SME in the Spotlight

The REUSE Company

Constant evolution in systems engineering

The REUSE Company, founded in 1999, envisions knowledge reuse which is fully integrated into a system's entire lifecycle from inception to retirement. This is a vision which has evolved alongside this Spanish SME, from its roots as a spin-off of Carlos III University of Madrid to its participation in the ITEA projects ReVaMP2 and EMBrACE. Professor Juan Llorens, Chief Technology Officer at REUSE, looks back on the journey so far.

Commonly changing

"In the 1980s, software reuse was very, very hot. Everybody wanted to do reuse but the main technologies were and are, even today, about pre-defining what is common in advance," begins Juan. "That's nice if what you define as common remains common down the years but, in the software world, this is not the case. People are crazy about changing things: functionality, programming languages, computers, new processors. So, what happened at the beginning of the 1990's was that all the effort that you used to find the commonality of something was out of date when you were interested in reusing it and you lost money because you invested more than you got out."

This issue was the spark that created the REUSE Company, which initially sought to provide commonalities without the need for investment via a search engine-like repository of software products, model requirements and test cases. "If you want to find a requirement which is similar to another, you cannot use standard Google technologies (or similar) because Google is too weak in semantics. So, in order to get into semantics, we created the first ontologies," Juan explains. These definitions of categories, properties and relationships between concepts, data and entities allow REUSE to connect, for instance, the models and requirements of different kinds of aircrafts in a consistent manner.

Crucial, essential, unavoidable

By 2010, REUSE had come to view its niche not as classical software engineering but as systems engineering, which has exploded in the last 20 years as companies search for processes to improve their systems. Juan: "We are in the market with the unique idea of improving systems engineering based on semantic capabilities and artificial intelligence. For us, innovation is crucial, essential and unavoidable. Why? Because the established systems engineering industry is huge and we are an SME which wants to join these markets. We must ensure that our unicity works as a commercial approach because otherwise we will not be in the market long."

As examples of such innovation, he points to the digital thread and digital twin. In the former, companies attempt to digitalise their system lifecycles from conception to dismantlement – a timeframe which typically lasts 40 to 60 years. Taking the example of aircraft, initial plans may have been blueprints and, via the digital thread, REUSE can digitalise these and connect them with the modern system to trace back possible issues in the design and prevent future problems. With digital twin, on the other hand, a virtual version of the aircraft system is created to enable testing and tweaks prior to production – but this is impossible unless every aspect of the process is digitalised, no matter how small. By offering processes, methods, tools and services for system, software and knowledge reuse within any organisation, REUSE is helping to make these future trends a reality.

A unique set-up

"There are two ways to do such innovation," continues Juan. "The first one is that we do innovation alone. That's it. The second one is that we do innovation together with someone else that can help us to fund this innovation. In the beginning, we did the innovation ourselves because we were a little bit afraid and wanted to protect ourselves from the big boys. But once our products stabilised, we started to receive invitations from customers or companies that were active in ITEA."

So far, this has resulted in participation in two projects: ReVaMP2, which developed the first comprehensive automation toolchain and associated executable process to support round-trip engineering, and EMBrACE, which provides an open environment for the co-design of cyber-physical systems based on a common requirements modelling language. REUSE's ability to play a key role in these projects alongside much larger companies lies partially in its unique set-up: all R&D has been maintained at the university, providing a strong link between fundamental research and real-world problems. "Whatever project we do, we do together," notes Juan. "The benefit of putting these two teams together is huge because a clear focus is presented by the company and the research is done professionally by the university."

The golden rule

In addition to the ITEA programme, REUSE has been involved in projects from other European initiatives such as Horizon 2020, national projects in Spain and regional projects in Madrid. The main benefits, as Juan highlights, are commercial prospects and the capacity to actively demonstrate one's own developments as an SME. As a company that sells software technology for lifecycle digitalisation, REUSE's growth prospects are enormous compared to companies requiring factory space, for instance, and such evolution will be the company's primary drive in future projects for ITEA and beyond.
"When we receive ITEA invitations, we have an unbreakable rule: we never go into projects that are not crucial to our roadmap. And if it is 10 degrees outside of the roadmap, we can negotiate with the leaders to shift a little in our direction. This mainly means that we only join projects when we can put them on the market almost at the same time as they finish. We have just finished EMBrACE and everything that we did there is already sellable. So, what's the role for ITEA? It helps us to create this virtuous circle," Juan concludes. "What we are going to do in a project is something that we already wanted to do, but now we can get some help."

More information

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