HIGH-TECH

UNLEASHING SEMICONDUCTOR INNOVATION THROUGH IP MANAGEMENT

Maximize the efficiency and resilience of your semiconductor innovation chain through platform-based IP management.

DASSAULT SYSTEMES

MEET OUR EXPERTS

MANUEL REI

Semiconductor Industry Solution Experience Director

Rei has been a valuable contributor at Dassault Systèmes for over 35 years. He has extensive global experience in high-tech and automotive markets, including deployments at IBM, Samsung and L.G. Electronics in the United States and South Korea. He manages the High-Performance Semiconductor Industry Solution Experience, enhancing business profitability amid semiconductor complexity.

BILL RUCCIO

WW ENOVIA Industry Process Expert Senior Director

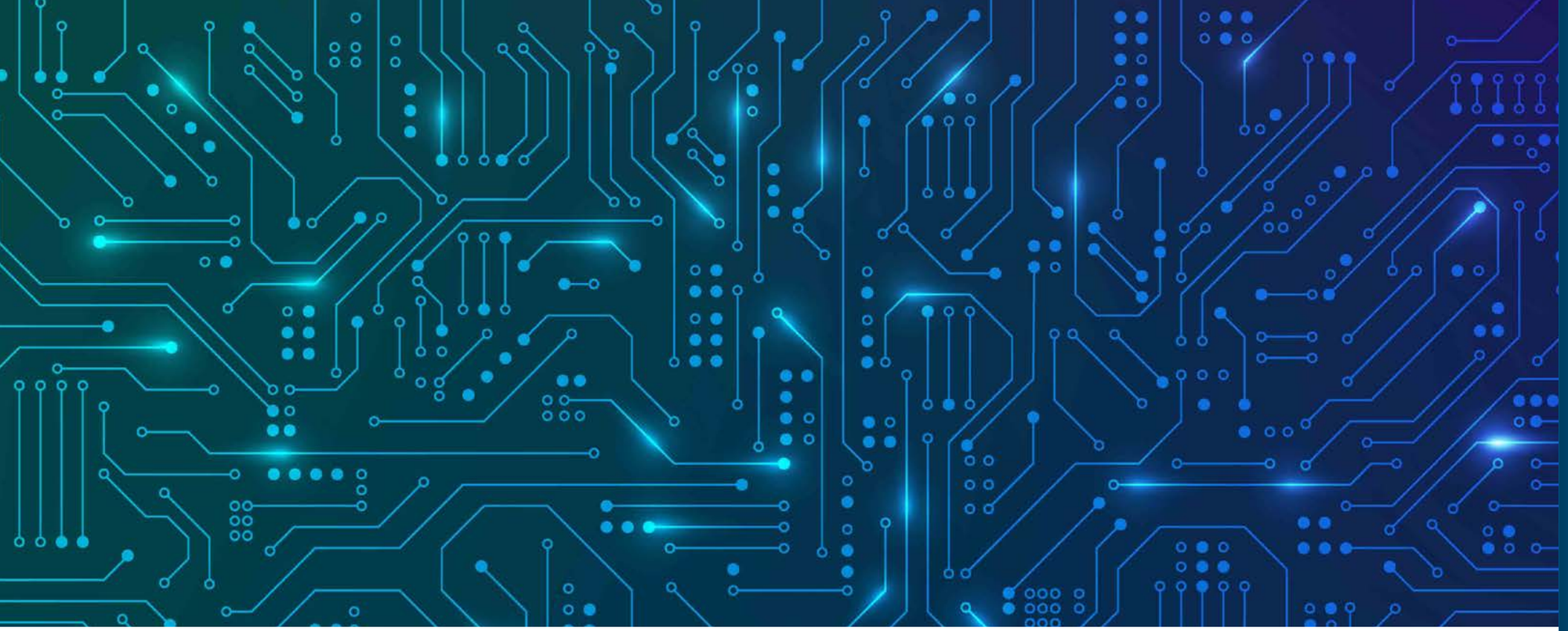
Ruccio has extensive PLM experience working with semiconductor companies across the globe for over 30 years. Today, he manages a team of globally distributed application development and quality engineers responsible for product marketing, product development, product quality, documentation and release engineering.

RACHID TAÏBI

High-Tech Industry Solution Technical Director

Taïbi is a physicist and Ph.D. graduate specializing in micro and nanotechnology. He has worked at STMicroelectronics, ONERA and iXblue, focusing on micro-electromechanical system (MEMS) sensors and inertial systems design, development and manufacturing. Since 2021, he has been a Technical Director for High-Tech Industry Solution Experiences at Dassault Systèmes.

SEMICONDUCTOR TRENDS AND CHALLENGES



DEMAND FOR CONNECTED, INTELLIGENT, AUTONOMOUS SYSTEMS

Consumers, workers and citizens across all industries increasingly benefit from connected, intelligent, autonomous systems driven by more efficient computer sensors and smart systems. Rachid Taïbi, High-Tech Industry Solution Technical Director, says, "The automotive industry's growth strategy relies heavily on semiconductors, forecasting a two to five times increase in their usage by 2030. Also, emerging VR/XR/AR technologies are gaining popularity and the industrial Internet of Things (IoT) or 'Industrial Metaverse' is being deployed widely."

GLOBAL INITIATIVES FOR SEMICONDUCTOR SOVEREIGNTY

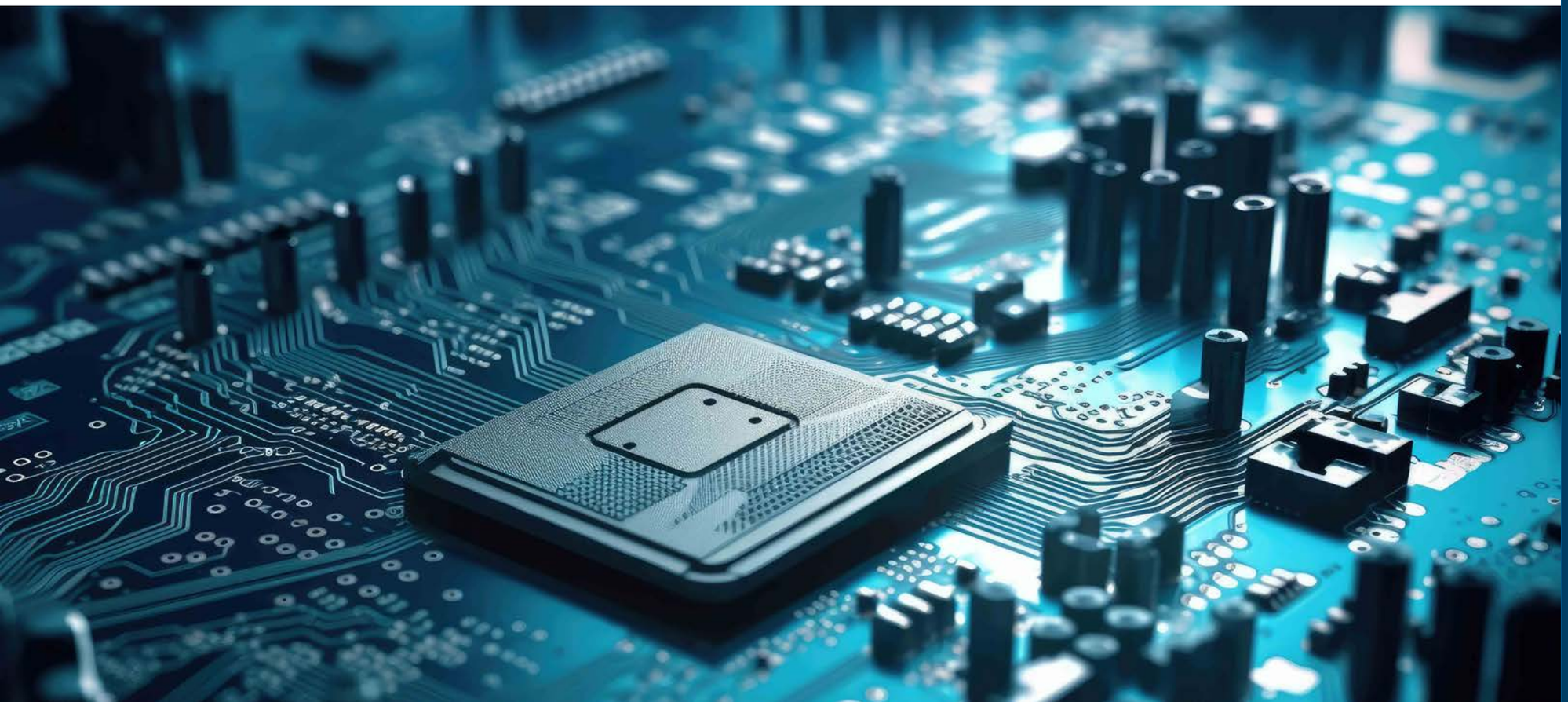
While the European Union (EU), the United States (US), China, Japan and Korea are making significant investments in local semiconductor innovation and manufacturing for sovereignty, these efforts are challenged by a conflicting condition — a workforce shortage in semiconductor design and engineering. As the evolving policies in the US and EU transform the competitive landscape and increase scrutiny of business transactions, this lack of skilled professionals adds another layer of complexity to the situation. Brexit and its resulting potential for parallel reviews in the UK and EU further compound this multifaceted issue.

ACCELERATE INNOVATION DESPITE INCREASING COMPLEXITY

"Demand for further reduced form factors of smart products and systems, higher performance and increased efficiency continues to drive 'More Moore' and 'More than Moore' strategies to develop third-gen semiconductors," says Bill Ruccio, Senior Director of ENOVIA Industry Process Expert. "Front-loading knowledge is one of the keys to accelerating new technology adoption, synchronizing engineering processes and mitigating risk for semiconductor innovators," Ruccio adds.

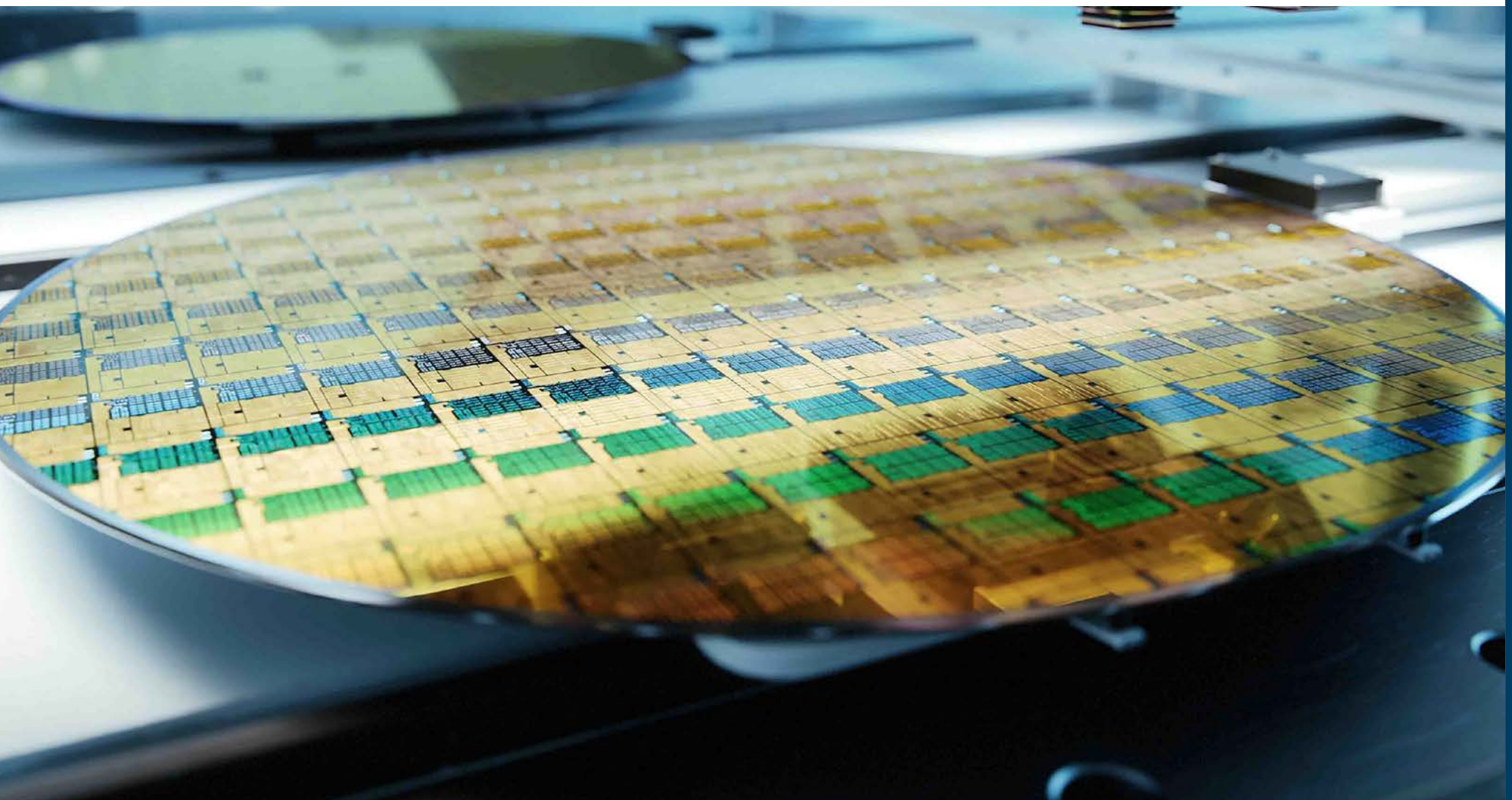
CREATE NEW, SECURE INNOVATION PARTNERSHIPS AND ECOSYSTEMS

Finally, as semiconductor innovation forms part of complex value chains, secure and effective collaboration is essential. Manuel Rei, Semiconductor Industry Solution Experience Director, explains, "The industry is witnessing an increase in mergers, joint ventures and new partnerships to improve chip architecture designs for secure, high-performance, flexible and efficient chips and systems." The semiconductor design and engineering workforce shortage exacerbates the challenges in achieving this goal.



IP MANAGEMENT SYSTEMS AND THEIR LIMITATIONS

IP is a strategic asset within the entire semiconductor value chain and IP reuse is a precondition to any modularization strategy addressing the challenges mentioned before. Semiconductor IP management systems strive to optimize the utilization of reusable IP blocks, minimize design cycle time, increase design productivity and mitigate risks associated with IP integration and usage. They play a critical role in the semiconductor industry by harnessing existing designs and technologies, enabling a focused development of distinctive and value-added components within a semiconductor system. This chapter underlines the need for advanced IP management solutions by examining the limitations of traditional systems.

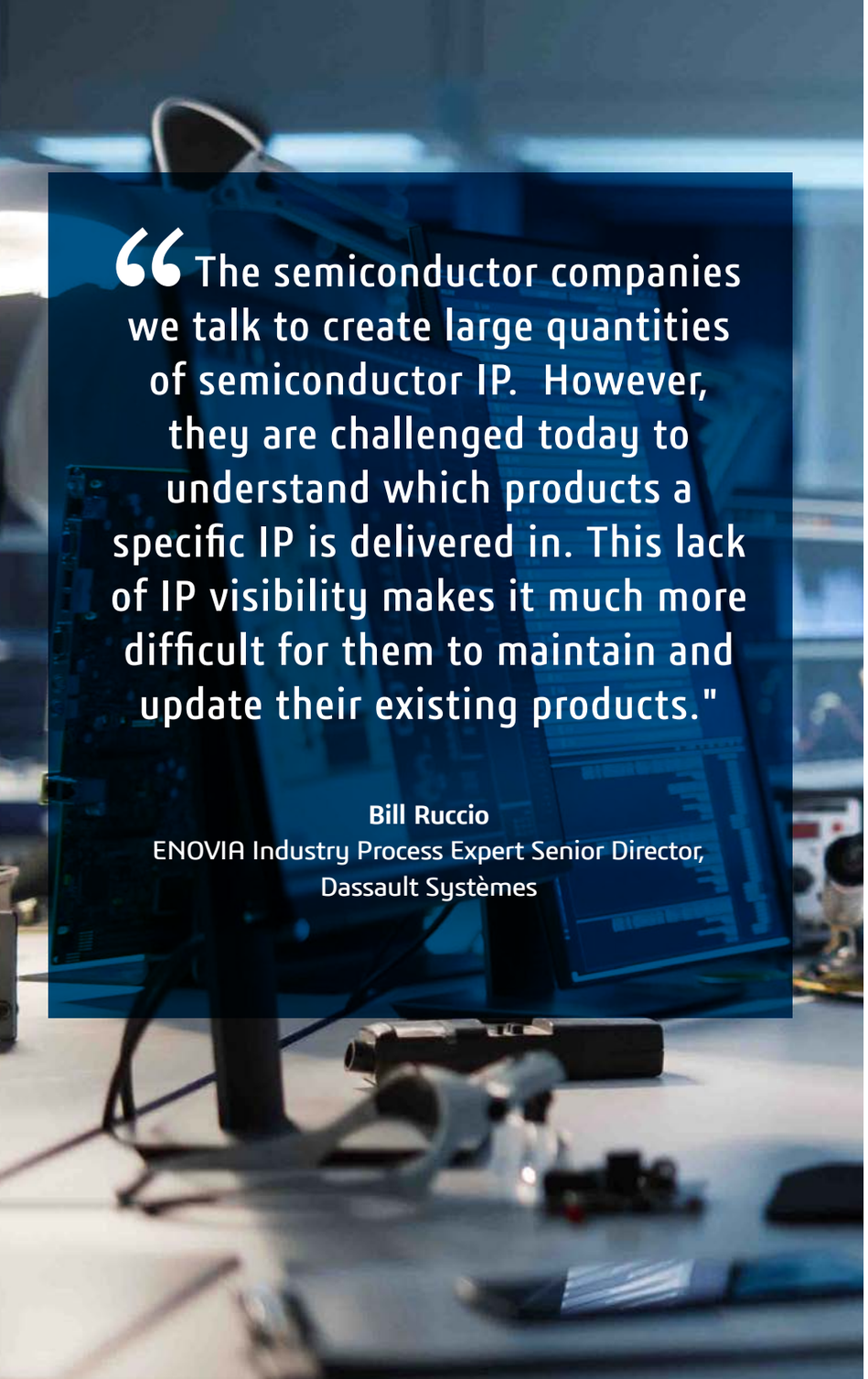


Comprehensive cataloging
Effective IP management requires thorough cataloging of both internal and external inventory. Cataloging should also include the maturity, compatibility and financial assessments, which are often missing.

Complexity and configuration
Some IP management systems' complexity and scarce configuration options pose increased challenges. Organizations require quick, flexible solutions with user-friendly interfaces, allowing for rapid refinement and adaptation to evolving requirements.

IP licensing and usage
Controlling IP distribution and calculating royalties are often major issues heightened by poor internal governance and the lack of traceability. Tracking IP usage is the best preventive measure, necessitating a systematic and automated approach to documenting IP provenance.

Integration challenges
Integrating IP management systems with other existing software or systems within an organization can be cumbersome. The lack of seamless integration with tools like electronic design automation (EDA), document management systems, accounting software, or customer relationship management (CRM) systems can hinder efficient data exchange and workflow integration.



> "The semiconductor companies we talk to create large quantities of semiconductor IP. However, they are challenged today to understand which products a specific IP is delivered in. This lack of IP visibility makes it much more difficult for them to maintain and update their existing products."
>
> **Bill Ruccio**
> ENOVIA Industry Process Expert Senior Director,
> Dassault Systèmes

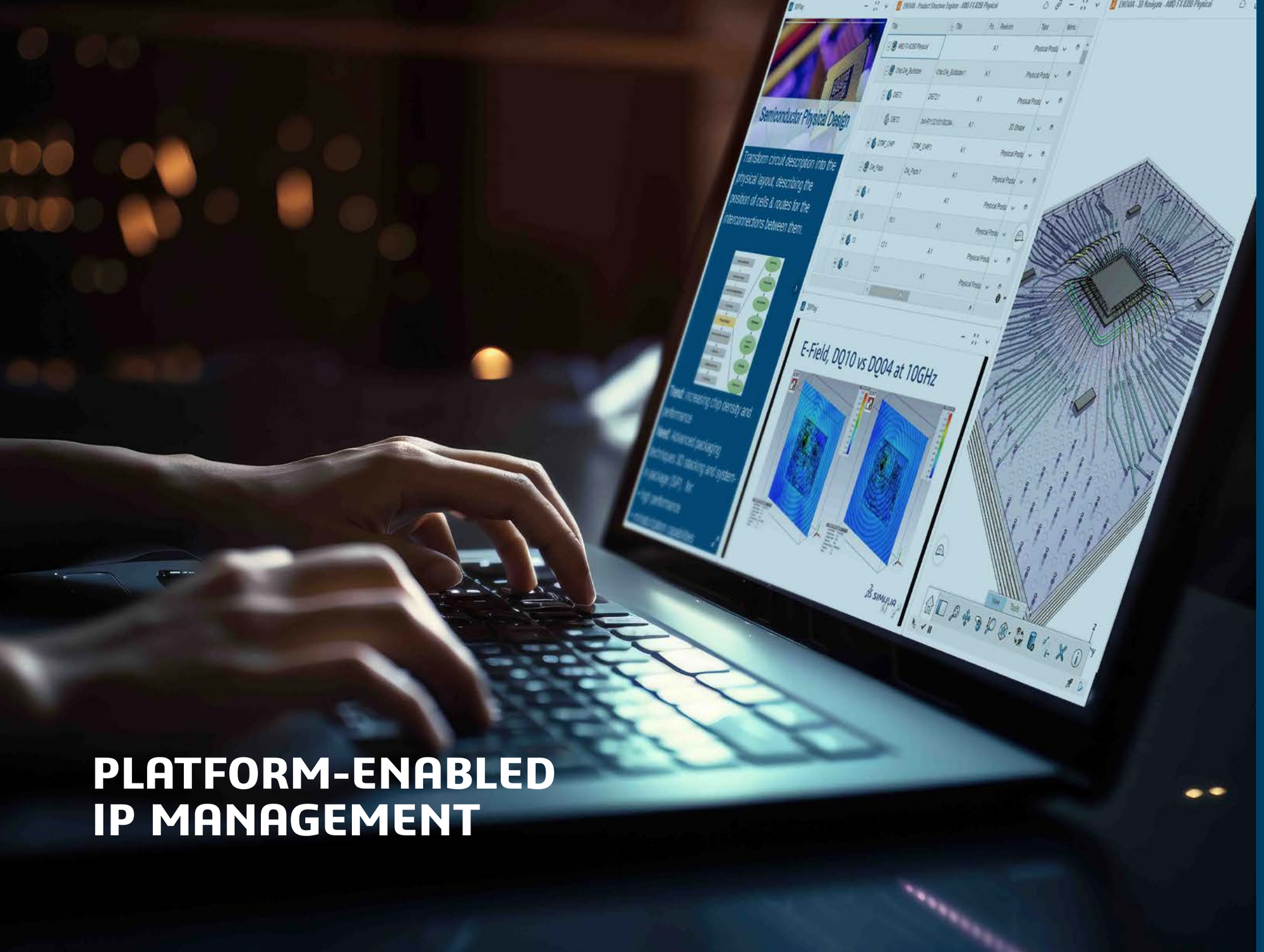
Inadequate collaboration features
Existing IP management systems often lack advanced real-time collaboration and communication features, creating a barrier to efficient workflows. An enterprise-wide IP management system facilitating real-time collaboration is crucial.

Cost and scalability issues
Cost can deter smaller organizations from adopting IP management systems. Scalability is also a concern, with cloud-based solutions offering a viable architecture.

Intellectual property law updates
Keeping abreast of IP law changes is challenging, requiring system updates for compliance and management. The rise of patent troll activities highlights the need for robust IP management.

Insufficient analytics
Existing systems often lack advanced features like patent searching, infringement analysis and predictive analytics. Embracing such capabilities can significantly enhance decision-making and strategic planning.

Disconnect between technical and business functions
Coordinating IP management across technical, business and legal teams is challenging, especially with complex system-on-chip (SoC) designs. An enterprise-wide IP management system can streamline collaboration with more efficient workflows, facilitate defect tracking, accelerate change management with built-in "where used" impact analysis and ensure legal compliance.



PLATFORM-ENABLED IP MANAGEMENT

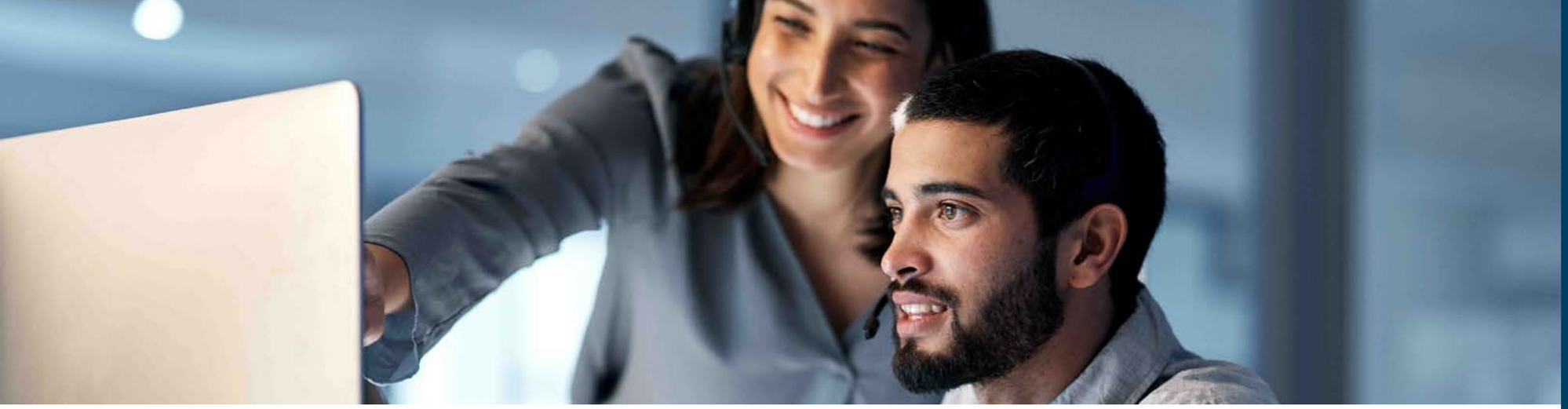
Functional virtual prototypes (FVP) combined with platform-based design have cut SoC design costs, enabling more design starts and shifting to flexible application-level SoC platforms.

Ruccio emphasizes, "A crucial step is establishing an infrastructure to link product, design and manufacturing groups, underpinning the SoC development process governance. A key initial step is creating a validated IP catalog to govern IP discovery and use. Extending FVP to include associated software types is also necessary, stressing the need for an ecosystem-wide approach to manage all IP reuse tasks."

The **3DEXPERIENCE®** platform from Dassault Systèmes provides integrated solutions to improve integrated circuit design and engineering, supporting key processes such as IP reuse, traceability, issue management, team collaboration and analytics. "The platform's semiconductor IP management capabilities are crucial for managing and optimizing IP reuse, especially during acquisitions or forming new partnerships," says Taïbi.

Rei says, "A company's value resides in its engineers and technologists, while effective IP management ensures optimal asset use and value, especially during talent turnover. Improvements in this domain are typically driven by top-level management through the Chief Technology Officer or the Vice President of Engineering."

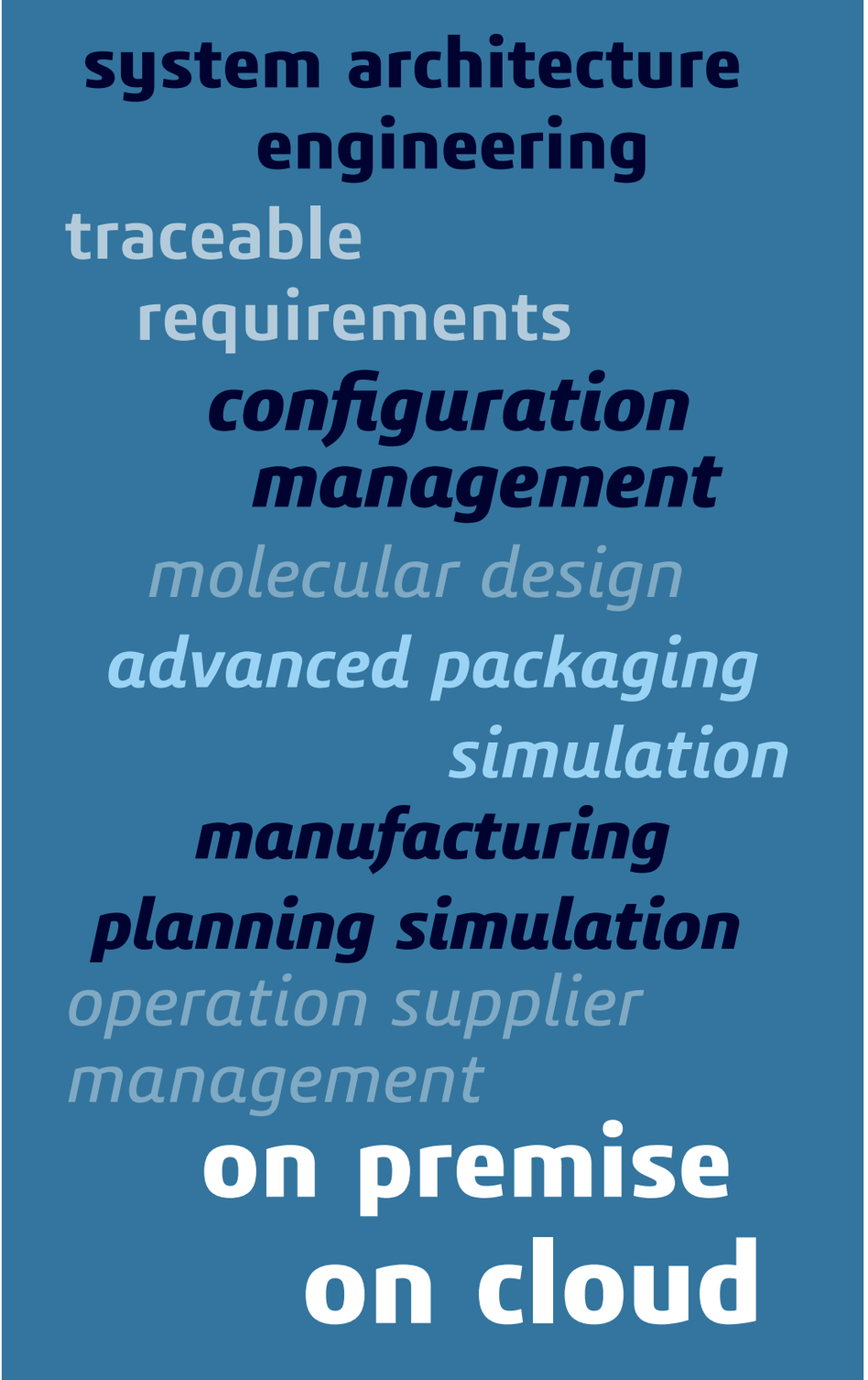
The **3DEXPERIENCE** platform enables comprehensive collaboration among various roles in semiconductor IP management and offers a range of applications designed to streamline and optimize IP-related processes. Here are just a few examples:



The **ENOVIA** Connected Software Engineer and Semiconductor Engineer apps enable collaboration on software and semiconductor designs to effectively manage changes from multiple contributors within the enterprise or ecosystem. Data can be managed at both the detailed file or directory level and at a modular level of abstraction. Design data contributed by individual teams can be seamlessly integrated into higher-level hierarchical designs. The apps manage semiconductor components in a continuous, collaborative engineering process. They federate semiconductor design metadata and leverage unified governance for all, with semiconductor logical items participating directly in all processes such as project management, lifecycle and release management, defect tracking and resolution, design and IP re-use.

The **ENOVIA** Classification Manager and Semiconductor Engineering Administrator apps provide an industry-standard taxonomy based on attributes defined by the Global Semiconductor Alliance (GSA) and the VSI Alliance (VSIA) specifications, with customization and extensibility available for firms to meet unique needs. They enable users to organize a company's globally dispersed IP in a catalog, facilitating search and comparison to enable efficient design reuse. The IP catalog can be tailored to a company's product and business environment, presenting different classification views depending on the user's role.

The **ENOVIA** IP Security Manager apps enable organizations to classify data properly with defined security rules (based on organization, citizenship, physical location and their combination) and exceptions. This classification framework implements the description of category-specific rules that must be met by any user trying to access a data item. It consolidates all IP data protection processes into one system for consistency of enforcement and improved auditability.



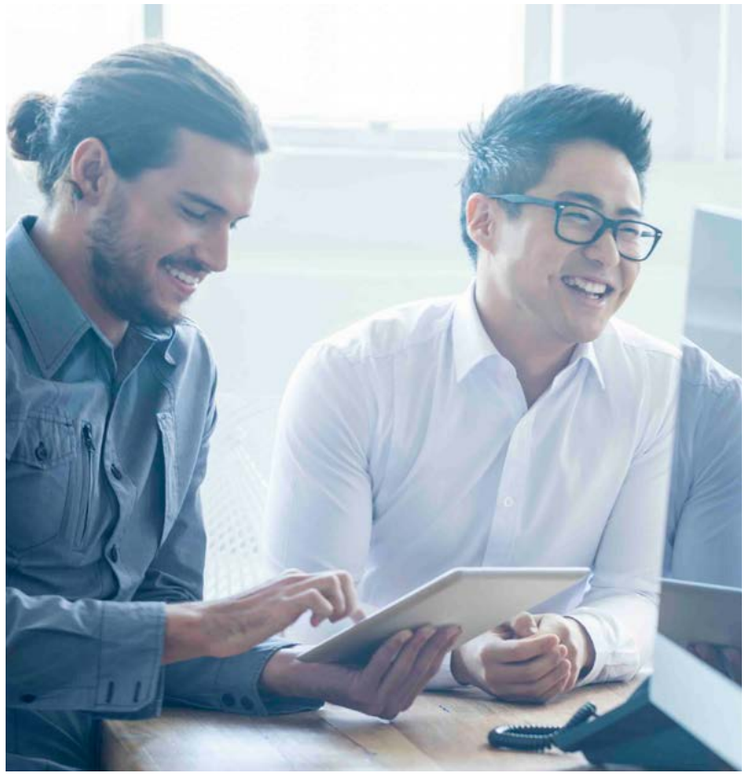
Having outlined the capabilities and benefits of using the **3D**EXPERIENCE platform for enterprise-level IP management, it is critically important to highlight that it offers a **comprehensive** range of robust capabilities to address **many** different aspects of semiconductor innovation. From systems architecture engineering to traceable requirements management, configuration management, molecular design and simulation, advanced packaging simulation, manufacturing planning and simulation, all the way to operations and supplier management, the platform provides an integrated set of world-class tools.

Ruccio explains," These capabilities enable semiconductor innovators to effectively manage every stage of the product development lifecycle, ensuring scalability, security, seamless integration, enhanced collaboration, reliability and efficient decision-making across various disciplines and functions."

The **3D**EXPERIENCE platform is available on-premise and on the cloud, effectively addressing the total cost of ownership and IT resource-related concerns.

"These solutions provide cost-effective options and alleviate the burden of managing expensive infrastructure and technical resources," says Taïbi. He stresses, "Companies of all sizes can scale their IP management systems as needed, accommodating increasing volumes of data and user demands."

Rei concludes, "This enables smaller companies to embrace efficient and reliable IP management practices while minimizing costs and maximizing the benefits of a cloud-based architecture."



Unleashing Semiconductor Innovation Through IP Management

Ready to empower your value network through platform-based IP Management? Discover the benefits of virtual twin experiences on the **3D**EXPERIENCE platform by connecting with us today.

For more information on how the **3D**EXPERIENCE platform supports semiconductor innovators, please visit https://www.3ds.com/industries/high-tech/semiconductors

Our **3D**EXPERIENCE® platform powers our brand applications, serving 12 industries, and provides a rich portfolio of industry solution experiences.

Dassault Systèmes, the **3D**EXPERIENCE Company, is a catalyst for human progress. We provide business and people with collaborative virtual environments to imagine sustainable innovations. By creating virtual twin experiences of the real world with our **3D**EXPERIENCE platform and applications, our customers can redefine the creation, production and life-cycle-management processes of their offer and thus have a meaningful impact to make the world more sustainable. The beauty of the Experience Economy is that it is a human-centered economy for the benefit of all –consumers, patients and citizens.

Dassault Systèmes brings value to more than 300,000 customers of all sizes, in all industries, in more than 150 countries. For more information, visit **www.3ds.com**.

3DEXPERIENCE®

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