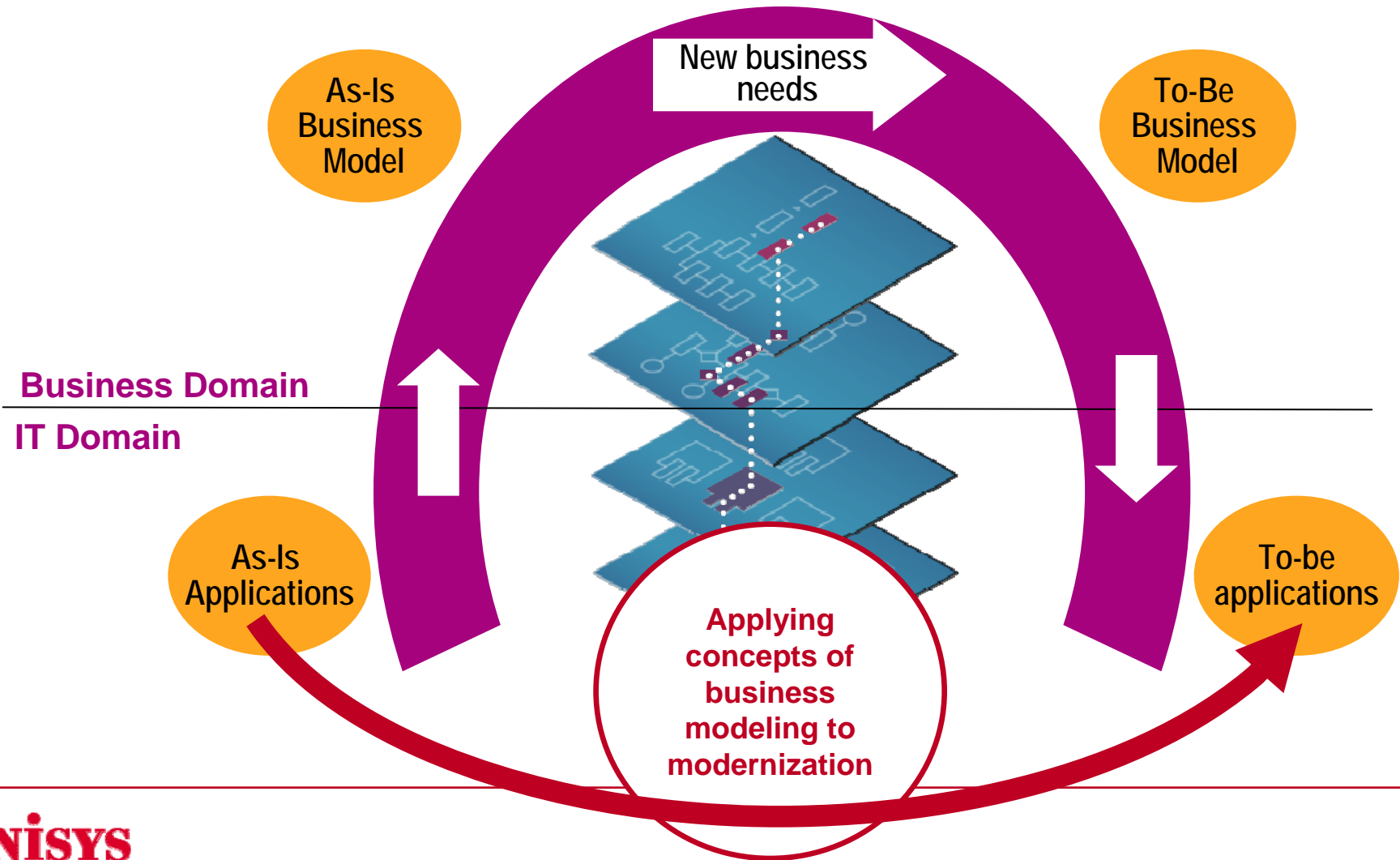
...and heads towards Service Oriented Architecture (SOA)

SOA will be used in part in more than 50% of new, mission-critical applications, business processes and infrastructures designed in 2007, and in more than 80% by 2010<sup>2</sup>

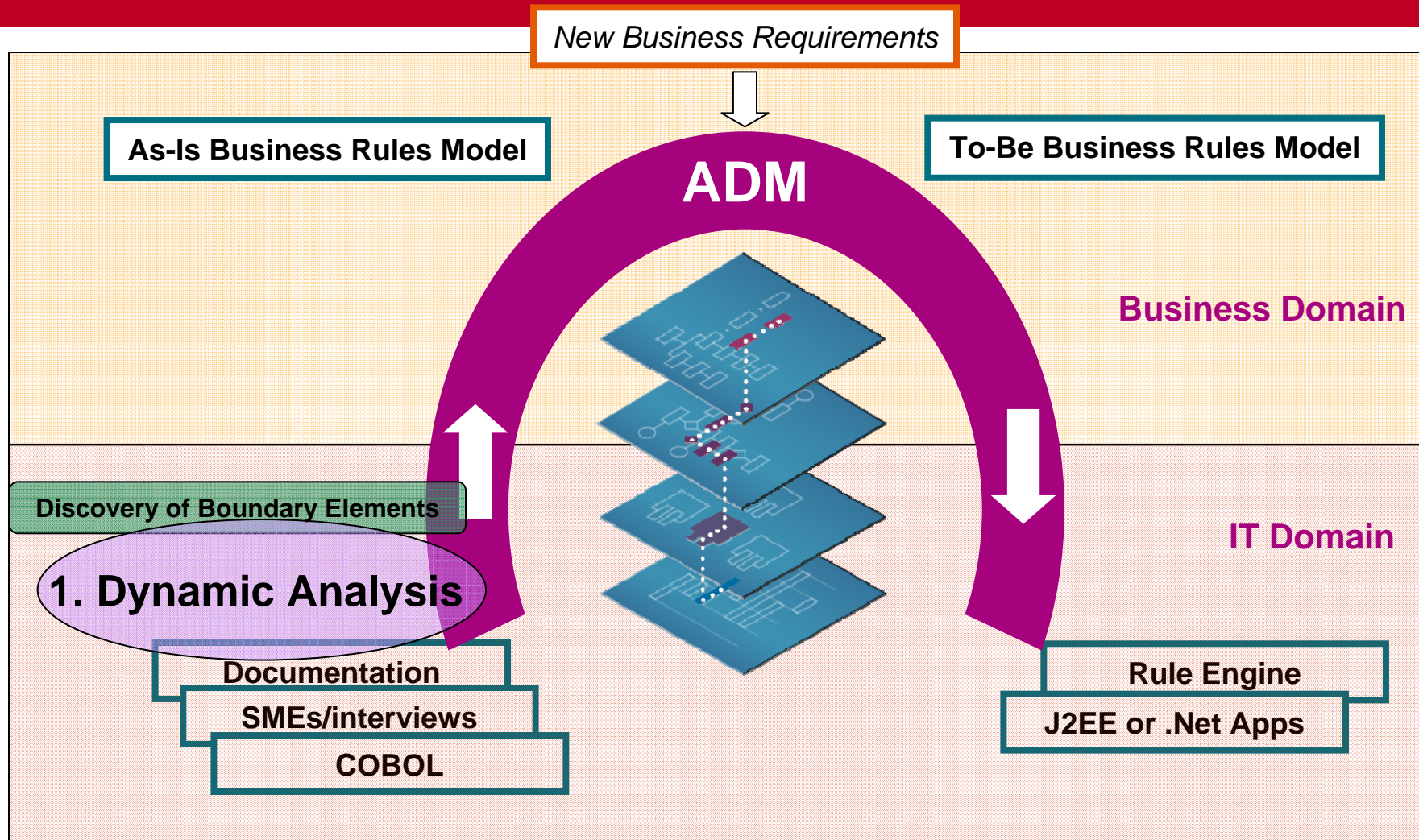
More than 80% of current (2006) production-deployed applications will be partly or fully re-engineered by 2011 to participate in the then-prevailing SOA-style business-driven application composition<sup>3</sup>

# Blueprinting Enterprise Modernization

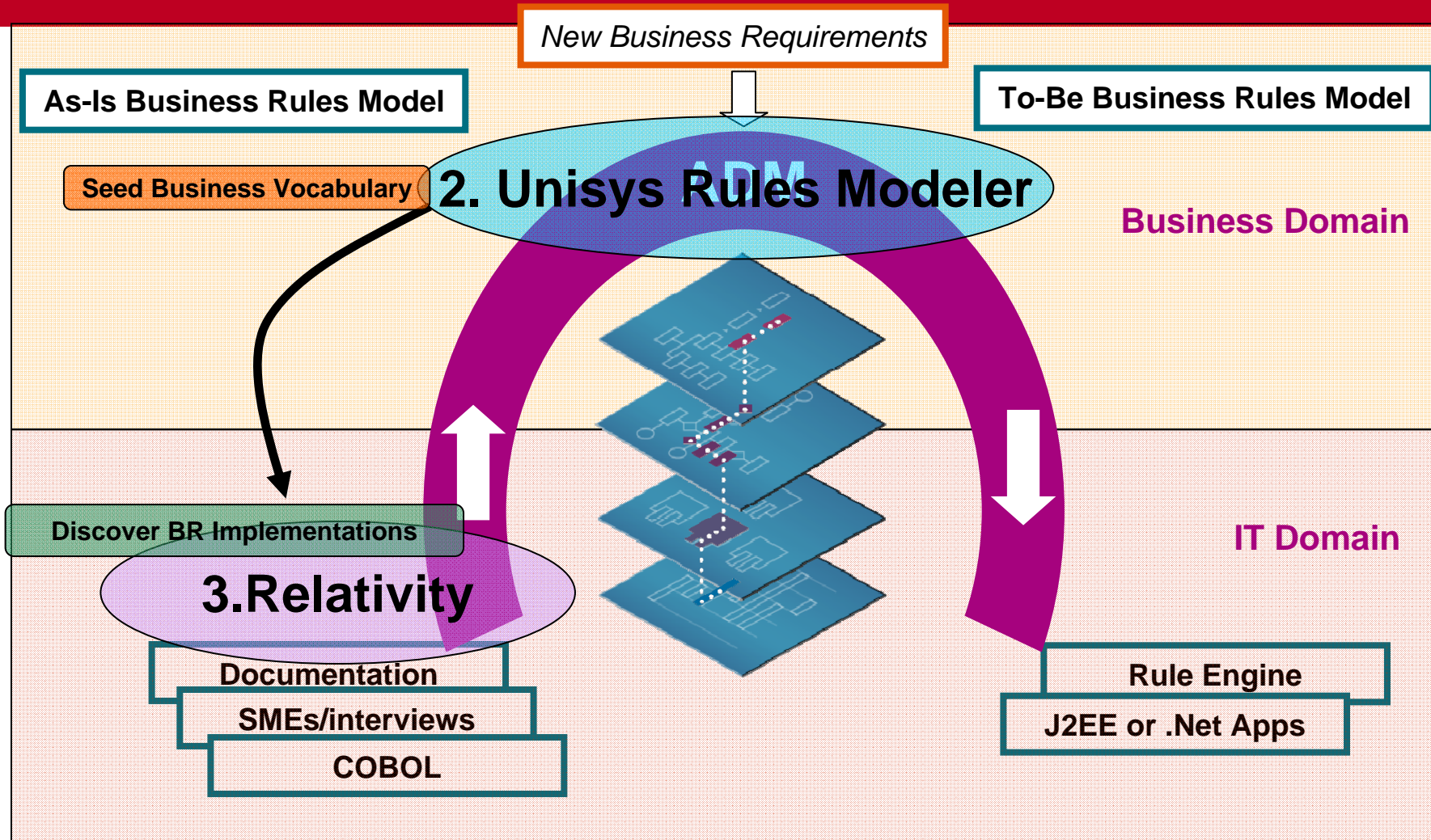
Applies Concepts of Traceability and Visibility to Challenge of Modernization



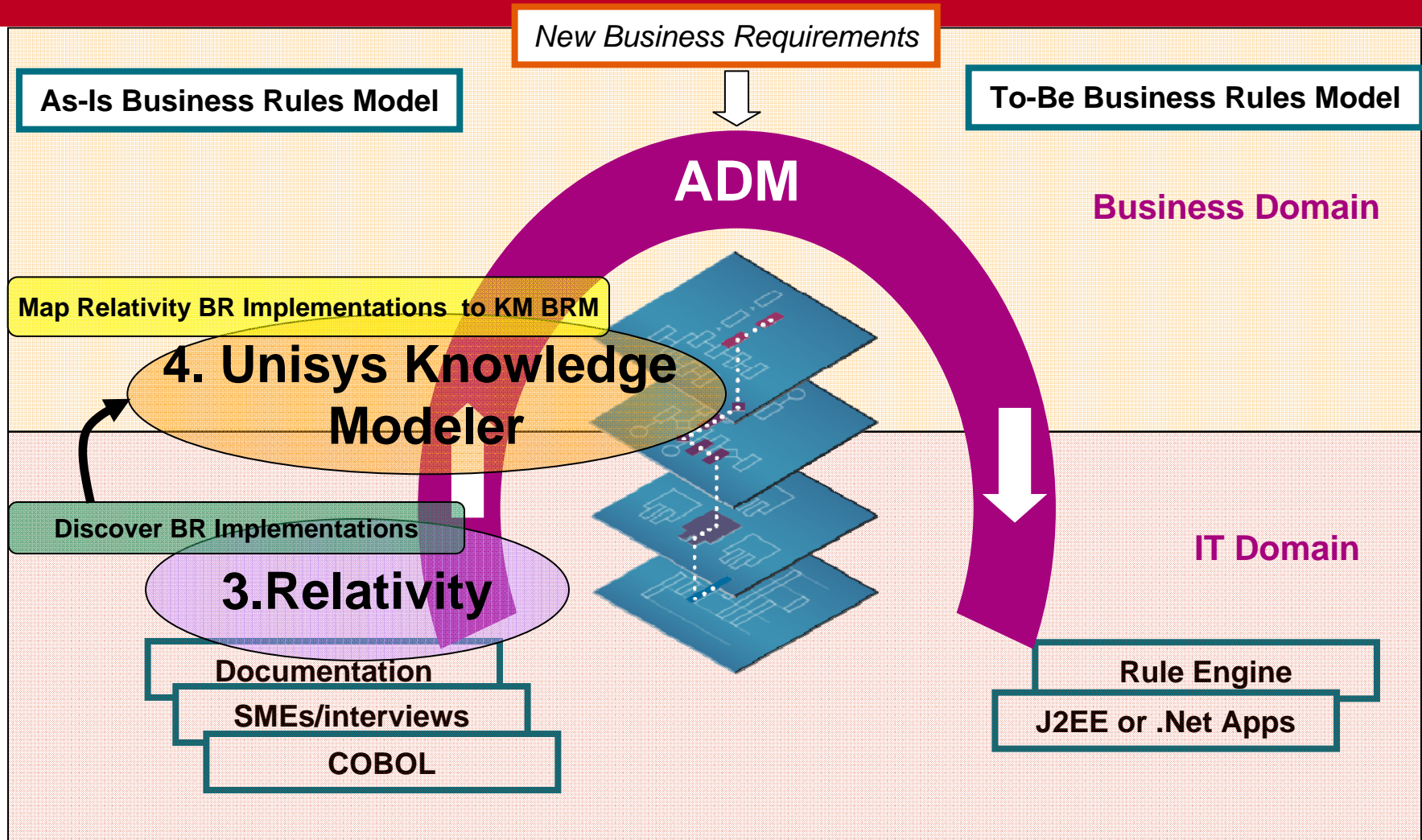
# 1. Discovery Reports Against Code



## 2. Discover BR Implementations



# 3. Map BR Implementations to BR Model



# IT Infrastructure Modernization

# Benefits, risks, and estimated costs

Approach	Benefits	Risks	Estimated Cost
Traditional (Add new Technology platform)	<ul style="list-style-type: none"> <li>➤ No interruption of current environment</li> </ul>	<ul style="list-style-type: none"> <li>➤ Expensive</li> <li>➤ Labor intensive</li> <li>➤ Business model – extra cost</li> <li>➤ Requires additional maintenance and support resources</li> </ul>	\$\$\$\$\$
Consolidate and Migrate ( Integrate and Replace Legacy Systems)	<ul style="list-style-type: none"> <li>➤ Relatively Quick ROI</li> <li>➤ Less complex environment</li> </ul>	<ul style="list-style-type: none"> <li>➤ Requires extensive planning</li> <li>➤ May be disruptive</li> <li>➤ May not work well for complex or diverse SLA application / DB systems</li> </ul>	\$\$\$
Virtualize and Replace Legacy Infrastructure	<ul style="list-style-type: none"> <li>➤ Lowest maintenance and support cost</li> <li>➤ Highest Level of IT and Business Agility</li> <li>➤ Resources can be re-positioned to create business value functionality</li> </ul>	<ul style="list-style-type: none"> <li>➤ More expensive than Consolidation</li> <li>➤ Will be disruptive</li> <li>➤ Requires different Skill Sets</li> </ul>	\$\$\$\$\$

# ...and where to start...

1

...begins with mining of knowledge from existing infrastructure...

Understanding legacy in all its complexity is a key to secure legacy transformation, Web enablement and SOA re-architecture. Enterprises should implement legacy analysis. We recommend automating that process<sup>1</sup>

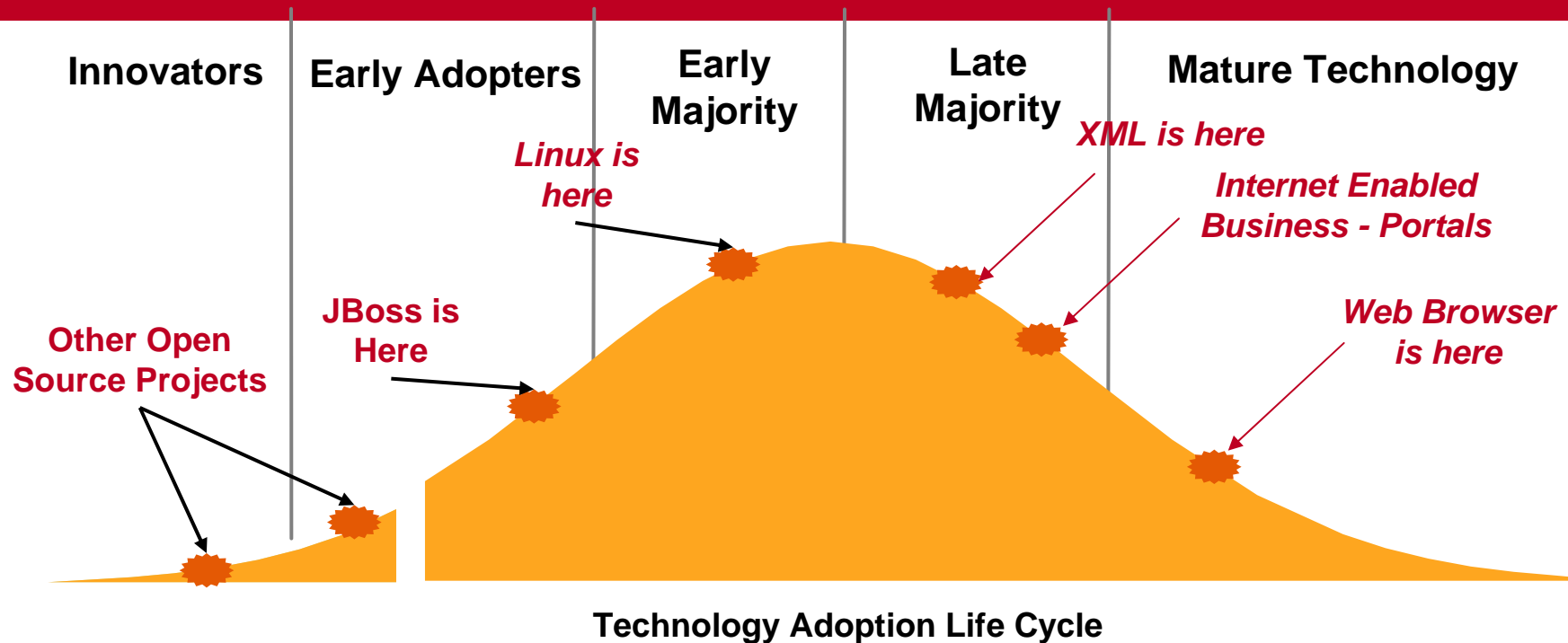
2

...and heads towards Service Oriented Architecture (SOA) And Virtualization

SOA and Virtualization will be used in part in more than 50% of new, mission-critical applications, business processes and infrastructures designed in 2007, and in more than 80% by 2010<sup>2</sup>

# Open Source and Open Standards

# Open Source and Open Standards Adoption Lifecycle: Where is the Market Today?



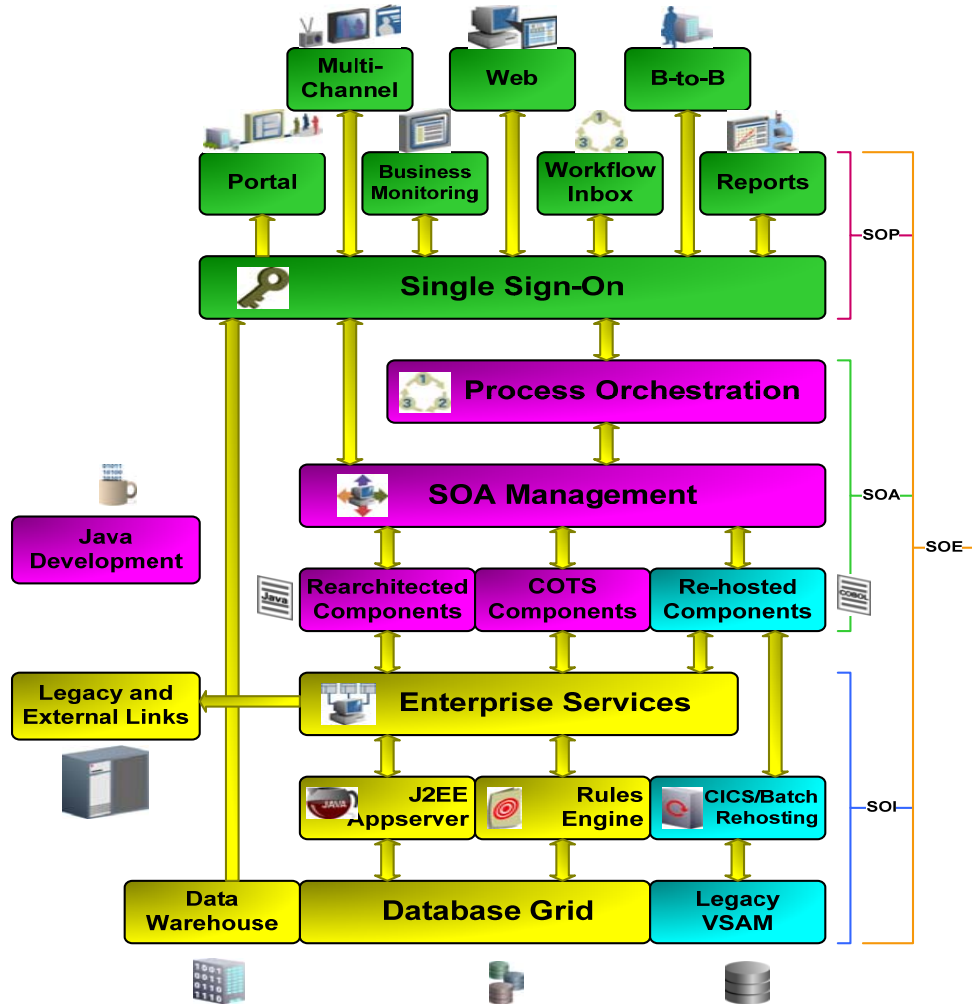
Linux and JBoss have “Crossed the Chasm”

Linux Economics and Dependability are driving Data Center Consolidation

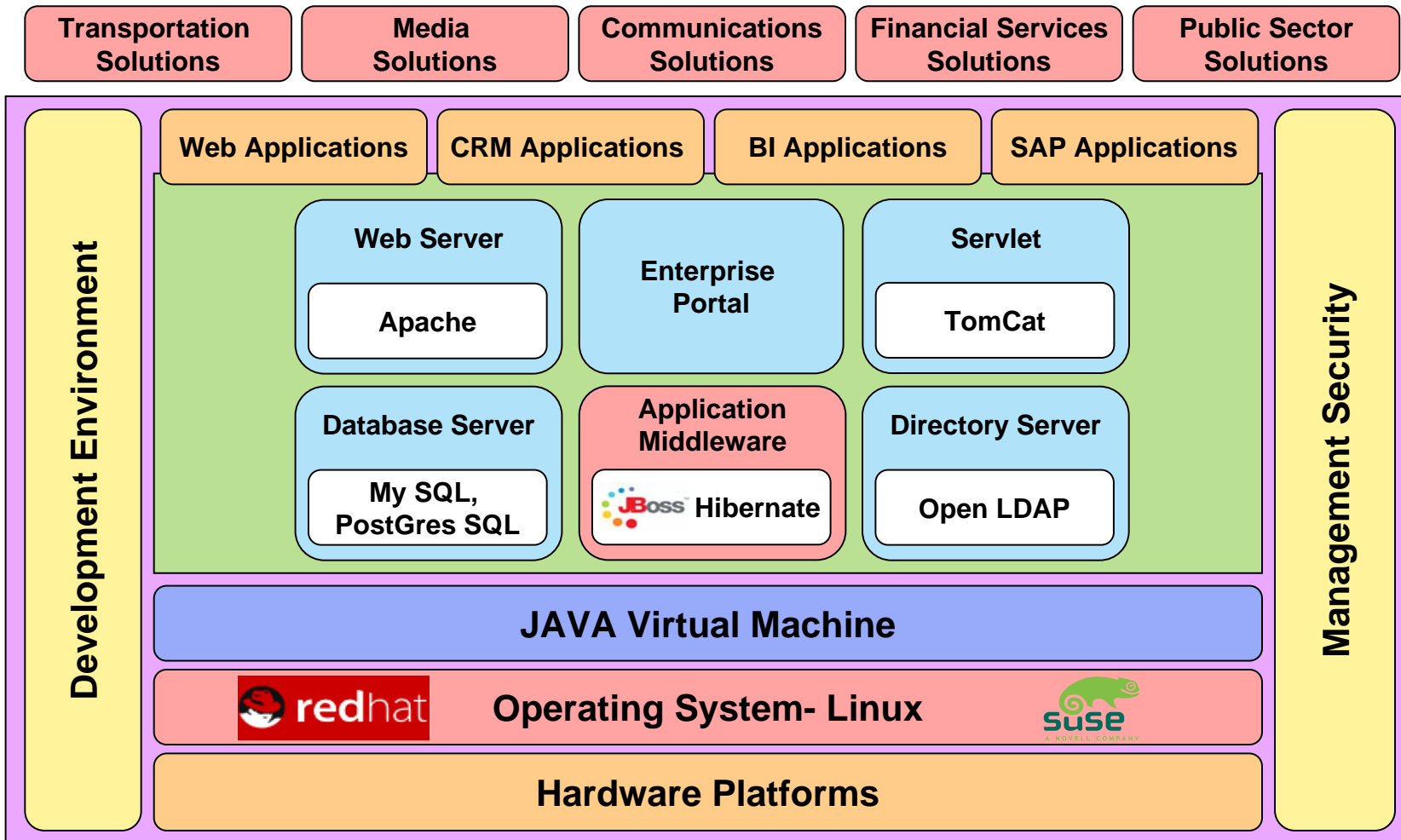
Other OSS is in the Innovator Phase of Market Adoption – Rapidly Gaining Acceptance

Web Services and SOA are Driving an Appl-structure Transformation

# Open Standards / Open Source Model

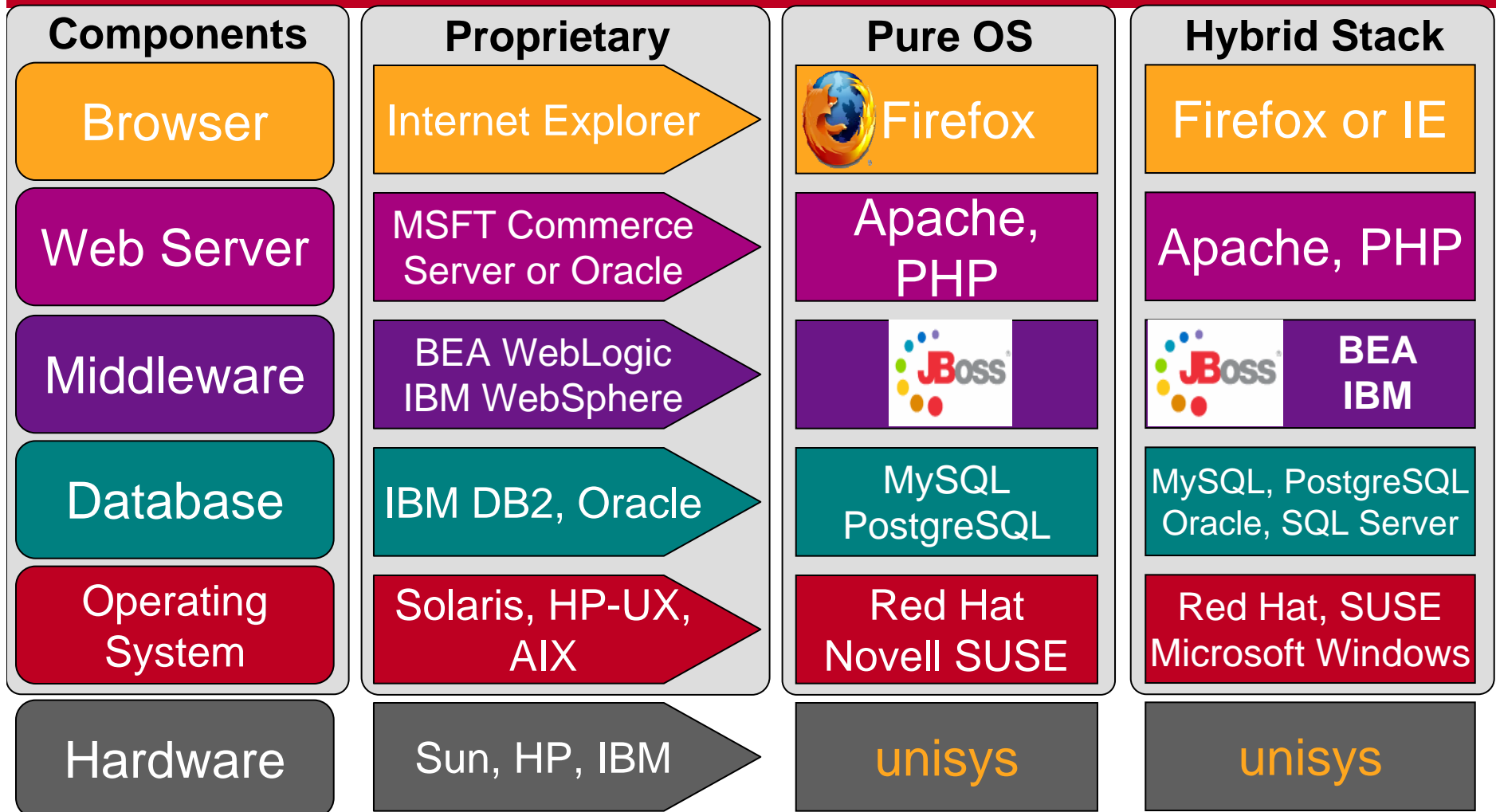


# Open Source Eco-system Core Components

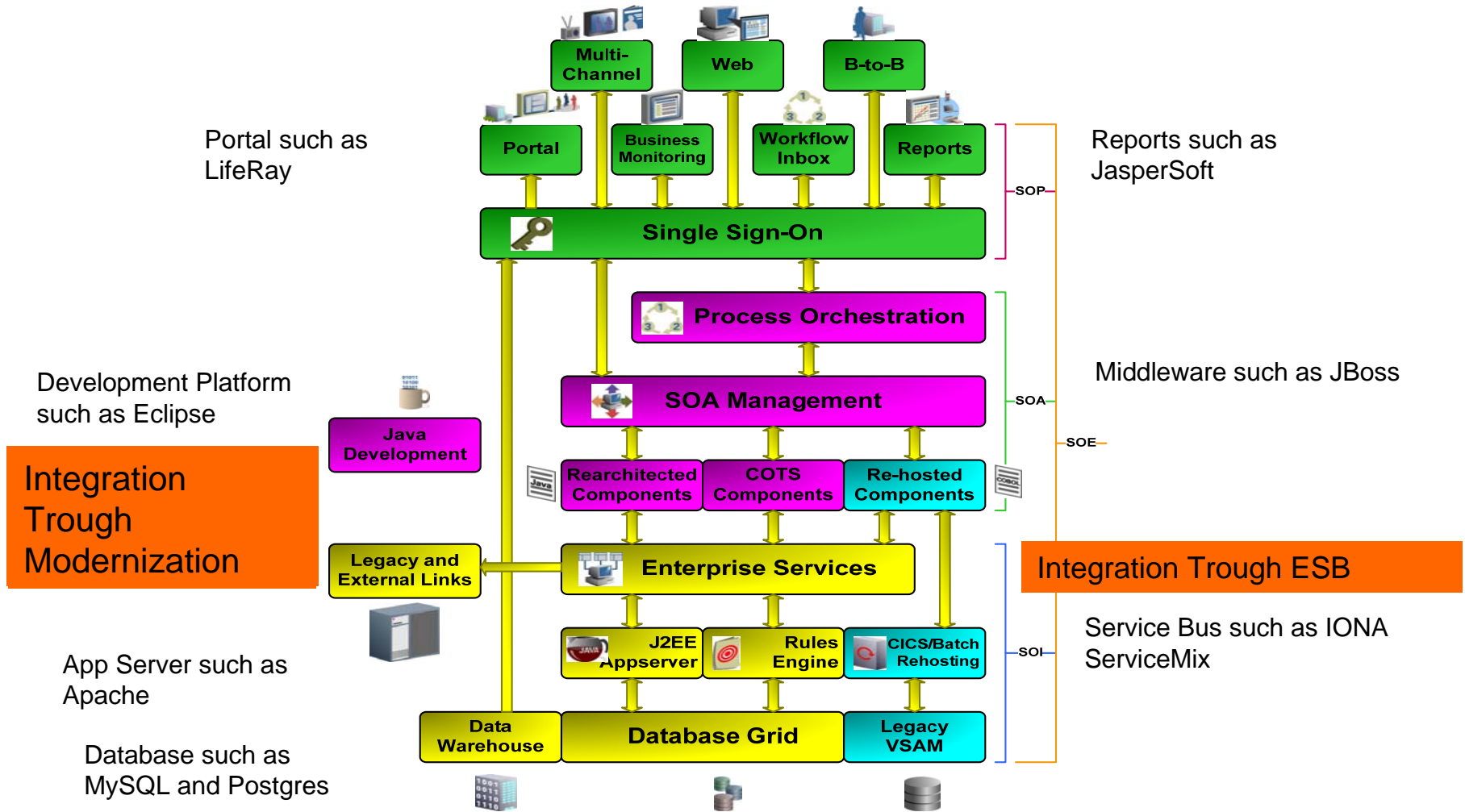


# Applying Open Source to Enterprise Modernization

# The Open Source Stack Components



# Legacy System Integration



# The ROI of Open Source

- Yankee Group, JupiterResearch, Forrester Research and others, have focused on the ROI of upgrading a Windows installation versus switching to Linux and have concluded that it is less expensive to stick with Windows. But the reports miss a critical point: Switching from Windows to Linux is the worst-case ROI scenario.

A more important question is, can open source generate real ROI elsewhere?

- ABB is an \$18 billion Swiss industrial company. It needed to integrate new features into its software infrastructure. By using a popular open-source tool called JBoss, ABB estimates it can save \$1.1 million in just its first five factories, with further savings to come as it rolls out to more of PTPR's 52 locations.
- Interestingly, the Integration Framework runs on Windows and uses SQL Server as its data store, belying the perception that moving to open source is a massive rip-and-replace operation.

# Enterprise Modernization using Open Source

## Case Studies

# Case Study: Leading Airline Alliance

## The Business Challenge



**Upgrade a seat on any member airline on any available flight from anywhere in the world using the Internet, Mobile Phone, fixed line phone or the airport check-in counter**



# Case Study: Leading Airline Alliance

- Customer experience is perceived single airline – upgrade, payment and check-in
- Real life environment is
  - operating airline has physical seat inventory,
  - marketing codeshare airline has reservation and revenue,
  - loyalty program airline has FF miles as form of payment for upgrade, and
  - third party airport operator manages airport check-in

# The IT Challenge

- Each airline has unique IT Infrastructure
  - IBM and Unisys legacy infrastructures
  - Web interfaces
  - Proprietary links between airlines and service providers
  - Proprietary processes
  - Proprietary and legacy external interfaces
- Unique airline environment needs to be preserved
  - Easy entry, easy exit
  - All process and transaction normalization will occur outside airline domains



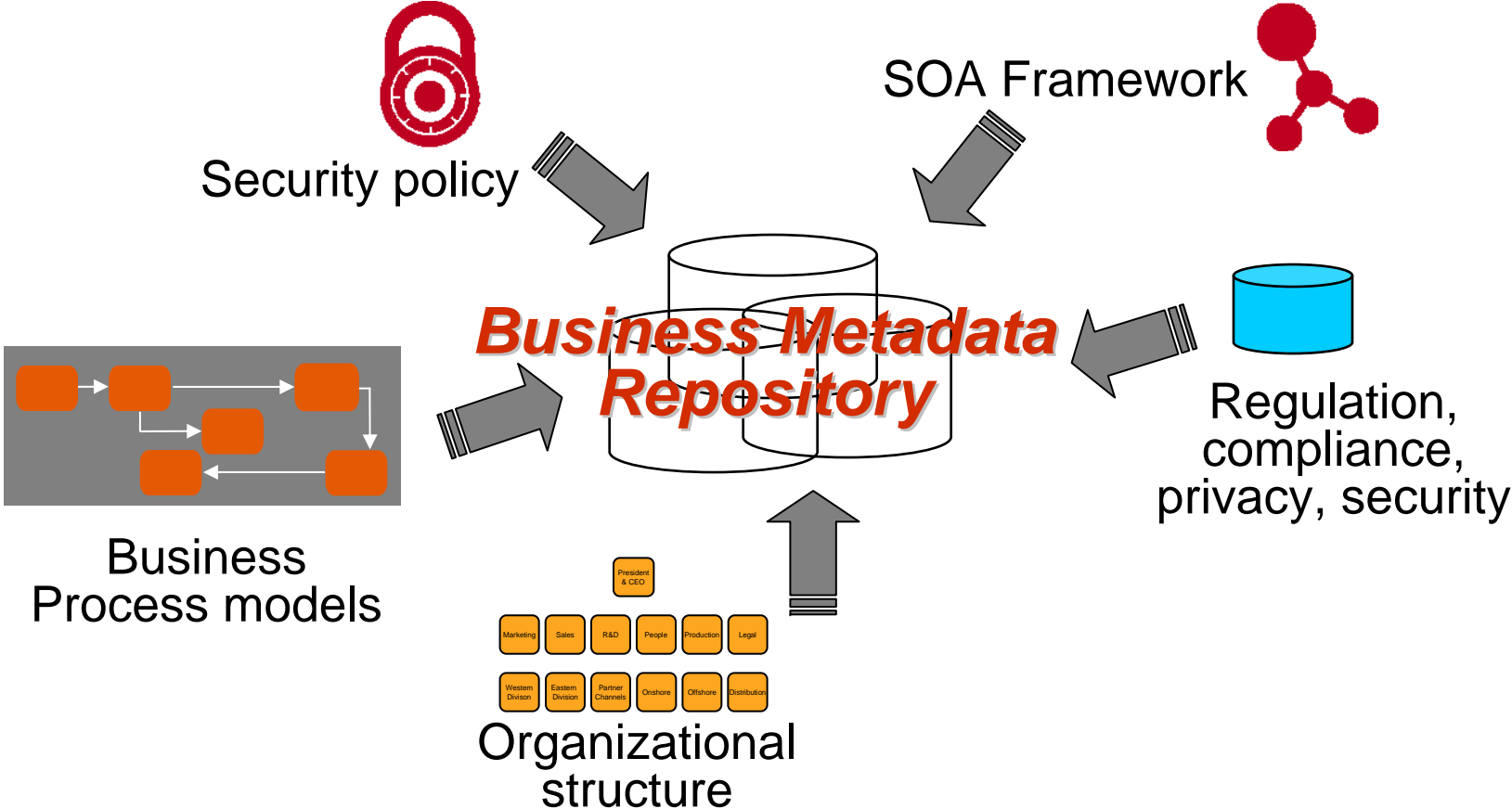
# Case Study: Leading Airline Alliance

## Solution

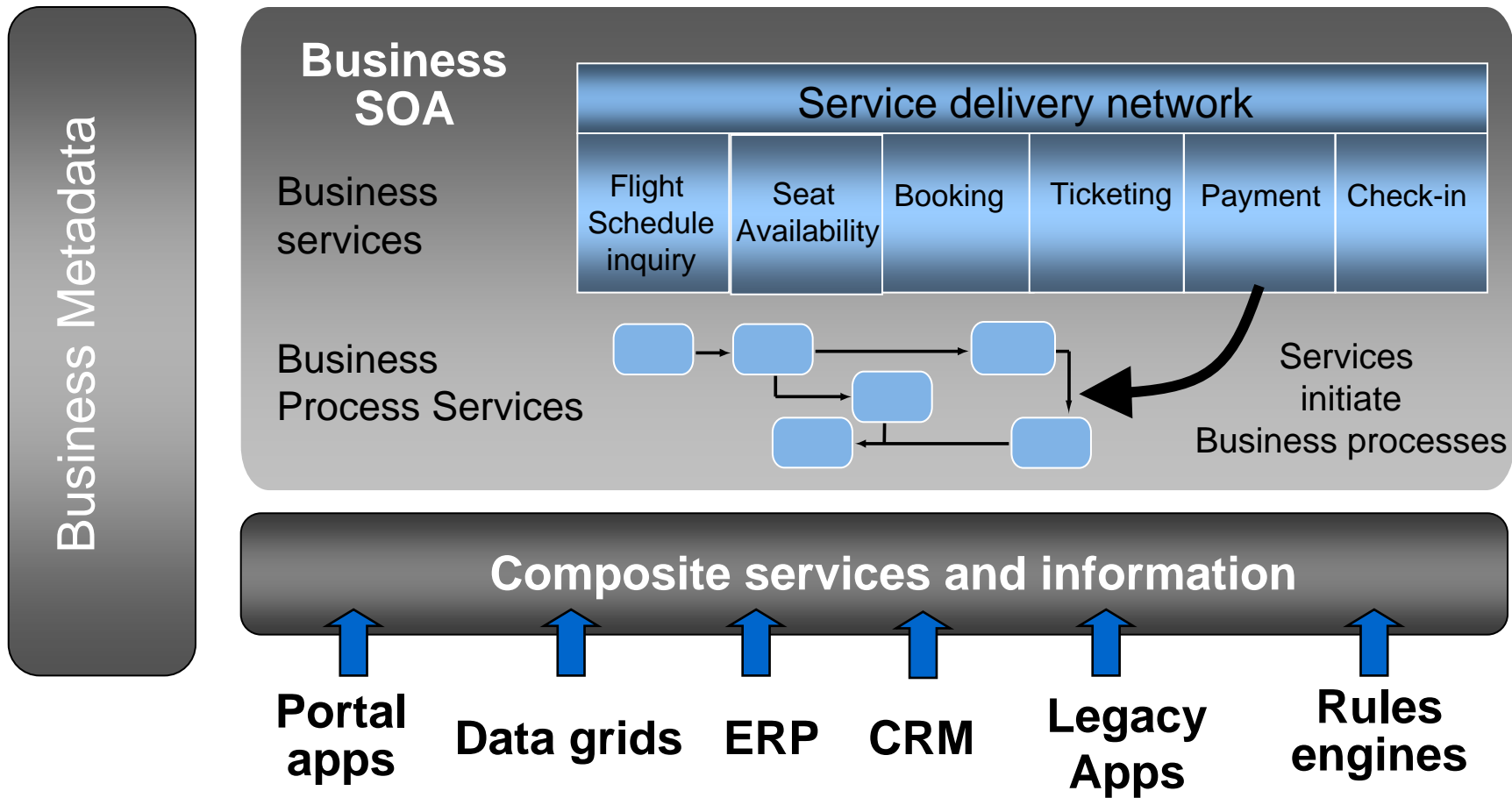
- Created common business metadata repository
- Created common business process services – inventory availability, eligibility, accounts payable, accounts receivable, etc.
- Created common application services from existing legacy applications and new web server applications
- Created Web Services infrastructure
- Created common messaging Interface
- Implemented Open Standards and Open Source

***Leading Market Research Company estimated US\$60 M+ in additional Revenue in Year 1 of full Deployment***

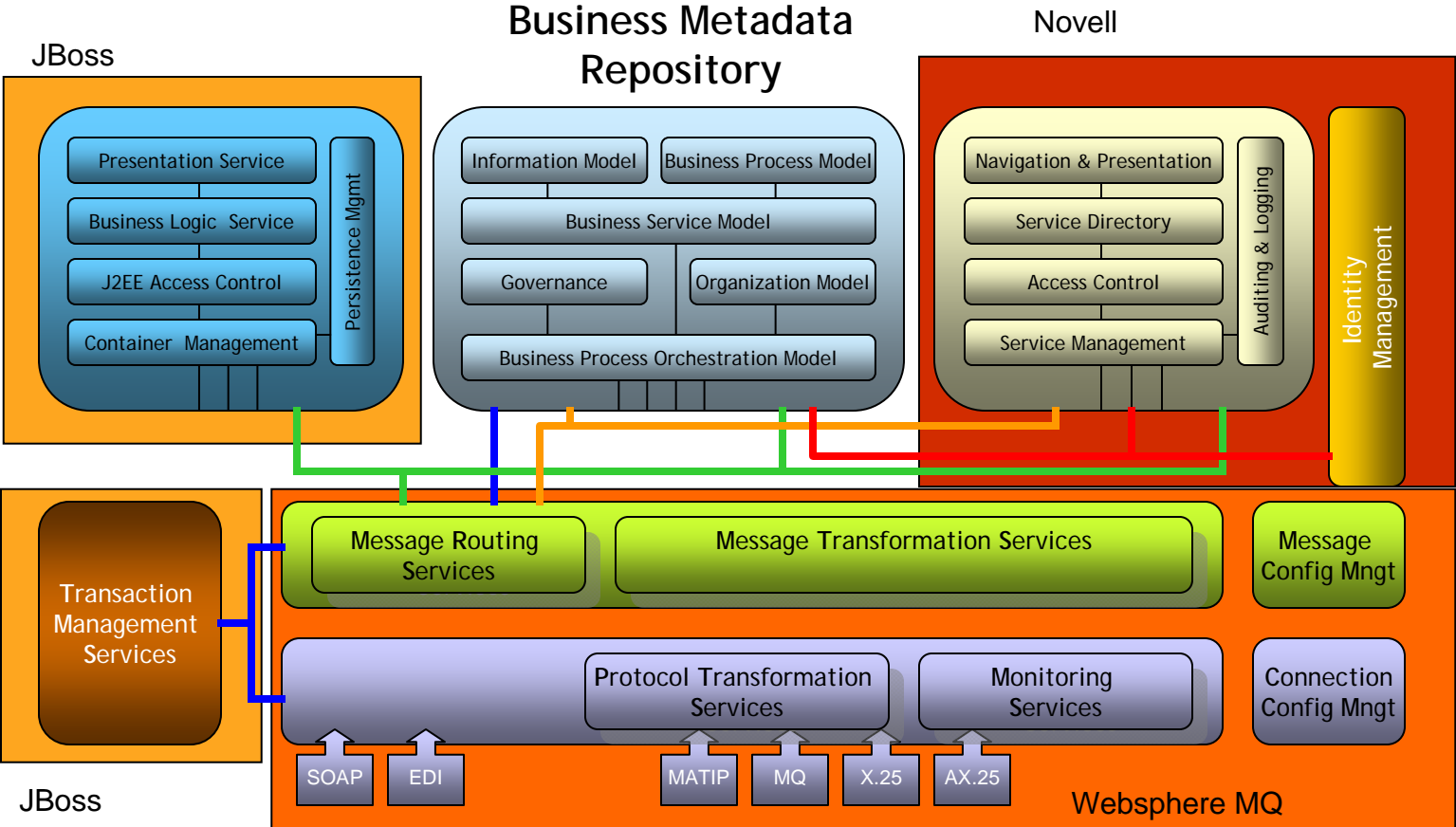
# Business Architecture Focus: Metadata



# Business services drive the agile Enterprise



# The IT Infrastructure Integration Model



# Sabre Holdings



## Application

Air Travel Shopping Engine fare search used by Travelocity and others moved from mainframe to Linux, MySQL with over 4 TB of data.

## Key Business Benefit

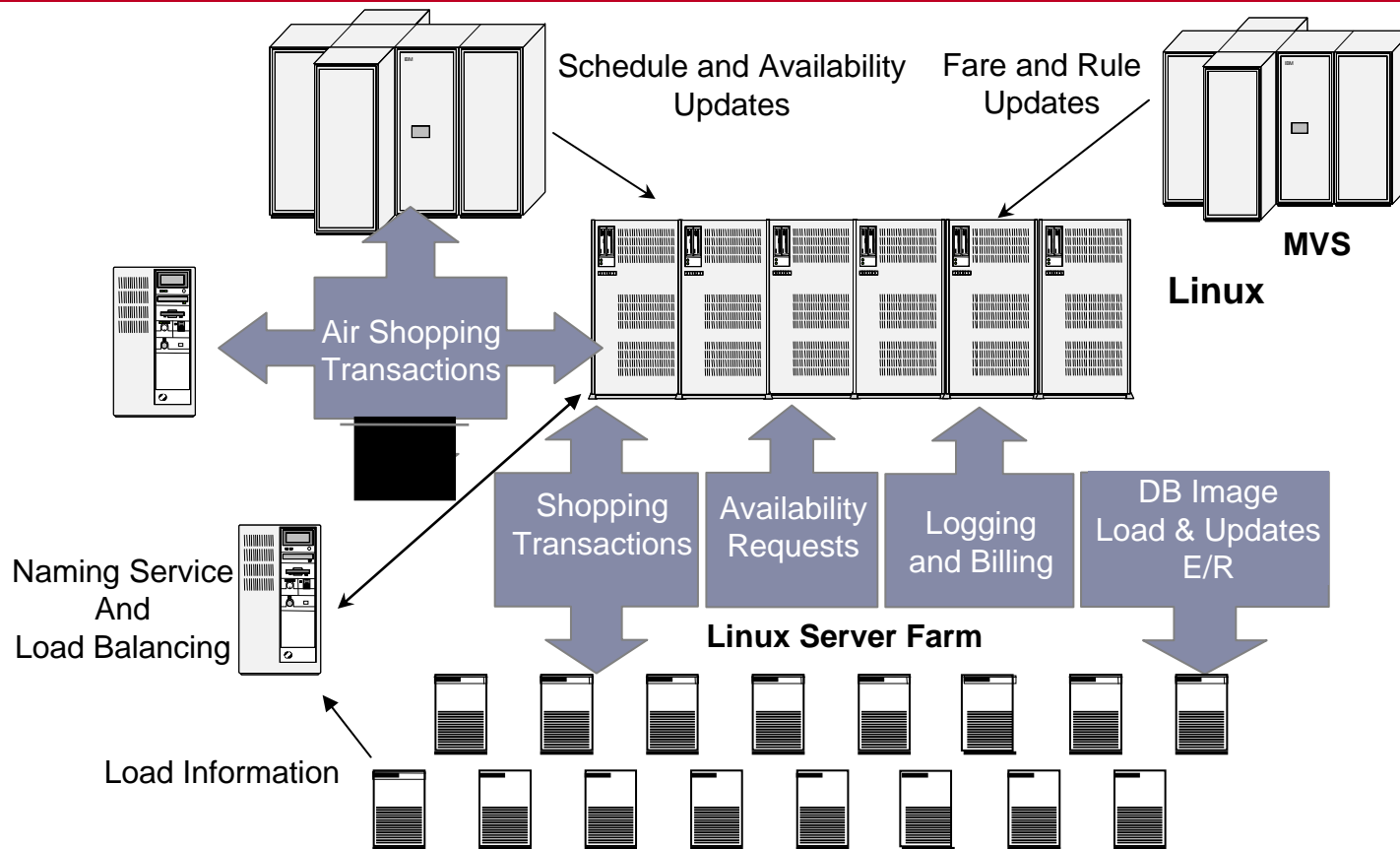
More than **\$10 million in savings** while scaling to millions of transactions daily.

## Why MySQL? Speed and scalability

*“MySQL ran faster or as fast as any commercial database we tested. It never crashed. It was the fastest to get working.”*

*Alan Walker  
Systems Architect  
Sabre Holdings*

# Sabre Holdings and MySQL



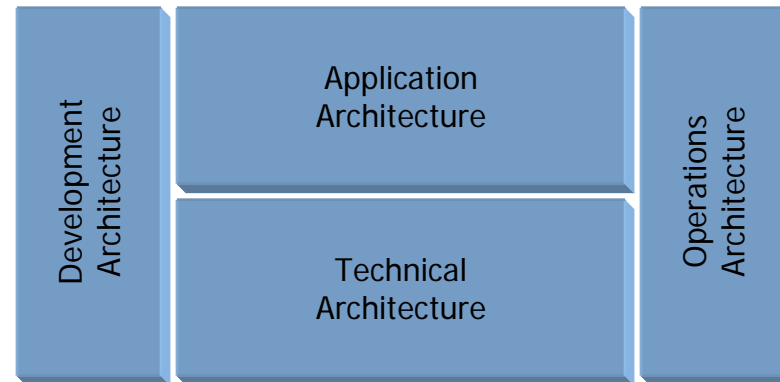
**59 4-way Servers for CPU & memory-intensive search**  
**45 4 way Servers for MySQL Database**

# Orbitz's Commitment to Open Source Software

- Where? In every environment
- What? Software at (almost) every layer of the stack.
- Who? All of
  - Orbitz.com
  - Cheaptickets.com
  - Travelport.com
  - Lodging.com
  - Orbitzforbusiness.com
  - Parts of American Airlines' website
  - Parts of United Airlines' website
  - Parts of Northwest Airlines' website
- Open source software has played an important role in the ability of Orbitz to compete successfully with entrenched companies that are much larger and much better funded.

Source: Orbitz

# Where is OSS used at Orbitz?



- Open source software is pervasive throughout the architecture
- Linux and Java are used everywhere
- OSS libraries and tools in use have many origins
- The catalog of open source software used in Orbitz systems is constantly growing

Source: Orbitz

# Airline client Unix Server Consolidation and Virtualization

Currently 817 HP and Sun Unix Servers Deployed

- Utilizing toolsets to analyze and profile applications, it could be reasonably expected that client airline could reduce the Unix Server footprint from 817 systems down to 426 Unix and 56 Linux servers.
- This would drive savings of \$13.247M over three years

# Open Source Virtualization: How You Could Do It

**Examine** and profile 817 Unix servers

- Eliminate 426 servers as unsuitable consolidation candidates for various reasons (SLA's, Applications etc.)

**Collapse** the remaining 391 servers on a 7:1 ratio to 56 servers

- Reduced total footprint is now 482 servers
- Every 50 servers costs \$1.5M over 3 years to operate

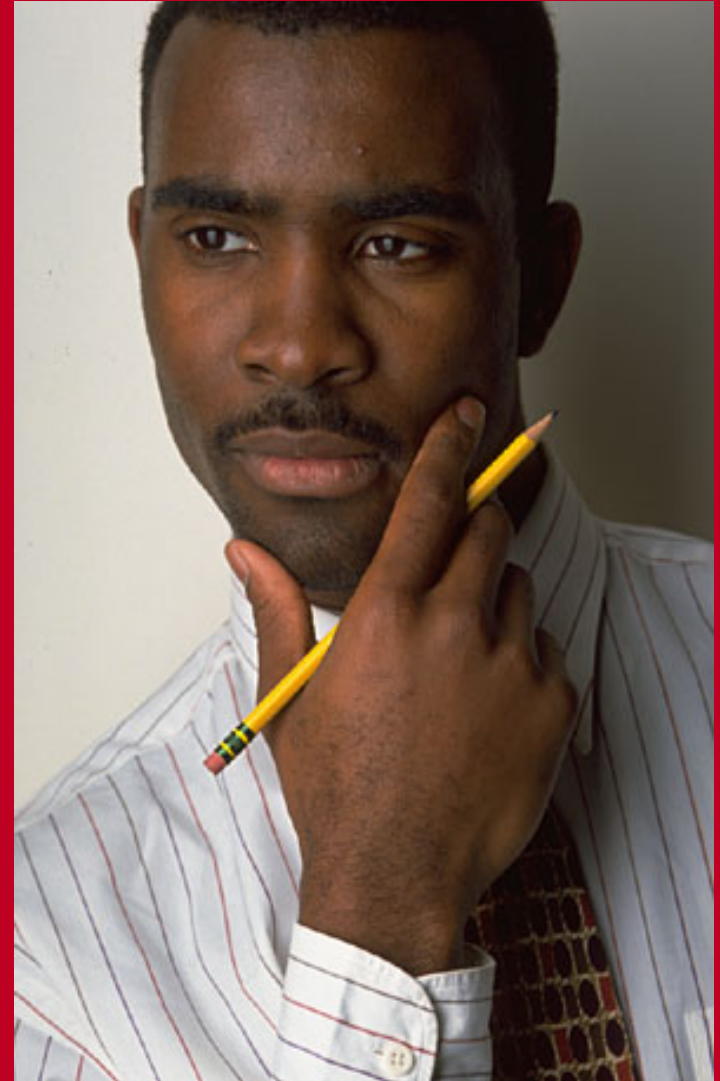
**Total savings over three years of \$13.247M**

# Migrate software maintenance and support licenses to Open Source

Currently 222 BEA Tuxedo/Weblogic maintenance and support licenses deployed

- Replace 222 BEA Tuxedo/Weblogic maintenance and support licenses with JBoss TS/AS for a cost reduction of \$1.519M over 3 years

Questions?



**Thank You.**

