Practical Industrialisation of Information Technology
(for alignment of business and IT)

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A lecture for course "Enterprise and Service-Oriented Architecture (ESOA) 2007"

Lausanne, EPFL, June 20, 2007

My CV

- **An enterprise solutions architect & coordinator**
- Have always worked in the provision of IT services
- From a programmer to a systems architect
- Experience in scientific, international, industry and public environments
  - IHEP (Protvino, Russia), CERN (Geneva)
  - ISO (Geneva), IOC (Lausanne), IUCN (Gland)
  - BUPA (Ashford, UK), Groupe Mutuel (Martigny)
  - IT department of a French-speaking canton

My CV (cont.)

- Ph.D. in computer graphics
- Co-author of book “The Latex Companion”
- Have created systems which work without me
- Current specialisation is practical aspects of architecting flexibility for enterprise solutions
- Current hobby is writing book “**Improving business process management systems**”
  - effectiveness (“Do the right things”)
  - efficiency (“Do the things right”)

Agenda

- General trends in IT
- Case study
- Around BPMN

Today's business imperative: deliver better enterprise systems

- No architecture blueprint
- 38 years of construction
- 160 rooms, 1257 windows, 950 doors
- Over 20 tonnes of paint required

- No disrupting of river traffic activities
- The committee evaluated 50 projects
- Three architectural techniques
- 8 years of construction
- Modernised for new technology

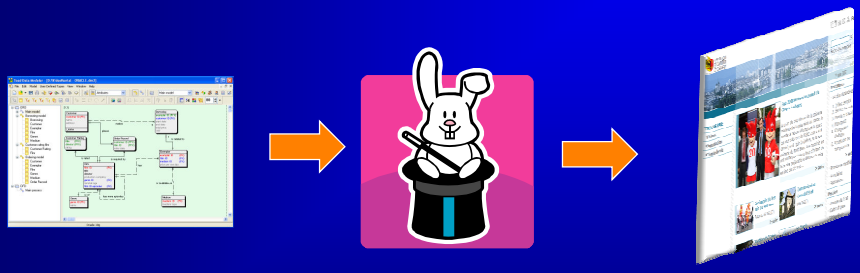
Need for industrialisation of IT

- The UN joint inspection unit reported (report 2002/9) that, "In spite of considerable financial investment in management information systems, which is estimated to be close to US$ 1 billion over the last ten years for the whole United Nations system, most of the United Nations system organizations have had a modest success in their implementation."

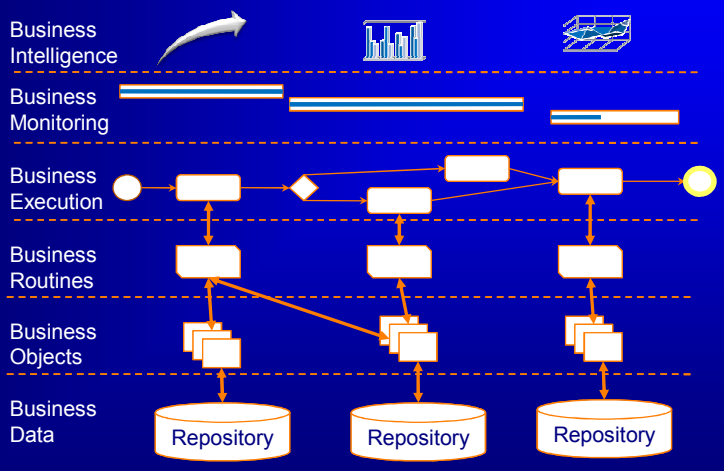
Needs for industrialisation of IT (cont.)

- 80 % of software life cycle costs occur during the post-release maintenance phase and 80 % of necessary maintenance is due to unmet or unforeseen user requirements

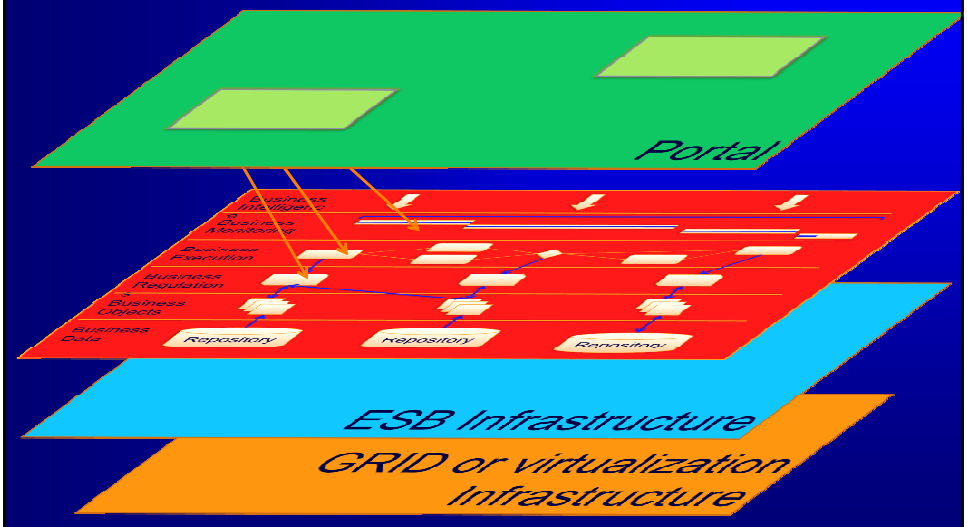
Expected evolution of IT: From guild “magic”



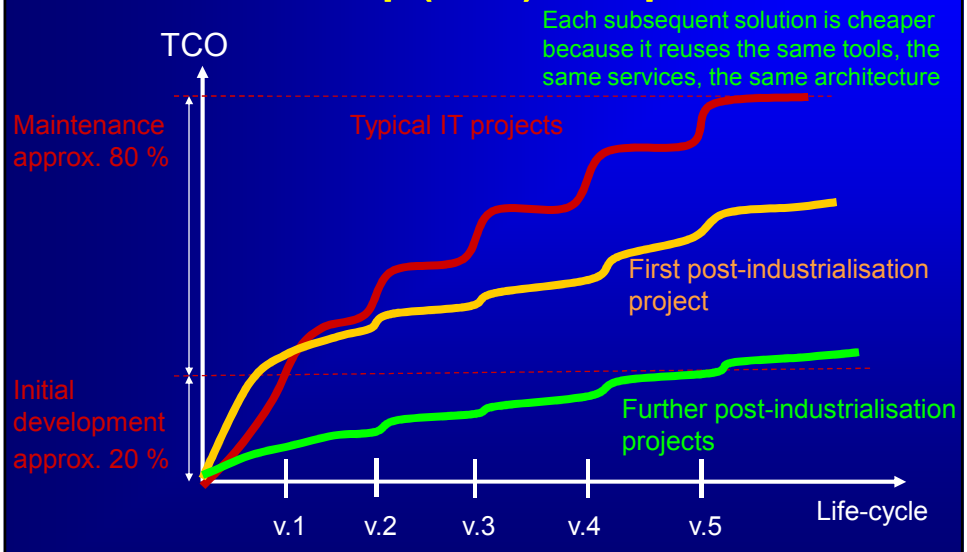
Expected evolution of IT: To processes & services



Expected evolution of IT: and other technologies



Considerable reduction of Total Cost of Ownership (TCO) is expected



Industrialisation drivers

- Lean production
- Toyota production system
- Regulatory compliance
- ISO 9001:2000
- Agile development
- IT governance (ITIL, ISO/IEC 20000)
- Enterprise architecture
- Flexibility of software-intensive systems
- SOA

Quality management system artefacts

Business processes	Quality manuals	Business procedures	Records
Management	1	~5	~100
Sales	1	~10	~10 000
Customer services	1	~10	~10 000
Production	1	~10	~100 000

Covered by traditional applications for quality management

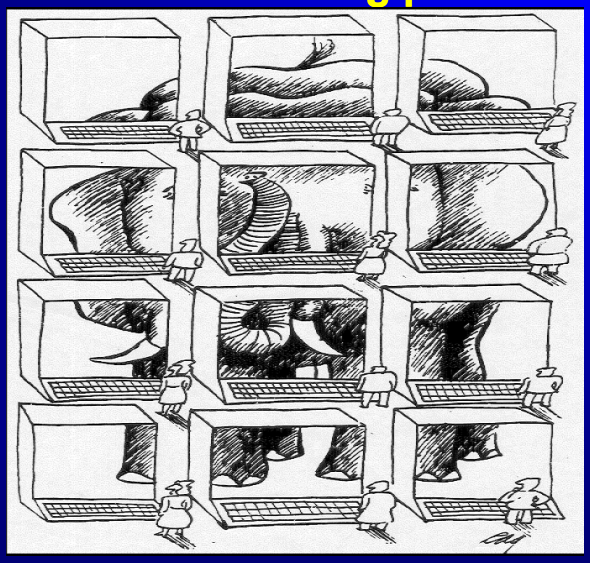
Covered by various business applications, paper and manual work

Having these artefacts is not enough; are they traceable, secure and correctly managed throughout their life cycle?

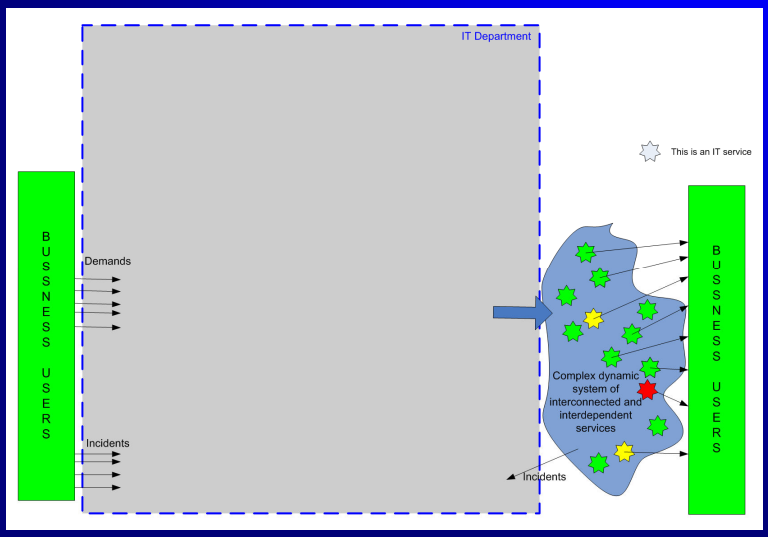
Agile methodology

- Agile system development is different from development of an agile system
- Build an agile system in an agile and incremental way
- Actually, we have to advance with users' pace

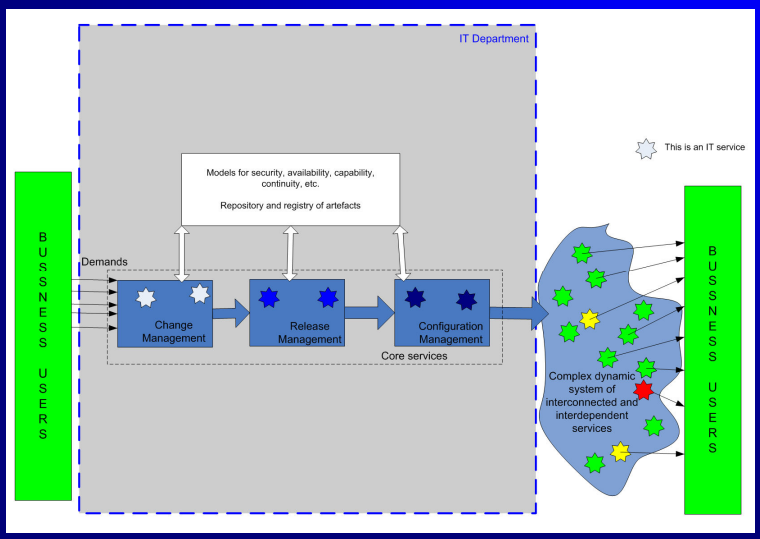
Agile methodology (cont.)
See and understand the big picture is critical



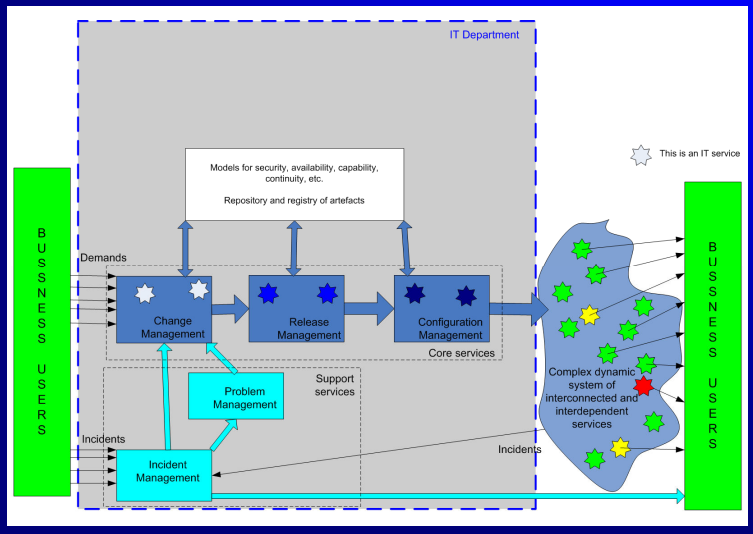
IT governance as a BPM system: Outside-in view



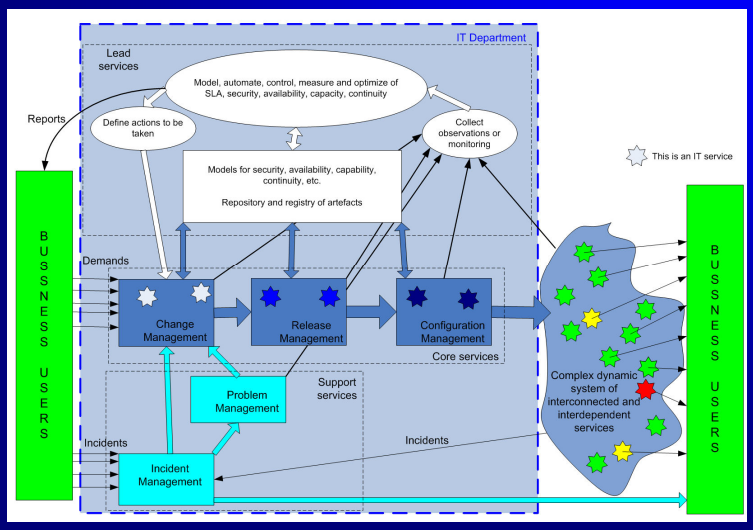
IT governance as a BPM system: Core processes added



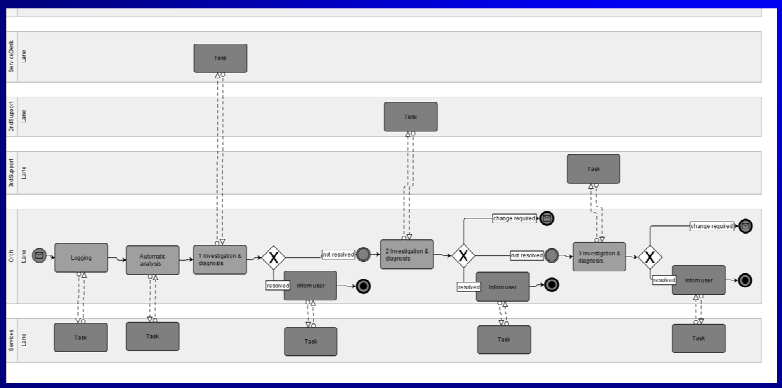
IT governance as a BPM system: Support processes added



IT governance as a BPM system: Lead processes added

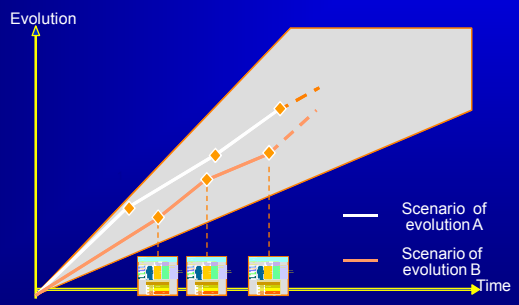


IT governance as a BPM system: Incident management process

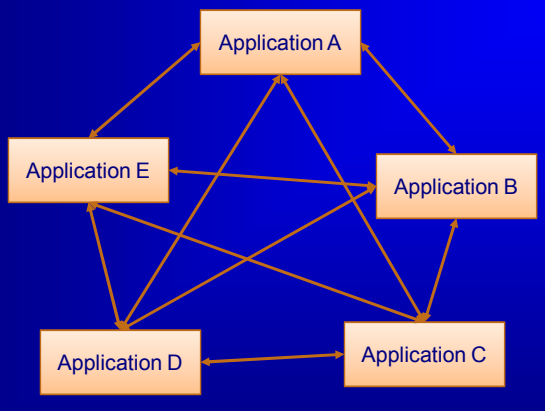


The main concern of an enterprise architect

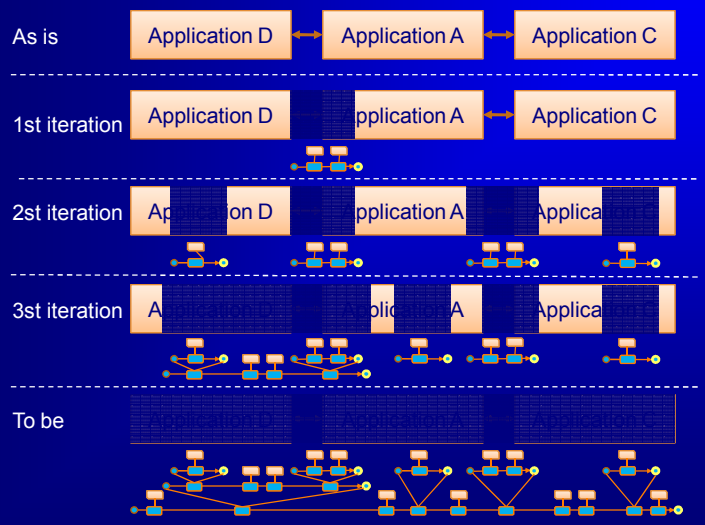
- Guarantee the smooth evolution of the whole system



Typical enterprise architecture AS-IS



Transforming a business process



Industrialisation of IT at the enterprise level

- Challenging many of existing barriers and technologies
- BPM, SOA, ECM, EA, BI, BR, EDA, IT governance have to be considered together
- Evolution is faster; IT systems are more complex
- The human factor becomes very critical

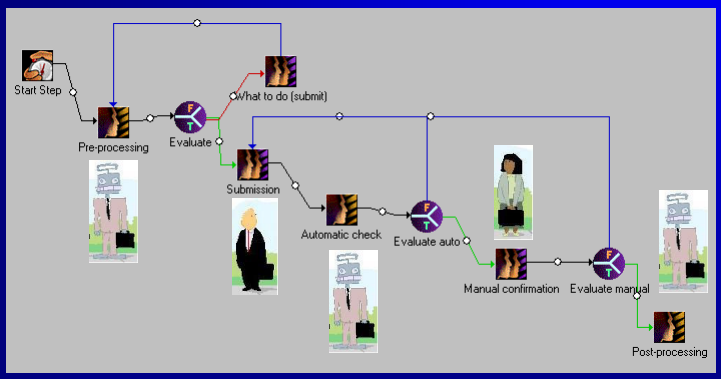
Case study: an international organization

- Automation of parts of the standards production chain (about 3 000 complex technical documents per year, 50 persons involved, about 50 different tasks, 3 production chains):
  - deployed since summer 2000
  - about 30 different workflows were designed
  - about 100 workflows initiated per day
  - integrated with e-mail, in-house databases, other DMS servers

Tools involved

- A document management system
- A workflow engine (BPMN didn't exist yet)
- Robot (external agent) based automation
- CORBA as basis for connectivity of services
- Dynamic language Jython
- Java
- About 40 services
- API for all enterprise applications and repositories
- Elements of EDA

An example of a process



Results

- The system has been in place for several years
- The maintenance and evolution of this production system required in several times less resources
- Several successful (and easy to do) migrations were undertaken

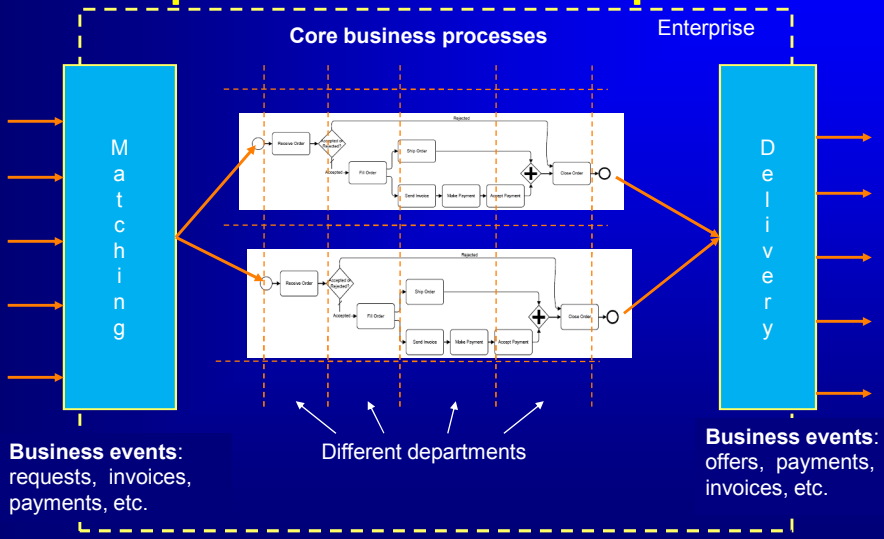
Case study: an insurance company

- Current environment - mainframe-based
  - Many applications are typical “usine à gas”
- Target environment - SOA-based
  - Enterprise-wide business process management
- Project approach
  - Total rework of all core business systems over 3 years

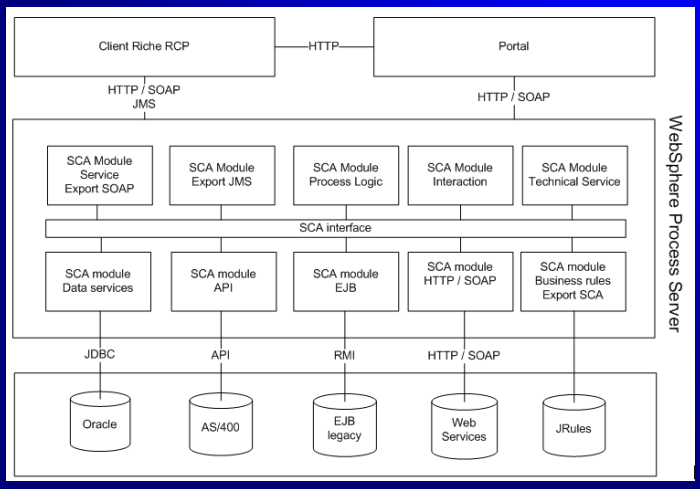
Common principles for design of the new system

- Big picture
- Business events
- Long-running processes
- Avoid dispersion of business logic
- Services, services, services
- Processes are first-class citizens
- Process modeling in Business Process Modeling Notation (BPMN)
- Process execution in Business Process Execution Language (BPEL)

Big picture: typical service- and process-oriented enterprise



Big picture of a technical architect



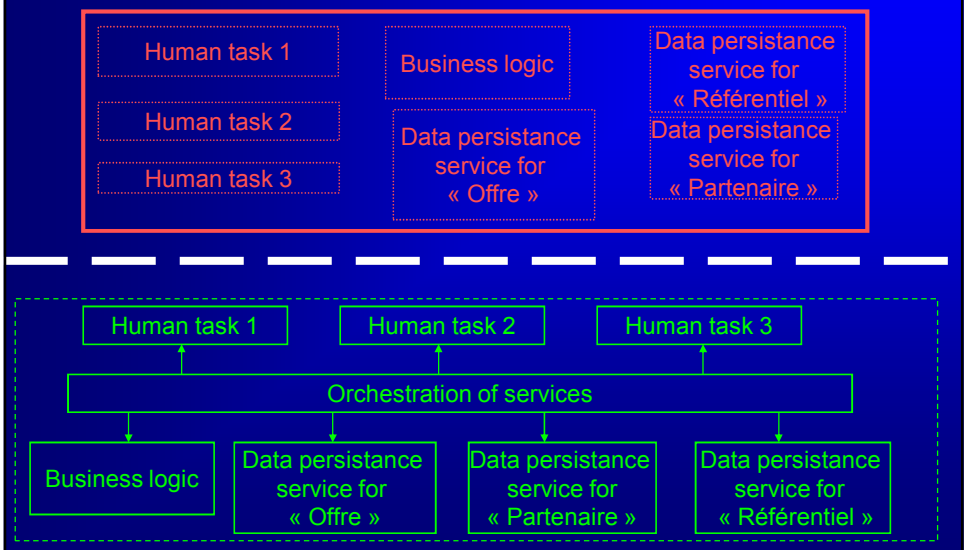
The reality: people understand the "processes" differently

- In the in-house Quality Management System
  - exist mainly as a set of work instructions
  - implemented by an external company
- In the in-house workflows
  - are disconnected from other IT systems
  - behave like Microsoft "Office assistant"
- In the software development practices
  - sometimes exist as UML activity diagrams

The reality: in-house software development style

- Current approach
  - GUI and database schemas are fixed
  - something to link them needs to be developed
- Current interactions
  - users -> BAs: specify everything everywhere, in great detail, in advance
  - BAs -> development: validation of specifications by implementation
- Current result
  - BAs produce unimplementable processes
  - IT "dissolve" processes into monolithic programs

Application architecture: monolithic vs. BPM on SOA



The reality: first try to do "processes"

- De facto process design procedure
  1. Creation of a quasi-BPMN diagram in Visio by a BA
  2. Translation of specs into a set of use cases by a BA
  3. "Reverse engineering" of use cases into a BPMN diagram (in Intalio) by a workflow specialist
  4. BPEL implementation (in WebSphere) by a developer
- Result – business processes have been lost between each of these steps

Recommendations to improve that reality

- A way to achieve flexibility with given tools
- An approach for evolution of artefacts
- A business process modeling procedure
  - to capture, but not to analyse a process
- A diagramming style in BPMN
- A programming style in BPEL
- A big picture of security

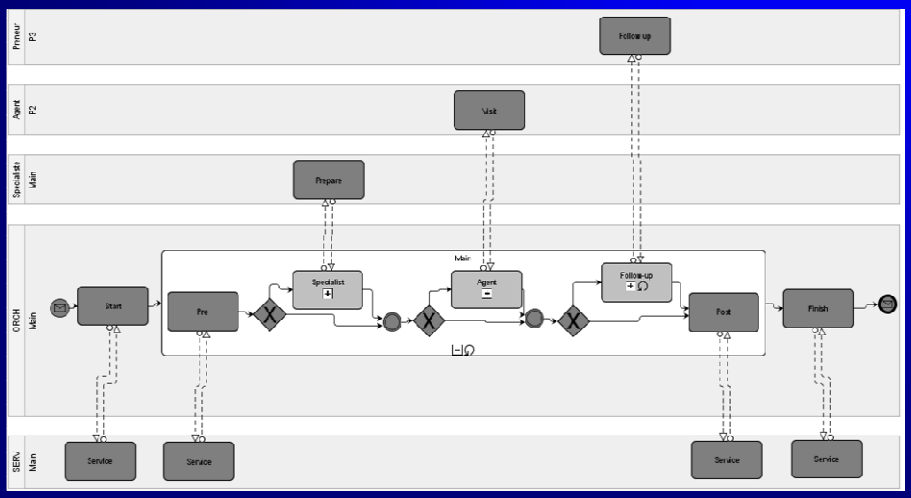
Business process modeling (1): create an aggregated model

1. Identify the main business objects
2. Determine related business events
3. List other business processes involved
4. Implement the flow of activities
5. Describe human activities
6. Describe automated activities
7. Document use cases

Business process modeling (2): make the model executable

- Formalise the main business objects as XSD
- Define routing logic
- Define business logic in a rules engine
- Link to existing services
- Develop missing services (firstly as WSDL)
- Determine the document types involved
- Determine KPI and traceability

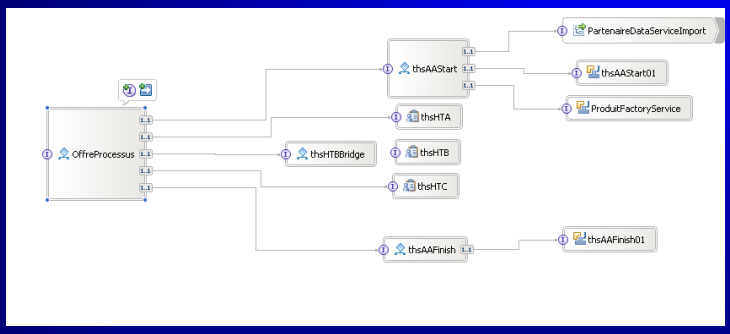
Process design and validation BPMN



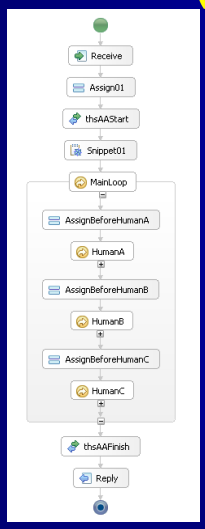
A common tool for business and IT: Designer from www.intalio.com

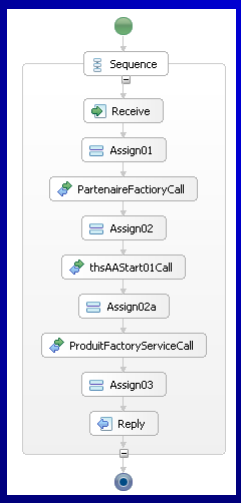
- BPMN diagrams serve for validation of specs
  - Artefacts defined by BAs are quickly implemented
  - Processes are always executable
  - Possibility to use existing services
  - Simple automated testing is reflected
- Encourage BAs to use Designer directly
- Discuss BPMN diagrams with the users

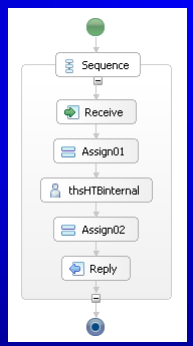
A programming style (with SCA in WebSphere)

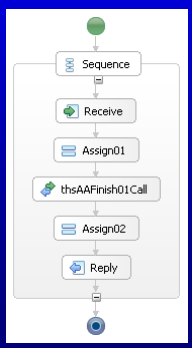


A programming style (with BPEL in WebSphere)

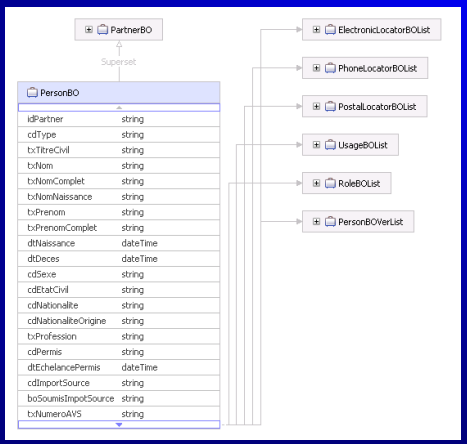




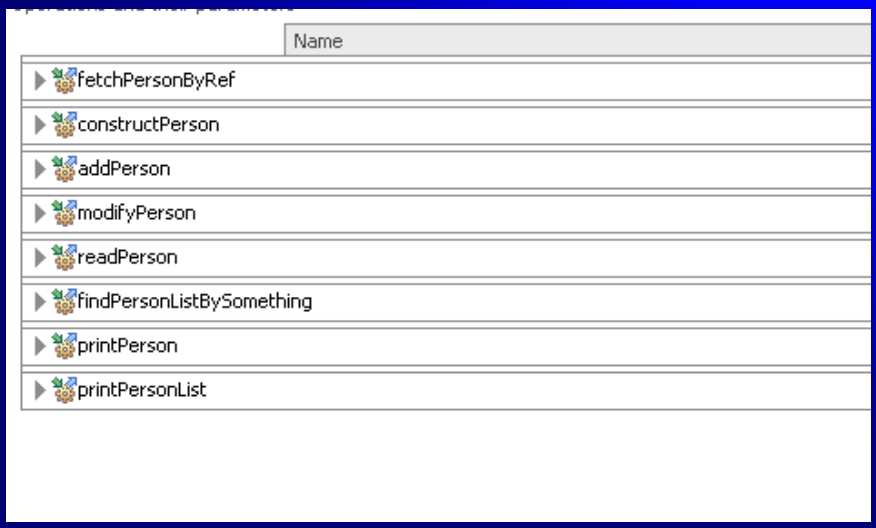




Patterns for business objects (1)



Patterns for programmatic interfaces (1)



Patterns for programmatic interfaces (2)

constructPerson		
Input(s)	txFirstName	string
	txLastName	string
	dtBirthday	dateTime
	cdGender	string
	obContext	ContextXO
	cdScenario	string
Output(s)	obPerson	PersonBO
Fault(s)	obFault	FaultXO
addPerson		
Input(s)	obPersonIn	PersonBO
	obContext	ContextXO
	cdScenario	string
Output(s)	obPersonOut	PersonBO
Fault(s)	uobFault	FaultXO
modifyPerson		

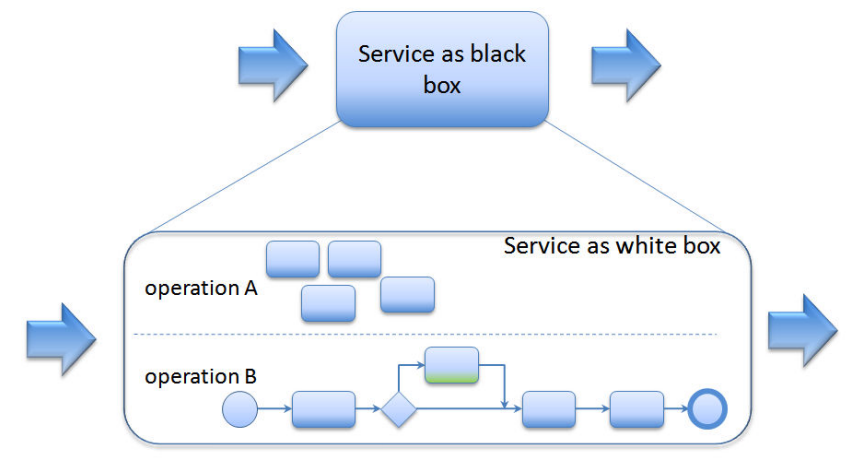
An example from an Open Group conference, October 2006, Lisbon

- Salamander Organization Limited have been able to demonstrate a ten-fold return on investment through improved coherence of processes: saving of 100 million Euros from the UK MoD logistic 3-4 billion Euro budget. It was experienced that the users (not generals, of course) were comfortable to work directly with BPMN-based tool to express their business processes.

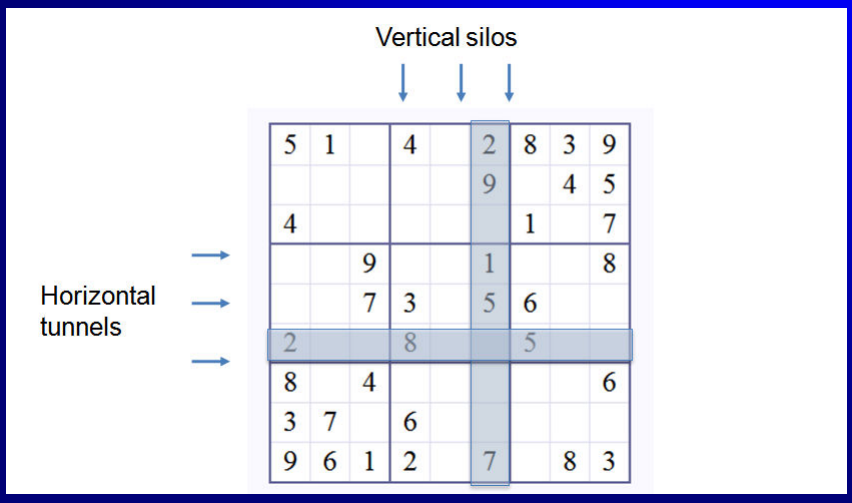
Around BPMN

- Some principles of BPM
- Some BPMN patterns
- An example of modeling

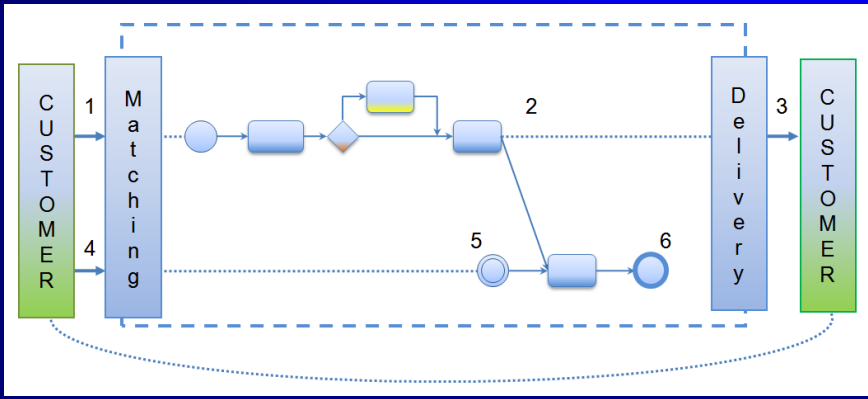
Services vs Processes



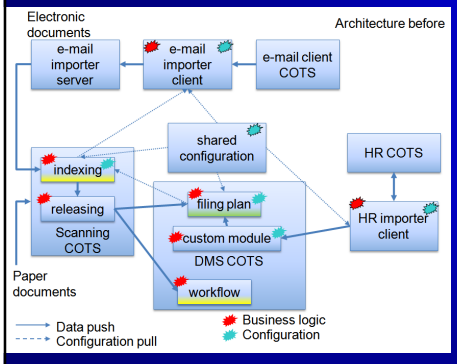
Horizontal and vertical coordination

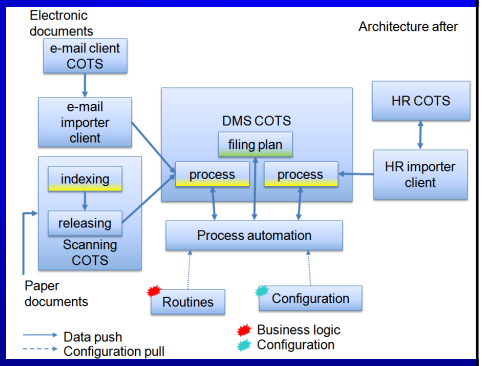


Long-running processes

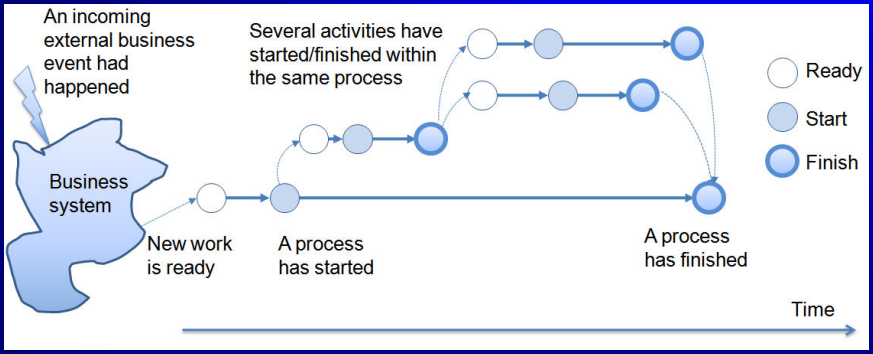


Avoid dispersion of business logic

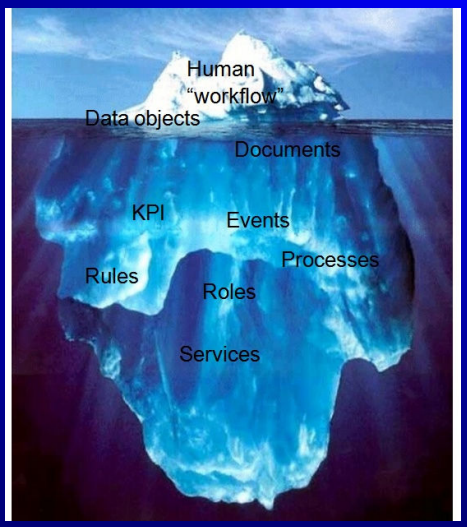




Importance of business events



Digitalisation of artefacts



Difficult artefacts: Events

- A construct that represents a solicited or unsolicited fact indicating a state change in the enterprise or its environment
- Categories: internal, external, temporal, spontaneous
- “Start” of something and “Finish” of something
- Usage:
  - Record management
- Challenges
  - Extract them from existing applications

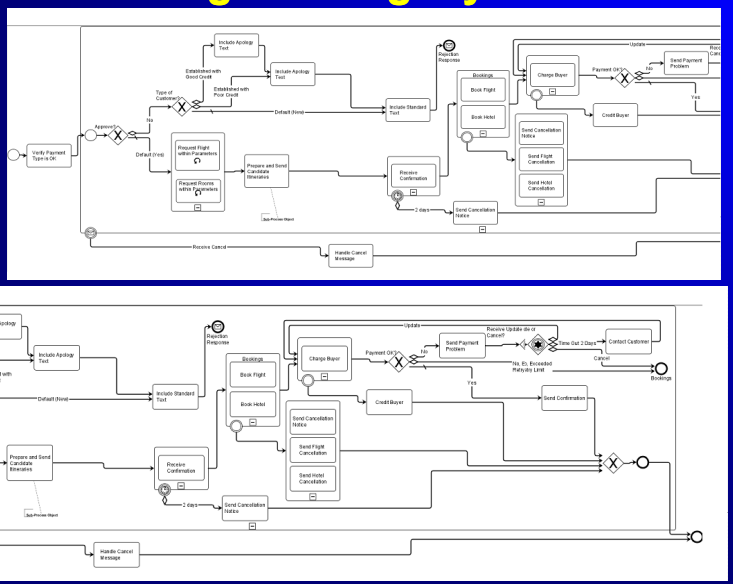
Difficult artefacts: Roles

- A construct that represents the relevant skills and responsibilities required to perform some operations
- Categories: management, organizational, functional, special expertise, project, security, application
- A word of warning
  - Composition of clients into roles may be complex
  - Role assignment can be very dynamic
  - Many tools and people treat “roles” differently

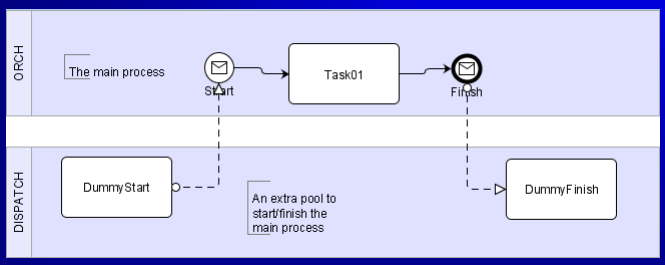
Difficult artefacts: Documents

- Metadata
  - type de document
  - security (“public”, “internal”, “confidential”, “secret”)
  - classification par domain / process
  - classification for record management
  - retention schema
- Life-cycle
- Permissions (may be dynamic)
- Formats (e.g. an archiving format)
- International and industry regulations

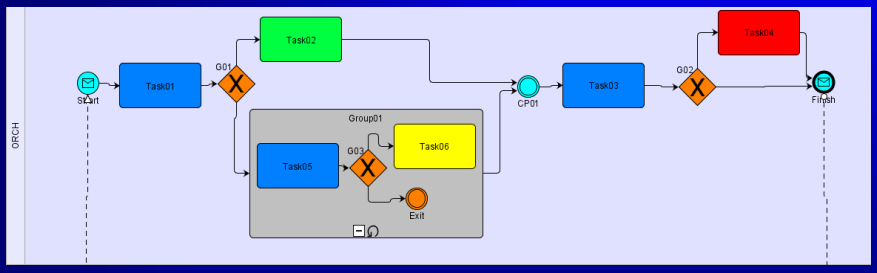
Diagramming style in BPMN



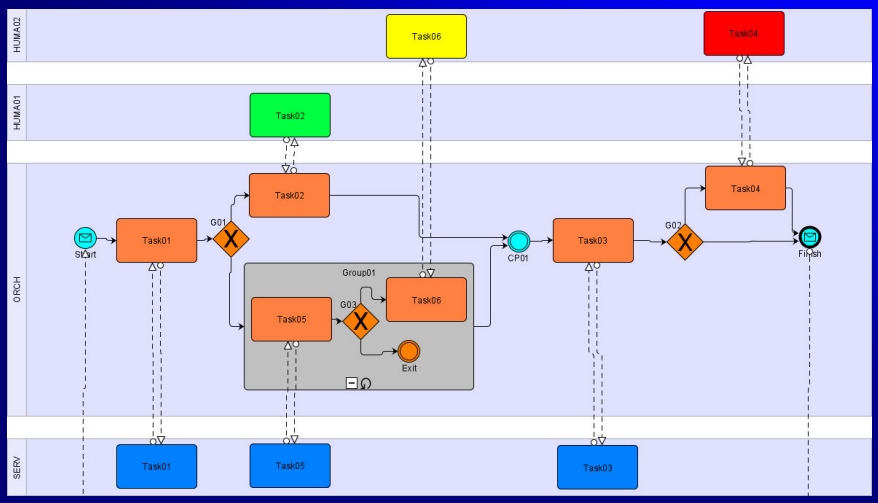
Diagramming style in BPMN (cont.)



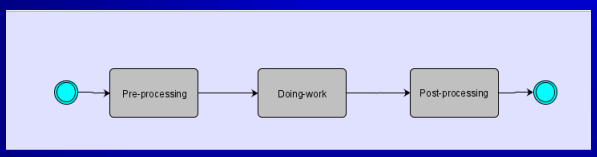
Diagramming style in BPMN (cont.)



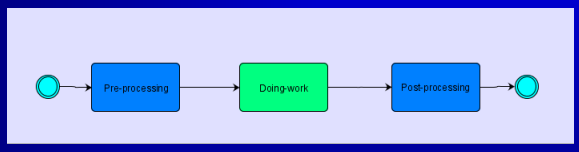
Diagramming style in BPMN (cont.)



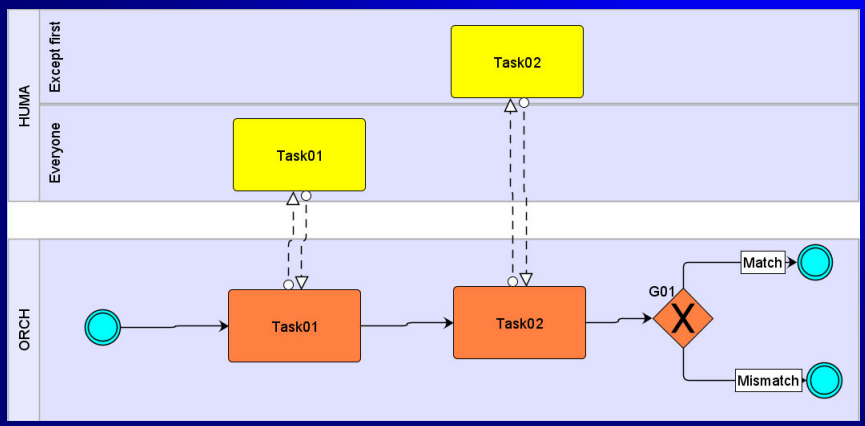
Pattern PDP
Pre-processing, Doing-work, Post-processing



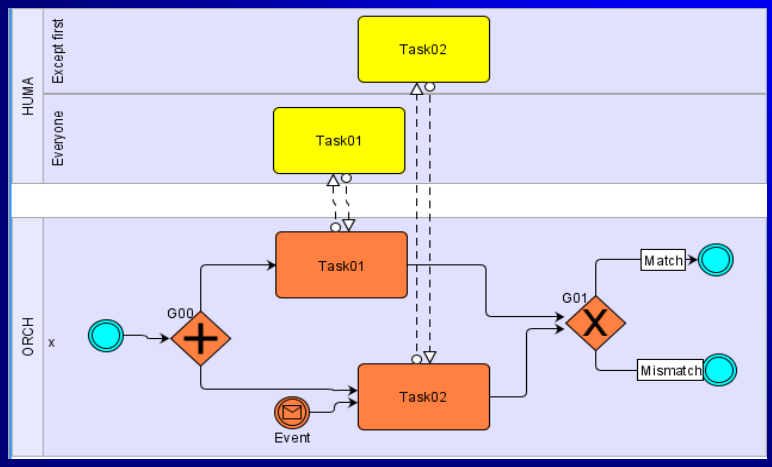
Pattern AHA
Automatic, Human, and Automatic



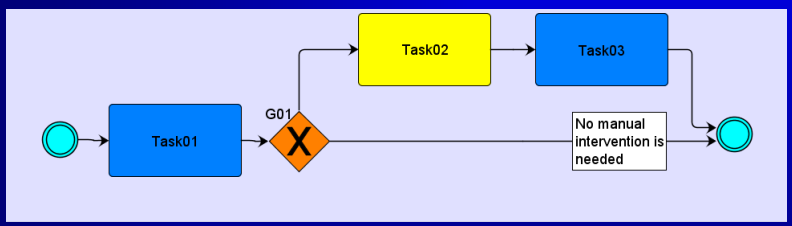
Pattern DC
Double Check



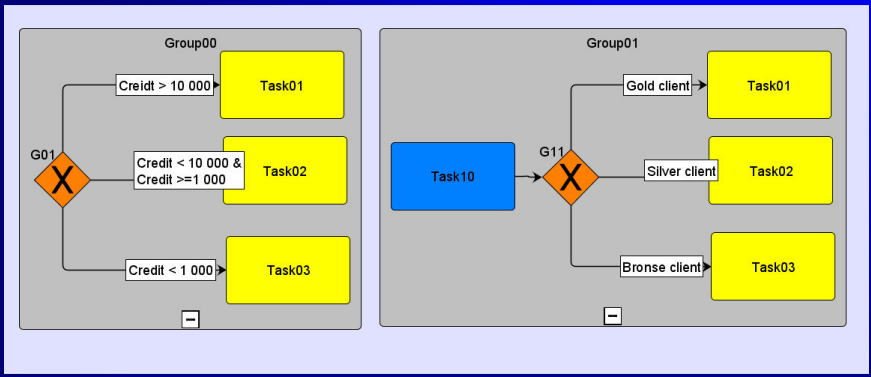
Pattern DC bis



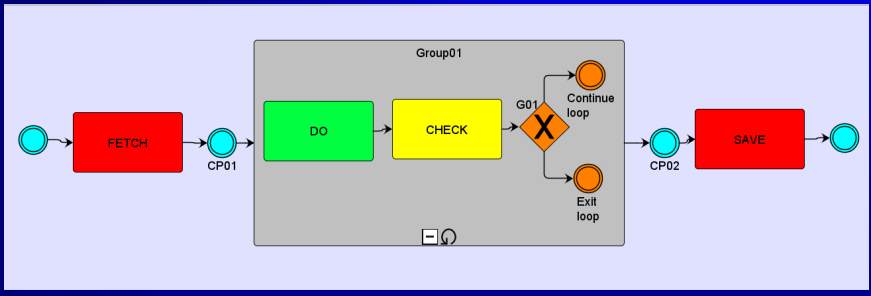
Pattern M&M
Man & Machine



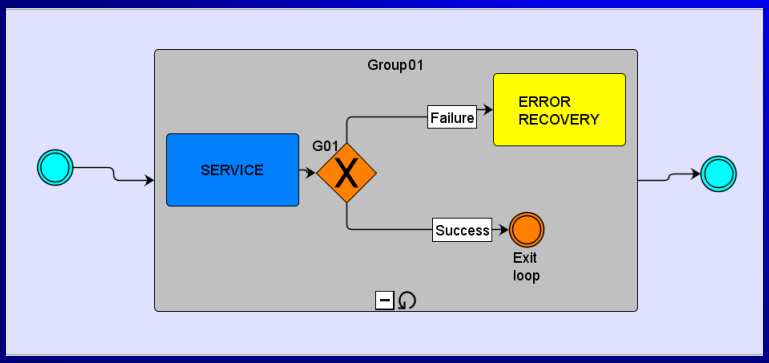
Pattern DBL
Decoupled Business Logic



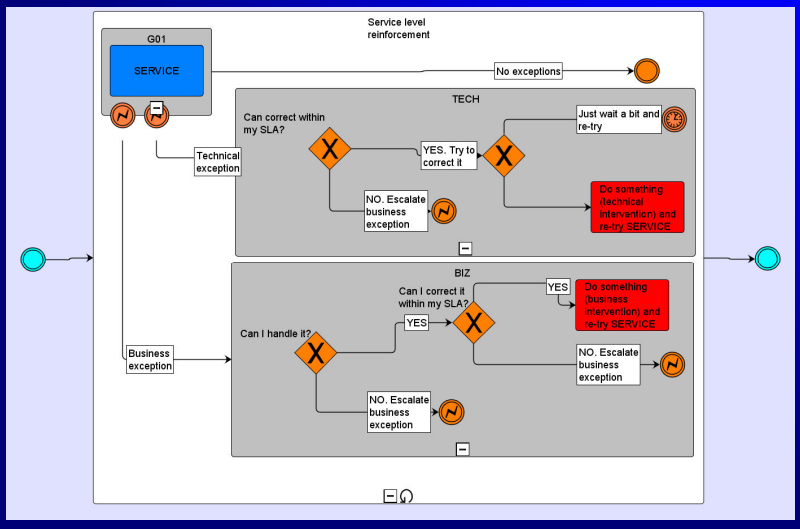
Pattern IPS
Initial Process Skeleton



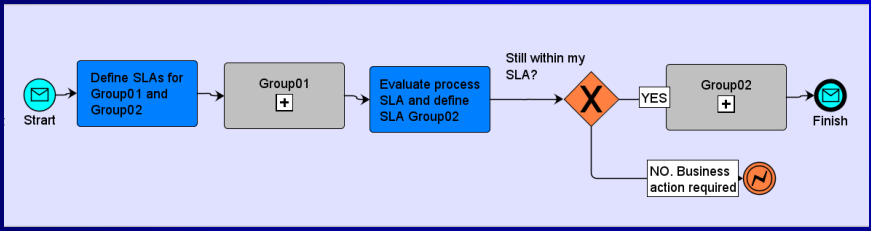
Pattern ERL
Error Recovery Loop



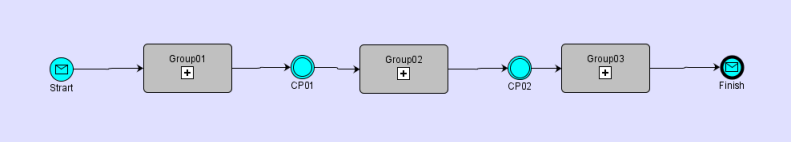
Pattern SLR (1)
Service Level Reinforcement



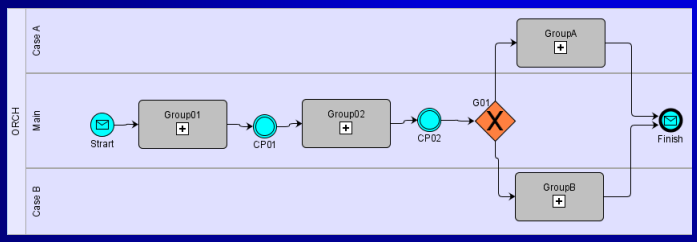
Pattern SLR (2)
Service Level Reinforcement



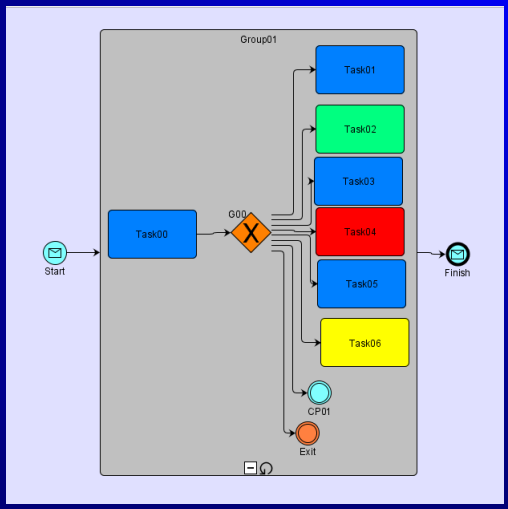
Pattern SYP (1)
Structure Your Process



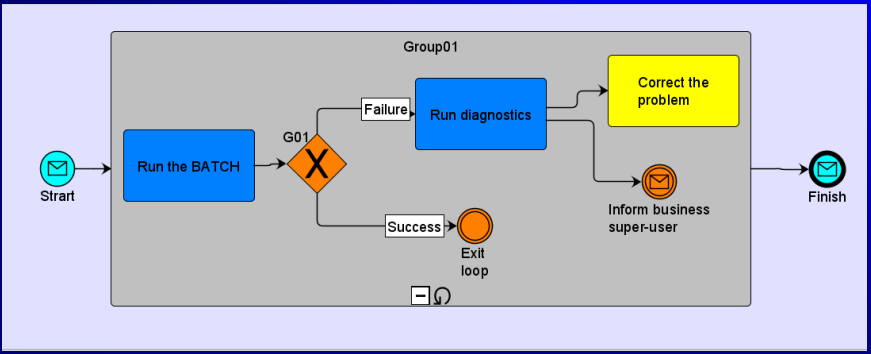
Pattern SYP (2)
Structure Your Process



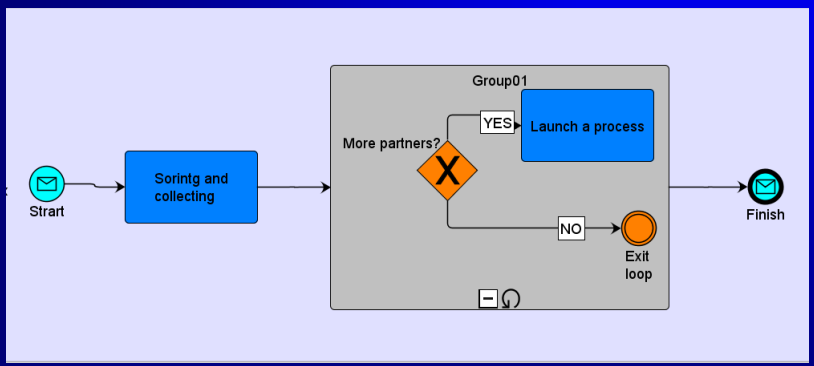
Pattern SYP (3)
Structure Your Process



Pattern FB
A Farewell to Batches



Pattern LP
Launching Pad



Pattern PP
Process Package

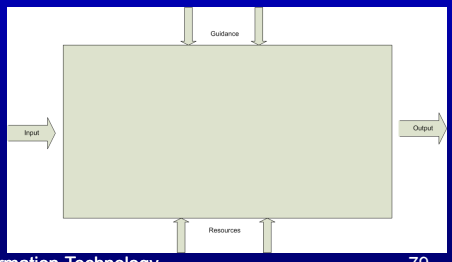
- With a process instance we “carry” a package with:
  - Business objects (by value and by reference)
  - Business documents (by value and by reference)
  - KPI
  - Audit trail
  - Comments
  - Local variables
  - Etc.

Example: request for absence

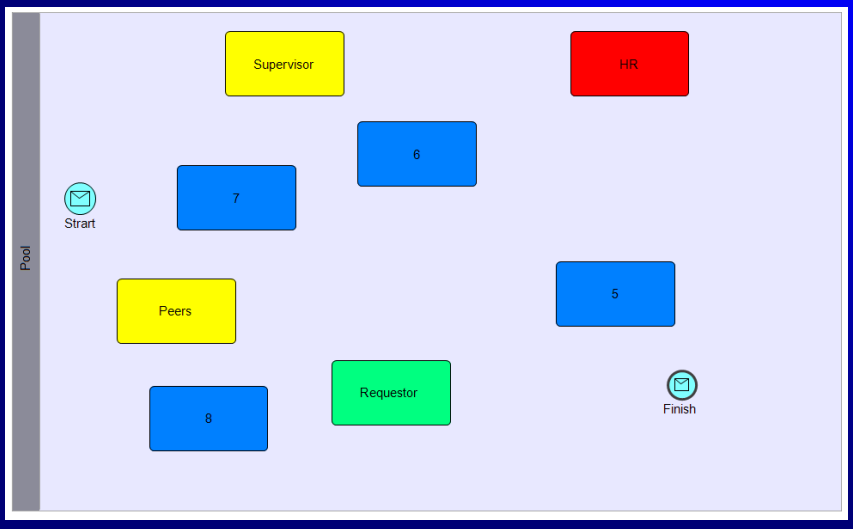
- complete a standard HR form with details of the absence requested,
- validate the proposed absence with your peers (e.g. those who need to provide back up for you),
- submit the completed form to your supervisor for approval,
- transfer the completed, approved, form to the HR department for registration in a time-accounting system,
- announce the approved absence to a business partner.

Modeling procedure: black boxing

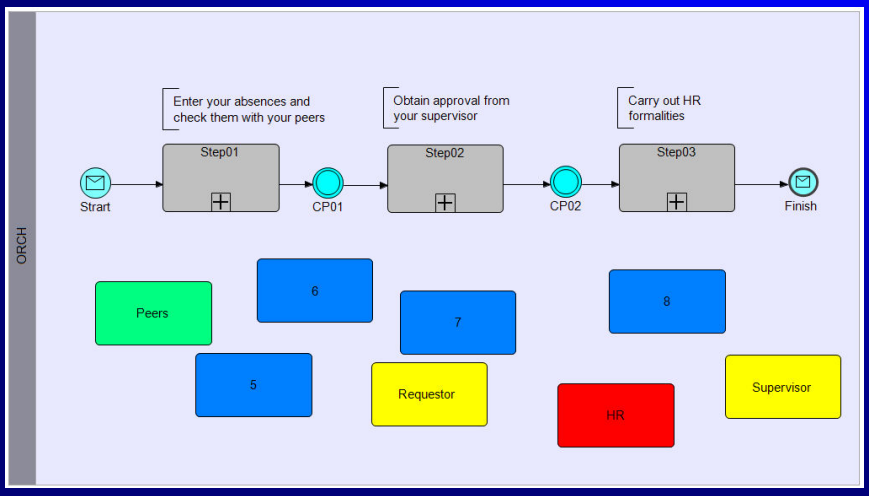
- the name of this building block
- the business story which explains how this building block works
- the nomenclature of incoming and outgoing business events
- the nomenclature of the input business objects (if any) (they may arrive by different channels)
- the nomenclature of the output business objects (if any)
- the nomenclature of the business objects (if any) to be used inside this building block
- the resources required, e.g. roles, other services (if known)
- guidance (business rules, KPIs) involved for correct functioning
- a choice of implementation



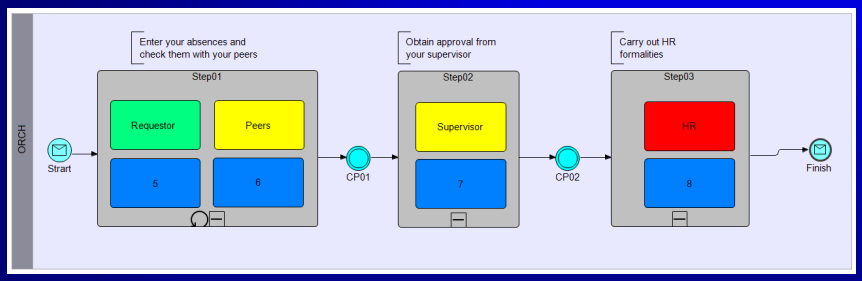
Modeling procedure: recognition of artefacts



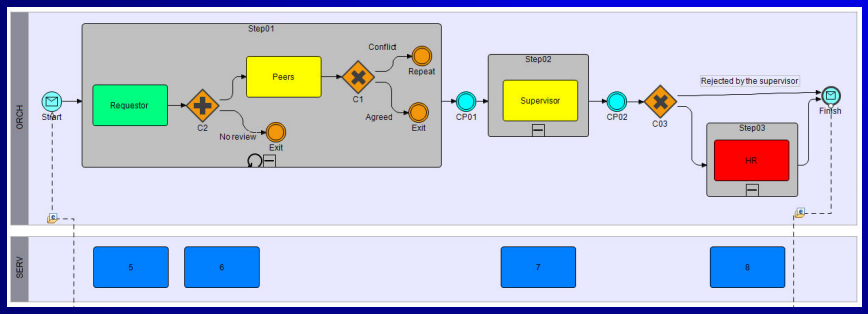
Modeling procedure: structuring



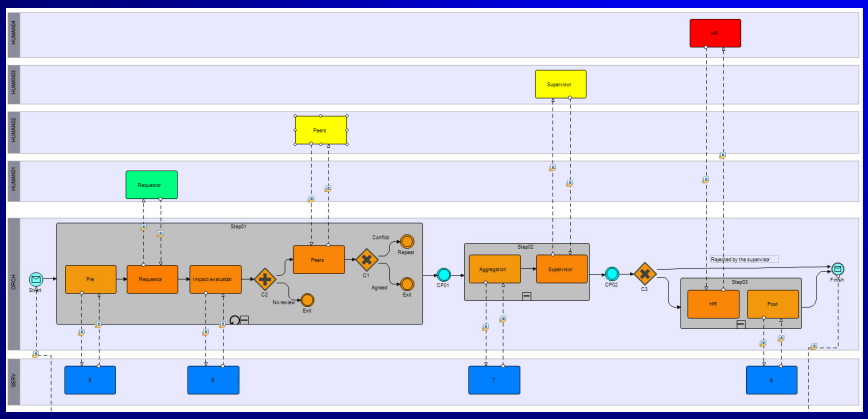
Modeling procedure: classification



Modeling procedure: re-construction



Modeling procedure: instrumentation / enrichment



Conclusions

- Tools and technologies are available
- Enterprise architecture is affordable
- Use it to architect future flexibility
- Implementation matters
- The use of common tools by both the business side and the IT side is of great benefit
- Neither technology nor any architecture works if the politics don't fly

THANK YOU

- Questions and answers

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