

## Overview of context awareness approaches in Business Process Management

Reference	Description	Requirements	Shortcomings
(Rosemann, Recker, & Flender, 2008)	Stratified framework differentiating four forms of context into concentric layers of an onion model: immediate, internal, external, environmental	<ul style="list-style-type: none"> <li>Specification of the contextual factors in the four layers</li> </ul>	<ul style="list-style-type: none"> <li>Taxonomy serves as an initial reference on research in process contextualization</li> <li>No specification of the contextual factors extraction</li> </ul>
(vom Brocke, Zelt, & Schmiedel, 2016)	Integrated framework of contextual factors related to four dimensions: goal, process, organization, environment	<ul style="list-style-type: none"> <li>Specification of the contextual factors in the four dimensions</li> </ul>	<ul style="list-style-type: none"> <li>Many contextual factors from other fields require empirical investigation in BPM</li> <li>Interdependencies of contextual factors require further investigation</li> <li>More research on validation and extension of contextual factors</li> </ul>
(vom Brocke et al., 2021)	Context-Aware BPM Method Assessment and Selection (CAMAS) Method helping to assess contexts for BPM methods application and select BPM methods for given contexts	<ul style="list-style-type: none"> <li>Set of BPM methods (method bases)</li> <li>Classification framework (Excel)</li> <li>Specification of contextual factors</li> </ul>	<ul style="list-style-type: none"> <li>Assumptions of the method</li> <li>Evaluation</li> <li>No specification of the contextual factors extraction</li> </ul>
(Anastassiou, Santoro, Recker, & Rosemann, 2016)	Method to identify the contextual elements of a process based on the analysis of a process model	<ul style="list-style-type: none"> <li>Process-related information such as input, output, resources, activities</li> <li>Context-related information such as conditions, artifacts, products, services, information key to the process, events from external environment</li> </ul>	<ul style="list-style-type: none"> <li>Lack of detailed information in process models</li> <li>Lack of formalization</li> <li>Focus on immediate/internal contextual elements based on the process model</li> </ul>
(Hoang & Jung, 2014)	Ontological framework for context-aware collaborative business process formulation	<ul style="list-style-type: none"> <li>Process execution data (event logs)</li> <li>Ontologies</li> </ul>	<ul style="list-style-type: none"> <li>Focus on primitive ontologies</li> <li>Context information is limited to process execution data and ontologies</li> </ul>
(Bucchiarone, Marconi, Pistore, & Sirbu, 2011)	Framework supporting context-aware evolution of processes based on process instance execution and adaptation history, identifies recurring adaptation needs	<ul style="list-style-type: none"> <li>Process execution data (event logs)</li> </ul>	<ul style="list-style-type: none"> <li>Context information is limited to process execution data</li> <li>Lack of specific solutions for the identified adaptation needs</li> </ul>
(De Maio, Fenza, Loia, Orciuoli, & Herrera-Viedma, 2016; Enrique, De Maio, Fenza, Loia, & Orciuoli, 2016)	Framework, model for context-aware heterogeneous group decision making in processes	<ul style="list-style-type: none"> <li>Data regarding decision making (decision makers, opinions, weights, records of past decision making)</li> <li>Contexts modelled with Semantic Web languages and vocabularies like OWL2 and SKOS</li> </ul>	<ul style="list-style-type: none"> <li>Focus on decision makers and opinion weights</li> <li>Limitations regarding weights learning</li> <li>Context information is limited to Semantic Web languages and vocabularies like OWL2 and SKOS</li> </ul>
(Wang, Shi, Li, & Liu, 2016)	Framework for context-aware semantic complex event processing	<ul style="list-style-type: none"> <li>Process execution data (event logs)</li> <li>Event ontologies</li> </ul>	<ul style="list-style-type: none"> <li>Focus on event log data</li> <li>Context information is limited to ontologies</li> </ul>
(Hompes, Buijs, & van der Aalst, 2016)	Framework to analyze key process performance indicators by considering the process context	<ul style="list-style-type: none"> <li>Process execution data (event logs)</li> <li>Descriptive context labels assigned to process entities by applying context functions</li> </ul>	<ul style="list-style-type: none"> <li>Focus on event log data</li> <li>Careful interpretation of the results of the automated analysis technique</li> </ul>
(Ploesser, Recker, & Rosemann, 2010)	Conceptual model of context-awareness comprising process elements, goals, and context elements	<ul style="list-style-type: none"> <li>KPIs</li> <li>Expert interviews</li> </ul>	<ul style="list-style-type: none"> <li>Limitations of the expert interviews</li> </ul>
(Boukadi, Chaabane, & Vincent, 2009)	Framework for context-aware process modelling considering functional, non-functional and environmental contexts	<ul style="list-style-type: none"> <li>Roles, business rules, goals</li> <li>Process model</li> </ul>	<ul style="list-style-type: none"> <li>Focus on modelling</li> <li>Abundant non-functional and environmental contextual factors</li> <li>No specification of the contextual factors extraction</li> </ul>
(Saidani & Nurcan, 2009)	Context model for process modelling including information on who, what, where, when, why, how	<ul style="list-style-type: none"> <li>Roles, business rules, goals</li> <li>Process model</li> <li>Context information</li> </ul>	<ul style="list-style-type: none"> <li>Focus on modelling</li> <li>No specification of the contextual factors extraction</li> </ul>
(Rekik, Boukadi, & Ben-Abdallah, 2017)	Framework to integrate context awareness in process outsourcing to the cloud, includes process (KPI, workload), temporal,	<ul style="list-style-type: none"> <li>Process execution data (event logs)</li> <li>Context information</li> </ul>	<ul style="list-style-type: none"> <li>Focus on specific problem</li> <li>No specification of the contextual information extraction</li> </ul>

	resource (cost, risk, performance) contexts		
(Mounira & Mahmoud, 2010)	Context-aware process mining framework for process flexibility	<ul style="list-style-type: none"> <li>• Process execution data (event logs)</li> <li>• Process mining components (preprocessing, tool) and context-aware components (context interpreter, reasoner)</li> <li>• Contextual variables</li> </ul>	<ul style="list-style-type: none"> <li>• Focus on process mining and technical perspective</li> </ul>
(Said, Chaabane, Andonoff, & Bouaziz, 2014)	BPMN meta-model for modelling process variability of considering contextual dimension	<ul style="list-style-type: none"> <li>• Context parameters including goal, resources, data, behavioural</li> </ul>	<ul style="list-style-type: none"> <li>• Focus on modelling</li> </ul>
(Song, Vanthienen, Cui, Wang, & Huang, 2019b)	Context-aware business process management ecosystem including context-aware process models, context models, decision models and context-aware process execution	<ul style="list-style-type: none"> <li>• Process execution data (event logs)</li> <li>• Process models</li> <li>• Decision rules</li> <li>• Context ontology</li> </ul>	<ul style="list-style-type: none"> <li>• Focus on methodology</li> <li>• Focus on Internet of Things</li> <li>• Complex requirements</li> <li>• Context interpretation</li> </ul>
(Cartelli, Di Modica, & Tomarchio, 2015)	Cost-centric model for context-aware (resources, environment) simulations of processes	<ul style="list-style-type: none"> <li>• Process execution data (event logs)</li> <li>• Process models</li> <li>• Context models</li> </ul>	<ul style="list-style-type: none"> <li>• Focus on simulations and costs</li> <li>• No specification of the contextual information extraction</li> </ul>
(Song, Vanthienen, Cui, Wang, & Huang, 2019a)	DMN-based method for context-aware business process modelling	<ul style="list-style-type: none"> <li>• Context-dependent decisions</li> <li>• Process and decision models</li> </ul>	<ul style="list-style-type: none"> <li>• Focus on methodology</li> <li>• Focus on decision modelling</li> </ul>
(Liptchinsky, Khazankin, Truong, & Dustdar, 2012)	Approach and a graphical notation to model context-aware collaboration processes	<ul style="list-style-type: none"> <li>• Process context information including related actors and artifacts</li> </ul>	<ul style="list-style-type: none"> <li>• Focus on modelling of collaboration processes</li> <li>• Absence of explicit communication entities (events or messages)</li> </ul>
(Hidri, M'tir, Ben Saoud, & Ghedira-Guegan, 2019)	Meta-model for context-aware adaptive business process as a service in collaborative cloud environment	<ul style="list-style-type: none"> <li>• Service, provider, customer, BPaaS, environment context information</li> </ul>	<ul style="list-style-type: none"> <li>• Conceptual formalisation</li> <li>• No specification of the contextual information extraction</li> </ul>

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