TOWARD AN INTEGRATED USER REQUIREMENTS NOTATION FRAMEWORK AND TOOL FOR BUSINESS PROCESS MANAGEMENT

Alireza Pourshahid  
Dr. Daniel Amyot  
Dr. Liam Peyton  
Sepideh Ghanavati

Pengfei Chen  
Dr. Michael Weiss  
SCS, Carleton University

Dr. Alan J. Forster  
Department of Medicine / OHRI  
University of Ottawa

uOttawa

L'Université canadienne  
Canada’s university

Carleton University  
Canada’s Capital University
AGENDA

- Introduction
- Problem definition
- User Requirement Notation (URN)
- The framework components & core models
- URN extension to support the framework
- Tool support for performance analysis
- Case study
- Summary
INTRODUCTION – BPM – BPMS – BAM

- **BPM:** The understanding and management of diverse and cross organizational processes which link humans and automated systems together.

- **BPMS:** A suite of product that enable us handle the required tasks in a BPM lifecycle in an automated and computerized manner.

- **BAM:** The real-time reporting, analysis, monitoring and alerting of significant business events, accomplished by gathering data, key performance indicators (KPI) and business events from multiple applications.

- **KPI:** A common way of evaluating different aspects of a business by quantitative measurement.
BPM Life Cycle

In which steps do we need both process models and goal models?
PROBLEM DEFINITION

- Performance methodologies and process monitoring tools:
  - Do not explicitly support *goal modeling* notations.
  - Are not capable of providing analysis and visualization on the *impact of processes* performance on the *organizational goals*.
  - Are based on *statistical and management* tools and are not suitable for monitoring *complex cross-organizational processes* that hit different information systems during the process flow and generate much data.
  - One of the main challenges is *integration* with the existing *processes supporting software* in enterprises.
URN – User Requirements Notation

- URN is the *first* standardization effort which explicitly addresses nonfunctional requirements (i.e. Process Goals) *(with GRL)* in addition to functional requirements (i.e. Process Steps) *(with UCM)*

- URN combines GRL *goals* and UCM *scenarios* in order to help capture and reason about user requirements and business processes prior to detailed design/execution.

- International Telecommunication Union (ITU-T Z.150 series)
- URN ... User Requirements Notation
- GRL ... Goal-oriented Requirement Language
- UCM ... Use Case Maps
Example Approval Process Goal Model

- **Soft Goal**: Increase regulatory compliance
- **Goal**: Increase agility & responsiveness, Prevent Privacy Violate, Prevent unauthorized use
- **Contribution Link**: Approval Process
- **Actor Boundary**: Healthcare
- **Task (Process)**: Encourage use of DW, Analyze data in DW, Improve the quality of health care delivery, Improve the efficiency of health care delivery
URN & BPM

- UCM combined with GRL can answer *Where, What, Who, When* and *Why* questions needed by BPM
- Use Case Maps (UCM)
  - Scenarios and Sequencing (When)
  - Responsibilities (What)
  - Components (Who and Where)
- Goal-oriented Requirement Language (GRL)
  - Business or system goals (Why)
  - Tasks (What)
  - Who (Actor)
- GRL & UCM
  - Link the process or a part of the process to business goals.
Framework Tool (jUCMNav)
- Process Models
- Context Object
- Validation Links
- Framework Meta-Model (Core + Extensions)

Data Exchange Layer
- Web services
- RMI
- Plug-ins

External Tools
- Requirements Management System (DOORS)
- BI/PMS (Cognos & BI)
- Data Warehouse
- Business Process Execution Engine
FRAMEWORK CORE MODELS
PERFORMANCE MODELS IN URN

URN

GRL

BPM

Business Goals

Performance Models

Business Processes

UCM
**URN EXTENSION FOR PERFORMANCE MONITORING**

**IntentionalElemnet**
- type : IntentionalElementType
- decompositionType : DecompositionType
- lineColor : String
- fillColor : String
- filled : boolean(id)

**GRLmodelElement**

**GRLNode**

**Indicator**

**IndicatorGroup**

**KPIInformationElementRef**

**GRLspec**

**KPIInformationElement**

**PerformanceModelLink**

**PerformanceModelLinkRef**

**<<interface>>**
- IURNDiagram
- IURNConnection
Detail Information on KPIs

Performance Model
**SCENARIO-BASED PROCESS ANALYSIS**

Analyze only a *scenario* or a *part* of the process we are interested in.

Observe the *impact* of highlighted part of the process on the related *business goals*
**Process portfolio analysis**

*Importance* value is the average satisfaction level of the top-level business goals when a process performs at its 100% capacity.

*Performance* value is computed from the performance model.
Case Study: Process Performance Model

Diagram showing the relationships between various process metrics and outcomes, such as number of complaints, number of users, average approval turn around time, and more. The diagram highlights strategies for reducing number of complaints, process effort, and costs, along with improving technical review turn around time and reducing mistakes during review.

Key concepts:
- Number of Complaints
- Number of Users
- Approval Time
- Service
- Technical Review
- Average Time Between REB Review and DW Review
- Number of Technical Review Mistakes
- Service
- Time
- Unit

Strategies include:
- Reduce number of complaints
- Reduce process effort
- Reduce process costs
- Reduce time to approve
- Reduce technical review turn around time
- Reduce mistakes during technical review

Outputs include:
- Average time lag between REB review and DW review
- Number of technical review mistakes
- Service
- Time
- Unit
CHANGING KPI VALUES

Before

<table>
<thead>
<tr>
<th>Importance</th>
<th>REB Approval</th>
<th>CPO Review</th>
<th>Technical Review</th>
</tr>
</thead>
<tbody>
<tr>
<td>Importance</td>
<td>37.6</td>
<td>36.7</td>
<td>37.6</td>
</tr>
<tr>
<td>Performance</td>
<td>71</td>
<td>78</td>
<td>60</td>
</tr>
</tbody>
</table>

After

<table>
<thead>
<tr>
<th>Importance</th>
<th>REB Approval</th>
<th>CPO Review</th>
<th>Technical Review</th>
</tr>
</thead>
<tbody>
<tr>
<td>Importance</td>
<td>28.25</td>
<td>27.5</td>
<td>57.75</td>
</tr>
<tr>
<td>Performance</td>
<td>50</td>
<td>76</td>
<td>49</td>
</tr>
</tbody>
</table>

Importance: 32.67  37.6  36.7  37.6  40
Performance: 89  60  78  71  50
CASE STUDY
REVISED PERFORMANCE MODEL
**Summary**

- Introduced a business process management framework based on the URN modeling notation
- Introduced concept of performance model derived from business goals
- Extended URN meta-model to support performance modeling
- A scenario-based technique for performance and impact analysis has been elaborated
- Talked about process portfolio analysis
- Explained these concepts in the context of a case study.