

Updated Dissemination Plan (M4)

Deliverable D7.2.M4

FFG – IKT der Zukunft
SHAPE Project
2014 – 845638



■ **Table 1** Document Information

Project acronym:	SHAPE
Project full title:	Safety-critical Human- & dAta-centric Process management in Engineering projects
Work package:	7
Document number:	7.2.M4
Document title:	Updated Dissemination Plan (M4)
Version:	1
Delivery date:	30 September 2016 (M4)
Actual publication date:	31 October 2016 (M4)
Dissemination level:	Public
Nature:	Report
Editor(s) / lead beneficiary:	WU Vienna
Author(s):	Cristina Cabanillas
Reviewer(s):	Axel Polleres, Alois Haselboeck

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1 Introduction

This document presents the most recent status of the dissemination plan containing information about the achievements obtained until milestone M4 of the project (i.e., until September 2016) in terms of publications, submissions under review, theses completed or under execution, events where results related to the project have been presented, and the plan for future publications and dissemination activities.

2 Publications

At the moment of reaching M4 the following publications have been achieved:

- Cristina Cabanillas, Manuel Resinas, Adela del-Río-Ortega, Antonio Ruiz Cortés: Specification and automated design-time analysis of the business process human resource perspective. *Inf. Syst.* 52: 55-82 (2015) [1]. This paper describes the most recent version of RAL (a textual language for defining resource assignments in business processes) and an implementation of a catalogue of analysis operations for the resource perspective of business processes based on description logics. In the context of SHAPE it is related to WP2.
- Cristina Cabanillas, David Knuplesch, Manuel Resinas, Manfred Reichert, Jan Mendling, Antonio Ruiz Cortés: RALph: A Graphical Notation for Resource Assignments in Business Processes. *CAiSE 2015*: 53-68 [2]. This paper describes the syntax and semantics of a novel graphical notation for the definition of resource assignments in business processes. In the context of SHAPE it is related to WP2.
- Stefan Schönig, Cristina Cabanillas, Stefan Jablonski, Jan Mendling: Mining the Organisational Perspective in Agile Business Processes. *BPMDS/EMM-SAD 2015*: 37-52 [3]. This paper presents a process mining approach focused on the organizational perspective of business processes that extracts resource assignment constraints from past executions stored in event logs, resulting in a declarative resource-aware process model. In the context of SHAPE it is related to WP3.
- Saimir Bala, Cristina Cabanillas, Jan Mendling, Andreas Rogge-Solti, Axel Polleres: Mining Project-Oriented Business Processes. *BPM 2015*: 425-440 [4]. This paper presents a mining approach for discovering project-oriented business processes from VCS logs that returns activity diagrams in the form of Gantt charts. In the context of SHAPE it is related to WP3.

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- Cristina Cabanillas, Manuel Resinas, Jan Mendling, Antonio Ruiz Cortés: Automated team selection and compliance checking in business processes. ICSSP 2015: 42-51 [5]. This paper presents an extension of RAL called RALTeam that aims at enabling the description of team compositions and which can be used both for defining team assignments in business processes and for defining and automatically checking team-related compliance rules. In the context of SHAPE it is related to WP2 and WP4.
- Giray Havur, Cristina Cabanillas, Jan Mendling, and Axel Polleres: Automated Resource Allocation in Business Processes with Answer Set Programming. BPM 2015 Workshops (BPI). In press [6]. This paper introduces a novel approach for automatically allocating resources to process activities during process execution taking into consideration estimated activity durations and all potential parallel running executions. In the context of SHAPE it is related to WP2.
- Simon Steyskal, and Axel Polleres: Towards Formal Semantics for ODRL Policies. RuleML 2015: 360-375 [7]. This paper proposes an interpretation of the formal semantics of general ODRL policy expressions and motivates rule-based reasoning over such policy expressions taking both explicit and implicit dependencies among actions into account. In the context of SHAPE it is related to WP2 and WP4.
- Tudor Ionescu, and Daniel Schall: Architecting Semantic Process Mining-Driven Optimization and Adaptation of Business Workflows for the Mobility Industry. SEMANTiCS 2015. In press [8]. This paper presents the conceptual architecture designed for SHAPE and its integration capabilities with the Camunda BPMS. In the context of SHAPE it is related to WP6.
- Simon Steyskal, Sabrina Kirrane: If you can't enforce it, contract it: Enforceability in Policy-Driven (Linked) Data Markets. SEMANTiCS (Posters & Demos) 2015: 63-66 [9]. This paper shows how ODRL can be used for specifying access policies as well as access requests, offers and agreements, and it proposes an approach to generate on-the-fly contracts that govern all explicit and implicit non-enforceable policies. In the context of SHAPE it is related to WP4.
- Cristina Cabanillas, Jan Mendling, Axel Polleres, and Alois Haselböck: Safety-critical Human- and Data-centric Process Management in Engineering Projects. Symposium on Data-driven Process Discovery and Analysis (SIMPDA 2015): 145-148 [10]. This paper outlines the goals of the SHAPE project and describes the current status of the project and the directions for present and future work. It is related to all the work packages of the SHAPE project.
- Stefan Schönig, Andreas Rogge-Solti, Cristina Cabanillas, Stefan Jablonski and

Jan Mendling: Efficient and Customisable Declarative Process Mining with SQL. CAiSE 2016: In press [11]. This paper introduces a process mining approach that directly works on relational event data by querying event logs with conventional SQL, enabling query customisation as well as support for several process perspectives. In the context of SHAPE it is related to WP3.

- Cristina Cabanillas: Exploring Human Resource Management in Crowdsourcing Platforms. CAiSE 2016 Workshops (EOMAS): 1-16 [12]. This paper presents the results of a survey on the existing support for resource management in crowdsourcing platforms compared to the existing support in the BPM domain. This work can be associated with WP2.
- Cristina Cabanillas: Process- and Resource-Aware Information Systems. EDOC 2016: 1-10 [13]. In this paper a framework for managing human resources in business processes as well as an outline and classification of the existing conceptual and practical support is introduced. This work is related to all the work packages of the project.
- Stefan Schönig, Cristina Cabanillas, Stefan Jablonski, and Jan Mendling: A Framework for Efficiently Mining the Organisational Perspective of Business Processes. Decision Support Systems (DSS) [14]. This journal paper extends the BPMDS 2015 publication by adding a post-processing phase to the process mining approach and further evaluations. In the context of SHAPE it is related to WP3.
- Kushal Agrawal, Michael Aschauer, Nico Tomsich, Thomas Thonhofer, Saimir Bala, Andreas Rogge-Solti: Resource Classification from Version Control System Logs. EDOC 2016 Workshops (CeSCoP): 1–10 [15]. This paper presents an approach to infer resource roles in a collaborative software development context. The approach is a combination between natural language processing techniques and data mining. In the context of SHAPE it is related to WP3.
- Giray Havur, Cristina Cabanillas, Jan Mendling and Axel Polleres: Resource Allocation with Dependencies in Business Process Management Systems. BPM (Forum) 2016: in press [16]. This paper presents a technique to derive an optimal scheduling for work items that have dependencies and resource conflicts, taking into consideration all types of resources involved in business processes. In the context of SHAPE it is related to WP2.
- Saimir Bala, Giray Havur, Simon Sperl, Simon Steyskal, Alois Haselböck, Jan Mendling, Axel Polleres: SHAPEworks: A BPMS Extension for Complex Process Management. BPM 2016 Demos: in press [17]. This paper present the first version of the tool designed and implemented in the context of the SHAPE project and hence, it is related to all the work packages of the project.

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- Stefan Schönig, Cristina Cabanillas, Claudio Di Ciccio, Stefan Jablonski and Jan Mendling: Mining Team Compositions for Collaborative Work in Business Processes. *Journal on Software and System Modeling (SoSyM)*: 1-19 [18]. This journal paper extends our process mining framework towards teamwork mining by describing an approach able to discover team compositions for collaborative process activities from event logs. In the context of SHAPE it is related to WP3.

3 Ongoing and Planned Papers

3.1 Papers under Review

- Saimir Bala, Cristina Cabanillas, Alois Haselböck, Giray Havur, Jan Mendling, Axel Polleres, Simon Sperl, and Simon Steyskal. A Framework for Safety-critical Process Management in Engineering Projects. *SIMPDA 2015 Post-proceedings*. This paper is an extension of the paper entitled “Safety-critical Human- and Data-centric Process Management in Engineering Projects” (SIMPDA 2015) for a potential publication in a post-proceeding volume of LNBIP. It is in the second review round.

3.2 Planned Papers

- Giray Havur and Axel Polleres intend to write a paper on comparing declarative formalisms for resource planning in processes under expressive constraints as a result of recent work performed in WP2.
- Saimir Bala and Jan Mendling (and others) intend to write a paper on mining activities from user comments in VCS as a continuation of the work developed in WP3.
- Simon Steyskal, Sabrina Kirrane and Axel Polleres are working on a book chapter on policies, which has results from a previous publication in the NORMAS workshop. It is aligned with WP4.

4 Bachelor and Master Theses

Up to M4 the project has resulted in the following theses:

- BSc thesis by Julia Fuchsbauer: How to manage Processes according to the European Norm 50126 (EN 50126) – Status: completed. This thesis reviews the

EN 50126 norm to (i) extract rules that relate to business processes in safety-critical domains and (ii) select a language that could help to model such rules. In the context of SHAPE it is related to WP4.

- MSc thesis by Alexander Wurl: Formalisms and Tools to Describe and Monitor Engineering Processes – Status: completed. This thesis presents an evaluation framework for BPMS with the aim of selecting the most suitable one for accomplishing the goals pursued in the SHAPE project, and delves into the functionalities and integration capabilities of the system selected by implementing a real business process. In the context of SHAPE it is related to WP6, WP5 and implementing some of the results of WP2, in the sense that it describes the integration of automated (re-)configuration/allocation capabilities into an existing BPMS (Camunda) which we use in the project.
- MSc thesis by Melanie Siebenhofer: An evaluation of the graphical notation RALph for resource assignments in business processes – Status: final stage. This thesis evaluates a novel graphical notation for resource assignments in business processes by designing, conducting and analysing the results of a survey. In the context of SHAPE it is related to WP2.
- MSc thesis by Lukas Fischbach: Concepts and Methods for Providing Data Infrastructure for Process Mining on Relational Databases – Status: completed. This thesis focuses on supporting process mining by implementing a standardized data infrastructure to access event log. The work includes the development of a software artifact able to import and store event data in compliance to the R-XES metamodel. In the context of SHAPE it is related to WP3 and WP6.

5 Dissemination Activities

The following dissemination activities have been performed until milestone M4 of the project:

- Presentation of the paper entitled RALph: A Graphical Notation for Resource Assignments in Business Processes by Cristina Cabanillas at CAiSE 2015 in Stockholm, Sweden.
- Presentation of the paper entitled Automated team selection and compliance checking in business processes by Cristina Cabanillas at ICSSP 2015 in Tallinn, Estonia.
- Presentation of the paper entitled Mining Project-Oriented Business Processes by Saimir Bala at BPM 2015 in Innsbruck, Austria.

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- Presentation of the paper entitled Automated Resource Allocation in Business Processes with Answer Set Programming by Giray Havur at BPM 2015 Workshops (BPI) in Innsbruck, Austria.
- Presentation of the paper entitled Towards Formal Semantics for ODRL Policies by Simon Steyskal at RuleML 2015 in Berlin, Germany.
- Presentation titled Towards Formal Semantics for ODRL Policies: Defining Expressive Access Policies for Linked Data using the ODRL Ontology given by Axel Polleres at the Dagstuhl Seminar 15131 (Normative Multi-Agent Systems) in March 2015 in Dagstuhl, Germany.
- Presentation of the paper entitled by Architecting Semantic Process Mining-Driven Optimization and Adaptation of Business Workflows for the Mobility Industry Tudor Ionescu at SEMANTiCS 2015 in Vienna, Austria.
- Presentation of a poster by Simon Steyskal at SEMANTiCS 2015 in Vienna, Austria.
- Invited talk on Human Resource Management in Business Processes by Cristina Cabanillas at University of Bayreuth, Germany.
- Participation of Alois Haselböck in the RailML.org meeting in March 2015 in Vienna, Austria.
- Participation of Giray Havur in the 11th Reasoning Web Summer School in July 2015 in Berlin, Germany. The topics included semantic web, linked data and reasoning techniques.
- Saimir Bala attended the SOAMED Autumn School on Processes and Data in October 2015 in the Steinhöfel castle, Germany. The event addressed research on the integration of service-oriented architectures, data management and their application to healthcare systems.
- Jan Mendling participated in the organization of two seminars, one in Liechtenstein in February 2015 and one in Germany in July 2015, target at PhD students. Giray Havur and Saimir Bala took part in such seminars presenting their PhD topics to faculty members and fellow researchers from other universities. As stated below, both PhD thesis are developed in the context of SHAPE. They received very valuable feedback.
- Presentation of the paper entitled Safety-critical Human- and Data-centric Process Management in Engineering Projects by Jan Mendling at SIMPDA 2015 in Vienna, Austria.
- Presentation of the SHAPE project by Axel Polleres at the Exhibition and Lightning talks of the Austrian Data Forum 2015 in Vienna, Austria.
- Presentation of Giray Havur's PhD thesis status in the light of the SHAPE project at the "Research Quality in Information Systems" doctoral seminar in

Flums, Switzerland.

- Presentation of Saimir Bala's PhD thesis status in the light of the SHAPE project at the "Research Quality in Information Systems" doctoral seminar in Flums, Switzerland.
- Participation in a brochure developed by the Austrian Ministry of Transport, Innovation and Technology (BMVIT) including short descriptions of a selected set of FFG projects from the "IKT der Zukunft" program.
- Article on the SHAPE project entitled "Planen ohne Fehler, Planungsprozesse automatisieren" ("Flawless planning, Automating planning processes" in English) published in the Siemens online magazine "SiemensWorld" in April 2016.
- Research talk by Jan Mendling on Research of the Institute of Information Business, including SHAPE, at Université Telecom SudParis, France, in November 2015.
- Research talk by Jan Mendling on Research of the Institute of Information Business, including SHAPE, at University of Hasselt, Belgium, in March 2016.
- Presentation of the paper entitled "Exploring Human Resource Management in Crowdsourcing Platforms" by Cristina Cabanillas at CAiSE 2016 Workshops (EOMAS) in Ljubljana, Slovenia.
- Presentation of the paper entitled "Process- and Resource-Aware Information Systems" by Cristina Cabanillas at EDOC 2016 in Vienna, Austria.
- Presentation of the paper entitled "Resource Allocation with Dependencies in Business Process Management Systems" by Giray Havur at BPM Forum 2016 in Rio de Janeiro, Brazil.
- Presentation of the tool "SHAPEworks" by Saimir Bala at BPM 2016 Demos in Rio de Janeiro, Brazil.
- Presentation of Giray Havur's PhD thesis status in the light of the SHAPE project at the BPM doctoral consortium (BPM-DC 2016) in Rio de Janeiro, Brazil.
- Presentation of Saimir Bala's PhD thesis status in the light of the SHAPE project at the BPM doctoral consortium (BPM-DC 2016) in Rio de Janeiro, Brazil.

6 Status of the Dissemination Plan and Outlook

As stated in the dissemination plan described in the SHAPE project proposal, within the project three PhD theses are planned. Now we know that in particular:

- A PhD thesis on automated reasoning and optimization in engineering processes will be performed by Giray Havur;

- A PhD thesis on process discovery from unstructured and semi-structured data in safety-critical domains will be performed by Saimir Bala; and
- A PhD thesis on the application of semantic technologies in the field of engineering processes will be performed by Simon Steyskal.

These three project members are responsible for work packages 2, 3 and 4, respectively. Unpublished results from the current project deliverables are at the moment polished and planned to be submitted to one of the venues listed below.

In the SHAPE proposal we stated that it was a primary goal to publish as many scientific papers in high-end conferences and journals as possible, with a special interest in the following (i) conferences: International Conference on Business Process Management (BPM), International Semantic Web Conference (ISWC), European Semantic Web Conference (ESWC), International Conference on Advanced Information Systems Engineering (CAiSE), International Conference on Service Oriented Computing (ICSOC), International Joint Conference on AI (IJCAI), The annual conference held by the American Association of AI (AAAI), European Conference on AI (ECAI), International Conference on Knowledge Representation & Reasoning (KR), International Conference on Rules and Reasoning (RR), Conference on Innovative Applications of AI (IAAI); and (ii) journals: Information Systems, Decision Support Systems (DSS), Journal of Web Semantics (JWS), Semantic Web Journal (SWJ), IEEE Transactions on Services Computing (TSC), Computers in Industry, IEEE Transactions on Knowledge and Data Engineering (TKDE), Journal on Data Semantics (JoDS), ACM Transactions on Computational Logic (TOCL), IEEE Expert / IEEE Intelligent Systems, Journal of Systems and Software (JSS), Applied Ontology.

Following that aim, we have already achieved publications in the BPM and CAiSE conferences (cf. Section 2), and in the Information Systems and Decision Support Systems journals, among others. The previous list remains potential targets for SHAPE-related publications. However, we will keep submitting papers to other venues when we deem it may be interesting for a specific research or industrial community and for getting valuable feedback.

In the dissemination plan of the SHAPE proposal we also stated that within Siemens, the main results of SHAPE would be shared in the corporate knowledge management system TechnoWeb and in one of the annually organized Product Configuration Symposiums (where also Siemens-external participants are invited). In particular, the following dissemination activities are planned for the project:

- Two articles in the Siemens Corporate Technology News channel, such as SiemensWorld (one in January 2016 and one at the end of the project).

- Regular postings about progress and achievements of SHAPE (e.g. accepted publications) in the Siemens TechnoWeb and in the Siemens Social Network:
 - TechnoWeb Communities of interest:
 - * Product Configuration
 - * Constraint-based Systems
 - * Semantic Systems
 - * Process Management Community Siemens
 - * Business Process Management ? Path towards intelligent operations
 - * Business Processes & Workflow

- A contribution to the Siemens Configuration Symposium 2016 (Oct. 2016)

In this regard, Siemens has already published a summary of the project in the Siemens online magazine SiemensWorld (cf. Section 5), which has caught attention all over the world. In addition, Alois Haselböck presented goals and results of SHAPE at a meeting of engineering and tool project managers from Siemens business unit Rail Automation (worldwide) in Vienna, Austria, in May 2016. On the other hand, the planned contribution to the annual Siemens Configuration Symposium 2016 was delayed to the Configuration Symposium 2017 because SHAPE did not match well the 2016 topic “Future Trends in Product Configuration”.

References

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