# Introduction to NE 100 Interface in CAE systems and to the LOP technology

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# Welcome

- ***Dr. Peter Zgorzelski,*** *works in the Process Management Technology staff unit at Bayer Technology Services GmbH and is Office Manager of PROLIST® INTERNATIONAL. He is active in NAMUR, eCl@ss, DKE and IEC working groups.*

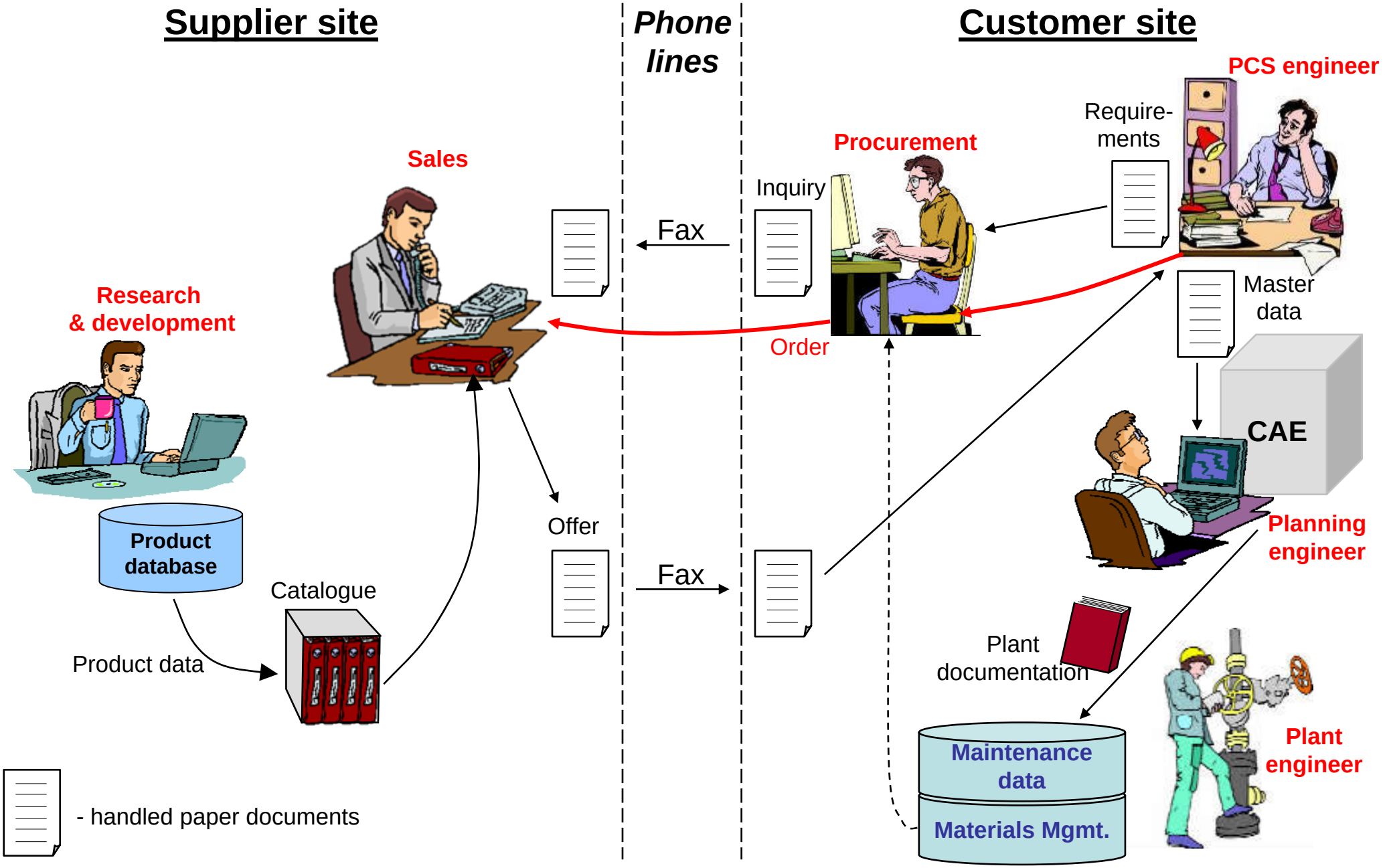
Key benefits through use of the LOP technology:

- Simplifying the engineering process
- Raising the plant documentation quality
- Reducing the costs in engineering and procurement

# Contents

1. Engineering and procurement workflows today and the ones using Lists of Properties (LOP)
2. Structure of an LOP
3. What does one need in a CAE system for implementing the NE 100 interface
4. NE 100 and its international standardization
5. Benefits using LOP technology

# Engineering workflow yesterday and today



# Engineering Workflow

Question:

Can we still afford the costs of this expenditure?

The answer of PROLIST:

- No.
- We want to reduce engineering and transaction costs for procurement and sales in the area of process control technology.
- To achieve this objective we need international standards concerning LOP technology as well as processes with standardized workflows using XML.

# Engineering workflow tomorrow

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**Supplier site**

***Web (Internet)***

**Customer site**

**Procurement**

Framework contracts

Order

Inquiry

XML file

**PCS engineer**

**CAE**

**Sales**

**Research & Development**

XML file

Offer (with CAE-relevant data)

Supplier y

Supplier x

Device data

– . . .

– . . .

– . . .

– . . .

**Comparison**

XML files

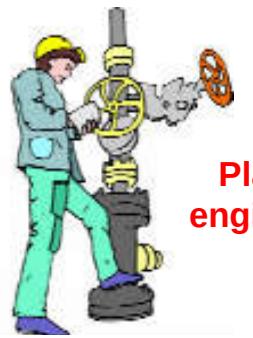
Plant documentation

**Product database**

Product data

**Maintenance data**

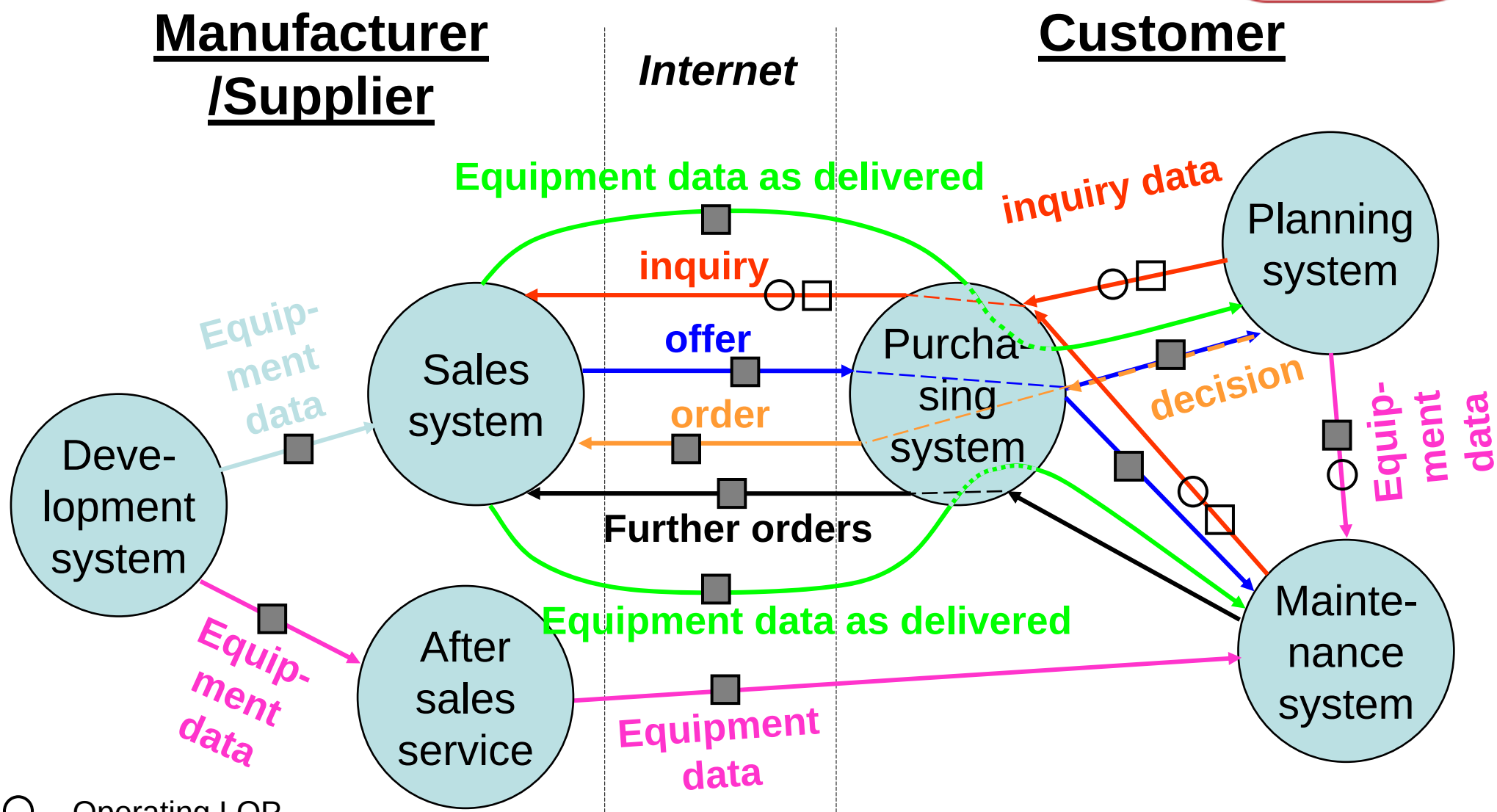
**Materials Mgmt**



**Plant engineer**

XML file - XML transaction file handled electronically

# Use of the Lists of Properties (considering live cycle)



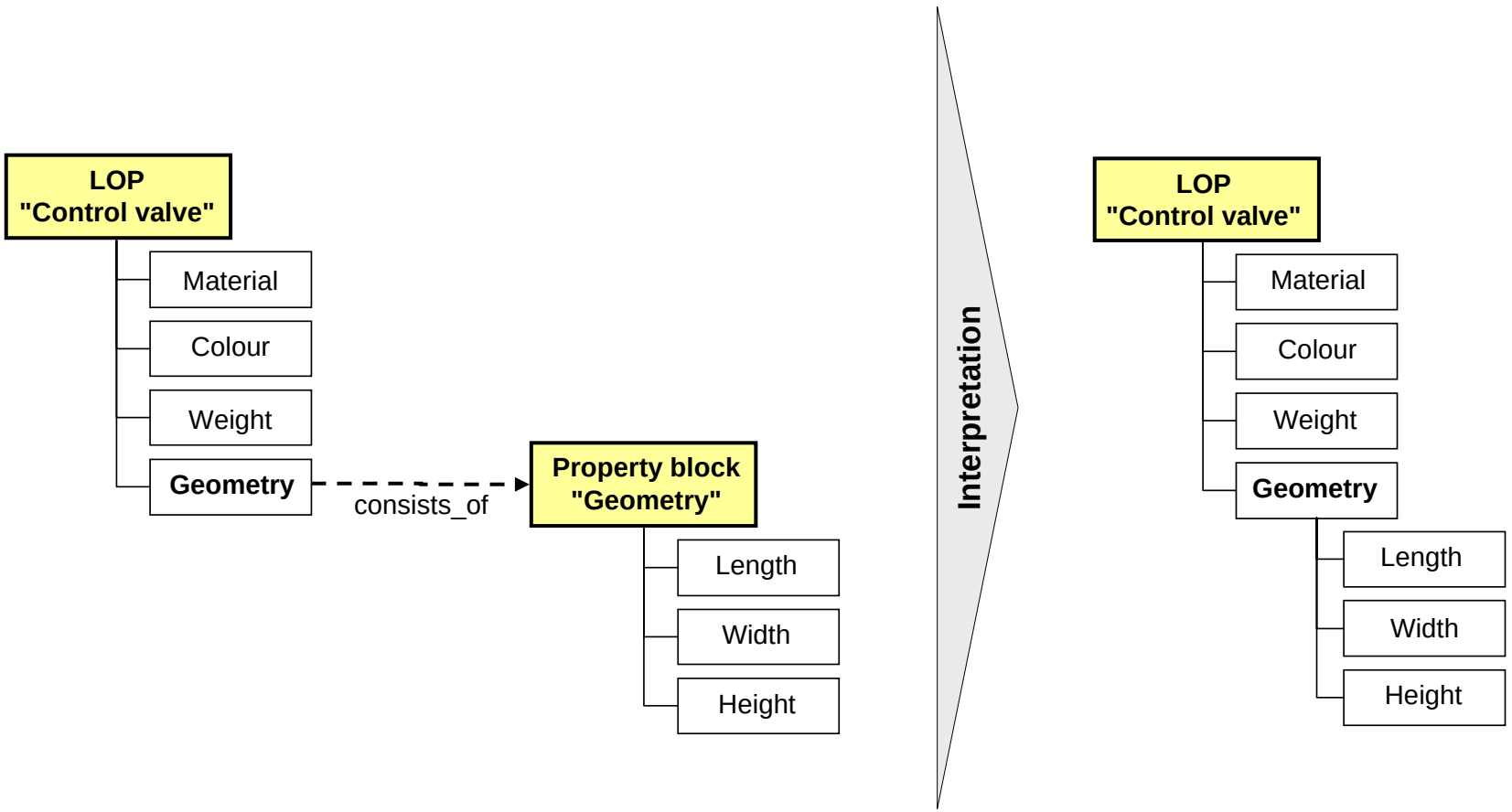

○ - Operating LOP

□ - Device LOP (in inquiry view)

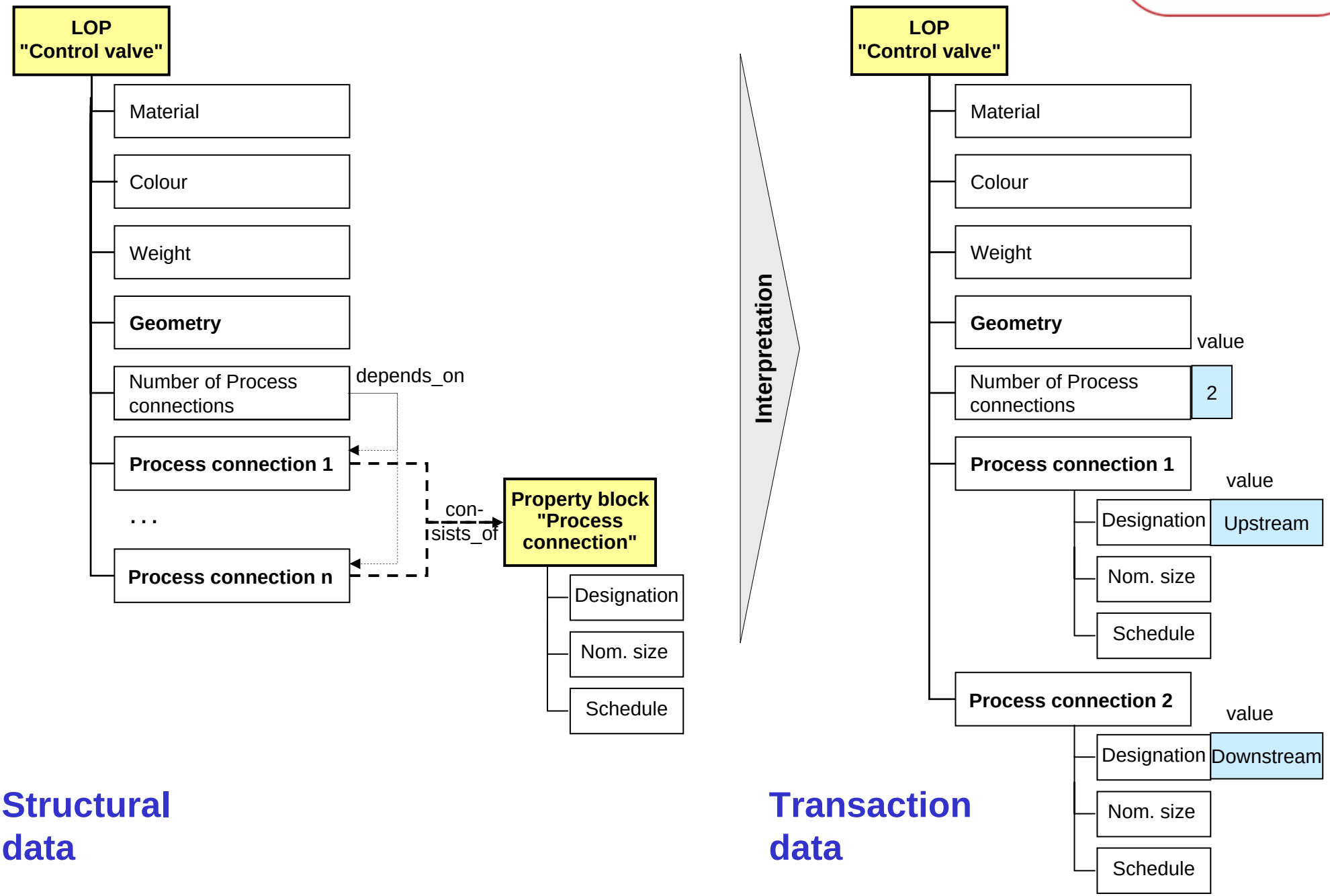
■ - Device LOP (with all properties)

LOP – List of Properties

# Interpretation of a block of properties



# Illustration of cardinality




**Structural data**

**Transaction data**

# A List of Properties with block structure

**Blocks:**

| Device list of characteristics of flowmeter (mass, Coriolis) | | | |
|---|---|---|---|
| **Device data** | | | |
| Equipment labeling/tag | | | |
| **Identification** | | | |
| Manufacturer | | | |
| Supplier | | | |
| Product name | | | |
| Product type | | | |
| Manufacturer's order code | | | |
| Article number | | | |
| EAN code | | | |
| ERP system inventory number | | | |
| Software version | | | |
| Hardware version | | | |
| Serial number | | | |
| Electronic insert | | | |
| Device labeling/tag | | | |
| Nameplate language | | | |
| **Function and system design** | | | |
| Measuring principle | | | |
| System architecture | | | |
| Parameterization software | | | |
| Communication and data processing | | | |
| **Digital communication** | | | |
| Protocol type | | | |
| Communication interface | | | |
| Maximum signal cable length | | m | |
| Signal cable shielding | | | |

**Device identification**

**Function and system design**

# Prerequisite for gaining the benefits

- The LOPs technology can be implemented in tools like CAE systems
- The most important precondition for achieving all of the benefits for process control equipment on the user side is to have a CAE system with an implemented NE 100 interface

- *Note: Nobody who uses LOPs needs to know how the LOPs are structured. He/she merely requires an appropriate tool.*

# NE 100 and its international standardization

- PROLIST INTERNATIONAL creates LOPs for process control equipment and publishes them in the NAMUR recommendation NE 100
- The contents of NE 100 has been channeled into an international standardization process.
- The first standards are introduced in the standard series IEC 61987: *„Industrial-Process Measurement and Control - Data Structures and Elements in Process Equipment Catalogues"*
- *Part 10: "Lists of Properties (LOPs) for Industrial-Process Measurement and Control for Electronic Data Exchange - Fundamentals"*
  - has FDIS status, till end of 2009 will be IS
- *Part 11: "List of Properties (LOP) for Measuring Equipment for electronic data exchange – Generic structures*"
  - has CD status (August 2009)
- Next standards will follow

# PROLIST INTERNATIONAL members


www.prolist.org

# CAE Systems' Forms

Supplier / Manufacturer

OLOP

DLOP

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| GENERAL | 1 | **Tag Number** | | **PROLISTV100BA01FT 1000** | | | |
| | 2 | Service | | Abgabemenge Schwefelsäure | | | |
| | 3 | P&ID No. | | LE-P-0815 | | | |
| | 4 | Area Classification | Location | Zone 1 | Field | | |
| | 5 | Line No. | Line Size / schedule | V100-BA01-LR001 | 50 mm | 25 | |
| | 6 | Line Internal Diameter | Pipe Material | 52,3 | S.S. 316L / 1.4571 | | |
| | 7 | Equipment No. | Pipe Class | | | | |
| | 8 | Pipe Insulation | | | | | |
| PROCESS CONDITIONS | 9 | Fluid Name | Fluid Phase | Sulphuric Acid 98% | Liquid | | |
| | 10 | | | **Minimum** | **Normal** | **Maximum** | **Units** |
| | 11 | Flow | | 0 | 20 | 40 | $Nm^3/h$ |
| | 12 | Temperature | | 30 | 30 | 30 | °C |
| | 13 | Upstream Pressure | | 1 | 1,5 | 2,5 | bar-a |
| | 14 | Specific Gravity | | | 1,86 | | |
| | 15 | Viscosity | | | 0,7258 | | $mm^2/s$ |
| | 16 | Cp / Cv Isotr. Exp. Normal | Pc Critic. Pressure | | | | bar-a |
| | 17 | Max. Dp Permitted | Molecular Mass | | bar | | |
| | 18 | Foaming | Bi-Directional Flow | No | | No | |
| | 19 | Entrained Gas % by Volume | | | | | |
| | 20 | Pulsating Flow | | | | | |
| | 21 | Corrosive / Erosive / Colored / Transp / Build-up | | | | | |
| | 22 | Ambient Temp : Sensor | Transmitter | 30 | | | |
| | 23 | Vibrations | Required Accuracy | | | | |
| SENSOR | 24 | Construction Type | Enclosure | | | | |
| | 25 | Model | Face/Face Dimension | | | | |
| | 26 | Process Connection | Size | Flansch DIN | DN50, PN40 | | |
| | 27 | Nominal Size | Internal Diameter | DN50 | | | |
| | 28 | Material | Purge Fitting | | | | |
| | 29 | Lining | Coating | | | | |
| | 30 | Housing Material | Distance to Transm. | | | | |
| | 31 | Cable Entry | Cable Length | | | | |
| | 32 | Insertion Length | Body Length | | | | |
| | 33 | Jacket Model | | | | | |
| | 34 | Transmitter Type | Model | | | | |
| | 35 | Instrument Range Min. | Max. | | | | |
| | 36 | Calibration Range Min. | Max. | | | | |
| | 37 | Power Supply / Signal/Load | Power Consump. | 24V DC | | | |

• • •

Operating parameters

Device specification

# Specification Sheets (ISA) and Lists of Properties (PROLIST)

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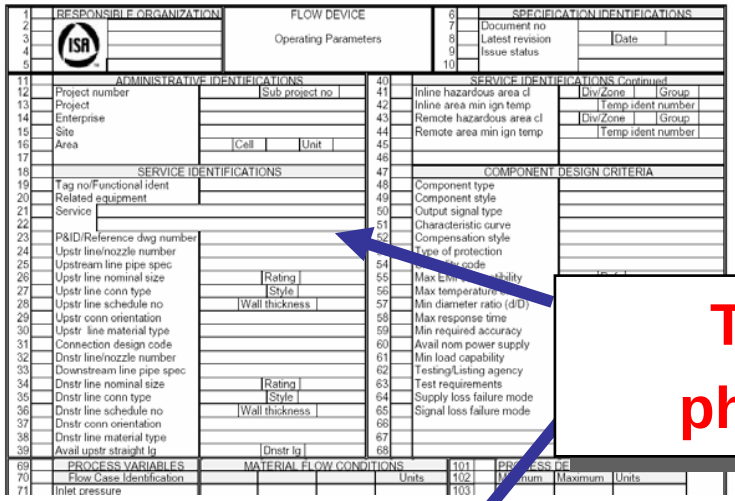
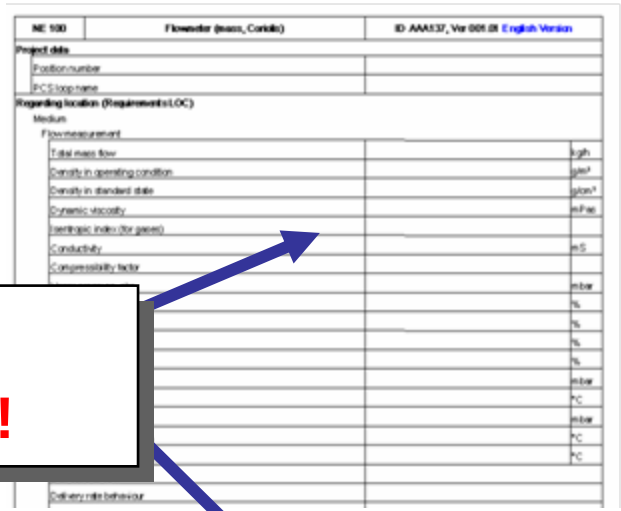
## ISA TR20

## NE 100

Operating Parameters:

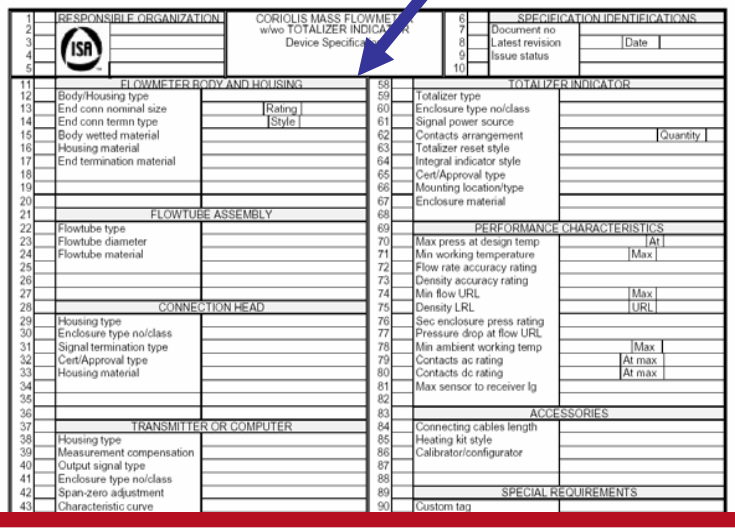



**OLOP** Operating LOP:

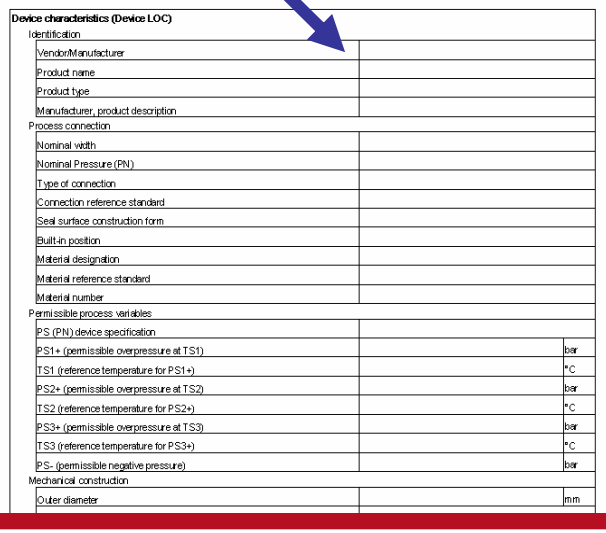



**The same philosophy!**

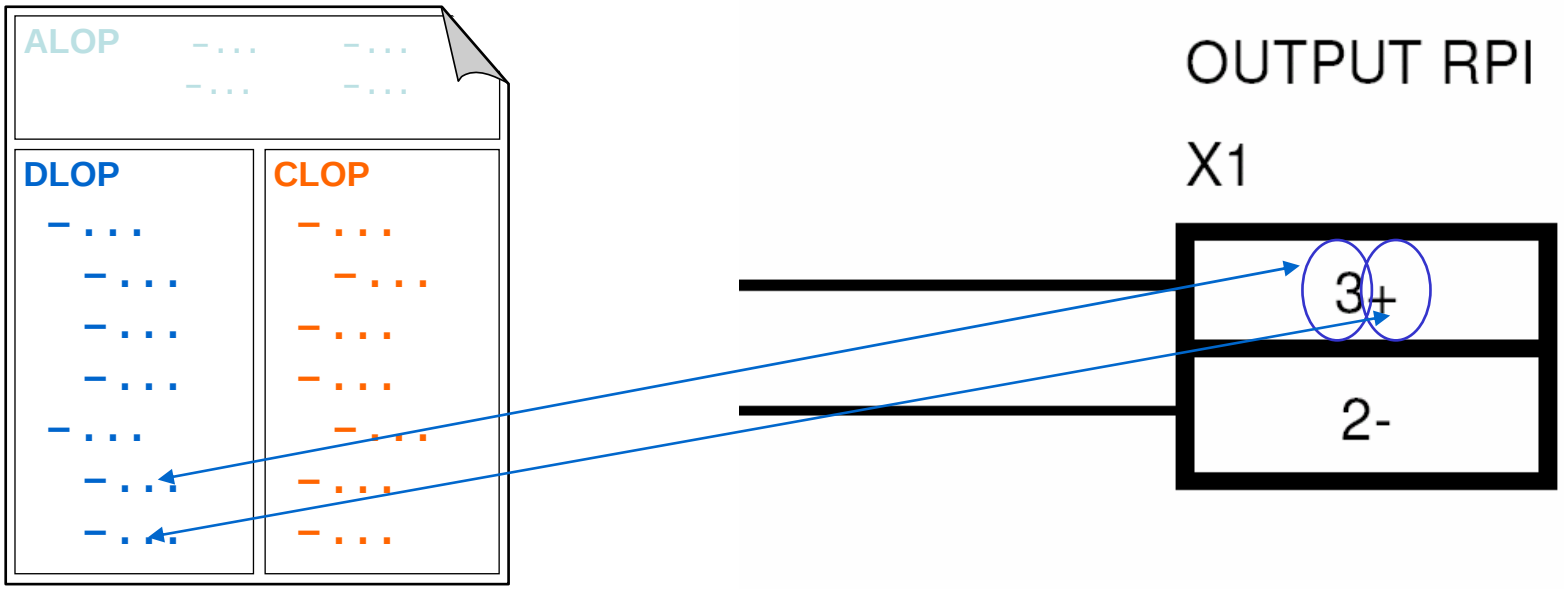
Device Specification:




**DLOP** Device LOP:



# CAE relevant data for implementation of the NE 100

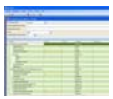


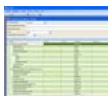

- Automatic transfer of description and designation of the terminals from the LOP to the loop sheet

# Generation of the intrinsic safety confirmation document

CAE system

PRO-SPEC





| | A | B | C | D | E | F | G | H | I |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 20 ZABA V101 PA01 F001 | | | | | 20 ZABA V101 PA01 F001 | | | |
| 2 | Durchflussmesser | | | | | Trennverstärker | | | |
| 3 | | | | | | | | | |
| 4 | **Si-techn. Kenngrößen Ex i-Kreis - (passiv / aktiv)** | | | | | **Si-techn. Kenngrößen Ex i-Kreis - (passiv / aktiv)** | | | |
| 5 | | Maximale Eingangsleistung (Pi) | 2 | mW | | | Maximale Eingangsleistung (Pi) | 2 | mW |
| 6 | | Maximale Eingangsspannung (Ui) | 24 | V | | | Maximale Eingangsspannung (Ui) | 24 | V |
| 7 | | Maximaler Eingangsstrom (Ii) | 0,5 | mA | | | Maximaler Eingangsstrom (Ii) | 0,5 | mA |
| 8 | | Maximale innere Kapazität (Ci) | | nF | | | Maximale innere Kapazität (Ci) | | nF |
| 9 | | Maximale innere Induktivität (Li) | | µH | | | Maximale innere Induktivität (Li) | | µH |
| 10 | | Maximale Ausgangsleistung (Po) | | mW | | | Maximale Ausgangsleistung (Po) | | mW |
| 11 | | Maximaler Ausgangsstrom (Io) | | mA | | | Maximaler Ausgangsstrom (Io) | | mA |
| 12 | | Maximale Ausgangsspannung (Uo) | 24 | V | | | Maximale Ausgangsspannung (Uo) | 24 | V |
| 13 | | Maximale äußere Kapazität (Co) | | nF | | | Maximale äußere Kapazität (Co) | | nF |
| 14 | | Maximale äußere Induktivität (Lo) | | µH | | | Maximale äußere Induktivität (Lo) | | µH |
| 15 | | Max. äußeres Induktivitäts-/Widerstandsverhältnis (Lo/Ro) | | µH/Ohm | | | Max. äußeres Induktivitäts-/Widerstandsverhältnis (Lo/Ro) | | µH/Ohm |
| 16 | | | | | | | | | |
| 17 | | | | | Zusammenschaltung | | | | |
| 18 | | | | | OK | | | | |
| 19 | | | | | | | | | |
| 20 | | | | | | | | | |

# What does one need in a CAE system for implementing the NE 100 interface

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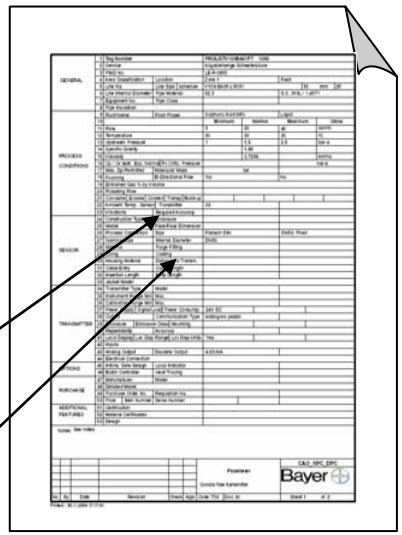
Supplier / Manufacturer

Visualization of the entire LOP sent to and received from supplier in SPI

| Device list of properties of coriolis mass flowmet... | |
|---|---|
| **Device data** | |
| Equipment identification code | |
| **Identification** | |
| Manufacturer name | ENDRESS+HAUSER |
| Supplier | |
| Manufacturer product name | PROMASS |
| Manufacturer product type | 83 F |
| Manufacturer product code | 83F25-AD2SAADAABA |
| Article number | |
| EAN code | |
| ERP system inventory number | |
| Software version | |
| Hardware version | |
| Serial number | |
| Electronic insert | |
| **Device tag plate** | |
| Tag plate language | |
| Number of text lines | |
| Text line | |
| Text color | |
| Tag plate height | |
| Tag plate width | |
| Tag plate thickness | |
| Tag plate color | |
| Tag plate material | |
| Tag plate mounting style | |
| **Application** | |
| Application description | |
| **Function and system design (1)** | |
| Measuring principle | Coriolis principle |

SPI database

Customer SPI sheet (or ISA TR20 sheet)



Already exists in SPI

Mapping

Report

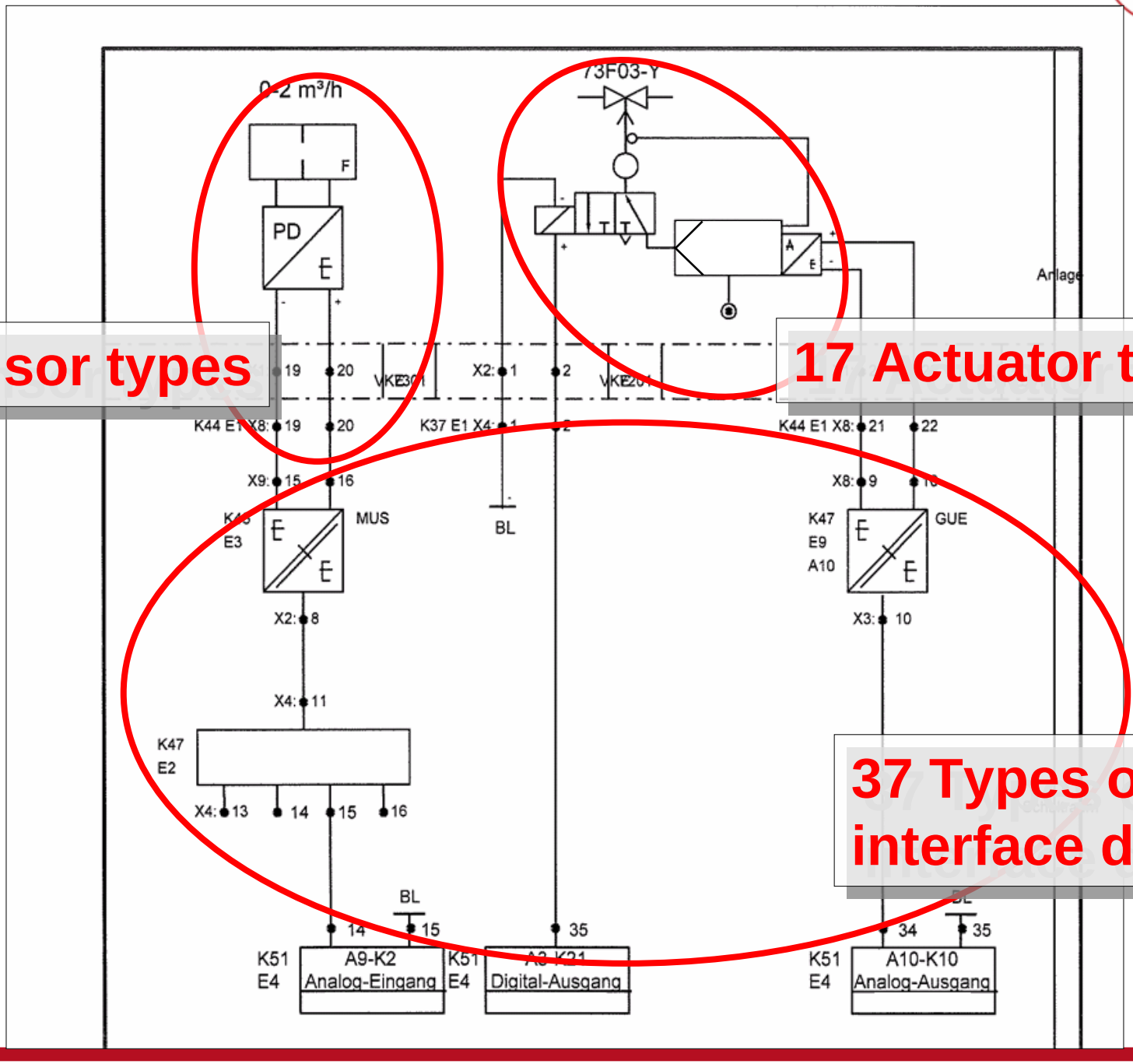
A mapping tool is needed for the implementation of the NE 100 interface

(only for a subset of the received LOP)

# Availability of LOPs and appropriate tools

- CAE systems with implemented NE 100 interface:
  - PRODOK
  - SmartPlant Instrumentation (in progress)
  - Comos (in progress)
  - other CAE system manufacturers are already talking with PROLIST
- Other available tools for the handling of LOPs
  - PRO-SPEC (creating, reading and comparing of LOPs in XML files and other functions)
  - PRO-VIEW (only reading of LOPs in XML files)

# Which LOPs are already available?

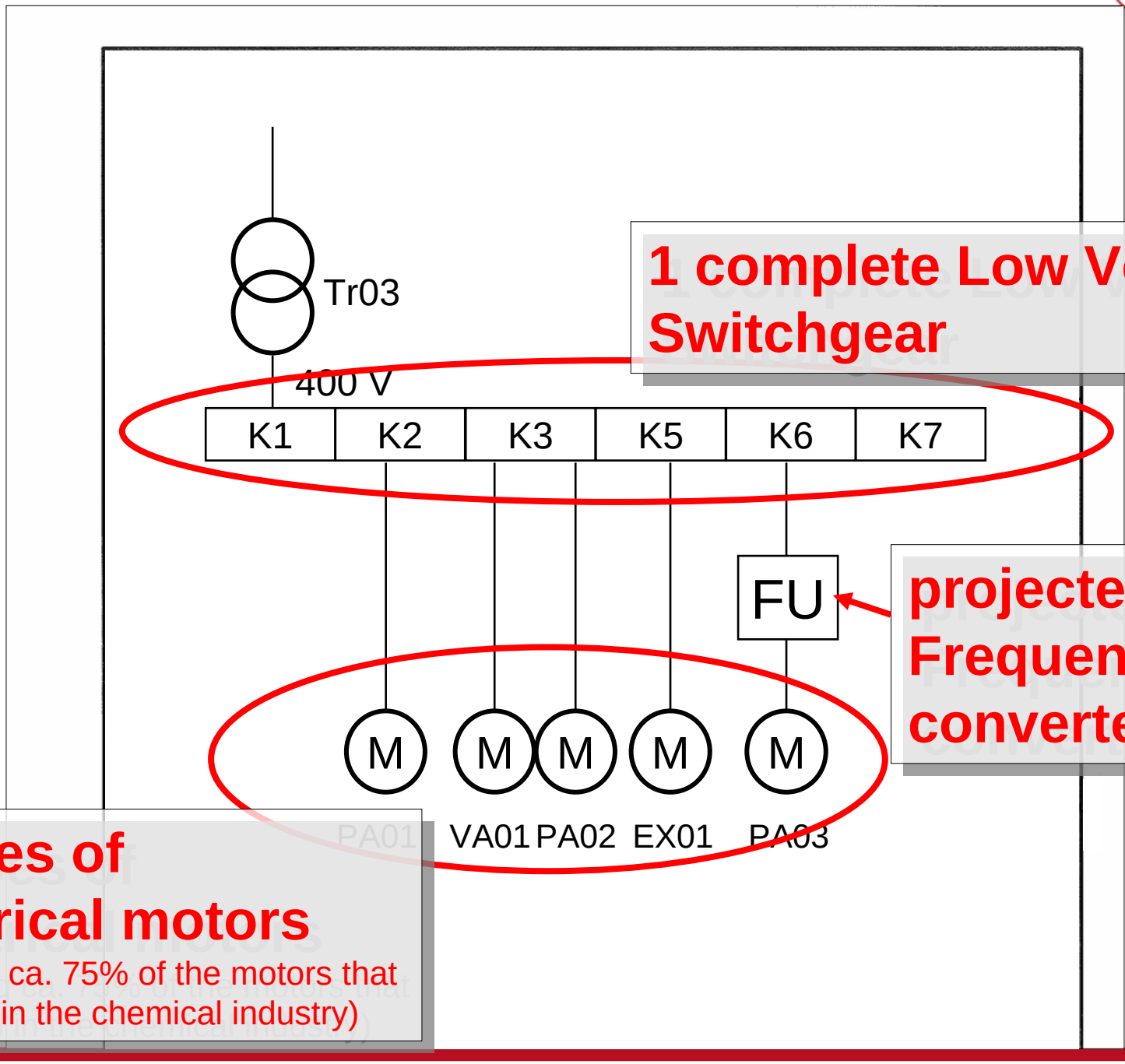



**51 Sensor types**

**17 Actuator types**

**37 Types of interface devices**

# Which LOPs are already available?




**1 complete Low Voltage Switchgear**

**projected: Frequency converter**

**2 types of electrical motors**
(covering ca. 75% of the motors that are used in the chemical industry)

# Main benefits for equipment users by utilizing PROLIST Lists of Properties

- Optimization of the integration of data from planning, purchasing, and commissioning through to maintenance
- Streamlining the engineering process
- No need to enter master data into your own CAE system
- Reduction of transaction costs (5 - 15%)
- Major improvement in data quality, i.e. virtually error-free device data (no manually caused input errors)
- Reduction of effort as regards creation (investment) and maintenance of the plant documentation (maintenance)
- Improved comparability of device data in offers

# Review of Key Points

- We have shown how through the use of the LOP technology
  - the engineering process can be simplified,
  - the plant documentation quality can be raised and
  - the costs in engineering and procurement can be reduced

- Major benefits:
  - simple integration of process control equipment data in one's own CAE system
  - avoidance of expensive, inflexible and error-prone manual data input

- The key benefits has been proven:
  - Simplifying the engineering process
  - Raising the plant documentation quality
  - Reducing the costs in engineering and procurement

# Q & A

- Any questions about the topics covered?

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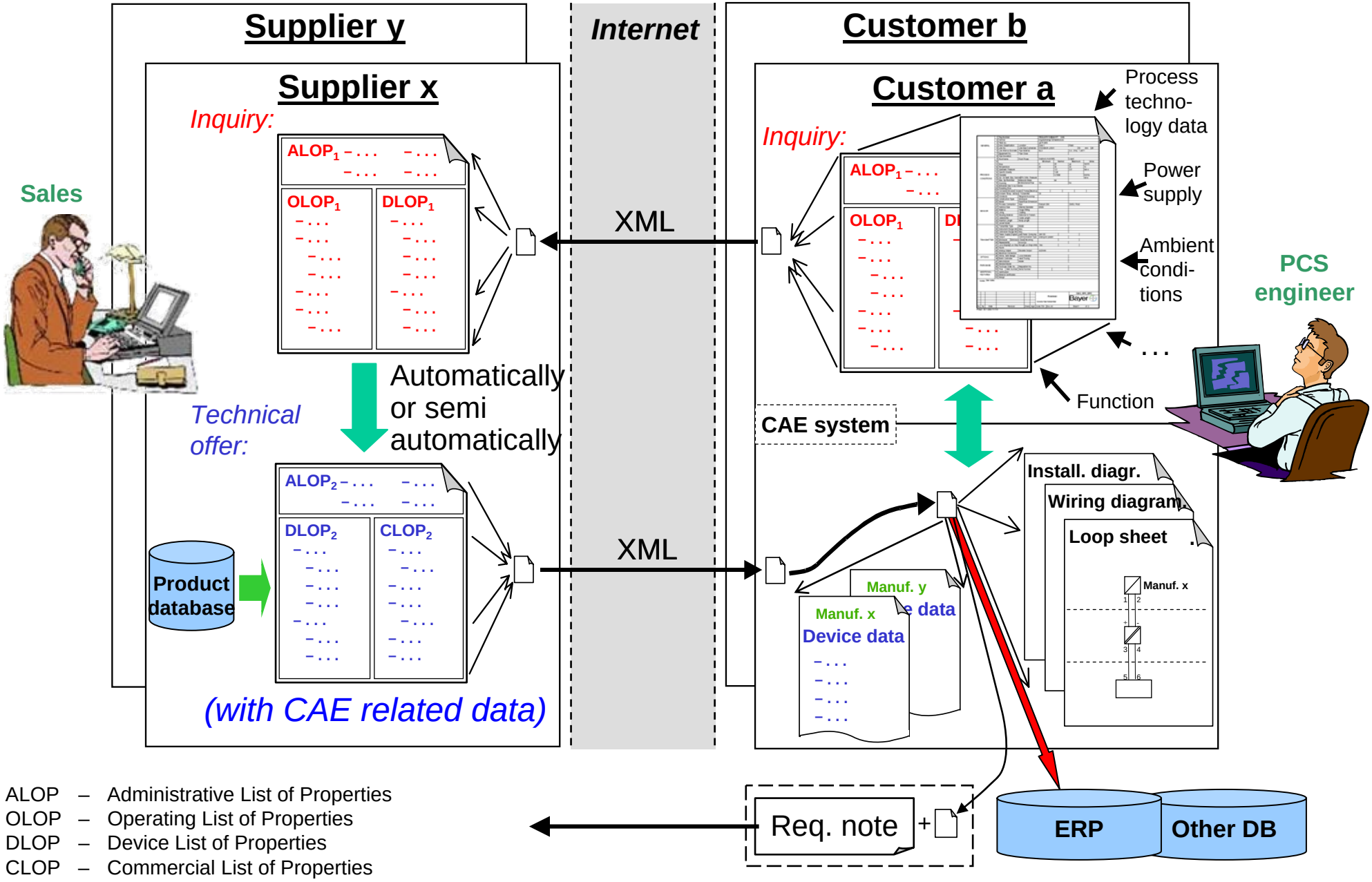
# Back up slides

# Core engineering workflow of PROLIST




ALOP – Administrative List of Properties
OLOP – Operating List of Properties
DLOP – Device List of Properties
CLOP – Commercial List of Properties

# Key role of CAE systems

- For the practical applications of LOPs according to IEC 61987-10, CAE systems play a decisive role on the customer side. They support and increase the efficiency of the work.

- One important condition is that all documents in the form of a transmission files, for example, should be capable of being exported from and imported to the system. It should also be possible to import CAE-relevant data such as terminal designations. The CAE systems should be capable of automatically accepting the master data of a new device type. Another important factor is the ability to compare the technical device data from several offers in the same CAE system.