



Integrated management of product heterogeneous data

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At a Glance

The purpose of the project, which is co-funded by the European Commission, is to develop an ICT tool to improve the efficiency and quality of the Product Development Process of innovative products. Aerospace, automotive and home appliances industries will collaborate in the project, sharing their knowledge and common understanding of the Product Development Process to achieve this tool.

LMS International NV is leading the consortium; the other partners are the Fraunhofer Gesellschaft (the Institute for Production Systems and Design Technology, and the Institute for Technology Management and Working Organisation), Paragon, Screen99, Scai Polska, CENAERO, Pininfarina, EPFL, CIDAUT, TUDelft, KE-Works, Alessi, Electrolux Italia and NOESIS Solutions N.V..

Summary of project context and objectives

iProd general aim is to **improve the efficiency and quality of the Product Development Process** of innovative products by developing a flexible and service oriented software framework that, reasoning and operating on a well-structured knowledge, will be the backbone of the computer systems associated with current and new product development processes.

A reduction in lead time and cost during new product development and an improvement in productivity and quality are key objectives for company competitiveness. These objectives can be achieved through the integration of three fundamental elements: corporate strategy, business processes optimisation and ICT support. In particular corporate strategy must drive process improvements towards innovation and ICT is a mean to actuate processes and share data and knowledge among all corporate actors and industrial roles. The Product Development Process (PDP) is a strategic process for company success; it requires innovation, attention to costs, focus on market needs, achievement of quality criteria and respect of timings. Knowledge management technologies applied throughout this complex process are a key to success. Therefore an ICT framework which supports the interoperability of all corporate systems and processes (resources, tasks, people, products, etc.) and related knowledge sharing can be adopted to achieve reductions of lead time and cost.

The European FP7 Project iProd addresses these challenges and has the objective of supporting interoperability during the Product Development Process (PDP) in all its assertions:

- *organizational interoperability* which deals with organizational processes (e.g. integration of various organisational roles such as marketing, Designers, Planners, Testing people, suppliers and customers)
- *business interoperability* which deals with business processes, services and objects (product development processes, product lifecycle management, testing process, validation, etc.)

- *technical interoperability* which deals with ICT systems and their interfaces (virtual and experimental data, process knowledge, information exchange, etc.)

To improve productivity and quality of the PDP and achieve the objectives of reduction of lead time and costs, the iProd solution consists of a flexible and service-oriented software framework that, reasoning and operating on a well-structured body of knowledge, will be the backbone of the computer systems (software tools, PLMs, PDMs, etc.) associated with current and new PDPs. As a backbone it will be used across and along the entire PDP and will support decisions and integrate results of the various phases of the process.

iProd applies knowledge management, reasoning engines and software process integration and automation technologies in order to achieve the following benefits:

- support knowledge and competencies extraction, structuring and sharing it throughout the enterprise and also with suppliers
- make decisions more reliably by making available structured information and indicators along PDP activities
- strengthen the supplier network management and integration by means of result and performance monitoring

iProd addresses PDP in a general way for manufacturing companies, but wants to prove the approach and methodologies in three well defined application areas, i.e., the aerospace, the automotive and the home appliances industries. These three areas generate the largest impact in European economy and are here addressed as the main targets for the iProd application.

Description of the work performed and main results

In the second project year, a number of important project objectives have been met. The most important ones can be summarized as:

- **The first software prototype of the iProd framework has been achieved.** This prototype is the first expression of the huge effort spent in Year 2 and gives evidence to a number of technologies and results achieved during this year.
- Based on the functional and non-functional requirements and end users' input, a set of domain independent ontologies has been researched. This consumed a considerable amount and is fundamental for the operability of the knowledge base. Being the knowledge base' foundations relying on the correct structure of entities and relations, a correct ontology design is key for software functionality. Here an important set of two requirements has been met: use ontologies to map PDP domains AND also make these ontologies usable in software application. This has not been a simple challenge and required a tight integration and cooperation between the partners and the diverse expertizes. At the current stage, a complete and working set of domain independent ontologies has been deployed in the iProd first prototype and has been used to implement the first two use cases: one automotive from Pininfarina and one aerospace from Fokker Aerostructures (member of the user group).
- A good practical definition of the use cases has been carried out, based on the interviews, questionnaires and information collected from the industrial users in the first year. In the second year, more concrete information has been collected in a more uniform way by using templates developed in WP5 and by gathering all the necessary information regarding the simulation models needed for virtual testing. This has largely helped to improve the domain independent ontologies and to kick start the domain specific ones.
- The software architecture specification process has made substantial progress and has completed the formalization of its findings in the various WP3 deliverables. These deliverables were originally delayed at the beginning of Year 2 but all of them have been then completed before the end of the year and have not impacted the delivery of the first iProd prototype. This is the result of a number of iterations with end users, ontologists and research experts in order to continuously improve the design of the architecture and its details. The specification deliverables will be updated in Year 3 to reflect the last implementation status after end user and project review feedbacks.

- The collaboration between the partners has been enhanced at software development level by the implementation of an enhancing feature of the technical website to allow the adoption of an agile software development approach. Partners with a consolidated software development experience helped the research partners to get up to speed with the agile methodology and provided an easy to use tool for consistent prototyping. Alongside the agile tool, a source version control tool has been used to keep track of source code modifications.
- Dissemination activities have been considerably improved, based on the feedback of the first review meeting. Especially in Poland, SCAIP has been very active in the generation of iProd awareness with local companies and universities and establishing a number of contacts in Poland. This activity led to the participation (in September) of the ICT proposers' day where iProd has been presented as example of project collaboration and to a comprehensive list of contacts and activities towards east Europe. An overview of this strong dissemination action is reported in WP6 section of this deliverable.
- Exploitation activities saw two slightly different trends: one external that has been positive with the inclusion in the user group of a new member and various negotiations and contacts with potential industrial entities in the sectors of interest for iProd. On the other side, a delay in the internal exploitation activities has been noted and actions have been taken to recuperate the delays and be back on track at the beginning of year 3. Deviation and corrective actions are discussed in WP6 section.

These achievements were possible thanks to a very tight cooperation between the partners. The project partners have been very active in a number of face to face and online meetings, always keeping a pro-active approach. This very tight cooperation has guaranteed a constant and effective progress of the work, reducing the risk of peak efforts, and anticipating them with a proper planning approach. Weekly online meetings have continued in the first half of the project year and have supported this constant pace.

On the other side, all the members of the consortium have actively contributed to the technical work also by reviewing the deliverables, thus ensuring quality and awareness of the activities being done.

In parallel, end users have been often involved in the creation of better and more structured end user stories and data collection was performed. The data collected has been extensively used to support the ontology creation process. This process founded its roots in WP2 deliverables and has been made explicit in WP3 deliverable D3.6. Naturally, this will provide input also for D3.7.

In parallel to this effort, the IT infrastructure design process has also made substantial progress and the implementation of the first prototype is the major result of WP4. In this phase, the input from the end-users has been critical to drive the design, especially of the graphical user interface. Visual mockups have been build and shared with all the partners to provide a collaborative feedback mechanism. This resulted in a clean and functional user interface that, although not yet exposing all the features technically operating 'behind the scenes', has allowed a first evaluation of the prototype by the end users and helped to define, together with them, an improvement trajectory for the second prototype in Year 3.

Expected final results and potential impact and use

iProd aims to improve the efficiency and quality of the Product Development Process by developing a flexible, service oriented, customer driven software framework that will be the backbone of computer systems associated with current and new development processes.

This framework will impact the product development process in order to **reduce** drastically product development costs and time by defining an optimised testing process, **support** knowledge and competencies extraction, structuring and sharing also with suppliers, **improve** focus of new product development with a fast and structured management of competitor and market analysis data.

The goals addressed in iProd have a clear European and international scope, explaining why a combined European research effort is needed. **iProd success will strengthen European**

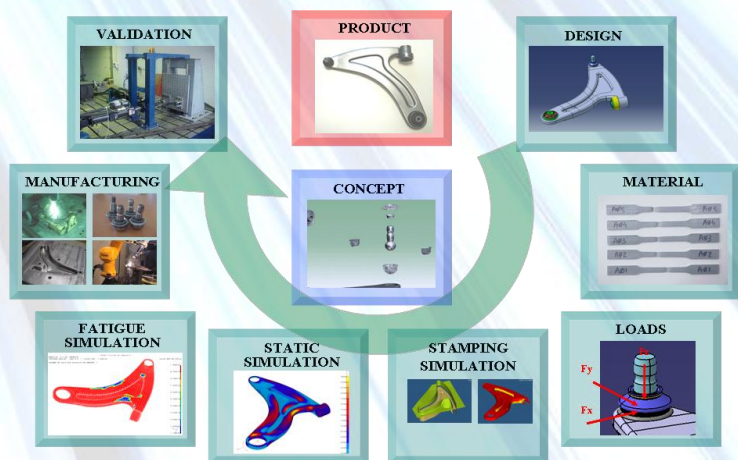
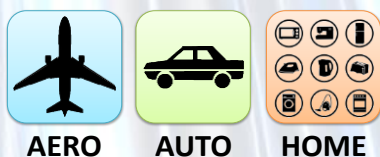
manufacturing and IT industries in their global competition because the project's objectives are of general meaning for more or less every industrial company in the world. Industrial companies addressed by iProd (including their supplier networks) are clearly European and international players. Their marketing organizations as well as their design, engineering, and manufacturing networks span all over Europe and beyond. They collaborate with international partners in more or less every relevant aspect of their business. They need collaboration and information exchange on a European and international scale. The software systems provided by IT vendors in this area frequently used in more or less every industrial and developing country. The core ontologies to be built will address needs of every industrial enterprise all over the world.

The iProd project has identified three sectors of application for the software framework that intends to develop. These sectors together constitute the largest part of the European economy and have deep connections at many levels with the supply chain that depends on these three main sectors. This means that the application of the iProd framework in these sectors has a large and durable impact on the European economy and allows the meeting of always more demanding requirements. In the next sections, the impact in the three markets will be analysed and an overview of the benefits that will be gained with the adoption of the iProd framework will be given as well.

In summary, the expected iProd impacts can be outlined as follows:

- Response to rapidly evolving conditions with flexible and dynamic solutions
- Improve the quality and quantity of output information
- Management of reliable information to ensure interoperability across different processes and industries
- Reduction of the new product development time and product testing costs
- Reduction of product development, warranty claims and field repair costs and reduction of the corresponding design and manufacturing deficiencies and downtime
- Increase competitiveness across domains
- Assure EU leadership at every step of the knowledge management and product development process

**iProd will improve
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Project website:

<http://www.iprod-project.eu>

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