

# Be a GAFA in the manufacturing industry

CPS platform that transforms “advanced technologies” into “earning power”

Program Director of the  
“Photonics and Quantum  
Technology for Society 5.0”

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Japan is proud of being officially recognized as a great manufacturing country. However, when looking at what is really happening underneath, we can hardly say that our “advanced technologies,” despite having them in abundance, bring us the “earning power” to spur the country’s economic growth. We are stuck and struggling between the U.S.A., which continues to create new value through ICT, and China, the world’s factory. To break through this situation and build the foundations for smart manufacturing systems in Japan, a project called the “Photonics and Quantum Technology for Society 5.0” has been launched as part of the Cabinet Office’s Cross-ministerial Strategic Innovation Promotion Program (SIP).

“To continue to be a “great manufacturing country,” it is essential to drastically change our system by which technologies can lead us to industrial competitiveness,” stresses Dr. Nishida Naoto, Program Director of the project.

## By integrating all the expertise of Japan Obtaining top-level competitiveness

The strength in our country’s manufacturing was attributed to the personal abilities of the engineers with advanced skills and knowledge, being

backed up by on-site synergetic potential whose true definition is rather unclear. However, as digital transformation (DX) progresses using the latest technologies such as IoT, artificial intelligence (AI) and 5G, manufacturing industries across the world are changing dramatically in terms of both quality and quantity. The COVID-19 pandemic has further accelerated the introduction of smart manufacturing systems.

In this project, the goal is to realize smart manufacturing systems in Japan by building the Cyber Physical System (CPS) which will serve as the underpinning framework for shoring up the Japanese manufacturing industry. In addition to a digital model that can represent the abilities of individual engineers dispersed across the physical space of a manufacturing site and their synergetic potentials on the spot, a digital twin will be made to recreate the entire production line in cyberspace as an aggregated representation of the individual abilities and potentials. We will thus contribute to building a system by which the production method of an industrial product and the production plan can be quickly optimized in an accurate manner.

Since its launch in 2018, the project has focused on R&D of underlying technologies for CPS applications in our three strong areas related to photonics and quantum technology: “laser processing,” “photonic quantum com-

munication” and “photonic and electronic information processing.” The obtained results and achievements paved the way for investment in CPS construction with no bottlenecks.

The project has now entered the phase of social implementation. Together with more and more companies, we will create and augment the “CPS platform” – a system that facilitates the establishment of CPS (Figure 1). To begin with, offices will be opened in Tokyo and other localities to help both domestic and overseas partner companies to build/manage the system, transfer/sell the technological development achievements, and survey the technological needs. Furthermore, demonstration experiments on specific applications will be started in the field of semiconductors whose demand is increasing in society. The first step is to quickly establish the microfabrication conditions for the most advanced semiconductor production, followed by production demonstration with the use of CPS for realization of highly accurate high-speed laser processing in addition to the assessment of effectiveness of using CPS for production. We intend to accelerate towards the realization of Society 5.0 by showing a clear roadmap towards CPS implementation in not only the manufacturing industry but also other industries.

“In order to assist in building the CPS to strengthen Japan’s industrial competitiveness, we need the perspectives, skills and knowledge of the users, that is, manufacturing companies. We welcome the participation of many partners who are willing to take on the challenge together,” urges Dr. Nishida.

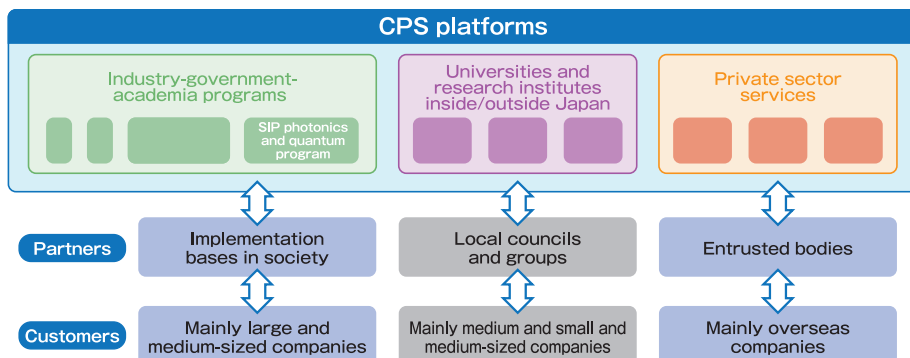


Figure 1 Laying the solid foundation for building a CPS platform

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