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# Optimizing semiconductor device innovation practices and processes

Smarter decisions, better products

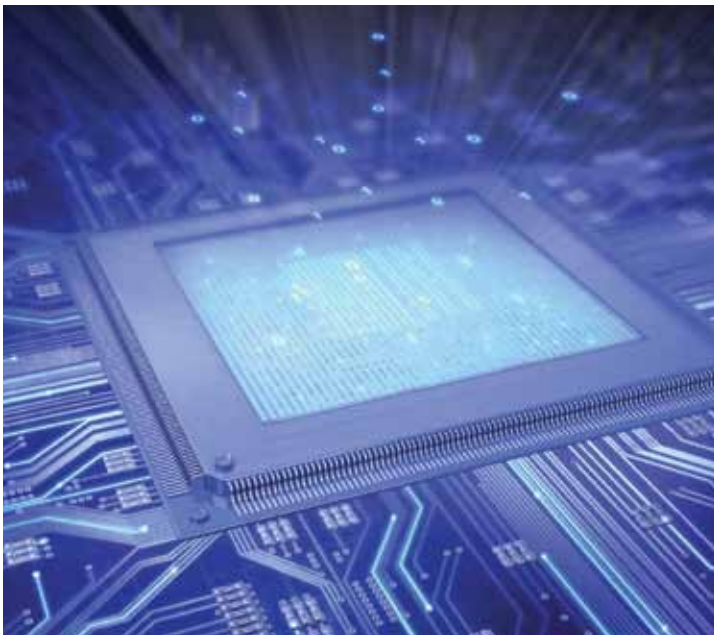
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*“If you examine what SOC-design teams are doing, you’ll find that creating an SOC is a process of finding, characterizing, and assembling previously used IP.”*

*Electronics Design News, August 11, 2011*

# Next-generation solution to get more out of semiconductor R&D



*“Today, there are nearly a billion transistors per human, and each one costs one ten-millionth of a cent. Yes, some of these transistors are going into servers, PCs, smart phones, MP3 players and tablets. But an increasing number of them are going into appliances and automobiles, power grids, roadways, railways and waterways.”*

*IBM CEO Samuel J. Palmisano, 2011*

Siemens PLM Software is a proven leader in providing solutions for managing semiconductor devices from concept ideation through end-of-life. Our solutions enable you to optimize your return on R&D investments, re-use your valuable intellectual property (IP) and know-how and leverage the massive innovation power of your value chain partners. These capabilities enable you to bring the right systems-on-chip (SoC), integrated circuits (IC) and other products to market with greater confidence, greater ROI, faster time-to-market, improved quality and better collaboration among partners.

Siemens PLM Software’s solutions for the semiconductor device industry enable you to effectively manage semiconductor design and manufacturing complexities with a complete set of unified applications that accelerate new device introduction, improve productivity, lower production costs and facilitate design for sustainability and environmental compliance.

Siemens PLM Software provides unique capabilities that enable semiconductor companies to:

- Optimize their semiconductor device R&D innovation pipeline throughout the device lifecycle
- Unify the decision making processes for the complex design of SoC, IC and IP
- Maximize the safe re-use of proven IP in device design and fabrication
- Build a secure and scalable collaboration platform within the enterprise and with semiconductor value chain partners
- Facilitate the device design for sustainability objectives
- Increase the participation of all decision stakeholders in the device design management processes with mobility and context-aware applications

# Challenges in the semiconductor device industry

*"Many institutions have a history of time and budget overruns, in addition to late adjustments to product specifications from the R&D department, resulting in angry customers. At the same time, changing customer expectations and requests for specifications lead to many new projects in the pipeline."*

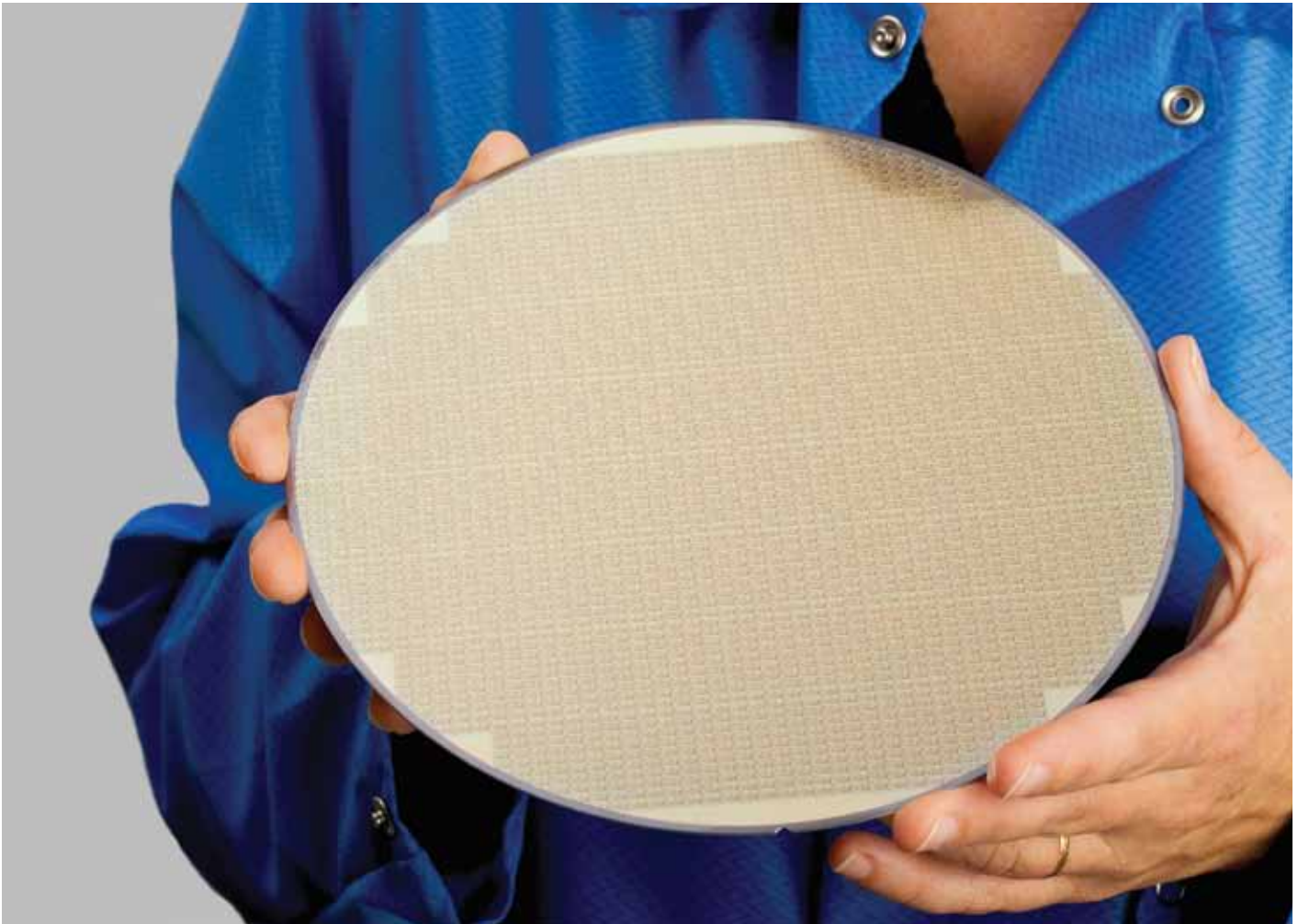
*McKinsey & Company, "Getting Mo(o)re out of semiconductor R&D"*

Today's semiconductor device makers are feeling the increasing impact of disruptive forces from multiple fronts. Hyper-fragmented market needs, escalating design costs, growing product complexity, shrinking average sales prices and the relentless pace of innovation are creating intense pressures on the industry. Coupled with the industry's daunting design challenges, accelerated lifecycles and complex supply chains, it is no wonder that product launch dates, development budgets and quality targets are frequently missed.

Device makers are being challenged by rapidly-evolving business models based on the collaboration between fabless (or fab-lite) and foundry companies, the increasing demands for complete turn-key solutions for niche markets, the difficulty to fulfill commitments to customers on schedule and at cost and the escalating complexities in both device design and operational processes that are distributed globally.

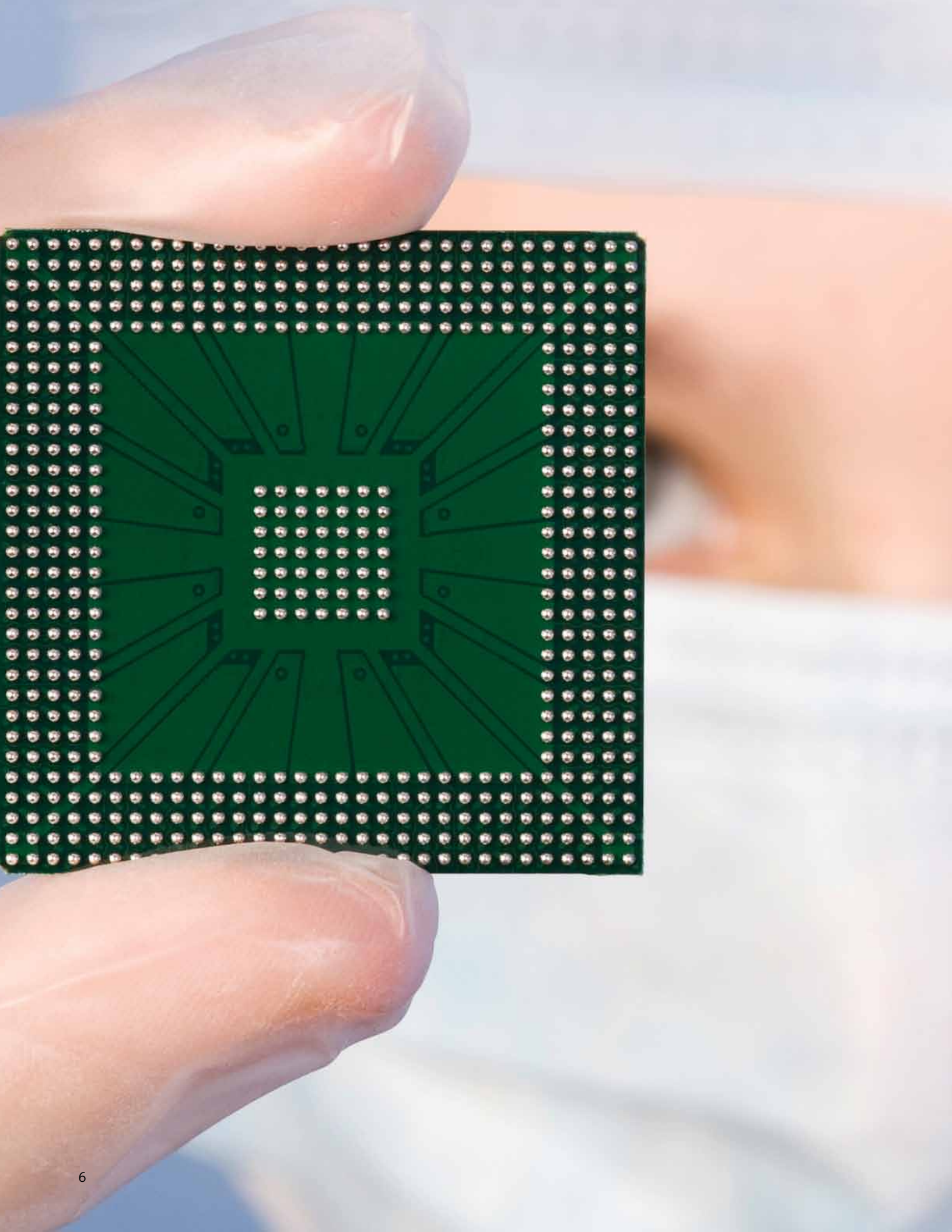
Not content with the past success formulas, device makers are embracing a new set of design best practices centered on collaborative SoC and IC design management. These practices promise to align their R&D investments closer to market needs, bring in IP partners and foundries into the design process in a secure environment and manage the inherent complexities to gain a competitive advantage.

Siemens PLM Software has worked with the leaders in the semiconductor ecosystem to understand the industry's needs and provide collaborative device design management solutions to meet these challenges.



*“The ratio of product lifecycle to product development time in semiconductors is half that for a mobile phone and a third that for an automobile. And for the growing ranks of “fab lite” or fabless players, R&D excellence is the key differentiating factor.*

*McKinsey & Company, “Getting Mo(o)re out of semiconductor R&D”*





# Vision

Siemens PLM Software has a clear vision that guides the development and investment in solutions consistent with the needs and aspirations of the leading device makers. This vision promises to bring about best practices to help device makers manage the process of developing SoC and IC devices. The vision centers on smarter decision making for the development of devices.

To create the best possible platform for collaborative decision support for device makers, we are investing in three main areas to fulfill that vision:

An **Intelligently Integrated Information environment** that links all of the design information and program management data in a unified fashion, across the key domains. This includes new device introduction stakeholder organizations that may be outside the four walls of the device makers. We not only understand how device design and program information are related, but why that relationship exists. This gives management, design teams and partners unique abilities to start predicting what IP and other design information they'll need and when they'll need it, so the system can start proactively delivering the right information instead of making the users go find it.

Building that environment on a next-generation **future-proof architecture** that ensures our customer's IT investment will continue to evolve in concert with ours.

We will also ensure that you have a **high-definition user experience** that proactively delivers the right information to you. This is how mobility and context-aware applications fit in our vision.

# Smarter decisions, better products for semiconductor devices through innovation management across the value chain

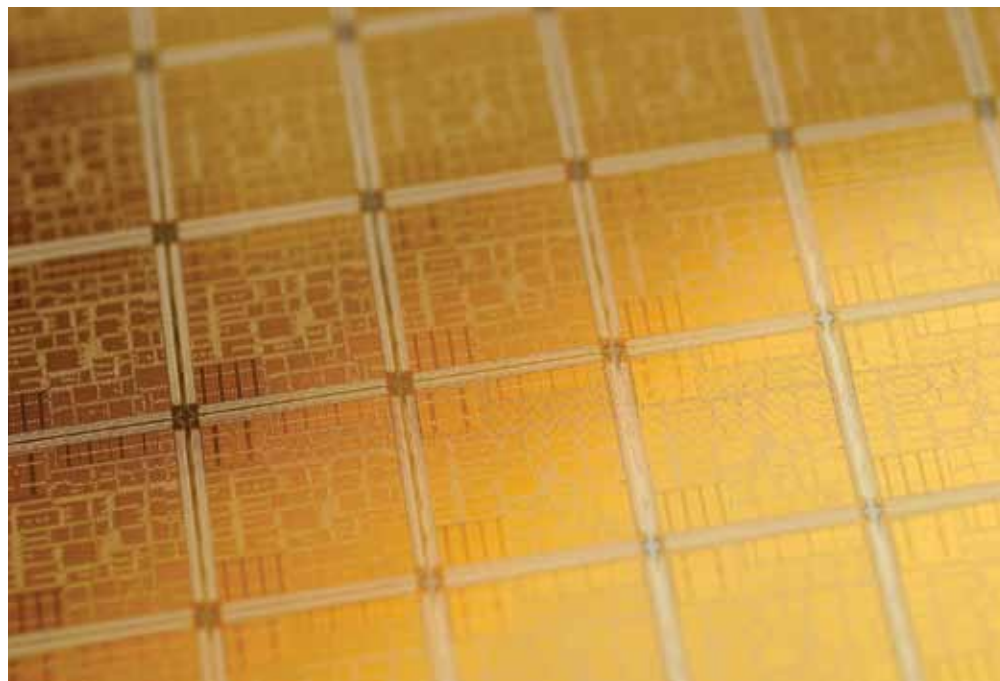
*“Moore’s law describes a long-term trend in the history of computing hardware: the number of transistors that can be placed inexpensively on an integrated circuit doubles approximately every two years.”*

*Wikipedia*

Siemens PLM Software provides a unified solution platform to ensure a single authoritative source of product and process information throughout the semiconductor device design lifecycle in a globally distributed value chain.

Semiconductor device makers are always on the leading edge of product innovation and the application of the latest technological breakthroughs, but they have increasingly realized that they need to invest more in development lifecycle management processes and disciplines in order to get more out of their R&D investments.

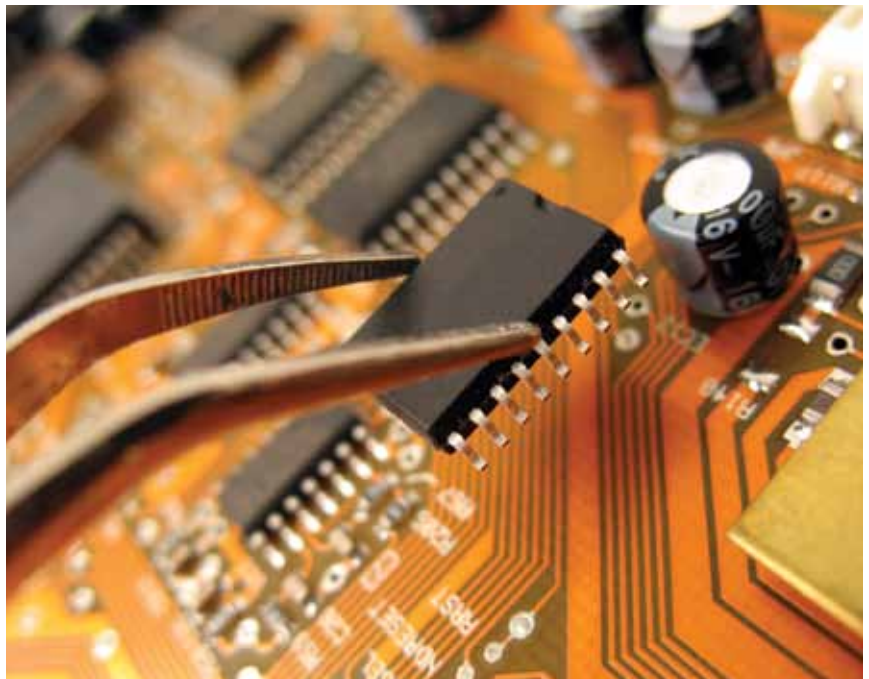
The industry’s innovative and early adopters of this comprehensive device development management solution benefited from acquiring enhanced or new capabilities including SoC/IC R&D pipeline optimization, SoC and IC design information and program management, IP re-use and legal protection, device software process management, design for sustainability and compliance and greater organizational productivity through innovative application of mobility and context aware social development.





Siemens PLM Software has worked with industry leaders in the United States, Europe and Asia Pacific regions. These pioneers include integrated design manufacturers (IDM), fabless device makers and foundries.

Siemens PLM Software has closely collaborated and co-innovated with these industry leaders across the entire semiconductor value chain to define and capture the best practices and model the most promising management processes in a single unified enterprise solution architecture.





*“Getting quality chip designs out the door takes super-human effort.”*

*Kalypso Research, “Semiconductor Product Lifecycle Management”*

#### **Optimizing the IC/IP innovation pipeline**

Our IC/IP investment pipeline optimization solution focuses on the strategic aspect of device development processes, enabling customer needs, requirements management, portfolio management and program management.

Customer needs and requirements management enable you to link, define, allocate, track and communicate market requirements with full traceability to architecture, design and fabrication artifacts. This end-to-end traceability ensures solution integrity and is a critical management lever for quality and customer satisfaction.

Portfolio management enables you to increase your ROI by focusing your critical financial and human resources on the most promising ideas.

Program management enables you to drive planning based on requirements and to manage execution of work tasks and deliverables all in one system.

#### **Unified SoC/IC design management**

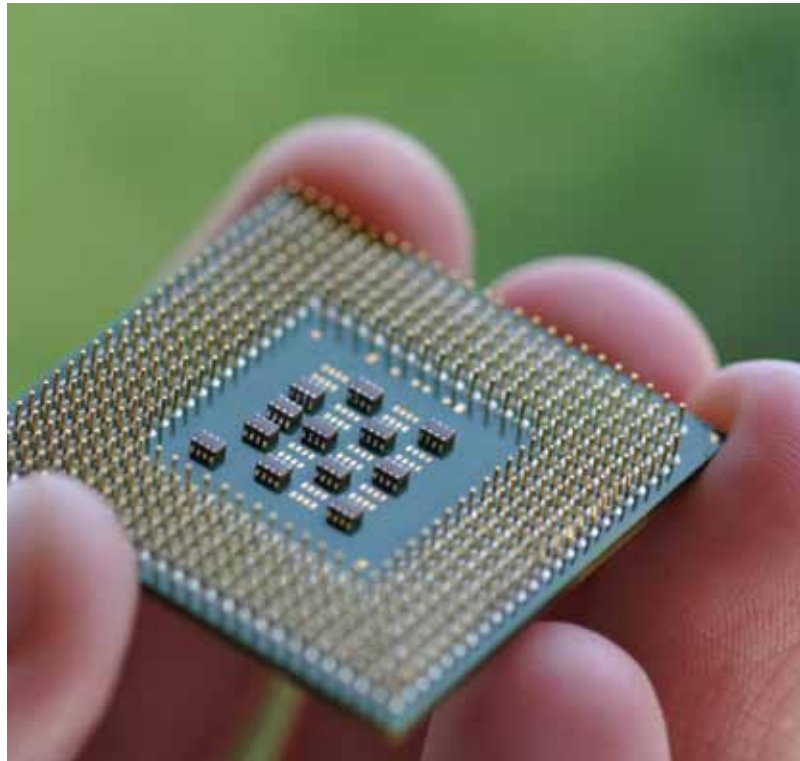
SoC/IC design management enables you to establish a single authoritative system to define, create, change and configure SoC/IC program requirements, schedules, phase gate or task deliverables, risks, changes, tape-out design release and archival, gate review checklists, issues and errata, IC maturity status, test programs and validation results.

#### **Global Enterprise IP Catalog Management**

You can design and engineer solutions much faster at lower costs by re-using your own and your partners' IP, as well as by licensing your IP to other companies in the value chain to create new sources of revenue and expand the entire semiconductor ecosystem. Siemens PLM Software's unique IP catalog management capabilities deliver global scalability, easy classification, navigation, search, legal team review, quality management and safe re-use, without legal and quality concerns.

*“Like many other top innovators, Silicon Valley companies not only have found success in creating path-breaking new technologies, but are almost twice as likely as average companies to have developed capabilities that provide a superior understanding of the stated and unstated needs of their end customers. It isn’t just about how many transistors you can fit on a chip, but also about how such advances can lead to products and services that gain unprecedented traction in the marketplace through superior insight into customers, as well as the development of practical value propositions that will win those customers’ business.”*

*Booz & Company, “The Global Innovation 1000: Why Culture Is Key”*



#### **Secure collaboration across your value chain**

Our solutions enable your product teams to work with your suppliers, IP partners, foundries and customers in a secure and collaborative environment that facilitates design issues and change management as well as IP/IC design data exchange by program or platform specific reviews. Siemens PLM Software takes pride in working with the world’s most innovative and largest semiconductor companies that demand secure, scalable and flexible collaboration infrastructure and methodologies.

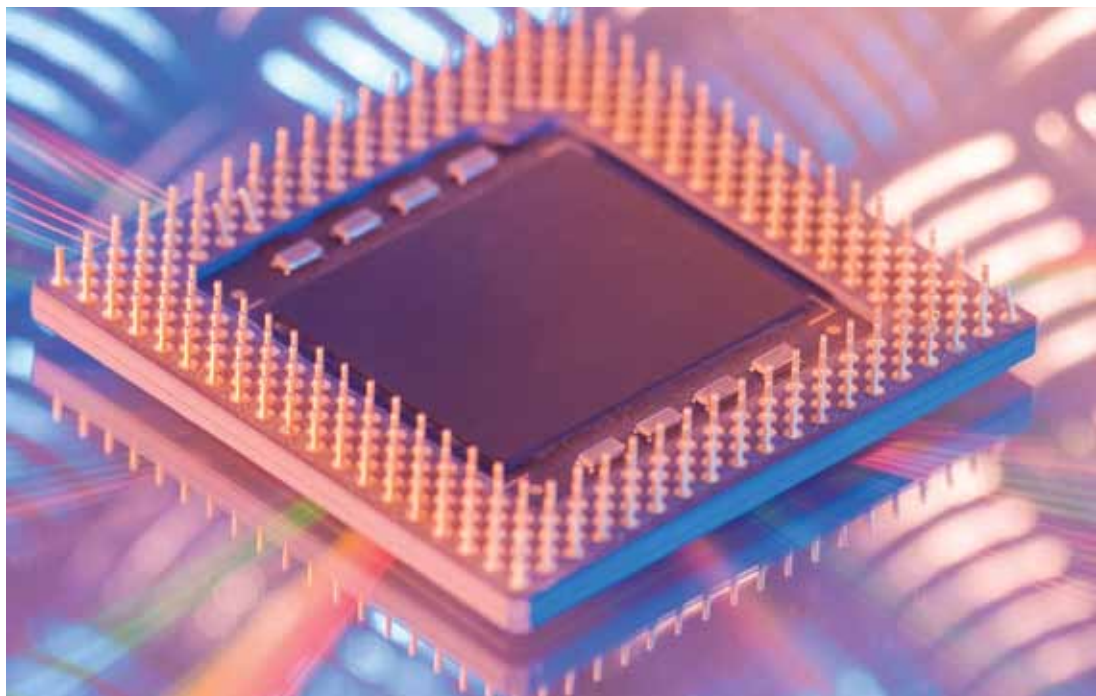
#### **Design for sustainability**

Industry leaders are no longer limiting their efforts to prove device compliances, as important as that is. They are also adopting a design for sustainability mentality across the product lifecycle to seek market and technological advantages. Siemens PLM Software delivers a full lifecycle solution to build up a model of the “cradle-to-grave” impacts for a new device, to manage the sustainability and environmental compliance requirements including carbon footprint, energy usage and various jurisdictions’ RoHS regulations, WEEE, EOL, EuP and REACH.

#### **Mobile and context-aware social development**

The next-generation solution for semiconductor device lifecycle management features critical capabilities, such as mobility and context-awareness, to boost productivity and embrace social aspects of device development programs across the value chain. Teamcenter® Mobility software extends your device development environment by providing always-on access, improving productivity by enabling the decisions to be made anywhere, anytime with mobile PLM. Context-aware interactions with your PLM environment focus your knowledge workers on the decisions and tasks. Relevant contexts are brought to the users through intelligent navigation, aggregation and application of relevant device program management and design data dynamically, thus shortening the learning curve and improving decision quality and productivity.

# Next-generation solution adoption and benefits



Siemens PLM Software has worked with the industry leaders of integrated semiconductor design companies, fabless wireless SoC companies, top foundries and equipment makers. Our customers have embraced PLM as the platform to make smarter decisions on resources, capacities, customer needs, SoC/IC design changes, issues and bugs, and IP re-use. They have the peace of mind knowing that Siemens PLM Software's solutions ensure the secrecy and security of their IP when shared in an extended value chain.

Our customers have been able to achieve real business value in time-to-market improvements by improving key operational areas such as:

- Significantly reduce the tape-out defects and mask set costs
- Improve design re-use across device programs
- Greater productivity through effective talent/capacity management
- Greater device quality through end-to-end traceability and impact analysis
- Trusted collaboration among device makers, IP providers and foundries



According to management consultancy firm Kalypso's study of 25 top semiconductor companies, best-in-class companies employing a strategic PLM program reported seeing increased business benefits in the following areas:

- 100 percent improved hitting their launch dates
- 84 percent experienced an increase in hitting revenue targets
- 89 percent achieved better product cost targets
- 95 percent improved their ability to meet development budgets
- 98 percent increased their ability to hit quality targets

Our findings are consistent with Kalypso's conclusions that leaders embrace PLM as not only technology transformations but also as a strategic enabler of their corporate innovation objectives.

# Siemens PLM Software leadership and next-generation platform advantages

*“IC companies are not just building discrete semiconductor components. Many of them are building entire systems on a chip. Among the consequences are the facts that pressures on manufacturing cycle times have increased significantly and the level of work required up and down the value chain has increased with it.”*

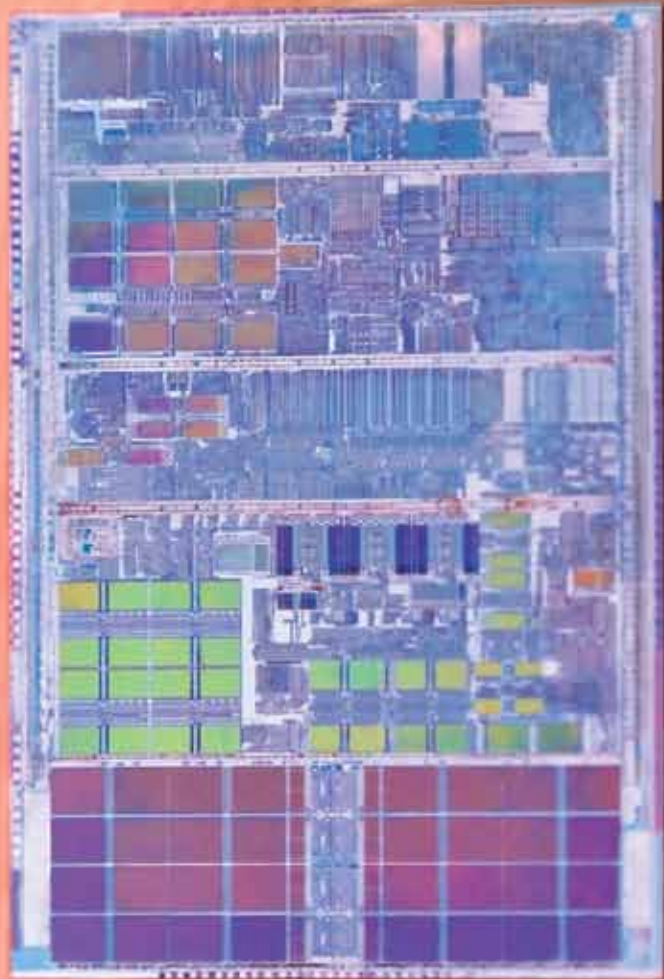
*Rick Cassidy, President, TSMC  
North America*

Siemens PLM Software is a leading PLM supplier to the entire semiconductor ecosystem including device makers, equipment makers and foundries. We are customer-focused and have collaborated with semiconductor industry leaders to develop industry specific best practice based solutions.

Our customers include the largest and most innovative semiconductor device companies in the world. For example, Siemens PLM Software solutions have been helping the world's largest integrated device manufacturer with a series of transformational PLM initiatives aimed at improving time-to-market and productivity. We also work with one of the fastest growing fabless companies to optimize SoC, IC and IP development processes. We have also been collaborating with a top foundry to enable its strategic initiatives in providing a scalable and secure open innovation platform.

Siemens PLM Software is a next-generation, unified platform that accelerates and dramatically improves product and process innovation for semiconductor device makers including integrated device manufacturers, fablite or fabless device

makers and foundries. Our solution is built on a unified architecture, single data model, with industry best practice workflows connecting semiconductor device makers' customers, IP providers, foundries and the core business functions within. These capabilities meet the core needs of device makers, including R&D pipeline and asset optimization, unified SoC/IC design management, global enterprise IP catalog management, secure collaboration across the value chain players, design for sustainability and compliance objectives, mobility and context-aware social development.



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## **About Siemens PLM Software**

Siemens PLM Software, a business unit of the Siemens Industry Automation Division, is a leading global provider of product lifecycle management (PLM) software and services with nearly 6.7 million licensed seats and 69,500 customers worldwide. Headquartered in Plano, Texas, Siemens PLM Software works collaboratively with companies to deliver open solutions that help them turn more ideas into successful products. For more information on Siemens PLM Software products and services, visit [www.siemens.com/plm](http://www.siemens.com/plm).

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