Co-funded by the EU

SMART VORTEX

Scalable Semantic Product Data Stream Management for Collaboration and Decision Making in Engineering

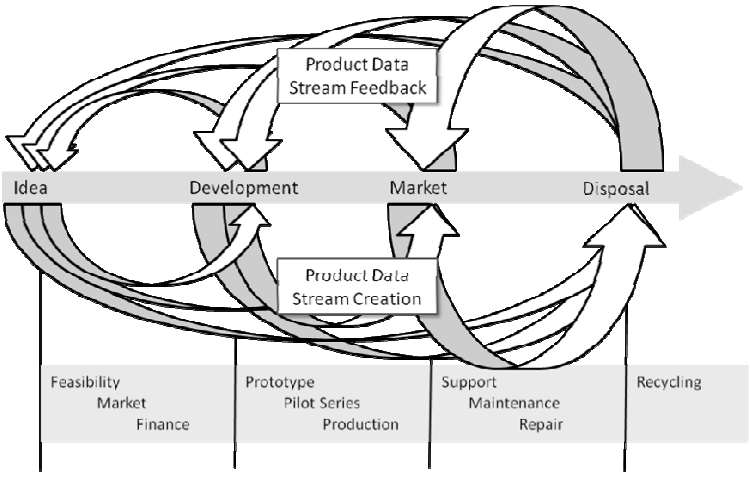
"Helping industry to cope with data deluge in Design & Manufacturing"

ANNUAL REPORT 2011

The SMART VORTEX project is a 48 months FP7 Integration Project started on October 1st 2010, under the domain of Strategic Objective 4.3 Intelligent Information Management.

The SMART VORTEX Project aims at providing a technological infrastructure and interoperable methods, tools, and services that will support large-scale industrial innovation and collaborative engineering projects; making possible that information management will underpin an intelligent analysis of massive data streams and growth of business value and capabilities.

In this project, the union of all product data streams, both along the direction of the product lifecycle and the product and innovation process feedback, is called **SMART VORTEX**. It comprises amongst other, sensors` data, design, simulation, experimental, and testing data, multi-media collaboration data and data from higher level inferred events generated by analyses.



IMPORTANT WORK AREAS

The SMART VORTEX Suite, with innovative high-impact components, is the main expected result of the SMART VORTEX Project. This infrastructure contains the architecture, methods, tools and services for supporting large-scale collaborative engineering projects as well as better collaboration and decision making, through intelligent management and analysis of massive data streams.

The course of action within SMART VORTEX project is organized in four overlapping cycles that comprises the development of all project processes towards accomplishing project objectives and thus generate expected results.

The Inception and Elaboration cycle is the first cycle, aimed at creating “common ground” among all consortium participants. This cycle has started with the definition of requirements analysis, which comprised setting up the definition of the standard RTD workflow of requirements needed for the RTD cycle of the project.

The requirements analysis and identification of user scenarios cycle; aimed at collecting the needs and expectations of end users and service providers for SMART VORTEX development. Key activities performed comprised organisation for setting up the analysis of user requirements, needs and usage scenarios.

The suite modelling, data & system architecture cycle; aimed at creating information models of concepts, relationships, constraints and rules for the technological framework of the project. Key activities performed comprised organisation and setting up the evaluation for high-level semantic representations for streaming information and data sources as well as for information and semantic modelling.

The semantic data stream models and access language cycle; aimed at developing semantic models for sensors` data streams and collaborative models. Key activities performed comprised evaluation of operational details for this area of work.

TARGET OUTCOMES AND EXPECTED IMPACT

The SMART VORTEX of product data streams is the core concept, around which targeted outcomes: capturing tractable information, delivering pertinent information and collaboration & decision support, take place. In the way SMART VORTEX generates the expected results (SMART VORTEX Suite) the project will deliver these outputs.

Notwithstanding, the SMART VORTEX project was designed to generate high-impact regarding industrial application scenarios and research, as project outcomes are a natural match to the key problems presented by the SMART VORTEX industrial application scenarios.

Through SMART VORTEX approach we expect to lead industry into improved models for representing products as well as to perform simulation of effects and behaviour. Bringing the real-life experience and simulation closer together will increase product quality, cost savings and therefore the value for customers and vendors altogether. In addition, those results could be fed into the development of product updates or even totally new products.

PROGRESS TO DATE

The main achievements of SMART VORTEX along 2011 are:

a) We have successfully set into motion the SMART VORTEX project and secured project roll-out, consolidating a shared vision and common understanding on the operational details of the SMART VORTEX project. Relevant work was done towards close integration and interaction between of the different work areas.

b) Analysis and definition of the SMART VORTEX requirements, architecture, success criteria, implementation, and testing/validation processes has been performed. Achievements in this area comprise:

- generation of information models reflecting the requirements analysis, modelling of information and knowledge in the domains of the SMART VORTEX scenarios/use cases, numerical engineering applications, advanced computations and ontology protocols,
- definition of requirement for a data stream management system and relative architecture
- development initial studies on collaborative problem solving, collaborative design and decision making processes

c) Based on the requirements, we have set into motion the **implementation of the SMART VORTEX infrastructure,** starting the infrastructure and service layer which is part of the development of the SMART VORTEX core services that will be delivered next year.

DISSEMINATION AND AWARENESS RAISING

During 2011, the initial version of the Dissemination Plan targeting both scientific and industry communities was delivered. It defines the steps to be taken in order to communicate the project results and increase SMART VORTEX visibility; as well as the dissemination strategy, the target audiences, and the communication channels to be used depending on the audience.

As part of the 2011 dissemination activities, the SMART VORTEX website www.smartvortex.eu has been set up, 18 scientific articles have been published and the project characteristics, scope and preliminary research results or publications have been presented to targeted audiences in several events and conferences; including conferences such as the ACM IUI 2011 Workshop on Semantic Models for Adaptive Interactive Systems (SEMAIS), the Hawaii International Conference on System Science (HICSS-44) 2011, the IUI workshop on Semantic Models for Adaptive Interactive Systems (SEMAIS) 201, the CENT 2011 in Florida, USA, the 3rd CIRP International Conference on Industrial Product Service Systems (IPS), the Awareness in Germany or the 7th International Workshop on Scalable Semantic Web Knowledge Base Systems (SSWS2011). SMART VORTEX also actively participated in the organisation of the prestigious database conference EDBT/ICDT 2011, March 21-25, 2011.

Among publications we can mention the article published in the Computers & Industrial Engineering journal (vol. 60), a chapter relevant to Smart Vortex in the newly published book “New Frontiers in Information and Software as Services”, and the publication presented in the VLDB Conference 2011, which results are expected to be of vital importance for SMART VORTEX and its industrial partners, as expensive algorithms can be executed over streaming data at wire speed.

SMART VORTEX industrial partners have promoted the project's scope, goals and challenges among both: key people of R&D, production, business development and other internal departments, as well as through its partnership network, including both academic institutions and other commercial enterprises.

FUTURE WORK

During 2012 efforts will be focused on consolidating and implementing the SMART VORTEX infrastructure and services. Specially, getting ready and making available core elements to execute first user trials and connect data stream producers from industry to the SMART VORTEX infrastructure.

Main activities will comprise designing and implementing the architecture for the Data Stream Management System (DSMS) development, the collaboration components and systems, ontologies and protocols, query languages, integration with tools, user interface prototype, as well as the demonstration and evaluation plan.

FURTHER INFORMATION

- EC ICT Information and Communication Technologies Projects: SMART VORTEX
- **SMART VORTEX Project website: www.smartvortex.eu**
- **Project Co-ordinator:** Ruben Riestra**,** INMARK