

# MindSphere for Closed-Loop Innovation in the Connected Intelligent Industry

## *CIMdata Highlight*

Siemens AG, with its expertise in digitalization, machine learning, and connectivity is providing solutions that help industrial organizations develop and leverage connected intelligent products, processes, and services through closed-loop innovation. Closed-loop processes and services are key to creating innovative solutions in the new world of connectivity and artificial intelligence. Siemens is focused on enabling companies to create easy, seamless, secure, and widely accessible IoT-based connections between assets equipped with sensors and/or actuators, and the software tools used for design, simulation, and analytics.

Siemens MindSphere is an open IoT operating system and Platform as a Service (PaaS) which provides connectivity between the physical assets and their digital representations, i.e., digital product/product/production/performance twins. MindSphere also serves as the platform on which domain-specific applications for connected intelligent products, processes, and services can be developed by value chain partners to make such systems perform optimally under changing conditions, as well as support remote condition monitoring, remote repair, and remote upgrading, while enabling complex decision-making and control in engineering and operations.

Siemens has leveraged the industry standard, Cloud Foundry™, to make MindSphere infrastructure agnostic. For example, it can run on cloud infrastructures such as AWS, Microsoft Azure, SAP Cloud Platform, and Atos Canopy. As a result, it helps customers focus on the development of innovative applications instead of having to first create the infrastructure. Additionally, MindSphere offers open APIs that can help customers and partners develop and deploy software applications quickly. This, in turn, helps enable a partner ecosystem for developing industry- and domain-specific applications and digital services to drive business success.

Physical assets in networked systems-of-systems (e.g., manufacturing, energy, transportation, etc.), be they Siemens-made or produced by other manufacturers, can be securely linked to MindSphere through its gateway elements MindConnect Nano or MindConnect IoT2040 which use standard protocols (OPC UA and S7 300/400) to collect relevant data. The data can be processed in-cloud or on-premise or both. On-premise computing is enabled by extending MindSphere onto the Edge devices (e.g., MindConnect Nano and MindConnect IoT2040) using the MindConnect Library and the associated APIs so that the Edge analytics for performance intelligence can be carried out in the proximity of the equipment of interest.

Essentially, MindSphere is a platform that helps collect data from assets in all phases of the lifecycle including testing, manufacturing, and service, and helps apply the information extracted from that data to conceive new products, processes, and services which leverage connectivity and artificial intelligence, and perform per customer expectations. For additional information, see: <http://www.plm.automation.siemens.com/global/en/topic/MindSphere-Whitepaper/8683/index.html?stc=usii422299>

## **About CIMdata**

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