

Interoperability and the software, services and semantic technologies challenges in the future of internet

Carlos Agostinho, Universidade Nova de Lisboa, Portugal

Abstract: As information systems in enterprises and organizations evolve and become more complex, the need for interoperable operations, automated data interchange and coordinated behavior of large scale infrastructures becomes highly critical. Lack of interoperability would disturb collaborative environments and creation of markets that will diminish innovation and competitiveness. Apart from being a technical issue, interoperability challenges also appear in the enterprises at organizational, software, services and semantic level, underlying the need for patterns and solutions that support the seamless cooperation among ICT systems, information and knowledge, organizational structures and people. Enterprise Interoperability (EI) is recognized as a high-impact productivity factor both within the private and the public sector, affecting the overall quality, yield time and cost of transactions, design and manufacturing operations or digital public services. Up to now, the principal tools for targeting the above challenges appear as the various standards that try to govern information systems development and operation. Such standards are usually linked with specific market sectors, application areas or technology trends, thus having a limited time span, a static nature and quite often different interpretations by technology vendors and users. Nevertheless, nowadays it has been established the scientific foundations for EI, enabling the generalization and complete reuse of the methods and tools that have been developed so far. The basis for it follows key open research questions of interest for the establishment of EI science: Why is there so much effort wasted in the development of dedicated technical solutions for interoperability problems ? How can we predict and guarantee the long-term knowledge and behavior of interoperability in engineering systems ? Why do certain interoperability problems appear to be very complex at first, but are actually not complex at all once we find a dedicated solution for them ? How can these solution be generalized and formalized ? Is complexity in engineering any different from complexity in natural science or social science ? How do we reduce complexity in systems interoperability?

Many European research projects are researching in this field (e.g., iSurf, K-NET, COIN, CoSpaces, ATHENA, INTEROP, CRESCENDO, ENSEMBLE, UNITE) concentrated in developing proposals conducting the researching towards such generalization in a scientific foundation ground. With the foreseen research results from these projects, the adoption of advanced techniques for meta-modelling and automatism for model and data transformations, will enable to have the engine for interoperability not embedded directly in the systems coding, but through proper adaptative techniques get a suitable characterization of the actual status of the system's morphisms, supporting predictive system evolution, and analysis of its complexity in the dynamics of the network, including the respective transients and systems responsive behaviour. As well, at knowledge level, it is foreseen the need for the harmonization of ontological structures within and between the different network nodes, to permit semantic adaptability for the users specificities and to support the application dynamics. Then, enrichment of the semantic mapping will be possible, as a process to gather, classify, describe and then analyse the semantically features in the domain of the system models, and take better decisions in the advent of uncertainty.

After the description of the state of the art and motivations for systems and applications interoperability, the speech will develop and discuss ideas and present proposals contributing for solutions of envisaged interoperability problems in the advent of the future of internet. Examples and considerations are presented supported by ongoing EC research indicators in the area. Also, the UNITE secondment programme will be presented, as an opportunity for research team across the Enlarged Europe to cooperate in the research areas presented, thus upgrading Europe's ICT excellence.