Overview of complexity research in Business Process Management.

Complexity	Studies	Approach	Practical contribution
Software	[1]	graph-theoretic complexity measures	• management and control of software program complexity
	[2]	program operands and operators-based measures	
	[3]	complex network theory-based measures	
	[4]	information-flow based measures (fan-in and fan-out)	• evaluating the structure of large-scale systems
	[5]	knots as a measure of control-flow complexity in program texts	• structuring programs
	[6]	a measure of the cognitive and psychological complexity of software as a human intelligence artifact	• analysis and prediction of software complexity
	[7]	discovery of architectural and design patterns	• analysis of the quality of architecture
	[8,9]	five design quality measures - coupling, cohesion, complexity, modularity, size	• evaluation of software designs
	[10–13]	the average size of the module's procedures, application's modules, the density of goto statements	• understanding and managing computer software complexity in terms of the maintenance costs
BP model	[14]	number of activities, control-flows, joins and splits in general and unique (not repeating), interface complexity, graph theory-oriented metrics measuring the complexity of a graphic	• understandability, fewer errors, defects, and exceptions • more robust processes requiring less time to be developed, tested, and maintained
	[15]	cognitive weights for BP models, information flow, max/ mean nesting depth, number of handles, (anti) patterns	
	[16–18]	adapted cohesion and coupling metrics, cross-connectivity (strength of the links between BP model elements)	
	[19]	graph theory-based metrics incl. size, separability, sequentially, structuredness, cyclicity, parallelism	
	[20]	structural metrics incl. diameter, nodes, density, gateway degrees and mismatch, the coefficient of connectivity	
	[21]	BP model metrics integrated with rules	
	[22]	visual comprehension of a BP model with eye-tracking experiment	
	[23]	Durfee and Perfect square	
Work- and control-flow	[24–26]	compound control-flow complexity of all split constructs	
Event log	[27]	number of process logs that are generated when workflows are executed	
	[28]	average trace length, size, event density, trace diversity	• metrics which can measure the degree of event log quality that is needed to be able to apply discovery algorithms
DMN	[29]	number of decisions, elements, information requirements, density, data objects, Durfee and Perfect square metric, sequentially, diameter, longest path, vertex degree, knot count, network complexity, decision nesting depth, cyclomatic complexity, interface complexity	• complexity metrics for DMN models
CMMN	[30]	size, length, complexity	• complexity metrics for CMMN models
Expert systems and rule bases	[31–33]	number of rules, decision components, breadth of the search path, depth of search space, number of antecedents and consequents of a rule, content, connectivity and size complexity, entropy-based rule base complexity	• systematic and reliable techniques for evaluating expert systems
Enterprise IT architectures	[34,35]	variability mining	• decision support to determine and remove redundant architectural artifacts
	[36]	interface complexity multiplier	• complexity measures for object-process models • compensate the hidden information at interfaces
	[37]	Roger Sessions' methodology	• reduce complexity to enhance security, • increase functionality • reduce costs of maintenance of the IT system
Task	[38]	extracting and measuring task description structural features such as metadata (title and description length, required qualifications, estimated time and reward), content (amount of words, links, images, keywords, and high-level topics to describe the task), visual (layout, color palette)	• new strategies for workers retention • a better communication channel between requesters and workers • fair compensation mechanisms
	[39]	supervised machine learning to automatically classify the input (textual process descriptions) based on a set of manually labeled training instances into the manual task, user task, or automated task	• identify candidate tasks for Robotic Process Automation

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