



Business Rules-Driven SOA.

A Framework for Multi-Tenant Cloud Computing

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About Our Team

- Industry-proven skills and research in Business Information Systems:
 - Information Systems analysis and design
 - Software engineering
 - Software design
 - Software development (Java/.Net)
 - Databases
 - Model Driven Architecture
 - Event-Driven SOA
 - Business Rules
 - Ontologies (research only)
 - Project Management
 - Risk Management
 - Information systems audit

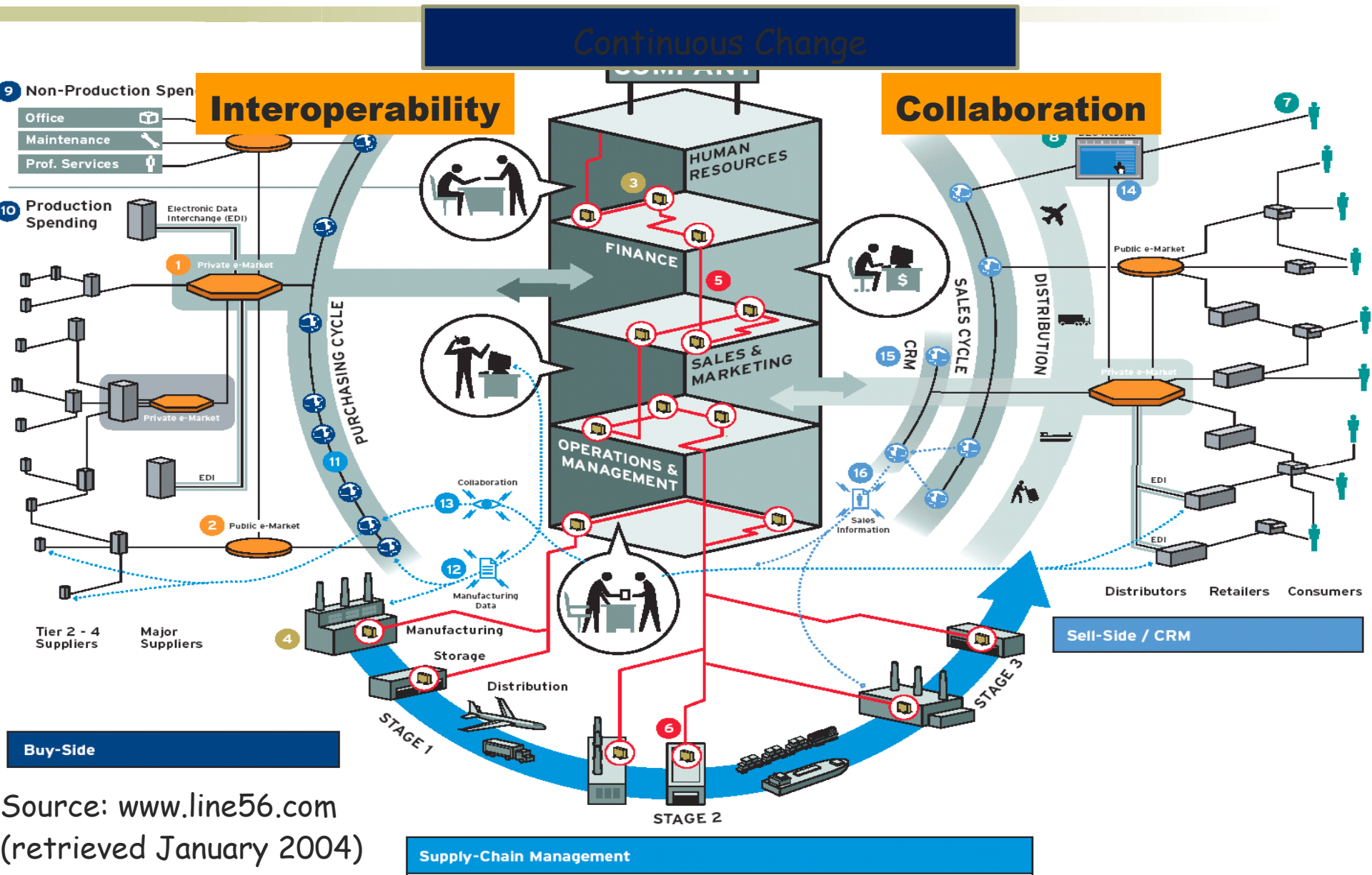


Agenda

1. Building software systems for (e-) business
2. The problem of multi-tenancy
3. Event Driven SOA - first solution
4. Business Rules Driven SOA - the second one
5. Real Life MDA - the way to deal with complexity



The old (e)Business Ecosystem



Source: www.line56.com
(retrieved January 2004)



SOA and the coupling problem

- Multiple **peer-to-peer** direct connections between software services in an Enterprise Information System:
 - generated by business needs as the company grows
 - leading to the so called "Spaghetti effect"



Enterprise Systems



- Particularities
 - Plethora of data
 - Many entry channels (web forms, mobile apps, e-mail, FTP)
 - Plethora of business rules
 - Continuous change of business requirements

- Main system's requirements
 - Highly reliable/configurable services
 - Scalability
 - 7x24 availability
 - Open to any entry channel
 - Open architecture



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Multi-tenancy principle

- One single software instance serves them all (the clients)

- Prerequisites:
 - Service Oriented Architecture

 - Software as a Service



The problem

- What happens when one tenant have different requirements than the other ones?

- Example: Payroll Business Process
 - Input: Employee's contract, Company payment rules, the national law

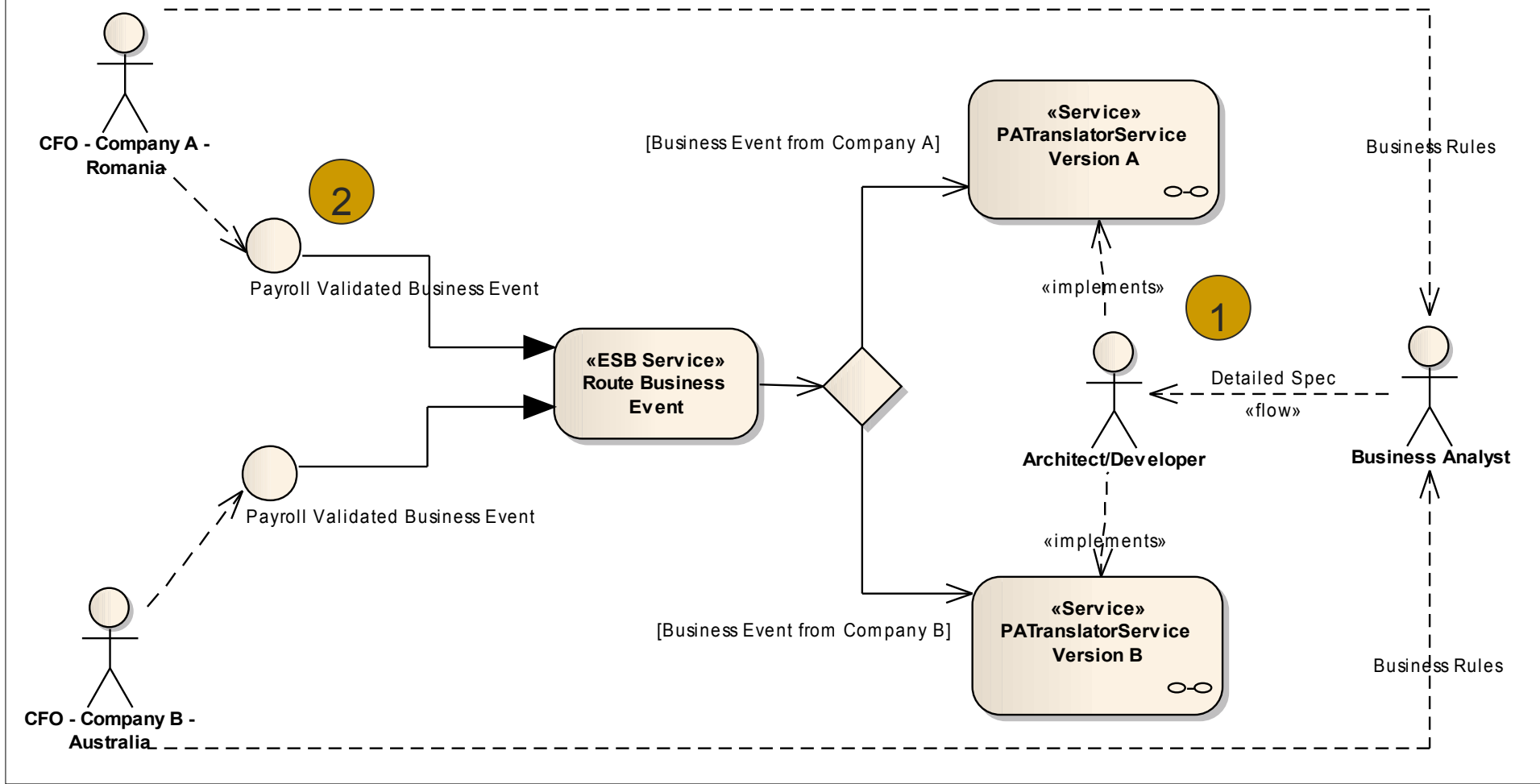
 - Output: payroll report
 - Process-to-Process interaction : Accounting BP
 - Input: payroll report
 - Output: accounting records

- The problem: the payroll \rightarrow accounting translation algorithm is different for two different clients



The First Solution - Event Driven SOA and Enterprise Service Bus

BPMN ED-SOA



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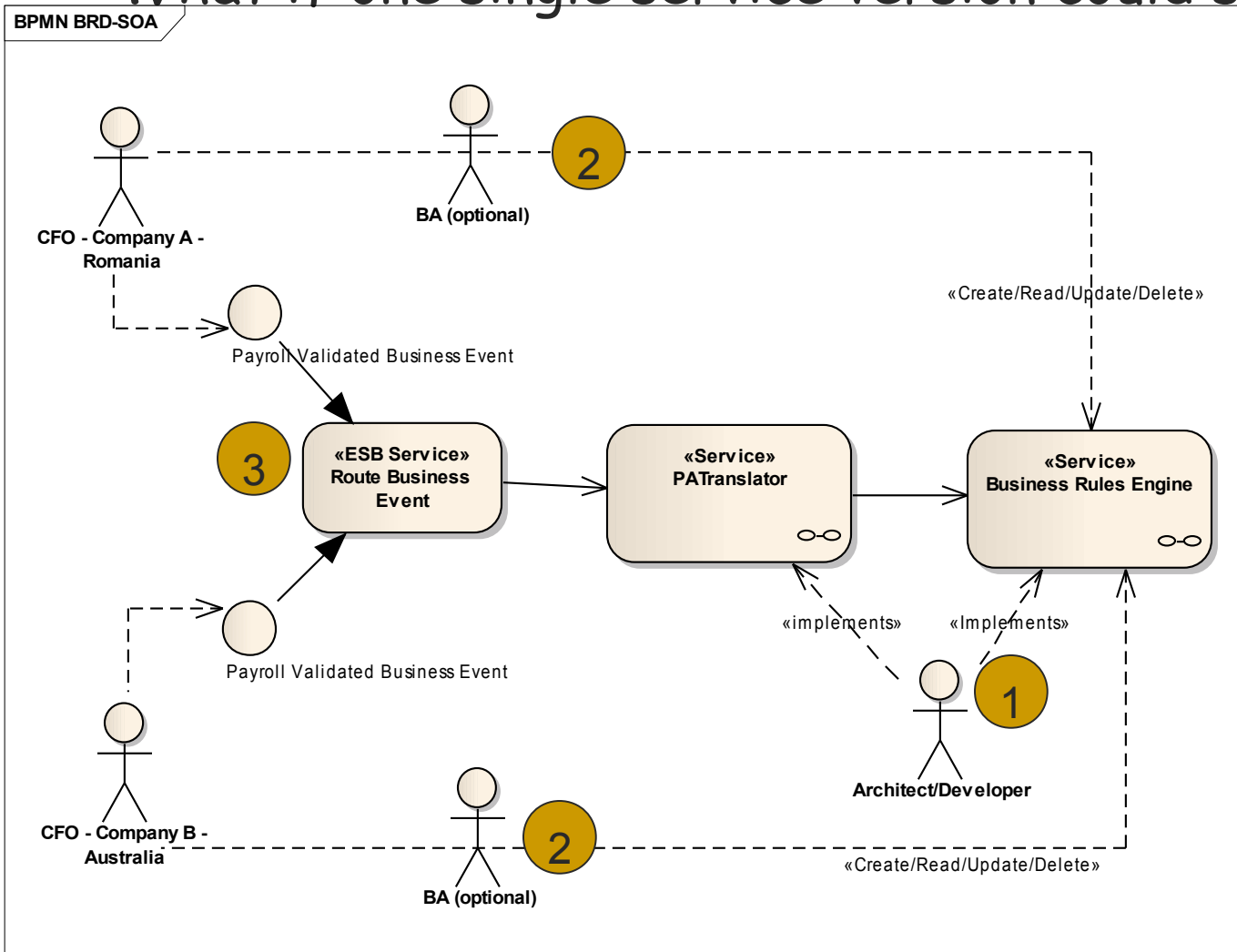
Use-Case driven development + MDA □ software evolution

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The Second Solution: Business Rules Driven SOA

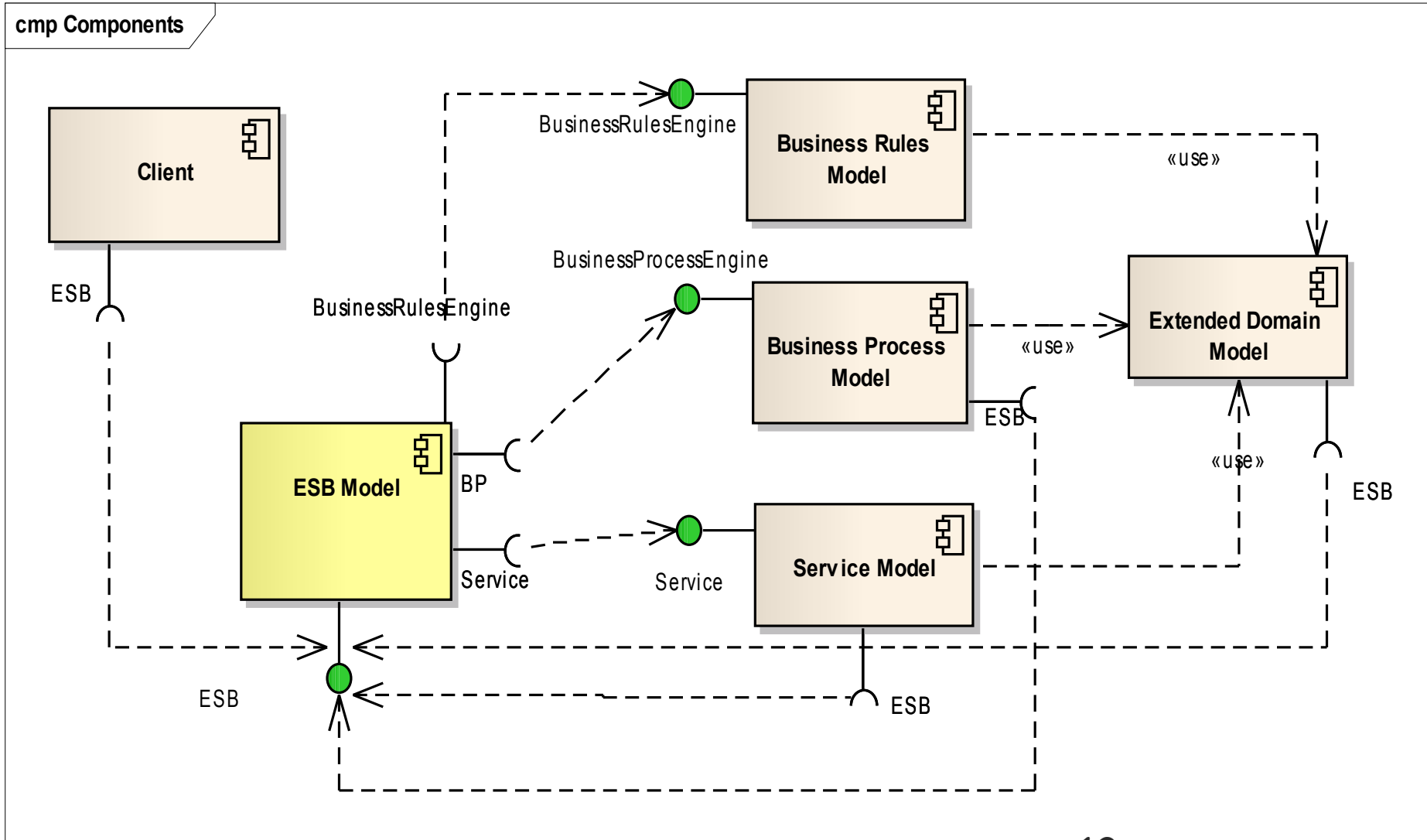
■ What if one single service version could serve them all?



1
Abstract thinking of
development /
software evolution



The Enterprise System's Architecture based on BRD-SOA





In BRD-SOA

- There may be **no** business logic encapsulated within the service/domain model, but only the system's logic

- The service becomes the orchestrator, not the business logic performer
 - Prepares the preconditions (model instances loaded from the persistence tier)

 - Creates business rules filters

 - Executes the business rules engine

 - Persists the result

Why BRD-SOA?

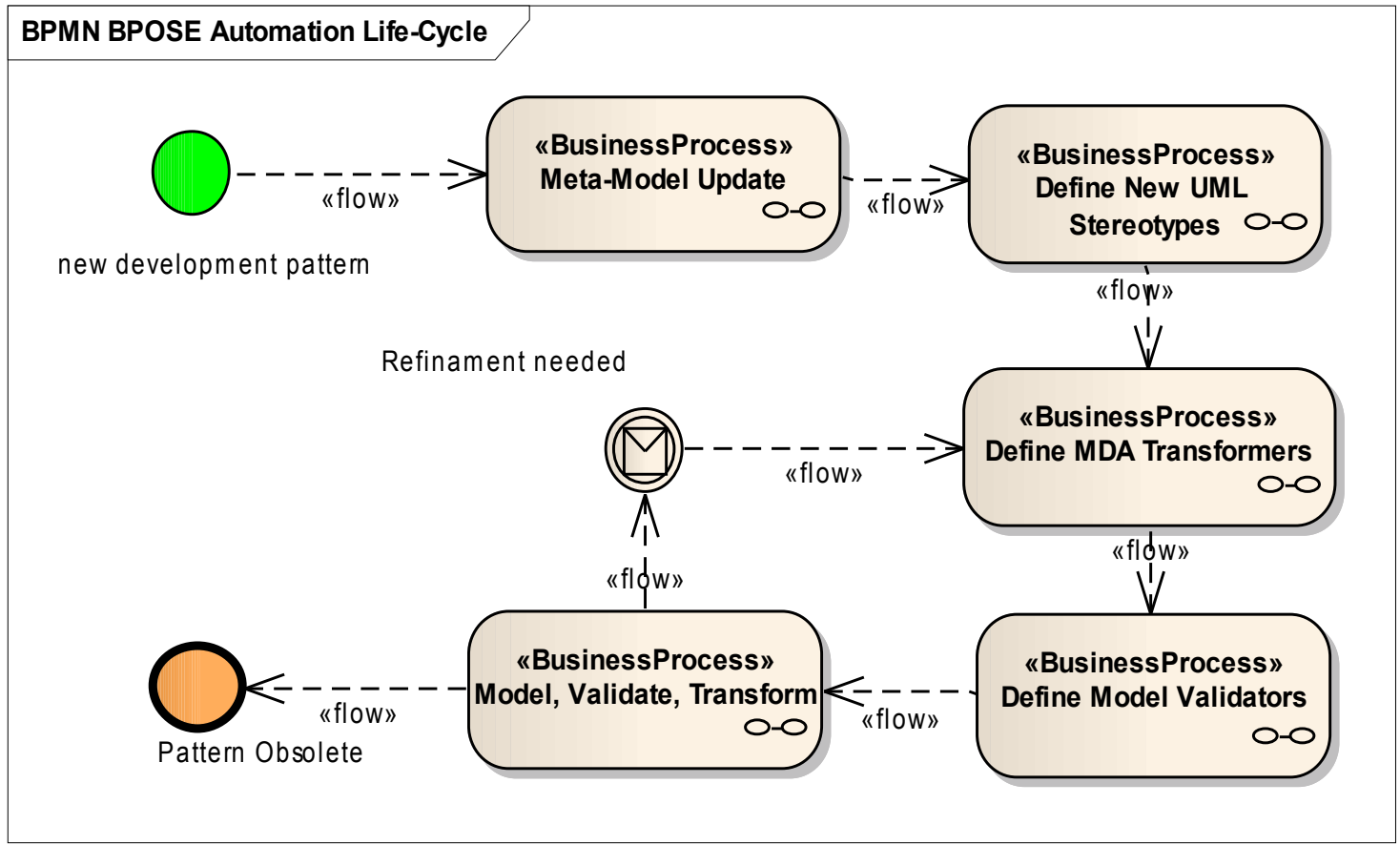
- Main advantage of Business Rules Engines:
 - Business rules may be expressed using natural language sentences (also using familiar business terms)
- IF and Only if there is an ontology in place so the business person will be able to express the nouns



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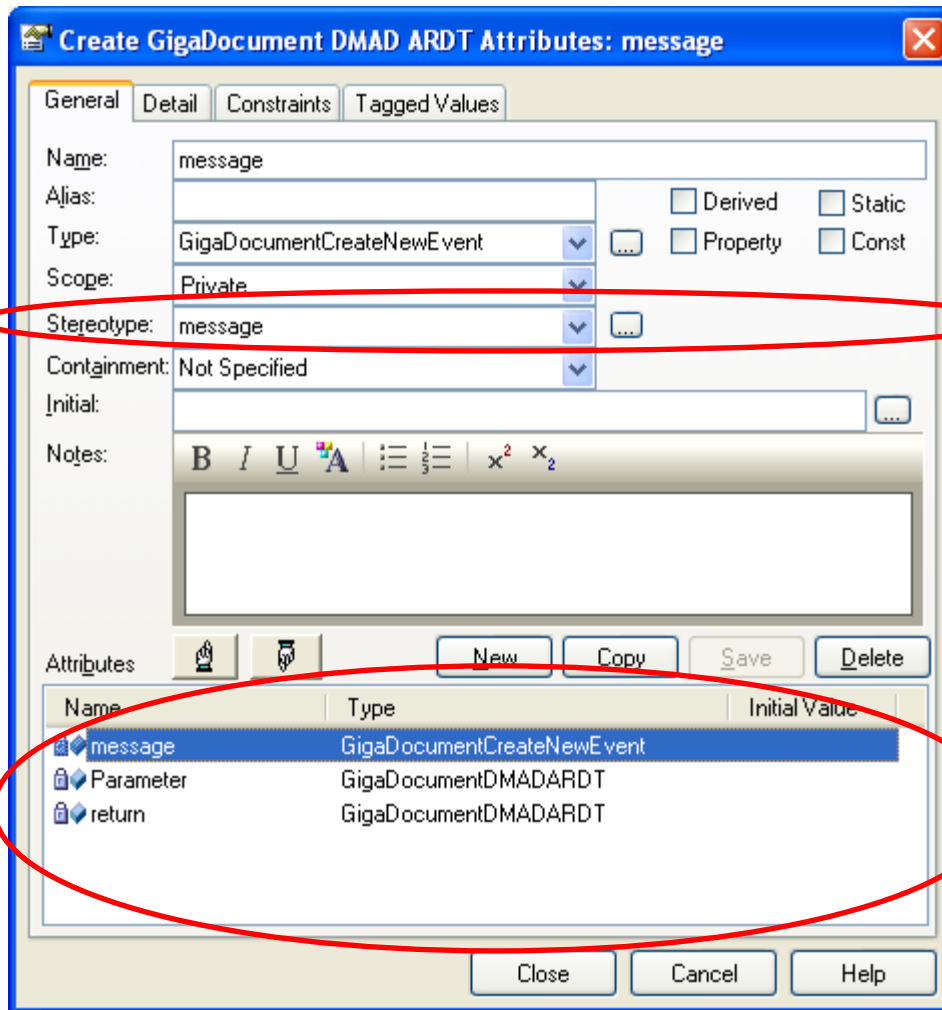
One way to approach Model Driven Architecture



Roles involved:
-Architect
-Developer



By means of modeling constraints (CIM-PIM/PSM mix)...



A set of design rules and stereotypes are applied to each CIM element

Roles involved:

- Business Analyst
- Developer
- Architect (rarely/optional)



To generated PSM (Java)...

```

IEditItemComponentController
«WebPageController»
GigaDocumentDMADARDTController

+ DETAIL_TAB_NAME: String = "DetailTab" {readOnly}
+ LIST_TAB_NAME: String = "ListTab" {readOnly}
+ clientSession: ViewController
+ selectedTab: String = LIST_TAB_NAME

+ tblOpAddRow(): void
+ tblOpDeleteRow(Object): void
+ tblOpEditRow(Object): void
+ entitySelected(Object, String, String, Boolean): void
+ editTblItemAddAction(): void
+ editTblItemDeleteAction(): void
+ editTblItemSaveAction(): void
+ editTblItemSaveAndCloseAction(): void
+ editTblItemRefreshAction(): void
+ editTblItemCancelAction(): void
+ editTblItemCloseAction(): void
+ GigaDocumentDMADARDTController()
+ changerstatuligreenrefuse(): void
+ repondrealavalidation(): void
+ edit(): void
+ validationlignesDMADARDT(): void
+ gigaDocumentDMADARDTtoDMADSSD(): void
+ informerutilisateursconcernes(): void
+ activity2(): void
+ saveGigaDocumentDMADARDT(): void
+ gigaDocumentDMADARDTtoDMADSD(): void
+ gigaDocumentDMADARDTtoDMADSDConvert(): void
+ bloquerlignes(): void
+ modifier(): void
+ createGigaDocumentDMADARDT(): void
+ gigaDocumentDMADARDTtoDMADSDConvert(): void
+ activity1(): void
+ addGigaDocumentDMADARDTdetail(): void
+ switchToListTab(): String
+ switchToDetailTab(): String
+ tabSwitchToDetailTab(): void
+ tabSwitchToListTab(): void
+ getESB(): JxeeESB
+ isDetailTabActive(): boolean
+ clearCaches(): void

«property get»
+ getSelectedTab(): String
+ getClientSession(): ViewController
+ getListAdapter(): GigaDocumentDMADARDTListAdapter
+ getDetailAdapter(): GigaDocumentDMADARDTDetailAdapter

«property set»
+ setSelectedTab(String): void
+ setClientSession(ViewController): void
+ setListAdapter(GigaDocumentDMADARDTListAdapter): void
+ setDetailAdapter(GigaDocumentDMADARDTDetailAdapter): void

```

```

IJxeeTableComponentAdapter
«WebPageListAdapter»
GigaDocumentDMADARDTListAdapter

+ controller: GigaDocumentDMADARDTController
- showavailablestatusesData: List<ExtendedAttribute>
- showDMADARDTsData: List<GigaDocumentDMADARDT>
- obtainAnalyticalAccountData: List<AnalyticalAccount>
- obtainOrganizationListData: List<OrganizationStructure>

«Property»
- showDMADARDTsSelection: SimpleSelection
- showDMADARDTsTableUtil: RichExtendedTableUtil = new RichExtendedTableUtil()
- showDMADARDTsTable: HtmlExtendedDataTable

+ GigaDocumentDMADARDTListAdapter(GigaDocumentDMADARDTController)
+ getItemsSession(): ViewController
+ getESB(): JxeeESB
+ getData(): List
+ isAddActive(): boolean
+ isEditActive(Object): boolean
+ isDeleteActive(Object): boolean
+ getShowavailablestatusesData(): List<ExtendedAttribute>
+ getShowDMADARDTsData(): List<GigaDocumentDMADARDT>
+ getSelectedShowDMADARDTsData(): GigaDocumentDMADARDT
+ getSelectedItemToEdit(): GigaDocumentDMADARDT
+ getObtainAnalyticalAccountData(): List<AnalyticalAccount>
+ getObtainOrganizationListData(): List<OrganizationStructure>

«property get»
+ getShowDMADARDTsSelection(): SimpleSelection
+ getShowDMADARDTsTable(): HtmlExtendedDataTable

«property set»
+ setShowDMADARDTsSelection(SimpleSelection): void
+ setShowDMADARDTsTable(HtmlExtendedDataTable): void

```

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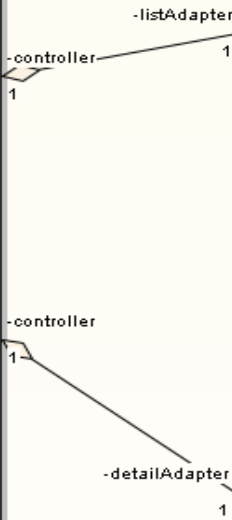
IEditItemComponentAdapter
«WebPageDetailAdapter»
GigaDocumentDMADARDTDetailAdapter

+ controller: GigaDocumentDMADARDTController
+ selectedEntity: GigaDocumentDMADARDT
+ TableDetailDMAD_SSSelection: SimpleSelection = new SimpleSelection()

+ getController(): GigaDocumentDMADARDTController
+ setController(GigaDocumentDMADARDTController): void
+ GigaDocumentDMADARDTDetailAdapter(GigaDocumentDMADARDTController)
+ getClientSession(): ViewController
+ getESB(): JxeeESB
+ setElementToEdit(Object): void
+ isAddBtnActive(): boolean
+ isDeleteBtnActive(): boolean
+ isSaveBtnActive(): boolean
+ isSaveNewBtnActive(): boolean
+ isRefreshBtnActive(): boolean

```

Developers are allowed to make adjustments to the generated model



And finally to working code

- Java Classes
 - Domain model structures
 - Business Event structure
 - EJB service
 - ESB configurations
- ORM mappings (JPA annotations)
- JPA-QL queries
- JSF web pages

Why do we call it “real life” MDA?

- A few **MDA shortcuts** have been formally defined to become productive
 - A CIM element may have a link to a PIM or a PSM element
 - A PIM element may include PSM concepts (Java code generated as the behavior content of UML class element)
 - Developers may interfere with the MDA multiple transformation steps (they are allowed to modify the generated models, before generating the next ones)