



METASONIC

DYNAMIC CATENATION AND EXECUTION OF CROSS ORGANISATIONAL BUSINESS PROCESSES

THE JCPEX! APPROACH



S-BPM ONE 2010 - Karlsruhe



METASONIC

MOTIVATION I

Motivation

Example

Requirements

Evaluation

Our solution

Conclusion & Future work

- Globalization and increased market transparency
- Product and Service life cycle
- Complex products and services
- Dynamic cooperation between organisations
- Flexible cooperation and quick adaption to changes
- Partners selected for a short period
- Expand business processes to partners
- Process execution across organizational boundaries cause increased complexity





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MOTIVATION II

Motivation

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Conclusion & Future work

- **Modelling inter-organisational cooperation**
- **Frequent partner change, selection during runtime**
- **Formalized decision criteria to define partners in advance**
- **Security and process interna hiding**
- **Only necessary aspects of internal process should be available to others**
- **Shared responsibility for whole model**





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EXAMPLE

Motivation

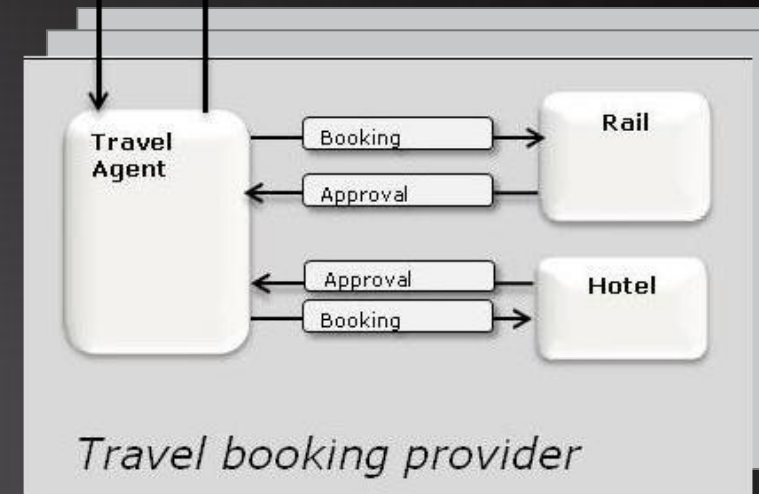
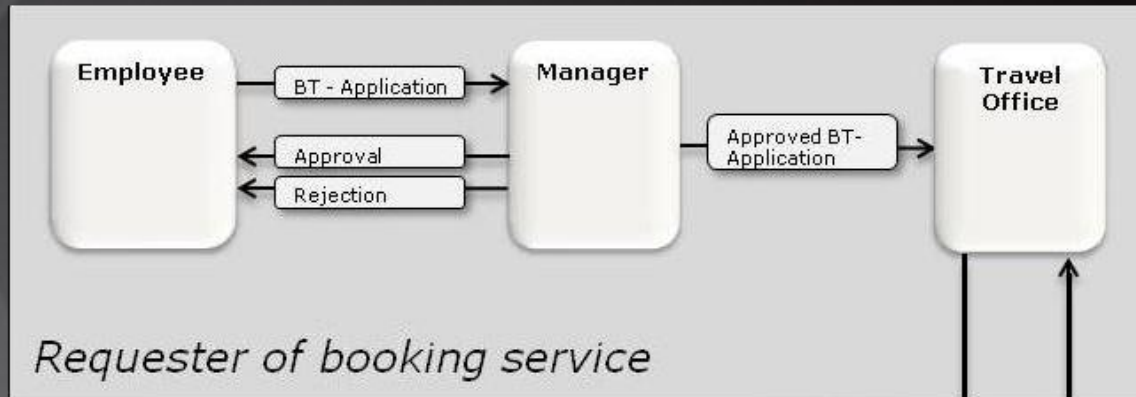
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REQUIREMENTS I

- **Modelling:**
 - Integrated modelling
 - One-to-many relationships
 - process dependent role definition
 - hiding of internal process events
 - dynamic catenation
 - relevance of observable behaviour





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REQUIREMENTS II

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- **Execution**

- No central instance to control the message flow
- Identification of potential partners at runtime
- Automate partner selection in respect to predefined conditions





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EVALUATION – EPC (EVENT DRIVEN PROCESS CHAIN)

Motivation

Example

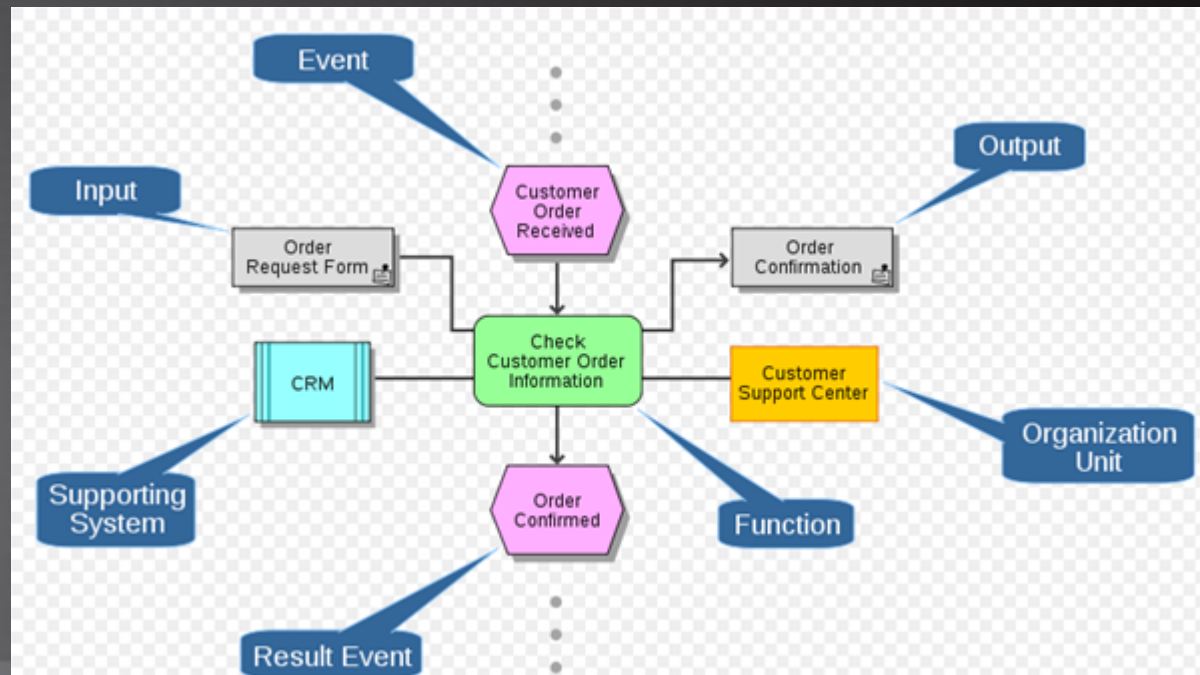
Requirements

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- Important part of ARIS
- Control flow oriented
- Approaches for CBP exist: global processes, process views and private processes
- Modelling to execution transformation





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EVALUATION – BPMN 2.0

Motivation

Example

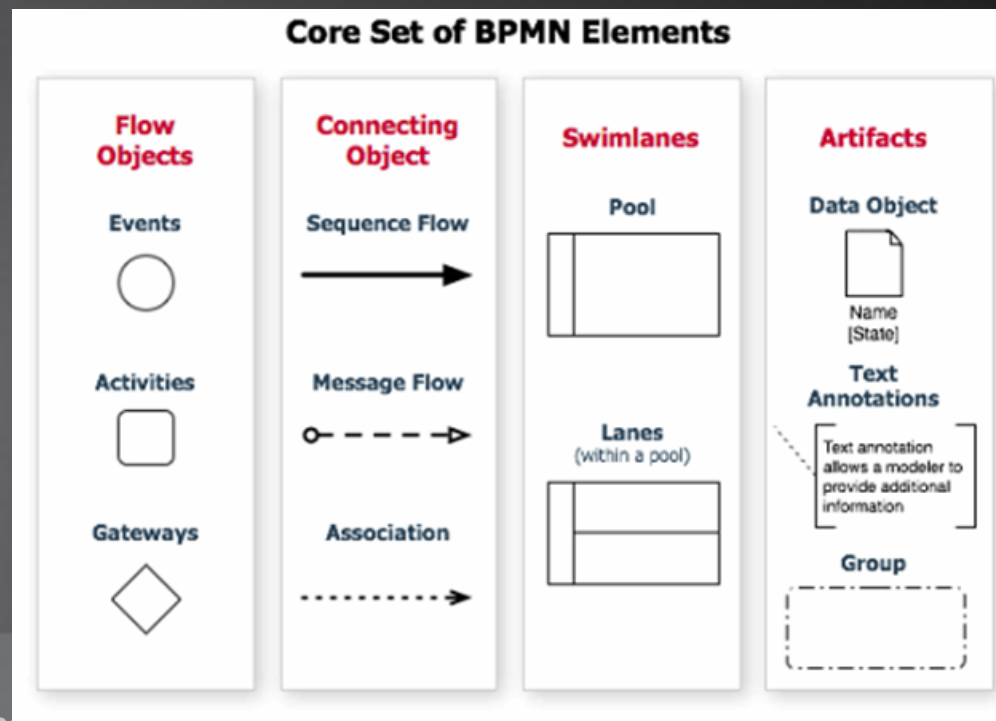
Requirements

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Conclusion & Future work

- Graphical business process and workflow modelling language
- Collaboration, Choreography and Conversation → can lead to inconsistencies
- No 1-to-many semantics
- Gap between modelling and execution, no concrete execution semantic





- Web Service Choreography Language describes globally the interaction between participants
- Globally observable behaviour
- Problems: Formalism, reusability, semantic inconsistencies, multi-party interactions are missing

```
<choreography name="ReiseAntragChoreographie" root="true">
  <description type="documentation">
    Choreographie für Reiseantrag
  </description>
  <relationship type="tns:Agent2Reisestelle" />
  <variableDefinitions>
    <variable name="Agent2ReiseStelleC" channelType="tns:Agent2ReiseStelleKanal"
              roleTypes="tns:AgentRolle tns:ReisestelleRolle">
      <description type="documentation">
        Kanal Variable (channel variable)
      </description>
    </variable>
    <variable name="Buchungsauftrag" informationType="tns:BuchungsauftragTyp"
              roleTypes="tns:AgentRolle tns:ReisestelleRolle">
      <description type="documentation">
        Buchungsauftrag
      </description>
    </variable>
    <variable name="BuchungBestätigung" informationType="tns:Bestätigungstyp"
              roleTypes="tns:AgentRolle tns:ReisestelleRolle">
```





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EVALUATION – LET'S DANCE

- Proposed by Queensland University and SAP Research Centre Australia
- Targets at behavioural aspects of service interactions
- Targeted at business analysts and software architects
- Generation of executable models possible
- Tightly coupled to the Interaction Patterns
- Modelling tool available
- Problems: Semantic gap between modelling and execution, lacks of fulfilling requirements like „rule based receiver selection“ and „roles“





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EVALUATION – EXECUTION

- Typically realized by workflow engines (Apache ODE, Bonita, FlowMind, imixs, jBPM,...)
- Cross-organisational communication realized by service calls → who is responsible for the whole process?
- Systems like SAP XI / ccBPM for connecting SAP and foreign systems: BPEL based → rules for message routing are stored centrally
- EDI: EDIFACT, RosettaNet describe data formats → no process support, no support of 1-n scenarios, dynamic connection of different organizations not covered





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EVALUATION – SUMMARY

Motivation

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Our solution

Conclusion & Future work

	EPC	BPMN 2.0	WS-CDL	Let's Dance	ATHENA
Integrated modelling	-	~	-	~	~
One-to-Many relationships	-	~	-	+	-
Process dependent role definition	-	-	-	-	-
Hiding of internal process events	-	~	+	+	+
Dynamic catenation	n.a.	~	~	~	~
Relevance of Observable Behaviour	~	~	~	~	~





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Motivation

Example

Requirements

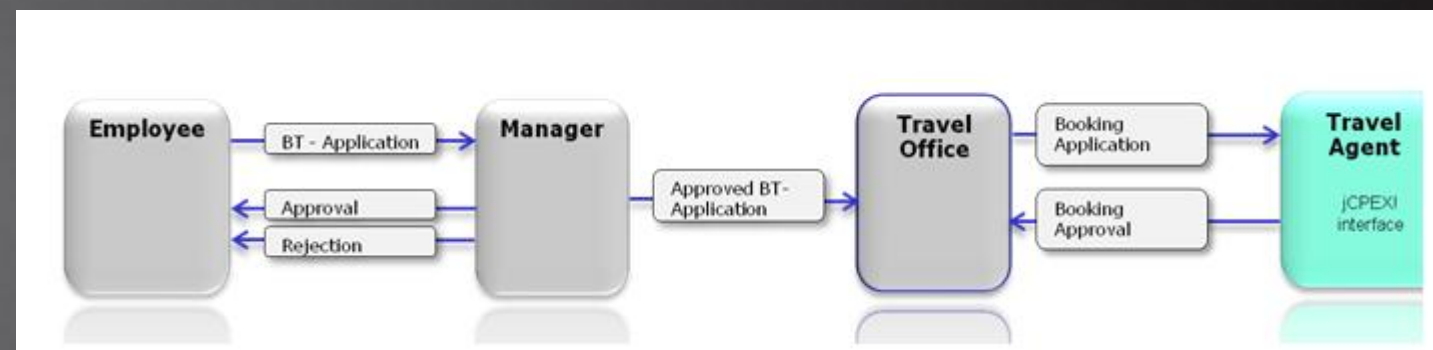
Evaluation

Our solution

Conclusion & Future work

OUR SOLUTION – INFORMATION HIDING I

- Subject-oriented modelling helps to hide internal matter
- Usually one subject is responsible for inter-organizational communication → message exchange of this subject with other internal subjects is hidden
- Creation of an „interface subject“, which can be seen as the observable behaviour of the whole process
- „Behavioural Interface“ (BI)
- Sequence of message flow and contained decisions is preserved





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OUR SOLUTION – INFORMATION HIDING II

Motivation

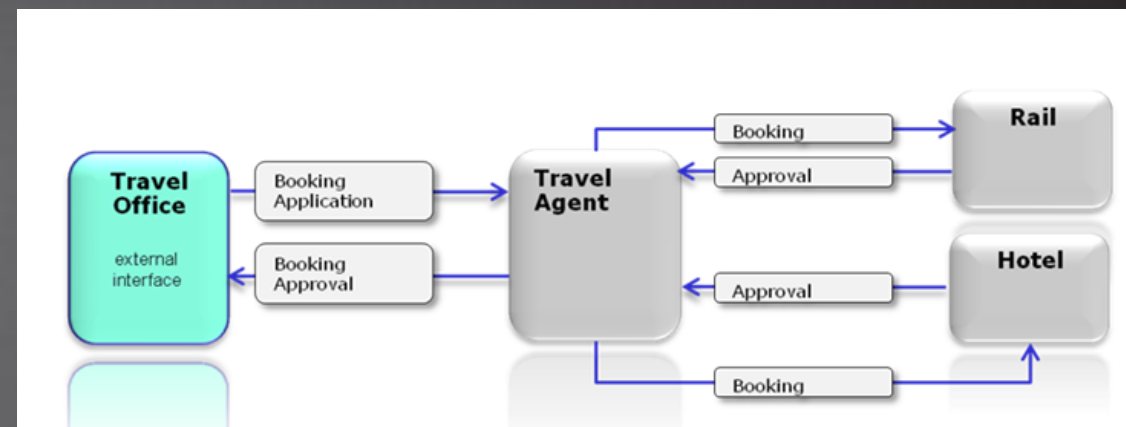
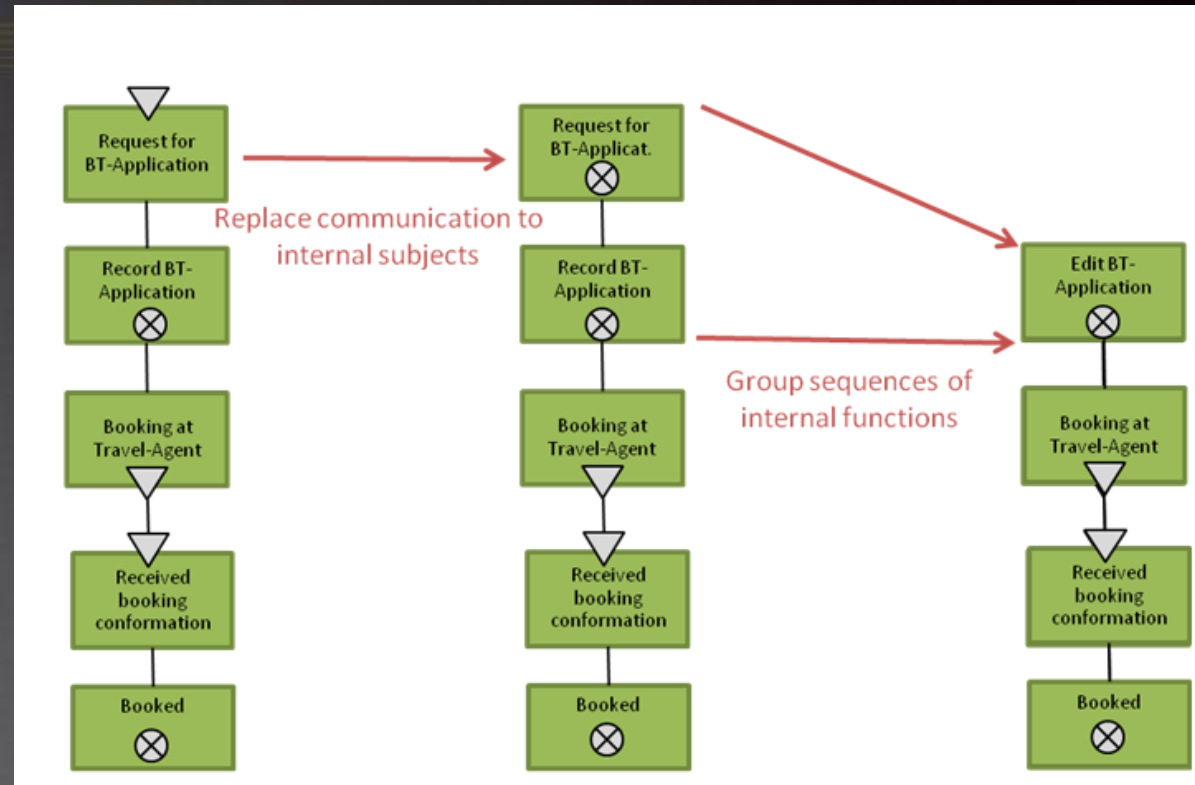
Example

Requirements

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Our solution

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OUR SOLUTION – ENABLE DYNAMIC CHANGE OF PARTNERS

Motivation

Example

Requirements

Evaluation

Our solution

Conclusion & Future work

- Behavioural Interface can be publicly announced
- Enable partners to model their processes suitable to this interface
- Further organizations can offer implementations for these Behavioural Interfaces
- All processes fulfilling this interface can be found and/or substituted during runtime





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OUR SOLUTION – GENERATION AND PUBLICATION OF THE BEHAVIOURAL INTERFACE

- After modelling and validation process description is internally deployed to the runtime
- When engine notices an external jCPEX! Subject, the user can define an URI in order to enable other companies to implement their services compatible to this BI
- Once this URI is given to an interfaces, the „observable behaviour“ of the process is calculated and published





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OUR SOLUTION – ADDING METADATA

- After BI generation, the user provides additional information about this BI in order to be findable by other companies

Motivation

Example

Requirements

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Our solution

Conclusion & Future work

The screenshot shows a Mozilla Firefox browser window displaying a web application titled "jCPEX Metadata für TravelAgent Behavioural Interface". The page content includes a confirmation message and a form for entering process data.

Das "Behavioural Interface" wurde erfolgreich generiert
Bitte geben Sie nun zusätzliche Metadaten zu diesem Interface an

Prozess Daten

Prozess Name	Travel Booking Process
Prozess Beschreibung	this service you can book travel applications
Stichwörter (Komma-getrennt)	travel, train, hotel, booking, business

Abgeleitete Prozess Eigenschaften:

Gefaltetes Subjekt	Travel Agent
Globaler Messagetype - Eingang	BookingApplication
Globaler Messagetype - Ausgang	BookingApproval

Buttons: OK, Abbrechen





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OUR SOLUTION – MODELLING SUITABLE PARTNER PROCESS

Motivation

Example

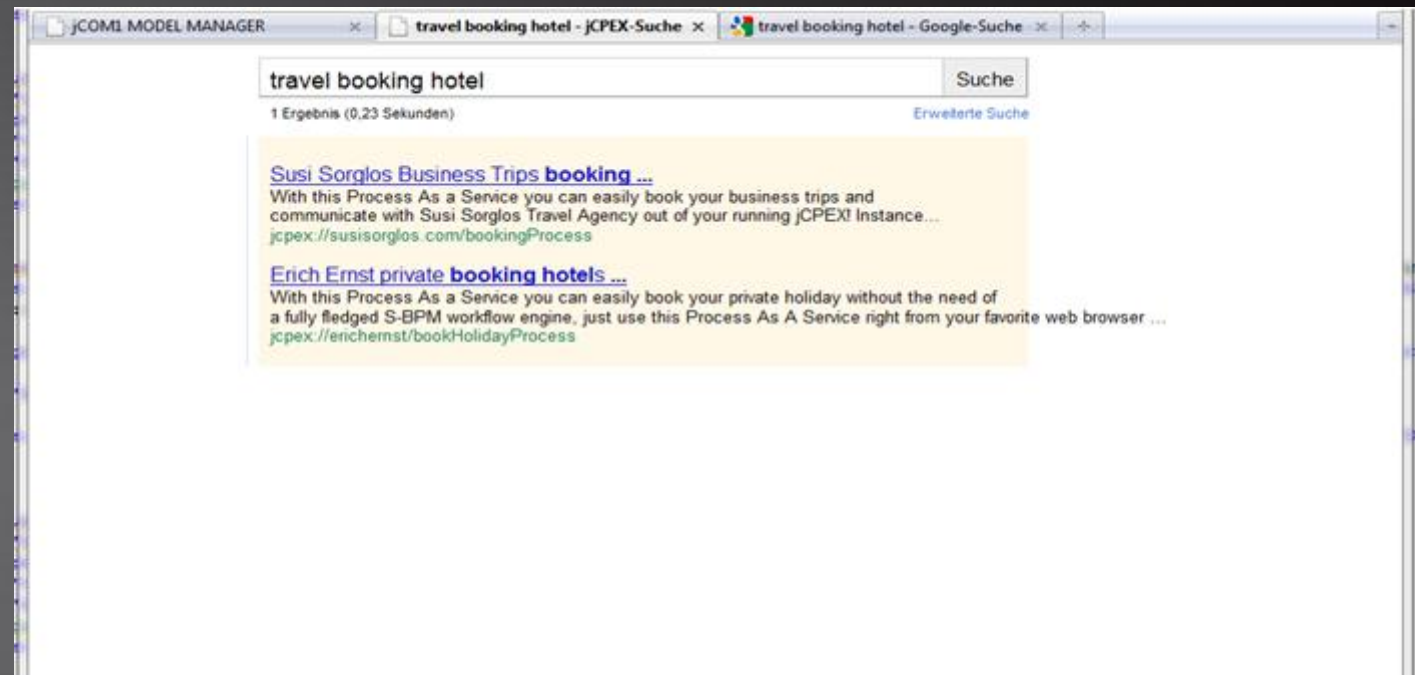
Requirements

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Conclusion & Future work

- Multi-Level search queries are possible
- Identify appropriate processes of potential partners
- An URI of the BI is returned by the search engine (for each entry)
- During modelling subjects can be marked with this URI





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Example

Requirements

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Conclusion & Future work

OUR SOLUTION – PROCESS EXECUTION

- Agent is able to execute cross organizational business process after deployment
- When process reaches a state, where a message has to be sent to an external jCPEX! Subject, the process engine forwards the message to the „Process Gateway“
- Each implementation of an BI returns data-structure which defines different „roles“ shown to the initiator





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OUR SOLUTION – PROCESS RULES

Motivation

Example

Requirements

Evaluation

Our solution

Conclusion & Future work

- Rules can restrict possible receivers or select a particular service provider
- E.g. validation of Business Objects (Sender rules)
- On the other side, receiver rules can act like „process firewalls“ and reject messages
- Rules reside within the Process Gateway
- Front-End to generate and edit rules
- Very generic rules





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OUR SOLUTION – DECENTRALIZED ARCHITECTURE

Motivation

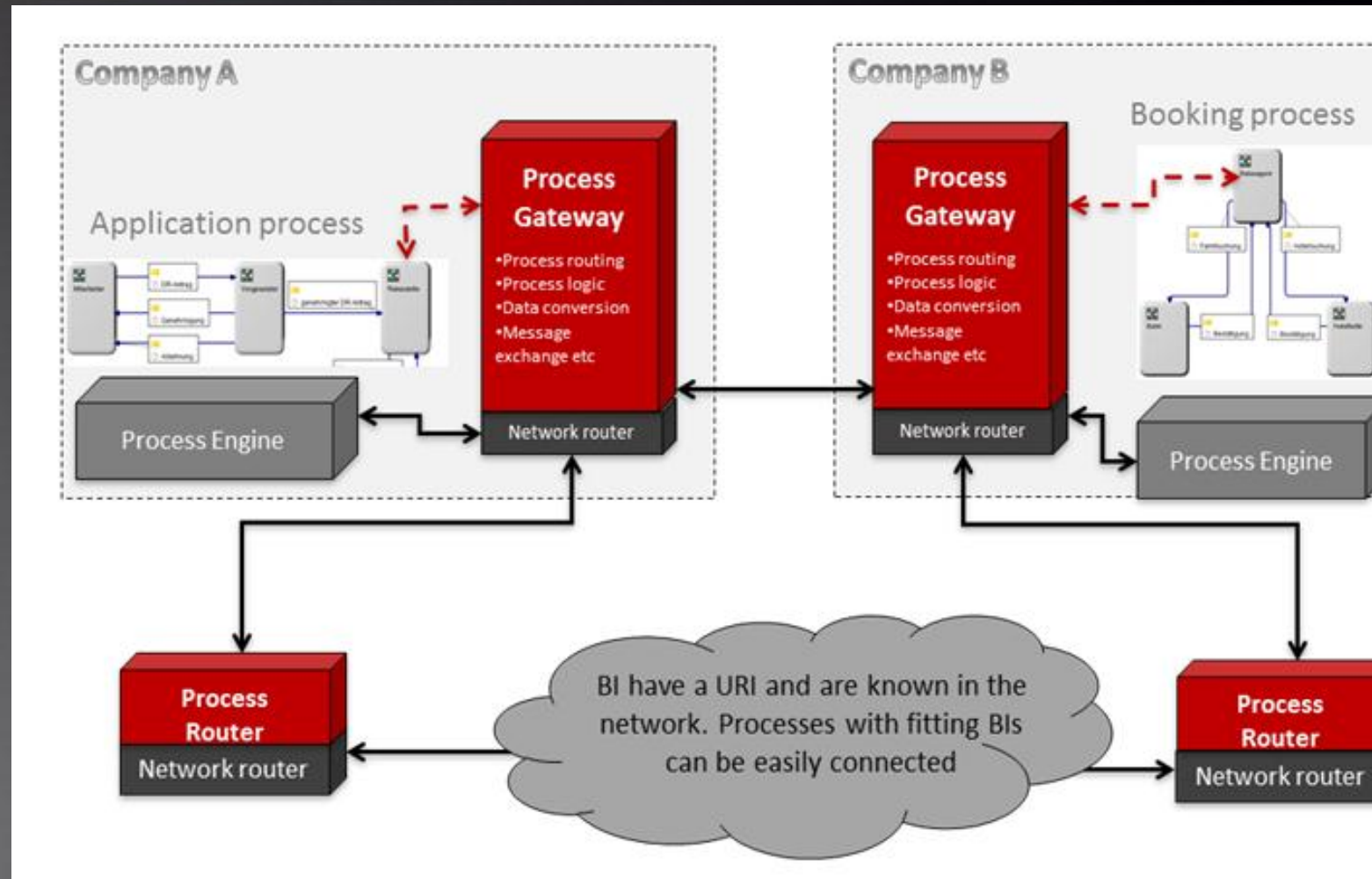
Example

Requirements

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Conclusion & Future work





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CONCLUSION AND FUTURE WORK

- **Several requirements were deduced regarding modelling & execution**
- **Evaluation of common CBPM approaches**
- **Introduction of our jCPEX! Solution, which fulfills all requirements**
- **“Subject Oriented” modelling already gave the appropriate granularity**
- **Gap between modelling and execution is minimized**
- **Future work is necessary regarding**
 - security and effective search capabilities
 - appropriate description of organizations
 - appropriate definition of „Capabilities“





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