

# Proposal of Smart Manufacturing Framework guideline ( Garis Panduan )

Disahkan Oleh:



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# **What is Smart Manufacturing ???**

## **Related Technology ??**

## **Got Guideline ??**

# Smart Manufacturing Framework guideline ( Garis Panduan ) as a architecture & related technology and functions for smart manufacturing

## TODAY

digitalization supports production



Construction Data  
e.g. CAD, CAE

Simulation Data  
e.g. MES, ERP

Runtime Data  
e.g. Sensor values  
temperature etc.

All combined

Near Future: Digital Twin

## FUTURE

digitalization leads production

Any Data

Functions

Type/  
Instance

Global  
unique ID

### Administration Shell

#### Virtual description

Virtual representation  
▪ CAD Model  
▪ Digital life log



Meta-information  
▪ ID: 3D\_DiK\_printer  
▪ Design space:  
200x200x250mm



Technical functionality  
▪ Operating software



Resource-Manager  
▪ Self-assessment information  
(Remaining printing time)



### ASSET

e.g. 3D-Printer



# Smart Manufacturing Framework guideline ( Garis Panduan ) as a document reference of architecture & related technology and functions for smart manufacturing

**As a flexible framework able to address all assets ...**



... able to consider a vendor independent complexity, as a composition of Assets...



# What is Smart Manufacturing?

JWG21-TR-SMRM-N05-v14\_2018-09-19

**Technical Report:  
Smart Manufacturing Reference Model(s)**

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*"Manufacturing that improves its performance aspects with integrated and intelligent use of processes and resources in cyber, physical and human spheres to create and deliver products and services, which also collaborates with other domains within an enterprise's value chains."*

*Note 1: Performance aspects include agility, efficiency, safety, security, sustainability or any other performance indicators identified by the enterprise.*

*Note 2: In addition to manufacturing, other enterprise domains can include engineering, logistics, marketing, procurement, sales or any other domains identified by the enterprise."*

*"Smart manufacturing is extending manufacturing. It is characterized by independent actors sharing standardized information. The actors can pro-actively and re-actively act upon the information. The actors collaborate dynamically in network structures. This collaboration occurs among and within lifecycles, on both strategic and operational levels, providing added value for organizations. The scope is to develop a reference architecture for smart manufacturing.*

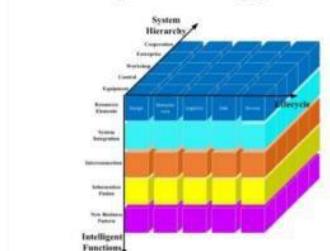
*Note: examples of actors are companies, products, assets, processes and parts."*

*"Set of methodologies and technologies for making goods and providing services with manufacturing systems that are designed with learning capability and operated based on product/service requirements so that it can respond in real time to meet changing demands and conditions in the factory, in the supply network and in customer needs, and can improve itself continuously.*

*This is obtained by the intensive use of digital technology (including IoT) to integrate products, production systems and business activities through their life cycles and value chains, and increasing decentralized decision making."*

# Related Standards for smart manufacturing

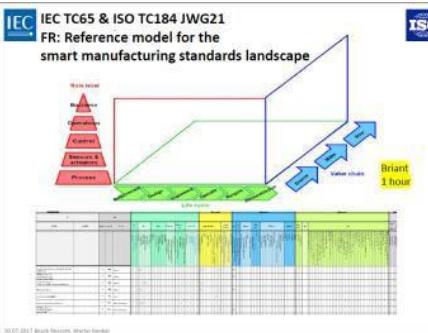
IEC TC65 & ISO TC184 JWG21  
CN: Intelligent Manufacturing System Architecture



China

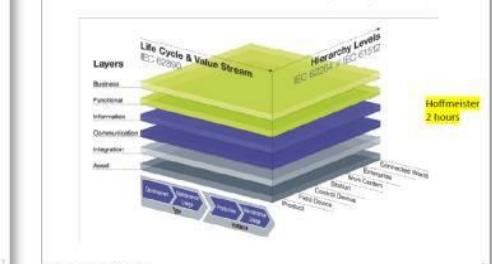
IEC  
ISO

IEC TC65 & ISO TC184 JWG21  
FR: Reference model for the smart manufacturing standards landscape



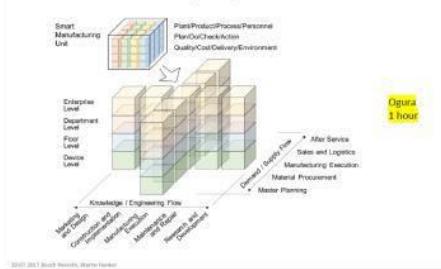
France

IEC TC65 & ISO TC184 JWG21  
GE: IEC/PAS  
Reference Architecture Model Industry 4.0 (RAMI4.0)



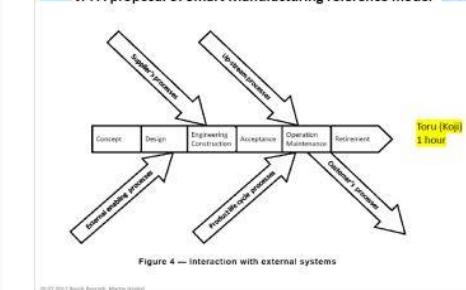
Germany

IEC TC65 & ISO TC184 JWG21  
JP: Industrial value chain reference architecture (IVRA)



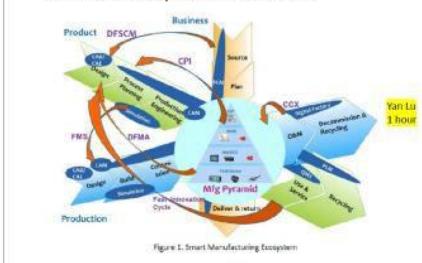
Japan

IEC TC65 & ISO TC184 JWG21  
JP: A proposal of Smart Manufacturing reference model



Japan

IEC TC65 & ISO TC184 JWG21  
US: NIST: Smart Manufacturing Systems: Standards Landscape & Reference Models



USA

IEC TC65 & ISO TC184 JWG21  
SE: Thomas Lundholm 2017-07-05

I could briefly present some smart manufacturing results from and initiatives in Sweden regarding:

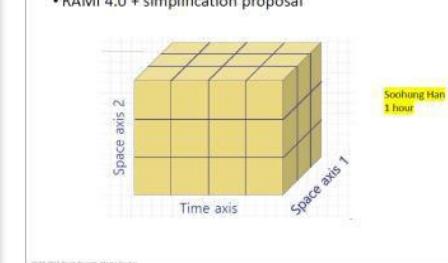
- LISA (line information system architecture)
- tweeting machine
- the Engineering innovation factory
- model-driven process and quality planning
- digital twins for efficient tool usage in manufacturing
- digital manufacturing infrastructure
- Swedish/German testbed for smart manufacturing.

Lundholm, Johansson  
1 hour

Sweden

IEC  
ISO

IEC TC65 & ISO TC184 JWG21  
KR: Soonhung Han



Korea

IEC TC65 & ISO TC184 JWG21  
US: Dan Carnahan

- Enterprise Reference Architectures (ISO 15704 - Requirements for enterprise reference architecture and methodologies)
- Enterprise-Control Models (IEC 62264 - Enterprise - Control System Integration)
- Key Performance Indicators (ISO 22400 Manufacturing Operations Management - Key Performance Indicators)
- Open Technical Dictionaries (ISO 29002 - Exchange of Characteristic Data)
- Data Quality (ISO 80001)
- Open Technical Dictionaries (ISO 22745 - Application to Exchange of Master Data)
- Oil & Gas Industry Interoperability (ISO/TC 184/WG 6, Project ISO 18101 - Automation systems and integration - Oil and Gas interoperability)
- Other relevant ISO/TC 184/SC 5 standards

Dan Carnahan  
1 hour

ISO Standards

IEC TC65 & ISO TC184 JWG21  
CA: Wally Leonard

- currently I have no issues, other than a few concerns that I am hopeful will be addressed by the forthcoming information package - these concerns stem from my initial take on the direction set by the ISO strategic business plan which defines a means to extend the enterprise capabilities of a manufacturing organization. I am also hopeful that the information package will provide a clear direction to guide the development of enterprise reference architecture and use of methodologies. - It's been my experience, that reference models do not become technical rather they break down the concepts and requirements into a series of discrete components and then define the interfaces and functional integration points where information flows must be managed to protect the integrity of critical data throughout its life-cycle.
- finally and most importantly, enterprise reference models provide direction to refine critical assets, systems, and development information transformations need/requirements that will maintain the asset, operations, and maintenance interoperability.
- below, highlight a complete list of the ISO standards that represent what I just summarized for your consideration.

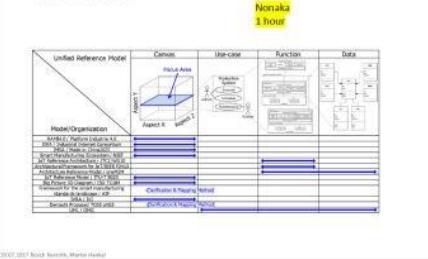
Wally Leonard 1 hour

- ISO 11749 -- business plan establishes the strategic needs and requirements of the ISO/TC 184 business environment
- ISO 15926 -- industrial automation systems requirements for enterprise reference architecture and methodologies defines the key principles, design considerations and approaches to developing reference architectures/models.
- ISO 15926 -- industrial automation systems and integration -- integration of life-cycle data for process plants including oil and gas production facilities
- ISO 18101 -- oil and gas asset management and operations and maintenance interoperability (Ogi)

2017-07-05 Block: Leonard, Martin (edited)

Canada

• Canvas from JP



Japan

Smart Manufacturing Framework  
Guideline  
(2021 )



**1、Overall Requirement**

- Guiding ideology
- Basic principle



**2、Construction ideas**

- system structure
- Standard architecture diagram
- Standard system framework



**3、Construction Content**

- Basic common standards
- Key technical standards



**4.Organizat ion and implementation**

- Standardization Working Group
- Dynamic update mechanism

TERIMA  
KASIH

*thank  
you*

Digital ITC  
Digital Transformation Consulting