Role of Standards in Smart Manufacturing...

Alec McMillan
Rockwell Automation
“To drive global productivity and manage business risk, we need real time access to the data on performance of machines, lines, factories and the enterprise. The key enabler is a fully connected enterprise built upon open standards for smart safe and sustainable manufacturing”

Excerpt from Keith Nosbusch, Rockwell Automation President and CEO, National Press Club Keynote Address – 9 September 2009
Standards in all aspects of the supply chain...

RoHS
Conflict minerals
Worker certifications

Social Accountability standards

ISO 9000
ISO 14000
ISO 50001
Energy efficiency
Product standards
KPI’s

Environmental Safety
EMC
Product standards
Interoperability

Product Cataloging
Supply Chain Integration

Upgrade/Repair Regulations

Multiple Product Transformations

Headquarters
• Cost, Productivity, Optimization
• Global Supply Chain, Procurement

• Intelligent Load Shedding based on process / equipment states
• Communications between the Utility and the Factory control system
• Optimize Energy Consumption
• Logically connect the Utility to the Factory

Smart Grid standards

Constrained Utility

Customer

Supplier

Constraint Utility Distribution Center

Suppliers

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Some Relevant Factory Standards Activities

- IEC TC65
- ISO TC 184
- IEC TC65/ISO TC184 JWG14
- ISO TC184/SC5/WG10
- IEC TC65 Sub Committees
- IEC TC 17
- IEC TC22
- IEC TC44
- ISO TC184
- ISO TC184
- ISA Standards

Digital Factory work group
“Big Picture Project”
Energy Efficiency in Industrial Automation
Methodology to evaluate energy efficiency of a manufacturing system
Safety, systems, control, communication
Control components, sensors
Drives
Machine safety
Ad Hoc group on Mechatronics
Oil and Gas Industry Applications of Asset Management Systems
Batch control, Enterprise control, FDT, HMI
IEC Systems Approach

System Characteristics

- Safety
- Environment
- Integrated Functions
- Other

Product

Domain

System Specification

Product to Product

Design → Commissioning → Operation → Maintenance → Disposal
IEC Systems Approach

• System Specification
  – Concept Drawings
  – Use Cases

• System Inventory
  – Products, Processes, Personnel
  – Listed with related standards, version and date

• System Mapping
  – Maps inventory elements to the specification and concept drawings

• Roadmaps
  – Showing current and planned evolution of the inventory over time
Multiple disciplines and tools required to support the design and development of the automation system.
Customer requirements -> Automation Solution

• How do we match our customer requirements with our automation solutions?
  – Complex decisions required to arrive at the automation solutions….
  – What manufacturing system design systems are preferential for our customers?
  – What is the customer domain requirements?
    • Discrete, process, batch, logistics,
    • Application sector in the domain?
      – automotive, semiconductor, food, pharma, beverage, energy,
  – Preferred automation framework?
    – Driven by customer preference…end users
    – Driven by 1st tier supplier preference…relationship to EPCs & System Integrators
    – Driven by OEM preference…
Baseline (some examples)
- Project Management - (BOM, costing, schedule)
- Mechanical design (panel layout)
- Electrical design (wiring connections)
- Control application programming
  - (PLC programming)
- Visualization (Human Machine Interface)
- Configuration tools (network management)

Productivity management
- Process management information (KPI’s)
- Energy monitoring information
- Condition monitoring information
- Simulation
- Optimization
- Software capability profiling - (manufacturing software units - MSU)
Integrated Architecture provides a “framework” to meet the customer application integration requirements...

- Programming & Configuration
  - RSLogix 5000
  - RSLinx
- RSView Studio
- RS Energy Metrix
- FT-Vantage Point
A Digital Factory may be described electronically

All Devices, Functions, Communications must be included (called automation assets)

All static and dynamic Relationships between the automation assets
  - must be covered including the timely behavior

It must be possible to describe the Processes (System Functions) based on the automation assets
Data Repository Contains the electronic Description of all Assets in Digital Factory

Automation Assets

Digital Factory

Maintenance

Engineering

Configuration

Operation

Security

System Functions/ Process

Program/ Software
Length of the Sensor Cell
Diameter of the Sensor Cell
Sensor Cell Material
Weight of the Sensor
Dimension of the Housing (length, wide, high)
Material of the Housing
Vibration Protection
Local Display
Local Operator Panel
Threshold Level
Event Signalling
Linearisation Curve
Compensating Function
Time Stamp Function
Self Calibration
Fail Safe Mode
Measuring Time
Cycle Time
Filter Time
Communication Intervall
etc.
e-business

Performance

Location

Construction
(Mechanical & Electrical Equipment)

Function
(Software)
ISO 8000 Quality Data

Data that meets requirements

Data that is Portable
ISO Data Standards are the Antidote to Application “Lock-in”

Quality data is **portable data**; it is independent of the software application and accessible by any application.
The Need for Portable Data

• The software we will be using tomorrow will be different from what we are using today

  and

• we will need access to our data .... Over a long time period

  and

• data that cannot be separated from licensed software is may also be considered licensed data.

  Then:

Our data should be “portable”; independent of any licensed software application.

ISO 8000 quality data is portable data!
eOTD (ECCMA Open Technical Dictionary): a registry of terminology from many sources where each concept is assigned a unique and permanent public domain identifier and where concept identifiers may be mapped to each other and ranked according to their use (ISO 22745).
Rockwell Automation has one of the first ISO 8000 compliant multilingual industrial product catalogs
Class ID: 0161-1#01-1070992#1

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Class Name: Contactor

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Marketing Description

Mechanically Held Lighting Contactor

Technical Description

Lighting Contactor, Mechanically Held, 208-240V AC, 50/60 Hz, NEMA 4/4X, Surface Mounting, Stainless Steel

Rendering guide
Better and better descriptions

Easier to find
Easier to integrate
Easier to order