

## Study Group of Next Generation Smart Factory Engineering within Engineering Advancement Association of Japan (ENAA)

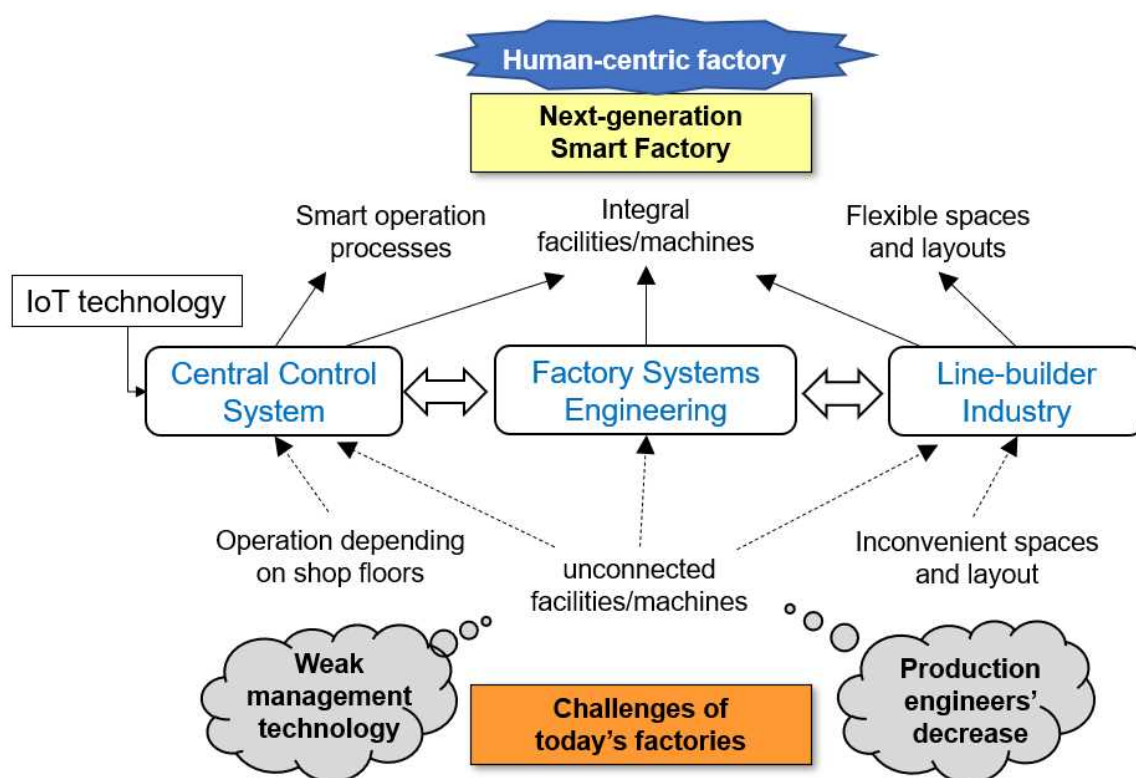
August 2025

### Purpose

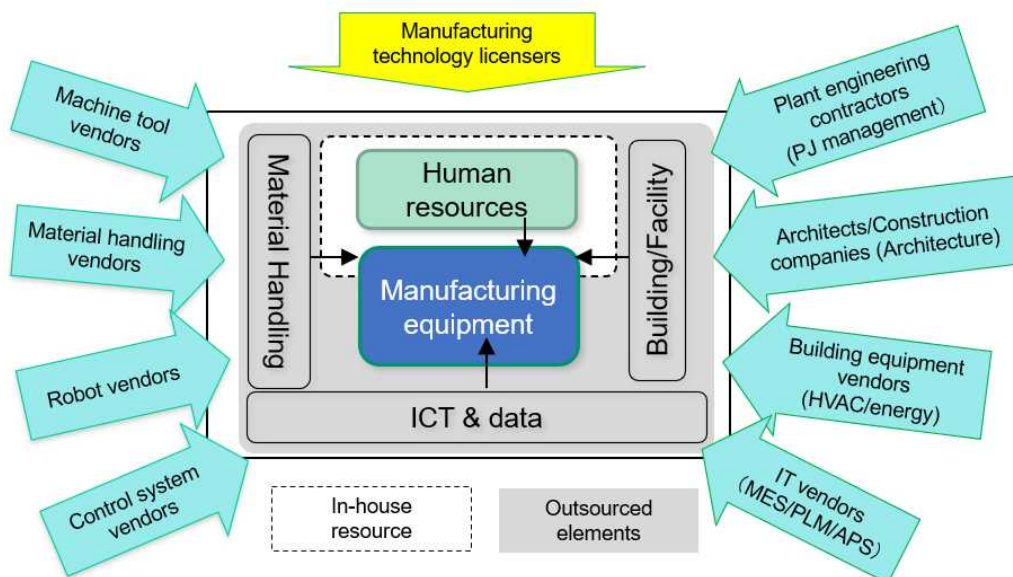
The purpose of this study group is to research, develop, and propose original engineering theories on how to design and operate manufacturing factories, with the aim of driving historic transformations.

This study group views manufacturing factories as an intersection of product engineering, factory engineering and supply chain management, and bring together the knowledge and creativity of engineers and consultants, who will spread it to a wide range of industries.

Specifically, our activities focusing on three pillars: “advocation of introducing Central Control System”, “practicing Factory Systems Engineering”, and “establishing “Line Builder” industry”.



Prospect of the Study Group © ENAA 2018



Overview of Line-builder Industry © Sato et al 2018

## History

This group was voluntarily founded in July 2017 as “Study Group on Design Theory of Next Generation Smart Factory” by about twenty members led by JGC holdings, Nomura Research Institute, Hirata corporation and Keio university.

In September 2018, this group was installed into ENAA and it was renamed to current name “Study Group of Next Generation Smart Factory Engineering”.

Since then, this study group has performed several kinds of activities every year. For example, continuously held Smart Factory symposium, Smart Factory Planning Personnel training course (SP-T1 course of ENAA PM seminar), Factory Managers training course” hosted by National Institute of Technology, Kitakyushu College, Fukuoka Japan (KCT).

Through those symposium and training courses, we are focusing on how to successfully install MES (manufacturing execution system) into domestic factories. Some of those activities have also been recognized by METI (Ministry of Economy Trade and Industry, Japan Government), and original research report “Status of MES installation in Japanese factories” was made public in April 2022 (in Japanese). [https://www.meti.go.jp/meti\\_lib/report/2021FY/000750.pdf](https://www.meti.go.jp/meti_lib/report/2021FY/000750.pdf)

We, as part of ENAA, suggest and promote Japanese manufacturing industry’s transformation from pure manufacturing activities into “manufacturing as a service” that contribute to the society experiencing GX (Green transformation and DX (Digital Transformation)).

## Advocating Central Control System (CCS) for the factory

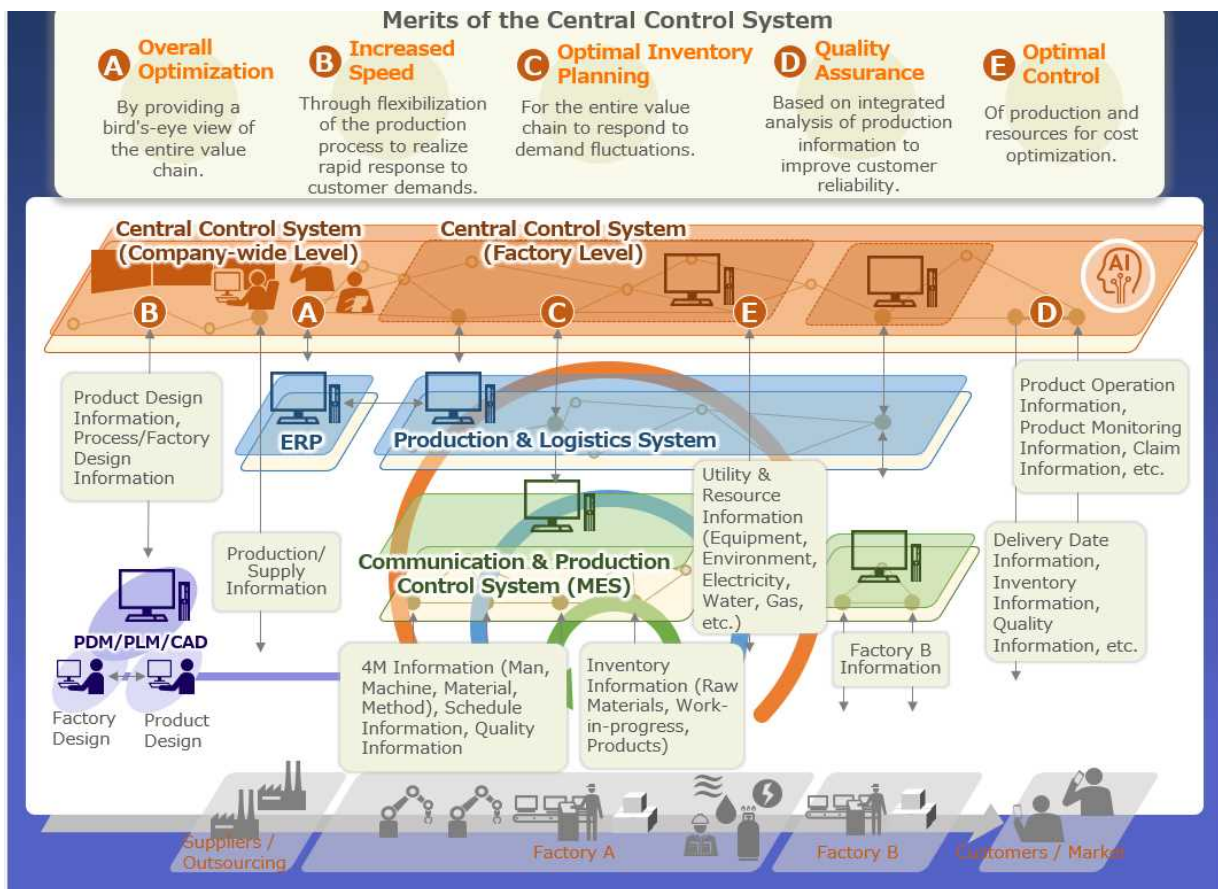
One of the advocations proposed by this study group is a "Central Control System" concept for manufacturing plants as a vital part of supply chain.

This CCS not only oversees in-company factories and business departments, but also encompasses the material suppliers, logistics companies, and retailers.

This CCS should be neither purely central controlled nor decentralized controllers, but should be "autonomously decentralized" control system.

This CCS should adopt System and Industrial Engineering technologies, and Factory Physics as basement for introducing cutting edge technologies, such as IoT and Cyber Physical Systems.

We believe this CCS combines automated machines, processed information, and artificial intelligence in order to make manufacturing factories globally competitive and adaptable to business environmental changes.



## Advocating Strategic (and Practical) Installation of MES/MOM \*system

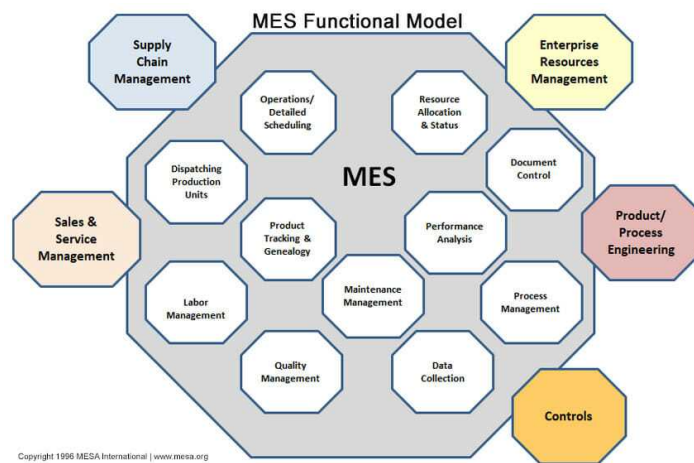
\* manufacturing execution system / manufacturing operation management

As you know, MES/MOM concept and its IT system was developed in US through 1980s and 90s.

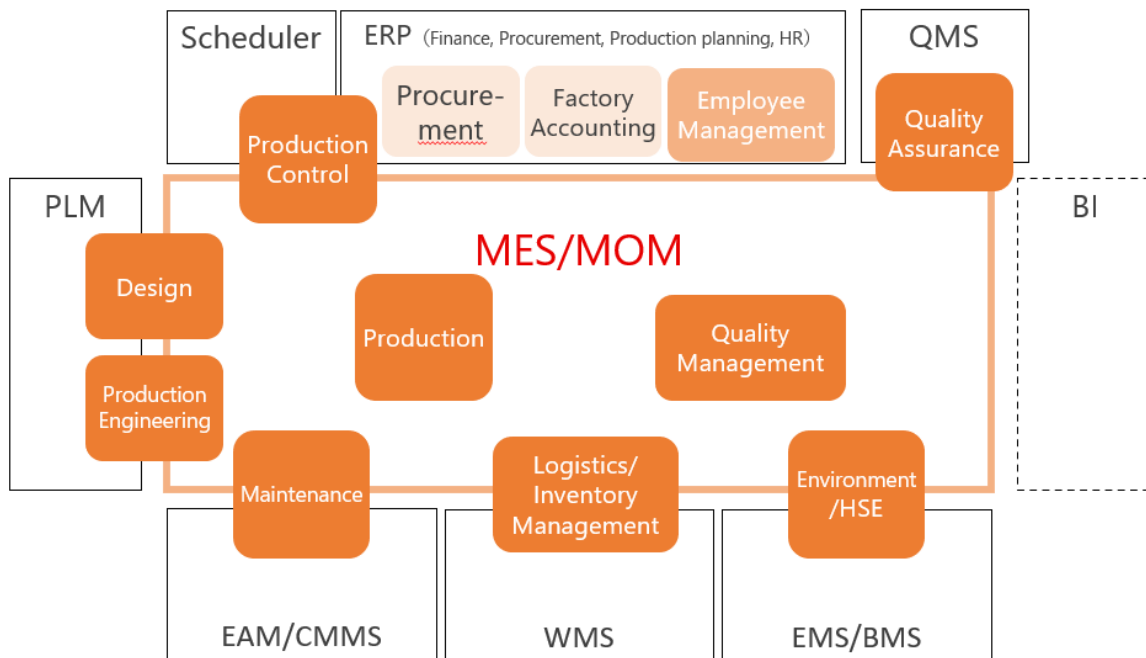
The concept and practice are standardized in English as ISA-95 and following ISO/IEC standards. But not yet officially translated (and also not understood) into Japanese Industrial Standard, due to the, maybe, cultural background and language barrier.

We regard the successful installation of MES/MOM system is indispensable for realizing the CCS concept.

Since 2024, we are proposing MES/MOM functions (or RFP for MES/MOM installation) template based on daily practice of Japanese discrete-type factories.



Conventional MES/MOM functions proposed by MESA international

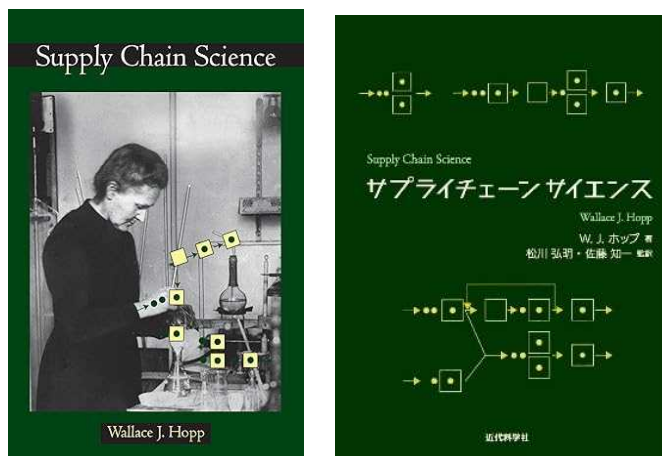


Proposed MES/MOM functions based on Japanese Practice

## Promoting Supply Chain Science in Japan

We believe the successful installation of CCS and MES/MOM system should be based on plain and sound engineering formula, thus we value Supply Chain Science by Wallace J.Hopp published in 2008.

After two years of preparation, Japanese translation version was published in 2023.



Supply Chain Science (Original: left Japanese Translation : right)

## Members

As of August 2025, this study group is participated by 66 individuals. Those individuals belong to following companies and organizations.

Keio University, JGC holdings, Nomura Research Institute, Yokogawa Solution Service, Takenaka Corporation, IPS, Rockwell Automation Japan, Frontier One, Chiyoda Corporation, Mitsubishi Heavy Industries, Nagoya Institute of Technology, SUBARU, Goal System Consulting, Abeam Consulting, K-plus solutions, Nissan Motors, Dassault Systems, Siemens, M2 Technology, Smart Craft, Tosoh Corporation and others