

Service Oriented Architectures for Small and Medium Organisations

An Open-Source based Approach

ISC 2008
21/10/2008

ISC departement of the CRP-GL

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 - +/- 200 researchers
- Informatics, System and Collaboration Departement
 - +/- 45 researchers in IT
- Pascal Bauler (bauler@lippmann.lu)
 - Project Manager
 - Research interests
 - IT architectures
 - Service Oriented Architectures
 - Enterprise applications

Overview

- IT integration: Historical background
- Open Source based SOA
 - SOA Layers
 - OSS SOA alternatives: overview
 - Use Cases
- Internals of an operational SOA
- Event Driven Architecture
- Discussion

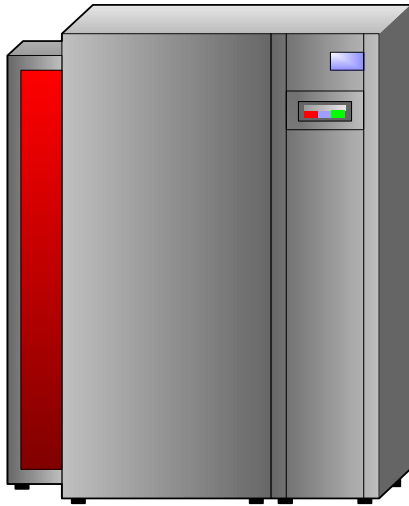


IT integration: Historical background

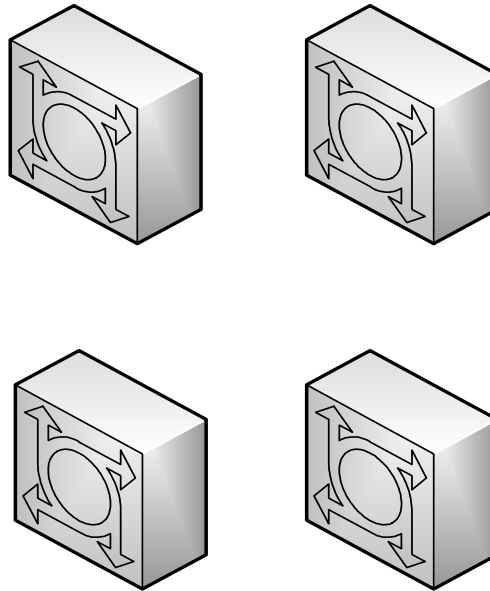
History

→ Central Mainframe to Distributed System

196x: Central Mainframe



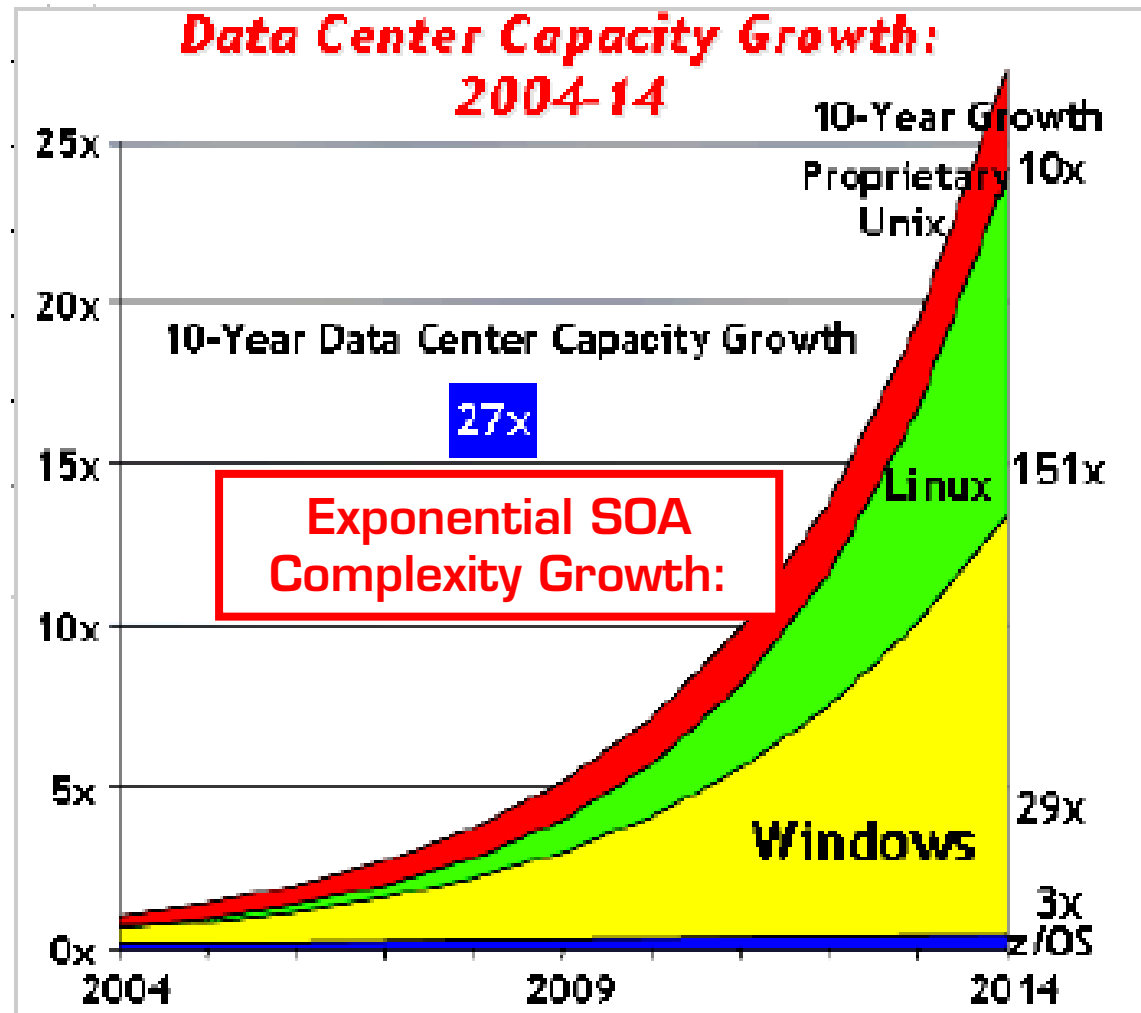
1980: Unix Servers



199x: Windows Servers



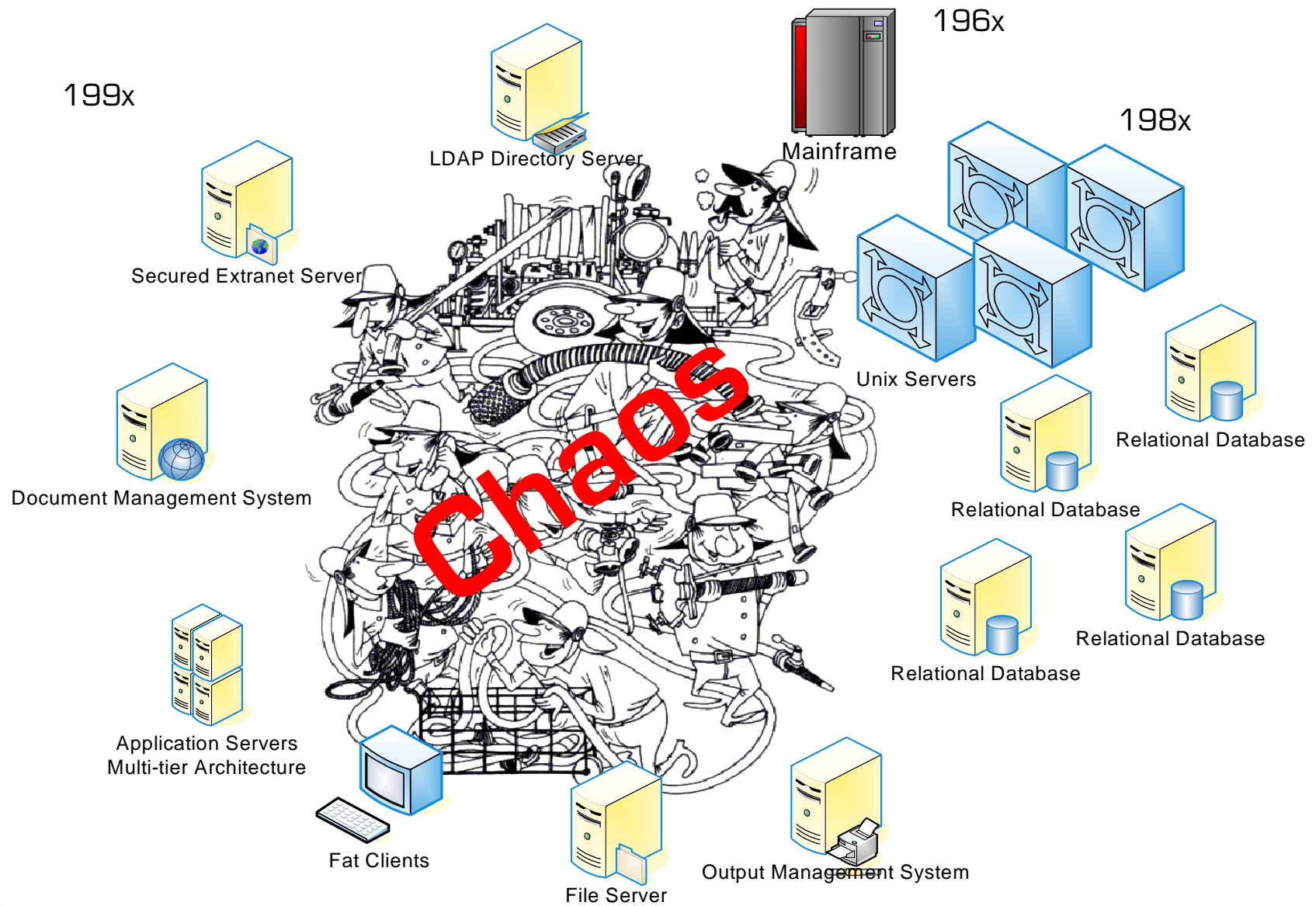
Estimated growth



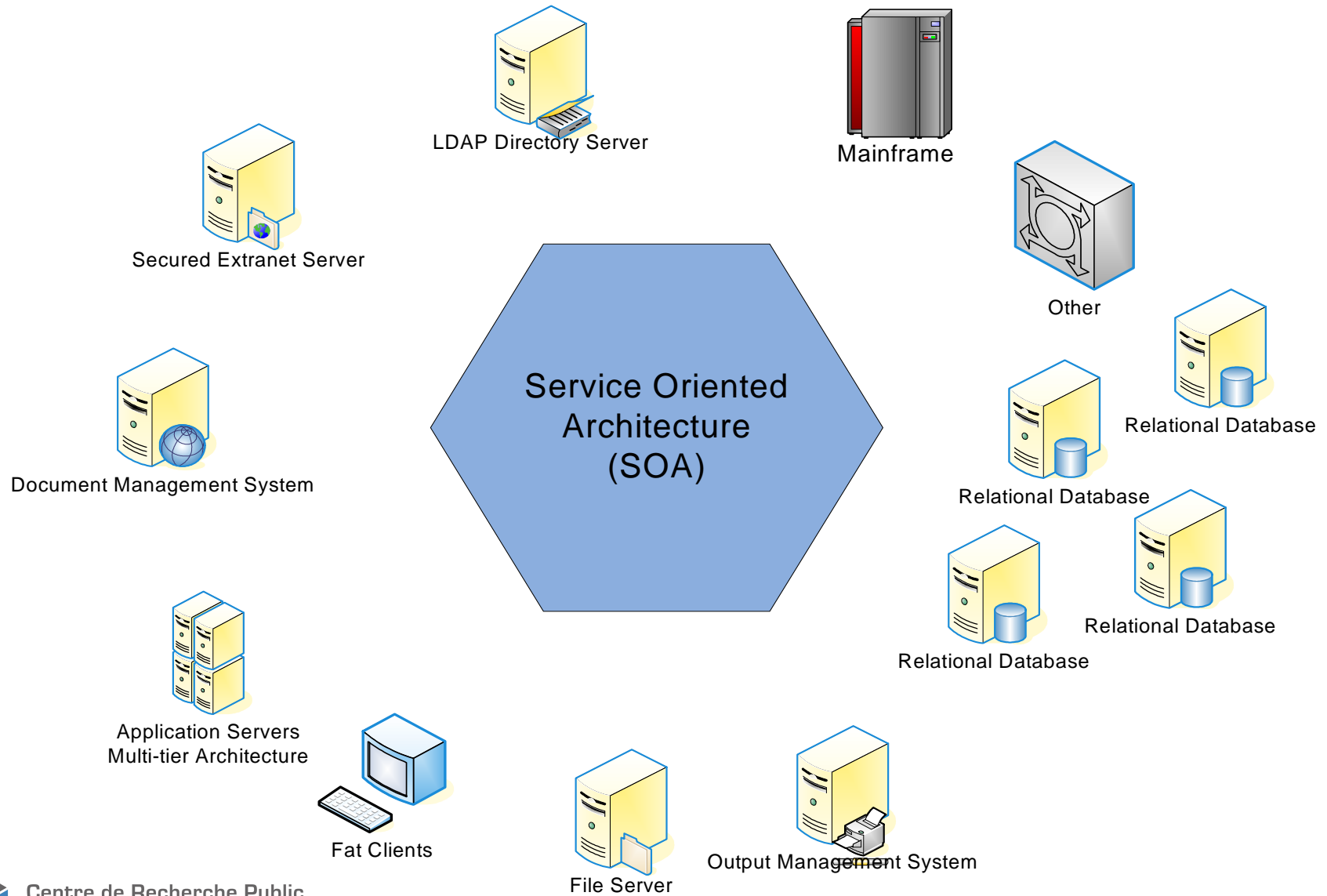
Quelle: META 2005

Formula: Number of
interconnections: $n \cdot (n-1) / 2$

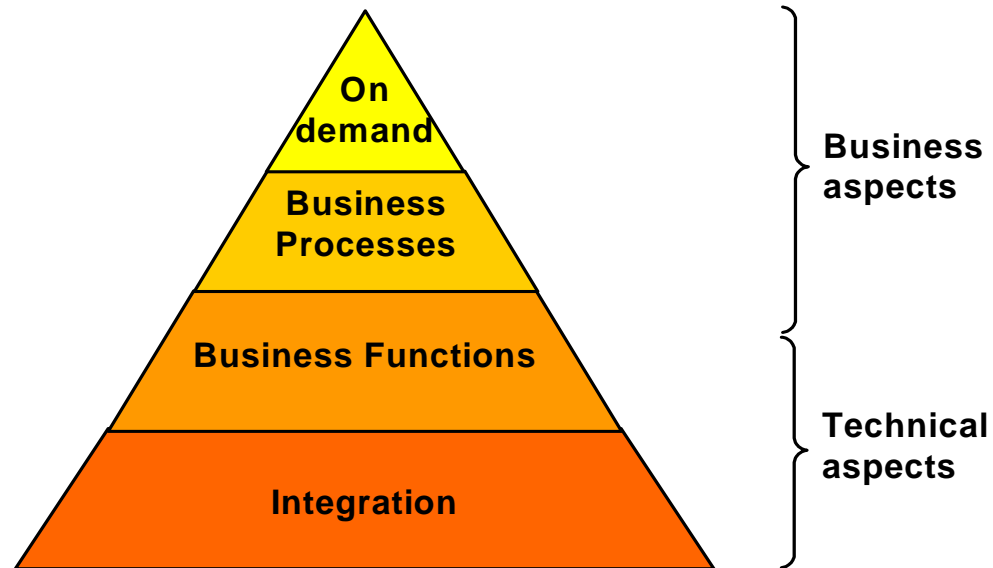
Modern IT environment



SOA approach



New requirements



- Technical integration, connectors
- Technical encapsulation (transport protocol independency)
- Business Services / Functions
- Orchestration of distributed Business Processes
- Choreography of existing business functions

Commercial solutions

- IBM
 - TIPCO
 - Vitria
 - Oracle
 - BEA
 - ...
-
- Target: Multinational Companies
 - Complexity / High entry costs

Open Source based SOA

SOA Layers

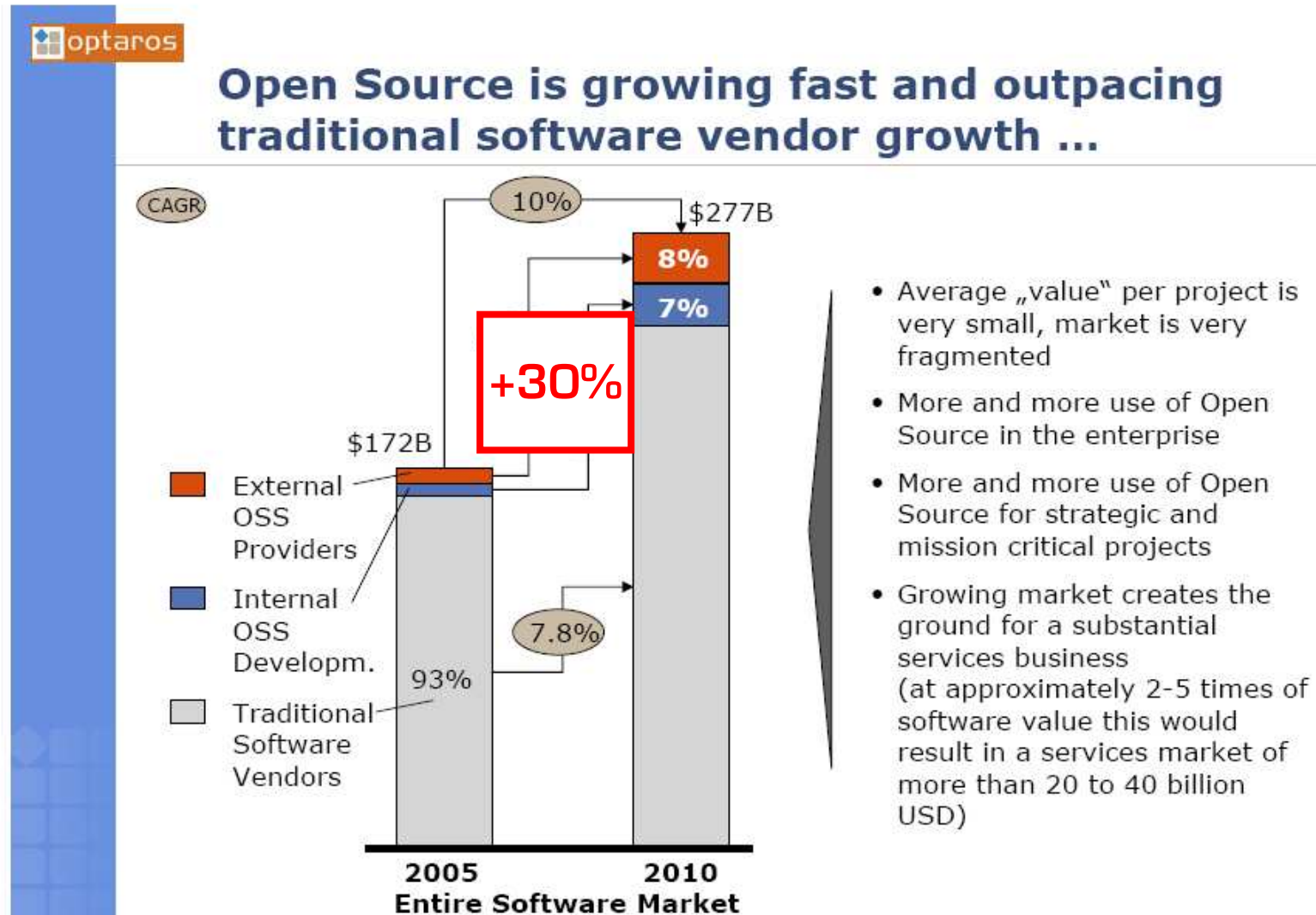
OSS SOA alternatives

Use Cases



Importance of OSS

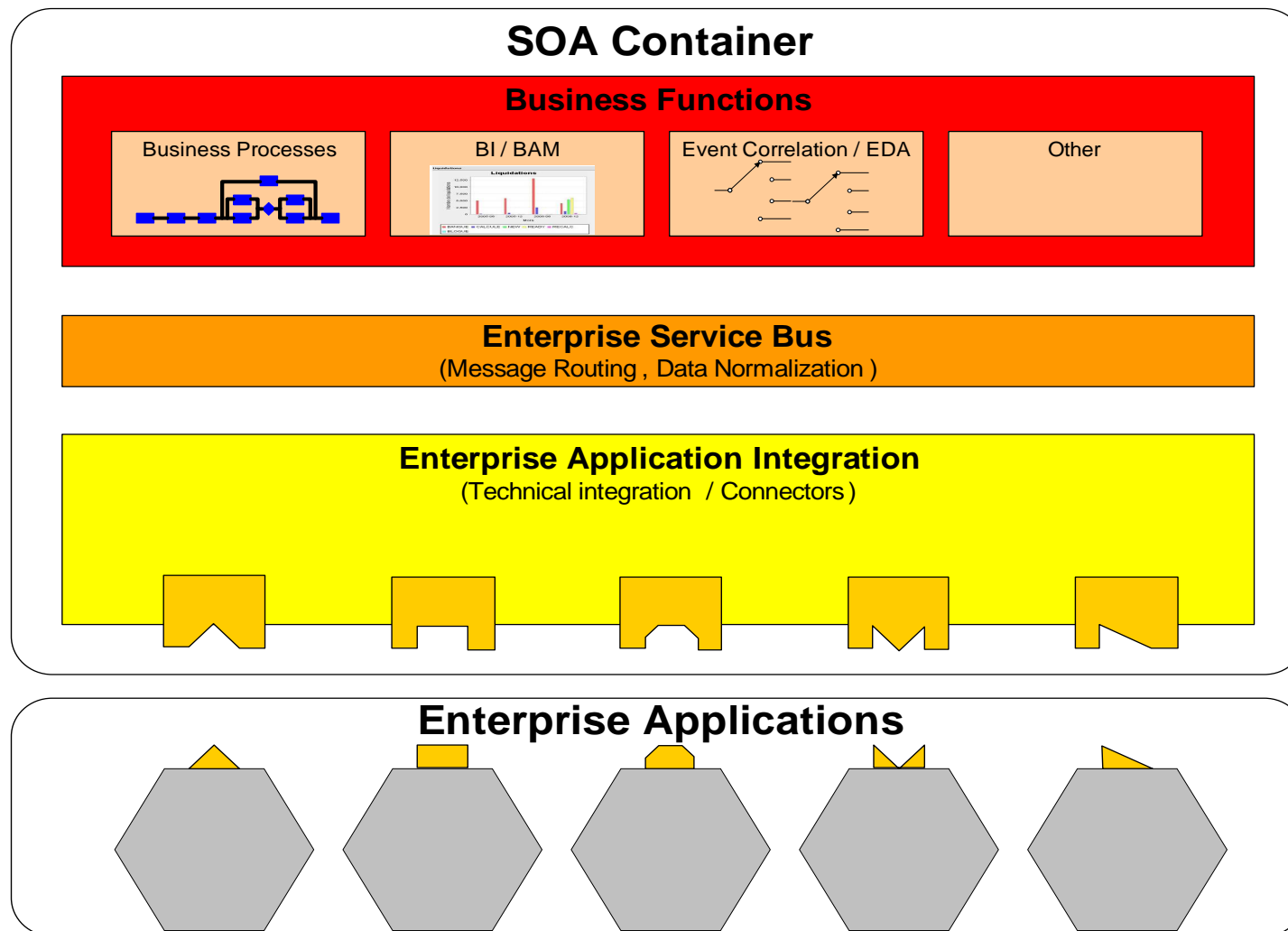
Heise Events: Open-Source Meets Business 2007



Source: Gartner Open Source Summit 2006:
"The Economics of Open Source - Measuring Market Influences" (Laurie Wurster)



SOA layers / Structure



SOA OSS alternatives

- Technical Integration
- Enterprise Service Bus
- Business Aspects

- « Entwurf von soerviceorientierten Architekturen auf Basis von Open-Source-Software » Pascal Bauler, Fernand Feltz, Nicolas Biri, Philippe Pinheiro HMD 253 dpunkt.verlag
- « Open-Source SOA for Small and Medium Organisations », Pascal Bauler, Nicolas Biri, Fernand Feltz, ERCIM News, Special Issue : Service-Oriented Computing, Juillet 2007, pp. 37-38.

- Technical Integration
 - OpenEAI
 - OpenSyncro

SOA OSS alternatives

→ Enterprise Service Bus

- Java Business Integration (JBI)
 - Open ESB
 - Service Mix
- Service Component Architecture (SCA)
 - Tuscany
- « Proprietary »
 - Mule
 - Celtix (IONA)



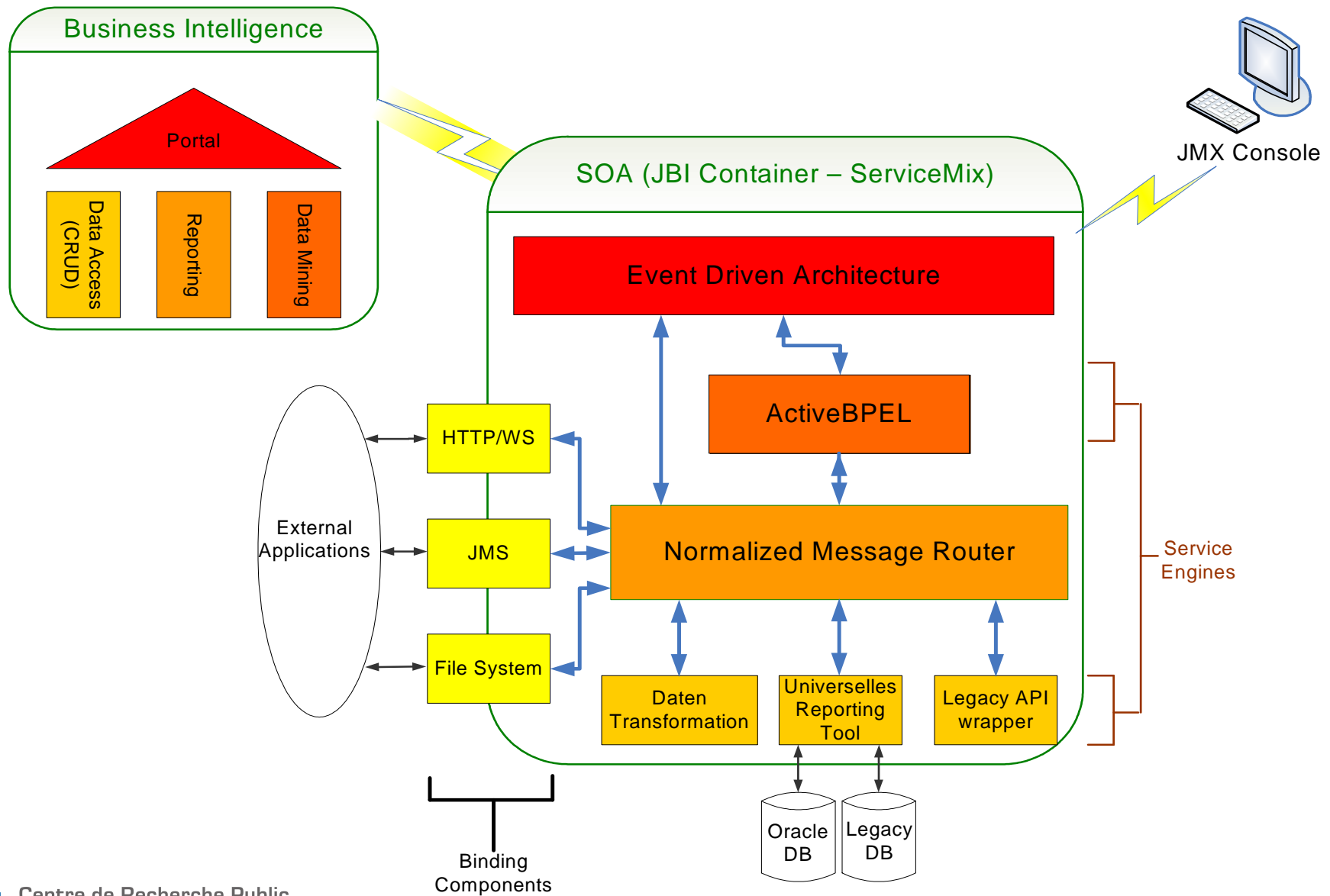
SOA OSS alternatives

→ Orchestration of Business Processes

- Business Process Modeling Notation (BPMN)
 - Readable / usable by business people
 - Not executable
- Business Process Execution Language (BPEL)
 - ActiveBPEL
 - Apache ODE
 - Semi-automatic generation out of BPMN
 - Technical solution based on Web-Services
- XPDL
 - Shark
 - OBE
 - WfMOpen
 - Combined process description/execution language
 - Many aspects are optional (limited benefits of XPDL)
- jBPM
 - Graph Oriented Programming
 - Support of multiple process description languages



SOA solution of the CRP-GL



Concept

- « Implementing a Service-Oriented Architecture for Small and Medium Organisations », Bauler Pascal, Feltz Fernand, Biri Nicolas et Pinheiro Philippe : EMISA 2006, Methoden, Konzepte und Technologien für die Entwicklung von dienstbasierten Informationssystemen, GI-Edition, Lecture Notes in Informatics, Volume P-95, Bonn 2006, pp. 105-118.
- ESB: JBI (JSR-208): Java Business Integration
 - Java based standard; (one of few existing 'SOA standards')
 - Concept
 - Meta-Container
 - Routing: Normalized Message Router
 - Management/Monitoring: JMX
 - Plug-ins
 - Connector: Binding Components
 - Business Facilities: Service Engines
 - » Low Level: Transformation; Protocol
 - » High level: Orchestration
- Orchestration: BPEL (OASIS)
Business Process Execution Language
 - Executable business processes
 - Focused on Web-Service

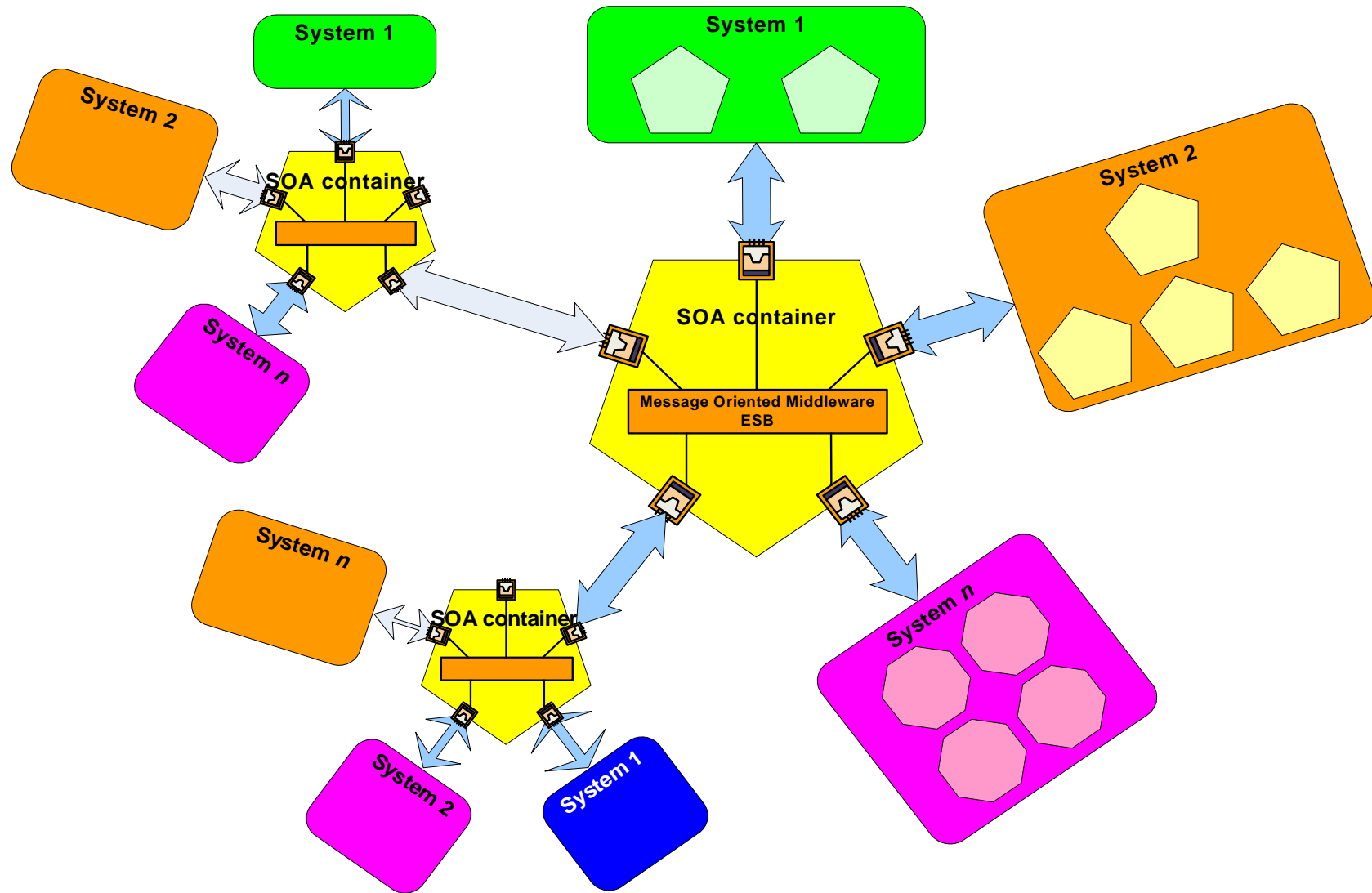


OSS Benefits

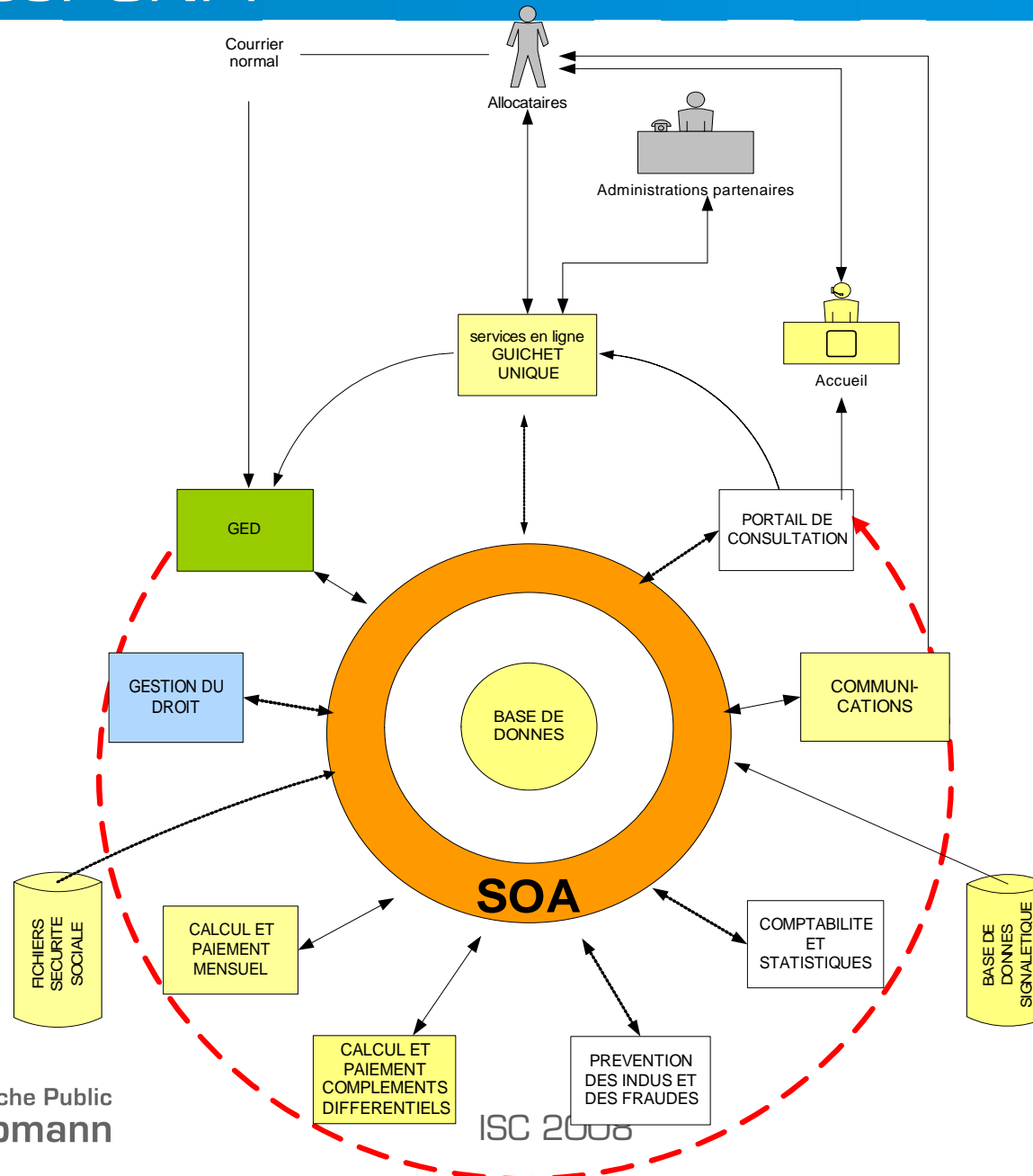
- Initial Costs
- Availability
- Barrier to Entry
- Time to market

- Tailored for SMOs
- Ease of use
- Prototype -> Proof of concept -> Solution

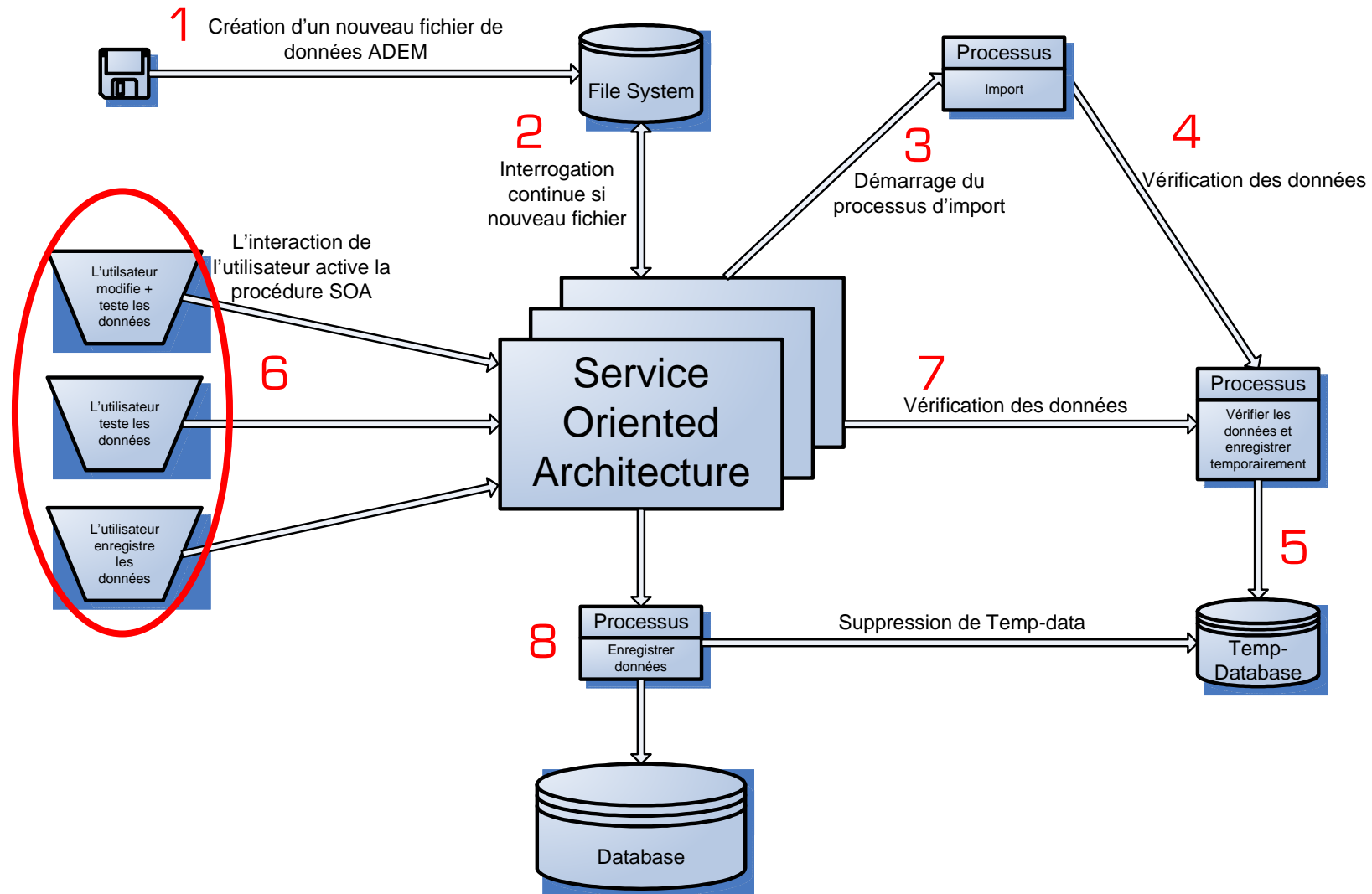
Intra/Inter-organisational SOA



Use cases: CNPF



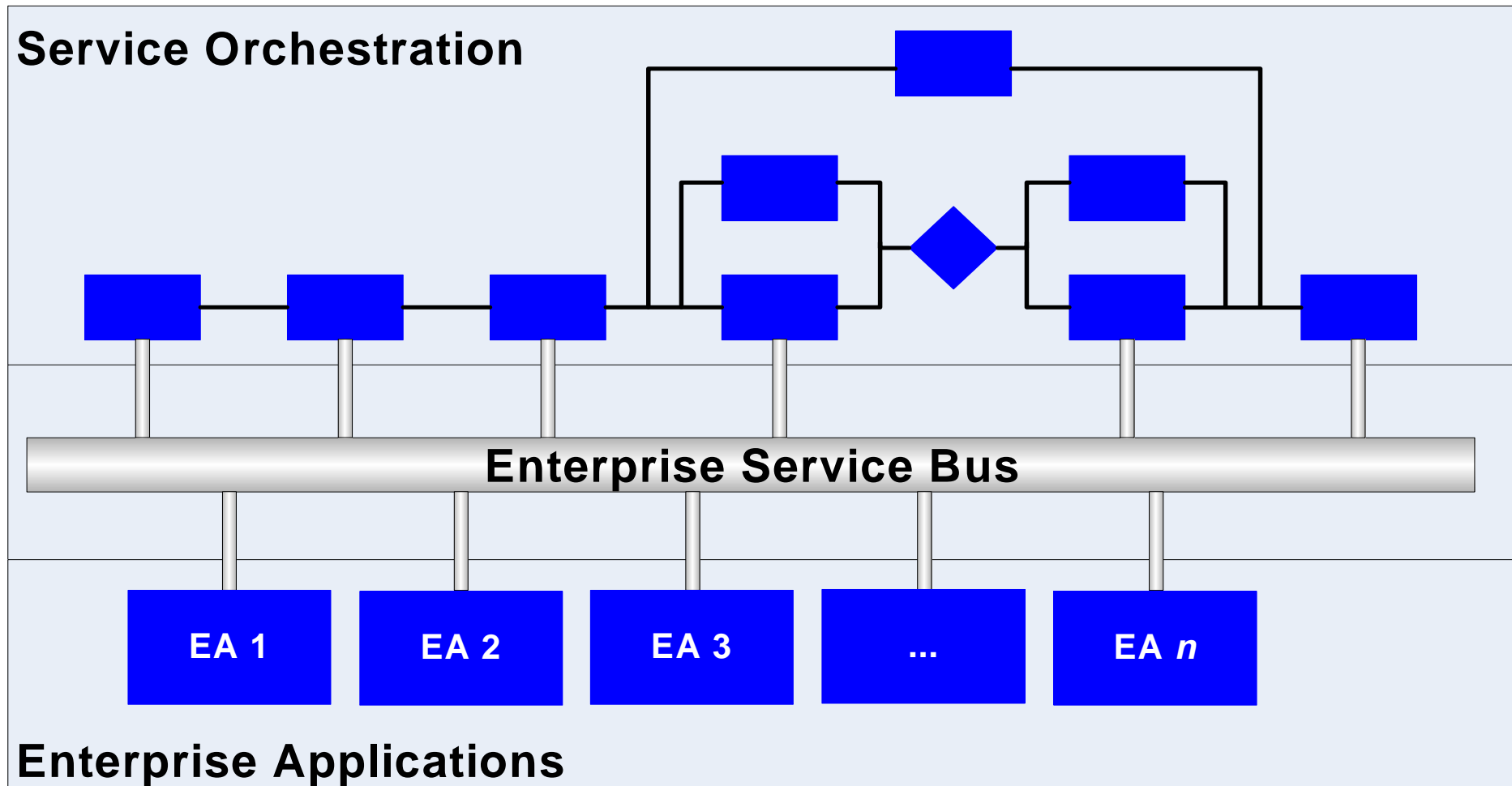
Use Case: Chambre de Commerce et ADEM



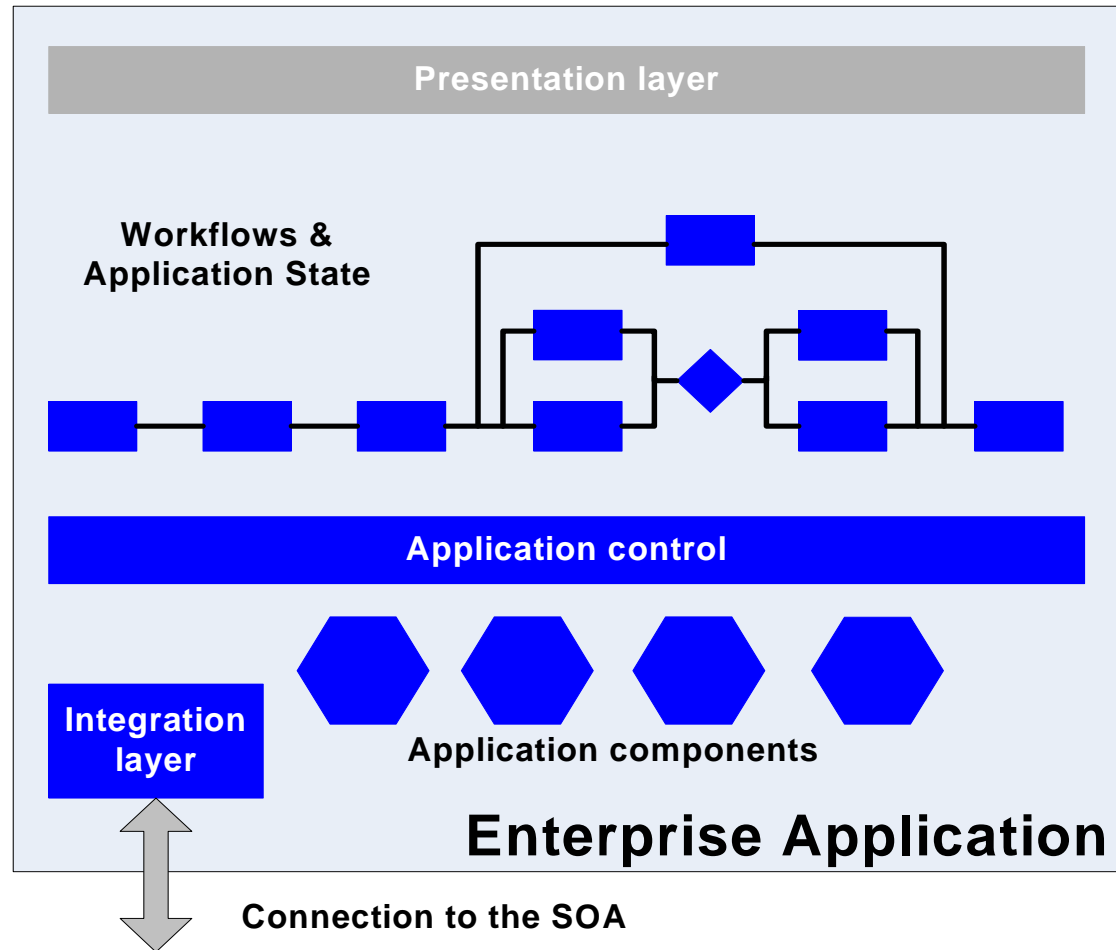
SOA and Service Oriented Computing (SOC)

- Architecture discussion
 - Enterprise Application and Integration Middlewares
 - Services vs Functions
 - Local and distributed workflows
-
- « Using BPEL as a workflow engine for local enterprise applications », Nicolas Biri, Pascal Bauler, Fernand Feltz, Nicolas Médoc, Céline Thomase, 2nd International Workshop on Enterprise Modelling and Information Systems Architectures - Concepts and Applications (EMISA 2007), Octobre 2007, St. Goar / Rhine, Allemagne.

Service Oriented Architecture



Service Oriented Computing

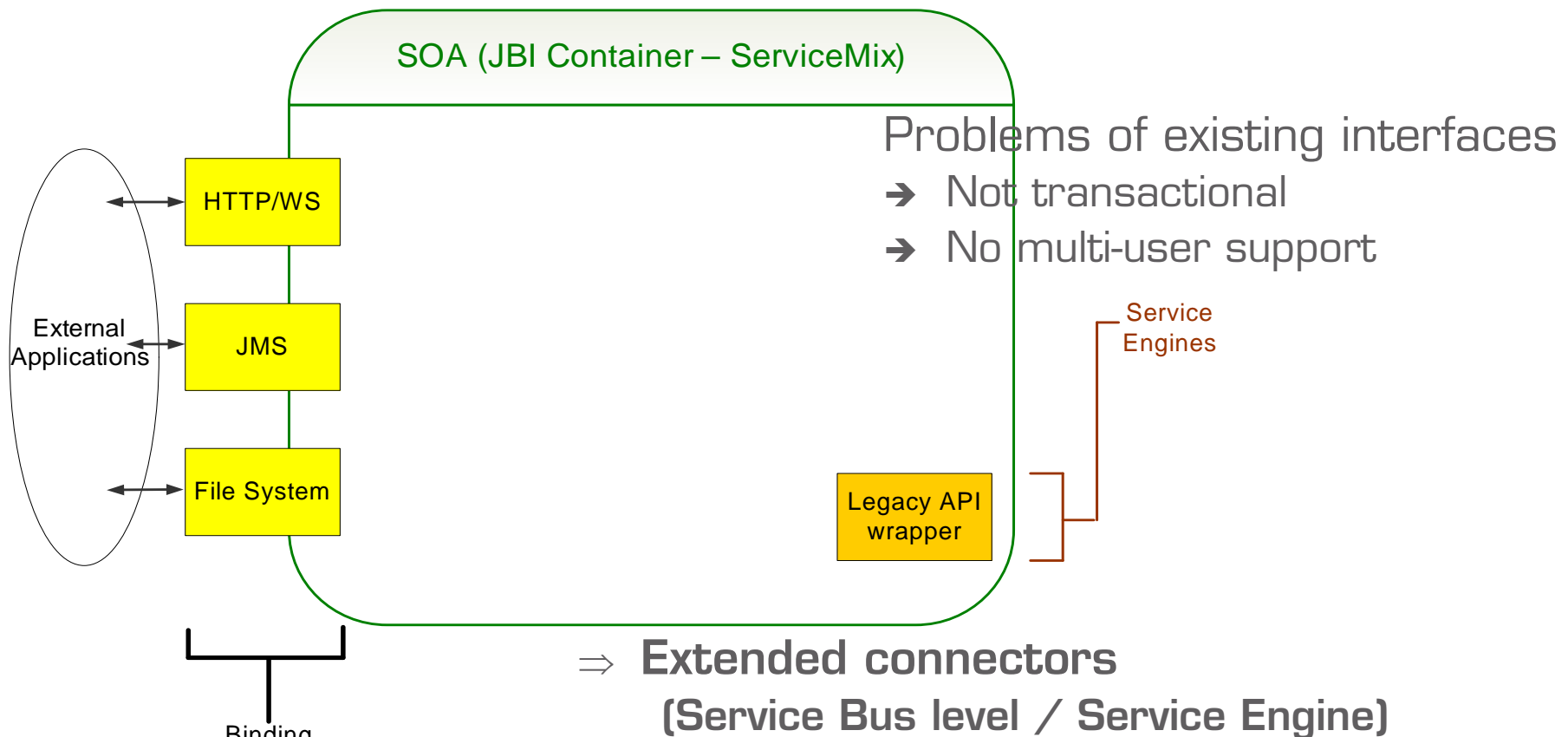


Internals of an operational SOA

Enterprise Application Integration: Connectors

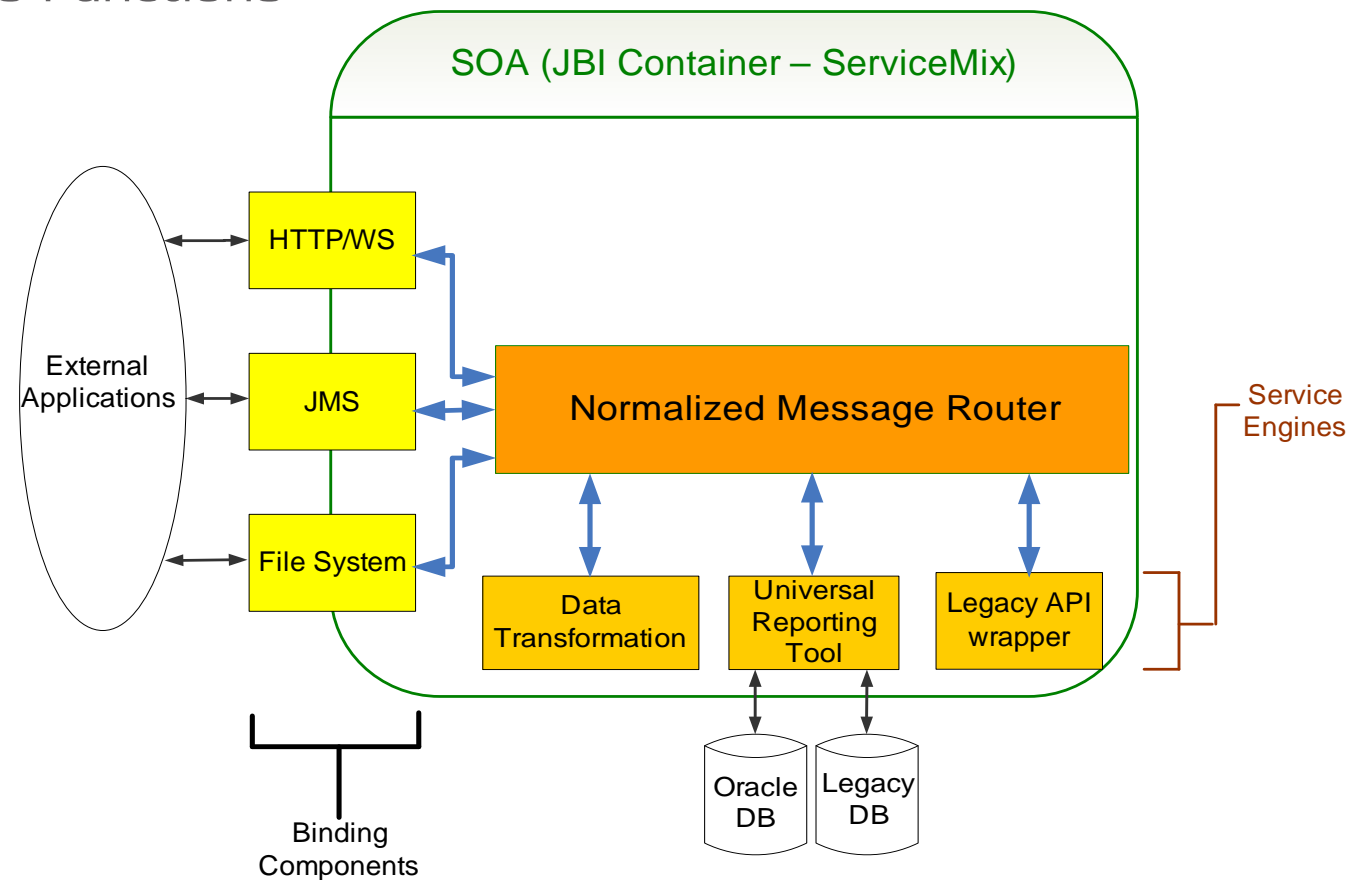
→ Technical concepts

- Communication with external applications
- Connectors (Binding Components)
- Reuse existing interfaced ! **Problem !**



Enterprise Service Bus

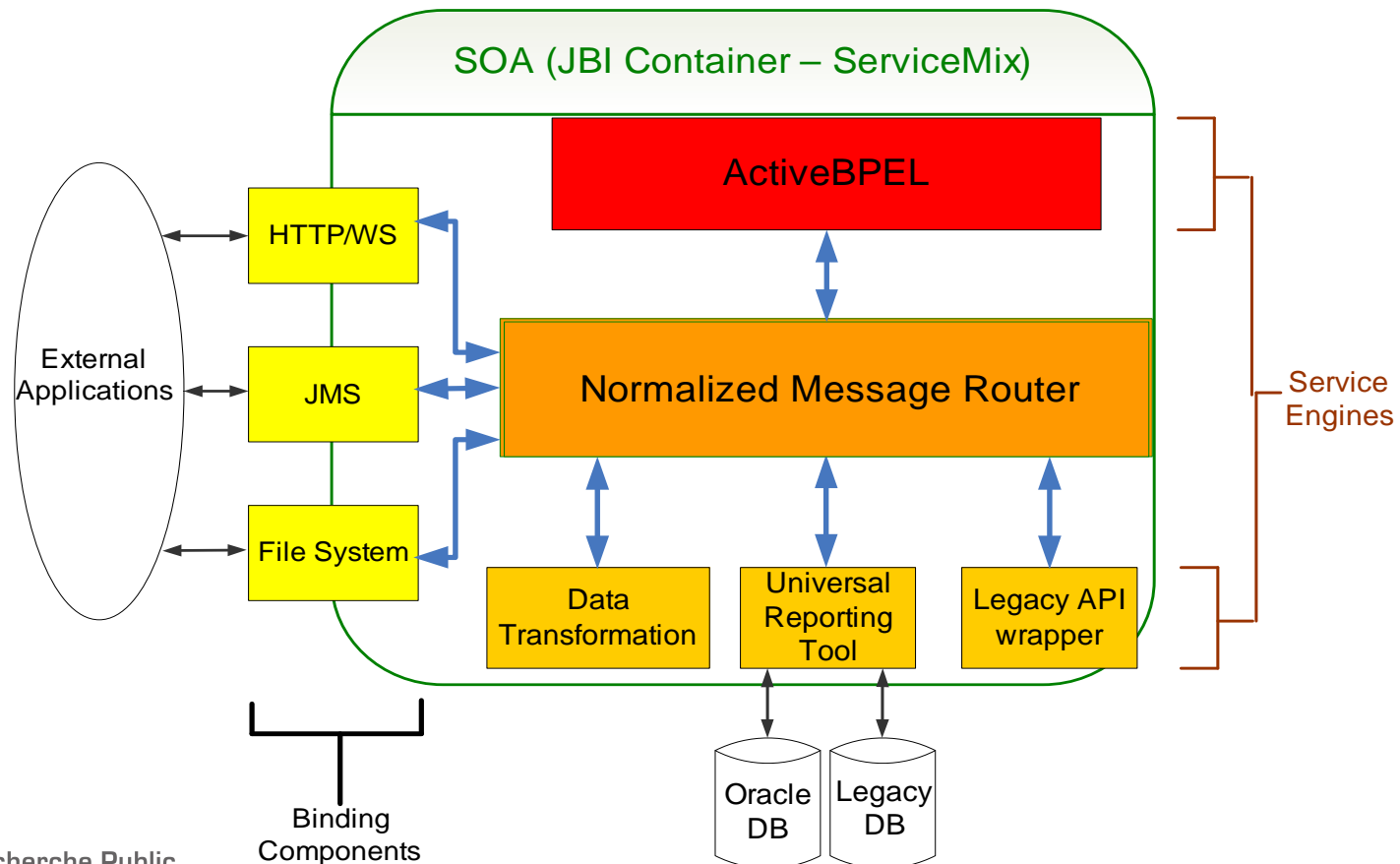
- Data transformations
- Transport protocol independency
- Standards
- Business Functions



Business Process Management

→ Orchestration

- Business Process Management
Business Process Execution Language (BPEL)

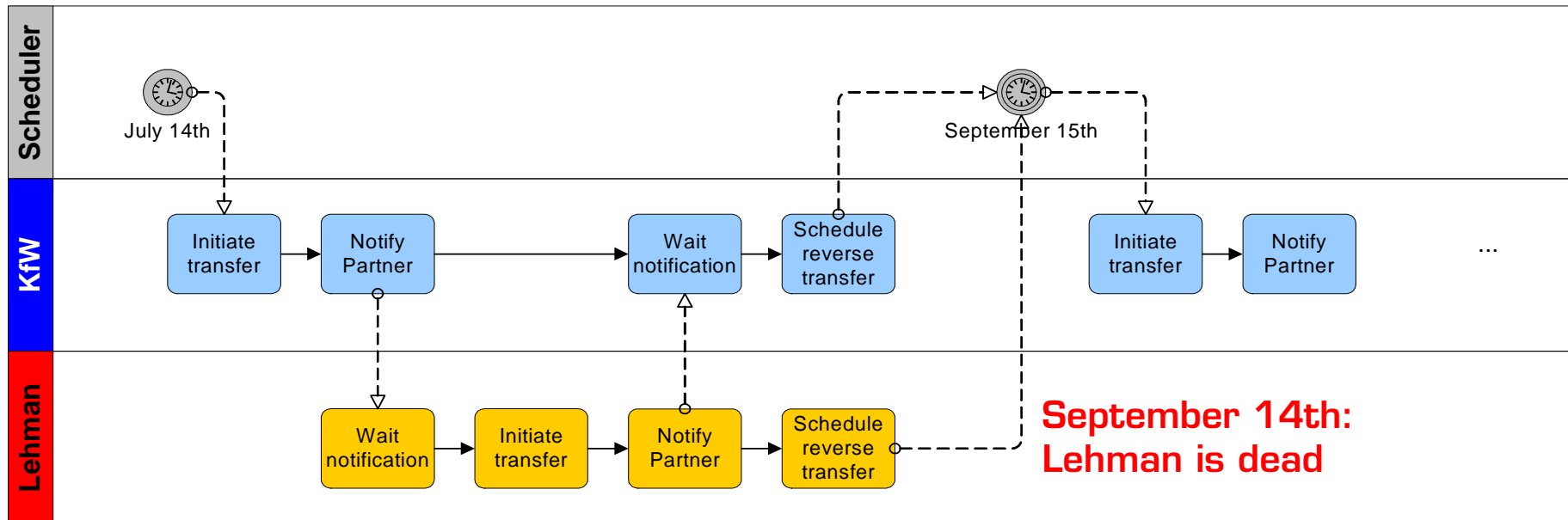


Example: KfW / Lehman Brothers

→ The « Lehman Brothers / KfW Deal »

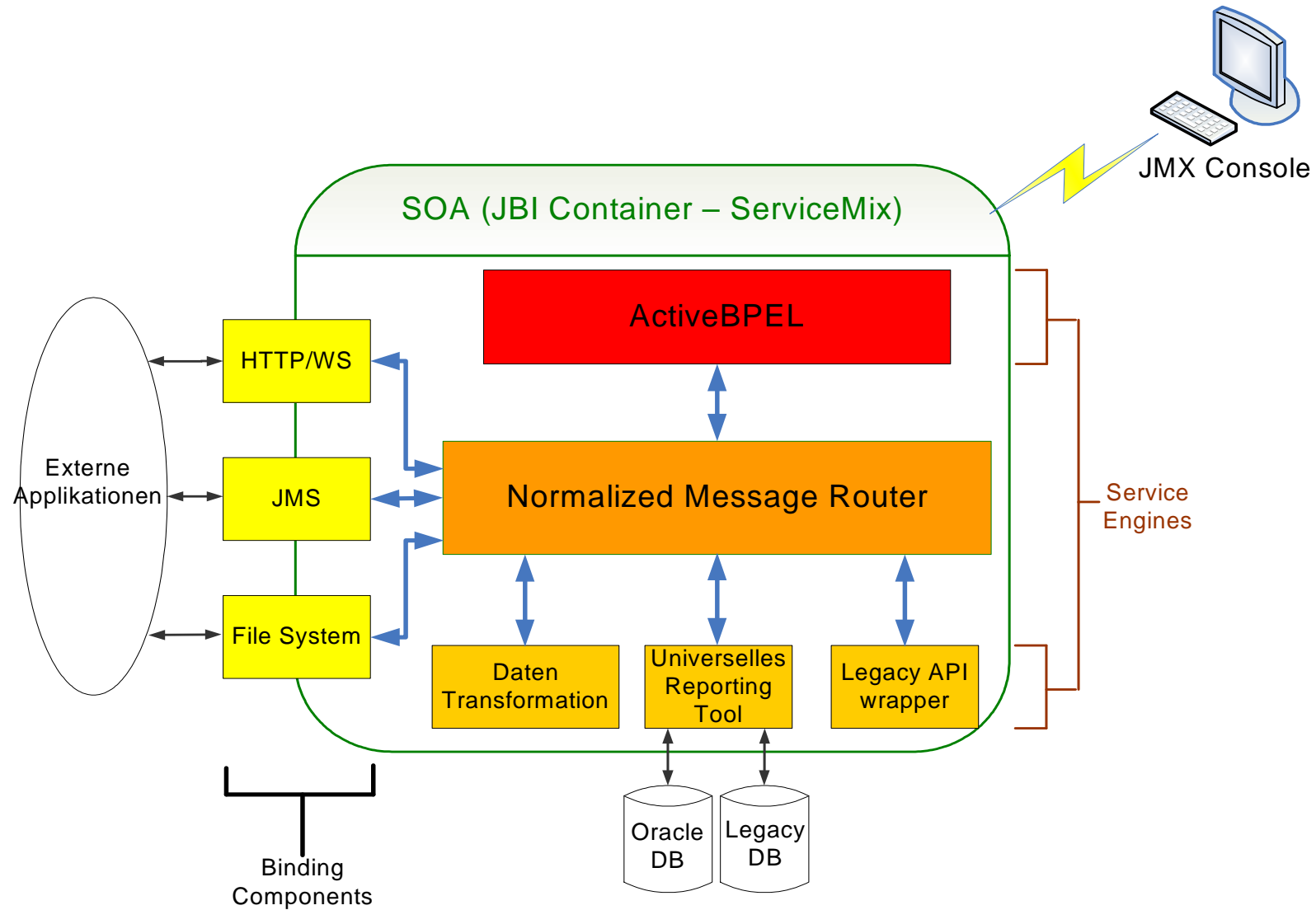
- Decision of July 10th: Swap Transaction
 - Key Dates: 14 July 2008, 15 September 2008
- July 14th
 - KfW transfers 500 Mio\$ to Lehman
 - Lehman transfers 317 Mio€ to KfW
- September 15th
 - KfW transfers 319 Mio€ to Lehman
 - Lehman transfers 500 Mio\$ to KfW
- Expected win of 50 Mio€ \$ (Dollar/Euro conversion)

Business Process Orchestration



« Usage of Model Driven Engineering in the context of Business Process Management » Pascal Bauler, Fernand Feltz, Etienne Frogneux, Benjamin Renwart, Céline Thomase, Multikonferenz Wirtschaftsinformatik 2008, Munic

Monitoring and Management



SOA SDK: Usability / Extensibility

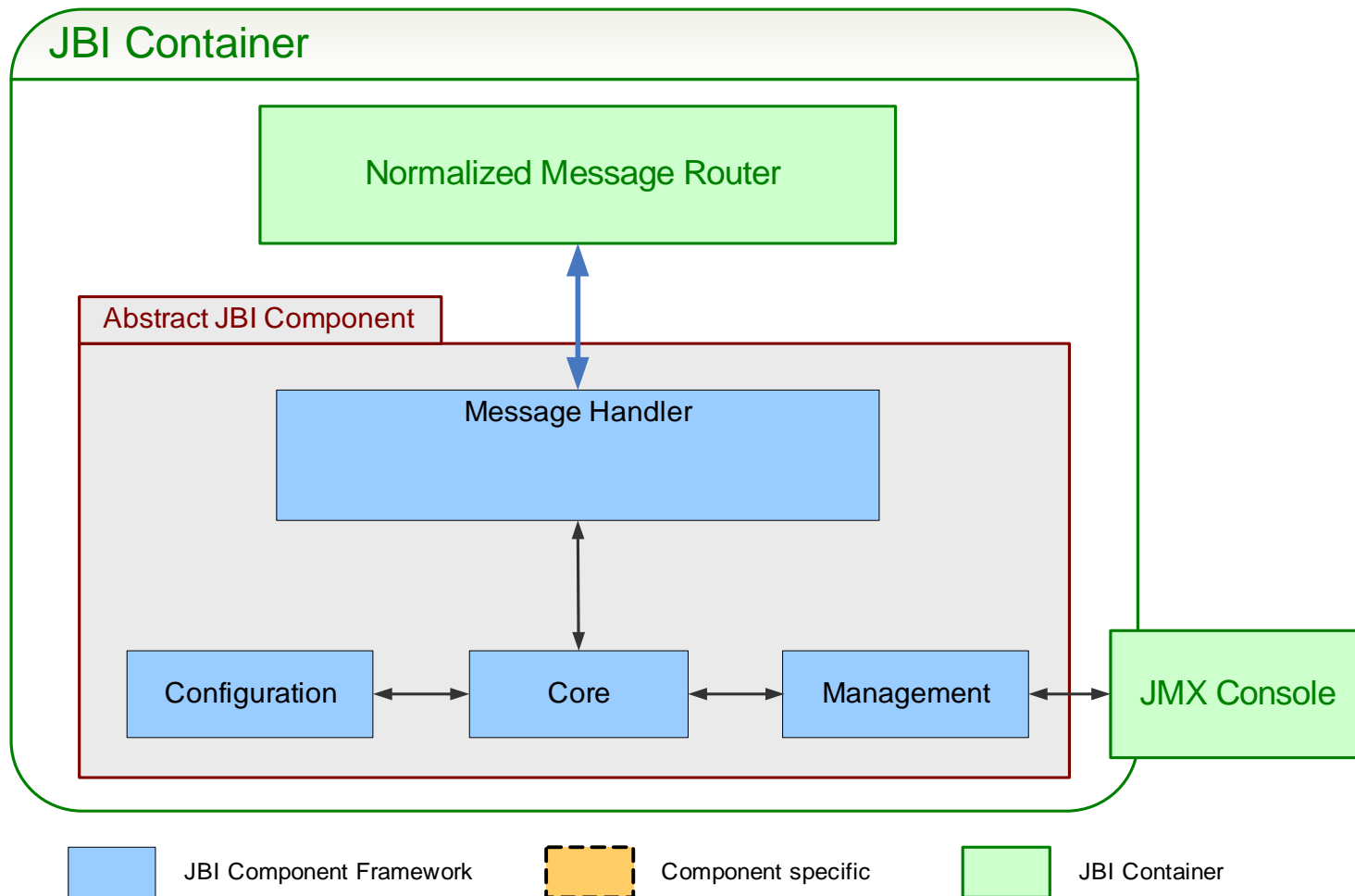
→ Problems

- Technical variety => complexity
- Complex SOA calls
- Difficult integration of new applications

⇒ Facilitate usage of the SOA

- ⇒ Extension of the SOA (component framework)
- ⇒ Design of custom applications (automated code generation based on UML models)

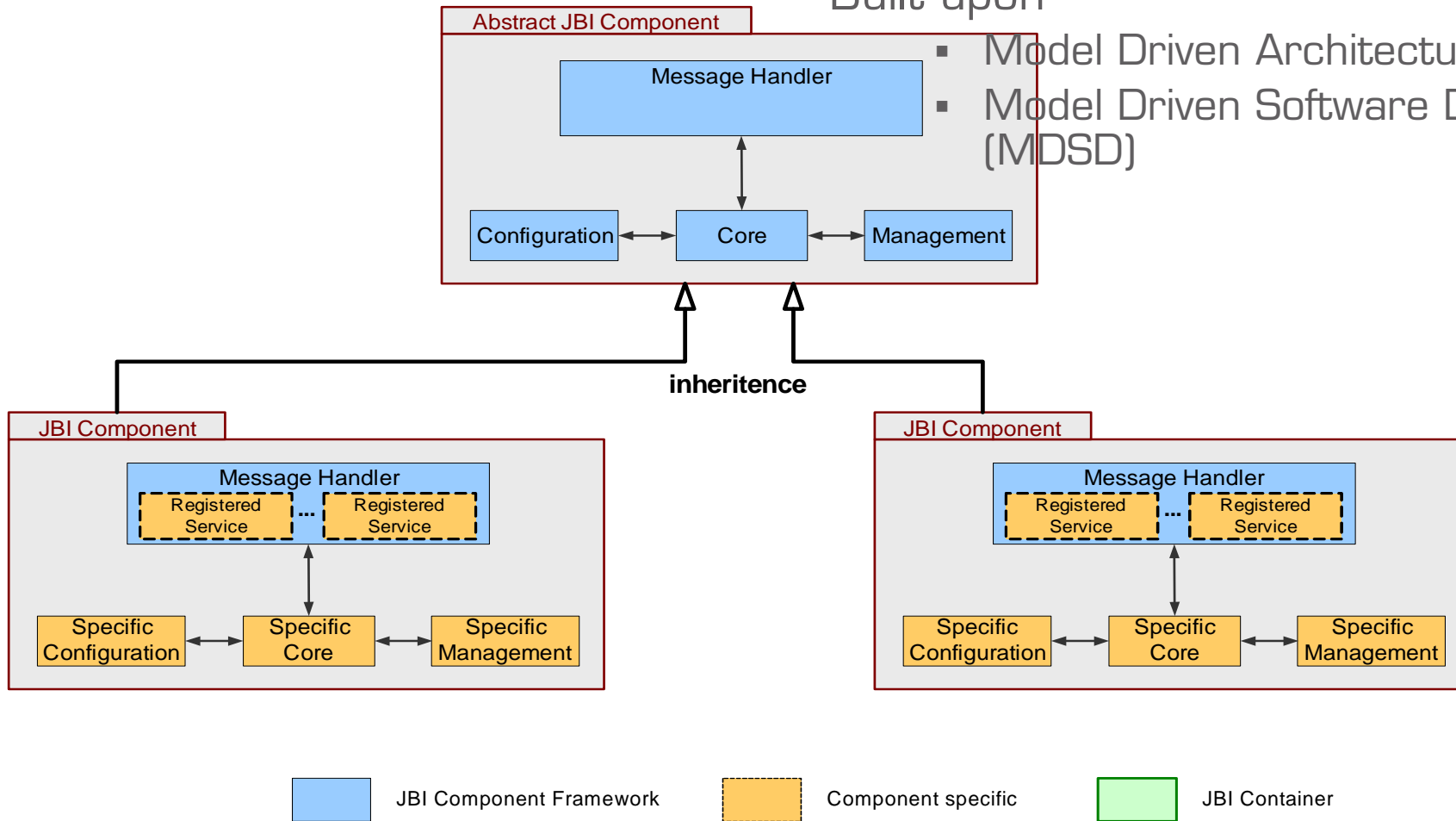
Generic JBI component



Design of new components

Built upon

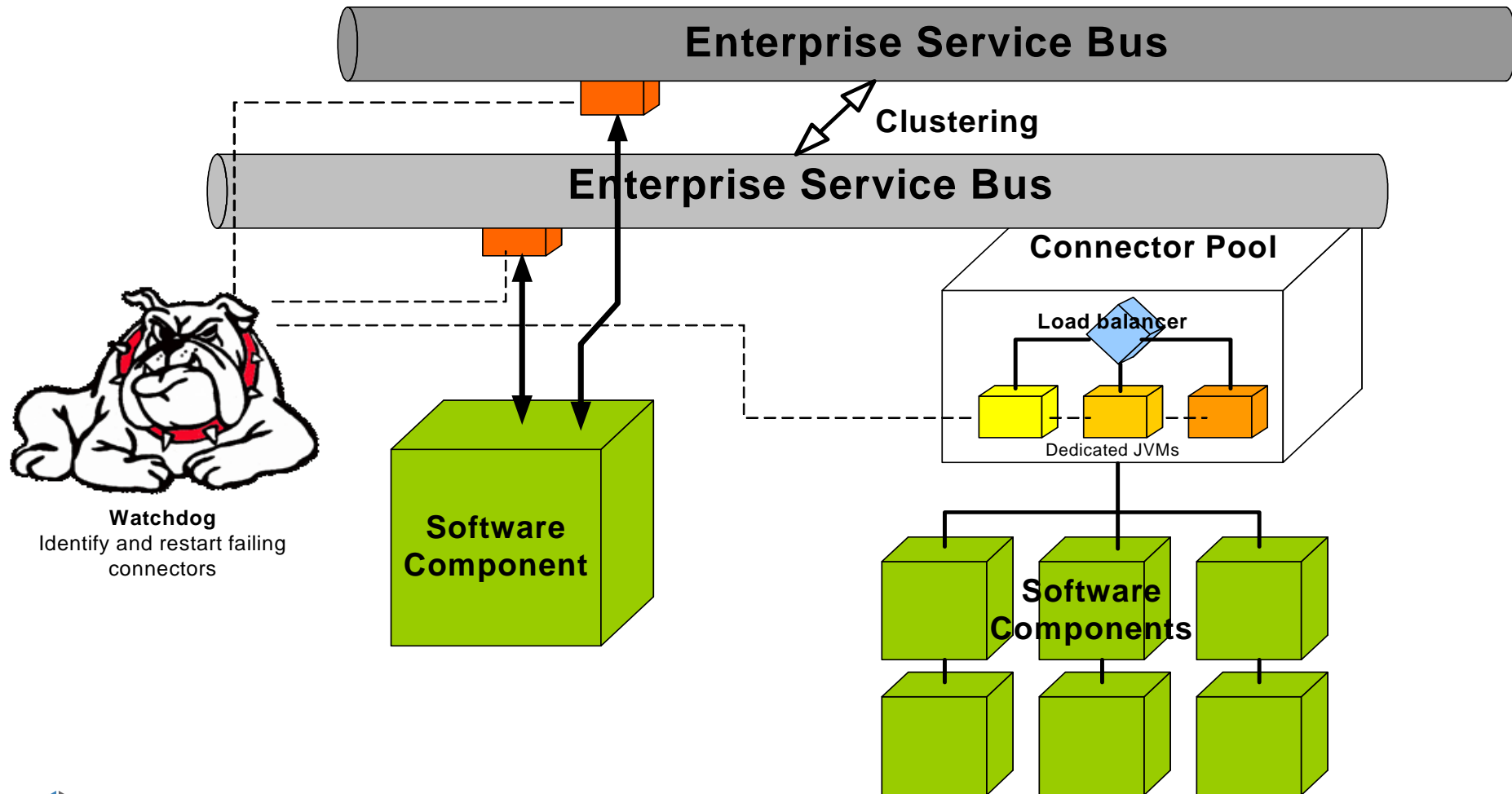
- Model Driven Architecture (MDA)
- Model Driven Software Design (MDSD)



OSS SOA in mission critical environments

- Performance
- Reliability
- Fault tolerance
- Service Level Agreement
 - Trust and Service Oriented Architectures
 - Quality of Service

Mission critical SOA





Event Driven Architecture

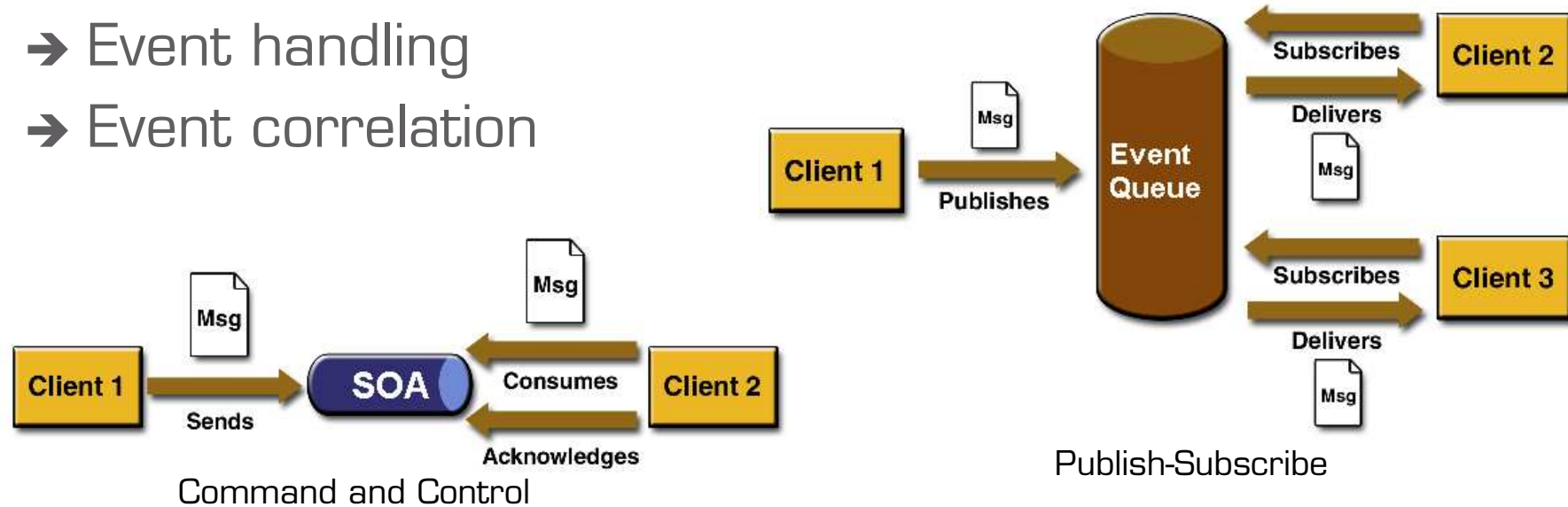
Event Driven Architecture

→ Push vs Poll

- Publish-Subscribe vs Command and Control

→ Event handling

→ Event correlation

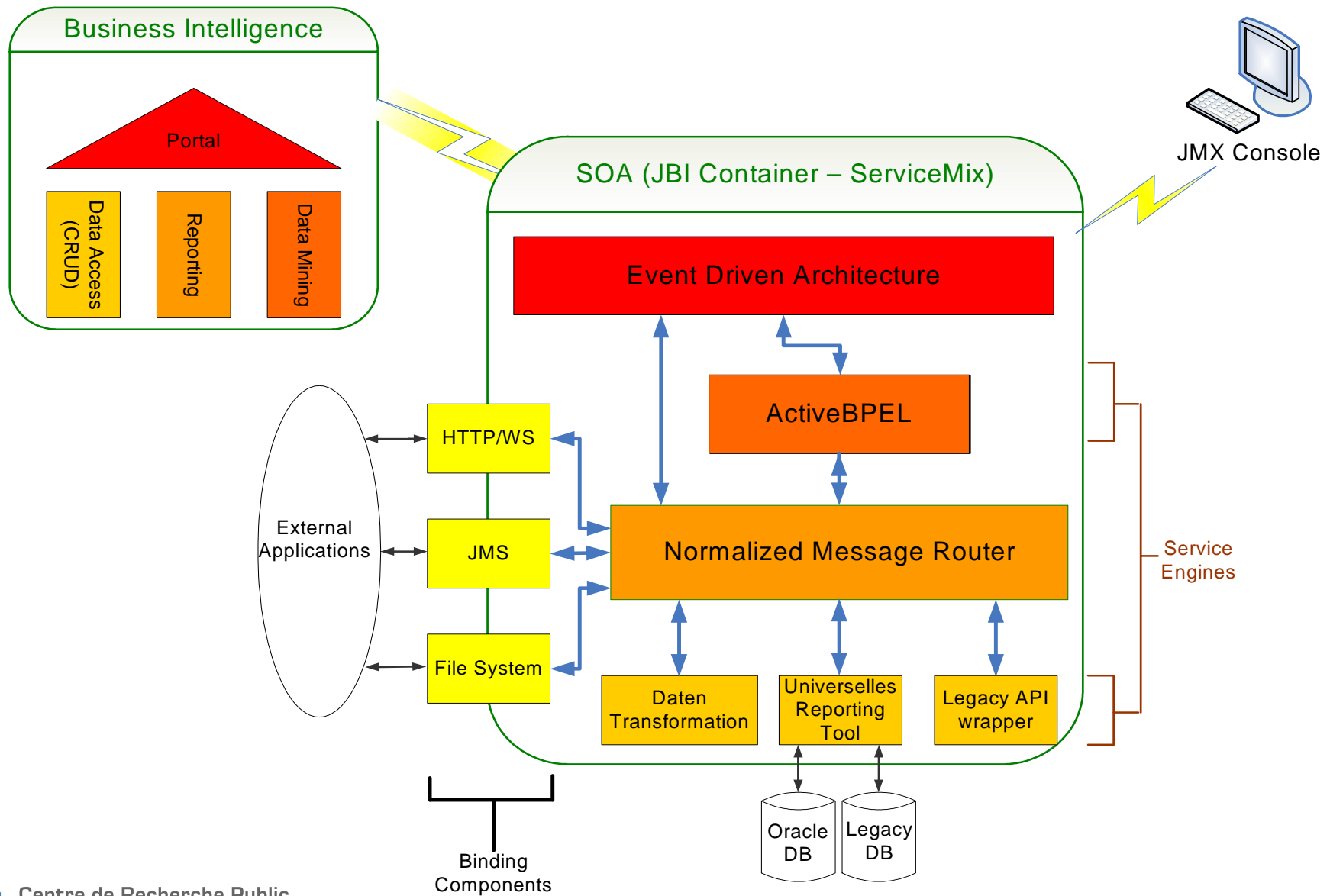


A sample pattern that alerts on each IBM stock tick with a price greater than 80 and within the next 60 seconds:

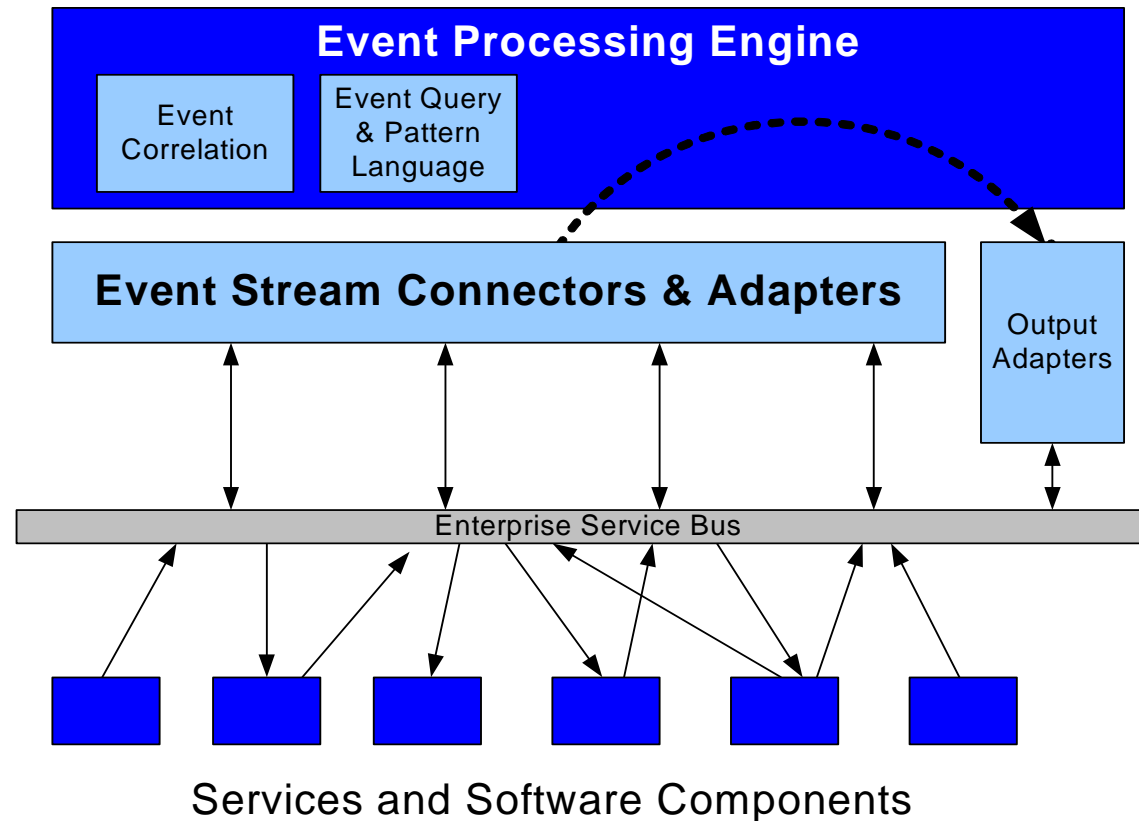
```
every StockTickEvent(symbol="IBM", price>80) where timer:within(60 seconds)
```



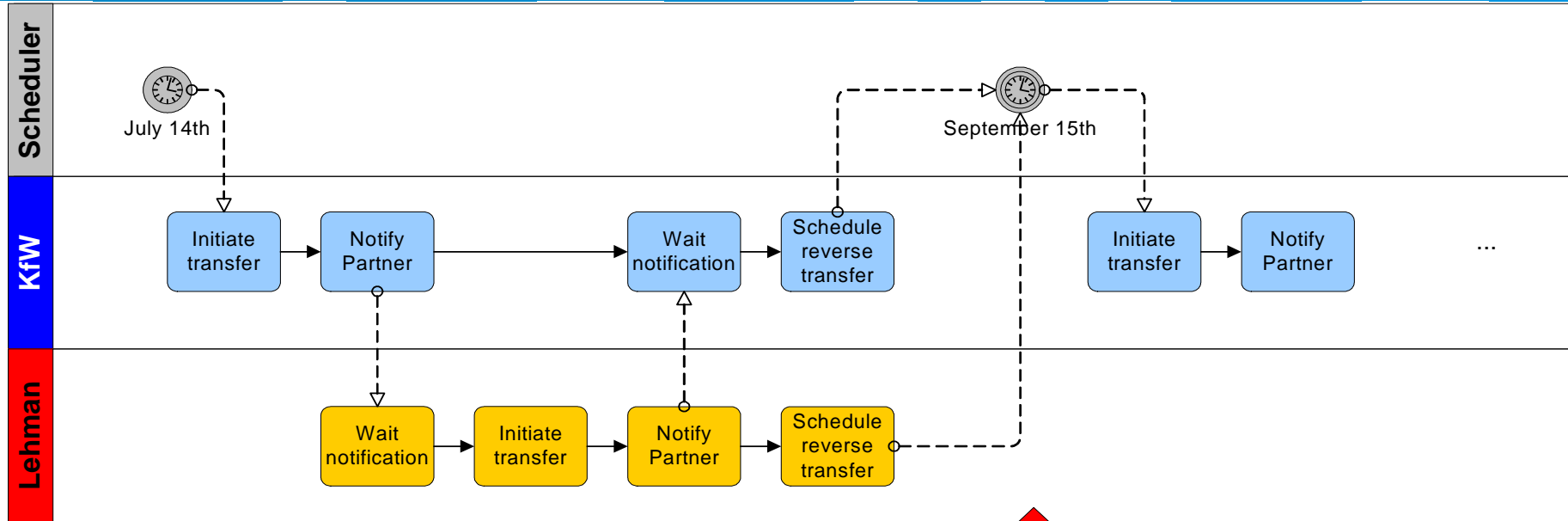
Event Driven Architecture



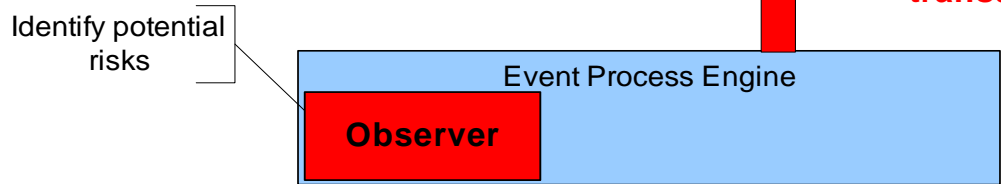
Event Driven Architecture / Choreography



Choreography and EDA

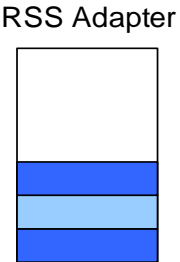


Suspend all pending transactions



September 14th:
Lehman Brothers encounters major problems

Bloomberg News Ticker →



Business Intelligence

- Portal
- Common access point to relevant data
- Statistics
- Analysis
- Data Mining
- Fraud detection

- Business Intelligence

Current research activities

→ Classification of Services

- Meta-Services (services for services)
 - Example: BPM, Logging, Reporting, Event Handling
- Business Services

→ Event Driven Architectures

- SOA and SLA monitoring
- On demand business / ad hoc workflows

Thanks you for your attention

Questions?

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