1.2 SYSMODEL

SYSMODEL (Jan. 2009 - Dec. 2011)
Interview with Ivan Ring Nielsen, Technoconsult ApS

Challenge

Industry is facing a crisis in the design of complex hardware/software systems. Increasing complexity is causing a rapid widening of the gap between the generation of a product idea and the realisation of a working system. So to manage that complexity and to shorten design cycles, industry is being forced to look at system-level languages towards specification and design. The challenge taken up by SYSMODEL was to enable SMEs to build cost-efficient ambient intelligence systems with optimum performance, high confidence, reduced time to market and faster deployment.

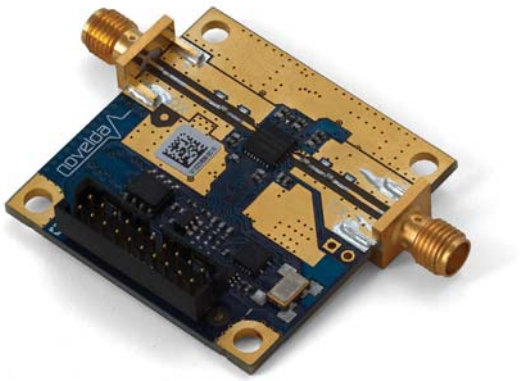
Achievement

In order to support the competitiveness of small and medium-sized enterprises (SMEs), six Nordic SMEs teamed up with three recognised R&D providers in the ARTEMIS SYSMODEL project to develop system-level modelling tools aimed at increasing their design productivity. The focus was on developing modelling concepts, methods and tools that master system complexity in an Open Source approach, with all tools available free of charge. The dissemination of the modelling methodologies and tools to a wider group of SMEs was facilitated by a wiki-based entry to tools, models, libraries and tutorials guiding new users through modelling exercises.

Additional training was organised through hands-on workshops where each SME worked on modelling their own prototype, supported by the R&D partners. For the development drive it was also important to clearly define objectives for each SME early in the project and to follow up these objectives with success criteria by means of clearly measurable and visible productivity gains. During the first eight months of the project each SME individually defined its productivity measures by means of markers like time-to-market, code size, system size, defect density, development effort, re-usability and maintainability. In summary, the open source system level tools and methodologies developed by SYSMODEL and taken on board by the SME partners led to significant productivity increases and commercial benefit.

Business Impact

Two of the project's SMEs have commercially incorporated the project's tools and methodologies. Novelda AS, an innovative Norwegian fabless semiconductor company specialising in nanoscale wireless low-power technology for ultra-high resolution impulse radars, applied the SYSMODEL tools to model parts of its next generation UWB radio system. The modelling enables the company to evaluate potential system architectures and tweak important parameters while the design is still at a conceptual level. Novelda's CTO, Dag T. Wisland, explained that this development step would have taken much longer using existing design methods and, even more importantly, the modelling reduces the risk of costly re-spins. It is safe to say that the methodologies provided by SYSMODEL have significantly improved Novelda's productivity and helped it recently win the prestigious Frost & Sullivan 'European Sensors New Product Innovation Award'.



Another tangible impact of the SYSMODEL results comes in the shape of Catena Wireless Electronics AB, a Swedish SME providing Systems-on-Chip developments including architectural choices, circuit design, embedded software development and contract research. Mats Carlsson, Operations

Manager at Catena Wireless Electronics, explained that at the start of a typical project they assist customers in translating their system requirements into a suitable IC architecture with agreed target specifications. After that process they take care of the design, layout and validation of the integrated circuit. At the beginning of this process it is crucial to describe and model at system level the performance of the final product. For this the company applied the SYSMODEL methodologies into one of its developments, where the complexity of integrating hardware and software requires a new tools approach: the SYSMODEL 'Synchronous MoC' and the 'Continuous Time MoC' to verify the systems performance with respect to the requirements. These two system-level modelling possibilities offer new ways to model hardware and software together, which is crucial for reducing time to market and increasing the chance of first-time-right designs.

Finally, the ForSyDe framework significantly profited from the development and testing in SYSMODEL, with ForSyDe-SystemC modelling libraries proving valuable for other European projects: iFest (Artemis) , CONTREX (FP7) and EMC2 (Artemis). Thus SYSMODEL had a huge impact in the development of ForSyDe, which is gaining more and more acceptance in both academia and industry, and the work of Novelda, DA Design and AuditData is documented in papers published after the completion of the project.

By increasing the level of innovation in SMEs over the whole design innovation cycle, SYSMODEL will stimulate sustainable economic growth.

1.3 SHIELD

By Josef Noll | Movation, Norway
Project: SHIELD (pSHIELD Jun 2010 - May 2011 & nSHIELD Sep 2011 - Dec 2014)

Challenge

European industries need measurable security, privacy and dependability (SPD), risk assessment of security critical products, and configurable and composable security. The business-based starting point for SHIELD focused on the impact of embedded systems in the years ahead and the security requirements expected from these Internet of Things systems.

Achievement

The core SHIELD platform is a middleware, prototypes, metrics and validation approach. The SHIELD methodology enables a business to significantly improve the SPD quality of embedded systems while addressing the specific industrial requirements, with both design and development of embedded security, privacy and dependability (SPD) possible via standardised design methods.

Figure 1: Measurable security, privacy and dependability (SPD) applied in various domains

The size of the project allowed expertise to be brought together, which had not previously been possible, and for prototypes in totally different application areas, even extended with unplanned application areas. Through SHIELD we have *(i)* achieved a de-facto standard for measurable security, privacy and dependability, *(ii)* developed, implemented and tested roughly 40 security-enhancing prototypes in response to specific industrial requests, and *(iii)* applied the methodology in four different domains, proving how generic the approach is.