eScop
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MARKET INNOVATION AND IMPACT

The central concept of eScop is to combine the power of Embedded Systems with an ontology-driven service-oriented architecture (SOA) for realising a fully open, automated manufacturing environment. The true innovation of the proposed solution lies in the convergence of the power of ontology knowledge and SOA control approaches that allow the control to be automatically based on the ontology, while Embedded Systems allow this architecture to work.

eScop aims to realise a modular, fully open solution for the operational control of manufacturing equipment, that allows easy and fast commissioning of new plants, "plug & produce" inclusion of new equipment, replacement of traditional control by a single level cohort of Embedded Systems and a series of software control levels. The eScop hardware and software platform will produce the following innovations: flexible re-configuration and knowledge update of newly plugged or unplugged equipment support, reduction of time and cost related to conventional manual reprogramming, facilitation of human-to-machine and machine-to-machine interactions, as well as new products with short-life cycles, without the need to totally restructure the production system, as well as the manufacture of customised products.

The eScop project results will impact the entire value chain of the production automation industry, with the stakeholder role shifting towards knowledge user/creator. Companies that require high productivity can certainly benefit from the project improvements on efficiency and transparency of shop floor information. Other important beneficiaries/customers for eScop results are companies that need to work with low volumes of different types of product, generally realised with job-shop production systems.
eScop

Embedded systems for Service-based Control of Open manufacturing and Process automation
Manufacturing and processing are the first industries to contribute to European economic growth, underpinning all economic activity. An increasingly competitive environment in the sector is waking many companies up to the need for appropriate management tools that allow them to reach higher productivity with better quality at lower costs. Proper information management systems can be divided, for example between business management and the factory floor.
The gap between the management and factory control level is traditionally filled by a software and hardware system, known as the Manufacturing Execution System (MES). MES helps directly run shop floor manufacturing operations – the core value-added processes in a manufacturing enterprise – and delivers information that enables the optimisation of production activities from order launch to finished products. The resulting rapid response to the changing conditions drives effective plant operations and processes.

**ONTOSTY-DRIVEN APPROACHES**
The development of MES within the overall control architecture of production systems is relatively more advanced than others and many different solutions are presently available. The complexity of interfaces prevents software customisation and effective integration. Often, a new problem requires an ad hoc solution. A step towards a more open solution is now in progress. The current control architectures are not satisfying industrial enterprises that require agile and efficient tools to manage the changes at the factory or factory floor and then to react to the customer demands. A further possibility of improvement is seen in the use of ontology-driven approaches. The eScop, "Embedded systems for Service-based Control of Open manufacturing and Process automation", aims to develop an alternative MES solution, based on ontologies and service oriented architecture (SOA), which is defined as Open Knowledge-Driven Manufacturing Execution System.

The eScop project aims to integrate different existing software tools for creating an innovative solution that allows the supervisory and command capability of the manufacturing system. The innovation of the eScop MES platform is the merging of the power of ontology-driven knowledge and service-oriented approaches to embedded systems. The ontology of production systems is used to drive the service-oriented, architecture-based control of the production equipment by integrating multi-domain knowledge, allowing orchestration of networked embedded systems. eScop enables the flexible use of equipment and the capability to integrate a process or a machine with others. The solution allows the smart and easy reconfiguration of a process with shorter life cycles, without the need for the total restructuring of the production system. This can lead to the manufacturing of highly-customised products. The eScop solution will also reduce the wasted time and cost of conventional reprogramming and redefine the role of the main stakeholders as knowledge users and creators. These benefits are significant to the companies that require high productivity, or to the companies (SMEs) that need to work with low volumes of different types of products.

**BETTER CONTROL CAPABILITIES**
The main result of eScop is a service-oriented MES that allows the building and simulation of factory and process control systems. eScop provides an innovative system that might encourage increased investments in the automation industry. A competitive advantage comes from the improved control capabilities of the eScop solution and the enhanced possibility to dynamically configure a production system made of components coming from different providers. This dynamic configurability may significantly reduce the cost of changes in factories, allow out-of-the-box extensibility and scalability of MES and enable proper equipment and embedded systems to be selected, thereby enhancing sustainability in the manufacturing industry. In addition, the reduced costs to design will increase profit and allow the same solutions to be offered at a lower price. The eScop platform can bring a real breakthrough for the sector.

**PROJECT ACCOMPLISHMENTS THUS FAR**
The project activities were launched in March 2013 and the first requirements and specifications for both technology and concept were successfully provided in January 2014, thereby achieving the first project milestone. In addition, the knowledge-oriented approach to production system definition,
Integration, execution and maintenance was presented during the ARTEMIS/ITEA2 Co-summit Event in December 2013. The focus was the use of the ontologies for the orchestration of production processes ranging from low-level (factory floor) to higher (application) levels. The online application, with explanations, model and concept presentation, is available from the project web page www.escop-project.eu/teaser. During the first year, a first escop platform prototype was also developed, where the initial vision for the main escop architecture blocks was tested.

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