



Historical Backgrounder

The SPIRIT Consortium™ was officially founded at the 2003 Design Automation Conference (DAC). The announcement of the formation of this organization followed several months of discussion among several companies, including ARM, Cadence, Mentor Graphics, Philips Semiconductors, ST, and Synopsys, who formed the original Steering Committee. These companies agreed on a simple premise: the design of complex Systems-on-Chip (SoC) is getting progressively harder, and greater efficiencies are required in the IP re-use process and in multi-vendor design flow integration.

Since the late 1990s, many design-chain supply companies began to provide full SoC tooling solutions for RTL design. The adoption of these tools into the average customer design flow faced two major issues: lack of a standard description for IP that would allow re-usable designs to be automatically imported into the tools, and difficulty in exchanging SoC architectural data with other tools to better enable design-flow integration. IP providers also faced demands from customers for a vendor-neutral way to describe IP to rapidly enable IP integration into multi-vendor design flows.

The SPIRIT Consortium decided that design-architecture exchange required a language-neutral description for IP and SoC design: a standard meta-data format. This would be a new, simple-to-create and machine-readable deliverable to accompany standard IP design files such as those written in Verilog, VHDL, SystemVerilog, SystemC, etc. The best approach for providing this meta-data is to leverage the established W3C standards used today for exchange of general meta-data across multiple platforms and applications, and The Consortium set about standardizing an XML schema for SoC design meta-data.

A major initial technology contribution from Mentor Graphics started the process, and the Consortium delivered the first version of an IP meta-data specification for public download in December 2004. With this first release, The Consortium established a commercial standard for validating specifications for commercial readiness by demonstrating multi-vendor SoC architecture exchange on the day of release. Since that time, a meta-data schema contribution from Synopsys for design-constraint mark-up and various technical developments from the other Contributing Members of The SPIRIT Consortium have led to the release of the IP-XACT™ specification. This specification has been customer-hardened and has been delivered into the IEEE P1685 process for official technical standardization. The IEEE P1685 process started in May 2006.

Basic principles of operation for The Consortium include quick advancement of specifications by allowing Contributing Members to contribute technology, which is then incorporated and ratified by the technical committees. All of the features included in The

SPIRIT Consortium's specifications are validated in commercial or pre-commercial tools before public release, and the specifications are accompanied with open-source examples to illustrate and support our technical claims. Building on our established reputation for quality product, The Consortium has accepted the industry request to extend the application of design meta-data into additional front-end SoC design-flow integration fields.

Beyond the original IP-XACT specification for IP and design meta-data to address RTL design and verification, The SPIRIT Consortium is actively working to provide IP-XACT with ESL Extensions to cover transaction-level model abstraction hierarchies, including the ability to handle SystemC and SystemVerilog IP models, as well as a complete meta-data database API to address IP generator and point-tool integration into any IP-XACT enabled design environment. The Consortium is also working to extend the application of its specifications to cover debug configuration, to ensure that the data model of IP-XACT encompasses system description, and to extend the IP-XACT architectural consistency into the back-end databases and automation environments.

Finally, in May 2007, The Consortium announced the creation of a new working group that will produce a human-readable standard format to express design intent of registers, including structure, function, and relationships, as well as access semantics. This signifies a new investment for The Consortium into human-readable data formats which enable simple automated creation of IP-XACT meta-data. Specifically, this effort will ensure consistency between hand-edited register formats and the IP-XACT meta-data specification for tool-to-tool data exchange; it is based on the third major contribution of technology to The Consortium: the SystemRDL format from Denali Software.

Respect for The Consortium's dedication to providing timely and comprehensively tested technical deliverables, as well as a general industry interest in the developments of The Consortium, have built the organization to a robust international membership. In July 2006, The SPIRIT Consortium became a California non-profit mutual benefit corporation, which includes very strong representation from the major tools and IP providers in the industry today. Also, that year, LSI became the first new Steering Committee member since the formation of the organization.

The new organization has four classes of members, designated as the Board of Directors, Contributing Members who dedicate engineering resources to the technical working groups, Reviewing Members who help validate ALPHA and BETA versions of the specifications, and Associate Members who are non-profit organizations and research institutes interested in early release developments within The Consortium. All Board Members are also Contributing Members.

The SPIRIT Consortium is actively recruiting new Reviewing, Contributing, and Associate Members. Over the past year, we have grown 30% and today can boast more than 70 members with 17 companies contributing engineering resource to our developments. Our specifications are downloaded worldwide with over 1400 downloads to date across more than 200 companies. The Consortium believes strongly that enabling design-flow and automated IP configuration and integration is the only way the system-to-silicon design-gap can be bridged, and our member companies are building and using the products to prove it.

