



March 2017

## Newsletter 3

### ProSEco in a nutshell

The ProSEco project will provide a means for collaborative product-service and production process design. The objective is to provide a novel methodology and a comprehensive ICT solution for collaborative design of product-services (Meta Products) and their production processes.

### ProSEco status

By the end of March 2017 the ProSEco project is reaching the middle of the last year of project. In this issue of our Newsletter, 6 months before the project end, we are happy to be able to present the main results of the project already in a near final state. During this year, and with the full prototypes of the platforms, engineering tools and core services, further customisation of the prototypes for the four business cases, testing and analysis of the developed technologies are taking place. In parallel to these activities, the demonstrators are being prepared to present the ProSEco results extensively and to a wider audience.

While the first newsletter issues presented the project in general and some more details of the work done regarding the Business Case analysis and the ProSEco concept, this third issue will focus on one of the main development results of the ProSEco solutions including the Collaborative development platform, engineering tools and methods used for Product Extension Services (PES) development, and ProSEco deployment platform as well as the ProSEco core services.

### ProSEco collaborative development platform

The ProSEco collaborative development platform provides a technical framework that can be used to integrate a variety of dynamic engineering tools and core services. This facilitates seamless exchange of knowledge across the whole network of actors involved in the creation of Product Extended Services (PES). The platform also offers reconfigurability to facilitate an enterprise to offer customized services based on customer's demand. The also called PES development platform is a web based collaborative work space to support team's communication, coordination and cooperation for the effective completion of design and development activities for the creation of a PES. Furthermore it comprises a set of engineering tools and support workflow that help the PES designer in developing new/update existing solutions.

**ProSEco**  
Collaborative Environment for  
Eco-Design of  
Product-Services and  
Production Processes  
Integrating Highly  
Personalised Functions  
(NMP2-LA-2013-609143)  
[www.proseco-project.eu](http://www.proseco-project.eu)

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## ProSEco Engineering Tools

The ProSEco Engineering tools are offered with the ProSEco development platform and support the PES designer in the design on Product Extension Services:

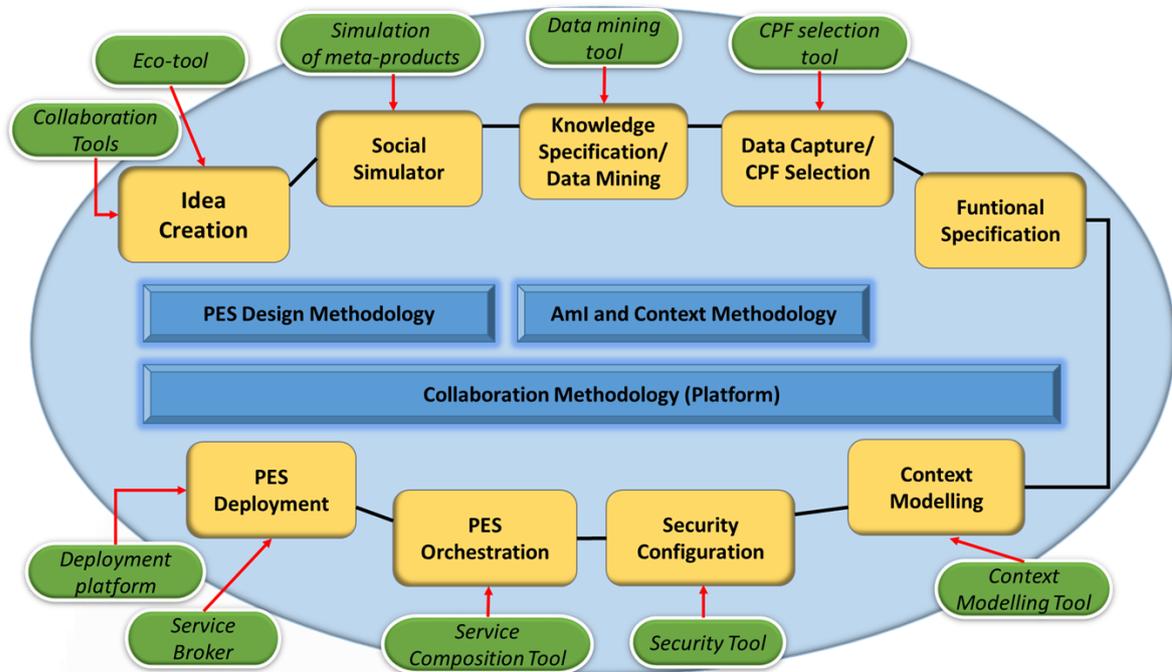
- Simulation tool for market simulation supporting the PES designers in addressing the broad range of market factors that can determine success.
- Eco design rules guides the conceptualization and design of new service solutions to reduce environmental footprint and the resources consumption.
- context modelling tool allowing for context sensitivity of the services to be built, i.e. the context of the situation where the PES is going to be used
- tool for selection of Aml solution to be used for building services, supports the definition/design of PES by allowing selection of Aml systems/sensors. The engineering tool proposes to the PES designer which Aml system/technology could be used in the product / process and which information the designed product and / or process one could obtain from such Aml systems/sensors
- Tool for data mining, to be used for designing and developing algorithms capable of analysing and predicting data related to user or equipment behaviour
- Tool for composition and configuration of services, supports the PES designer – at the final stage of PES development – to specify the runtime data exchange and time definitions between the enclosed services of the PES.
- Application specific services specification tool supports the short specification of any application specific service that needs to be developed in addition to the ProSEco core services.

## ProSEco methods

- Collaboration methodology for designing the Product Extension Services is constituted of three collaboration services; Communication services, Coordination services and Cooperation services. Communication services are provided to develop a shared understanding around complex tasks. However, coordination and cooperation services support an effective development of the services by envisaging an interactive workflow engine to align the task and activities to their corresponding tools and users at each stage of the development process.
- The methodology for Aml based Product-Services defines how to use information to be collected by Aml solutions and other sensors embedded in the products and other systems in order to generate various Product Extension Services, support effective selection of the Aml systems for different products and systematically define which information from Aml solutions and other sensors embedded in the products and other systems can be used for PES.
- Methodology for Context based Product-Services serves as guideline for the definition of context models needed for context sensitivity and personalisation of PES.
- Lean-based eco-driven Product Extended Service Methodology: The methodology guides the identification of those environmental aspects connected with the product / service along with others like functionality, safety, feasibility, etc. to ideate new product extended services (PES) that will improve the performance of the machines, as a consequence increase the product lifetime.

## ProSEco deployment solution

The ProSEco deployment platform support the deployment of the PES. This solution combines several components inside the Deployment Platform that provide the coordinated usage and management of resources (core/application specific Services) in order to perform the execution of the designed PESs. The Composition Tool allows the specification of runtime parameters and connection between the Development and the Deployment Environments.



The figure above shows the ProSEco workflow on a high level. Following the workflow steps (rectangular boxes) it is shown how a PES has to be designed and finally deployed using the ProSEco solution. The text in the rectangles describe the main use case in a workflow step. The oval boxes show the associate ProSEco tools for a related use case, and the middle long boxes describe the process phases and the followed methodology within the workflow.

## ProSEco Core Services

The ProSEco core services are offered with the ProSEco deployment platform and support the implementation of the PES. ProSEco Core Services are templates of deployable services, easily configurable through ProSEco Engineering Tools. The composition of different ProSEco Core Services and application specific services is representing the PES. ProSEco offers following core service templates for rapid prototyping using the ProSEco engineering tools:

- Aml Monitoring: used for collection and aggregation of Aml systems/sensors (at the product/process) raw data into Aml based data.
- Context Extraction: used for extract context during daily product use operation, and to provide the extracted context to the downstream services.
- Knowledge Provision: enable the gathering of relevant knowledge about costumer that can be used for developing new and more accurate PES solutions.
- Security enforcement: inspects, modifies, and queries the policy database, resource managers for each host that provides protected resources, session managers for each user initiated session, and session initiation functions within the ProSEco platforms
- Eco core service: allows the impact assessment calculation, following the single score approach provided by "endpoint" impact calculation methods.
- Data Mining core service: analyses the behaviour of the providers and customers or to predict future events, such as the proper times for predictive maintenance.

## Past Events

- **Many articles in scientific conferences. Some examples are:**
  - Scholze, S., et al. (2016). Tools for Human-Product Collaborative Development of Intelligent Product Service Systems. 17th PRO-VE 2016, Porto, Portugal, October 2016, Springer International Publishing: 373-384.
  - Nagorny, K., et al. (2016). An Approach for Implementing ISA 95-Compliant Big Data Observation, Analysis and Diagnosis Features in Industry 4.0 Vision Following Manufacturing Systems. Technological Innovation for Cyber-Physical Systems: 7th DoCEIS 2016, Costa de Caparica, Portugal, April 2016, Springer International Publishing: 116-123.
- **Many articles in scientific journals. Some examples are:**
  - Oliviu Matei, Kevin Nagorny and Karsten Stoeber, "Applying data mining in the context of Industrial Internet" IJACSA, 7(1), 2016. (ISI journal)
  - Fox, S. (2016) Reframing the influence of national cultures within multi-resolution simulation models. Management Research Review, 39(5), 521 – 545. doi.org/10.1108/MRR-09-2014-0211
  - Scholze S, Barata J, Stokic D. (2017) Holistic Context-Sensitivity for Run-Time Optimization of Flexible Manufacturing Systems. Sensors. 17(3):455.
- **September 2016:** DESMA house fair in Achim and EFFRA 's 1st Factories of the Future conference in Brussels
- **February 2017:** ATB, Electrolux, CNU, UNINOVA participated at 2nd Industry 4.0 Iran conference and disseminated ProSEco project results.

## Upcoming Events

June 2017 in Madeira, Portugal: ProSEco is organising a special session in ICE 2017

June 2017 in Cluj, Romania: Open Innovation 2.0 Conference 2017

July 2017 in Emden, Germany: ProSEco is organising a special session in INDIN 2017

ProSEco LinkedIn group: <https://www.linkedin.com/groups/8184999>

ProSEco research group: <https://www.researchgate.net/project/ProSEco>

## Future work

In the upcoming newsletter we will present the ProSEco demonstrators in each of the four ProSEco Business Cases.



This project has received funding from the European Union's Seventh Framework Programme under grant agreement number NMP2-LA-2013-609143