

A Template for Categorizing Business Processes in Empirical Research

Daniel Lübke^{1,2}, *Ana Ivanchikj*³, *Cesare Pautasso*³
innoQ¹, University Hannover², USI Lugano³



Outline

- Motivation & Goals
- Template Structure
 - Metadata
 - Extensions
- Validation
 - Survey
 - Industry Project
- Conclusions & Outlook





- For gaining insight into the usage of Process Models, ***Empirical Research is necessary***
- However, Process Models are ***sensitive*** to the owning organization
- ***Context Information is necessary*** to better comprehend and interpret results
- Better and clear context is necessary for ***meta-studies (comparison) and replication studies***
- What should researchers report?

What to report?

- Question arose when reading (and writing) empirical papers
 - We think everyone has had this thought...
- For example, Juric & Hertis (2014) [1]:
 - > 1000 BPEL Processes analyzed
 - Indicate global distribution of domains and tools used
 - However, analyze the set of processes as one coherent set
 - Because they maintained no mapping between domains, tools etc. and process models



Is this set really coherent? What should we report?

[1] Juric & Hertis (2014): An Empirical Analysis of Business Process Execution Language Usage, IEEE Trans. SE, 40/08

Image Credits: <http://pursuitmag.com/writing-the-perfect-investigative-report/>

Goals

- Help researchers to **collect data** about processes that is relevant to others
- Help researchers to **publish meaningful results** by knowing which properties of the business process can be anonymized and which should not
- Help researchers to **report the important properties** of business processes in their publications, so that their audience has sufficient details to evaluate the quality of the reported research
- **Foster empirical research** about business processes... [which] can be accumulated based upon multiple, comparable works
- **Enable meta-studies** that combine, aggregate and detect trends over existing and future [research]

Main Template

- ***Applicable to all*** Business Process Models and Collections thereof
- ***Independent*** of any Technology

Process Name	Name or Anonymous Identifier of the Process
Version	Process Version (if available)
Domain	Business Domain of the Process
Geography	Location of the processes
Time	Period of data collection
Boundaries	Cross-Organizational / Intra-Organizational / Within-Department
Relationship	Calls another / Is being called / No call / Event triggered
Scope	Business Scope: Core / Auxiliary, or Technical Scope
Process Model Purpose	Descriptive / Simulation / Execution
People Involvement	None / Partly / No Automation
Process Language	e.g., WS-BPEL 2.0 / EPC / BPMN1 / BPMN2 / ...
Execution Engine	Engine used for running the Process Model if the model is executable
Model Maturity	Illustrative / Reference / Prototypical / Reviewed / Productive / Retired

Extension Templates

- Specific to Research Purpose and/or Technology

Transfer Register Mortgage Certificate to Trustee (Version 26.0)		
Number of Process Instances		13
Execution Time (min)		00h:00m:01s
Execution Time (med)		02h:33m:00s
Execution Time (mean)		12h:34m:39s
Execution Time (max)		64h:24m:14s
Execution Time (total)		163h:30m:32s
Transfer Register Mortgage Ce	Count	BP
Assign (B)	79	On
Catch	4	On
CatchAll	2	On
Compensate (B)	0	On
Compensate Scope	0	Par
Compensation Handler	0	Pic
Else	13	Receive (B)
Else If	3	Repeat Until (S)
Empty (B)	42	Reply (B)
Exit (B)	9	Rethrow (B)
Extension Activity	1	Scope
Flow (S)	1	Sequence (S)
ForEach (S)	4	Throw (B)
If (S)	13	Validate (B)
Invoke (B)	37	Wait (B)
Link	2	
Derived Metrics:		
Basic Activities (B)	198	Structured Acti

Extensions:		http://www.activebpel.org/2006/09/bpel/extension/activity
		http://www.activebpel.org/2009/06/bpel/extension/links
		http://www.activebpel.org/2006/09/bpel/extension/query_handling
		http://www.activebpel.org/2009/02/bpel/extension/ignorable
		http://www.omg.org/spec/BPMN/20100524/DI
Activities:	Type	Count
	ActiveVOS Continue	1
	Total	1



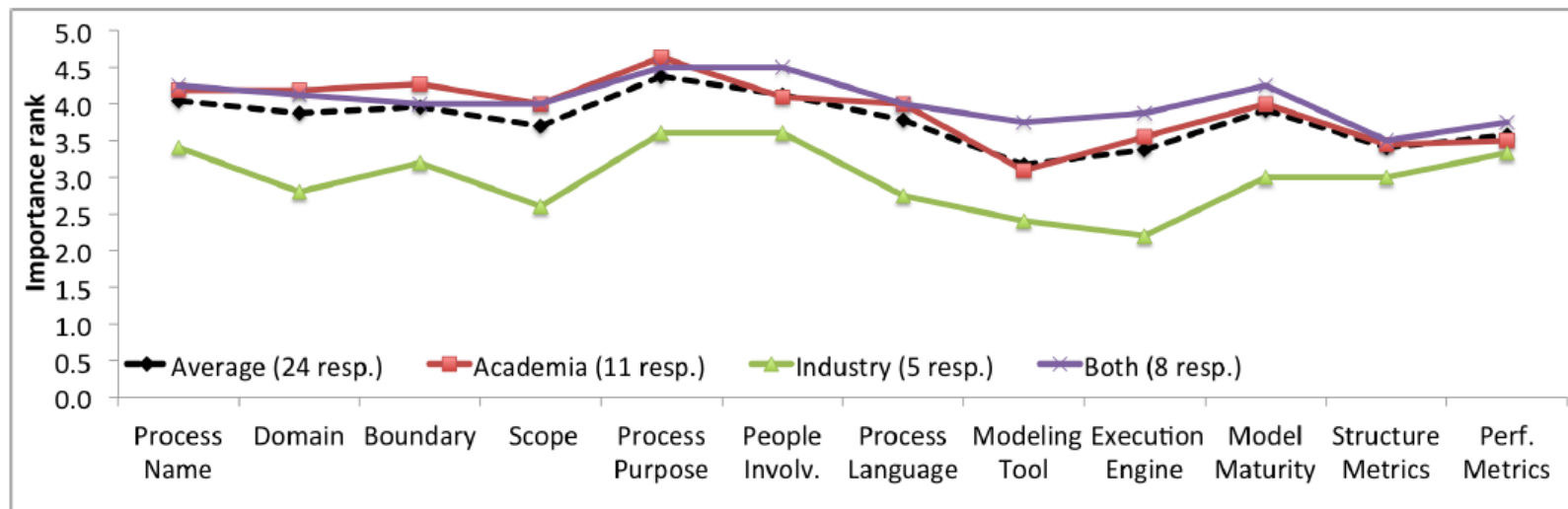
Validation – Survey I/II

- Exploratory Survey
 - 24 participants
 - 46% Academia, 21% Industry, 33% Both
 - 88% IT, 63% Business (multiple answers allowed)
- Questions:
 - Rate proposed Categories (5-Lickert)
 - “Helpfulness”, “Getting a feeling”
 - Missing properties?
 - General feedback



Validation – Survey II/II

- Led to improvements in the Metadata Template
 - **Modeling Tool** removed
 - **Version, Geography, Time,** and **Relationship** added
 - **Reference** and **Retired** attributes added to Maturity
- Overall high agreement



Validation – Industry Project I/III

- Application to Industry Project
 - 62 Executable BPEL Models
 - 918 Process Model Versions
 - 435093 Process Instances
- Research Questions:
 - Can the template actually be applied?
 - Are metrics well-defined and precise?
 - Can all categories be measured? Automated?
 - Is classification beneficial when evaluating process metrics?





Validation – Industry Project II/III

Collection Name	Terravis
Process Count	62 Models with 918 Versions
Domain	Land Registry Transactions
Geography	Switzerland
Time	2012-03-09 till 2016-08-30
Boundaries	Cross-Organizational 37%, Intra-Organizational 13%, Within-System 50%
Relationship	Is being called 31%, Calls another 26%, Both 8%, Event triggered 24%, No call 11%
Scope	Technical 52%, Core 39%, Aux 10%
Process Model Purpose	Executable
People Involvement	None 79%, Partly 21%
Process Language	WS-BPEL 2.0 plus vendor extensions
Execution Engine	Informatica ActiveVOS 9.2
Model Maturity	51 Productive, 11 Retired Models



Validation – Industry Project III/III

	#Model	#Activities	#Instances ^a	#Duration
Total	62	10'132	86'035	2'238'583 hours
Boundary				
Cross-Organizational	37%	71%	14%	68%
Intra-Organizational	13%	19%	8%	32%
Within-System	50%	10%	78%	0.1%
Relationship				
Is being called	31%	22%	19%	71%
Calls another	26%	55%	62%	9%
Is being called, Calls another	8%	12%	2%	20%
Event triggered	24%	3%	15%	0%
No call	11%	9%	2%	1%
Scope				
Technical	52%	10%	85%	0.2%
Core	39%	85%	13%	99%
Auxiliary	10%	5%	2%	1%
People Involvement				
None	79%	66%	86%	10%
Partly	21%	34%	14%	90%
Model Maturity				
Production	82%	84%	100%	96%
Retired	18%	16%	0.2%	4%

^a Only for latest process model version

What if...

- ... large studies like Hertis & Juric would have used such a template?
 - Research Design had incorporated classification of business processes
 - Analysis of influencing attributes on models could have been observed
- Comparison with other studies could be made
 - Identifying relevant factors and excluding noise better





Conclusions & Outlook

- First Steps for ***standardizing reports*** of empirical research
 - Better Comparability: Meta Studies & Replication
 - Better Comprehensibility
 - Guidance for Researchers during Planning & Execution
- However, implicitly asks ***what are factors*** that influence Process Models
 - More Empirical Evidence required
 - Discussion about tooling that we could not answer with one project

Conclusions & Outlook

- Call for Chapters:
“Empirical Studies on the Development of Executable Business Processes”
- Deadline for 2-page proposal
2017-10-15



<http://design.inf.usi.ch/books/ESDEBP>