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Constraint-based analysis of business process models

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Bibliography

- [AAA⁺09] Bernhard Aichernig, Farhad Arbab, Lacramioara Astefanoaei, Frank S. de Boer, Sun Meng, and Jan J. M. M. Rutten. Fault-based Test Case Generation for Component Connectors. In *Theoretical Aspects of Software Engineering, 2009. TASE 2009. Third IEEE International Symposium on*, pages 147–154. IEEE, july 2009.
- [ABBR04] Farhad Arbab, Christel Baier, Frank De Boer, and Jan J. M. M. Rutten. Models and Temporal Logics for Timed Component Connectors. In *2nd International Conference on Software Engineering and Formal Methods*, pages 198–207. IEEE Computer Society, 2004.
- [ABC⁺09] Farhad Arbab, Roberto Bruni, Dave Clarke, Ivan Lanese, and Ugo Montanari. Tiles for Reo. In *Recent Trends in Algebraic Development Techniques*, volume 5486 of *Lecture Notes in Computer Science*, chapter 4, pages 37–55. Springer, 2009.
- [Abd02] Abdelwaheb Ayari and David Basin. QUBOS: Deciding Quantified Boolean Logic using Propositional Satisfiability Solvers. In *Formal Methods in Computer-Aided Design*, pages 187–201. Springer, 2002.
- [ABS15] Farhad Arbab, Christel Baier, and Marjan Sirjani. Priority in Reo and Constraint Automata. Technical report, Centrum voor Wiskunde en Informatica, 2015. In preparation.
- [ACMM07] Farhad Arbab, Tom Chothia, Sun Meng, and Young-Joo Moon. Component Connectors with QoS Guarantees. In *Coordination Models and Languages, 9th International Conference*, pages 286–304, 2007.
- [act] Activiti. <http://www.activiti.org>. Accessed: 2019-09-30.
- [ACvdM⁺09] Farhad Arbab, Tom Chothia, Rob van der Mei, Sun Meng, Youngjoo Moon, and Chretien Verhoef. From coordination to stochastic models of QoS. In *Coordination Models and Languages*, pages 268–287. Springer, 2009.
- [AJ15] Farhad Arbab and Sung-Shik T. Q. Jongmans. Coordinating Multicore Computing. In *Advanced Lectures of the 15th International School on Formal Methods for the Design of Computer, Communication and Software Systems: Formal Methods for Multicore Programming*, volume 9104 of *Lecture Notes in Computer Science*, pages 57–96. Springer International Publishing, 2015.

- [AKM⁺08a] Farhad Arbab, Christian Koehler, Ziyang Maraike, Young-Joo Moon, and José Proença. Modeling, Testing and Executing Reo Connectors with the Eclipse Coordination Tools. In *5th International Workshop on Formal Aspects of Component Software*, volume 8. ENTCS, 2008.
- [AKM08b] Farhad Arbab, Natallia Kokash, and Sun Meng. Towards Using Reo for Compliance-Aware Business Process Modeling. In *ISoLA*, pages 108–123, 2008.
- [AM08] Farhad Arbab and Sun Meng. Synthesis of Connectors from Scenario-based Interaction Specifications. In *Proceedings of the International Symposium on Component Based Software Engineering*, volume 5282 of *Lecture Notes in Computer Science*, pages 114–129. Springer, 2008.
- [AP08] Ahmed Awad and Frank Puhmann. Structural detection of deadlocks in business process models. In *Business Information Systems, 11th International Conference*, pages 239–250, 2008.
- [AR02] Farhad Arbab and Jan J. M. M. Rutten. A coinductive calculus of component connectors. In *Recent Trends in Algebraic Development Techniques*, volume 2755 of *Lecture Notes in Computer Science*, pages 35–56. Springer-Verlag, 2002.
- [Arb02] Farhad Arbab. Abstract Behavior Types: A Foundation Model for Components and Their Composition. In *Formal Methods for Components and Objects*, pages 33–70, 2002.
- [Arb04] Farhad Arbab. Reo: a Channel-Based Coordination Model for Component Composition. *Mathematical Structures in Computer Science*, 14:329–366, 2004.
- [Arb06] Farhad Arbab. Computing and interaction. In D. Goldin, S. Smolka, and P. Wegner, editors, *Composition of Interacting Computations*, pages 277–321. Springer-Verlag, 2006.
- [ari] ARIS Express. <http://www.ariscommunity.com/aris-express>. Accessed: 2019-09-30.
- [Bai05] Christel Baier. Probabilistic Models for Reo Connector Circuits. *Journal of Universal Computer Science*, 11(10):1718–1748, 2005.
- [Bal01] Gianfranco Balbo. *Introduction to Stochastic Petri Nets*, pages 84–155. Springer Berlin Heidelberg, Berlin, Heidelberg, 2001.
- [Bau97] Falko Bause. *Analysis of Petri nets with a dynamic priority method*, pages 215–234. Springer, 1997.
- [BBK⁺10] Christel Baier, Tobias Blechmann, Joachim Klein, Sascha Klüppelholz, and Wolfgang Leister. Design and verification of systems with exogenous coordination using vereofy. In *ISoLA (2)*, volume 6416 of *Lecture Notes in Computer Science*, pages 97–111. Springer, 2010.

- [BCS12] Marcello Bonsangue, Dave Clarke, and Alexandra Silva. A Model of Context-dependent Component Connectors. *Science of Computer Programming*, 77(6):685 – 706, 2012.
- [BFV11] Kelly Rosa Braghetto, Joao Eduardo Ferreira, and Jean-Marc Vincent. From Business Process Model and Notation to Stochastic Automata Network. Research report, Universidade Sao Paulo, 2011.
- [BHF05] Michael Butler, Tony Hoare, and Carla Ferreira. A Trace Semantics for Long-running Transactions. In *Proceedings of the International Conference on Communicating Sequential Processes: The First 25 Years, CSP’04*, 2005.
- [BJT05] Jean Bézivin, Frédéric Jouault, and David Touzet. An introduction to the atlas model management architecture. Technical Report 05-01, LINA, 2005.
- [BK92] Eike Best and Maciej Koutny. Petri net Semantics of Priority Systems. *Theoretical Computer Science*, 96(1):175 – 215, 1992.
- [BPM] BPMN 2.0 Modeler. <https://www.eclipse.org/proposals/soa.bpmn2-modeler/>. Accessed: 2019-09-30.
- [BSAR06] Christel Baier, Marjan Sirjani, Farhad Arbab, and Jan J. M. M. Rutten. Modeling Component Connectors in Reo by Constraint Automata. *Science of Computer Programming*, 61(2):75–113, 2006.
- [BSST09] Clark W. Barrett, Roberto Sebastiani, Sanjit A. Seshia, and Cesare Tinelli. Satisfiability Modulo Theories. *Handbook of Satisfiability*, 4, 2009.
- [BW06] Christel Baier and Verena Wolf. Stochastic Reasoning about Channel-based Component Connectors. In *Coordination Models and Languages*, volume 4038 of *Lecture Notes in Computer Science*, pages 1–15. Springer-Verlag, 2006.
- [BZ07] Lucas Bordeaux and Lintao Zhang. A Solver for Quantified Boolean and Linear Constraints. In *Proceedings of the 2007 ACM symposium on Applied computing, SAC ’07*, pages 321–325. ACM, 2007.
- [CCA07] Dave Clarke, David Costa, and Farhad Arbab. Connector Colouring I: Synchronisation and Context Dependency. *Science of Computer Programming*, 66(3):205–225, 2007.
- [CCH11] David Raymond Christiansen, Marco Carbone, and Thomas Hildebrandt. Formal Semantics and Implementation of BPMN 2.0 Inclusive Gateways. In *Web Services and Formal Methods*, page 146–160. Springer, 2011.

- [CKA10] Behnaz Changizi, Natallia Kokash, and Farhad Arbab. A Unified Toolset for Business Process Model Formalization. In *7th International Workshop on Formal Engineering approaches to Software Components and Architectures*, pages 147–156. ENTCS, 2010.
- [CKA12] Behnaz Changizi, Natallia Kokash, and Farhad Arbab. A Constraint-based Method to Compute Semantics of Channel-based Coordination Models. In *International Conference on Software Engineering Advances*. IARA, 2012.
- [CKA19] Behnaz Changizi, Natallia Kokash, and Farhad Arbab. Service Orchestration with Priority Constraints. In *International Conference on Software Engineering Advances*, Lecture Notes in Computer Science. Springer-Verlag, 2019.
- [CM02] Manuel Clavel and José Meseguer. Reflection in Conditional Rewriting Logic. *Theoretical Computer Science*, 285(2):245–288, 2002.
- [Cos10] David Costa. *Formal Models for Context Dependent Connectors for Distributed Software Components and Services*. PhD thesis, Vrij Universiteit Amsterdam, 2010.
- [CPLA10] Dave Clarke, José Proença, Alexander Lazovik, and Farhad Arbab. Channel-based coordination via constraint satisfaction. *Science of Computer Programming*, In Press, Accepted Manuscript, 2010.
- [Dav88] James H. Davenport. Computer Algebra Applied to Itself. *Journal of Symbolic Computation*, 6:127–132, 1988.
- [DDO08] Remco M. Dijkman, Marlon Dumas, and Chun Ouyang. Semantics and Analysis of Business Process Models in BPMN. *Information & Software Technology*, 50(12):1281–1294, 2008.
- [DM03] Thomas Dufresne and James Marti. *Process Modeling for E-Business*. INFS 770 Methods for Information Systems Engineering: Knowledge Management and E-Business., 2 edition, 2003.
- [DRMR13] Marlon Dumas, Marcello La Rosa, Jan Mendling, and Hajo A. Reijers. *Fundamentals of Business Process Management*. Springer, 2013.
- [DW11] Gero Decker and Mathias Weske. Interaction-centric Modeling of Process Choreographies. *Information Systems*, 36(2):292–312, 2011.
- [ESB14] Nissreen El-Saber and Artur Boronat. BPMN Formalization and Verification Using Maude. In *Proceedings of the 2014 Workshop on Behaviour Modelling-Foundations and Applications*, BM-FA '14, pages 1:1–1:12. ACM, 2014.
- [fla] Adobe Flash. <https://get.adobe.com/flashplayer/>. Accessed: 2019-09-30.

- [FPHA02] Reinhard Füricht, Herbert Prähofer, Thomas Hofinger, and Josef Altmann. A Component-based Application Framework for Manufacturing Execution Systems in C# and .NET. pages 169–178, 2002.
- [GLS17] Hubert Garavel, Frédéric Lang, and Wendelin Serwe. From LOTOS to LNT. *ModelEd, TestEd, TrustEd: Essays Dedicated to Ed Brinksma on the Occasion of His 60th Birthday*, page 3–26, 2017.
- [GMR⁺06] Jan Friso Groote, Aad Mathijssen, Michel Reniers, Yaroslav Usenko, and Muck Van Weerdenburg. The Formal Specification Language mCRL2. In *Methods for Modelling Software Systems*, volume 06351 of *Dagstuhl Seminar Proceedings*. IBFI, 2006.
- [GPR⁺07] Jan F. Groote, Marija Petkovic, Ivo Raedts, Yaroslav S. Usenko, Lou J. Somers, and Jan Martijn E.M. van der Werf. Transformation of BPMN Models for Behaviour Analysis. In *Proceedings of the 5th International Workshop on Modelling, Simulation, Verification and Validation of Enterprise Information Systems*, pages 126–137. INSTICC Press, 2007.
- [Gro11] Object Management Group. Business Process Model and Notation (BPMN) Version 2.0. Technical report, Object Management Group, 2011.
- [HHL⁺12] Monika Heiner, Mostafa Herajy, Fei Liu, Christian Rohr, and Martin Schwarick. Snoopy – A Unifying Petri Net Tool. In *Application and Theory of Petri Nets*, page 398–407. Springer, 2012.
- [Hoa85] Charles A. R. Hoare. *Communicating Sequential Processes*. Prentice-Hall, Inc., 1985.
- [Hoa13] Tony Hoare. Unifying Semantics for Concurrent Programming. In *Computation, Logic, Games, and Quantum Foundations. The Many Facets of Samson Abramsky - Essays Dedicated to Samson Abramsky on the Occasion of His 60th Birthday*, volume 7860 of *Lecture Notes in Computer Science*, pages 139–149. Springer, 2013.
- [Hoo11] Geoffrey Hook. Business process modeling and simulation. In *Winter Simulation Conference*, pages 773–778, 2011.
- [IB08] Mohammad Izadi and Marcello M. Bonsangue. Recasting Constraint Automata into Büchi Automata. In *International Colloquium on Theoretical Aspects of Computing*, pages 156–170, 2008.
- [IBC08] Mohammad Izadi, Marcello Bonsangue, and Dave Clarke. Modeling Component Connectors: Synchronisation and Context-dependency. In *Software Engineering and Formal Methods*, pages 303–312. IEEE Press, 2008.

- [IBC11] Mohammad Izadi, Marcello Bonsangue, and Dave Clarke. Büchi Automata for Modeling Component Connectors. *Software and System Modeling*, 10(2):183–200, 2011.
- [JA12] Sung-Shik T.Q. Jongmans and Farhad Arbab. Overview of Thirty Semantic Formalisms for Reo. *Scientific Annals of Computer Science*, 22:201–251, 2012.
- [JK05] Frédéric Jouault and Ivan Kurtev. Transforming Models with ATL. In *MoDELS Satellite Events*, pages 128–138, 2005.
- [JKW07] Kurt Jensen, Lars Michael Kristensen, and Lisa Wells. Coloured Petri Nets and CPN Tools for modelling and validation of concurrent systems. *International Journal on Software Tools for Technology Transfer*, 9(3-4):213–254, 2007.
- [JSS⁺12] Sung-Shik T. Q. Jongmans, Francesco Santini, Mahdi Sargolzaei, Farhad Arbab, and Hamideh Afsarmanesh. *Proceedings of the International Conference on Service-Oriented and Cloud Computing*, pages 1–16. Springer, 2012.
- [KA13] Natallia Kokash and Farhad Arbab. Formal Design and Verification of Long-Running Transactions with Extensible Coordination Tools. *IEEE Trans. Serv. Comput.*, 6(2):186–200, 2013.
- [Kan10] Oscar Kanters. QoS Analysis by Simulation in Reo. diploma thesis, CWI Amsterdam and Vrije Universiteit Amsterdam, 2010, 2010.
- [KAT16] Tobias Kappé, Farhad Arbab, and Carolyn L. Talcott. A Compositional Framework for Preference-Aware Agents. In *Proceedings of The First Workshop on Verification and Validation of Cyber-Physical Systems*, pages 21–35, 2016.
- [KB09] Sascha Klüppelholz and Christel Baier. Symbolic Model Checking for Channel-based Component Connectors. *Science of Computer Programming*, 74(9):688 – 701, 2009.
- [KC09] Christian Koehler and Dave Clarke. Decomposing Port Automata . In *SAC’09: Proceedings of 2009 ACM Symposium on Applied Computing*, pages 1369–1373. ACM, 0 2009.
- [KCA10] Natallia Kokash, Behnaz Changizi, and Farhad Arbab. A Semantic Model for Service Composition with Coordination Time Delays. In *ICFEM*, pages 106–121, 2010.
- [KKdV10] Natallia Kokash, Christian Krause, and Erik de Vink. Data-aware Design and Verification of Service Compositions with Reo and mCRL2. In *SAC’10: Proceedings of the 2010 ACM Symposium on Applied Computing*, pages 2406–2413. ACM, 0 2010.

- [KMLA11] Christian Krause, Ziyang Maraikar, Alexander Lazovik, and Farhad Arbab. Modeling Dynamic Reconfigurations in Reo Using High-level Replacement Systems. *Science of Computer Programming*, 76(1):23–36, 2011.
- [KNP02] Marta Z. Kwiatkowska, Gethin Norman, and David Parker. PRISM: Probabilistic Symbolic Model Checker. In *Computer Performance Evaluation, Modelling Techniques and Tools 12th International Conference*, pages 200–204, 2002.
- [Kra11] Christian Krause. *Reconfigurable Component Connectors*. PhD thesis, Leiden University, The Netherlands, 0 2011.
- [LP16] Irina. A. Lomazova and Louchka Popova-Zeugmann. Controlling Petri Net Behavior using Priorities for Transitions. *Fundamenta Informaticae*, 143(1-2):101–112, 2016.
- [LPT07] Alessandro Lapadula, Rosario Pugliese, and Francesco Tiezzi. A Calculus for Orchestration of Web Services. In *Programming Languages and Systems*, page 33–47. Springer Berlin Heidelberg, 2007.
- [MA07a] Sun Meng and Farhad Arbab. On Resource-Sensitive Timed Component Connectors. In *Proceedings of the International Conference on Formal Methods for Open Object-Based Distributed Systems*, volume 4468 of *LNCS*, pages 301–316. Springer, 2007.
- [MA07b] Sun Meng and Farhad Arbab. Web Services Choreography and Orchestration in Reo and Constraint Automata. In *Proceedings of the ACM Symposium on Applied Computing*, pages 346–353. ACM Press, 2007.
- [MA09] Sun Meng and Farhad Arbab. QoS-Driven Service Selection and Composition Using Quantitative Constraint Automata. *Fundamenta Informaticae*, 95(1):103–128, 2009.
- [MA10] Sun Meng and Farhad Arbab. A Model for Web Service Coordination in Long-Running Transactions. In *The Fifth IEEE International Symposium on Service-Oriented System Engineering*, pages 121–128, 2010.
- [MAA⁺12] Sun Meng, Farhad Arbab, Bernhard K. Aichernig, Lacramioara Stefanoei, Frank S. de Boer, and Jan J. M. M. Rutten. Connectors as Designs: Modeling, Refinement and Test Case Generation. *Science of Computer Programming*, 77(7-8):799–822, 2012.
- [Mar09] Marcello M. Bonsangue and Dave Clarke and Alexandra Silva. Automata for Context-Dependent Connectors. In *COORDINATION*, pages 184–203, 2009.

- [MBL⁺18] Umair Mutarraf, Kamel Barkaoui, Zhiwu Li, Naiqi Wu, and Ting Qu. Transformation of Business Process Model and Notation Models onto Petri nets and Their Analysis. *Advances in Mechanical Engineering*, 10(12):1687814018808170, 2018.
- [MSA04] Mohammad Reza Mousavi, Marjan Sirjani, and Farhad Arbab. Specification and Verification of Component Connectors. Technical Report CSR-04-15, Department of Computer Science, Eindhoven University of Technology, 2004.
- [MSA06] Mohammad Reza Mousavi, Marjan Sirjani, and Farhad Arbab. Formal Semantics and Analysis of Component Connectors in Reo. *Electronic Notes in Theoretical Computer Science*, 154(1):83 – 99, 2006.
- [MSKA10] Young-Joo Moon, Alexandra Silva, Christian Krause, and Farhad Arbab. A Compositional Semantics for Stochastic Reo Connectors. In *Proceedings Ninth International Workshop on the Foundations of Coordination Languages and Software Architectures*, pages 93–107, 2010.
- [MSKA14] Young-Joo Moon, Alexandra Silva, Christian Krause, and Farhad Arbab. A compositional model to reason about end-to-end QoS in Stochastic Reo connectors. *Science of Computer Programming*, 80:3–24, 2014.
- [MSTV07] Roshanak Zilouchian Moghaddam, Marjan Sirjani, Samira Tasharofi, and Mohsen Vakilian. Modeling Web Service Interactions using the Coordination Language Reo. In *Proceedings of the 4th International Workshop on Web Services and Formal Methods*, volume 4937 of *Lecture Notes in Computer Science*, pages 108–123. Springer, 2007.
- [MSY14] Radu Mateescu, Gwen Salaün, and Lina Ye. Quantifying the parallelism in bpmn processes using model checking. In *Proceedings of the 17th International ACM Sigsoft Symposium on Component-based Software Engineering*, CBSE '14, pages 159–168. ACM, 2014.
- [PA91] Brigitte Plateau and Karim Atif. Stochastic Automata Network For Modeling Parallel Systems. *IEEE Transactions on Software Engineering*, 17(10):1093–1108, 1991.
- [Pad15] Julia Padberg. Reconfigurable Petri Nets with Transition Priorities and Inhibitor Arcs. *The Proceedings of the 8th International Conference on Graph Transformation*, pages 104–120, 2015.
- [Plo04] Gordon Plotkin. A Structural Approach to Operational Semantics. *The Journal of Logic and Algebraic Programming*, 60–61(0):17 – 139, 2004.
- [PQZ08] Davide Prandi, Paola Quaglia, and Nicola Zannone. Formal Analysis of BPMN Via a Translation into COWS. In *Coordination Models and*

Languages, 10th International Conference, COORDINATION, pages 249–263, 2008.

- [Pro11] José Proença. *Synchronous Coordination of Distributed Components*. PhD thesis, Institute for Programming research and Algorithms, 2011.
- [PS12] Pascal Poizat and Gwen Salaün. Checking the Realizability of BPMN 2.0 Choreographies. In *Proceedings of the 27th Annual ACM Symposium on Applied Computing, SAC '12*, pages 1927–1934. ACM, 2012.
- [PSHA12] Bahman Pourvatan, Marjan Sirjani, Hossein Hojjat, and Farhad Arbab. Symbolic Execution of Reo Circuits using Constraint Automata. *Science of Computer Programming*, 77(7-8):848–869, 2012.
- [Ray87] Gerhard Rayna. *REDUCE: Software for Algebraic Computation*. Springer-Verlag New York, Inc., 1987.
- [RBM05] Ugo Roberto Bruni, Hernán C. Melgratti and Montanari. Theoretical Foundations for Compensations in Flow Composition Languages. In *Proc. of the 32nd ACM SIGPLAN-SIGACT Symposium on Principles of Programming Languages*. ACM, 2005.
- [RKNP04] Jan J. M. M. Rutten, Marta Kwiatkowska, Gethin Norman, and David Parker. *Component Connectors*, volume 23 of *CRM Monograph Series*. American Mathematical Society, 2004.
- [RMP⁺12] Valentín Valero Ruiz, Hermenegilda Macià, Juan José Pardo, María-Emilia Cambronero, and Gregorio Díaz. Transforming Web Services Choreographies with priorities and time constraints into prioritized-time colored Petri nets. *Science of Computer Programming*, 77(3):290 – 313, 2012.
- [Rol95] Asbjorn Rolstadas. Business Process Modeling and Reengineering. In *Performance Management: A Business Process Benchmarking Approach*, pages 148–150, 1995.
- [SBPM09] David Steinberg, Frank Budinsky, Marcelo Paternostro, and Ed Merks. *EMF: Eclipse Modeling Framework 2.0*. Addison-Wesley Professional, 2nd edition, 2009.
- [SOP⁺06] Lou J. Somers, Olivia Oanea, Reinier Post, Kees M. van Hee, and Jan Martijn E. M. van der Werf. Yasper: A Tool for Workflow Modeling and Analysis. In *Sixth International Conference on Application of Concurrency to System Design*, volume 00, pages 279–282, 2006.
- [STK⁺10] David Schumm, Oktay Turetken, Natallia Kokash, Amal Elgammal, Frank Leymann, and Willem-Jan van den Heuvel. Business Process Compliance through Reusable Units of Compliant Processes. In *Current Trends in Web Engineering: 10th Int. Conf. on Web Engineering*, pages 325–337. Springer, 2010.

- [TJ10] Nasi Tantitharanukul and Watcharee Jumpamule. Detection of Live-Lock in BPMN Using Process Expression. volume 114 of *Communications in Computer and Information Science*, pages 164–174. Springer, 2010.
- [TSJ10] Nasi Tantitharanukul, Prompong Sugunnasil, and Watcharee Jumpamule. Detecting Deadlock and Multiple Termination in BPMN Model using Process Automata. *ECTI-CON2010: The 2010 ECTI International Conference on Electrical Engineering/Electronics, Computer, Telecommunications and Information Technology*, pages 478–482, 2010.
- [vdA98] Wil M. P. van der Aalst. The Application of Petri Nets to Workflow Management. *Journal of Circuits, Systems, and Computers*, 8(1):21–66, 1998.
- [vdA04] Wil M. P. van der Aalst. *Business Process Management Demystified: A Tutorial on Models, Systems and Standards for Workflow Management*, pages 1–65. Lecture Notes in Computer Science. Springer, 2004.
- [vdADK02] Wil M. P. van der Aalst, Jörg Desel, and Ekkart Kindler. On the Semantics of EPCs: A Vicious Circle. In *EPK 2002 - Geschäftsprozessmanagement mit Ereignisgesteuerten Prozessketten, Proceedings des GI-Workshops und Arbeitskreistreffens*, pages 71–79, 2002.
- [vdAtH02] Wil M. P. van der Aalst and Arthur H. M. ter Hofstede. Workflow Patterns: On the Expressive Power of (Petri-net-based) Workflow Languages. Technical Report DAIMI PB-560, 2002.
- [vDdMV⁺05] Boudewijn F. van Dongen, Ana Karla A. de Medeiros, Henricus M. W. Verbeek, Ajmm Ton Weijters, and Wil M. P. van der Aalst. The ProM Framework: A New Era in Process Mining Tool Support. In *Applications and Theory of Petri Nets*, page 444–454. Springer, 2005.
- [VvdAK04] Henricus M. W. Verbeek, Wil M. P. van der Aalst, and Akhil Kumar. XRL/Woflan: Verification and Extensibility of an XML/Petri-Net-Based Language for Inter-Organizational Workflows. *Information Technology and Management*, 5(1-2):65–110, 2004.
- [WG08] Peter Y.H. Wong and Jeremy Gibbons. A Process Semantics for BPMN. In *Proceedings of 10th International Conference on Formal Engineering Methods.*, volume 5256 of *Lecture Notes in Computer Science*, page 355–374, 2008.
- [Wil67] Stanley Williams. Business Process Modeling Improves Administrative Control. *Automation*, pages 44–50, 1967.

- [Yao] Yaoqiang BPMN Editor. <http://sourceforge.net/projects/bpmn/>.
- [YSSW08] JianHong Ye, ShiXin Sun, Wen Song, and LiJie Wen. Formal Semantics of BPMN Process Models Using YAWL. *Intelligent Information Technology Applications*, 2:70–74, 2008.