

# Enterprise Modelling: A Declarative Approach for FBPMML

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# Part I:

# Introducing Enterprise Modelling



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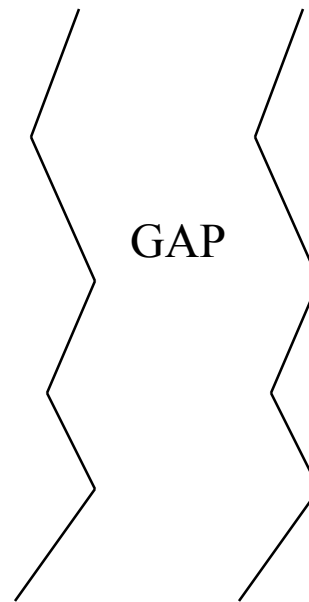
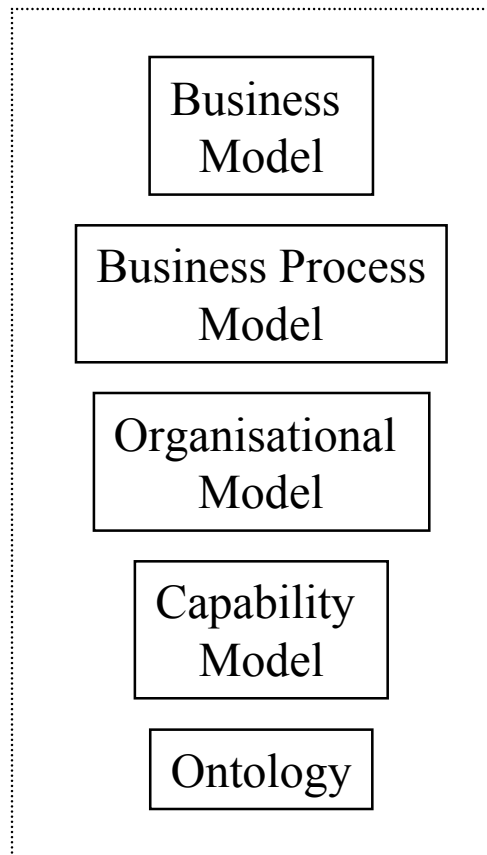
# Enterprise Modelling

- **EM methods are well-recognised for they value and are used in practice;**
- **EM methods may be characterised in the following types:**
- **Business modelling method:**
  - business modelling of IBM's BSDM (Business System Development)
- **Process modelling method:**
  - IDEF0, IDEF3, PSL, RAD, RACD
- **Organisational modelling method:**
  - Oredit, Ulrich Frank's MPM approach
- **Capability Modelling Method**
- **Ontology**

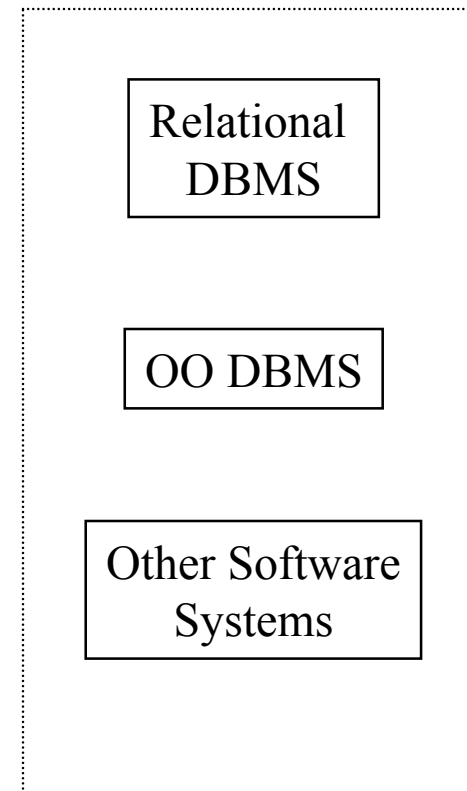


# Technical Challenges - The Gap between EM and Reality

Enterprise Models (EM)

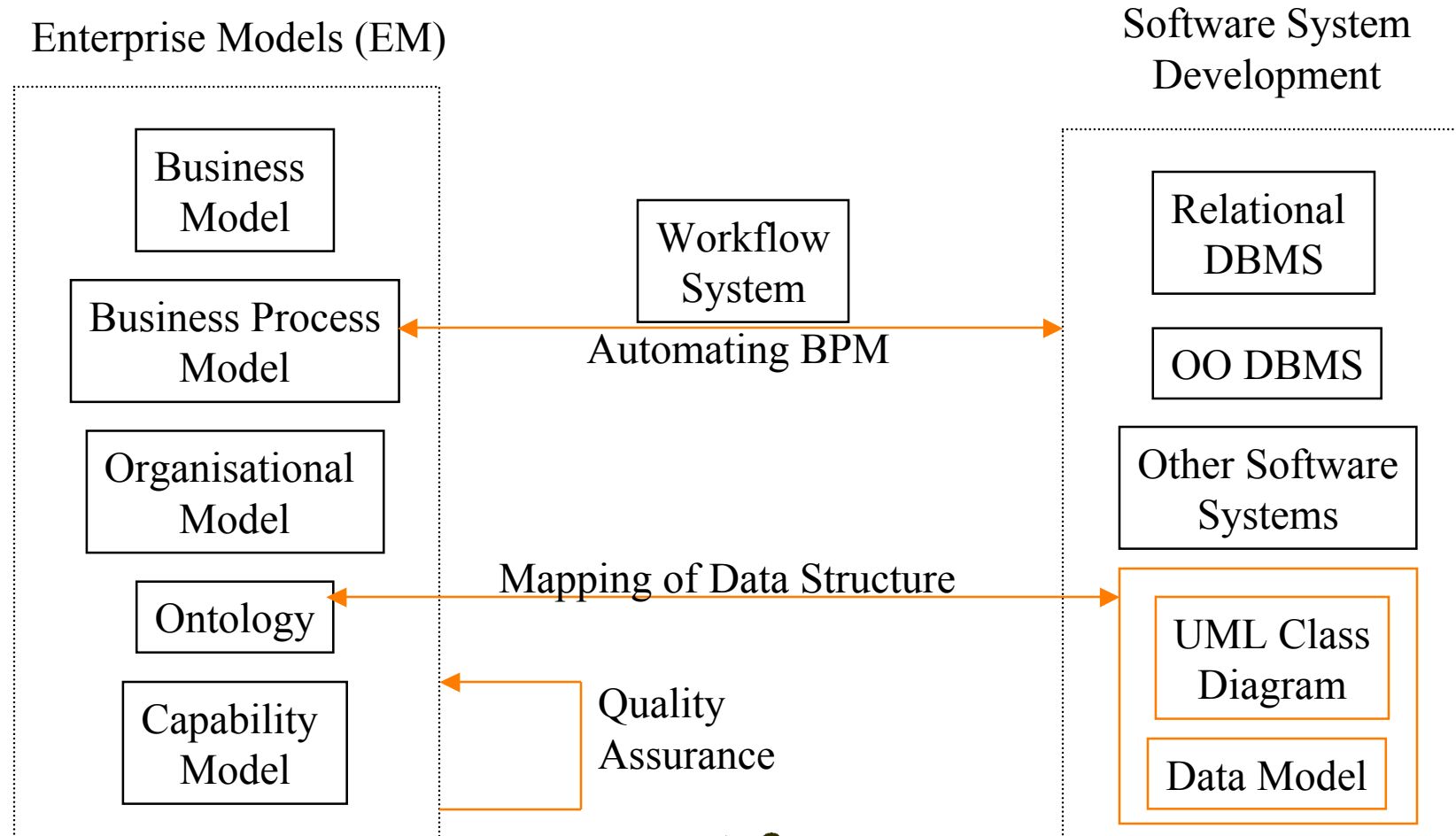


Software System  
Development



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# Bridging The Gap between EM and Reality



# What is a business process ?

- **“A business process is a course of events consisting of one or more coherent activities (operations) which are necessary to deliver a product or service with a tangible value to a customer (client).”**
  - **Christofer Tolis, Anders G. Nilsson**
  - **Advancing Your Business: People and Information Systems in Concert, EFI**
    - **Stockholm School of Economics, Sweden**
    - **Research project: business modelling**



# Types of Business Process Models

## - 1

- **Communication based model**
  - Winograd/Flores Model
- **Activity based model**
- **Artefact based model**
  - Karen Myers, Pauline Berry
    - SRI, SWIM project
- **Behaviour Model**
- **Transformation Model**
  - Christofer Tolis, Anders G. Nilsson
    - Advancing Your Business: People and Information Systems in Concert, EFI



# Types of Business Process Models

## - 2

- **Artefact-Centric**
- **Process- and Activity- Centric**
- **Agent-Centric**
- **General: a combination of some or all of the above**

- **Editor: Nicola Guarino, Milena Stefanova**
  - **ONTOweb report**
  - **State of the Art in Content Standards**
    - **Nov. 2001**



# Types of Business Process Models

## - 3

- **Role-Central Business Process Model**
  - Electronic Institution, RAD, RACD, UML's Activity Diagram
- **Activity-Central Business Process Model**
  - IDEF0, IDEF3, PIF, PSL, Petri-Net, Flow-Control
- **Data-Central Business Process Model**
  - BSDM's Business Process Model, Data-Flow
- **Communication-Central Business Process Model**
  - Swim-lane diagram
- **State-Central Business Process Model**
  - IDEF3's Object Schematic (Object-centered), BSDM's Life Cycle Diagram (entity-centered), State Transition Diagram (object and system-centered)

– Jessica Chen-Burger



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# Example Business Process Modelling Languages (Methods):

- **Process Interchange Format (PIF)**
- **Process Specification Language (PSL)**
- **Handbook of Organisational Processes**
- **IDEF0**
- **IDEF3**
- **UML's Activity Diagram**
- **SAP R/3: EPC**
- **Petri Net**
- **Process Model, BSDM**
- **RAD, RACD**
- **Flow-Control, Data-Flow Diagram**



# What is workflow ?

- **“The automation of a business process, in whole or part, during which documents, information or tasks are passed from one participant to another for action, according to a set of procedural rules”**
  - **Workflow: An Introduction**
    - **Rob Allen, Open Image Systems Inc., UK**
  - **Chair, WfMC External Relations Committee**
    - **Workflow Handbook 2001**



# Why does people want a workflow system?

- **A recent survey published by Delphi Group:**
  - **Automate repetitive tasks – streamline practice and improve efficiency (30%)**
  - **Manage and monitor performance of processes (25%)**
  - **Business users modify process logic, not IT personnel, and without IT's help. (20%)**
- **BPM 2002: Market Milestone Report, Delphi Group.**



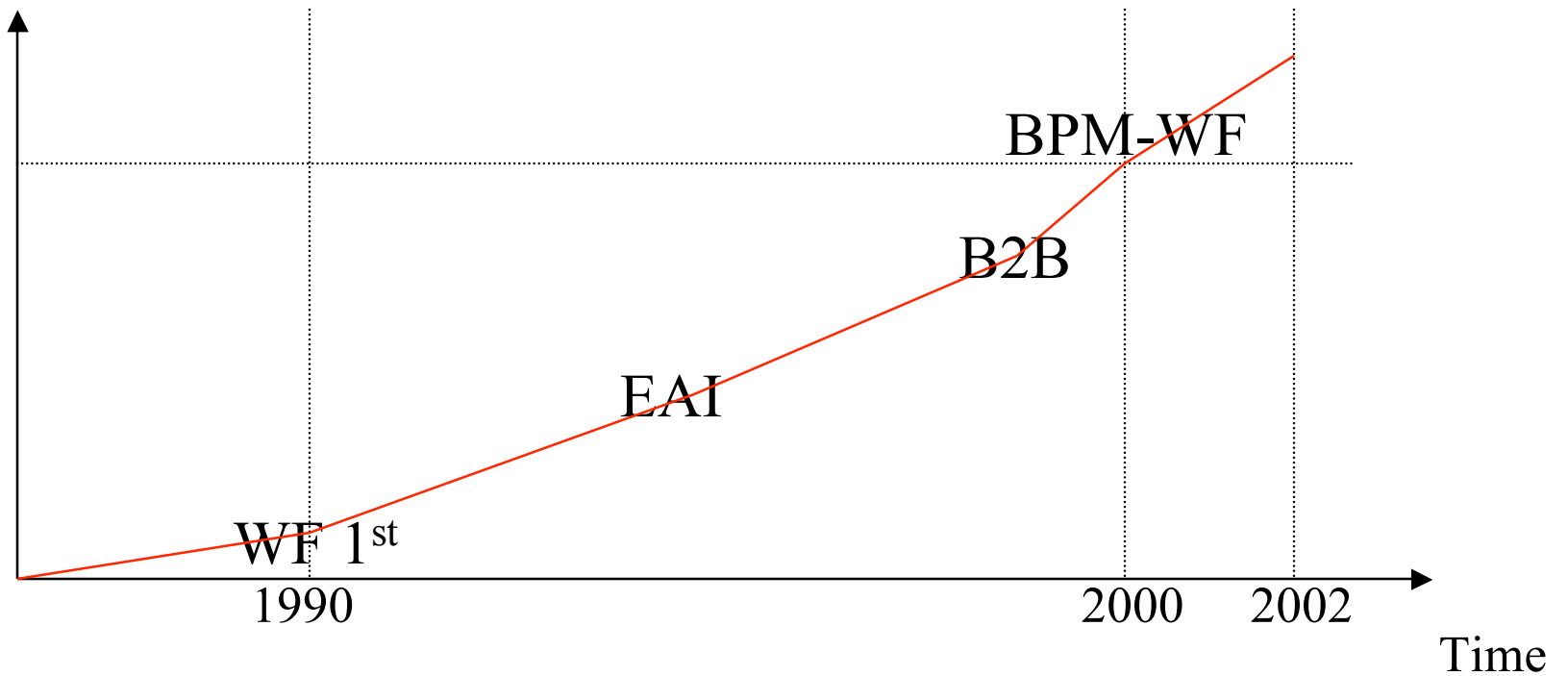
# Types of Workflow Processes

- **Application to Application**
  - Data-centric
  - Simple in Complexity, process duration is short
  - Discrete, typical involves data transfer
- **Person to Application**
  - Transaction-centric workflow management
  - E.g. individual validation, exception handling
  - State based process with few variations (standard practice),
- **Person to Person**
  - Collaboration-centric
  - Process or knowledge-driven
  - Tacit and explicit knowledge (Res. scheduling, project mgmt)
  - Complex, process duration is long



# History

Degree  
Of BPM  
Approach



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# Origins of Workflow Systems/vendors

- **Transaction-centric or Document-centric:**
  - E.g. FileNET, Optika
- **Workflow approach**
  - Manual and automatic workflow, e.g. Ultimus, Fujitsu
- **Integration approach**
  - System, EAI: Sterling Commerce, HP and Staffware
  - B2B internet cross-enterprise application to internal and external process: Peregrine
  - Collaborative software: Handsoft (BizFlow)
  - Separation from application to process logic: Fuego, Q-Link



# Pitfalls

- **Lack of training and understanding of BPM**
- **Complicated, not easy to use and understand**
- **Brittle in reaction to dynamic and changing environment that the workflow**
- **Lack of connection from high level modelling method to lower lever implementation method**
  
- **Result: two kinds of systems?**
  - **BPM tool**
  - **Workflow System**



# How can Business Process Modelling Help ?

- **Focus on a few issues – operation-related**
- **Provide a structural method to capture and document the operation of a business**
- **Provide a communication medium between businessmen to understand key operations of the business and to form a consensus**
- **Provide an alternative analysis tool for business practice (As-is and To-be)**
- **Provide early requirement specification for software systems from a business' view**



# How can Business Process Modelling Help? (2)

- **Participating and becomes part of everyday business operations – I.e manual and automatic processes**
- **Ensure standardisation of practice**
- **Training**
- **Automation/connection of manual procedures**
- **Alert at critical business circumstances**
- **Business management tool**
- **React to a fast changing environment**



## Part II:

# Developing a Workflow System based on a BPM approach



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# Problem Context

- **Internal Factors:**
  - Modern organisations are virtual entities;
  - People involved are located in different places, each with different capabilities and responsibilities;
  - People needs to **work collaboratively** to accomplish tasks and together achieve organisational goals.
- **External Factors:**
  - Organisations want to make use of modern technology, esp. internet to provide **Web Services**;
  - Organisations want to be able to react to changes in the environment and hand exceptions correctly and swiftly
  - Organisations want to communicate and integrate with applications not just internally, but also externally, B2B.



# Requirements on BPM - 1

- Describe and record business processes
- Can un-ambiguously specify all important “things” that are related to those business processes
- Can express temporal relations and enable latency automation
- Flexible in reaction to changes of business practices



# Requirements - 2

- Agile in reacting to changes in dynamic business practice
- Sharable “knowledge base” for diversified business practice
- Easy to use and maintain by non-BPM or IT personnel
- Easy to understand and can be used to communicate to business folks

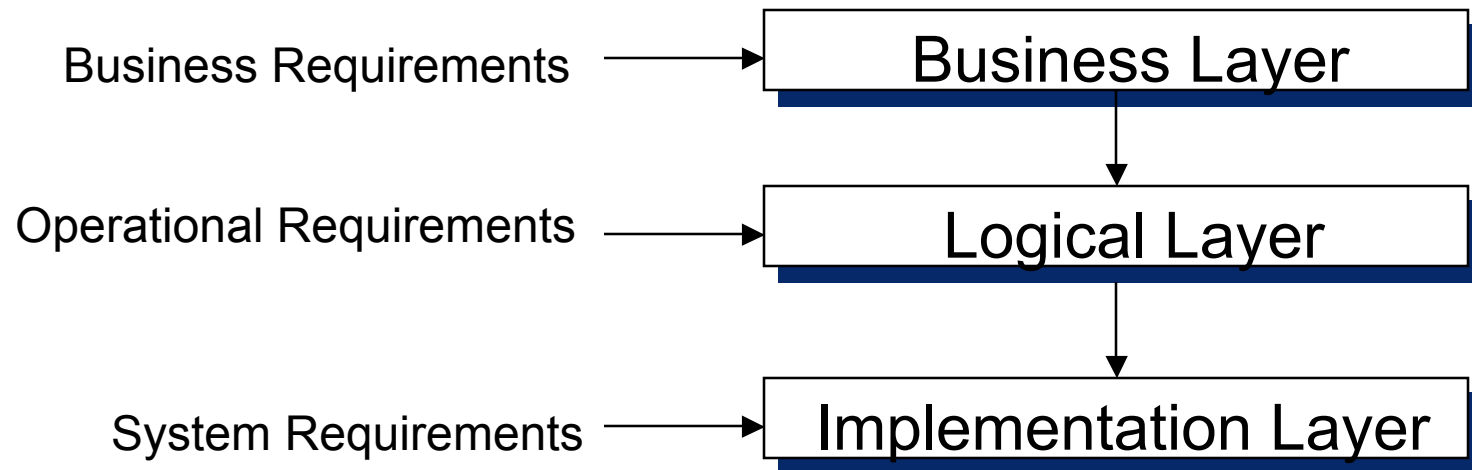


# Solution

- Business process modelling (bpm) approach that separates business logic from application logic
- Sharable ontology as a communication medium among different processes that may be carried out by different system components
- Formal representation of the business process model that may interact and enact processes in the workflow system level
- Altogether enable: improved workflow technology



# The Three-Layered Business Process Modelling Approach



# Business Layer - 1

- High level description
- Robust against changes of technologies and change of current practice (manual or automatic practice)
- Include business objectives
- Include business constraints



## Business Layer - 2

- Include policies
- “Long lasting” organisational structure, e.g. authority.
- Business level decision making



# Logical Layer - 1

- Procedural description
- Inherit all properties and constraints defined in the Business Layer
- Robust against changes of implementation method
- Provide a **common and sharable knowledge base** for all implemented systems – Ontology
- **Operational level decision making**



## Logical Layer - 2

- Specify all “**integrity constraints**” that are required in a business operation so that any implementations of this description do not violate business or operational constraints; example operational constraints are:
  - R/W policies on data fields – each data field may have different R/W policies
  - Detailed authorisation policies on processes



# Implementation Layer - 1

- The description of procedures for implementing a workflow system
- Inherit all properties and obey constraints defined in the Logical Layer
- Processes defined in this layers are **changeable, disposable, and application- and technology-dependent**

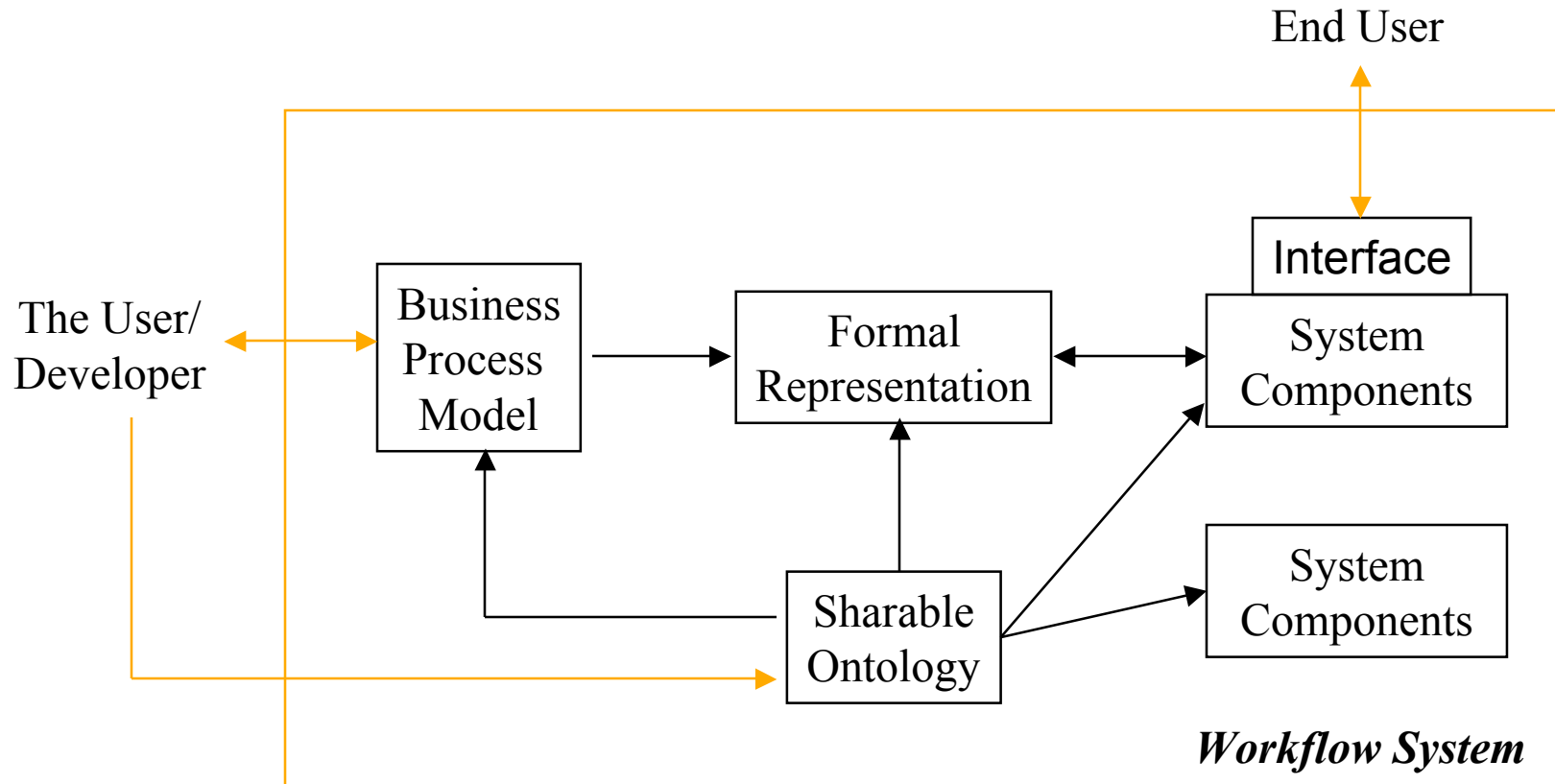


# Implementation Layer - 2

- May have multiple mappings to the same process defined in the Logical Layer – each describes a specific implementation method, e.g.
  - Ordering process by phone
  - The same logical ordering process by Web
  - The same logical ordering process by mobile phone (WAP)
- Use **knowledge base** in the Logical Layer to communicate with other processes in the Implementation Layer
- **System building level decision making**



# An Ontology Based BPM Approach



# Case Study: Implementation Layer

The process “Get Valid Credit Card Info”: may be implemented by

- Voice (e.g. over the Phone)
- Web
- Mobile phone (e.g. WAP)
- Over the counter
- Or **a combination of the above** operating at the same time.
  
- Each implementation is described in a different “implementation” process.
  
- **Question:** How do they communicate with each other?
- **Solution:** the data is constrained at the Logical Layer and shared among models in the Implementation Layer.



# Case Study

## Business Layer



Business Rules:

Financial Commitments may be one of the below methods:  
Receive money or check in sterling pounds, or  
valid credit card details.

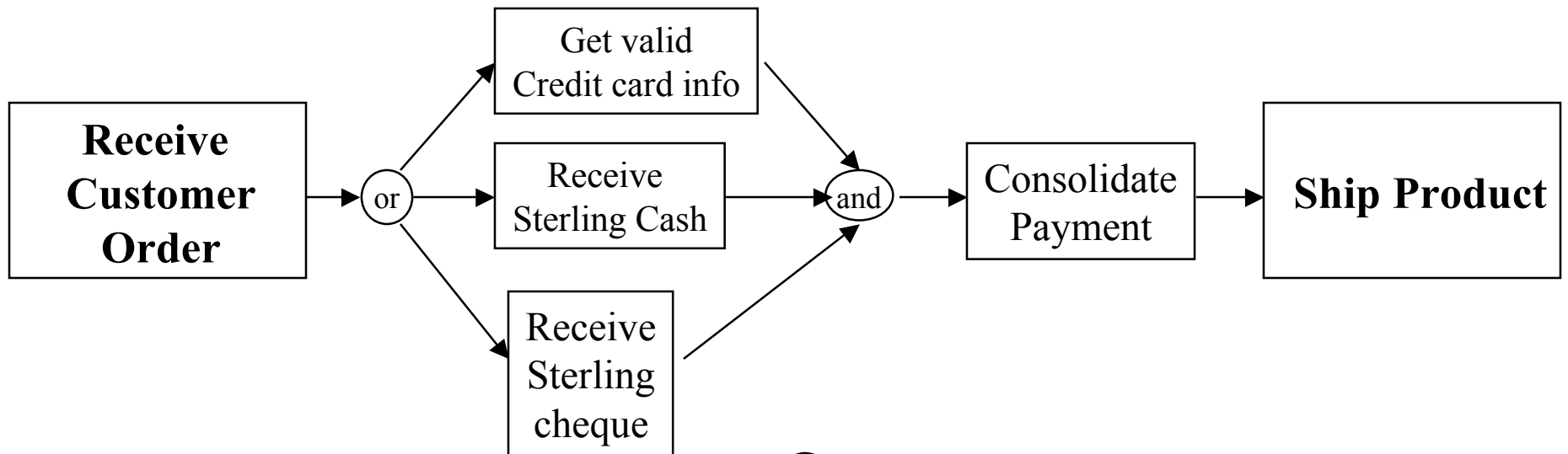
### A Simplified Customer Order Process



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# Case Study

## Logical Layer



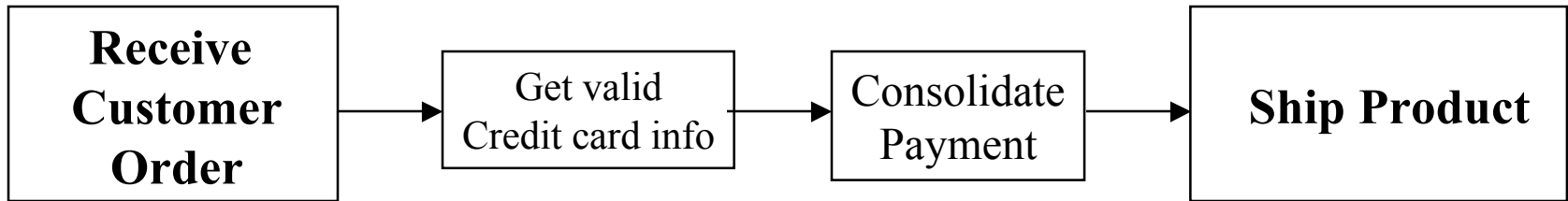
(or) - at least one activity has to be carried out

(and) - all (activated) activities must end

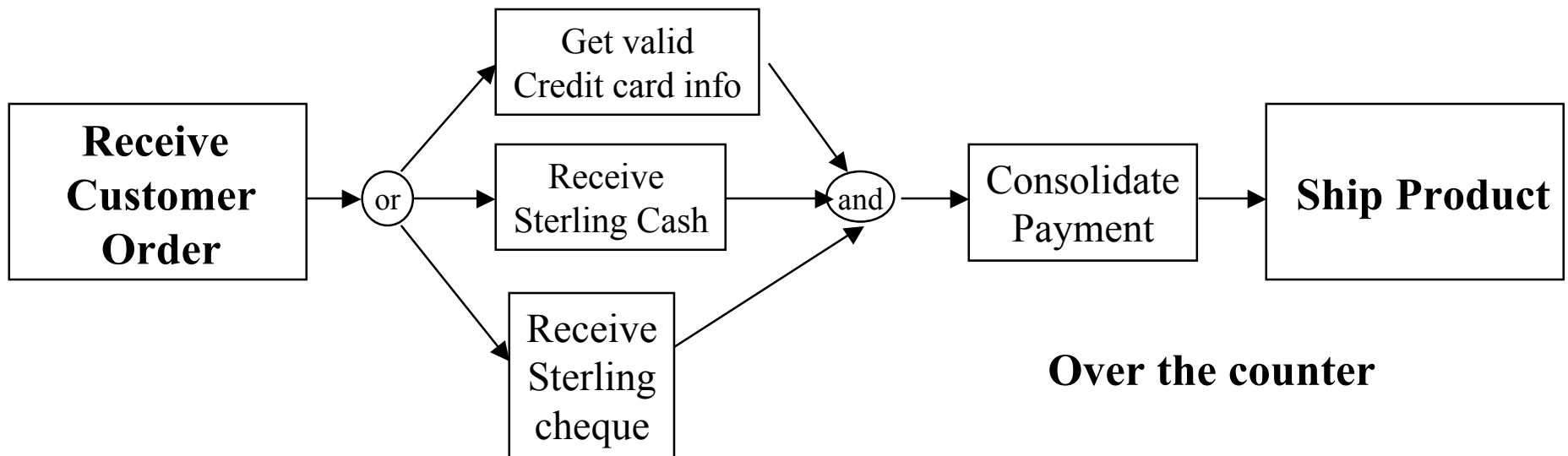


# Case Study

## Implementation Layer



**Over the phone**



**Over the counter**



# Part III:

## Creating FBPML



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# Foundation of the Business Process Modelling Language

- **Design Principles:**
  - **Compliant with standardised process modelling languages**
  - **Minimum notations - easy to understand and use (extendable)**
  - **INCA framework compliant – issue based**
  - **Semi-Formal modelling language based on formal theories**
    - » **Notation with formal semantics - junction**
    - » **Transaction theory**
    - » **Declarative - executable**
  - **Visual Modelling Language**
  - **Capture role**
  - **Explicit communication processes**
  - **Methodical way of building BPM – iterative process in two higher level stages**

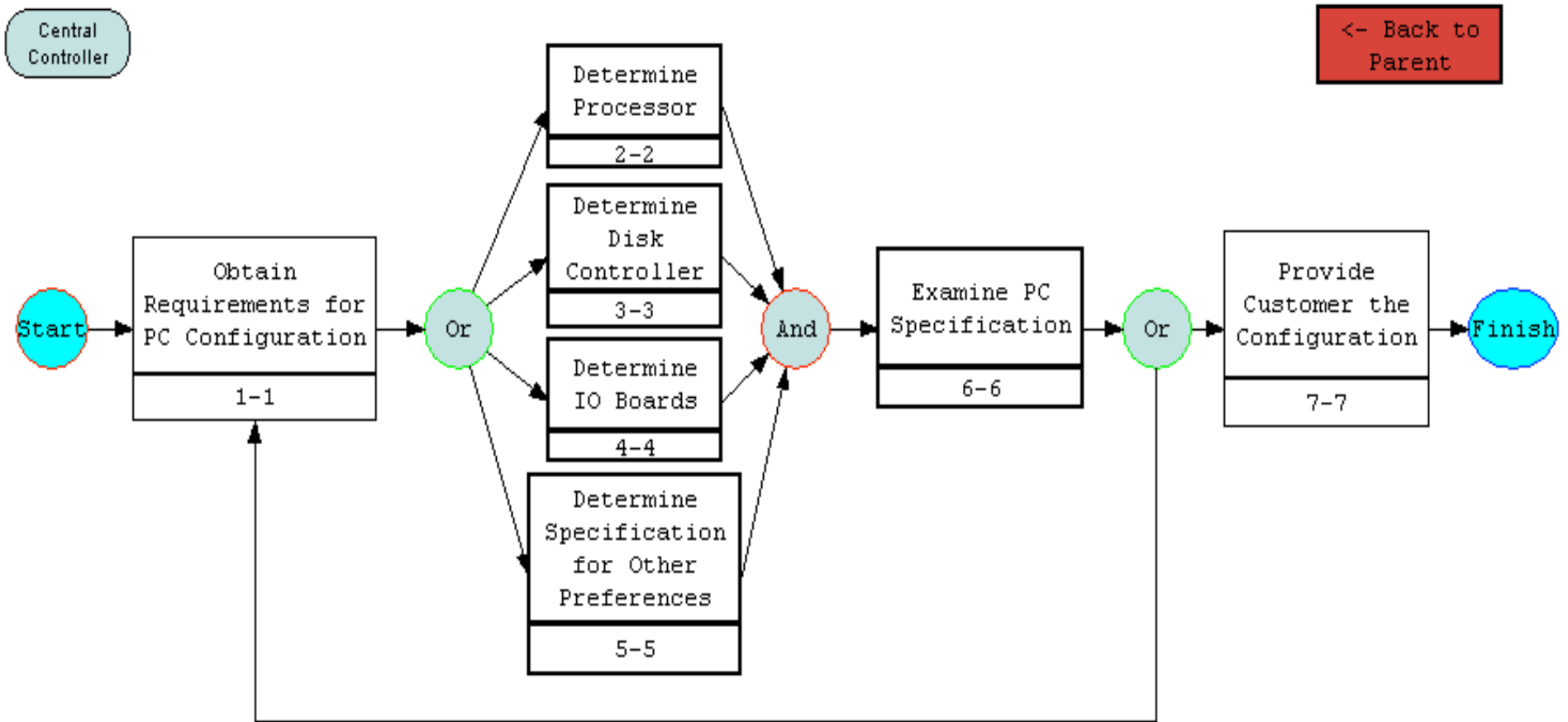


# Fundamental Business Process Modelling Language (FBPML)

- **An Integration of concepts from several standard modelling languages:**
  - **IDEF3 – graphical notation, process concept**
  - **PSL – formal semantics**
  - **INCA framework compliant**
  - **IBM's business model in BSDM – modelling principle**
  - **RAD – concept of roles**
  - **Planning and Workflow – formalism that is executable BPML**

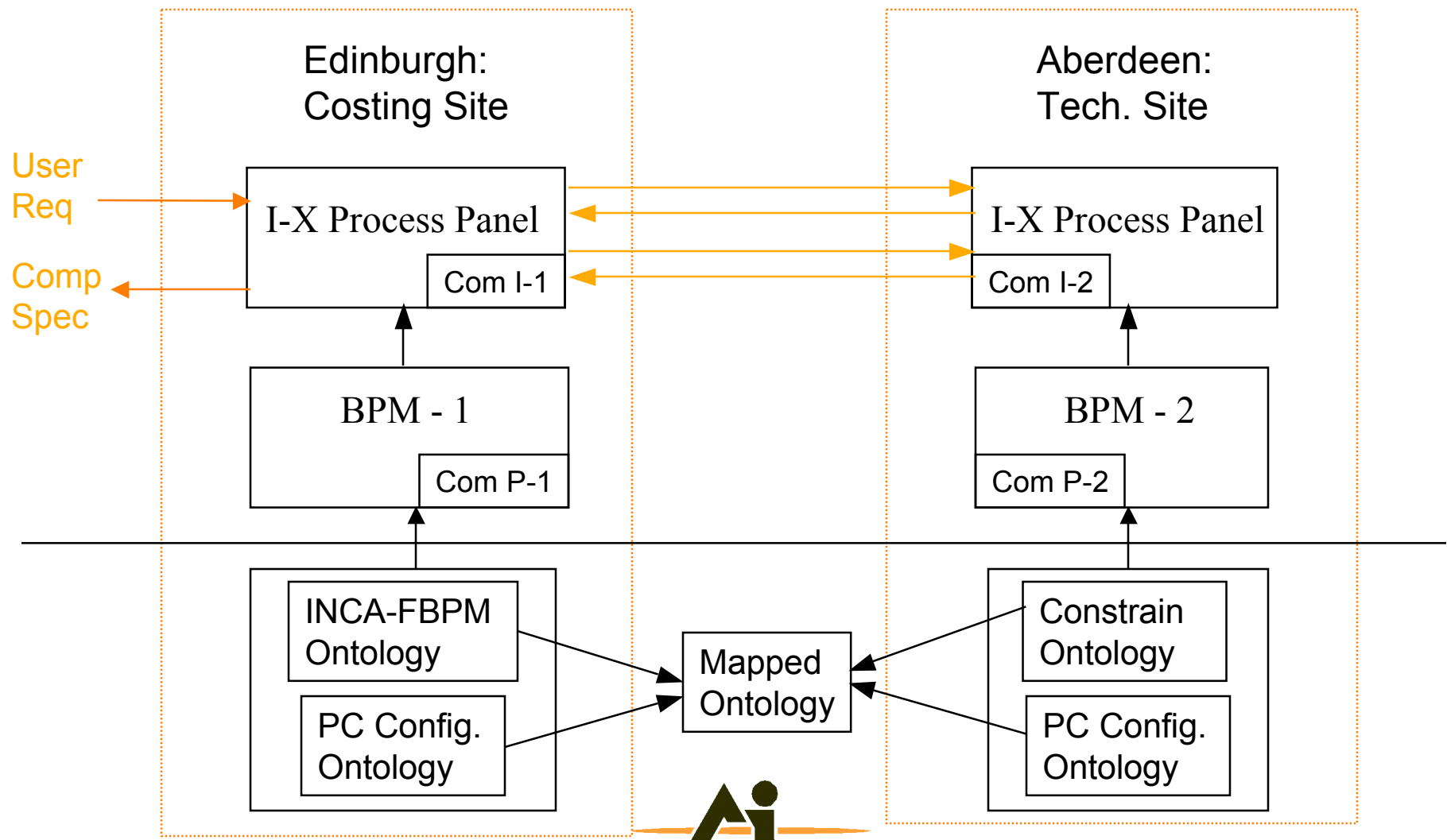


# Business Process Model using FBPML



# PC Configuration Domain

## Collaboration between two types of Actors



# Presenting in an I-X Process Panel – Costing Site


Edinburgh I-AKT

File Issue Tools Test

Issues

Description	Annotations	Priority	Action
"Perform Top Level Process for PC Configuration" john 1 "(type, PC-desktop), (case, m		Medium ▼	Expand using perform_to
"Obtain Requirements for PC Configuration" 1 "(type, PC-desktop), (case, mesh-midi-to		Medium ▼	Done
"Determine Processor" 1 "(type, PC-desktop), (case, mesh-midi-tower), (processor,AMD		Medium ▼	Done
"Determine Disk Controller" 1 "(type, PC-desktop), (case, mesh-midi-tower), (processor		Medium ▼	No Action
"Determine IO Boards" 1 "(type, PC-desktop), (case, mesh-midi-tower), (processor,AMD		Medium ▼	No Action
"Determine Specification for Other Preferences" 1 "(type, PC-desktop), (case, mesh-mid		Medium ▼	No Action
"Examine PC Specification" john 1 "(type, PC-desktop), (case, mesh-midi-tower), (proce		Medium ▼	No Action
"Provide Customer the Configuration" john 1 "(type, PC-desktop), (case, mesh-midi-tow		Medium ▼	No Action

Edinburgh Advanced Knowledge Technologies  
Based on I-X Process Panel Technology



# Presenting in an I-X Process Panel – Technical Site

The screenshot displays the Aberdeen I-AKT software interface. At the top, there is a title bar with the Aberdeen I-AKT logo and window controls. Below the title bar is a menu bar with 'File', 'Issue', and 'Tools' options, and a 'Test' button on the right. The main area is titled 'Issues' and contains a table with the following columns: 'Description', 'Annotations', 'Priority', and 'Action'. The table lists five issues, all with a 'Medium' priority. The first issue has a specific action, while the others have 'No Action'. A scrollbar is visible at the bottom of the table area. At the bottom of the interface, there is a footer with the Aberdeen logo, the text 'Advanced Knowledge Technologies' and 'Based on I-X Process Panel Technology', and a crest with the number '1495' above it.

Description	Annotations	Priority	Action
receive dispatched technical details for device 3 "internet-browsing, high-speed, (dvd, y		Medium ▼	Expand using top_level_process_on_tec
"Obtain Partial Specification For Device" 3 "internet-browsing, high-speed, (dvd, yes), (cd		Medium ▼	No Action
"Refine Partial Specification" 3 "internet-browsing, high-speed, (dvd, yes), (cd, rewriter),		Medium ▼	No Action
"Suggest Alternative Specification" 3 "internet-browsing, high-speed, (dvd, yes), (cd, rew		Medium ▼	No Action
dispatch without report-back technical specification for device 3 "internet-browsing, high		Medium ▼	No Action

Aberdeen Advanced Knowledge Technologies  
Based on I-X Process Panel Technology

1 4 9 5

# Ultimate Goal – Support for a Virtual Organisation

- To provide distributed knowledge- and semantic-based manipulation and collaboration;
- A realisation where **multiple tools** are used (e.g. OU and Soton's hyperlink tool, processor modeller, AKT-0, AKTbus, netmeeting) **multiple methodologies** and **disciplines** are involved, and information from **multiple domains** are used. Most importantly, **people** with different responsibilities and capabilities are working together to accomplish tasks, solve problems, and achieve organisational goals.



# End of Slides

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