



TC 65

TC65: Industrial-process measurement, control and automation



**Industrie 4.0: Ohne Normung
geht es nicht**

Roland HEIDEL, Chairman IEC TC 65

Wie bringt man „Things“ zusammen?

Carl Benz, geboren 1844 in
Karlsruhe



IEC TC65

Industrial-process measurement, control and automation

- **Zahl der Mitglieder in IEC (2013):**
 - **Mitgliedsländer: 162**
 - Vollmitglieder : 81
 - Angeschlossene Länder: 81
- **Arbeitsgruppen: >1000**
- **Technische (Sub-) Komitees: 174**
- **Experten in den Arbeitsgruppen: ~10.000**
- **IEC-Normdokumente: > 6000**

To prepare ...


- international standards for **systems** and **elements**
- used for industrial-process measurement and control concerning continuous and batch processes....

IEC TC65: Das Systemkomitee der Automatisierungstechnik: Wichtige Technikthemen

- **Wired and Wireless Communications**
- **Modelling of the Digital Factory including Engineering**
- **Engineering Data Exchange**
- **Product Properties**
- **Device Integration**
- **Security in Automation**
- **Smart Grid**
- **Manufacturing Execution System**
- **Life Cycle Management**
- **Smart Grid**
- **Electrical and Functional Safety**
- **Electromagnetic Compatibility in Automation**
- **Energy Efficiency**
- **Process oriented standards including *harmonization***
 - **P&I diagrams, P&ID tools and PCE-CAE tools**
 - **Alarm Management in Process Industries**

Organisation von IEC TC65

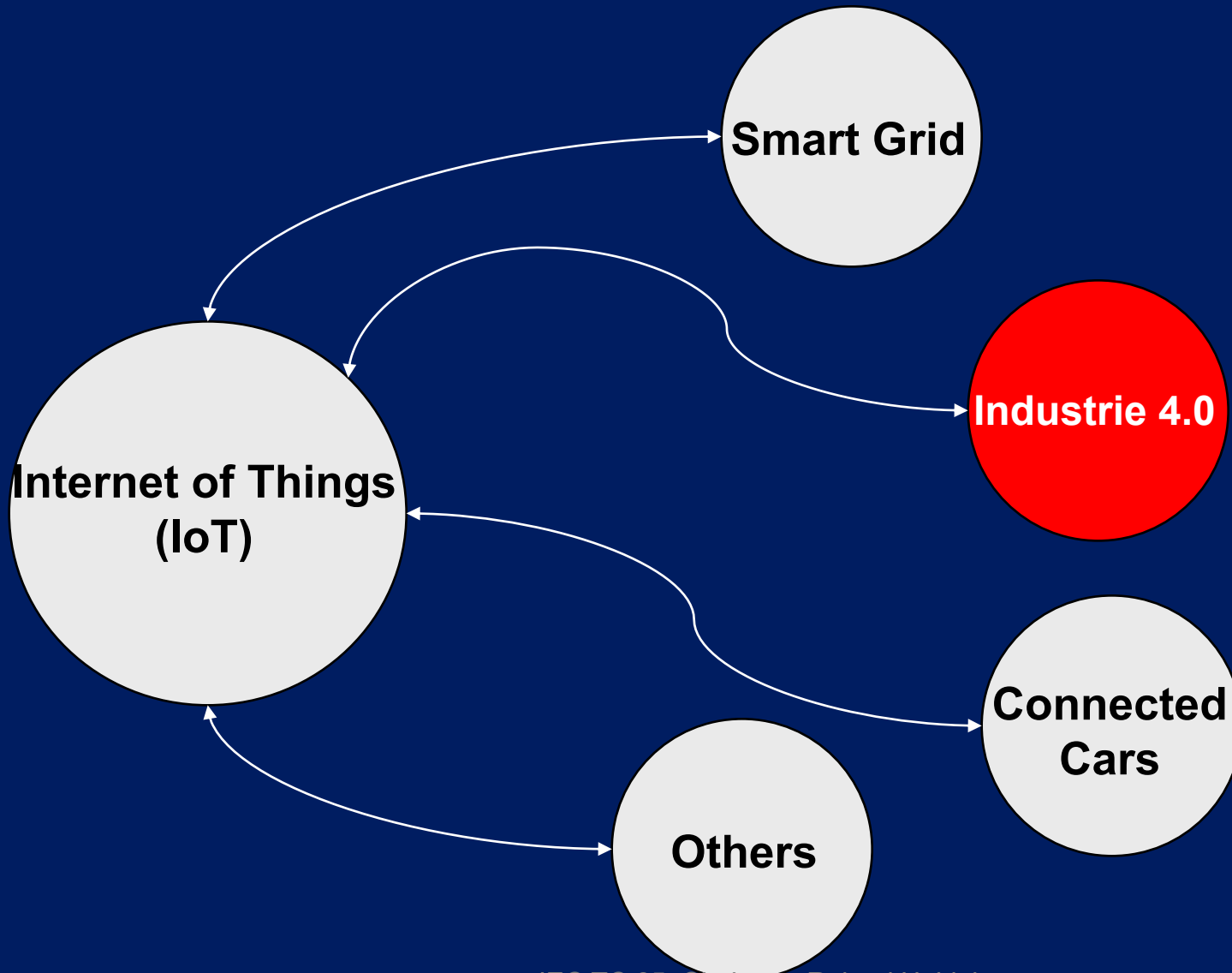
Membership: P:26/O:17*

 <p>TC 65</p> <p>TC 65</p> <p>INDUSTRIAL-PROCESS MEASUREMENT, CONTROL AND AUTOMATION</p> <p>Chairman: R. HEIDEL (DE) Secretary: R. BELLIARDI (FR)</p> <p>Assist. Sec: B. DUMORTIER (FR) Techn. Officer: M. COCIMAROV</p>			
<p>ADVISORY GROUP 16</p> <p>Chairman: R. Heidelberg</p>	<p>SC 65A</p> <p>SYSTEM ASPECTS</p> <p>Chairman: R. KRETSCHMANN (US) Secretary: P. LUZAJIC (GB)</p>	<p>SC 65B</p> <p>MEASUREMENT & CONTROL DEVICES</p> <p>Chairman: W. HARTMANN (DE) Secretary: D. VASKO (US)</p> <p>Assist. Sec: J. HARMAN (US) Assist. Sec: M. GIRTON (US)</p>	<p>SC 65C</p> <p>INDUSTRIAL NETWORKS</p> <p>Chairman: A. CAPEL (CA) Secretary: V. DEMASSIEUX (FR)</p> <p>Assist. Sec: B. DUMORTIER (FR)</p>
<p>P:28/O:14*</p>	<p>P:24/O:16*</p>	<p>P:25/O:15*</p>	<p>P:22/O:4*</p>
<p>WG4: E.M.C. Requirements Convenor: B. JAEKEL (DE) 24</p> <p>WG14: Functional Safety Guide Convenor: R. BELL (GB) 21</p> <p>WG15: Alarm systems Convenor: D. G. DUNN (US) 23</p> <p>WG16: IEC 61069 Convenor: R. KRETSCHMANN (US) 11</p> <p>WG17: Human Factors and Ergonomics Convenor: C. SANDOM (GB) 19</p> <p>MT61508-1/2 Maintenance Convenor: R. BELL (GB) 55</p> <p>MT61508-3 Maintenance Convenor: A. CANNING (GB) 44</p> <p>MT61511 FS for Process Ind. Convenor: V. MAGGIOLI (US) 62</p> <p>MT61512 Batch Control systems Convenor: R. DWIGGINS (US) 14</p> <p>AHG16 Human factors and FS Convenor: C. SANDOM (GB) 17</p> <p>AHG17: Terminology</p>	<p>WG5: Temperature Sensor Convenor: M. GOTOH (JP) 20</p> <p>WG6: Testing & Evaluation Convenor: D. FANTONI (IT) 29</p> <p>WG7: Programmable control sy. Convenor: R. KRETSCHMANN (US) 65</p> <p>WG9: Final Control Elements Convenor: A. GLENN (US) 16</p> <p>WG14: Analyzing Equipment Convenor: J. TATERA (US) 26</p> <p>WG15: Function Block Convenor: J. CHRISTENSEN (US) 17</p> <p>WG16: Power sources Convenor: L. WINKEL (DE) 11</p> <p>JWG7: LOP Pressure Measuring Convenor: P. ZGORZELSKI (DE) 11</p> <p>JWG 8: LOP Temperature Convenor: D. BOGHUN (DE) Convenor: P. ZGORZELSKI (DE) 10</p> <p>JWG 17: LOP valves & process regulators Convenor: R. OKUTSU (JP) 12</p> <p>PT61207-7: Gas Analyzers Convenor: J. WANG (CN) 6</p> <p>PT62829: Chemometrics Convenor: M. MAIWALD (DE) 7</p>	<p>MT9: Fieldbus Maintenance Convenor: L. WINKEL (DE) 54</p> <p>JWG10: Industrial Cabling Convenor: F. RUSSO (IT) 35</p> <p>JWG14: EEIA Convenor: G. HOERCHER (DE) 40</p> <p>WG12: FS for fieldbus Convenor: V. DEMASSIEUX (FR) 39</p> <p>WG13: Cyber Security Convenor: T. PHINNEY (US) 27</p> <p>WG15: High Availability network Convenor: G. HOERCHER (DE) 40</p> <p>WG16: Wireless Convenor: J. D. DECOTIGNIE (CH) 47</p> <p>WG17: Wireless Coexistence Convenor: L. WINKEL (DE) 34</p> <p>PT61131-10: XML Exchange Convenor: R. SIMON (DE) 8</p> <p>PT62492-2: Radiation thermometry Convenor: M. GOTOH (JP) 6</p>	<p>WG2: Prod. Prop. & Class Convenor: P. ZGORZELSKI (DE) 11</p> <p>WG3: Commissioning Convenor: T. KNOHL (DE) 4</p> <p>WG4: Field Device Tools Convenor: C. DIEDRICH (DE) 14</p> <p>WG7: Function Block + EDDL Convenor: C. DIEDRICH (DE) 17</p> <p>WG8: OPC Convenor: I. WEBER (DE) 22</p> <p>WG9: Automation ML Convenor: B. GRIMM (DE) 9</p> <p>JWG5: Enterprise Control SI Convenor: D. BRANDL (US) 27</p> <p>JWG6: Device Profile Convenor: I. WEBER (DE) 9</p>
<p>WG1: Terms & Definitions Convenor: W. CRAEMER (DE) 4</p> <p>WG10: Net & Syst. Security Convenor: T. PHINNEY (US) 66</p> <p>WG12: P&ID P&ID PCE-CAE Convenor: G. MAYR (DE) 8</p> <p>JWG13: Safety requirements Convenor: R. KRETSCHMANN (US) 29</p> <p>JWG14: Energy Efficiency (EEIA) Convenor: G. HOERCHER (DE) 40</p> <p>WG15: Documents f. Process Industry Convenor: S. SCHÜLER (DE) 10</p> <p>WG16: Digital Factory Convenor: U. DOEBRICH (DE) 22</p> <p>WG17: Smart Grid Convenor: T. ISHIKUMA (JP) 19</p> <p>WG18: Cause and Effect Table Convenor: H. WEBER (DE) 6</p> <p>WG19: Lifecycle Mgmt. Convenor: M. ULLEMEYER (DE) 10</p>	<p>214</p>		
<p>Status: 8/14</p>	<p>290</p>	<p>316</p>	<p>113</p>

*Type of membership:
P=Participating country,
O=Observing country

Number in red indicates seats
1060 Experts
46 Working Groups

Zur Ausgangssituation

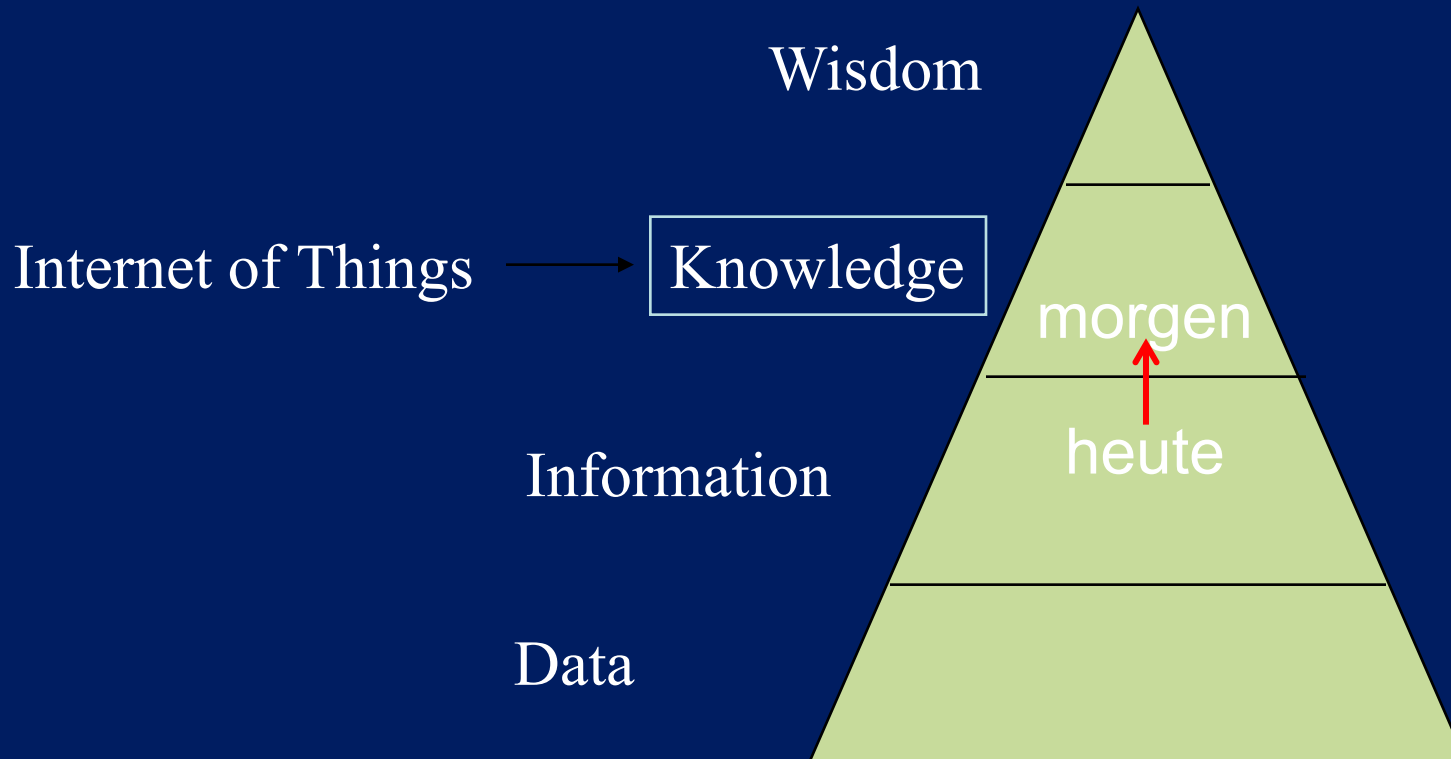




The Industrie 4.0 vision

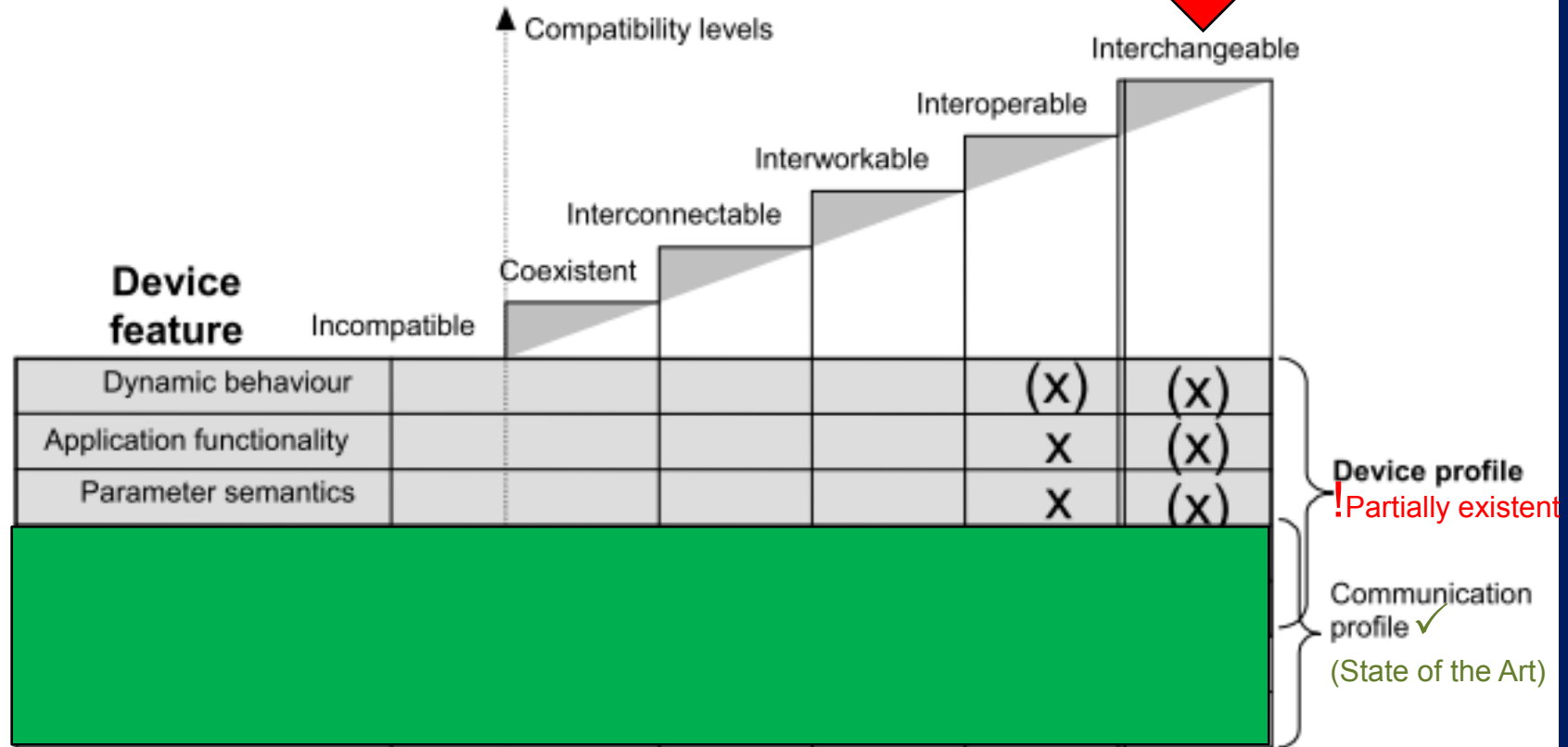
- The **product** to be manufactured **has all the data necessary** for its manufacturing requirements
- **Self-organization of networked manufacturing equipment**, taking into account the entire value added chain
- The **manufacturing sequence is determined on a flexible basis**, depending on the current situation
- The **human remains essential as the creative planner, supervisor and decision-maker**

Quelle: Siemens



„Knowledge“ bedeutet auch die Trennung von Abläufen und Daten

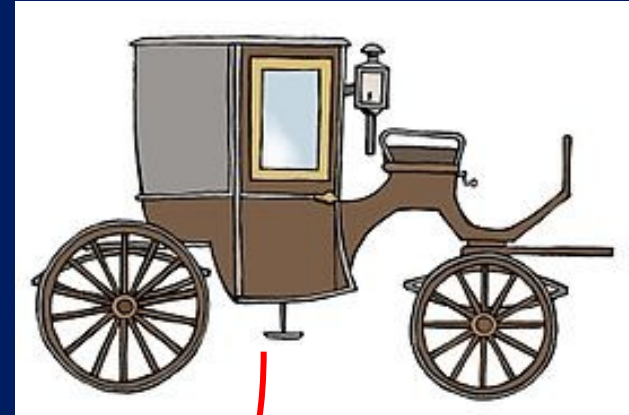
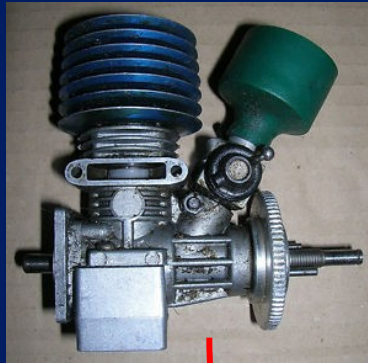
Kompatibilitätsgrade nach IEC TR 62390



IEC 010/05

Note: (X) indicates that according to this property interchangeability may be given or not

Zwei harmlose Dinge neu kombiniert.....

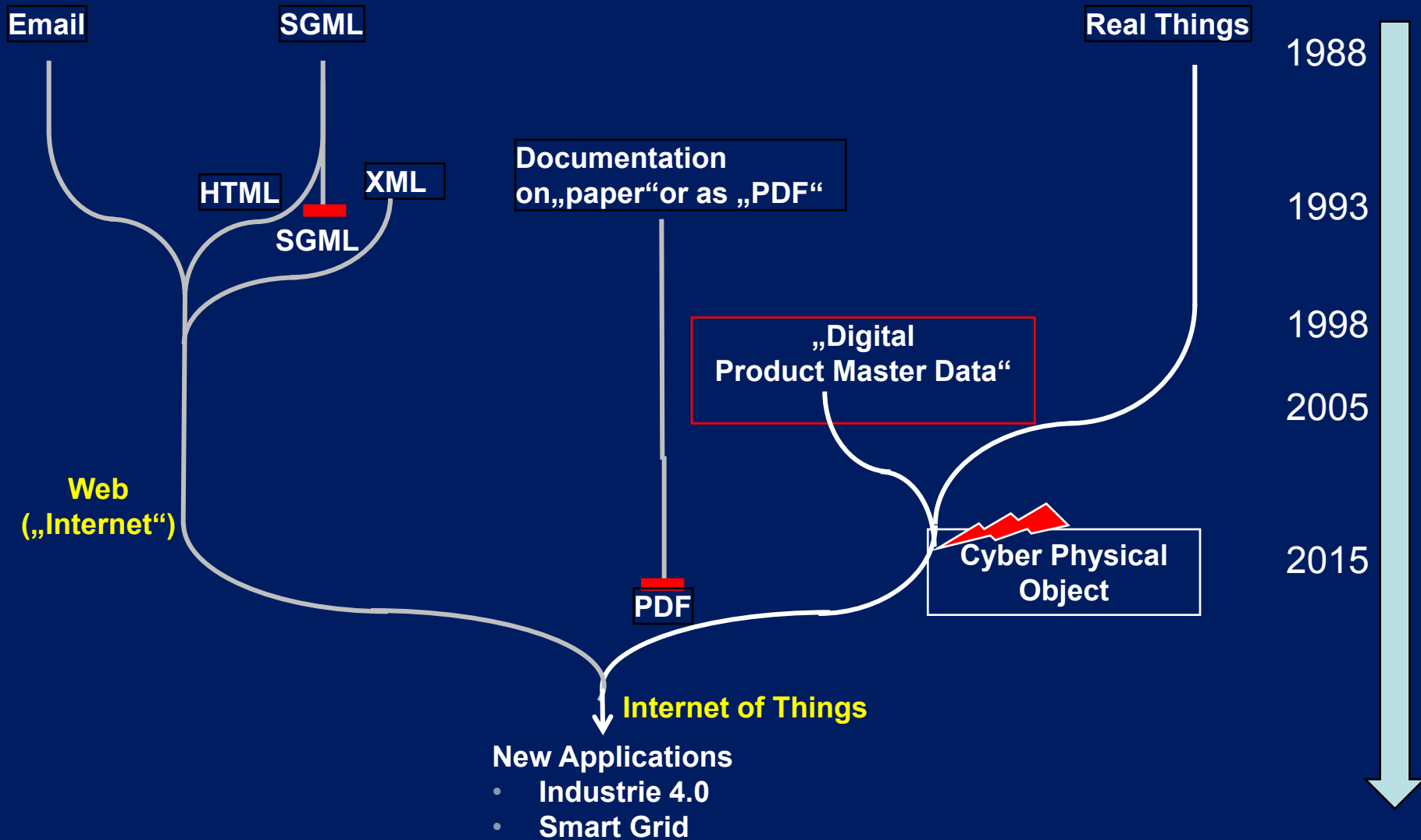


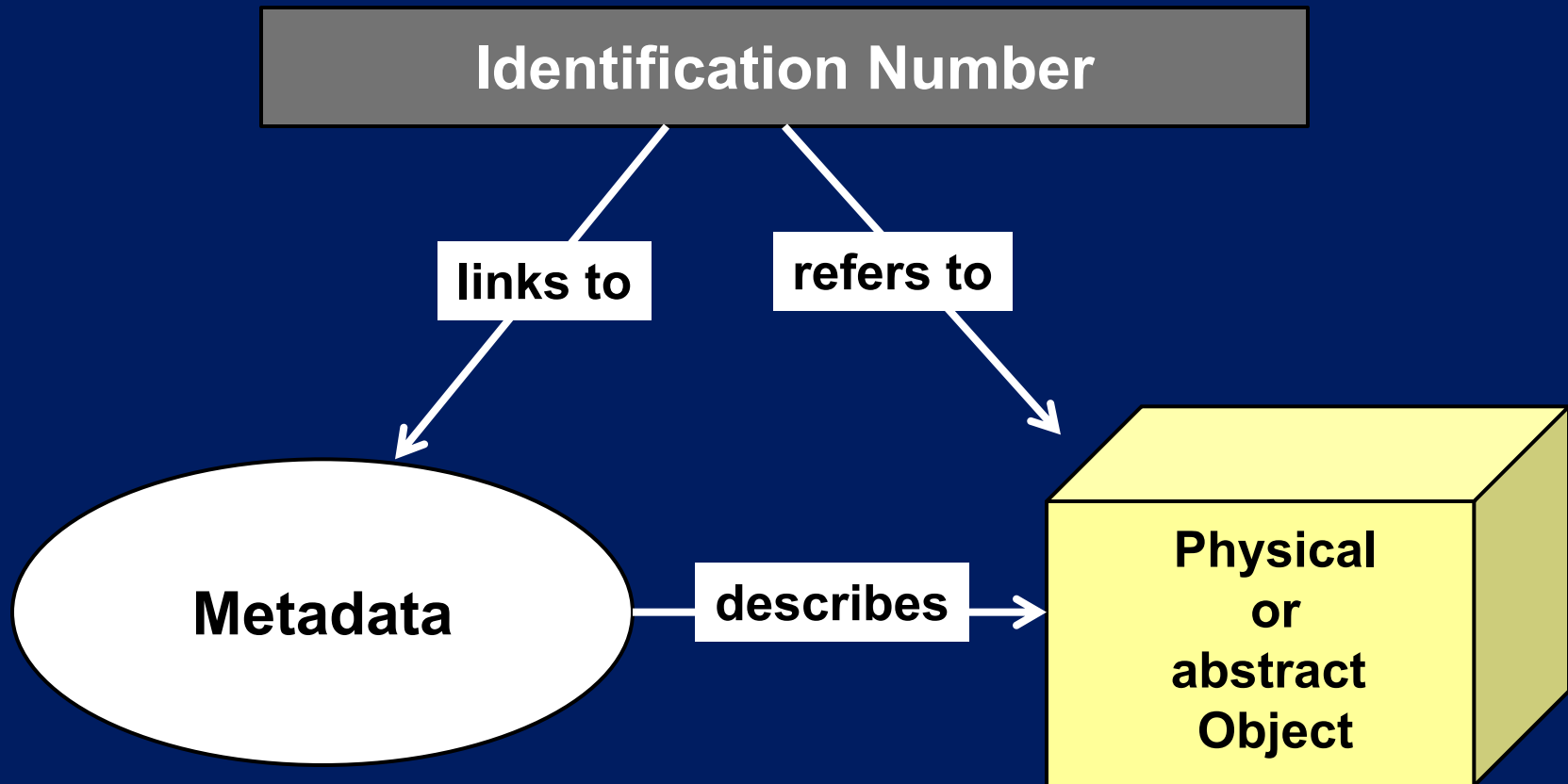
Gottlieb Daimler

Es werden höchstens 5000
Fahrzeuge gebaut werden. Denn es
gibt nicht mehr Chauffeure, um sie zu
steuern.

Henry Ford

Wenn ich die Menschen gefragt
hätte, was sie wollen, hätten sie
gesagt schnellere Pferde.

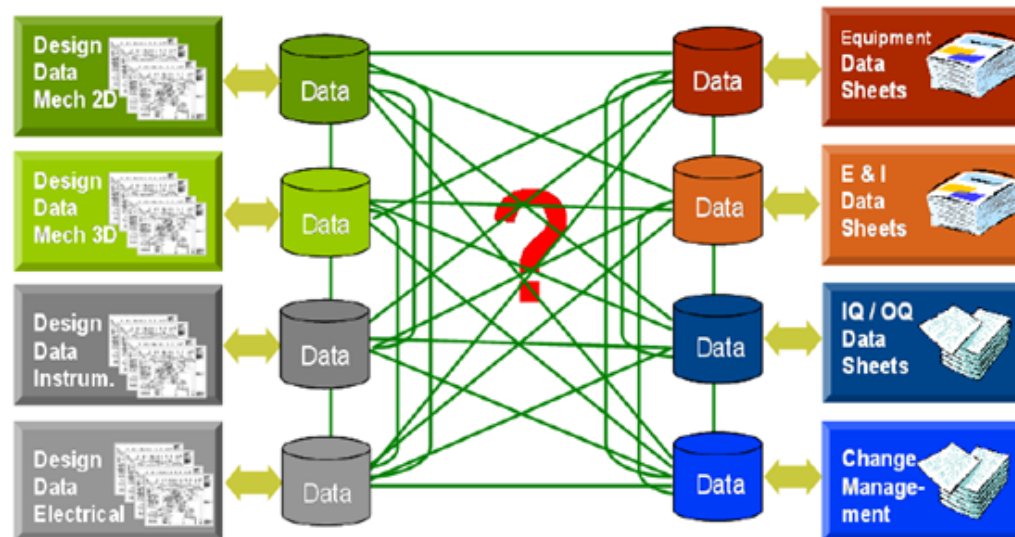




Das Schnittstellen-Dilemma (1)

Jede Schnittstelle hat ihre eigene Semantik

Current packages



elIFE - Presentation Innotec Kundentagung

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 NOVARTIS

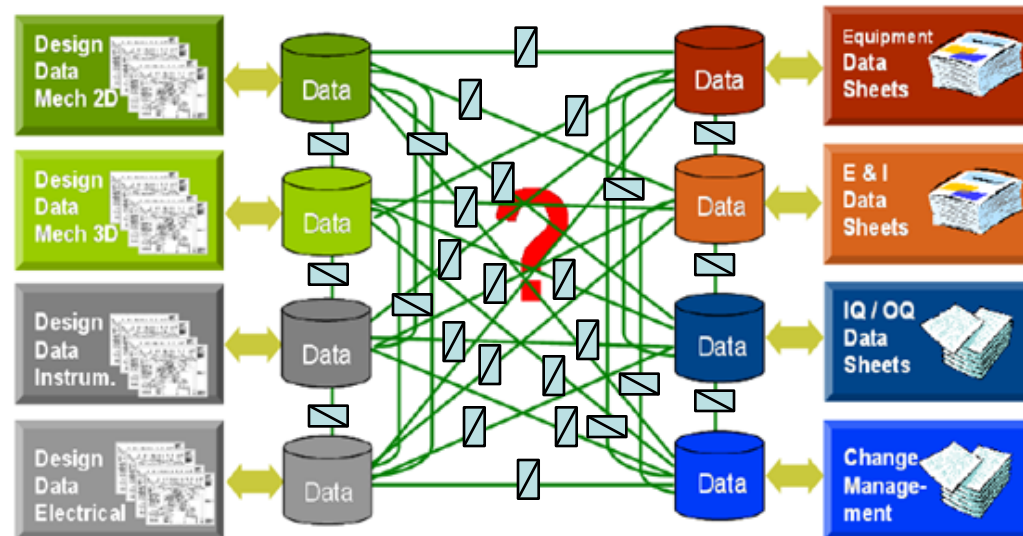
Freigegeben von NAMUR (H.Dr. Tauchnitz)

2005

Das Schnittstellen-Dilemma (2)

Zwischen den Werkzeugen sind „Übersetzer“ erforderlich

Current packages



eLIFE - Präsentation Innotec Kundentagung

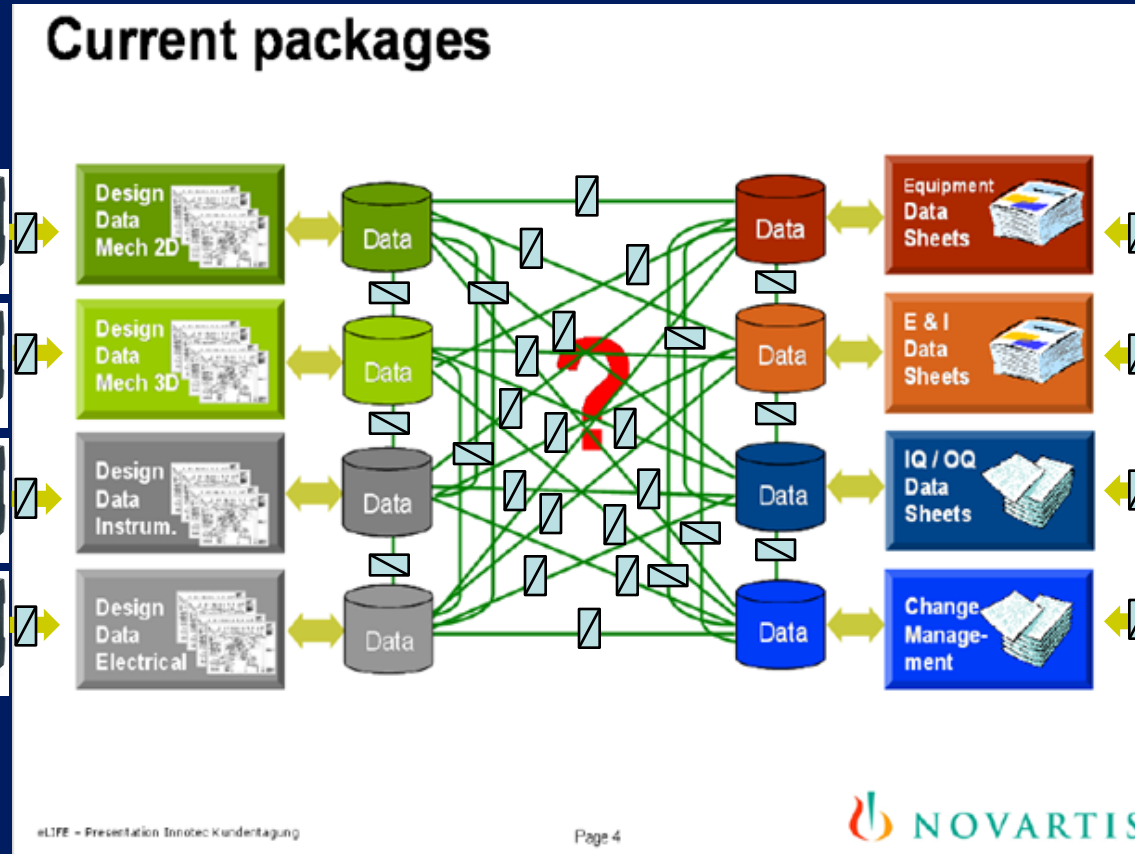
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 NOVARTIS

Anzahl N semantischer Konvertierungen
bei n Instanzen: $N=n(n-1)$

Das Schnittstellen-Dilemma (3)

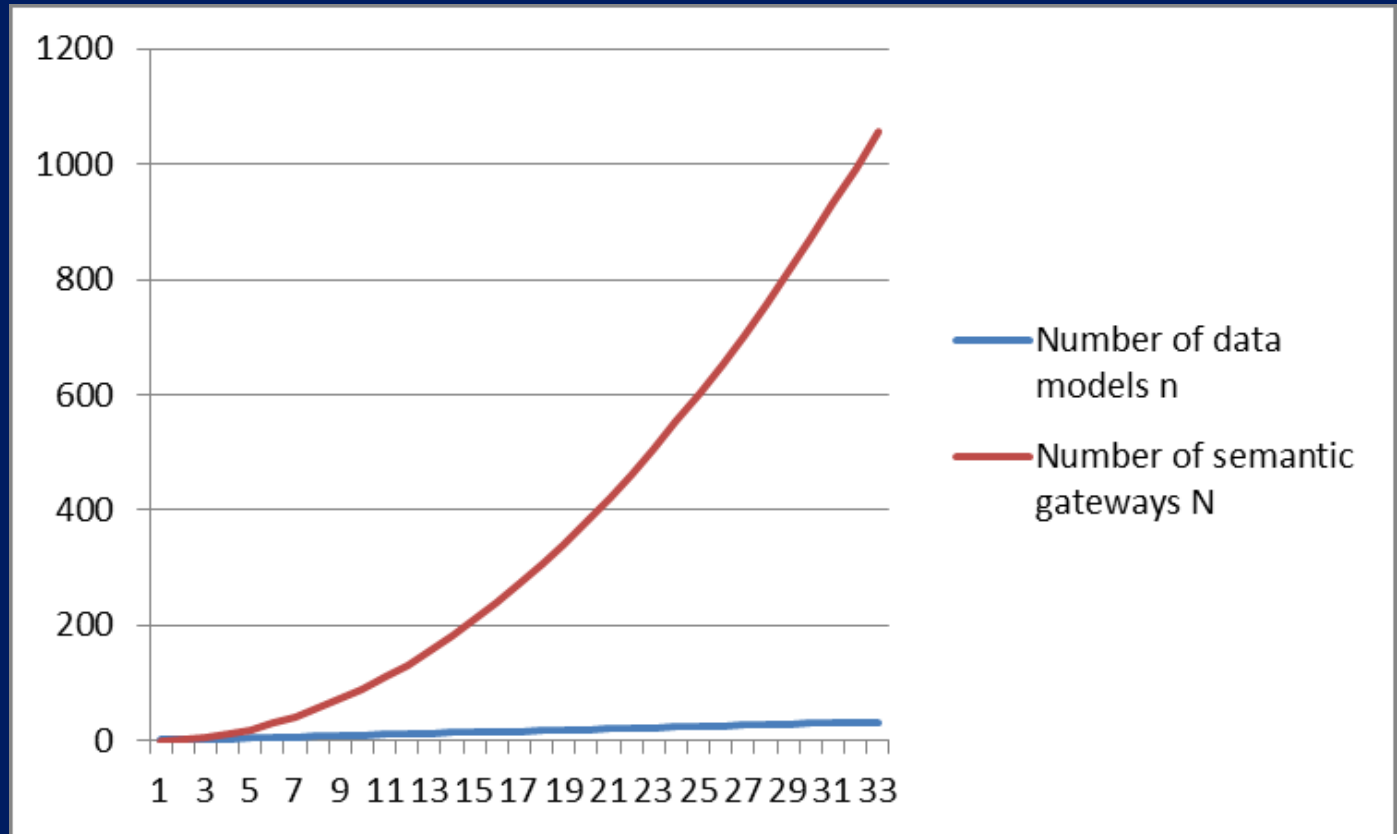
Jedes Werkzeug bildet Komponenten anders ab



Anzahl N semantischer Konvertierungen
bei n Instanzen: $N=n(n-1)$

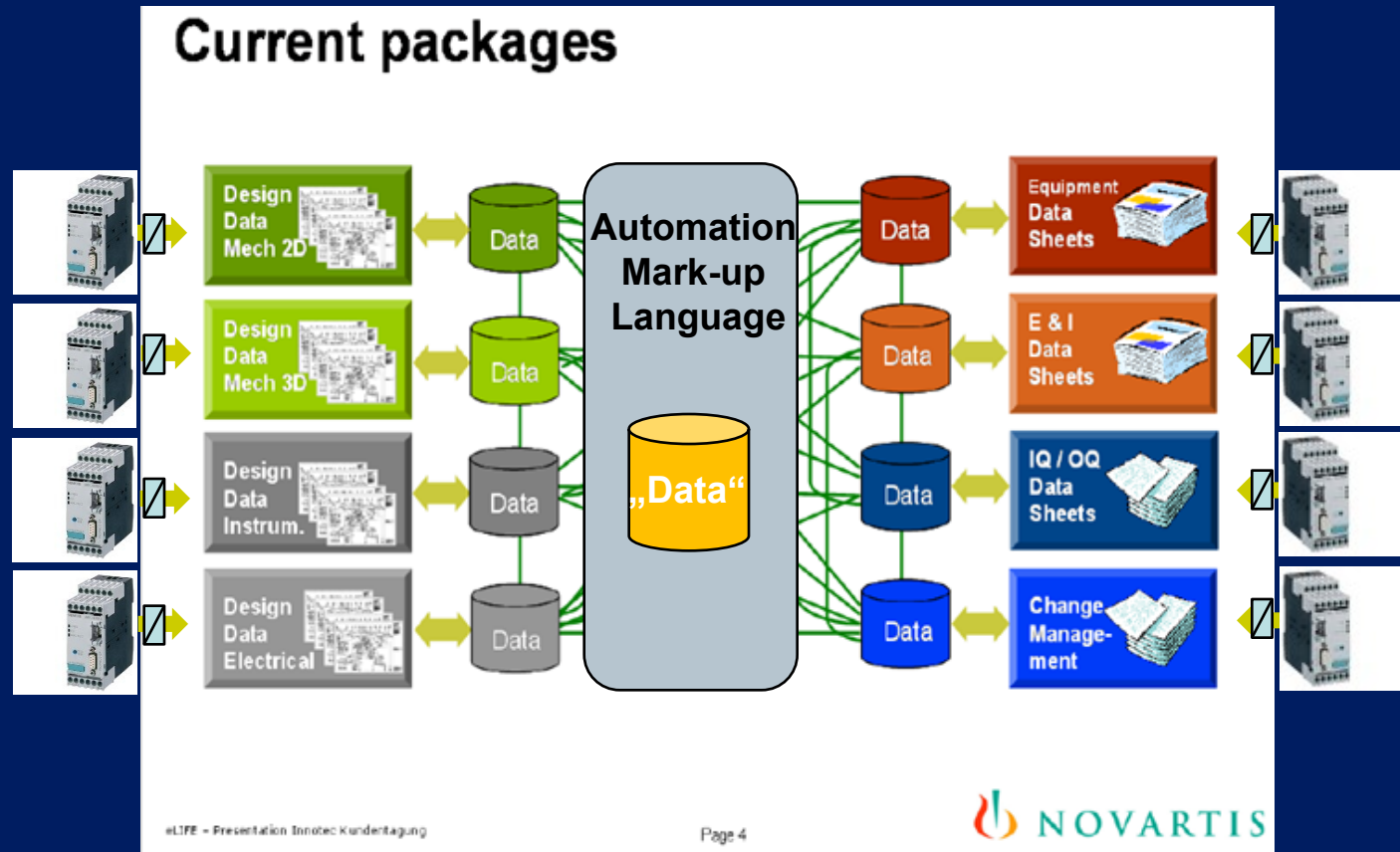
Das Schnittstellen-Dilemma (4)

Die Zahl der semantischen Umsetzungen steigt quadratisch mit der Zahl der Schnittstellen



$$N=n(n-1)$$

Zwischen den Werkzeugen wird auf eine einheitliche Semantik umgesetzt



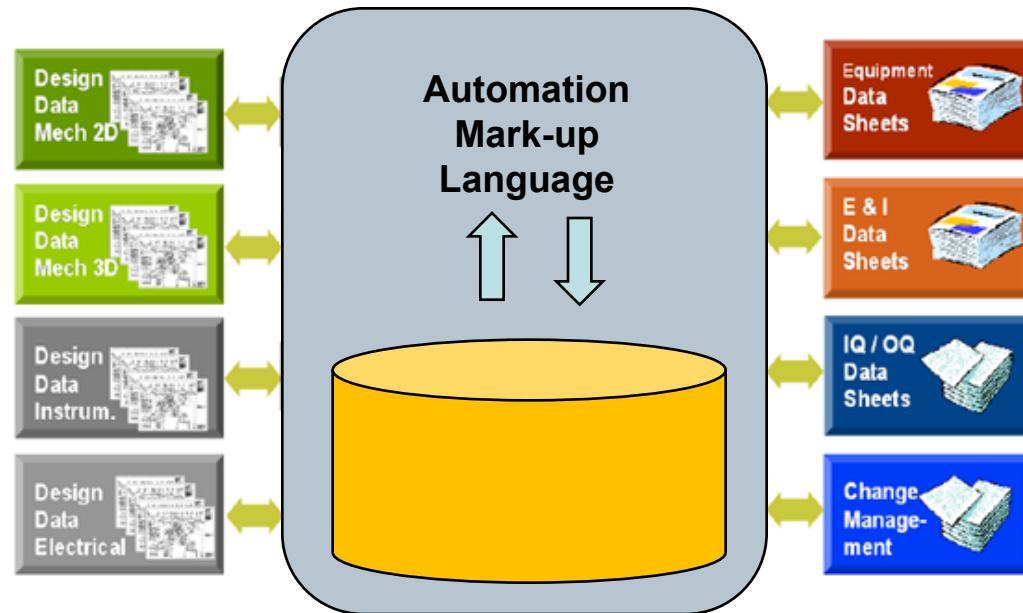
Anzahl N semantischer Konvertierungen
bei n Instanzen: $N=2n$

Anzahl N semantischer Konvertierungen
bei n Instanzen: **N=0**

Die Lösung des Schnittstellen-Dilemmas

Alle Komponenten sind konsistent in einem Repository abgelegt

Role of AutomationML in the future for Industrie 4.0



eLIFE - Präsentation Innotec Kundentagung

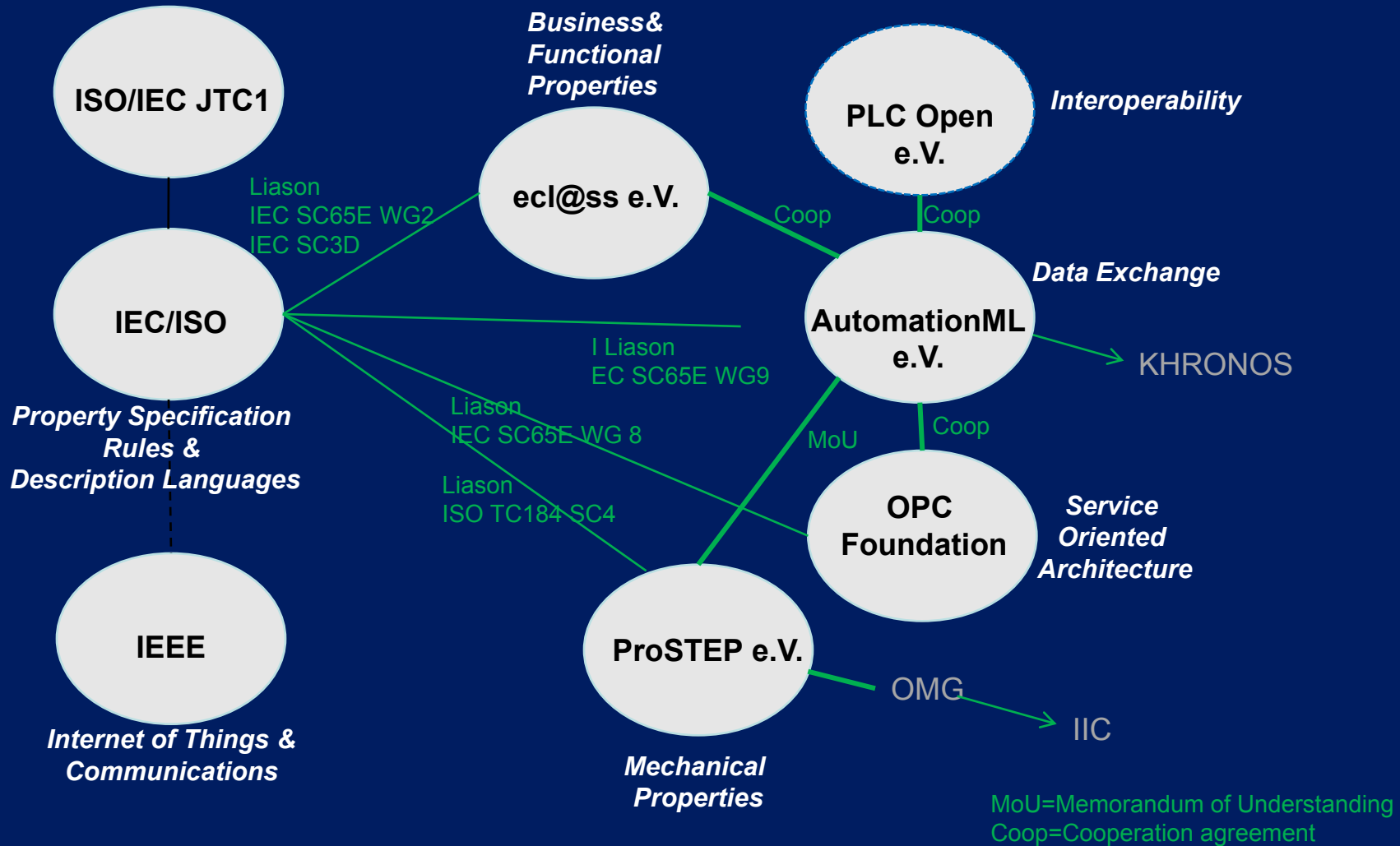
Page 4



Wichtig: Die Eigenschaften der realen Produkte ändern sich dadurch NICHT

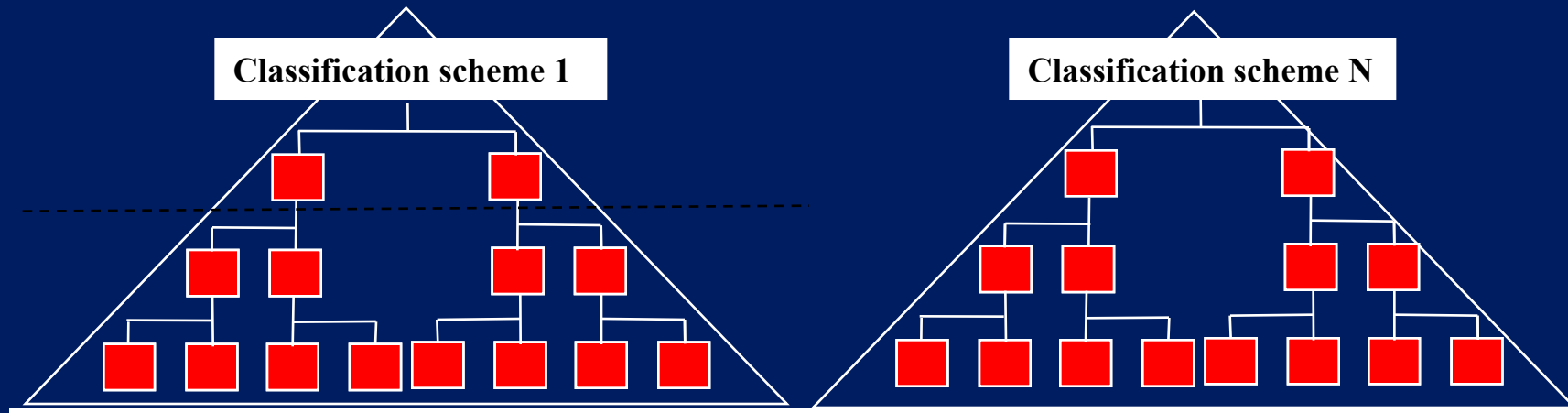
Anzahl N semantischer Konvertierungen

bei n Instanzen: **N=0**

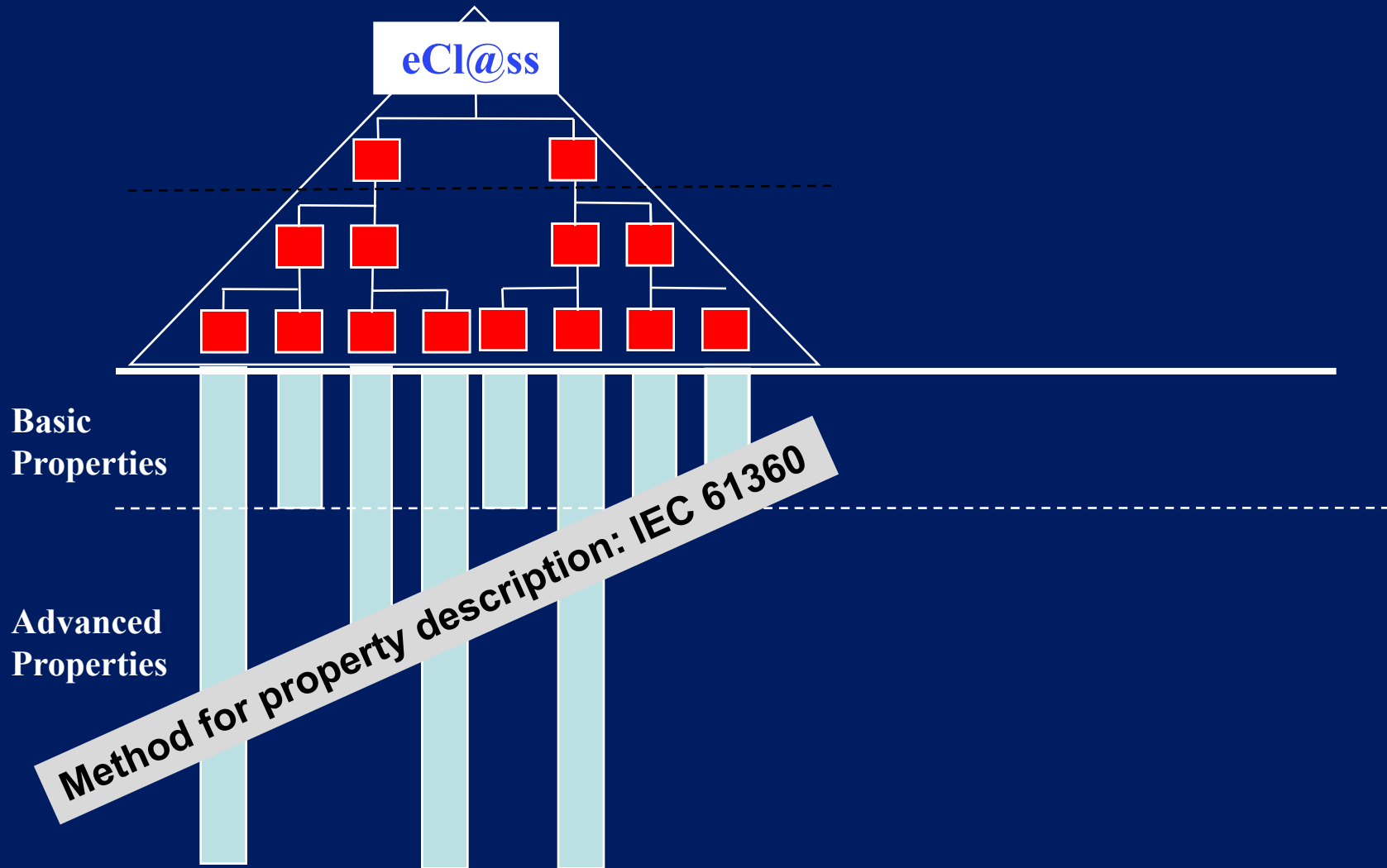


Existierende Konzepte und Normen (Auswahl)

Es gibt Klassifikationssysteme für unterschiedliche Zwecke ...



- Identification of application areas i.e. procurement, customs, taxes....
- Identifies mostly product/service families (types)
- Is **NOT** an identification of any device/service

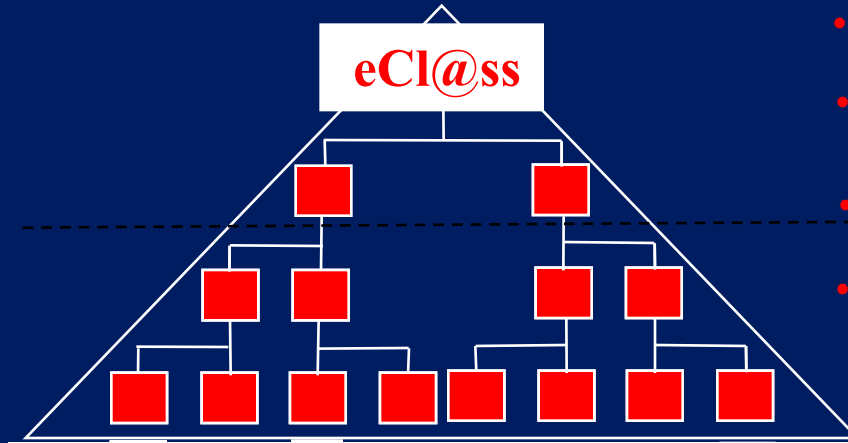


Basic
Properties

Advanced
Properties

Method for property description: IEC 61360

Klassifikation **und** Merkmale : Example ecl@ss* V9.0



- Identification of application areas
- Often used for Procurement
- Identifies product families
- Is NOT an identification of any device

Basic
Properties

Basic technical product properties

Advanced
Properties

- Technical product properties for different technical purposes (i.e. engineering, maintenance...)

Method for property description: IEC 61360

Das Formblatt für Merkmale gemäß IEC 61360 (ISO 13584-42)

Property Attribut Standard: IEC 61360-1/2 = ISO 13584-2



m/o/c	Attribute	Example
m	Code	AAE254
m	Version number	005
m	Revision number	02
m	Value format	Real
m	Data element type class	E01
m	Preferred name	LOW-state output current
o	Synonymus name	output sink
m	Definition	The minimum guaranteed LOW-state dc output current (in A) of a digital function of an IC
o	Source document of data element type definition	IEC748-2 (III.5.3.1)(1985)
o	Unit of measure	A >> future link to Units
o	Formula
o	Figure

Digitale Fabrik (IEC TR 62794 und IEC CD62832): Klassifikation der Merkmal-**Typen**

Mechanical and Constructive Properties

- Length of the Sensor Cell
- Diameter of the Sensor Cell
- Sensor Cell Material
- Weight of the Sensor
- Dimension of the Housing
- Material of the Housing
- Vibration Protection
- Local Display
- Local Operator Panel
- etc.

Function Properties

- Threshold Level & Event Signalling
- Linearisation Curve
- Compensating Function
- Time Stamp Function
- Self Calibration
- Fail Safe Mode
- etc.

Performance Properties

- Measuring Time
- Cycle Time
- Filter Time
- Communication Interval
- Start up Time
- Wake up Time
- Energy Consumption
- etc.

Business Properties

- Price
- Delivery Time
- Rebate

Location Properties

- Location of mainboard
- Location of communication Board



Reference	Edition	Date	Stability	Title
IEC 62541-1	1.0	2010-02-18	2013	OPC unified architecture - Part 1: Overview and Concepts
IEC 62541-2	1.0	2010-02-18	2013	OPC unified architecture - Part 2: Security Model
IEC 62541-3	1.0	2010-07-29	2013	OPC unified architecture - Part 3: Address Space Model
IEC 62541-4	1.0	2011-10-20	2013	OPC unified architecture - Part 4: Services
IEC 62541-5	1.0	2011-10-18	2013	OPC unified architecture - Part 5: Information Model
IEC 62541-6	1.0	2011-10-18	2013	OPC unified architecture - Part 6: Mappings
IEC 62541-7	1.0	2012-07-20	2013	OPC unified architecture - Part 7: Profiles
IEC 62541-8	1.0	2011-10-18	2013	OPC unified architecture - Part 8: Data Access
IEC 62541-9	1.0	2012-07-27	2013	OPC unified architecture - Part 9: Alarms and conditions
IEC 62541-10	1.0	2012-07-27	2013	OPC unified architecture - Part 10: Programs

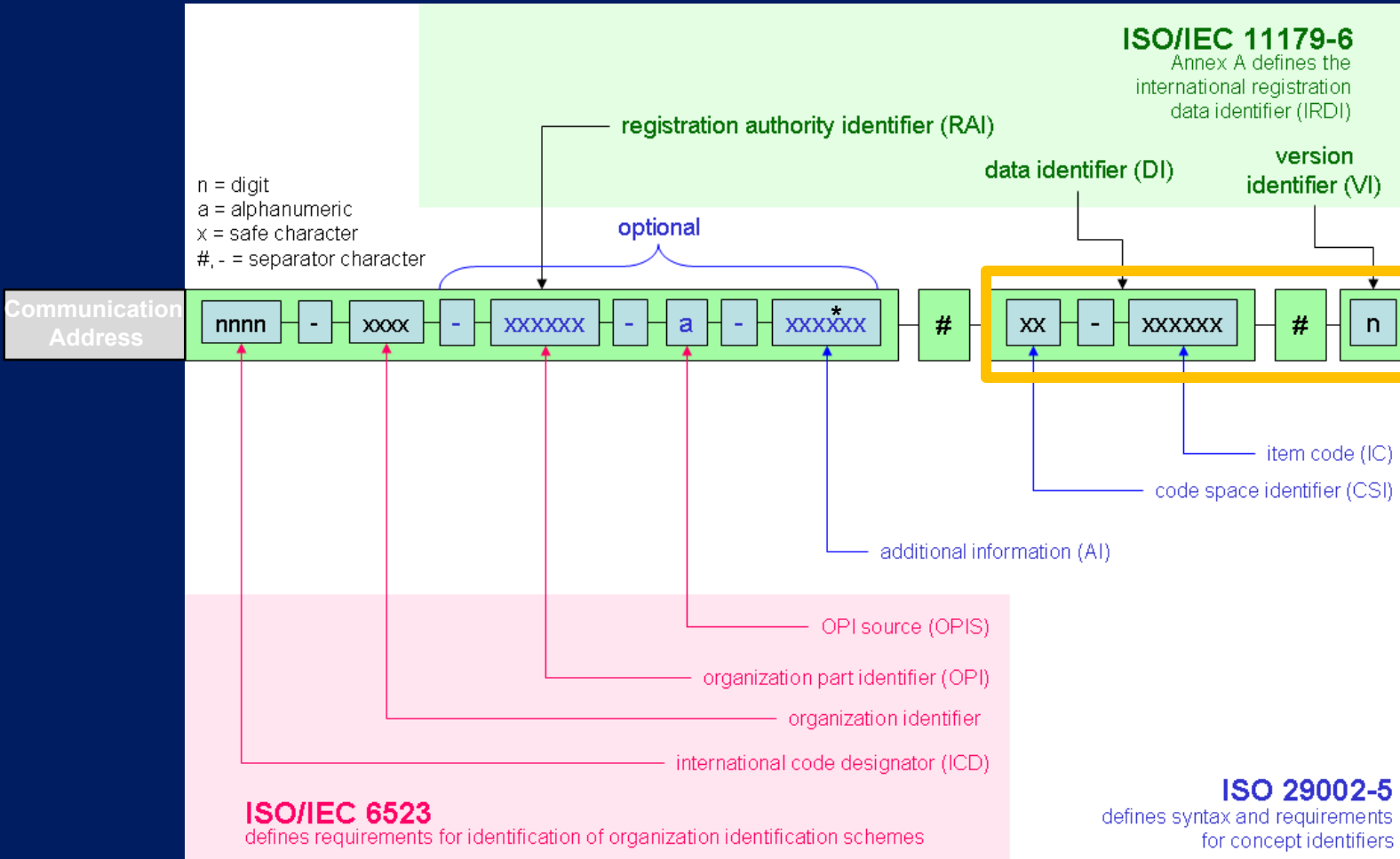
New Proposals:

Part 11 Historical Access

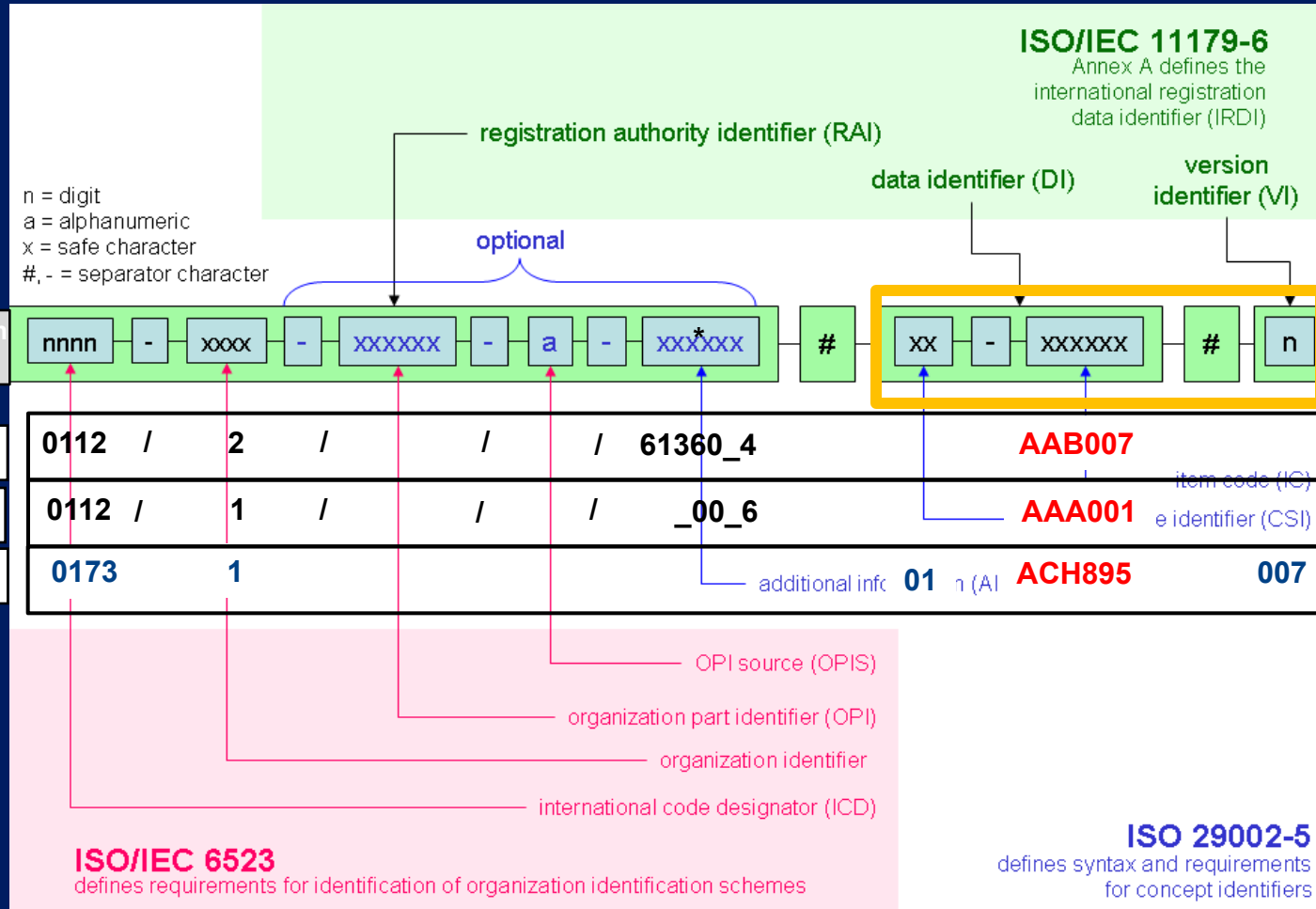
Part 13 Aggregates

Part 12 Discovery (planned)

Addressierung/Identifikation der Merkmale: ISO 29002-5



Addressierung/Identifikation der Merkmale: Beispiele

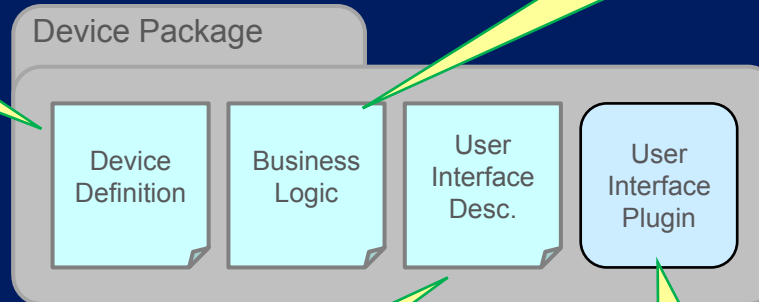


*International Registration Data Identifier

Integrationsmethodik mit FDI: Device Package



- Device parameters (e.g. alarm limits, diagnostic data, etc.)
- Device **model** (e.g. Blocks) (EDD)

- Consistency rules/dependencies between parameters
- Device **functions** (e.g. calibration) (EDD)



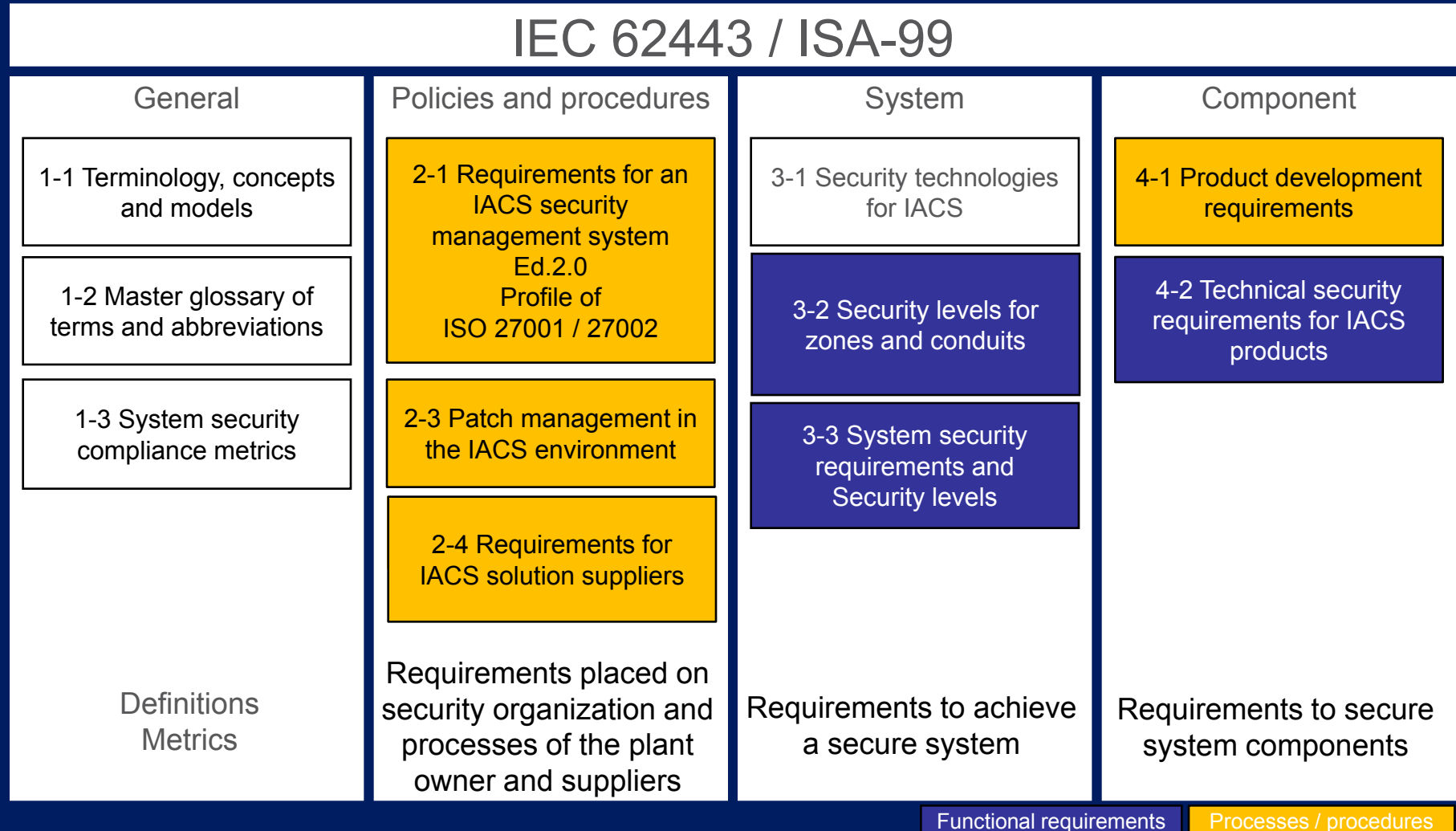
User Interface
(EDD)

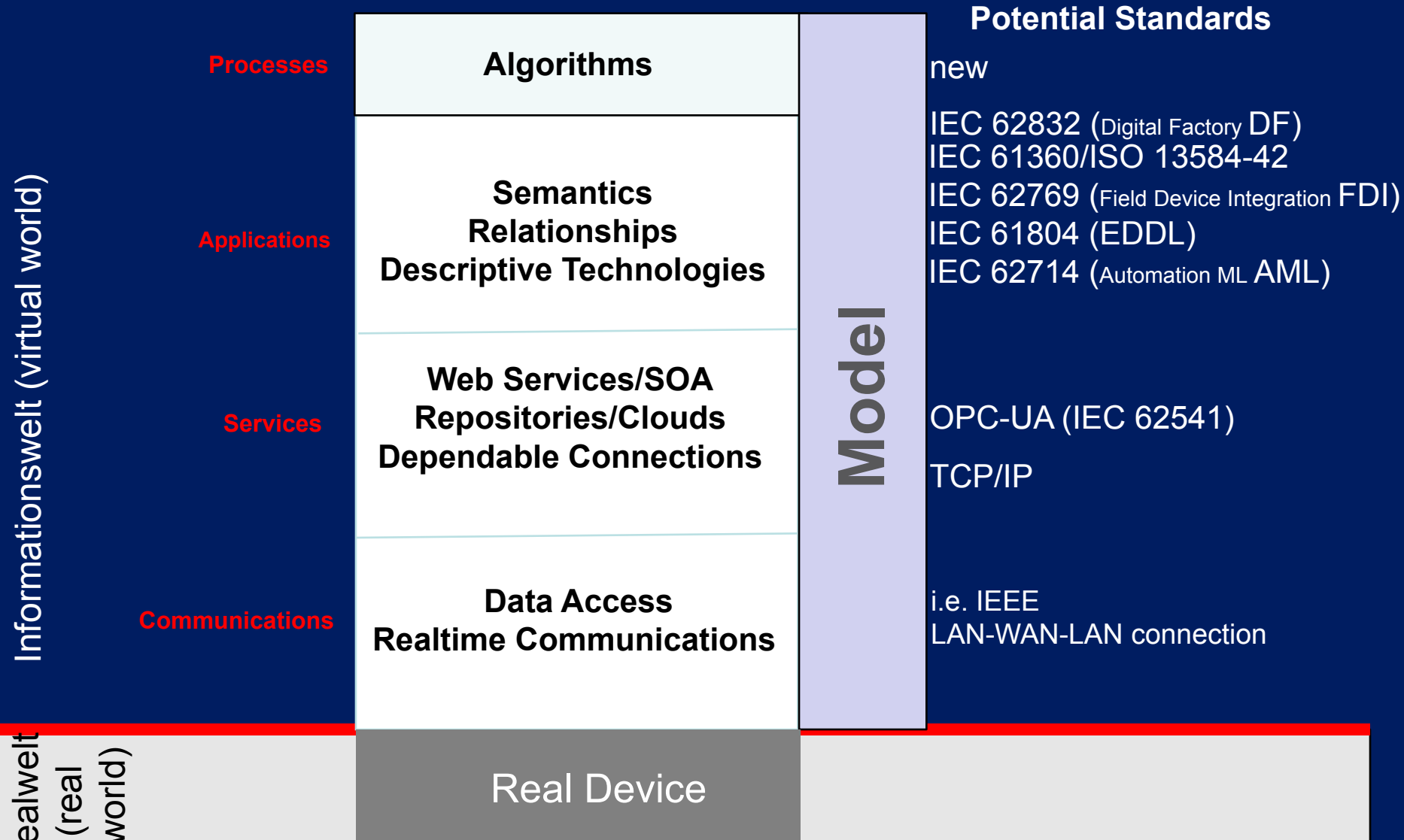
User Interface optional
(invoked by EDD-
Interpreter)

Legend:
 mandatory
 optional

Security in Automation:

Dokument-Struktur IEC 62443 / ISA-99





- **Thank you very much**