ISO 15926 in Action
Production Grade Exchange of P&ID Drawings

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Autodesk
Business Development Plant

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Autodesk
Product Manager Plant

Key learning objectives

At the end of this class, you will be able to:

- Understand Autodesk iRING/ISO15926 strategy and implementation
- Understand the needs of an owner/operator of a process plant in regards to data exchange
- Learn about the challenges of data-exchange implementation and discover their Solutions
- Understand the benefits of a close partnership between industry and Autodesk

Agenda

Challenges – Why Data Exchange

DEXPI group

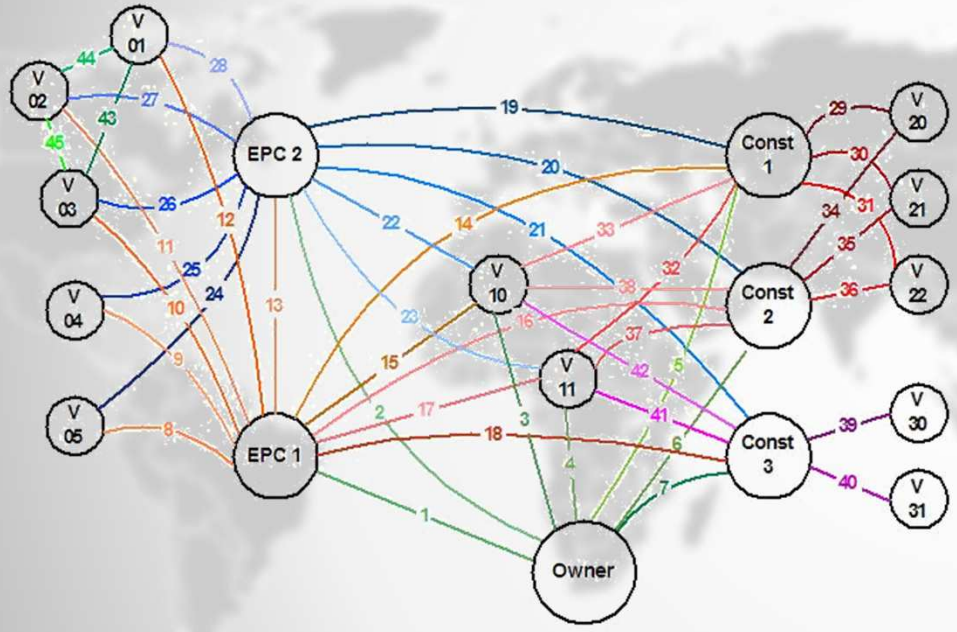
ISO 15926 – What's that?

Data interchange – Current efforts

Data Interchange – Future plans

Summary and Q&A

Process Plant Design Projects

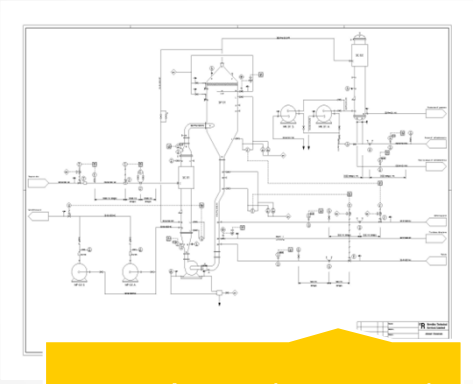


Complex and global with constant data exchange

- Multiple interfaces and communication paths
- Multiple languages and communication barriers

Types of data

Documents



Graphics (2D, 3D)

Stückliste zur Schubstange Zeichnung Nr...

Zeichen	Gegenstand	Stück-zahl	Material	Bemerkungen
A	Schubstange	1	Siemens-Martin-Stahl	Im Gabelende Keilnut.
B	Verschlußstück	1	" " "	
C	Bolzen	2	Schmiedeeisen	Mit 3/4"-Gewinde und je zwei Muttern O und N nebst Sicherung M.
D	Lagerschalenhälfte	2	Bronze	Neues Modell, ausgießen mit Lagermetall.
E	Zwischenlagen	2	Messing	
F	Kreuzkopfbolzen	1	Stahl	Mit 3/4"-Gewinde und Keilnut.
G	Scheibe	1	Schmiedeeisen	
H	Mutter	1	"	3/4"-Gewinde.
J	Keil	1	Stahl	
K	Scheibe	1	Schmiedeeisen	
L	Kopfschrauben	4	"	5/16"-Gewinde.
M	Sicherungsschraube	2	Stahl	
N	Mutter	2	Schmiedeeisen	S. a. C
O				
P				

Lists

Structures

Media

Paper

Data media (CDRW, USB)

FTP

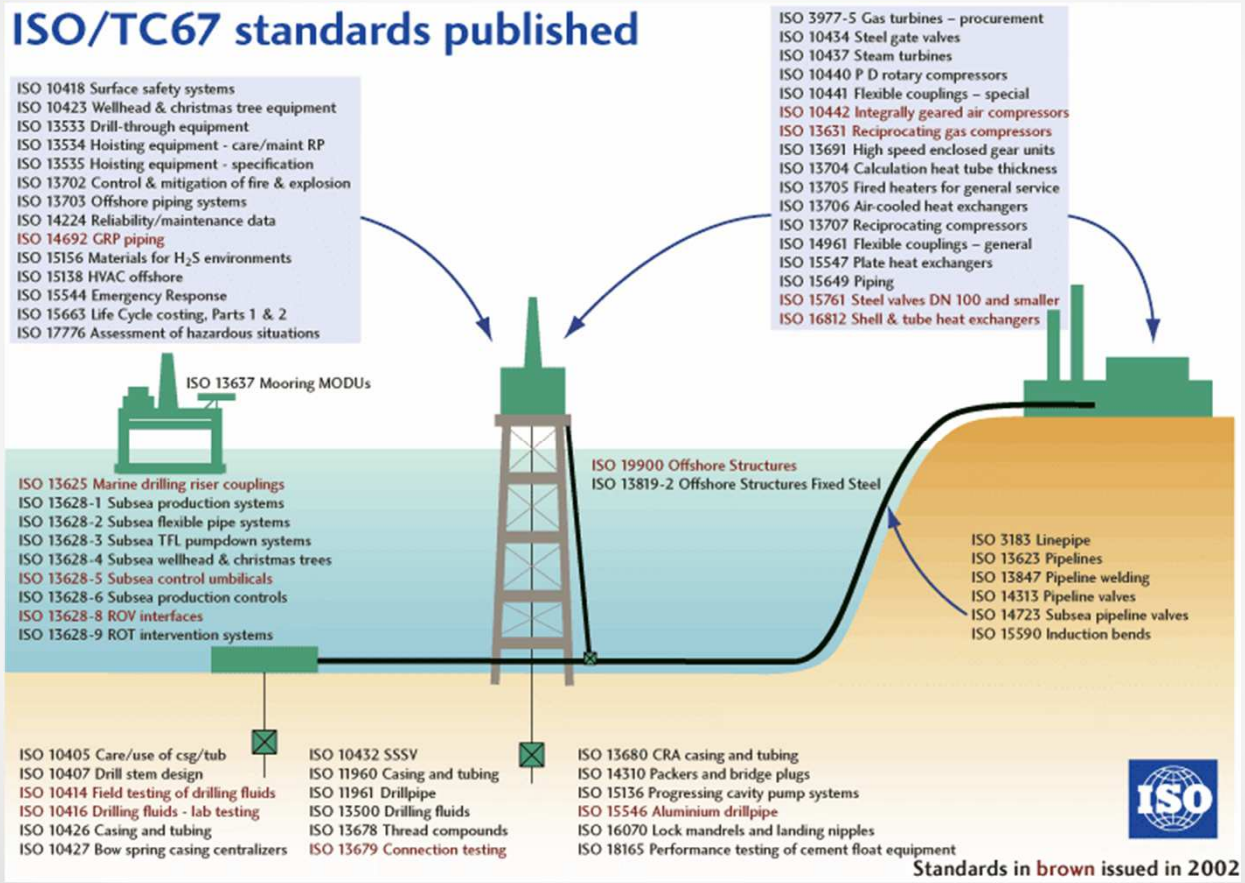
E-Mail

Cloudstorage

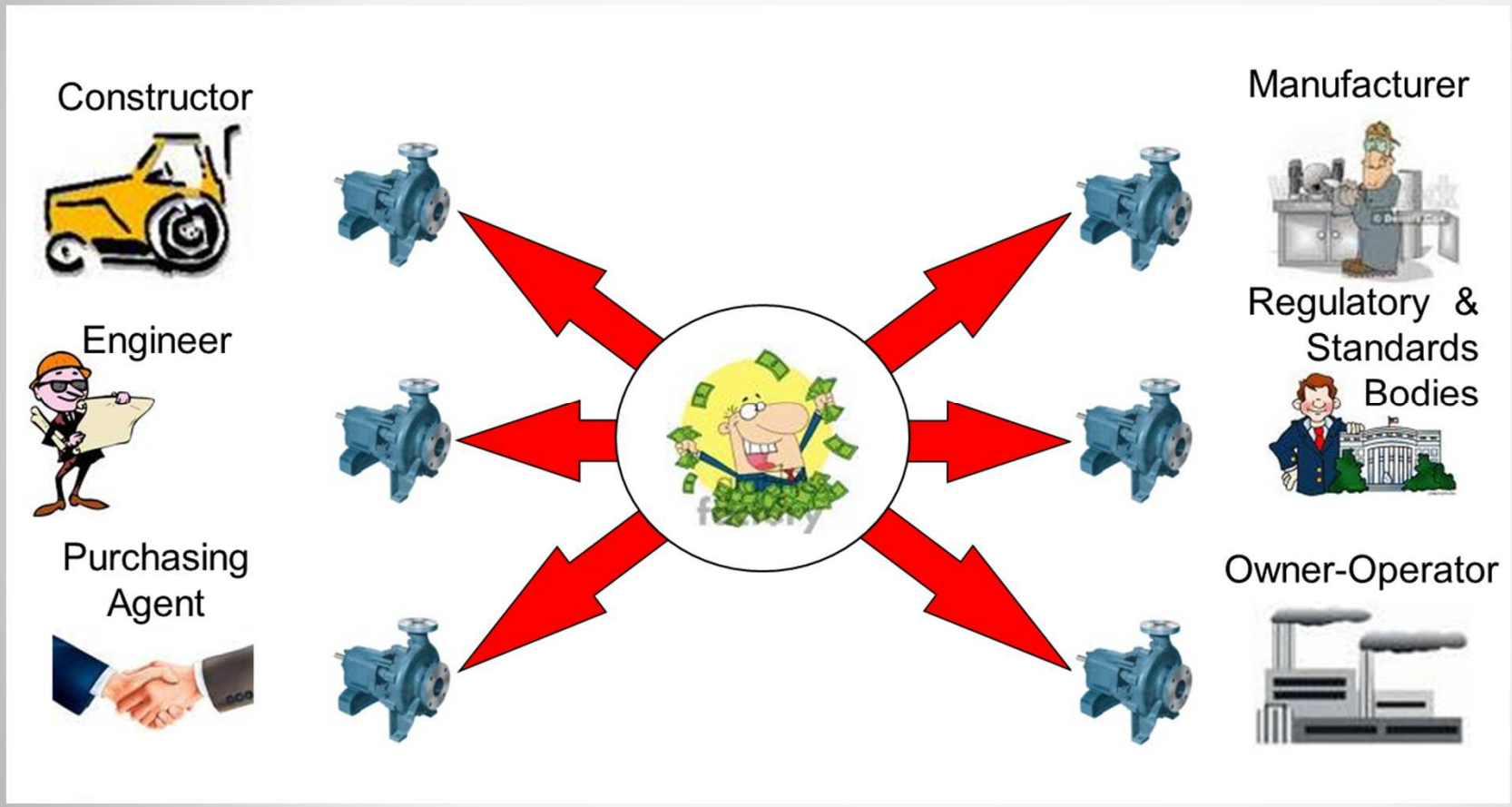
Social Networks

VPN

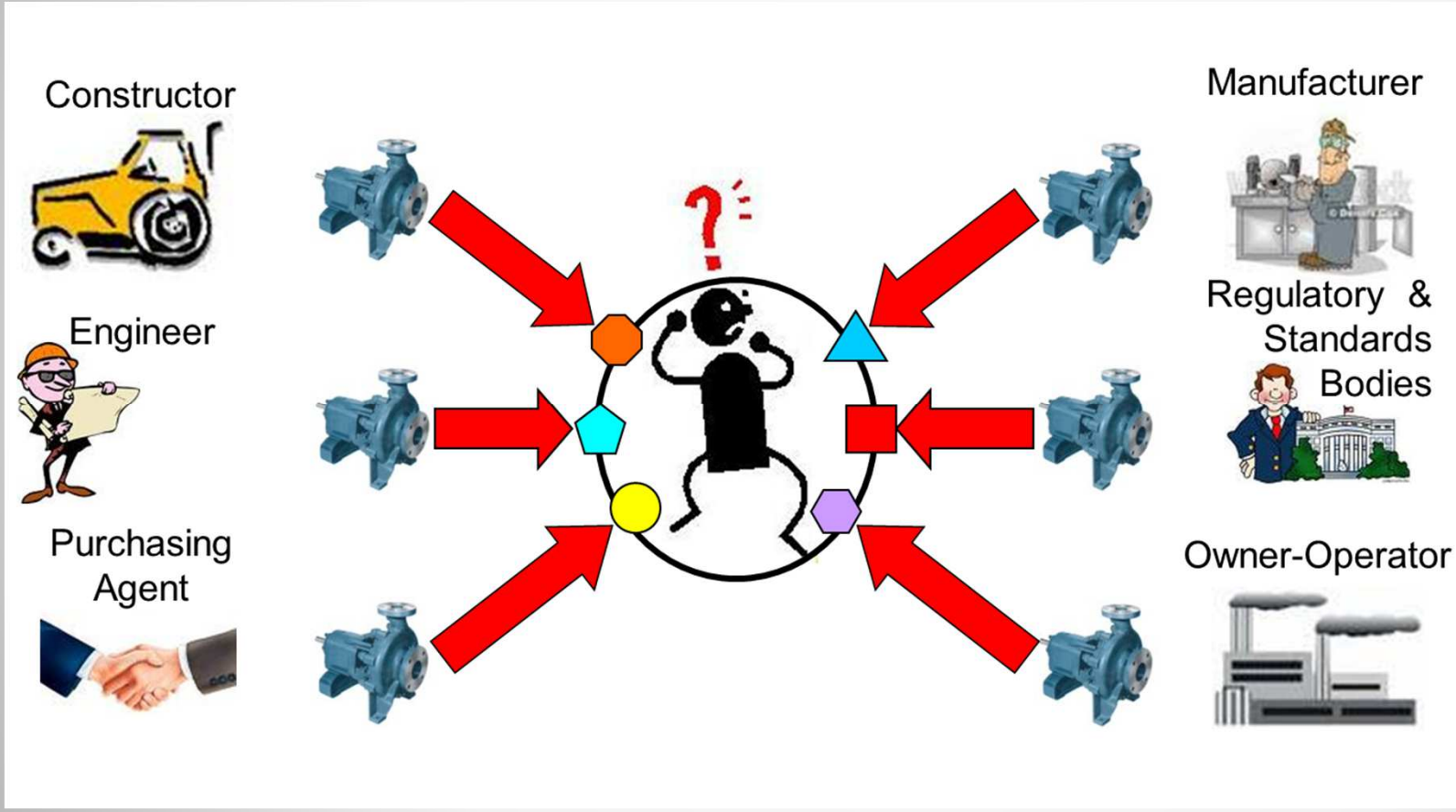
Data standards in O&G Process Plant



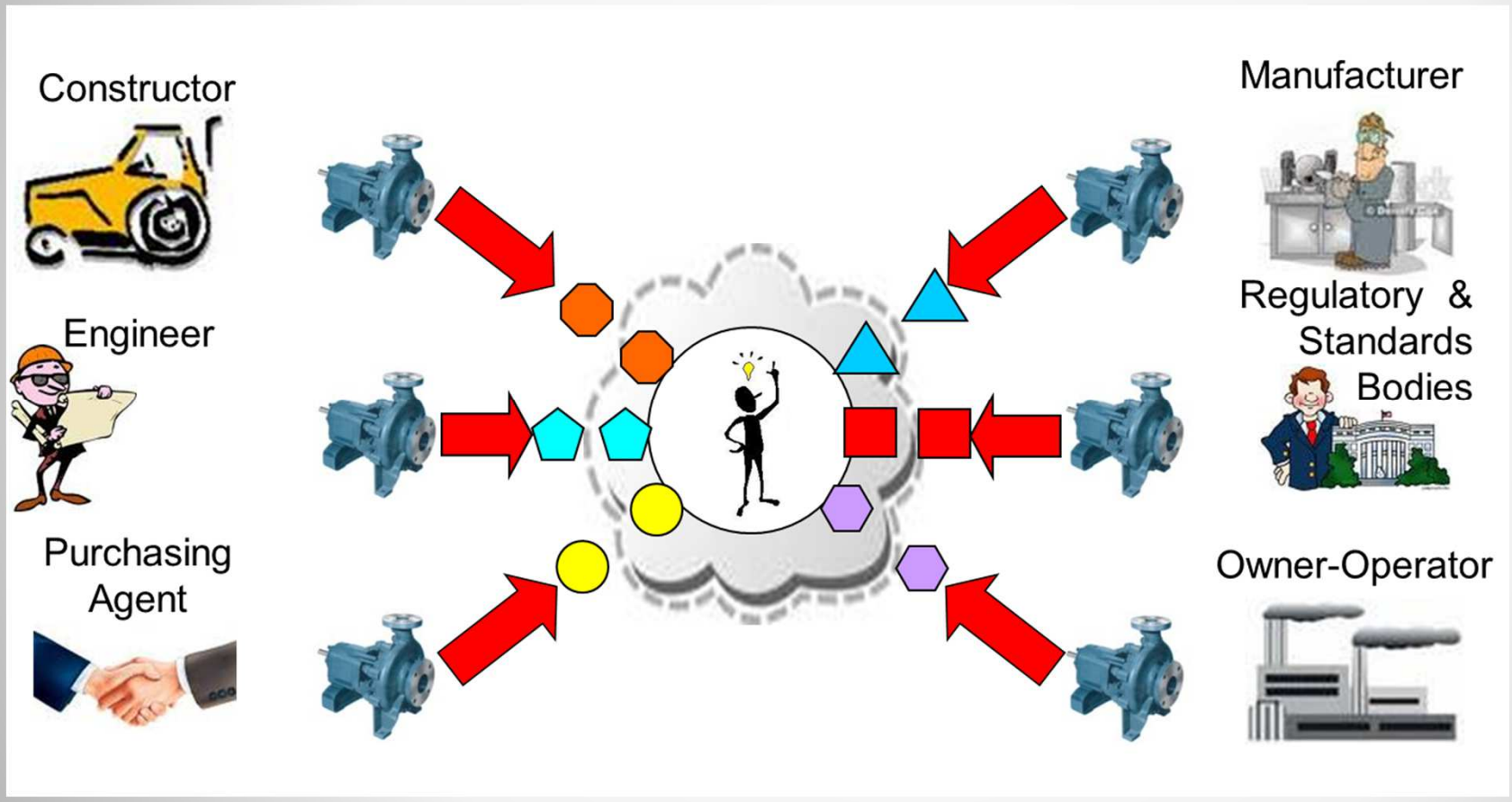
How Information Exchange is Supposed to Work



How Information Exchange Actually Works



How ISO 15926 Handles Information Exchanges



Agenda

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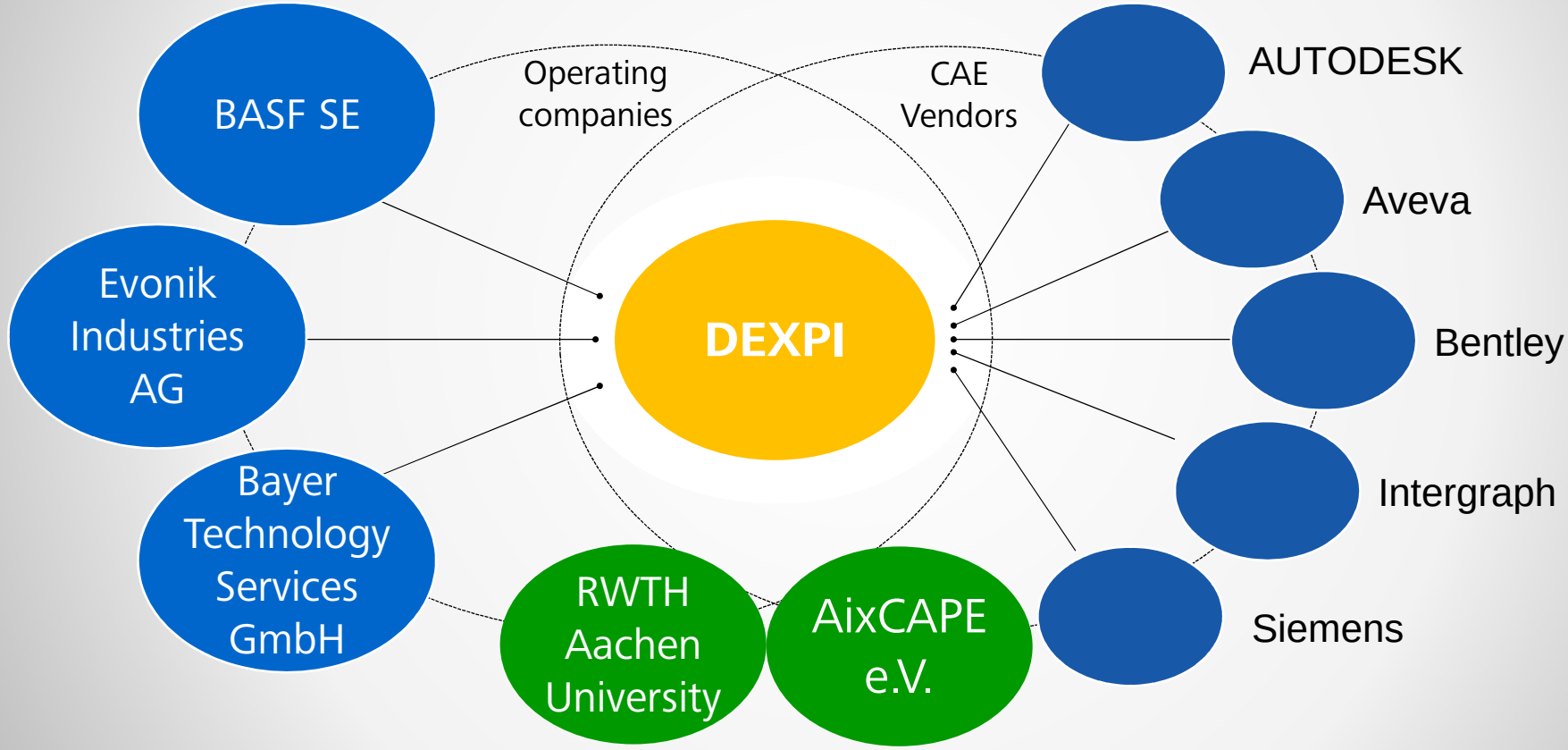
Summary and Q&A

DEXPI members

Data EXchange in the Process Industry



DEXPI approach

- Bottom up
- Small and pragmatic steps
- 80% functionality is fine
- Working and learning group
- Public presentation of results
- Linked to other groups and organisations

Noumenon Consulting Limited

MIMOSA

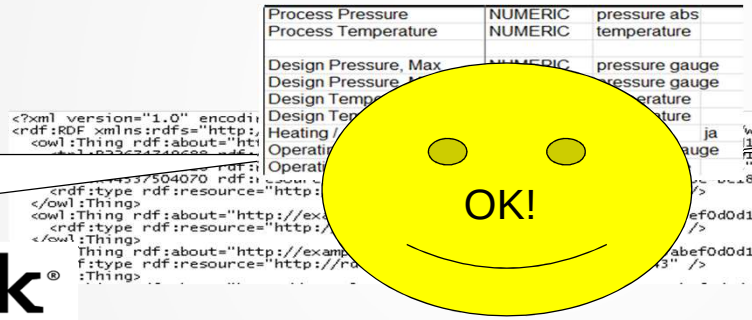
Fiatech™
Innovation that builds the world.

POSC Caesar Association

DEXPI proof of concept ISO 15926
PAAT Congress, Fulda, Germany 2011

DEXPI proof of concept ISO 15926
PAAT Congress, Fulda, Germany 2011

Some equipment properties as
ISO 15926 OWL format



BASF
The Chemical Company

EVONIK
INDUSTRIES

Autodesk®

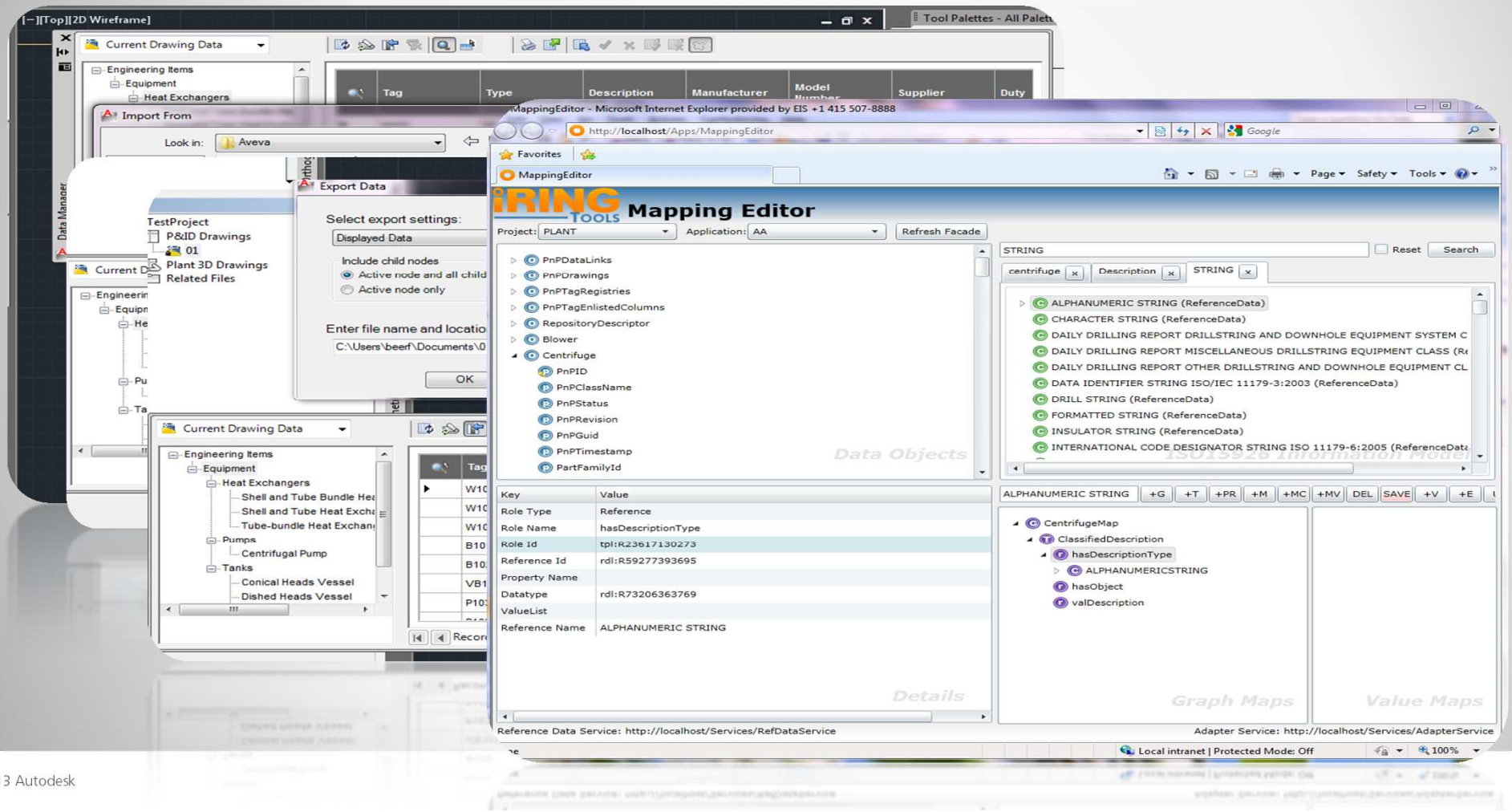
SIEMENS

AVEVA
CONTINUAL PROGRESSION

INTERGRAPH

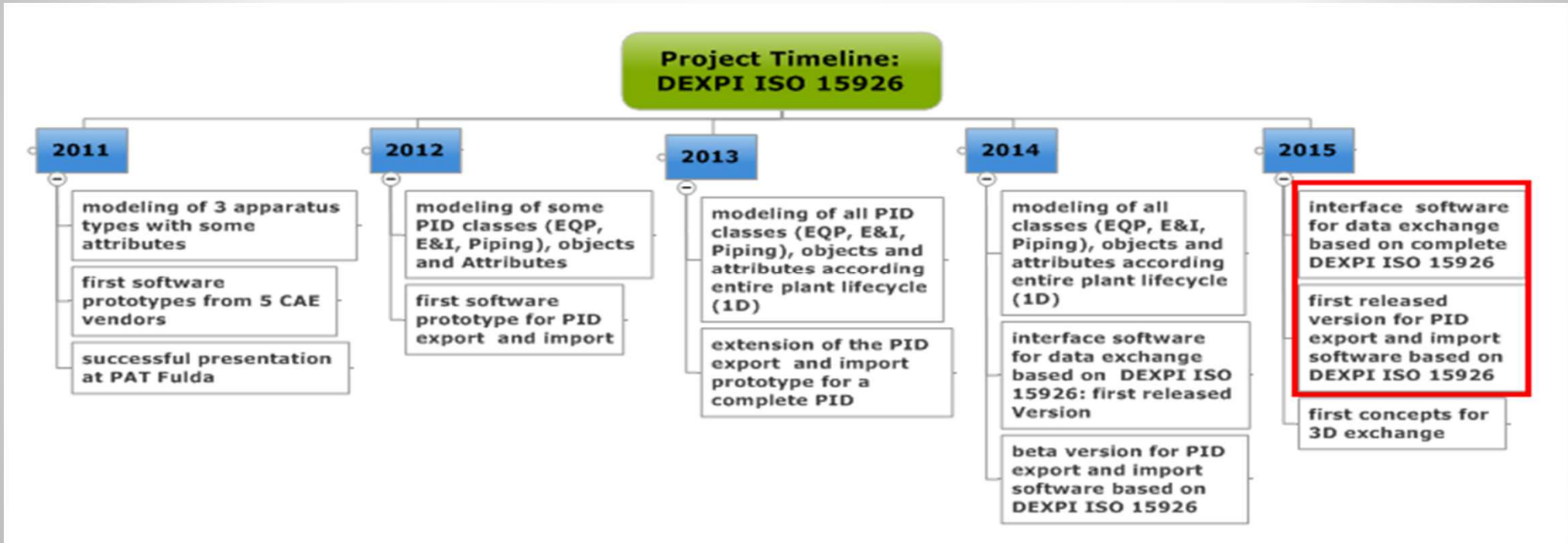
Bentley
Sustaining Infrastructure

AutoCAD P&ID
ISO 15926 prototype



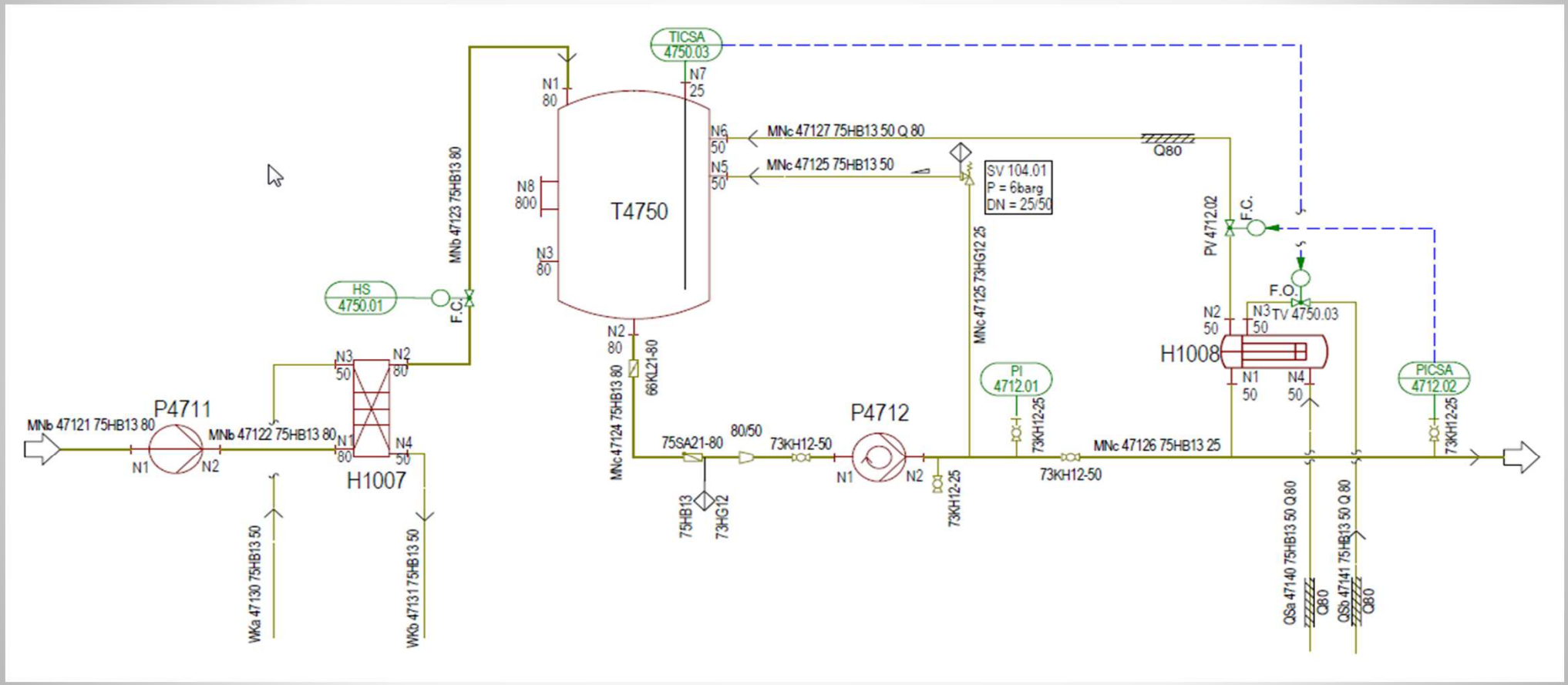
AUTODESK.

DEXPI roadmap until 2015



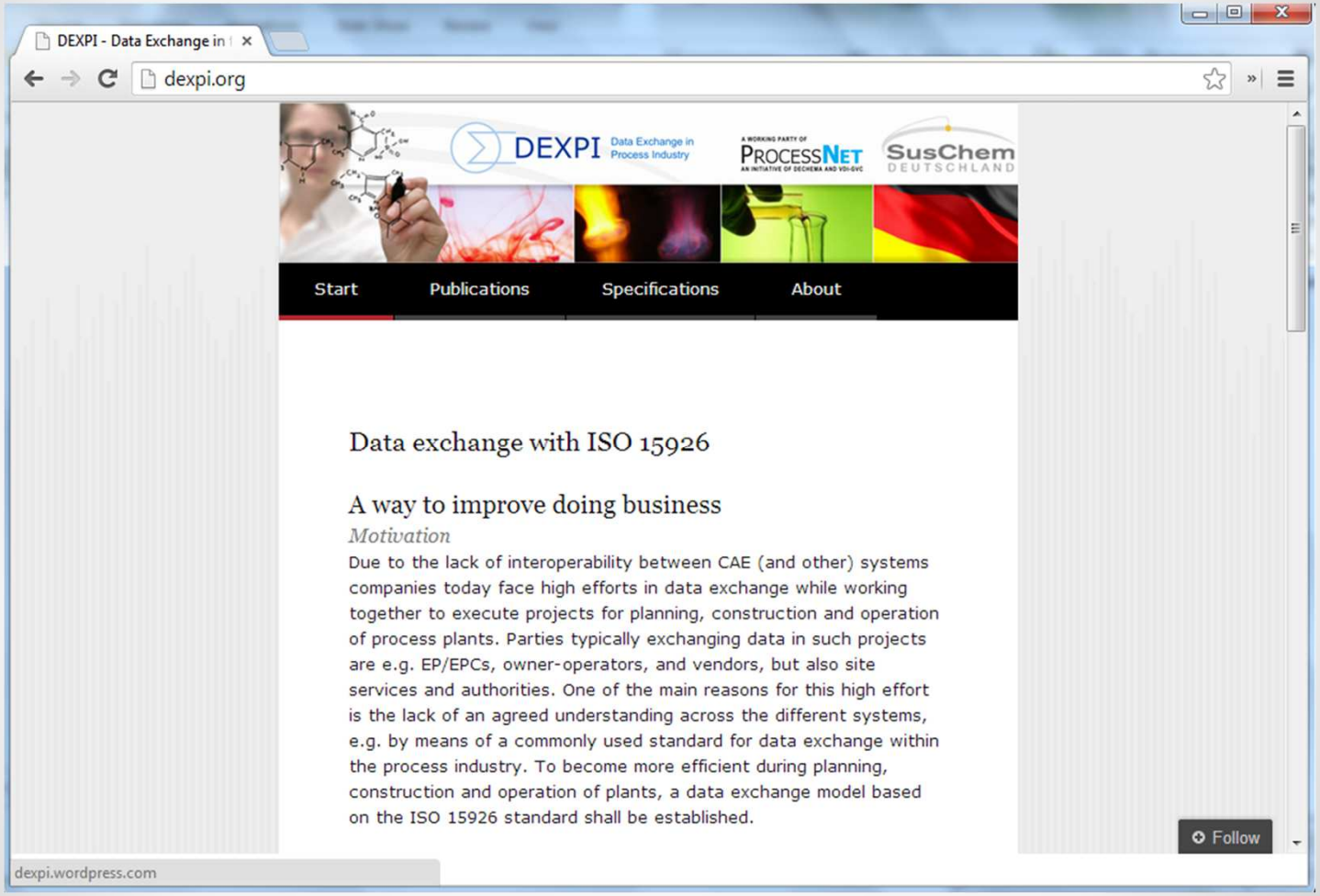
main goals

Scope for data exchange - P&ID fragment



Proteus / XMpLant schema to bridge the gap

Website DEXPI.org



Proteus XMpLant V3.3.3

- Several predefined attributes

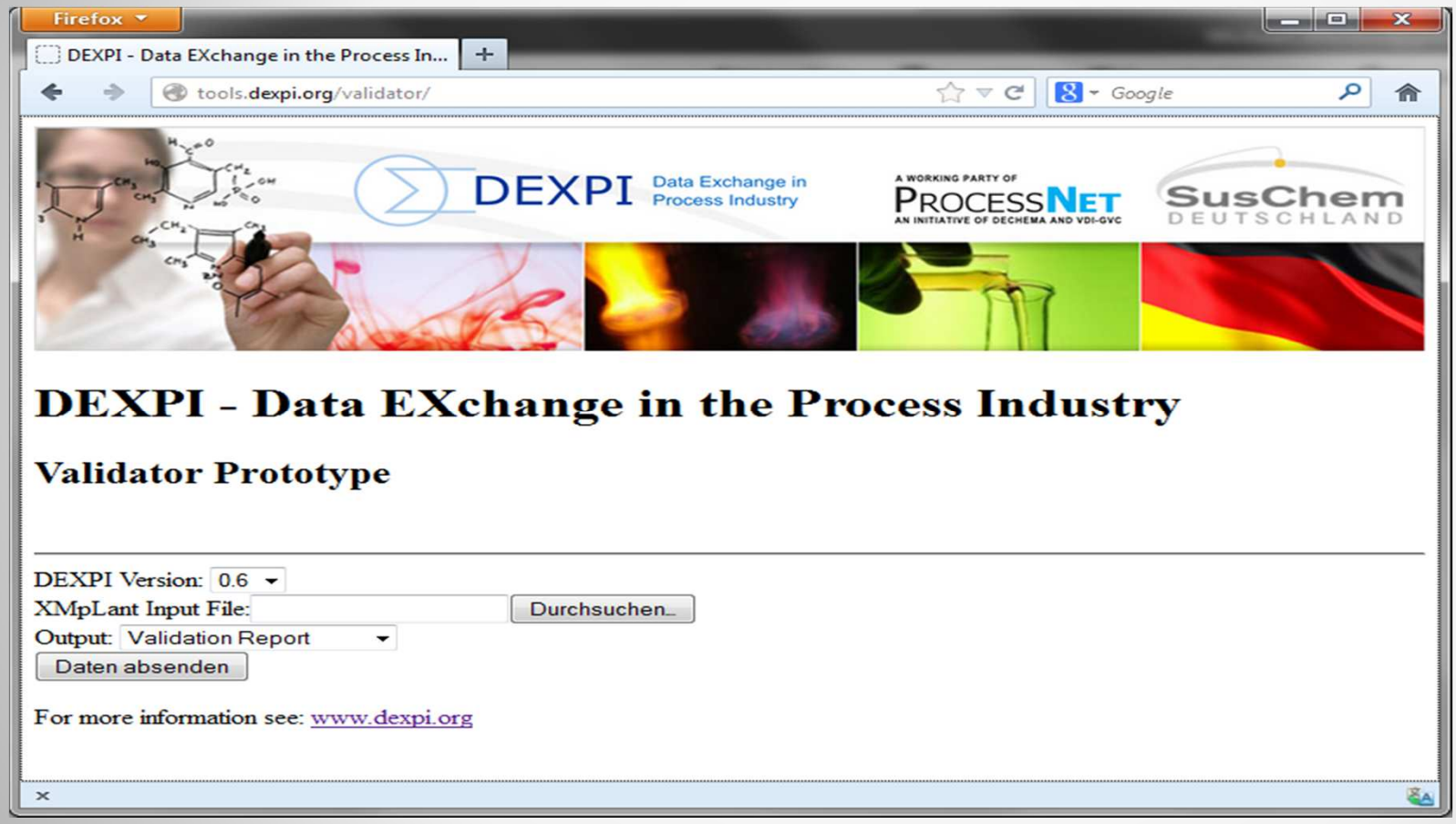
```
<NominalDiameter Value="80.0" Units="mm"  />
```

- Non-predefined attributes as „generic attributes“:

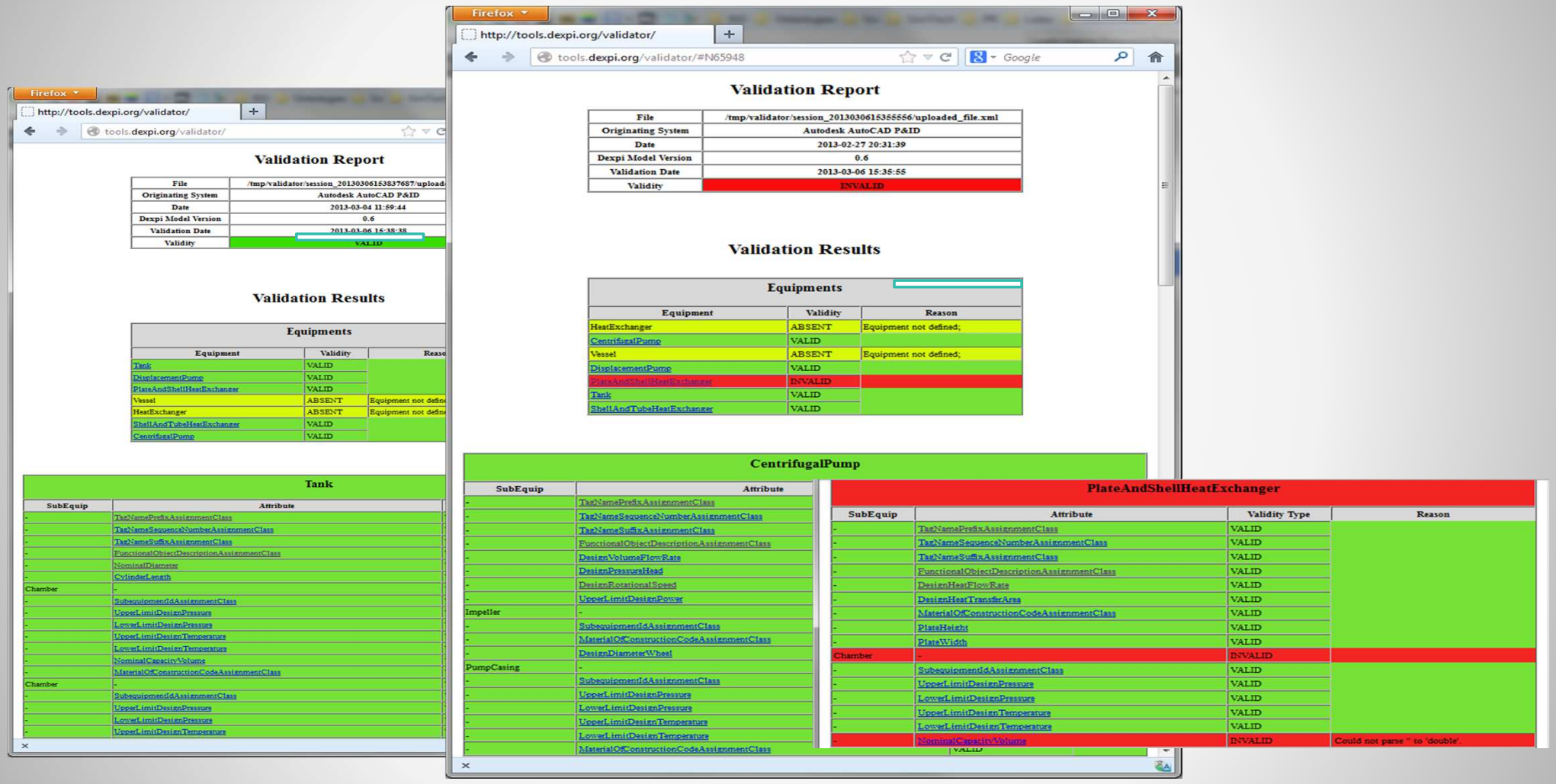
```
<GenericAttribute
Name="FunctionalObjectDescriptionAssignmentClass"
Value="Prozessgaskühler"
Format="string"
URI="http://posccaesar.org/rdl/RDS2101566251"/>

<GenericAttribute
Name="DesignHeatFlowRate"
Value="313"
Format="double"
Units="Kilowatt"
URI="http://sandbox.dexpi.org/rdl/DesignHeatFlowRate"/>
```

DEXPI Validator



Formatted Report



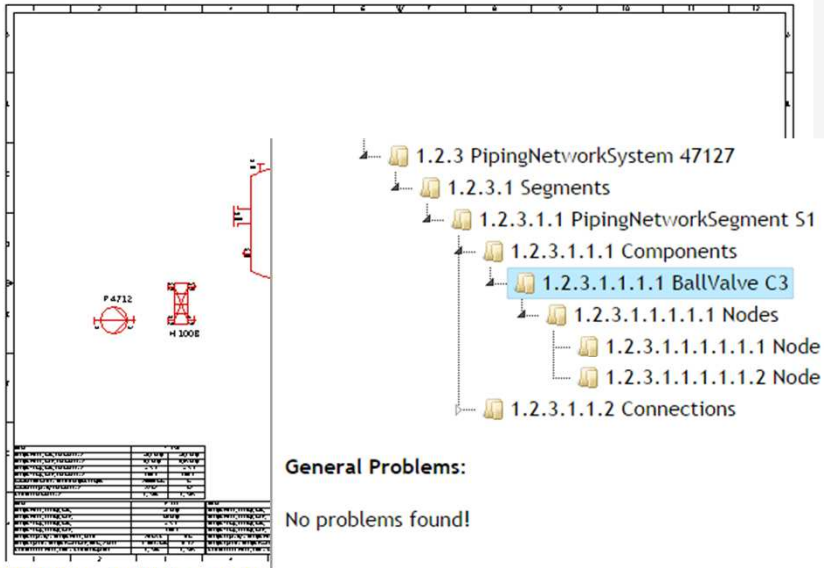
Graphical Display (new)

Your Verification Results

Navigation Tree:

Click on the small arrow to uncollaps the tree. The element data will appear under the PID image.

- 1 Plant
  - 1.1 Equipments
  - 1.2 PipingNetworkSystems
    - 1.2.1 PipingNetworkSystem 47125
      - 1.2.1.1 PropertyBreaks
      - 1.2.1.2 Segments
        - 1.2.1.2.1 PipingNetworkSegment S1
          - 1.2.1.2.1.1 Components
            - 1.2.1.2.1.1.1 SafetyReliefValve SV 104.01
              - 1.2.1.2.1.1.1.1 Nodes
          - 1.2.1.2.1.2 Connections
        - 1.2.1.2.2 PipingNetworkSegment S2
    - 1.2.2 PipingNetworkSystem 47126



Click here for higher resolut

- 1.2.3 PipingNetworkSystem 47127
  - 1.2.3.1 Segments
    - 1.2.3.1.1 PipingNetworkSegment S1
      - 1.2.3.1.1.1 Components
        - 1.2.3.1.1.1.1 BallValve C3
          - 1.2.3.1.1.1.1.1 Nodes
            - 1.2.3.1.1.1.1.1.1 Node
            - 1.2.3.1.1.1.1.1.2 Node
      - 1.2.3.1.1.2 Connections

General Problems:

No problems found!

Type	Value
Source ID	PIPE_47127_C1
Source Line	6373

Components

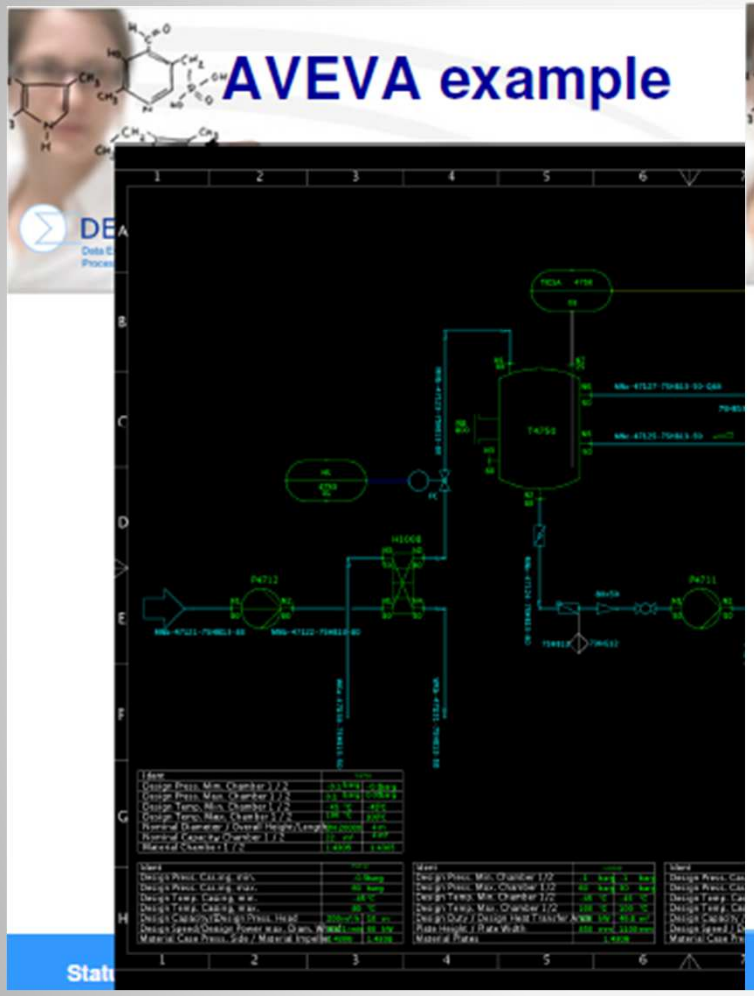
Relation	Value
Nodes	1.2.3.1.1.1.1.1.1 Node
	1.2.3.1.1.1.1.1.2 Node

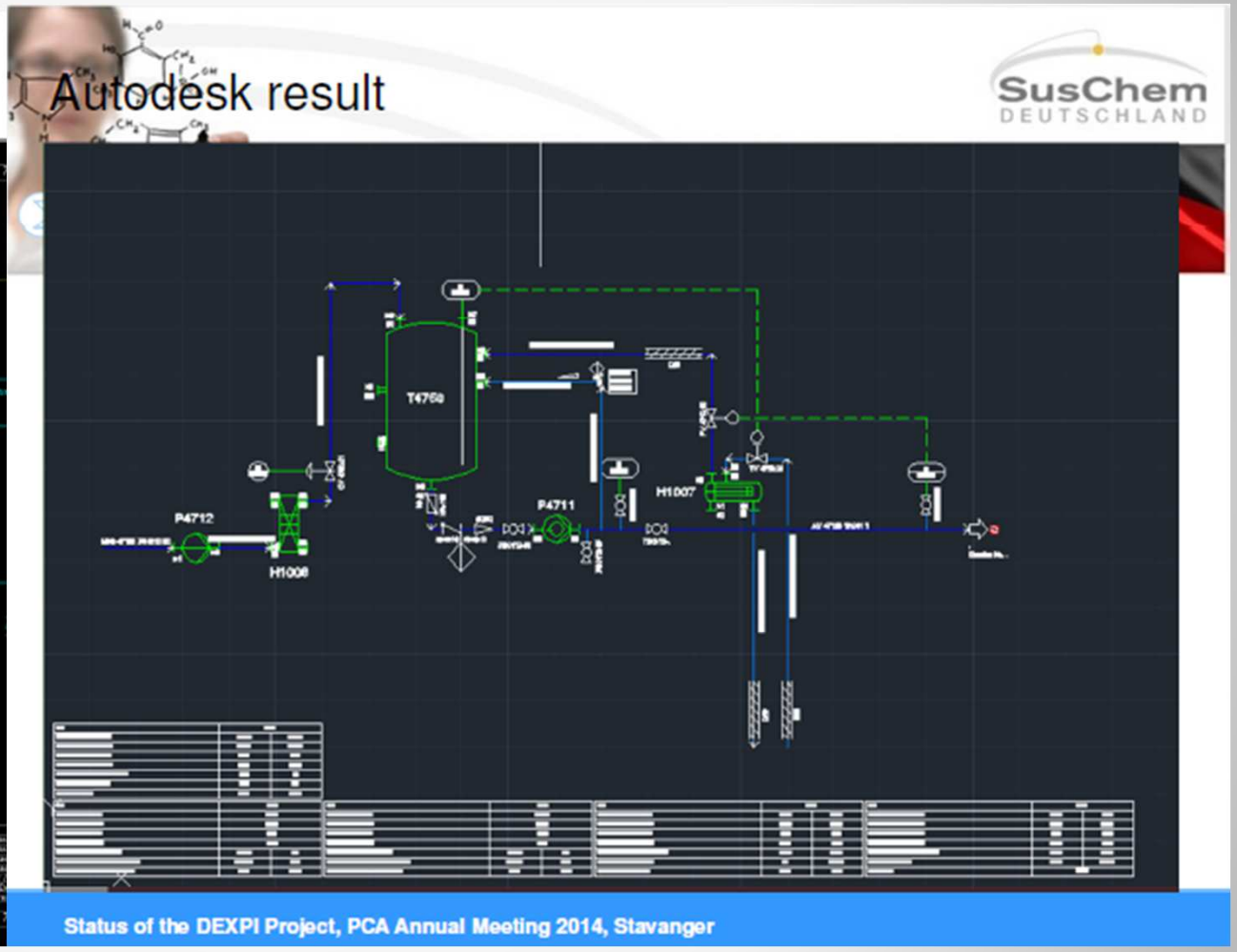
Data Attributes

Relation	Value
TagNameAssignmentClass	"C3"

DEXPI Status report

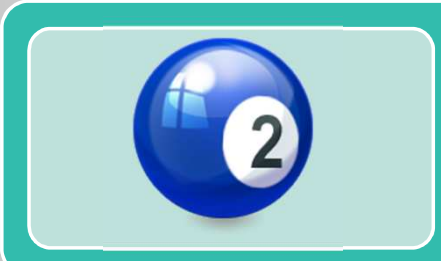
Progress report





Three points why DEXPI is different to other industry groups

Three major O/O **and** the major CAD vendors in **one** working group.



Very pragmatic approach with an agile kind of working mode.

So far, the group has sticked to it's tight schedule.

Agenda

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DEXPI group
ISO 15926 – What's that?
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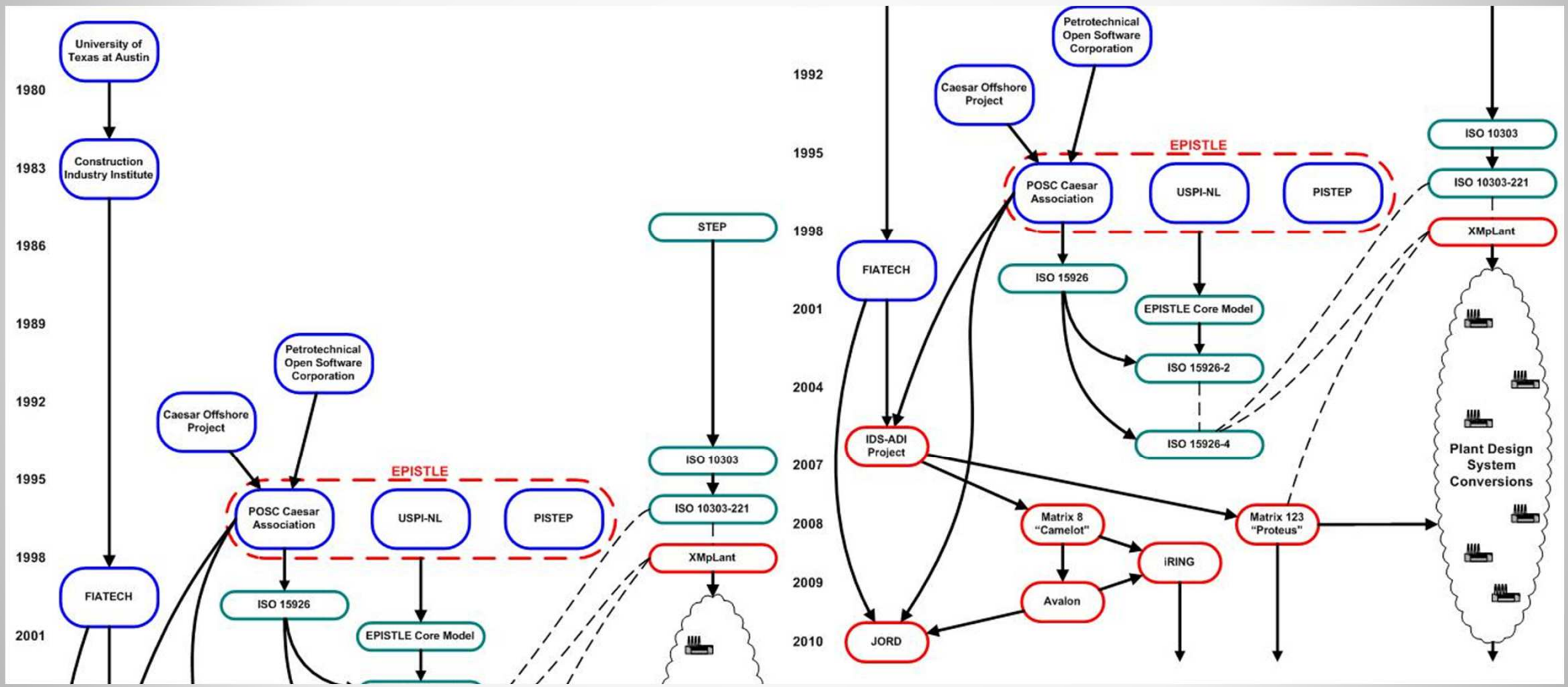
Summary and Q&A

AUTODESK.

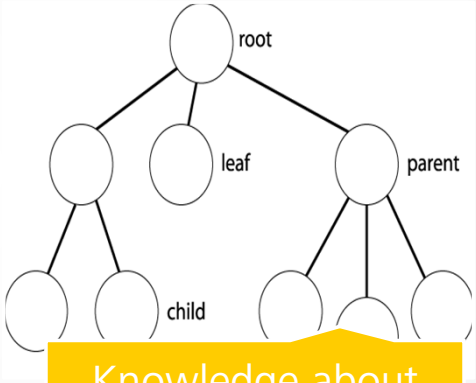
Es war einmal…



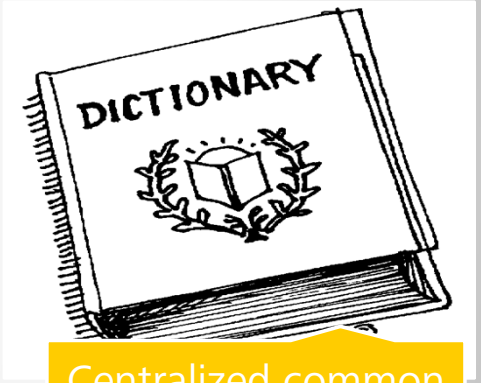
The Basic Concepts of ISO 15926

Describe the how not the what

Exchange data between machines



Knowledge about family



Centralized common dictionary (RDL)

The ISO 15926 framework

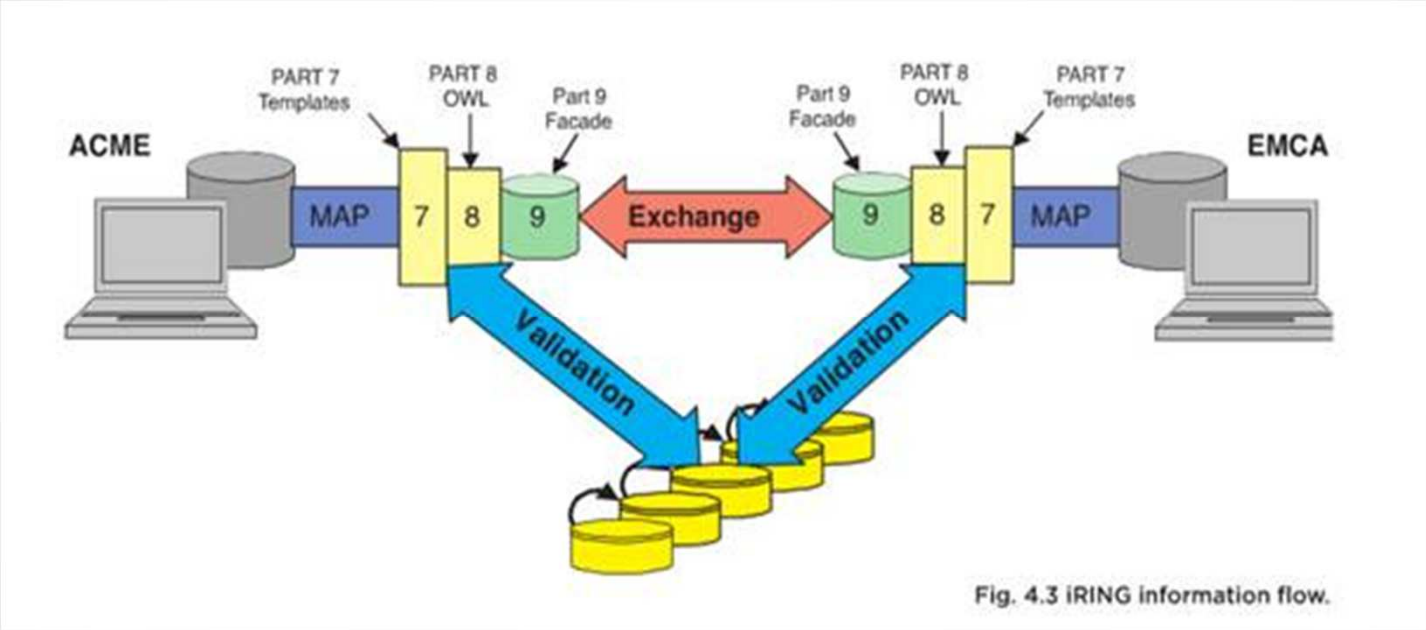


Fig. 4.3 iRING information flow.

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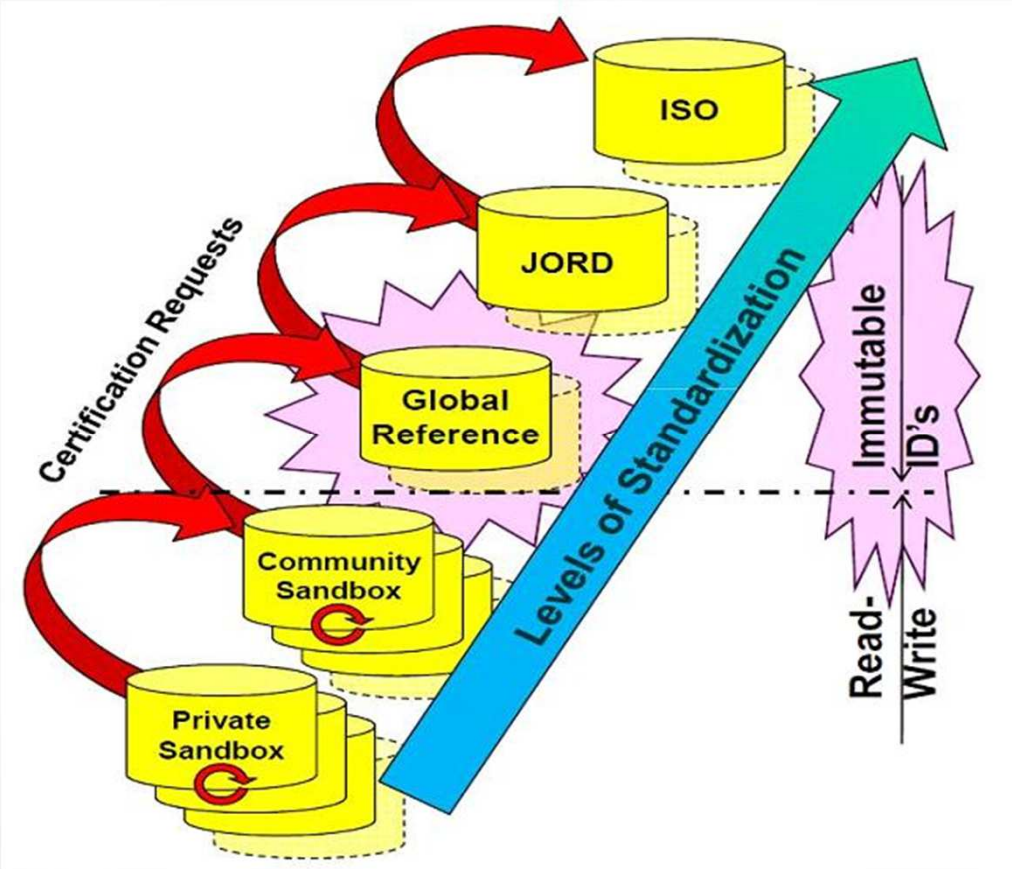
Standardization



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iRING – the new name for ISO 15926

(ISO 15926 Realtime Network Interoperability Grid)

- Organisations

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ISO

POSC Caesar Association

MIMOSA

USPI-NL
Uitgebreid Samenwerkingsverband Procesindustrie-Nederland

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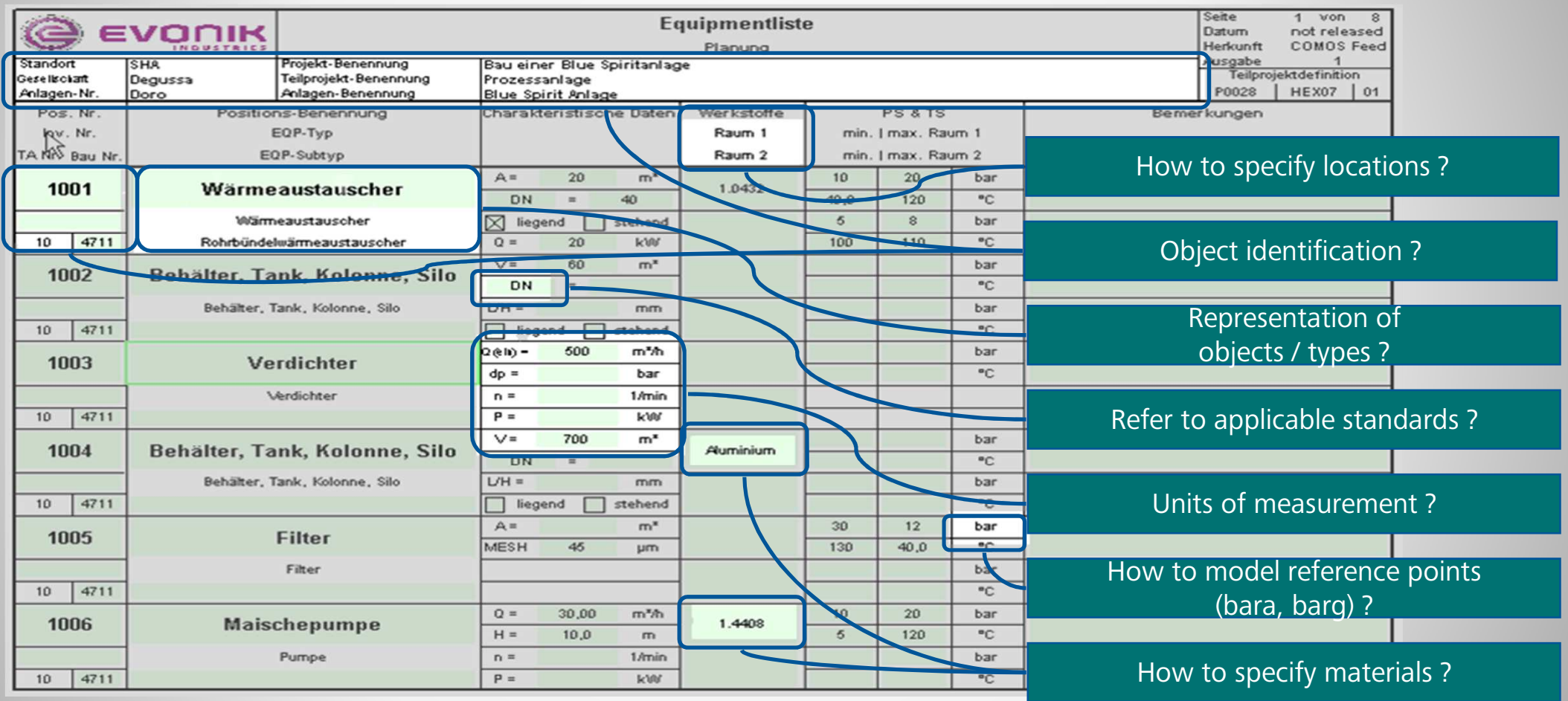
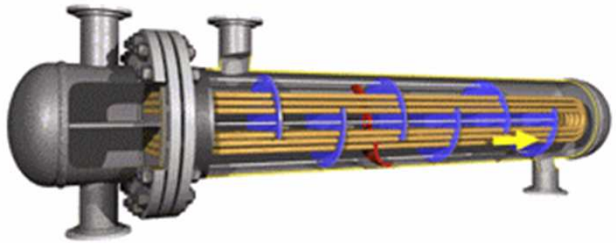
Open modeling issues



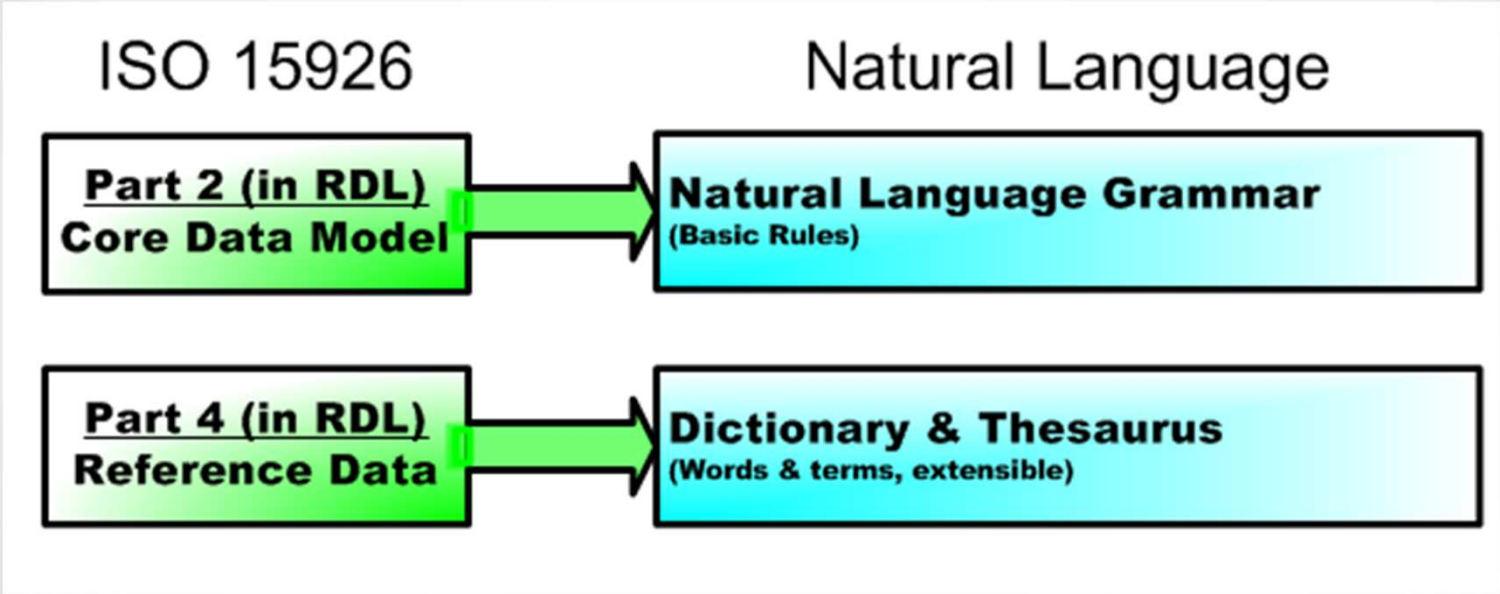
How ISO15926 works: Modelling a heat exchanger



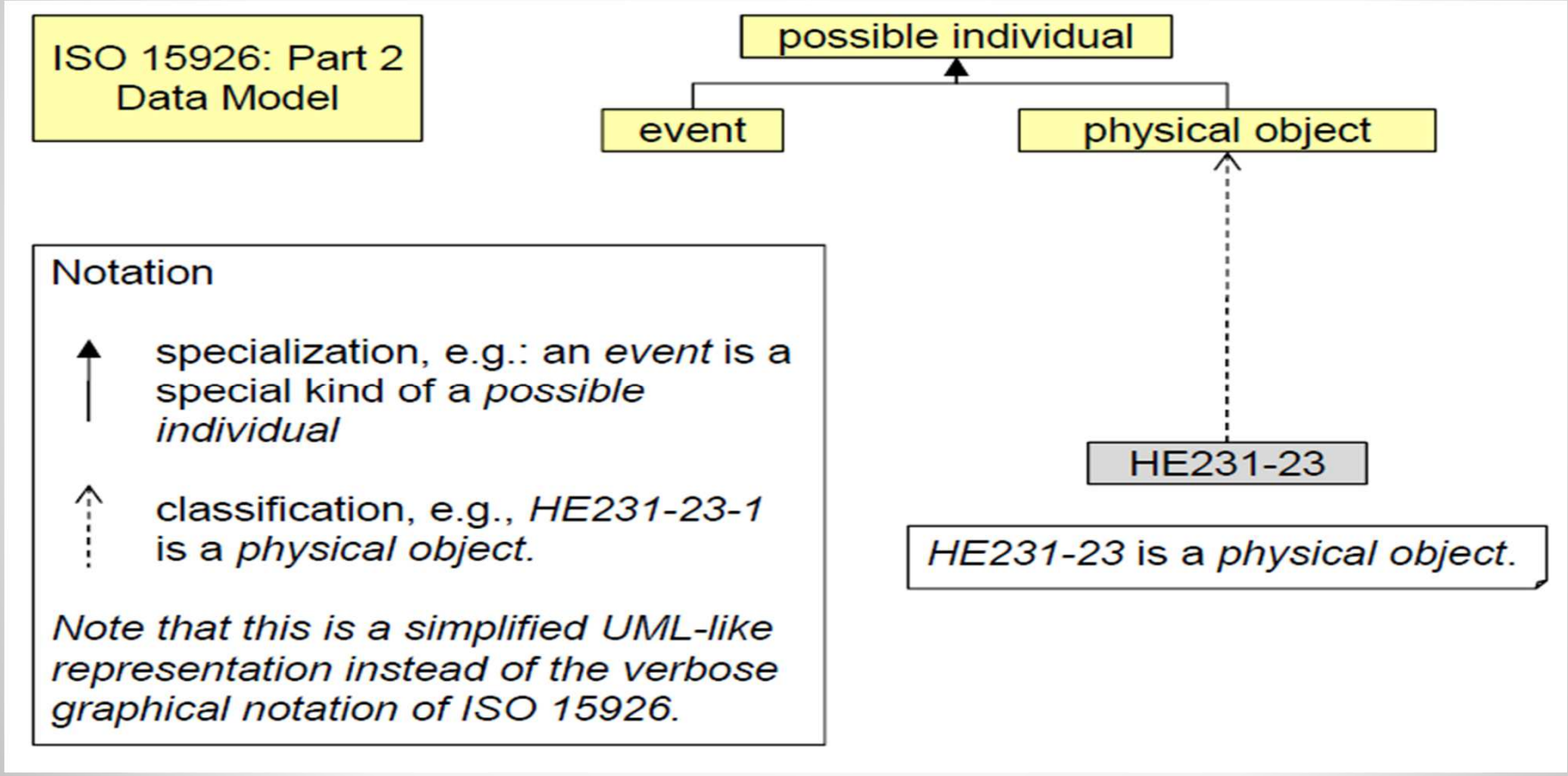
Copyright Southern Heat Exchanger Corporation

Part 2 Data model	Grammar of a language
Part 4 Reference data	Dictionary
Part 7 Template methodology	Phrases & Sentences
Part 8 RDF / OWL	Writing / Paper
Part 9 Facades	Reading books

How ISO 15926 Works - Part 2 and Part 4



ISO 15926 – part 2



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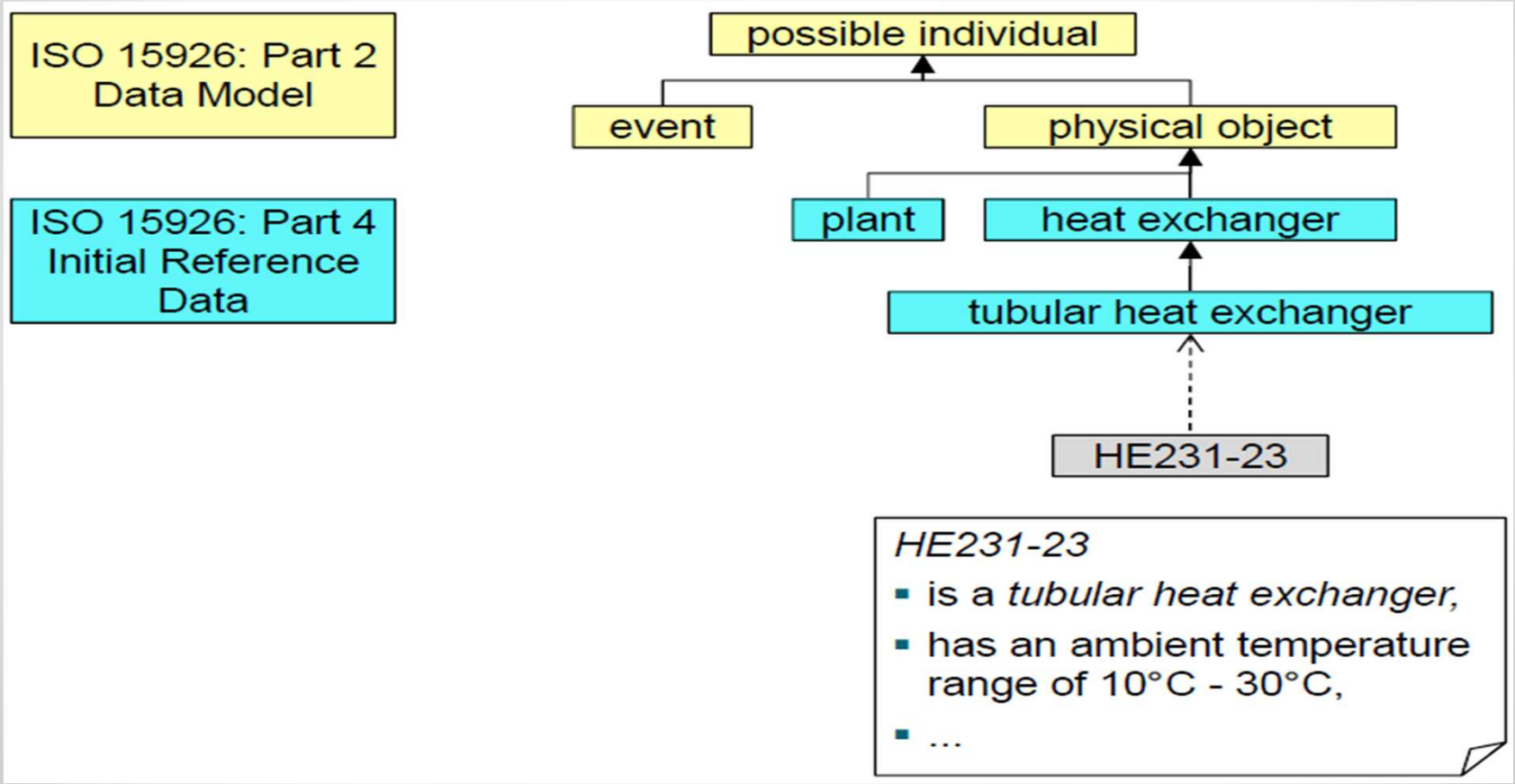
ISO 15926



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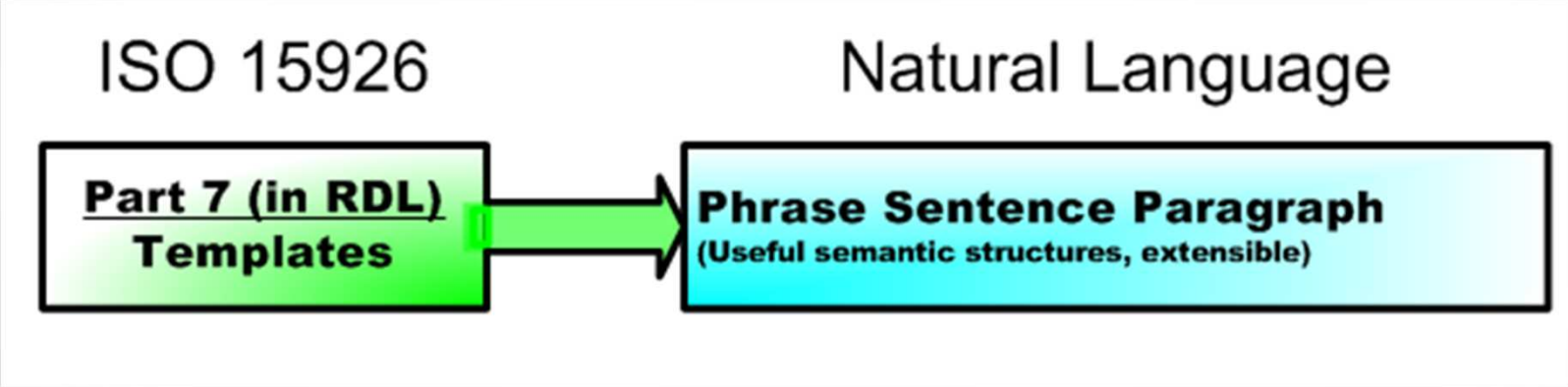
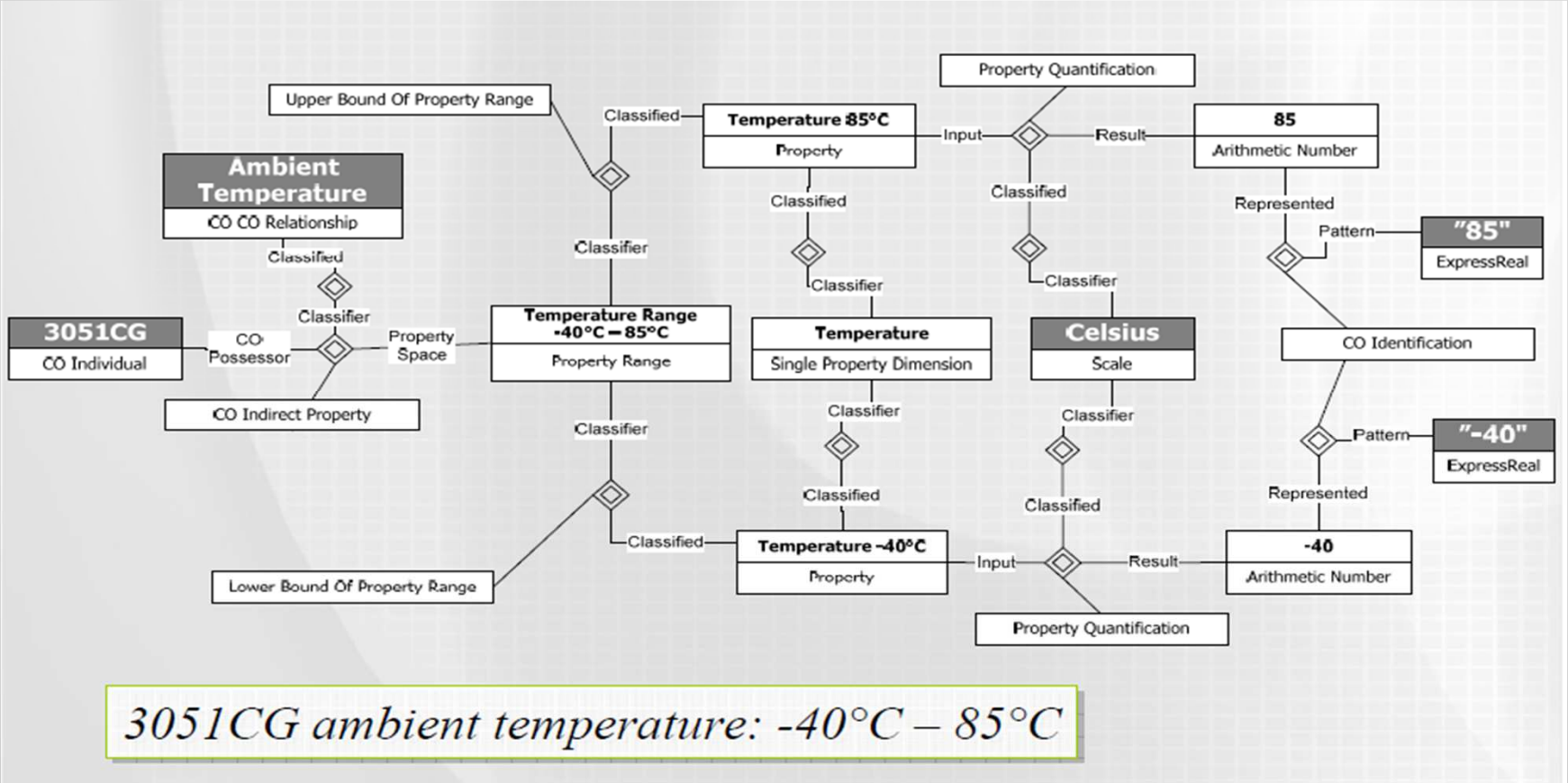
How ISO 15926 Works - Part 7

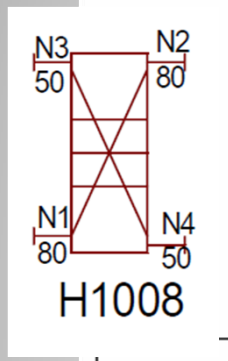


A *Simple* Example of a Data Record



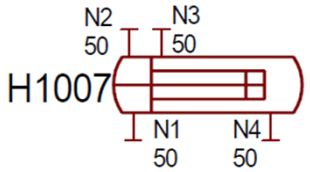
AUTODESK.

Heat Exchanger Modelling



HeatExchanger
-TagNamePrefixAssignmentClass : string
-TagNameSequenceNumberAssignmentClass : string
-TagNameSuffixAssignmentClass : string
-FunctionalObjectDescriptionAssignmentClass : string
-DesignHeatFlowRate : power
-DesignHeatTransferArea : area

Specialization



PlateAndShellHeatExchanger
-MaterialOfConstructionCodeAssignmentClass : string
-PlateHeight : distance
-PlateWidth : distance

ShellAndTubeHeatExchanger
-NominalDiameter : distance

Decomposition

2

Chamber
-SubequipmentIdAssignmentClass : string
-UpperLimitDesignPressure : pressure
-LowerLimitDesignPressure : pressure
-UpperLimitDesignTemperature : temperature
-LowerLimitDesignTemperature : temperature
-NominalCapacityVolume : volume

1

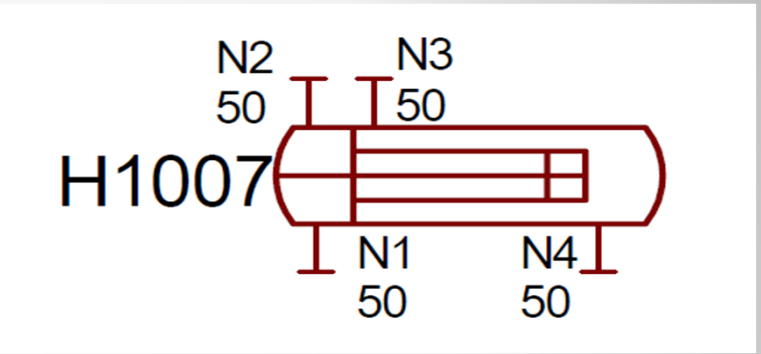
HeatExchangerShell
-SubequipmentIdAssignmentClass : string
-UpperLimitDesignPressure : pressure
-LowerLimitDesignPressure : pressure
-UpperLimitDesignTemperature : temperature
-LowerLimitDesignTemperature : temperature
-MaterialOfConstructionCodeAssignmentClass : string

1

ShellAndTubeHeatExchangerTubeBundle
-SubequipmentIdAssignmentClass : string
-UpperLimitDesignPressure : pressure
-LowerLimitDesignPressure : pressure
-UpperLimitDesignTemperature : temperature
-LowerLimitDesignTemperature : temperature
-MaterialOfConstructionCodeAssignmentClass : string
-TubeLength : distance

Heat Exchanger in the Sample PID

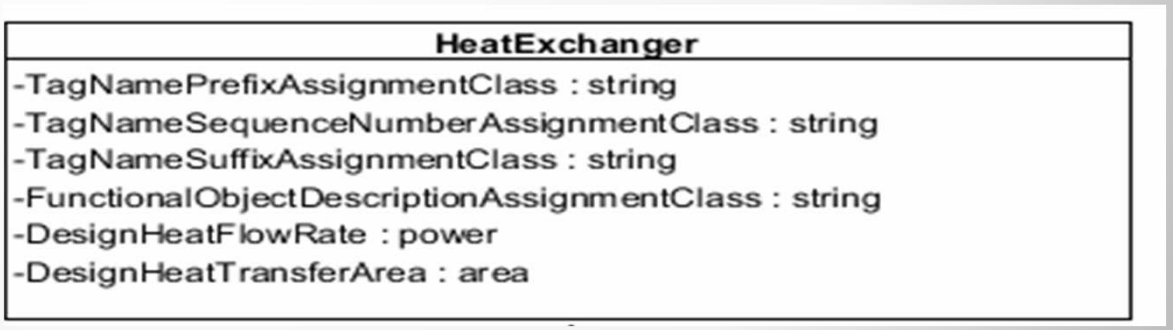
Here:
Shell and Tube Heat Exchanger



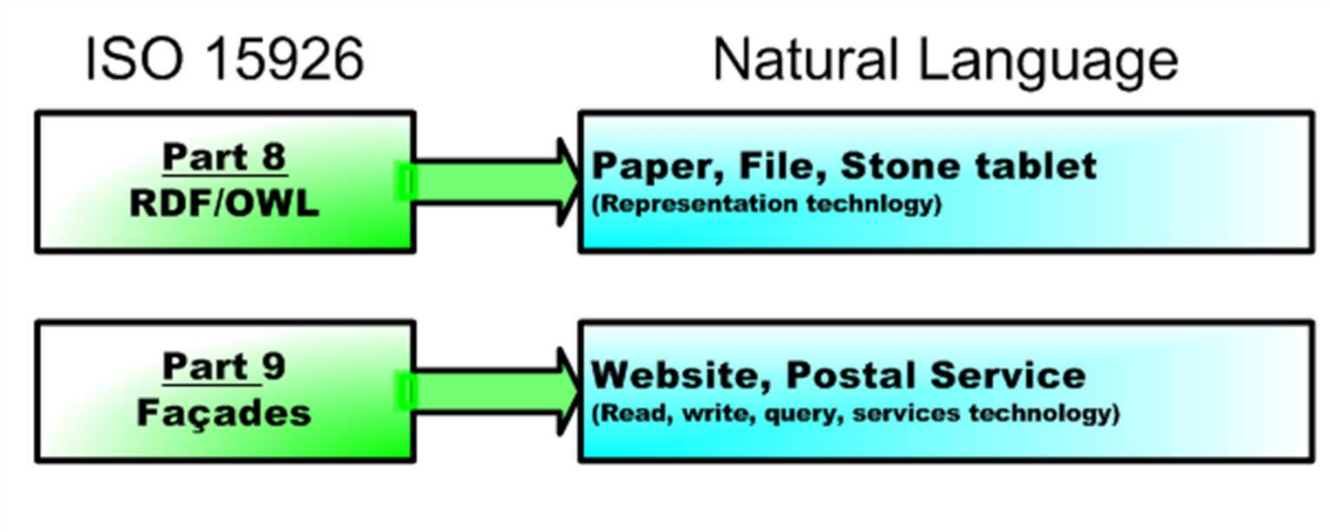
Ident	H1007	
Design Press. min. Chamber 1 / 2	-1 barg	-1 barg
Design Press. max. Chamber 1 / 2	60 barg	30 barg
Design Temp. min. Chamber 1 / 2	-45 °C	-45 °C
Design Temp. max. Chamber 1 / 2	100 °C	100 °C
Design Duty / Design Heat Transfer Area	313 kW	46,8 m²
Nominal Diameter / Tube Length	DN 800	2200 mm
Material Tubes / Material Shell	1.4306	1.4308

Heat Exchanger attributes

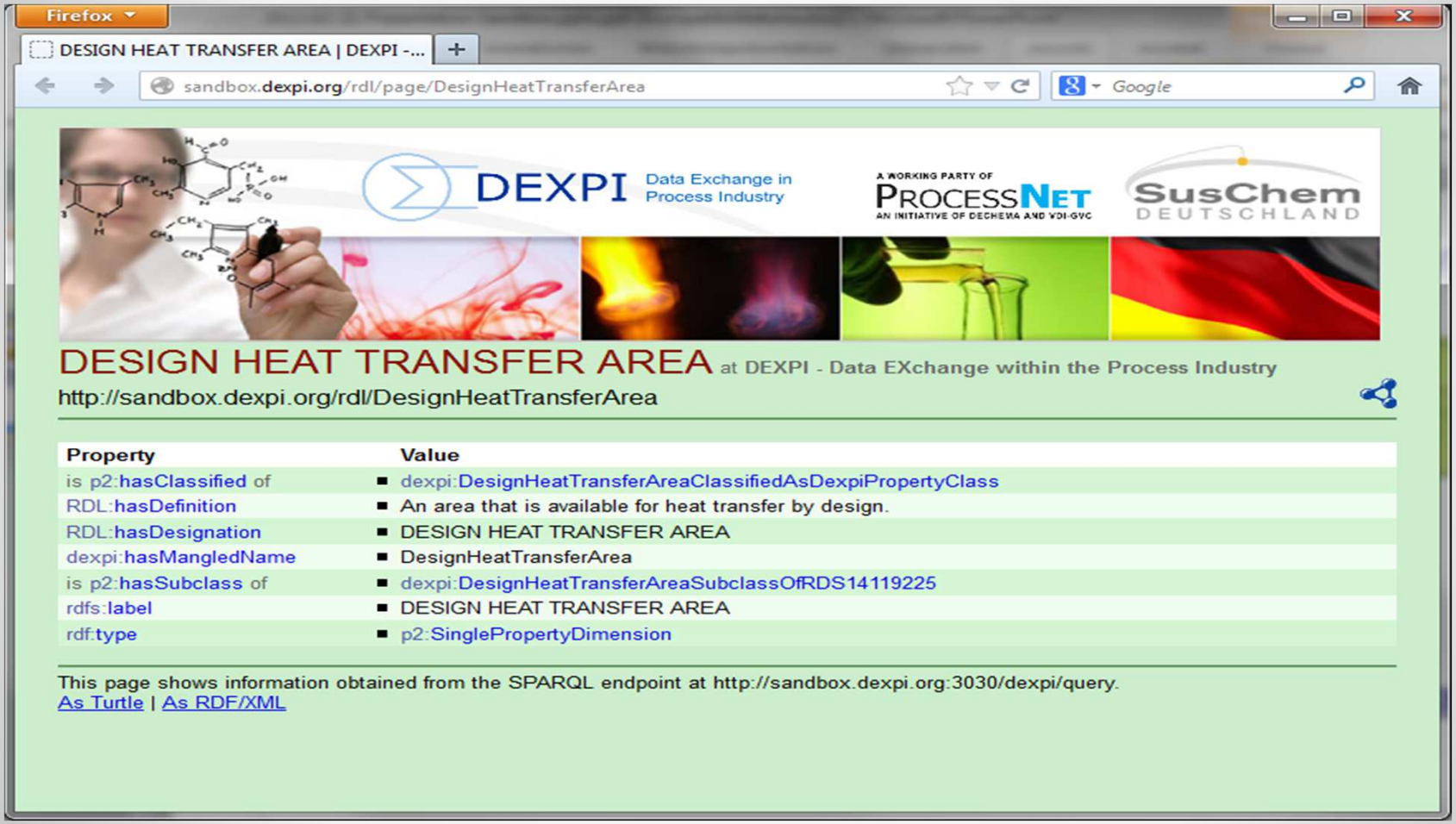
- Specifications by the DEXPI group:
  - Tag Name (e.g. „H1007“)
    - Tag Name Prefix („H“)
    - Tag Name Sequence Number („1007“)
    - Tag Name Suffix („“)
  - Description
  - Flow Rate
  - Transfer Area



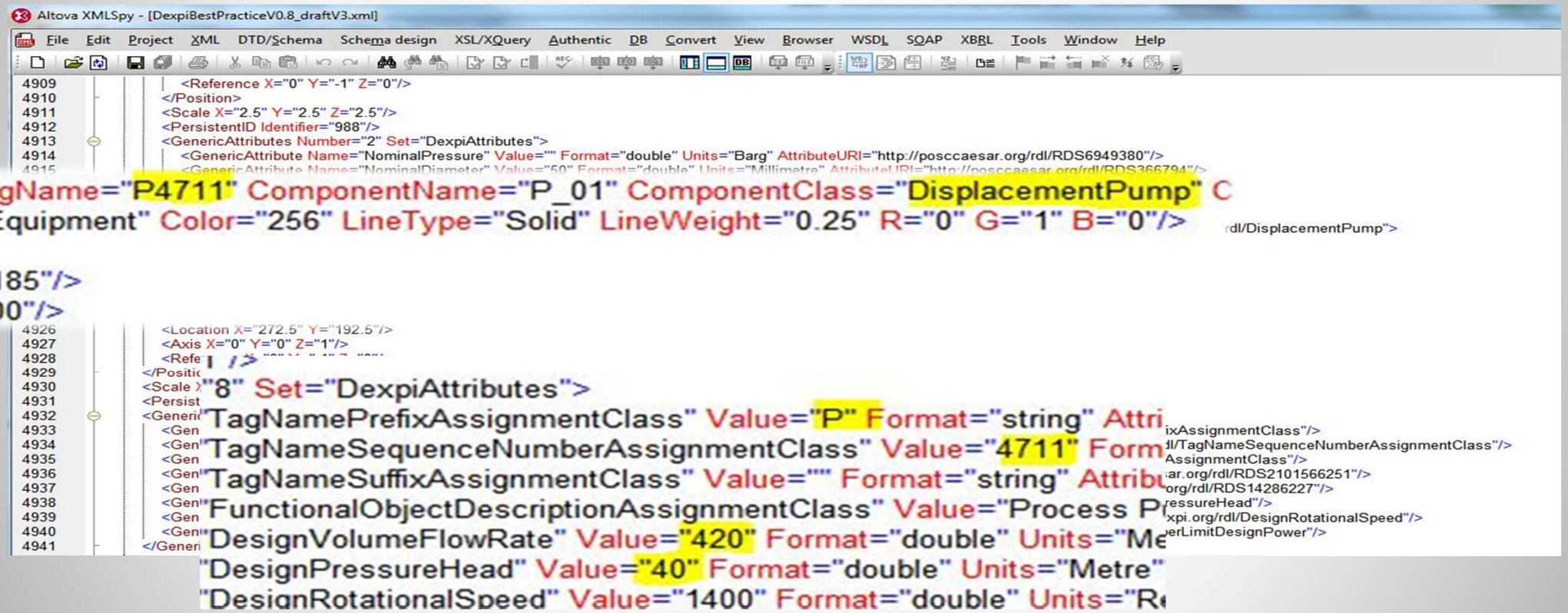
How ISO 15926 Works - Part 8 and Part 9



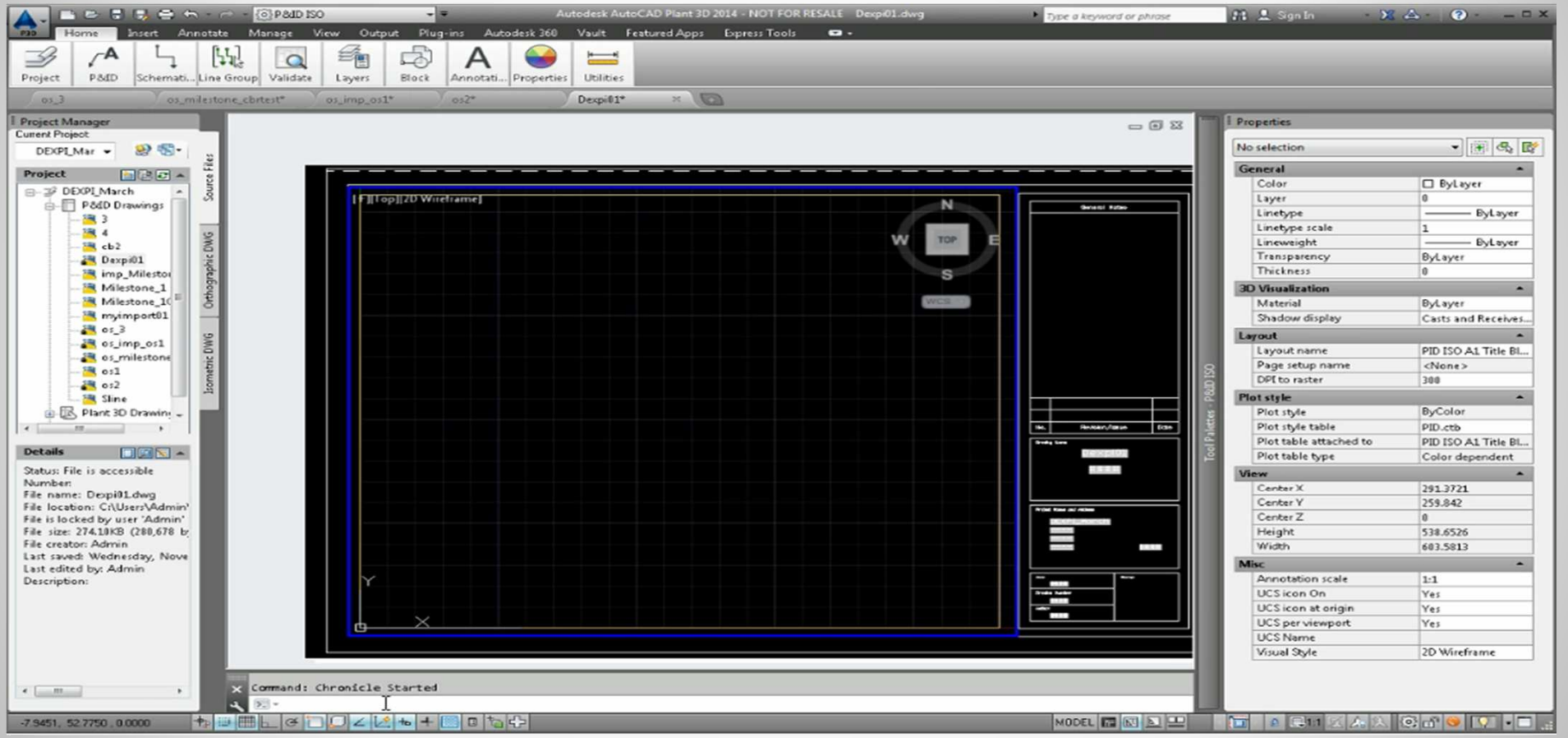
DEXPI.ORG - Sandbox published



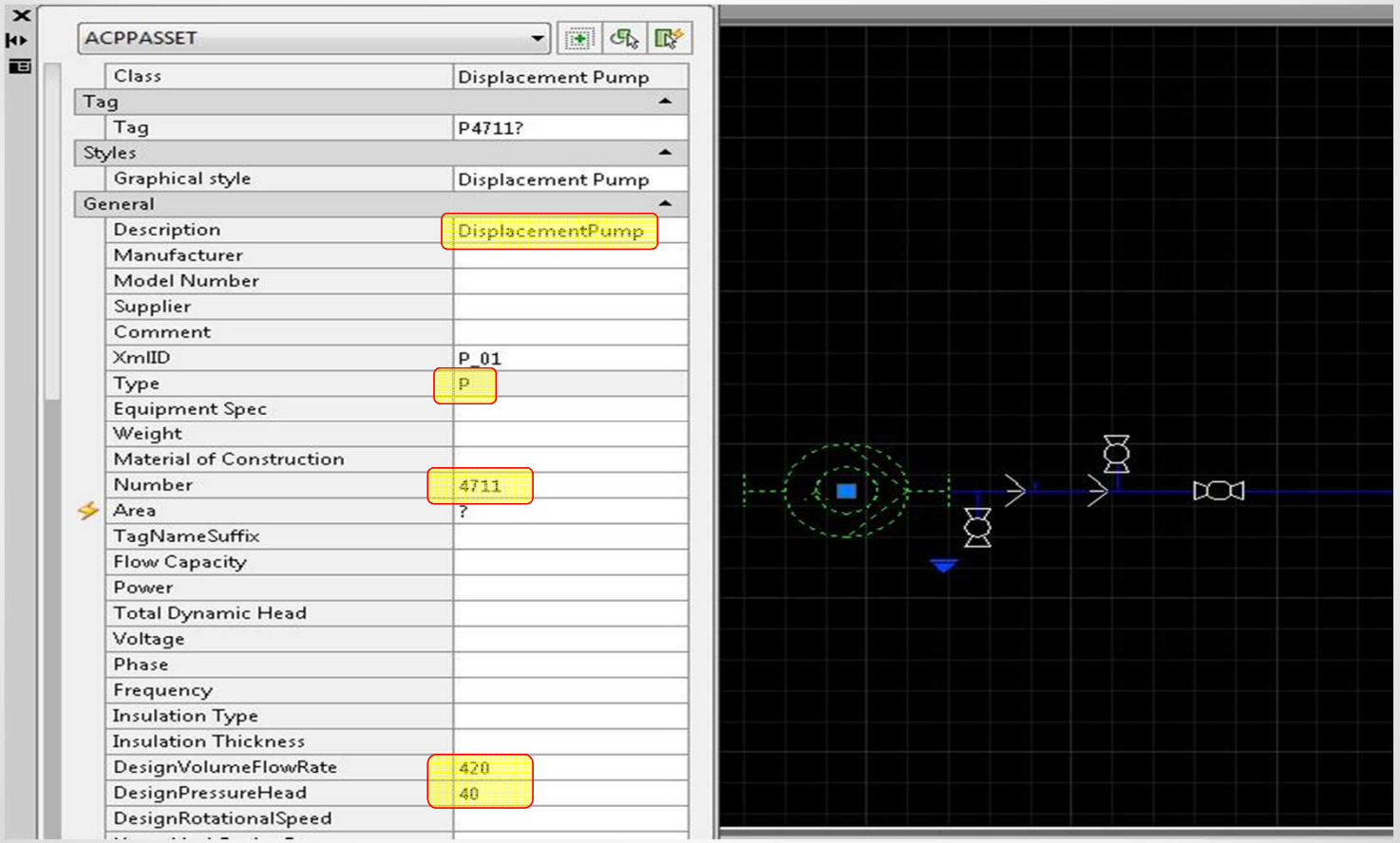
DEXPI XMpLant Import File



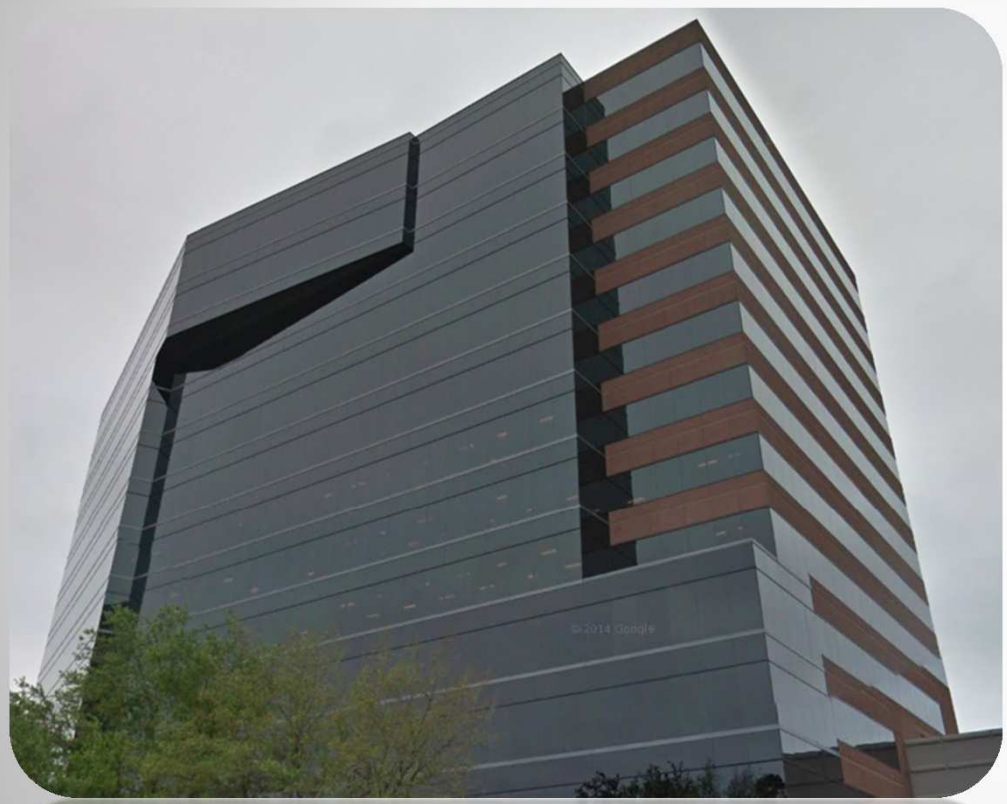
DEXPI import video



AutoCAD P&ID imported properties



Joint Fiatech, MIMOSA, PCA RDL Workshop
SEPTEMBER 10, 2014 – HOUSTON, TEXAS



*„On behalf of Ken Dunn (**BP** Information Technology & Services, Chief Architect Upstream), **Fiatech**, **MIMOSA** and **POSC** Caesar Association would like to invite Autodesk to participate in the Joint ISO155926 Reference Data Library (RDL) Workshop, hosted by BP in Houston, Texas on Wednesday, September 10, 2014. We would welcome and appreciate Autodesk's participation."*

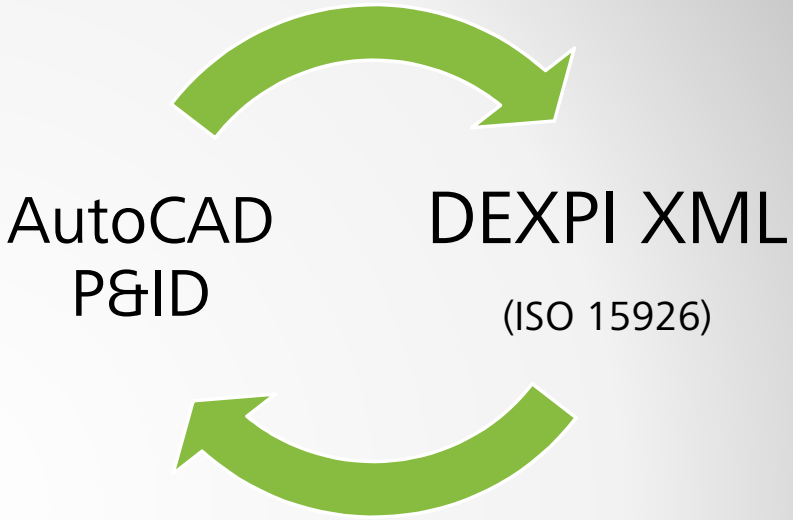
Ray Topping, Fiatech

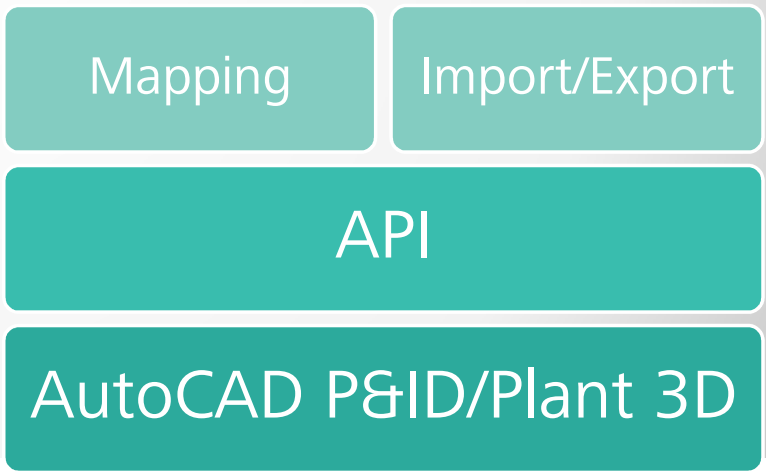
Agenda

Challenges – Why Data Exchange
DEXPI group
ISO 15926 – What's that?
Data interchange – Current efforts
Data Interchange – Future plans
Summary and Q&A

Data Interchange

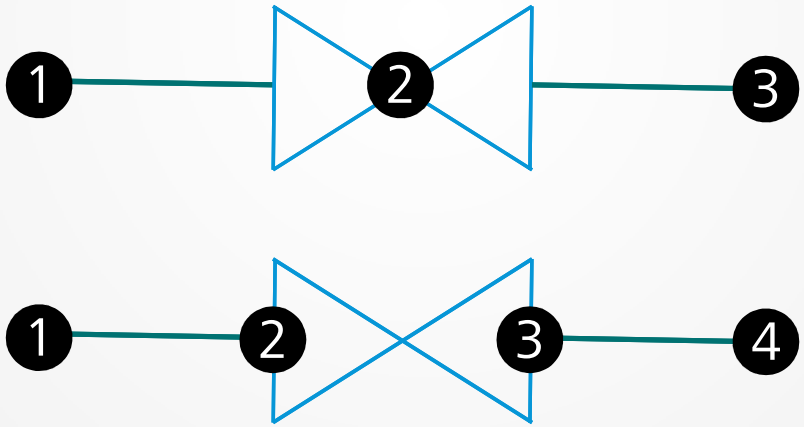
- Foundation – APIs
- PDS P&ID -> AutoCAD P&ID
- Autoplant P&ID -> AutoCAD P&ID
- DEXPI and ISO 15926





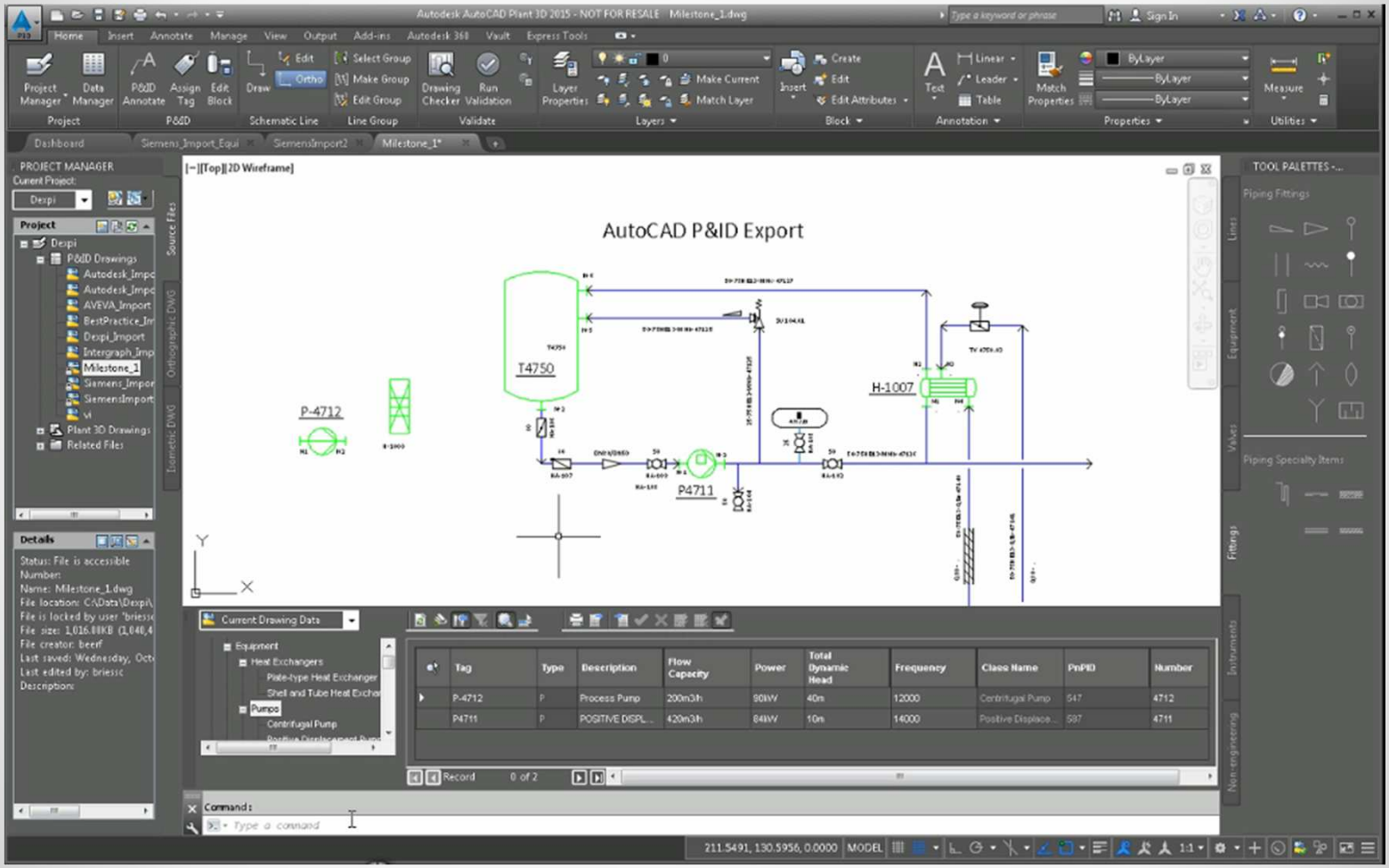
Why is DEXPI Different?

- DEXPI specifies semantics
- ISO15926 just specifies grammar
- Small solution space – P&ID data/graphics only
- Example

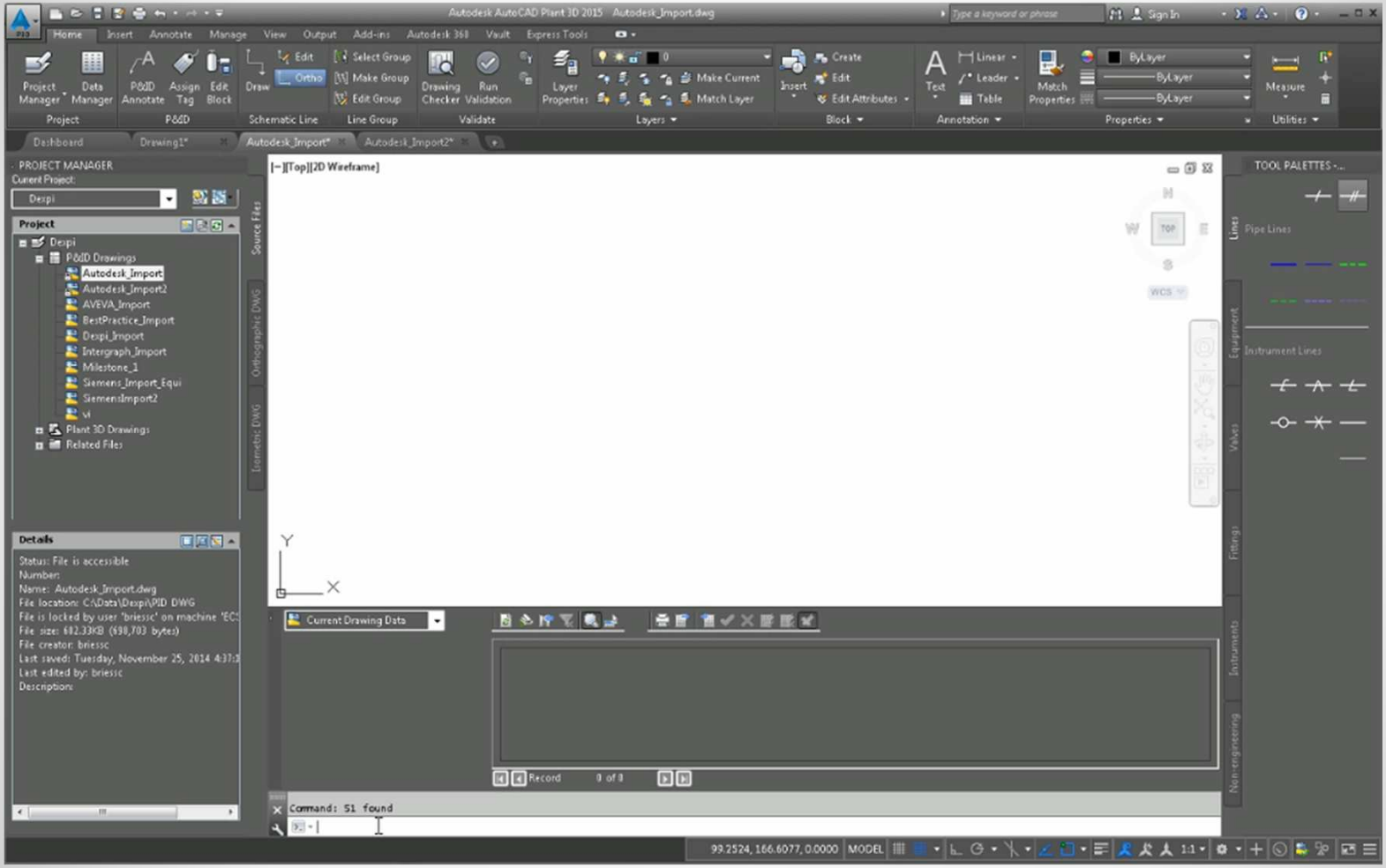


Which is right?

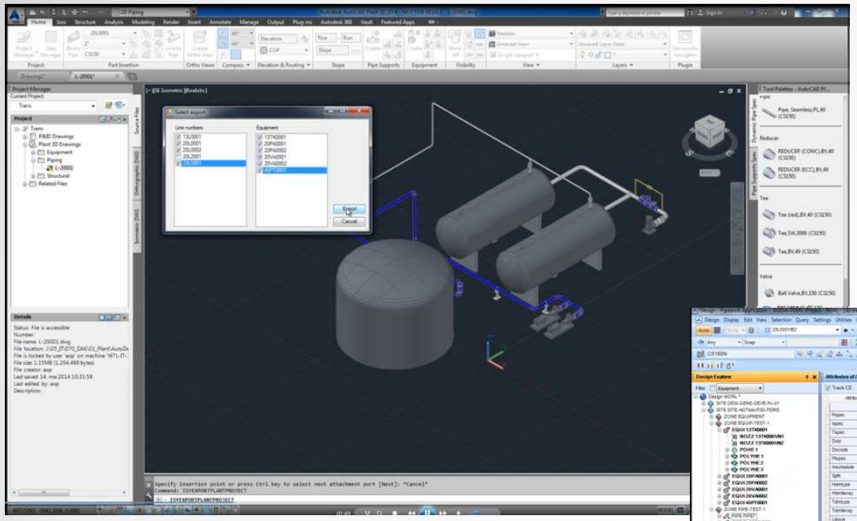
Export to DEXPI XML



Create P&ID from DEXPI XML



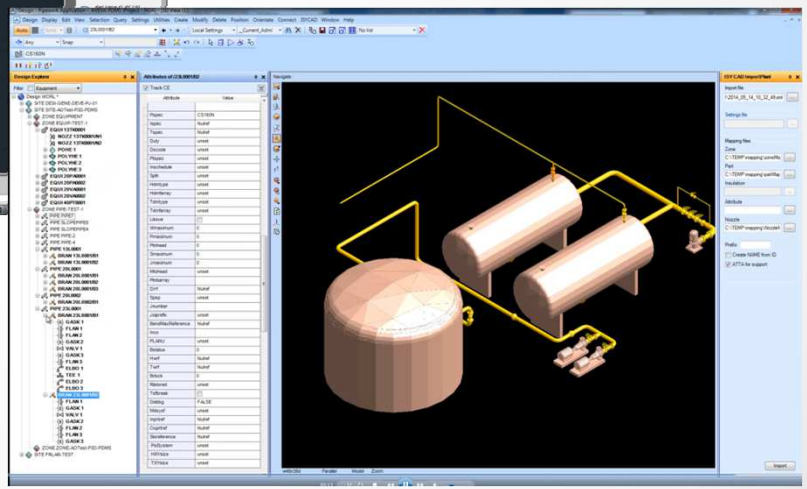
ISY Norconsult - Plant3D to PDMS



Isometric - a model imported from AutoCAD Plant 3D is an intelligent model you can generate isometrics from without doing any modifications to the model.

Our applications to import plant data into PDMS now supports AutoCAD Plant 3D. Via an XML schema our application is able to build an intelligent piping model in PDMS with equipment, nozzles and graphics.

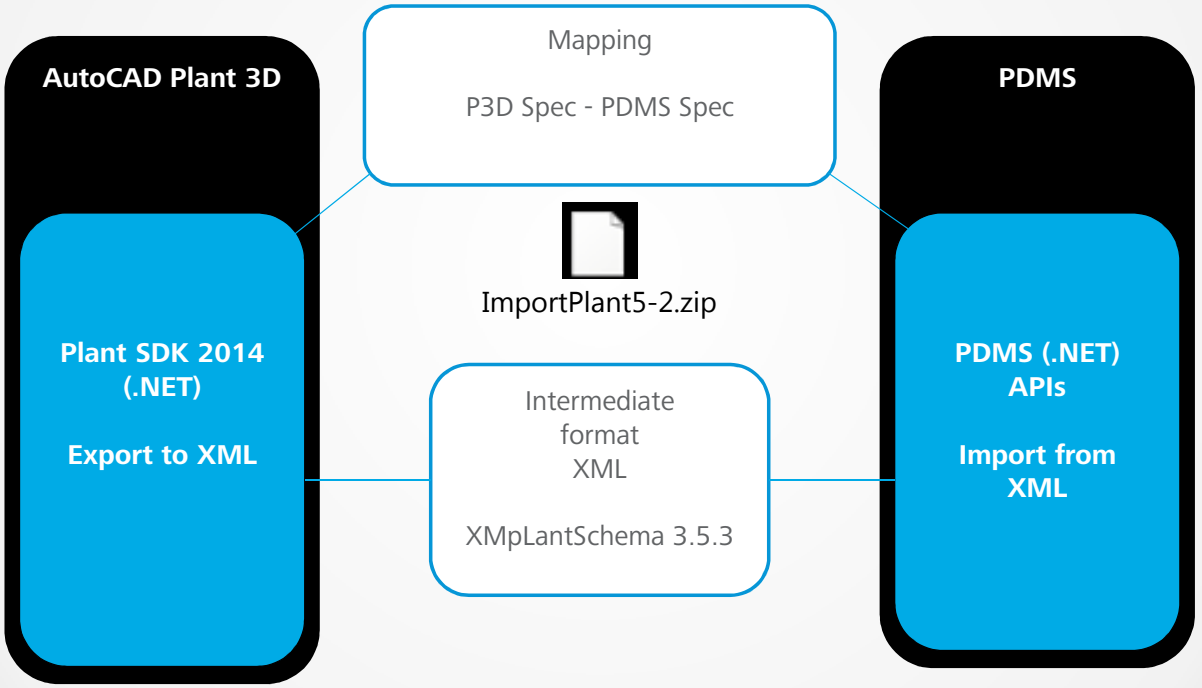
A small plugin to PDMS is all you need to read the data that is exported from AutoCAD Plant 3D.



Conversion
The workflow of converting models from AutoCAd Plant 3D to PDMS

AutoCAD Plant 3D to PDMS

Design conversion



Agenda

Challenges – Why Data Exchange
DEXPI group
ISO 15926 – What's that?
Data interchange – Current efforts
Data Interchange – Future plans
Summary and Q&A

Future Plans for Data Exchange

- Maintain/enhance foundation APIs to support import/export efforts
- Data import/export of 3D models
  - Pragmatic approach
    - Import PCF
    - Export structures using Advance Steel XML format
  - Standards based approach
    - Investigating a DEXPI like approach for 3D models

Agenda

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Q&A and comments

Session Feedback

- Via the Survey Stations, email or mobile device
- AU 2014 passes given out each day!
- Best to do it right after the session
- Instructors see results in real-time

AUTODESK.