The Road Ahead in Process Modeling: Issues, Challenges and Research Problems

Marta Indulska, PhD
UQ Business School
The University of Queensland

University of Queensland

- Top 3 Universities in Australia
- Member of Go8
- Member of U21Global
- 4 campuses
- 7 faculties, 4 institutes
- >40,000 students
- Longest established in QLD (1909)
UQ Business School

- Faculty of Business, Economics and Law
- Largest School at UQ
- > 100 academic staff + teaching staff
- 95% PhD holders
- 80% business experience
- Management, Marketing, Finance, Accounting, International Business, Information Systems

Me

- Background in IT
- School of Electrical Engineering and Information Technology: B Information Technology, Hons Information Technology, PhD (Computer Science; 2004)
- UQ Business School since 2004
- Research Interests:
  - Conceptual modeling, Business Process Management, Business rule modeling, Compliance management
Overview

- Brief BPM & PM intro
- Motivation
- Empirical insights
- Business Process Management issues
- Process Modeling issues
- BPM in academia
- Some open research questions

What is BPM?

- Business Process Management is a structured, coherent and consistent way of understanding, documenting, modeling, analyzing, simulating, executing and continuously changing end-to-end business processes and all involved resources in the light of their contribution to business improvement.

Australian BPM Community of Practice (www.bpm-roundtable.com)
The Nescafé Process

The Process-Aware Organization

A process-aware organization has a better understanding of the most important set of its business processes.

- “What processes are exposed to the largest risk?”
- “What are the top five revenue generating processes in the business?”
- “What are the most resource intensive processes?”
- …
### BPM (Still) The #1 Priority

**Business expectations for IT focus on improving current operations and performance**

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Improving business processes</td>
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<tr>
<td>Reducing enterprise costs</td>
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<td>5</td>
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<td>2</td>
<td>7</td>
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<td>Improving enterprise workforce effectiveness</td>
<td>3</td>
<td>6</td>
<td>4</td>
<td>*</td>
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<td>Attracting and retaining new customers</td>
<td>4</td>
<td>2</td>
<td>3</td>
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<td>Increasing the use of information/analytics</td>
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<td>8</td>
<td>7</td>
<td>6</td>
<td>8</td>
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<tr>
<td>Creating new products or services (innovation)</td>
<td>6</td>
<td>9</td>
<td>10</td>
<td>9</td>
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<td>Targeting customers and markets more effectively</td>
<td>7</td>
<td>9</td>
<td>*</td>
<td>*</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Managing change initiatives</td>
<td>8</td>
<td>12</td>
<td>*</td>
<td>*</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Expanding current customer relationships</td>
<td>9</td>
<td>7</td>
<td>*</td>
<td>*</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Expanding into new markets or geographies</td>
<td>10</td>
<td>4</td>
<td>9</td>
<td>*</td>
<td>4</td>
<td></td>
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<tr>
<td>Consolidating business operations</td>
<td>11</td>
<td>13</td>
<td>14</td>
<td>*</td>
<td>15</td>
<td></td>
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<tr>
<td>Supporting regulation, reporting and compliance</td>
<td>12</td>
<td>14</td>
<td>13</td>
<td>*</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Creating new sources of competitive advantage</td>
<td>13</td>
<td>11</td>
<td>8</td>
<td>*</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

Gartner, 2009

### The Value Proposition

**BPM adoption maturity**

- **Transformation**
- **Business insight**
- **Compliance & consistency**
- **IT agility**
- **Efficiency**
- **Knowledge**

**Value to shareholders and competitiveness**

- **Process modeling**

**Process execution**

- **Process monitoring**

**Process Optimization**

- **Workers, supervisors, and managers**
- **CIO**
- **CFO**
- **CXO**
- **CEO**

Stakeholders

Forester 2007 BPM Market Overview
BPM Span

- Document Mgmt
- Process Documentation
- Compliance
- Knowledge Mgmt
- SOA
- Training
- Workflow Mgmt
- Simulation
- Enterprise Systems
- Software Evaluation
- Process Improvement

The Industry - Research Gap

- Research Issues
- Practical Problems
- BPM Teaching / and Research
- BPM Practice
- Research Methods & Teaching Styles
- Practical Solutions
Bridging the Gap

- Increasing the relevance of research
- Increasing communication between industry and academia
- HOW?
  - Case studies, surveys, focus groups, interviews, delphi studies, experiments
What are the BPM pain-points/challenges in Australian organizations?
Research Questions

- What are the major issues in BPM?
- What are the most important issues?
- What are the challenges related to these issues?

Show me the data! - WHO?

- Focus Groups
  - Australian user organisations
  - Brisbane, Perth, Sydney
- Interviews
  - BPM tool vendors
  - leading BPM experts worldwide
Show me the data! - HOW MANY?

- Focus Groups
- 24 Australian user organisations
- Brisbane, Perth, Sydney

Show me the data! - HOW MANY?

[Logo images of various companies such as Rio Tinto, AMP, HBF, Illuka Resources Ltd, AeM Group, GWF, Suncorp, Powerlink, MLC, ConocoPhillips, and Colstra]
Show me the data! - HOW MANY?

- Focus Groups
  - 24 Australian user organisations
  - Brisbane, Perth, Sydney
- Interviews
  - 8 global BPM tool vendors
  - phone & face-to-face
  - 14 leading BPM experts worldwide
  - phone & face-to-face

Data Analysis: 3 BPM Communities

- consolidation of rankings for focus groups
- transcription of interviews
- Nvivo analysis of interviews
- 3 separate coders

Strategic
  e.g. Alignment, Governance

Tactical
  e.g. Process Modeling, BPM Methodology, Process Performance Management

Technical - Operational
  e.g. web services, SOA, BPEL,
BPM Issues

Resistance to change
- Lack of governance and redefining accountability
- Lack of top management support
- Lack of support for process owners

Lack of visibility
- Lack of BPM understanding
- Lack of measurable returns
- Lack of coordination
- Lack of standardization
BPM Issues

Lack of expertise
Lack of performance measures
Lack of progress in process maturity
Lack of clear starting point

Lack of suitable tools for holistic BPM
Lack of technology capability
Lack of process monitoring
Lack of integration
Study Motivation & Design

- **Research agenda for process modeling**
  - What are the current and future pain-points/challenges related to process modeling?
  - Do they differ depending on the stakeholder?
    - researchers; practitioners; vendors

- **Delphi study approach**
  - 73 participants worldwide
  - 28 researchers, 24 practitioners, 21 tool vendors
Who does process modeling relate to?

- Programmers
- Systems analysts
- Business analysts
- Business users
- Compliance managers

Research Questions

- What are the current process modeling issues?
- What are the challenges in process modeling likely to be in 5 years time?
- What are the benefits of process modeling?
Delphi approach

- multi-round approach to data collection
- consensus-seeking
- useful in explorative situations
- anonymous
- requires specific and careful selection of participants (v.s. random sample)
- requires consideration of levels of participant agreement
- generally done in a tight time-frame

Our Delphi approach

Questions posed

Consensus on Analysis & Definitions

Weighting of the data

.70*5*3=1,050 responses!
consolidate!

enough agreement?
if not, revise, repeat!
Response rates

- Minimise study time-span to reduce drop out rate
- ~ 3 month duration
- upfront buy-in from participants
- 85% ongoing participation rate

<table>
<thead>
<tr>
<th>Panel group</th>
<th>Response to initial contact</th>
<th>1st round response</th>
<th>2nd round response</th>
<th>3rd round response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academics</td>
<td>28</td>
<td>26</td>
<td>26</td>
<td>25</td>
</tr>
<tr>
<td>Vendors</td>
<td>21</td>
<td>21</td>
<td>18</td>
<td>18</td>
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<tr>
<td>Practitioners</td>
<td>24</td>
<td>23</td>
<td>22</td>
<td>19</td>
</tr>
<tr>
<td>Total</td>
<td>73</td>
<td>70</td>
<td>66</td>
<td>62</td>
</tr>
</tbody>
</table>

Consensus & satisfaction

- Consensus seeking by nature
- How do we determine consensus?
- Previous studies: 7.5 (scale 1-10)
- Our study: 8 (scale of 1-10)

<table>
<thead>
<tr>
<th>Issues</th>
<th>Academics</th>
<th>Vendors</th>
<th>Practitioners</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average satisfaction score</td>
<td>8.338</td>
<td>9.000</td>
<td>8.791</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>1.853</td>
<td>1.185</td>
<td>1.143</td>
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</table>

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Academics</th>
<th>Vendors</th>
<th>Practitioners</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average satisfaction score</td>
<td>8.442</td>
<td>8.638</td>
<td>8.883</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>1.520</td>
<td>1.468</td>
<td>1.150</td>
</tr>
</tbody>
</table>
### Top 10 process modeling issues

<table>
<thead>
<tr>
<th>Rank</th>
<th>Issue</th>
<th>Description</th>
<th>Mean Rating</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Standardization</td>
<td>Issues related to the standardization of modeling notations, tools, and methodologies.</td>
<td>9.525</td>
<td>4.465</td>
</tr>
<tr>
<td>2</td>
<td>Value of process modeling</td>
<td>Issues related to the value proposition of process modeling to the business.</td>
<td>8.091</td>
<td>7.007</td>
</tr>
<tr>
<td>3</td>
<td>Model-driven process execution</td>
<td>Issues related to the model-driven development of executable process code and the lifecycle of process modeling to execution.</td>
<td>6.874</td>
<td>6.252</td>
</tr>
<tr>
<td>4</td>
<td>Model management</td>
<td>Issues related to the management of process models such as publication, version, variant or release management.</td>
<td>5.729</td>
<td>0.666</td>
</tr>
<tr>
<td>5</td>
<td>Modeling level of detail</td>
<td>Issues related to the definition, identification or modeling of adequate levels of process abstraction.</td>
<td>4.934</td>
<td>4.351</td>
</tr>
<tr>
<td>6</td>
<td>Methodology</td>
<td>Issues related to the process of process modeling.</td>
<td>4.690</td>
<td>4.202</td>
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<td>7</td>
<td>Governance</td>
<td>Issues related to the governance of process modeling efforts or projects.</td>
<td>4.192</td>
<td>3.727</td>
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<tr>
<td>8</td>
<td>Buy-in</td>
<td>Issues related to the acquisition or ongoing assurance of buy-in and commitment from process modeling sponsors.</td>
<td>3.167</td>
<td>5.485</td>
</tr>
<tr>
<td>9</td>
<td>Business–IT-divide</td>
<td>Issues related to the use of process modeling in IT versus business scenarios, application areas or communities.</td>
<td>2.944</td>
<td>5.100</td>
</tr>
<tr>
<td>10</td>
<td>Process orientation</td>
<td>Issues related to the development or education of a process-aware perspective in relevant stakeholders or organizational units.</td>
<td>2.889</td>
<td>5.004</td>
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</table>

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**How do you make a Cup of Coffee?**
The Nescafé Process

1. Boil Water
2. Put Coffee in Cup
3. Put Boiling Water in Cup
4. Coffee is Ready

The Espresso Machine Process

1. Check if Kettle is empty?
2. Check if Cup is dirty?
3. Check if Water is cold?
4. Yes: Fill Kettle
5. No: Put Coffee in Cup
6. Put Boiling Water in Cup
7. Coffee is Ready

Coffee Lover

Clean Cup

Dishwasher
The Starbucks Process

Top 10 process modeling issues

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<td>Methodology and governance</td>
<td>Issues related to the governance of process modeling efforts or projects.</td>
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<td>4.202</td>
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<td>10</td>
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<td>2.889</td>
<td>5.004</td>
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</table>
Current Process Modeling Issues (frequency)

<table>
<thead>
<tr>
<th>Academics</th>
<th>IT/BPM Vendors</th>
<th>BPM Practitioners</th>
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<tbody>
<tr>
<td>Standardisation</td>
<td>Standardisation</td>
<td>Training</td>
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<tr>
<td>Model-driven process execution</td>
<td>Model-driven process execution</td>
<td>Standardisation</td>
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<tr>
<td>Modelling views</td>
<td>Process discovery</td>
<td>Value of process modeling</td>
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<td>Flexibility</td>
<td>Value of process modelling</td>
<td>Governance</td>
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<td>Compliance</td>
<td>Model management</td>
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<td>Methodology</td>
<td>Modelling level of detail</td>
<td>Model management</td>
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Top 10 process modeling challenges

<table>
<thead>
<tr>
<th>Rank</th>
<th>Issue</th>
<th>Description</th>
<th>Mean Rating</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Value of process modeling</td>
<td>The establishment of a business value proposition of process modeling.</td>
<td>12.893</td>
<td>5.041</td>
</tr>
<tr>
<td>2</td>
<td>Model-driven process execution</td>
<td>The support for process enactment, automation or execution based on process models.</td>
<td>9.061</td>
<td>8.276</td>
</tr>
<tr>
<td>3</td>
<td>Standardization</td>
<td>The standardization of process modeling approaches, methodologies, tools, methods, techniques or notations.</td>
<td>8.340</td>
<td>1.221</td>
</tr>
<tr>
<td>4</td>
<td>Business-IT-alignment</td>
<td>The use of process modeling to support alignment between business and IT stakeholders, viewpoint or approaches.</td>
<td>5.111</td>
<td>8.853</td>
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<tr>
<td>5</td>
<td>Service orientation</td>
<td>The support for aspects relevant to the management of web services, service-oriented architectures or quality of services.</td>
<td>5.039</td>
<td>4.477</td>
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<tr>
<td>6</td>
<td>Training</td>
<td>The establishment of process modeling expertise.</td>
<td>4.543</td>
<td>3.936</td>
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<tr>
<td>7</td>
<td>Model management</td>
<td>The management of process model variants, versions, releases, changes etc.</td>
<td>4.264</td>
<td>3.736</td>
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<tr>
<td>8</td>
<td>Buy-In</td>
<td>The acquisition or ongoing assurance of buy-in and commitment from process modeling sponsors.</td>
<td>4.114</td>
<td>7.126</td>
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<td>9</td>
<td>Ease of use</td>
<td>The complexity or business of process modeling methodologies, tools or notations.</td>
<td>3.648</td>
<td>6.319</td>
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<tr>
<td>10</td>
<td>Collaborative modeling</td>
<td>The involvement of multiple people in the modeling of processes.</td>
<td>3.000</td>
<td>5.196</td>
</tr>
</tbody>
</table>
## Future Process Modeling Challenges (frequency)

<table>
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<th>Academics</th>
<th>IT/BPM Vendors</th>
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<tr>
<td>Model-driven process execution</td>
<td>Standardisation (11)</td>
<td>Value of process modelling (15)</td>
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<td>Methodology (6)</td>
<td>Value of process modelling (11)</td>
<td>Training (11)</td>
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<tr>
<td>Compliance (6)</td>
<td>Model-driven process execution (9)</td>
<td>Buy-in (9)</td>
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<td>Service integration (5)</td>
<td>Training (6)</td>
<td>Governance (4)</td>
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<tr>
<td>Model integration (5)</td>
<td>Model management (5)</td>
<td>Adoption (4)</td>
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<tr>
<td>Standardisation (5)</td>
<td>Service orientation (4)</td>
<td>Business-IT-Alignment (4)</td>
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### Current (weighted)

<table>
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<tr>
<th>Practitioners</th>
<th>Vendors</th>
<th>Academics</th>
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<tbody>
<tr>
<td>Standardization</td>
<td>Model-driven process execution</td>
<td>Service Orientation</td>
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<tr>
<td>Value of process modeling</td>
<td>Value of process modeling</td>
<td>Model-driven process execution</td>
</tr>
<tr>
<td>Buy-In</td>
<td>Business-IT alignment</td>
<td>Flexibility</td>
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<tr>
<td>Expectation Management</td>
<td>Standardization</td>
<td>Compliance</td>
</tr>
<tr>
<td>Training</td>
<td>Process orientation</td>
<td>Methodology</td>
</tr>
</tbody>
</table>

### Future (5 years)

<table>
<thead>
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<th>Practitioners</th>
<th>Vendors</th>
<th>Academics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value of process modeling</td>
<td>Model-driven process execution</td>
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<td>Buy-In</td>
<td>Business-IT alignment</td>
<td>Methodology</td>
</tr>
<tr>
<td>Standardization</td>
<td>Value of process modeling</td>
<td>Service orientation</td>
</tr>
<tr>
<td>Expectation Management</td>
<td>Ease of use</td>
<td>View integration</td>
</tr>
<tr>
<td>Governance</td>
<td>Standardization</td>
<td>Value of process modeling</td>
</tr>
</tbody>
</table>
What is done in current research?

- How do we get an overview of current research?
- Read all available papers.... ?
- Use IT as a support tool
  - Adobe Professional
  - Available data [proceedings]
  - Text mining tools: e.g. Leximancer
- Let’s have a look at the last 5 years of BPM proceedings - it takes 20 minutes!
BPM Research - Proceedings 2003-2008

- Technical research
  - algorithms
  - control flow
  - services
  - performance
  - workflow
  - constraints
  - execution
- All very important

Many exciting & relevant research problems

- Most expressive modeling languages?
- Lowering modeling language complexity?
- Methodology for process modeling?
- Methodology for BPM?
- Standardisation of process modeling?
  - different purposes?
- Integration of BPM tools?
- Improving BPM education?
- Improving process modeling education?
- ...
Thank You – Questions?

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The University of Queensland  
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