

SOP⁴EBPM: Generating Executable Business Services from Business Models*

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Abstract. This paper presents the vision considered by the REMPLANET project for providing a platform for the discovery, design, deployment, execution, interaction, operation, optimization and analysis of extended business processes with the objective of supporting the collaborative decision processes in the context of Resilient Multi-Plant Networks in the manufacturing sector.

Keywords: Business Process Management (BPM), Software Oriented Architectures (SOA), Collaborative Processes, Workflows.

1 Introduction

One of the main topics of research in the enterprise interoperability (EI) [1] field nowadays is the Business Process Management (BPM) [2], putting special emphasis in the interorganizational collaboration aspects. The main goal of BPM is to increase the effectiveness and efficiency of enterprises through the holistic management of their business processes. This holistic management includes modeling, automation, integration, monitoring and continuous improvement of processes as a way of providing high levels of quality. Among the different aspects involved in BPM, the direct translation from a business process business perspective representation of business processes to a technical process representation that can be executed (a.k.a. workflow) – automated – by a workflow technology [3], takes a lot of research effort. The idea consists in being able to obtain an abstract representation – workflow – taking as starting point a business perspective description in an automated and straightforward way. Moreover, in enterprise network scenarios this translation has to provide facilities for defining interoperable technical aspects that support the necessary level of co-operation among partners.

Most of traditional approaches concerning workflow automation have been focused on very clearly structured business process. However, this paper presents the vision that has been taken in the Resilient Multi-Plant Networks project (REMPLANET, <http://www.remplanet.eu>) where BPM concepts and methodologies will be applied to resilient

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manufacturing scenarios, where many heterogeneous partners needs be integrated and their processes be interconnected.

The intended approach will consist in defining a set of extensions and restrictions to follow in the traditional business process definition that will facilitate the generation of executable representations in a specific platform overcoming the gaps between both.

Therefore, with a single business process representation based on a business perspective, which can be easily defined by business analysts, the system will be able to obtain the executable representation supporting interorganizational collaboration. Thus, it will be only necessary to maintain a single representation, simplifying the business process management as a whole. The problem resides in the fact that usually a direct translation from a process business perspective representation leads to a workflow representation that presents some lacks which make it impossible to obtain all the expected benefits from its automated execution. This is due to the fact, that the existing models at both levels, and therefore their respective representations, have different goals as it has been explained in [4].

Business perspective process models are oriented to represent business processes in an easy, understandable and precise enough way for businesses experts, but not their automation. In fact, these representations help enterprises to: a) have a good knowledge and understanding of their processes, b) ensure the quality of their processes and, c) to facilitate the cooperation among different enterprises, helping to establish the interaction points amongst their respective processes. Technical aspects needed at execution time are out of the scope of this business modeling. Therefore, generating executable representations from these models is not enough.

Executable models, used for modeling workflows, as they should be executed automatically by software, in addition to the flow of activities and participant roles also have to define: a) repositories and sources of process related information and b) the way in which actors can participate in the automated execution for ensuring the progress and termination of the workflow. Actors represent both human and machine (e.g. processes) participants. This extra information should cover technical aspects for the automated workflow execution.

In order to obtain workflow representations rich enough to be executed in an automated way from business processes represented using a human readable model, it is necessary to enrich the original representations with extra information [4]. Besides, it is necessary that these business human readable representations can define precisely all necessary types of business collaboration in a network.

Moreover, the presented approach also considers the basic aspect of interoperability at workflow level [5], in order to facilitate the cooperation of members belonging to a resilient multi-plant network being necessary to obtain maximum benefits from collaboration. In doing so, the business processes are offered as services to the outside, promoting therefore the development of new business processes based on the composition or aggregation of existing ones.

This paper is structured as follows: in Section 2 an overview of the REMPLANET project and its main goals is presented. The environment for the SOP⁴EBPM is explained in Section 3. Some related work is detailed in Section 4. Finally, Section 5 presents some conclusions.

2 REMPLANET Project

This project is funded by the European Union through the 7th Framework Programme. Its main concept is the development of methods, guidelines and tools for the implementation of the Resilient Multi-Plant Networks Model in non-hierarchical manufacturing networks, characterized by non-centralized decision making.

The project considers that a resilient organization has the capability to respond rapidly to unforeseen change, even chaotic disruption. It is the ability to bounce back — and, in fact, to bounce forward — with speed, determination and precision. In recent studies, resilience is regarded as the next phase in the evolution of traditional, place-centric enterprise structures to highly virtualized, customer-centric structures that enable people to work anytime, anywhere. A resilient organization effectively aligns its strategy, operations, management systems, governance structure, and decision-support capabilities, so that it can uncover and adjust to continually changing risks, endure disruptions to its primary earnings drivers, and create advantages over less adaptive competitors. From an organizational point of view, the “resilience” concept has two fundamental perspectives: strategic resilience and operational resilience. On one hand the strategic resilience is not about responding to a one-time crisis, or just having a flexible supply chain. It is about continuously anticipating and adjusting to discontinuities that can permanently impair the value proposition of a core business. Strategic resilience refers, therefore, to a capacity for continuous reconstruction. On the other hand, operational resilience can be understood as the ability to respond to the ups and downs of the business cycle or to quickly rebalance product-service mix, processes, and the supply chain, by bolstering enterprise agility and flexibility in the face of changing environments.

In order to achieve these goals several models, guidelines, tools and platforms will be developed. So, the combination of all these elements will provide to networks of manufacturing enterprises a generic way for increasing their competitiveness in a more and more exigent, dynamic and globalised market.

Among these results it must be highlighted the development of an ICT platform for efficient real time collaborative planning/scheduling execution. Every future supply network member will be interconnected through this platform. The ICT platform incorporates interoperability functionalities, to facilitate the supply network member’s systems integration, and allow each new member a fast connection to the network. Additional ICT platform functionalities will allow to handle customer’s customized orders, or incidents that take place in the network, in a non-hierarchical and real-time decentralized decision making way. In both cases, the most suitable network configuration is established in order to increase feasibility and accuracy of customer service. In next section it is presented this platform.

3 REMPLANET SOP⁴EBPM

In the context of the REMPLANET project, the Service-Oriented Platform (SOP) for Extended Business Process Management (EBPM) will provide support for the collaborative work in a resilient network as it has been said before. The REMPLANET environment in which the SOP⁴EBPM will work is shown in Figure 1. On the sequel,

the different elements composing this environment and how they interact in order to provide the maximum performance for the platform are described.

One of the challenges to face in the project is to select and validate the right combination of notations, languages, mappings and tools appropriate for the requirements of REMPLANET EBPM. Thus, it is necessary to review standard proposals of collaboration initiatives like ebXML [6], RosettaNet PIPs – Partner Interface Process – [7], OAGIS [8] in order to select the most suitable approach for the initial extended process harmonization. The goal is to be able to define the appropriate level of interoperability in the resulting processes for supporting the collaboration in the Resilient Organization. This study will provide several Modeling Constructs that will be used in order to obtain the Collaborative Business Process Models necessary for the SOA⁴EBPM platform.

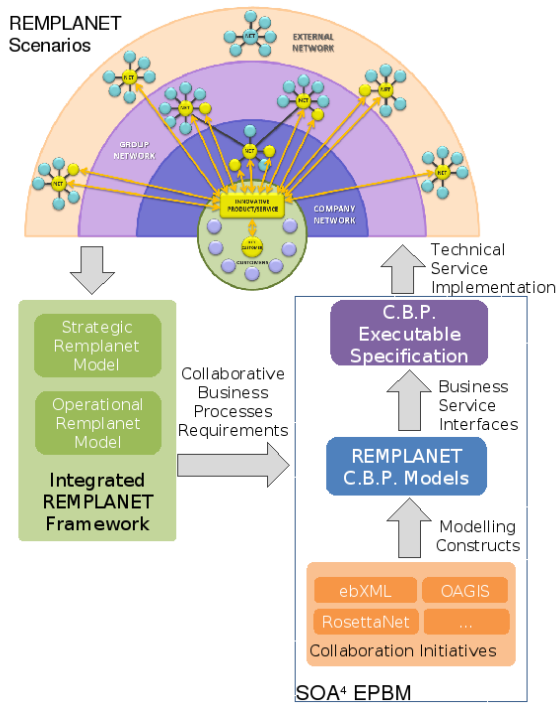


Fig. 1. REMPLANET SOP⁴EBPM Environment

The Integrated REMPLANET Framework will link the Strategic REMPLANET model and Operational REMPLANET model developed in the project context for obtaining the maximum benefits. On one hand, the former will provide tools, methods, and guidelines to enable enterprises to profit from open innovation along the entire multi-plant value network. On the other hand, the second will provide an Operational Resilient Supply Network Model, as well as its tools, methods, and guidelines to help globalised manufacturing organisations to decide where to buy-manufacture-assembly, and how to

deliver, the different customized products demanded from different markets, as cheaply and as quickly as possible. Their combination within the Integrated REMPLANET Framework will provide and define the Business Processes that best fit the efficacy and efficiency requirements (see Fig 1).

So, the combination of collaborative modeling constructs and business processes requirements will allow the definition of Collaborative Business Process Models. These models will represent the collaborative business processes in a readable and understandable way for business analysts. Moreover, these models will be taken as inputs for generating the Collaborative Executable Representation using Business Service Interfaces as a way of introducing interoperability among the network members in the executable representation.

The next step in the REMPLANET SOP⁴EBPM environment process consists in implementing the necessary services (if they don't exist) in order to prepare the whole system for being operative. Once it has been done, the business process can be deployed among all the participants at different levels (company network, group network and external network) in order to be used in production. These obtained implementations will be deployed in the SOP⁴EPBM platform supporting their execution. The SOP⁴EPBM will provide support for the discovery, design, deployment, execution, interaction, operation, optimization and analysis of EBP with the objective of supporting the collaborative decision processes. Moreover, it will provide capabilities for services re-use and composition to support and create resilient and agile resource networks based on the SOA paradigm [9]. The design and implementation of the SOA⁴EBPM platform will be based on Open Source tools and will follow international standards.

4 Related Work

In regard to the coordination of the business perspective and the technical perspective, the paper [4] proposed two additional approaches to the Aspect Oriented Architecture: Layered Architecture and Domain Service Architecture. The Layered Architecture takes as starting point the technical process –workflow– and enriches it for obtaining the business perspective. This facilitates the separation among both perspectives but severe limitations are introduced due to synchronization problems. In the Domain Service Architecture technical and business aspects are encapsulated in modules, facilitating the isolation of technical details but depending on the selection of decomposition criteria. As the three presented architectures have different advantages and drawbacks they encouraged to combine these alternatives in order to maximize the advantages of the architectures.

Many proposals have appeared in last years in order to specify workflows and most of them have considered the necessity of workflow collaboration among enterprises. The authors of [5] presented a framework of requirements to consider for interorganizational workflows and compared several approaches considering the facilities they provided for defining these collaborative workflows. They observed how none of them supported correctly all the proposed requirements. Therefore, they proposed the option of extending existing languages or combining them.

5 Conclusions

In this paper it has been presented the vision of the REMPLANET project for obtaining a platform, SOP⁴EBPM, that will support a fully non-centralized decision making process, as is expected to be achieved in non-hierarchical manufacturing networks. Complementary, this platform will enable dynamic and fast-responsive adaptation of IT-based organizational mechanisms needed to fully achieve the resilience structure that REMPLANET is proposing.

This platform will be based on open standard tools and international standards will put a special emphasis in the collaborative business process modeling for Resilient Multi-Plant Networks of the manufacturing sector, and their corresponding translation to executable representations. Moreover, it will take advantage of interoperable services as a way of facilitating collaboration and coordination in the whole network context.

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