Integrated Engineering Data – Key of efficient digitalization and new business?

eCl@ss Congress 2019

18 September 2019 / Michael Mönch, Siemens AG
Integrated Engineering Data – Key of efficient digitalization and new business?

Introduction:

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R&D Modularisation & Standardisation
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Working at Siemens AG, Process Solution

Offerings: Automation-, Drives-, Electrification-,
and Digitalization Solutions for

Minerals, Marine, Oil&Gas, Offshore, Onshore,
Metals, Fiber
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Agenda:

- Motivation & Challenges for Integrated Engineering
- Opportunities for classification systems
- Best-practise examples
- Summary & Outlook

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Motivation & Challenges for Integrated Engineering

Transition of business, caused through digitalization aspects and trends, e.g. Industrie 4.0. Agile companies are capable to react and learn faster.
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Motivation & Challenges for Integrated Engineering

Integrated Engineering support efficient PLM-SCM-CRM value chains. Classification systems (e.g. eCl@ss) should be the basis for a common semantic and domain know-how structuring.

Source: E4TC / RWTH Aachen
Motivation & Challenges for Integrated Engineering

Forecasting the volume of digital data generated annually, worldwide (Source: Statistica [Stat14])

Industrie 4.0 is an important driver of data-growth (Source: [FiSt14])

Data complexity: Data volume + Data quality + Data linkage

Management of Data-complexity, is a key of success. Answers are needed to keep smart data manageable at reasonable costs and effort.
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Opportunities for classification systems / Process Industries

Product data for engineering e.g.:
- Technical description
- Technical specification
- CAD / CAE Information models
- Simulation properties
- Module- and Component Structure
- Modularisation Architecture of complex products

Plant data for engineering e.g.:
- Process design on physical level
- Feed engineering
- P&ID’s
- Piping
- El&C engineering
- CFD
- Plant Simulation

Data-complexity

Production data for engineering & analytics e.g.:
- Production operation Management
- Information visualization, e.g. Dashboards
- Data Analytics
- Data Acquisition

Virtual World - Digital Plant ("Digital Twin")

Collaboration platforms
"The concept for the study was developed together with the E4TC (European Transformation Center) Institute in Aachen. The main topic of the institute is to take care of the practical, optimal application of software solutions (ERP, PDM, CAE) and to digitize engineering and manufacturing processes in the sense of Industry 4.0 with the integration of these solutions." "Vogel's design practice 19.8.19"
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“Industrie 4.0” stands for full digitisation and integration of the industrial value creation chain. Connecting information and communication technology with automation technology to the Internet of Things and services enables an increasing degree of networking within and between production plants – from the supplier right through to the customer. This also includes digitisation of the product and service offering, which allows new business models. Ultimately, Industrie 4.0 is the realisation of the smart factory within the digital value creation network.

ZVEI Automation, Gunther Koschnick
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Best-practise examples
Cooperation eCl@ss 27-02 Electrical drives and ZVEI Working Group “Drives Industrie 4.0”

Fig. 7: Provision of Information for Electrical Drives Across the Life Cycles of Product and Plant

Fig. 9: Transferring a Nameplate to eCl@ss

Challenges for eCl@ss 27-02:
- Harmonization of structuring and properties
- Block usage
- Extension for integrated engineering work,
  - Provide properties and value’s
  - Communication via open source (OPC UA)
  - Maintain & Creation of domain related structuring
  - Reusage for other expert groups

Example

<table>
<thead>
<tr>
<th>Power data (motor)</th>
<th>Power data of the motor in operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>AN030</td>
</tr>
<tr>
<td>Rated power (motor)</td>
<td>AN03T</td>
</tr>
<tr>
<td>Rated power (device)</td>
<td>AN03T</td>
</tr>
</tbody>
</table>

Source: ZVEI
Next in 2020:
Building a real **demonstrator** Modell incl. communication for electrical motors & drives

The Industrie 4.0 electrical drives ad-hoc working group has grouped properties and data that relate to the PDS based on different application cases:
- Functionality
- Technical data, mechanics/electrics
- Documentation
- Certificates/approvals
- Purchase order data
- Logistics
- Interfaces
- Service/maintenance/support
- Other

**Business Opportunities in:**
- Plant- and Product optimization (e.g. auto-tuning)
- Plant operating data & asset management (e.g. Identification of the motor)
- Service business for products and plant operators
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Best-practise examples
Usage in Engineering- Plant- and PLM-Software

➢ Usage of classification systems
   ➢ One-Source of data, e.g based on R&D, product data, simulation-models and properties

➢ Import- and export of complex product data, e.g. for digital twin modelling, asset-mgmt.

➢ Integrated Engineering and operating models with customer, suppliers and sales
   ➢ Delivery and selection of products via pre-configuration & customizing
   ➢ Extended value-chain models, from “engineered to order” “up to “configure and use”

➢ Pre-condition: Good classification models are the basis, shape your future!
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Summary & Outlook

Data-Complexity is a driver for new business opportunities

Advanced classification models support efficient engineering of:
  ✓ Plants, Systems and Components
  ✓ Service & Analytics
  ✓ Asset-Mgmt of real operating systems & products

Agile cooperation in/with companies and
Standardization of Product and Solution engineering / development
Speed up the business opportunities and saving potential (up to 80%).
Questions ?

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