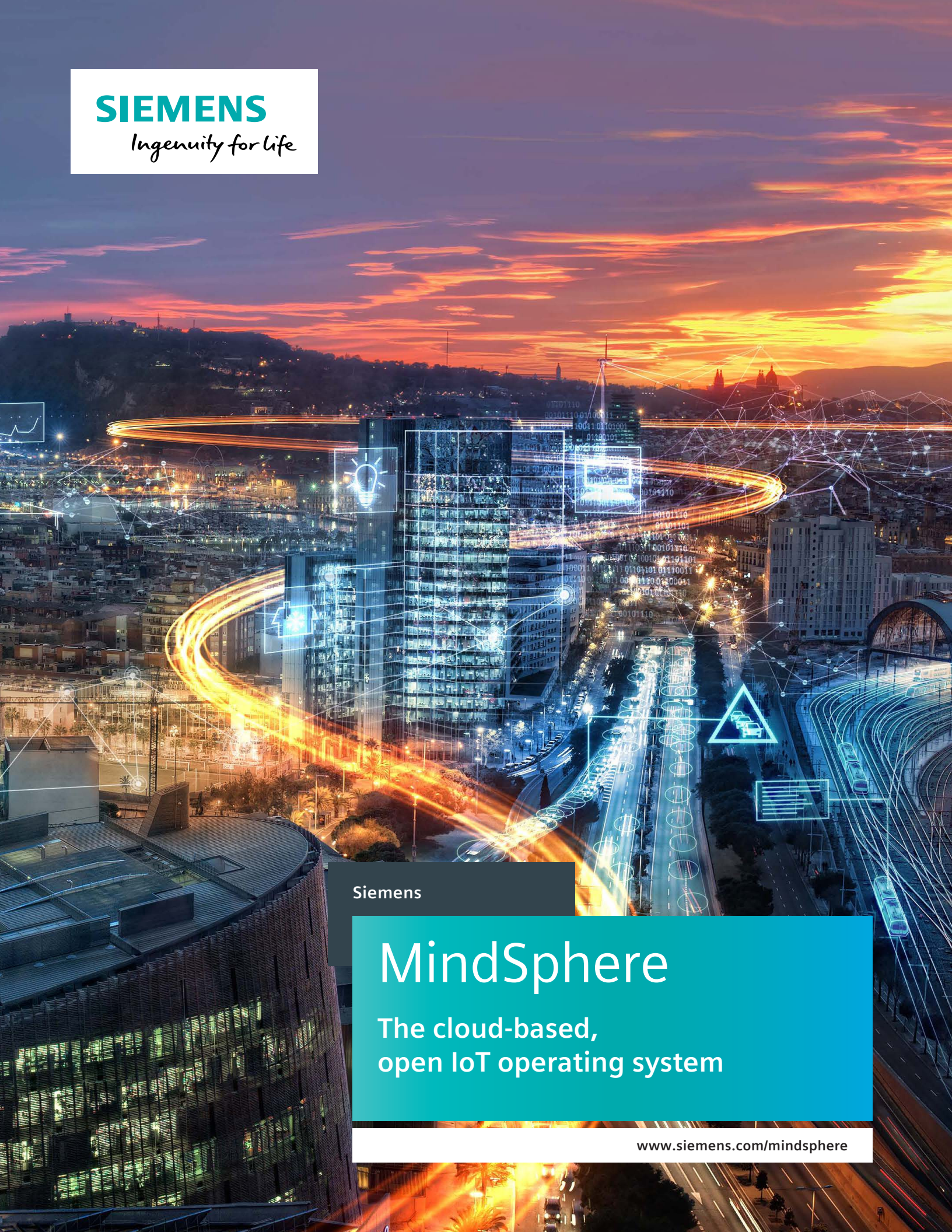
SIEMENS

Ingenuity for life

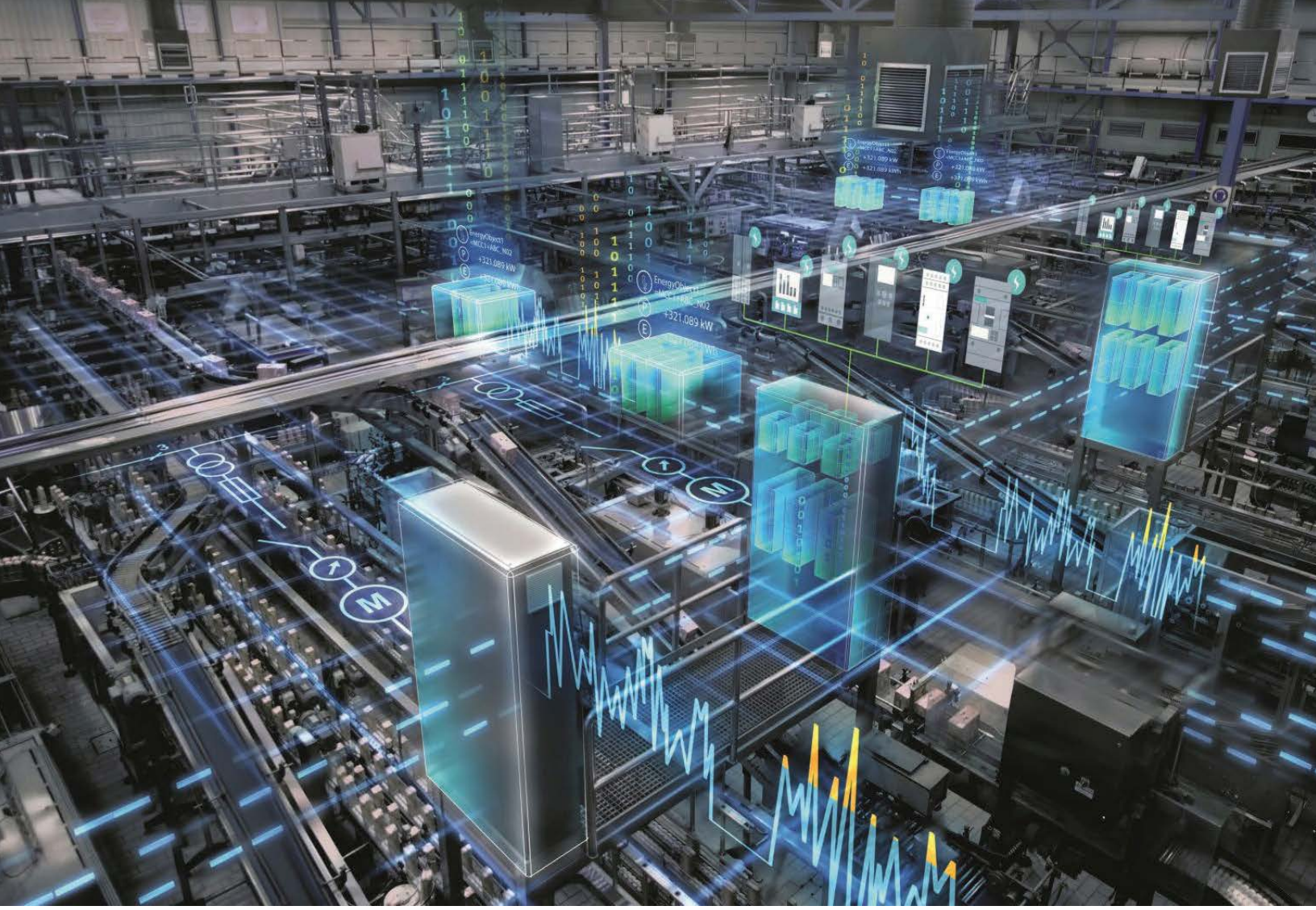


Siemens

MindSphere

The cloud-based, open IoT operating system

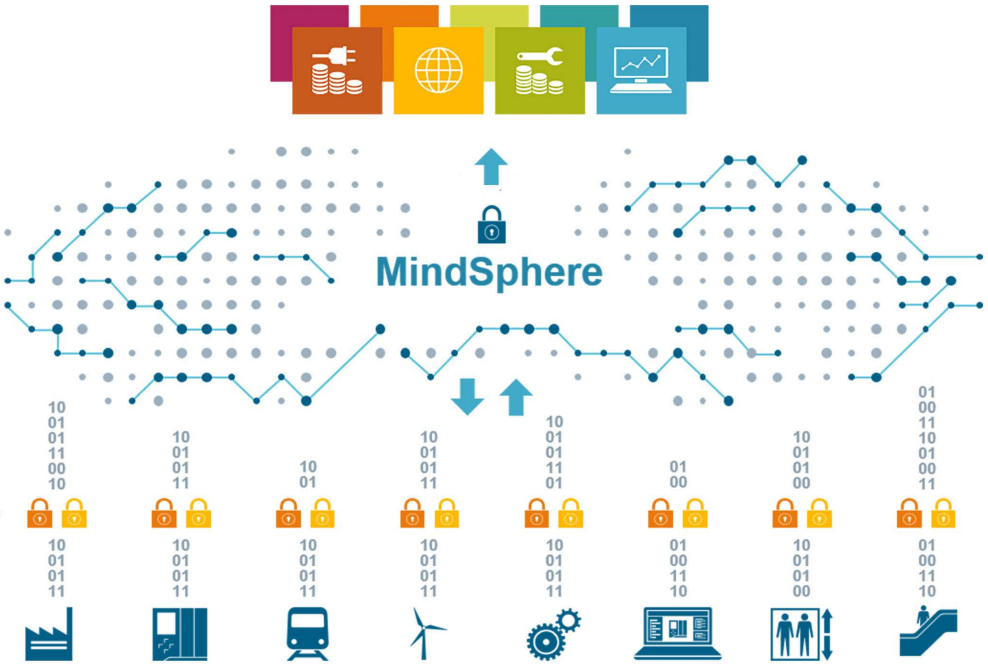
www.siemens.com/mindsphere



MindApps
Powerful industry applications and digital services for asset transparency and analytical insights

MindSphere
Open Platform as a Service (PaaS) for scalable, global IoT connectivity and application development

MindConnect
Secured plug-and-play connection of Siemens and third-party products, plants, systems and machines



MindSphere

Every machine and system in your business provides a wealth of data with insights and benefits yet to be fully realized. MindSphere enables you to transform this data into productive business results. By connecting your machines and physical infrastructure to the digital world, MindSphere provides powerful industrial applications with advanced analytics and digital services to unleash increased productivity and efficiency across your entire business. MindSphere is the Internet of Things (IoT) operating system built as a secure and scalable industrial end-to-end solution from connectivity of products, plants, systems and machines to unlocking your IoT data potential.

MindSphere offers you:

- Secured end-to-end solutions for connecting devices, storing data and developing and running applications on a managed service platform
- Extensive device, enterprise and database connectivity options to support a vast variety of IoT-ready assets
- Open platform as a service (PaaS) with numerous options for data exchange using Siemens open APIs and native cloud accessibility
- Fast development of robust industry-driven IoT solutions with advanced analytics capabilities
- Combined global scalability of Siemens as the number one automation provider and the world's largest cloud providers, including Amazon Web Services and Microsoft Azure

MindSphere enables you to transform data into productive business results.

Connecting real things to the digital world

MindConnect APIs enable programming of customer- or use case-specific connectivity agents by interacting with MindSphere standardized APIs.

Industries undertaking IoT initiatives face challenges connecting to a wide range of assets quickly, affordably and securely from disparate locations. With MindConnect as part of the MindAccess IoT Value Plan, Siemens offers flexible, open connectivity solutions including software and hardware options for connecting both Siemens and non-Siemens assets to MindSphere.

With the MindConnect IoT Extension, a software connectivity integration option in the MindAccess IoT Value Plan, virtually any IoT-ready asset from any manufacturer can be connected to MindSphere. Numerous field protocols are supported out of the box, along with a wide range of hardware connectivity agents to bridge the gap for other protocols.

Additionally, MindConnect APIs enable programming of customer- or use case-specific connectivity agents by interacting with MindSphere standardized APIs. These APIs for connectivity facilitate data transmission from assets to MindSphere, securely and efficiently.

Along with asset connectivity, the MindConnect Integration option provides a way to connect multiple data systems into MindSphere, including historian databases, enterprise resource planning (ERP), manufacturing execution system (MES) and supervisory control and data acquisition (SCADA) systems. Using browser-based tools to graphically configure data value mapping, users can build a flexible integration to bring enterprise systems both on-cloud and on-premise into context with MindSphere.

The MindConnect Nano and the MindConnect IoT2040 offer hardware connections to MindSphere with different levels of service for any size production environment. Both devices create a direct and secured connection through both green field and brownfield installations.

You can also leverage existing Siemens S7-1500 PLCs to connect directly to MindSphere and the digital world using a TIA Portal STEP 7 library. The TIA Portal STEP 7 library extends the function of the S7-1500 PLC to transmit PLC data to MindSphere.

By connecting, collecting and analyzing both current and historical data, operation teams, business analysts and data scientists alike will discover valuable and actionable insights to truly transform their businesses. For the first time, companies will have unprecedented transparency across their entire operations to not only optimize processes but also develop new business models to increase profitability.

Security is a top priority for Siemens as the world's leading automation provider with 30 million automated systems, 75 million contracted smart meters and one million connected products in the field. MindSphere provides state-of-the-art security during data acquisition in the field, transmission and storage in the cloud. The security framework of MindSphere is aligned to the principles of industry standards (IEC 62443, ISO 27001) and governmental recommendations for data handling in cloud environments.

MindConnect Integration provides a flexible way to connect multiple data systems to MindSphere.

Open platform as a service

Transformation of IoT data into meaningful and actionable information for companies is not "one size fits all." With open standards and robust APIs, MindSphere enables developers to build applications that suit a broad range of business requirements, and to connect and exchange data with a wide range of products with little effort.

With Siemens' deep domain expertise across industries and the global scale of Amazon Web Services (AWS) and Microsoft Azure public cloud infrastructures, IoT solution development is accelerated. By accessing MindSphere's open APIs, partners can develop high-value applications and deliver digital services in collaboration with Siemens and AWS or Azure. With open APIs and interoperability with other systems, partners can develop, deploy and distribute their MindSphere solutions and offer them among the entire MindSphere community.

The MindAccess DevOps Plan includes a Developer Plan and an Operator Plan, providing access to a complete environment for application development and lifecycle management including managing applications in the production environment. With the Developer Plan, developers can create

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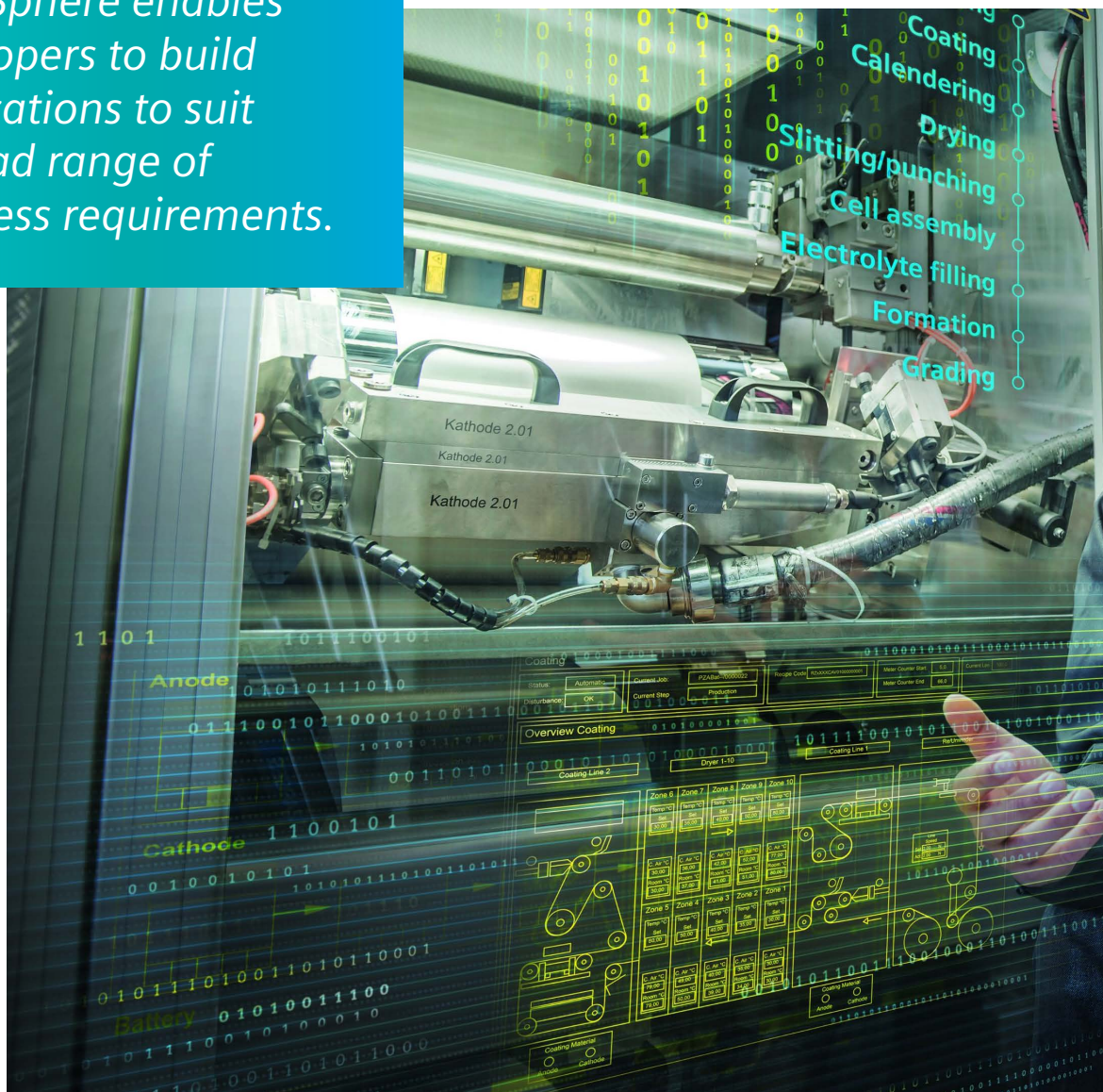


robust IoT applications using advanced analytics and services including data management, predictive learning, and visualization to accelerate the development process. Developers can easily develop, register and validate their applications as well as access a continual expansion of APIs and services. The Operator Plan provides a dedicated environment for running production applications. System administrators can seamlessly manage, run, monitor and publish applications for customers and partners through the MindSphere Store.

Powerful industrial applications and digital services

With MindSphere, Siemens is paving the way for businesses to offer their organizations and end customers new digital services. Through the use of powerful industrial applications leveraging advanced analytics, businesses realize higher availability as well as improved productivity and efficiency for individual machines, entire plants, systems or globally distributed machine fleets.

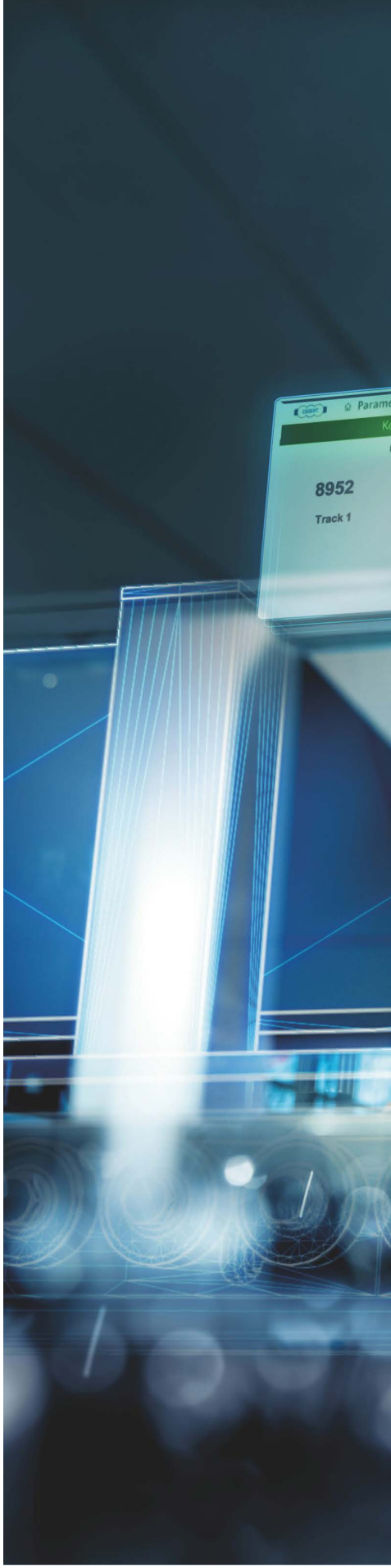
As a standard and best-practice IoT starting point, users of MindSphere, through the MindAccess IoT Value plan, can quickly configure assets and begin collecting data and monitoring with MindSphere's Fleet Manger. With easy-to-use data model configuration, MindSphere users can locate connected assets at a glance on a geographical map and monitor the condition of the assets in real time. Additional MindSphere applications from both Siemens and partners can be accessed to further unleash the value of IoT data.

Product Intelligence is a MindSphere MindApp, developed by Siemens, that automatically discovers insights from contextualized product performance data. By providing greater visibility into product and supply chain performance, you will prevent costly recalls, solve quality problems faster and close the loop between design and actual product performance.

Manage MyMachines is a MindApp that provides transparency across your machines anywhere in the world. Through the configuration and display of critical monitoring variables, insightful information on current operations and productivity history are used to reduce machine inspection and maintenance costs.

MindServices accelerates your IoT initiative with flexible and cost-effective training and professional services. Benefit from the experience and insights of Siemens' MindSphere experts throughout your MindSphere journey. MindSphere Academy offers training for business users and developers to scale your business with digital solutions. MindSphere Professional Services provides support throughout your IoT solution lifecycle from development of new applications to implementation of your full MindSphere IoT solution.

To address the broad scope and complexity of digital transformation across all industries, MindSphere has established an extensive network of world-class partnerships with broad domain expertise and IT capabilities. The MindSphere global partner ecosystem provides a robust offering of IoT solutions and services with the flexibility to match customers' requirements. MindSphere provides partners with an unparalleled opportunity to participate in the digital transformation of companies regardless of industry or size.



MindSphere provides partners with an unparalleled opportunity to participate in the digital transformation of companies regardless of industry or size.

Closed-loop innovation with end-to-end digital twin

Digitalization and the transformation of IoT data into real business results are core drivers of MindSphere. High-value industry-based applications built on MindSphere deliver measurable results through digital services. In addition, companies can leverage MindSphere to close the digital twin loop through product ideation, realization and utilization to seamlessly integrate operational data throughout the value chain by connecting the digital twin of performance with the digital twin of production and the digital twin of the product. This helps not only to drive operational efficiency, but also to compare simulation and test results with real-world observations.

Customers can now optimize the entire value chain, from design, to production, to performance.

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MindSphere is the cloud-based, open IoT operating system

MindSphere connects real things to the digital world and enables high-value industry-based applications and digital services to drive business success.

As the world becomes increasingly connected, digitalization – using digital technologies to transform business operations – is a key differentiator that will enable companies to remain competitive. Using Internet of Things data driven by billions of intelligent devices generating massive volumes of data, digitalization promises lower costs, improved production quality, flexibility, efficiency, shorter response time to customer requests and market demands, and also opens up new business opportunities and services. With MindSphere, Siemens is addressing these challenges across our entire business and enabling other companies to unlock their full potential with IoT data.

Cutting throughput times, increasing flexibility, enabling individualized mass production, and optimizing consumption of energy and resources are some of the challenges facing companies today. They must optimize the entire value chain, from design, production planning and engineering, to services. Increasing availability, capacity and resilience of any type of infrastructure in the areas of industry, energy, mobility, healthcare systems and many others is enabled through MindSphere and industry-driven applications and solutions. By collecting, contextualizing and analyzing the vast amount of available data, companies will gain transformational insights to make informed decisions and changes to improve profitability.

MindSphere connects real things to the digital world and enables high-value industry-based applications and digital services to drive business success. With its open platform-as-a-service capabilities, MindSphere enables a rich partner ecosystem, including solution partners, application developers and connectivity partners to offer innovative IoT solutions. By seamlessly integrating operational data throughout the value chain, companies will not only drive operational transparency, but also compare simulation and test results with real-world observations to gain competitive advantage.

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