Process-Oriented Integration of Applications for a Service-Oriented IT Management

Integrated IT Management Architecture

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Overview

• Introduction
• Related Work
• Requirement Analysis
• Integrated Architecture
• Prototypical Implementation
• Conclusion and Outlook
INTRODUCTION – Scenario and Questions

- Understanding processes for service-oriented IT management
- Defining relationships between traditional management and service-oriented management
- Extending traditional management architectures to support service-oriented management
RELATED WORK – Development and Standardization Achievements

• IT Service Management
  - Best-practice processes for service-oriented IT management
    ▪ Office of Government Commerce (OGC):
      IT Infrastructure Library (ITIL) as de facto standard
  - Rather organizational level, not sufficient to develop management applications

• Management Architectures
  - Models to formalize IT services (function, quality, resource, view, lifecycle etc.)
    ▪ Internet Engineering Task Force (IETF):
      Structure of Management Information (SMI)
    ▪ Web-Based Enterprise Management (WBEM) initiative:
      Common Information Model (CIM)
  - More technology-oriented, not sufficient to model IT services

• Technologies
  - Technologies to automate the SLA negotiation
    ▪ World Wide Web Consortium (W3C):
      Web service technologies (SOAP – used to transfer data, WSDL – used to describe available Web services, UDDI – used for listing what Web services are available)
    ▪ IBM Research Division:
      Web Service Level Agreement (WSLA) Framework
  - SLA specification language associated with Web services
RELATED WORK – Structuring IT Operation Processes According to ITIL

Service Customer
- Customer
- Business Needs
- User

Service Provider
- Relationship Management
- Service Desk

Service Delivery
- Service Level Management
- Availability Mgmt.
- Capacity Mgmt.
- Continuity Mgmt.
- Financial Mgmt.

Service Support
- Incident Mgmt.
- Problem Mgmt.
- Change Mgmt.
- Release Mgmt.
- Configuration Mgmt.

IT Service Infrastructure
- ICT Infrastructure Management
- Operations Mgmt.
- Network Mgmt.
- Systems Mgmt.
- Installation Mgmt.

Application Management
- Application Management Processes

Supplier
- Software
- Hardware
- External Service Provider
- Building
- Personnel
METHODOLOGY –
Process-oriented Integration of (Management) Applications

• Starting point – focused business domain and IT landscape

• Business View – process-oriented domain analysis
  - Functional areas
  - Roles and responsibilities
  - Activity sequences
  - Information and document flows

• System View – business-driven service definition
  - (Application-based) service identification
  - (Application-based) service specification

• Objective – directory with services which can be used
SERVICE (LEVEL) MANAGEMENT PROCESSES – Modeled with Business Process Modeling Notation (BPMN)

Service Customer

- IT Service Request
- Design & Install SLA Measurement and Reporting
- Sign SLA
- Service Level Achievement
- SLA Monitoring
- SLA Report
- Catalog IT Services
- Draft SLA Documents
- SLA [signed]
- Report Configuration & Service Measurement Design
- Change SLA
- Delete SLA
- Service Level Agreement
- Underpinning
- Supplier

Service Provider - Service Level Management

- Catalog IT Services
- Draft SLA Documents
- SLA [drafted]
- SLA Establishment
- Service Requirements
- Service Module Catalog
- Operational Level Agreement
- Operational Level Agreement
- Supplier

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REQUIREMENTS ON MANAGEMENT APPLICATIONS – Refinement of Activities and Management Information Flow

**Business View**

- **IT Service Cataloging**
- **SLA Establishment**
- **SLA Monitoring**

**Processes**

- **Service Description Requirements**
  - Service Catalog
  - Service Description
  - Service Module Catalog
  - Service Module Description
  - Service Measurement Design

- **SLA Editing Requirements**
  - SLA
  - Report Configuration
  - Service Instance

- **SLA Reporting Requirements**
  - SLA Report
  - Service Level Achievement
  - Data of Data Warehouse

- **Condition Evaluation Requirements**
  - Measurement Requirements
  - Service Measurement Data

- **Measurement Design Requirements**
  - Service Measurement Design

- **Report Configuration Requirements**
  - Report Configuration

- **SLA Editing Requirements**
  - Service Module Description
  - Service Module Description
  - Service Module Description

**SLM Documents**

- **Service Description Requirements**
  - Service Module Description

- **SLA Reporting Requirements**
  - SLA Reporting

- **Measurement Requirements**
  - Service Measurement Data

**Data Warehouse**

- **Measurement Design**
  - Service Measurement Design

- **Report Configuration**
  - Report Configuration

- **SLA Editing**
  - SLA Editing

**Service Instance**

- **Service Instance**
  - Service Instance

- **Service Catalog**
  - Service Catalog

- **Service Description**
  - Service Description

- **Service Module Catalog**
  - Service Module Catalog

- **Service Module Description**
  - Service Module Description

- **Service Measurement Design**
  - Service Measurement Design

- **Report Configuration**
  - Report Configuration

- **SLA**
  - SLA

- **SLA Monitoring**
  - SLA Monitoring

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REQUIREMENTS ON MANAGEMENT APPLICATIONS – Supporting Service-oriented IT Management

• Functional requirements
  - Service (module) description
  - SLA editing, measurement design, report configuration
  - SLA reporting, condition evaluation, measurement

• Architectural requirements
  - Integration of existing applications supporting traditional IT management
  - Customization to align management applications with service management processes
  - Integration and composing management functionality along processes
  - Highly flexible and adaptable to fulfill future needs on processes
  - Workflow mechanisms to support the cooperation between various roles of a service provider
INTEGRATED MANAGEMENT ARCHITECTURE – Relationships between Service Level Management Information

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<SLA>
  <Parties> ... </Parties>

<ServiceDefinition name="myITService">
  <SLAParameter name="Availability_UpTimeRation">
    <Metric>UpTimeRation</Metric>
  </SLAParameter>
  <Metric name="UpTimeRation" unit="percent">
    <Source>ICT_MeasurementDepartment</Source>
    <Function>
      ...</Function>
  </Metric>
</ServiceDefinition>

<Obligation>
  <ServiceLevelObjective name="SLO_1">
    <Obliged>ServiceProvider</Obliged>
    <Validity> ... </Validity>
    <Expression>
      <Predicate xsi:type="Greater">
        <SLAParameter>
          Availability_UpTimeRatio
        </SLAParameter>
        <Value>98</Value>
      </Predicate>
    </Expression>
    <EvaluationEvent>NewValue</EvaluationEvent>
  </ServiceLevelObjective>
  <ActionGurantee name="Send_Notification">
    ...
  </ActionGurantee>
  <ReportConfiguration>
    ...
  </ReportConfiguration>
</Obligation>

<ReportConfiguration>
  ...
</ReportConfiguration>
</SLA>
```
INTEGRATED MANAGEMENT ARCHITECTURE –
SOA-Based Integration of Management Applications

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**Service Provider**

- **Service Module Manager** (Technology-oriented)
- **Service Catalog Manager** (Customer-oriented)

**Presentation**

- **Portal (internal)**

**Choreography**

- **IT Service Cataloging**

**Composite Web Services**

- **Manage SMD**
- **Manage SD**

**Core Web Services**

- **Service Module Description Web Service**
- **Service Description Web Service**

**Application Components**

- **Configuration Manager**
- **Service Catalog Manager**

**Management Information**

- **CMDB**
- **Service Description**

**Service Customer**

- **Portal (external)**
PROTOTYPICAL IMPLEMENTATION –
Configuration Manager and Service Catalog Manager (SCM)

• Implementation strategy
  - Extension of existing (Java-based) management applications
  - Description of Web service interfaces with Web Service Description Language (WSDL)
  - Process-oriented integration of Web services using Business Process Execution Language (BPEL)

• BEA WebLogic
  - Graphical design of integration process
  - Behind graphical design Process Definition for Java (PD4J) generated (precursor of BPEL and Java-enhanced BPEL/J)
PROTOTYPICAL IMPLEMENTATION – Overall BPMN Process Model

Customer

Receive Service Catalog

Send IT Service Request

Receive IT Service Agreement

Receive Service Reports

Service Manager Department

Define and Publish Service Catalog

Receive IT Service Request

Negotiate and Agree on IT Services

Send Service Agreement

Provide Managed Service

Service Catalog

IT Service Offer

IT Service Request

SLA

SLA Reports

Supplier

Provide IT Resources Offer

Receive Service Reports
PROTOTYPICAL IMPLEMENTATION – BPMN Process “Define and Publish Service Catalog”

Define and Publish Service Catalog

Service Manager

SM-catalog changed

Define Service Description

Publish SC

Service Module Manager

Fill Out SMDT with Common attributes

Fill Out SMDT with specific attributes

Create Service Module Description

SMD Template

SMD

+ +
PROTOTYPICAL IMPLEMENTATION – BPMN Process of “Fill Out SMDT with common attributes”
PROTOTYPICAL IMPLEMENTATION – Towards an Integrated Architecture for IT Service Management

User interaction logic

Business process integration logic

Adapter logic

Business application logic

Data management

ITSM Portal

<<BPEL>>

ITSM Business Process Control

<<Web Service>>

CMDB

<<Web Service>>

Service Catalog

<<Web Service>>

SLA Editor

Config. Manager (CMDB) facade

Service Catalog Manager facade

SLA Editor facade

Database

Database

Database

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PROTOTYPICAL IMPLEMENTATION – Configuration Manager

- GUI elements to support the Service Module Description
- Describing service-relevant resource properties to enable the definition of services
- GUI elements to support the Service Description
- Definition of services based on service modules respective resources
CONCLUSION AND OUTLOOK

• Conclusion
  • Paradigm shift from traditional IT management to service-oriented IT management
  • Models of service-oriented IT management processes as prerequisite to develop management applications
  • SOA-based integration of traditional management applications with additional service management applications
  • Business-alignment of management applications through loosely coupling applications according to management processes

• Outlook
  • Formalization of management information, especially the specification of quality of service information
  • Derivation of (quality of) service requirements on invoked IT services from business processes