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

Organization

IEC TC65

Industrial-process measurement, control and automation

Die IEC-Familie

- **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**

www.iec.ch

IEC TC65: Scope

To prepare ...

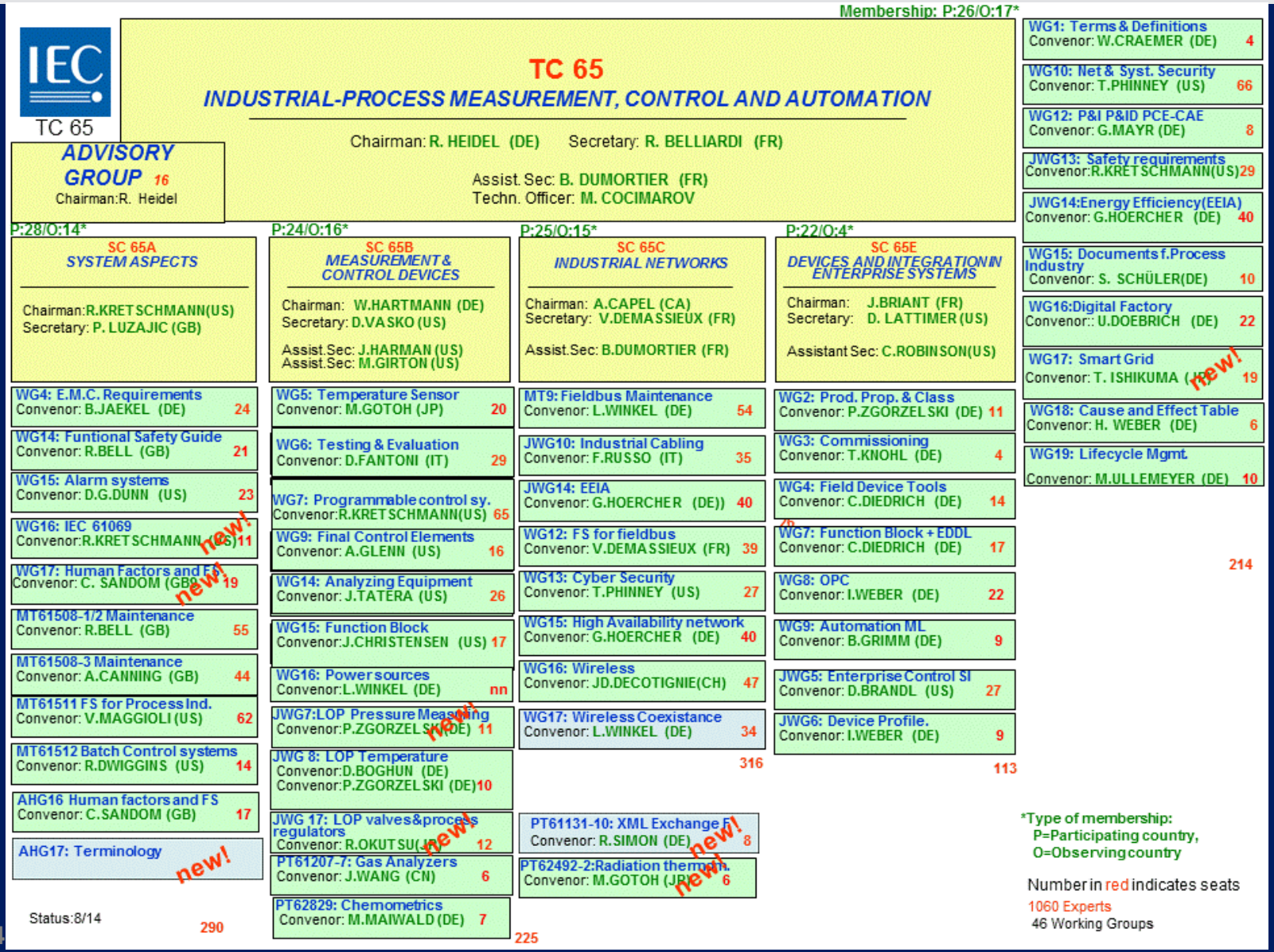
- international standards for systems and elements
- used for industrial-process measurement and control concerning continuous and batch processes....

IEC TC65: Das Systemkomitee der Automatisierungstechnik: Wichtige Technikthemen

TC 65

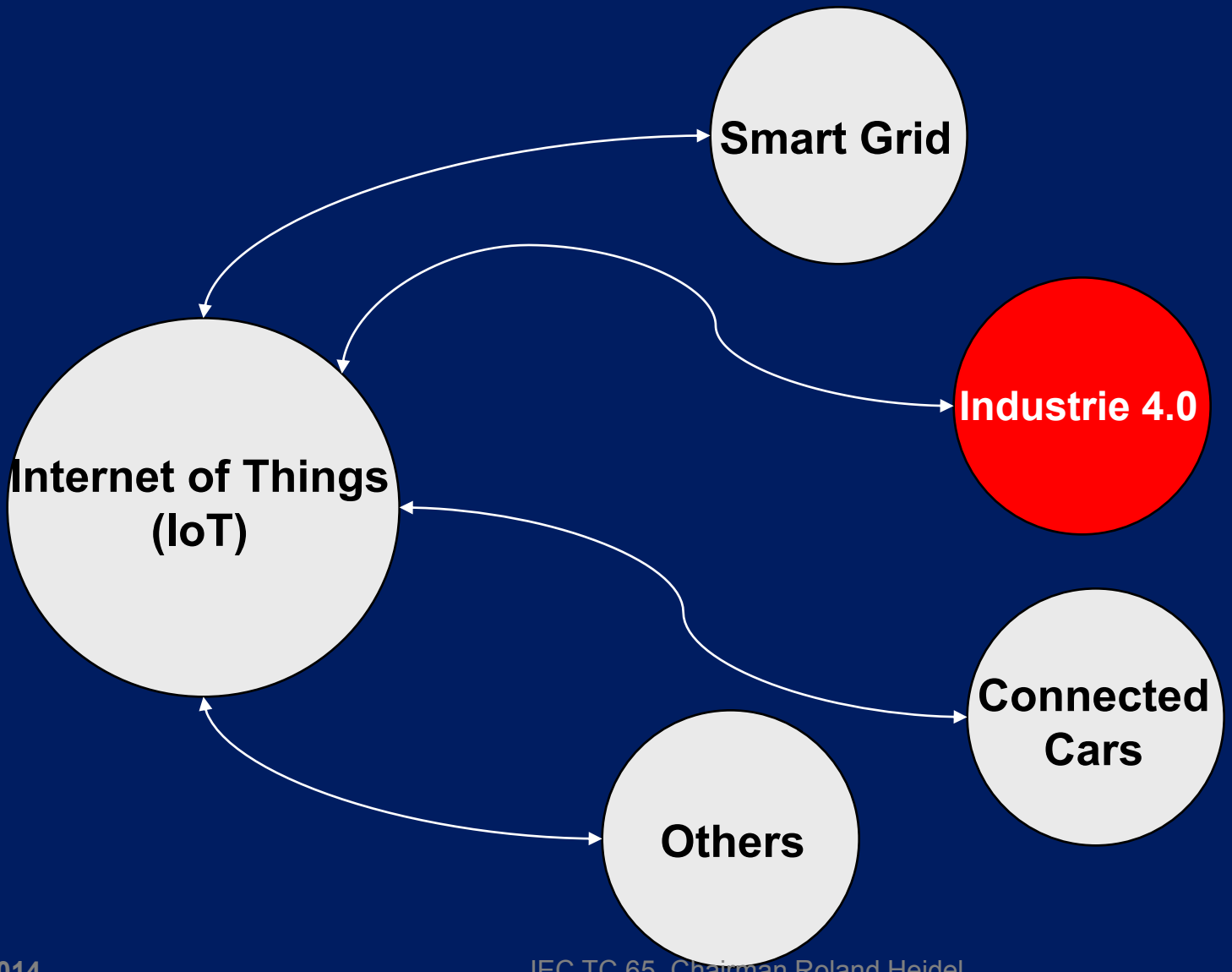
- Wired and Wireless Communications
- Modelling of the Digital Factory including Engineering
- Engineering Data Exchange
- Product Properties
- Device Integration
- Security in Automation
- Smart Grid
- Manufacturing Execution System
- Life Cycle Management
- Smart Grid
- Electrical and Functional Safety
- 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



Zur Ausgangsituation

Industrie 4.0 ist eine Ausprägung des „Internet der Dinge“



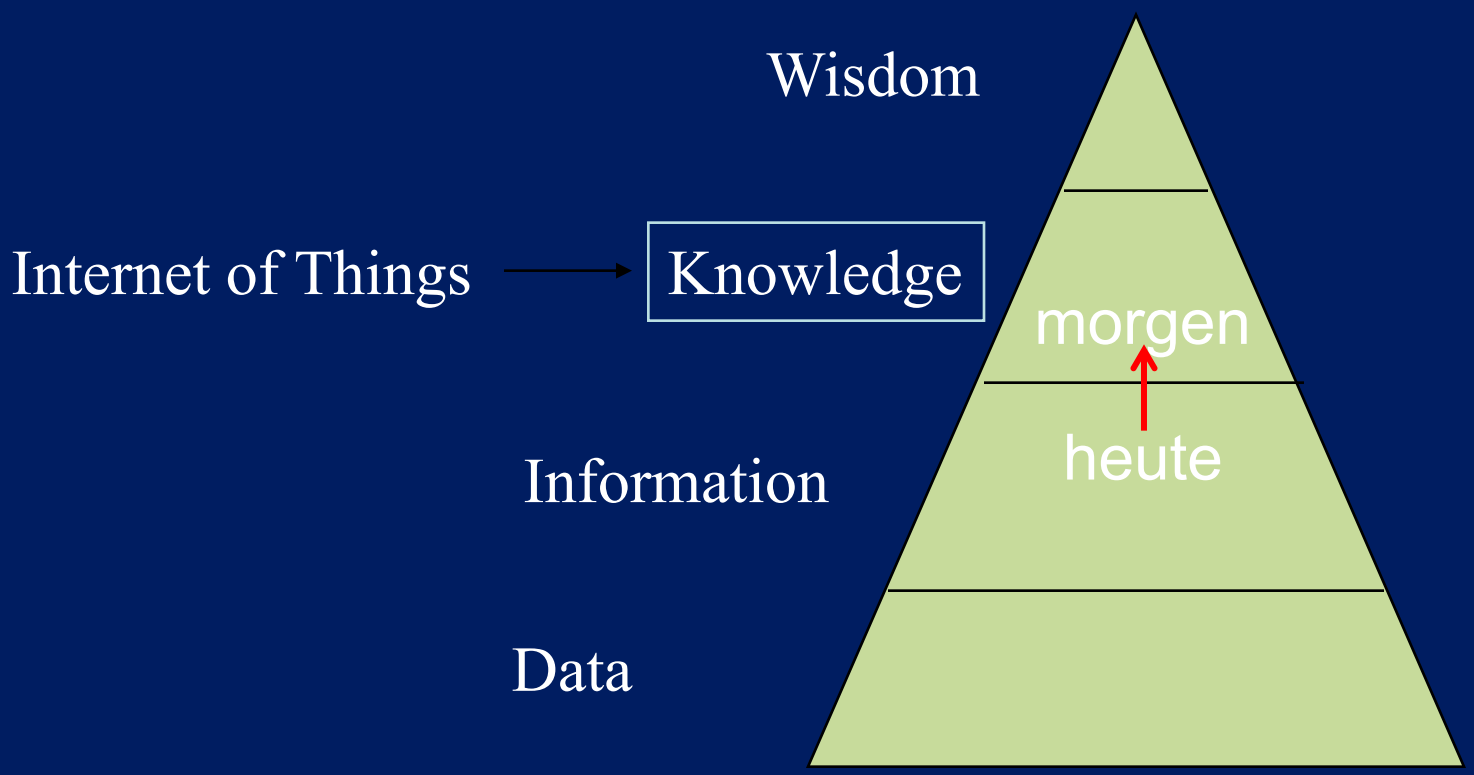
Die Industrie 4.0-Vision

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**

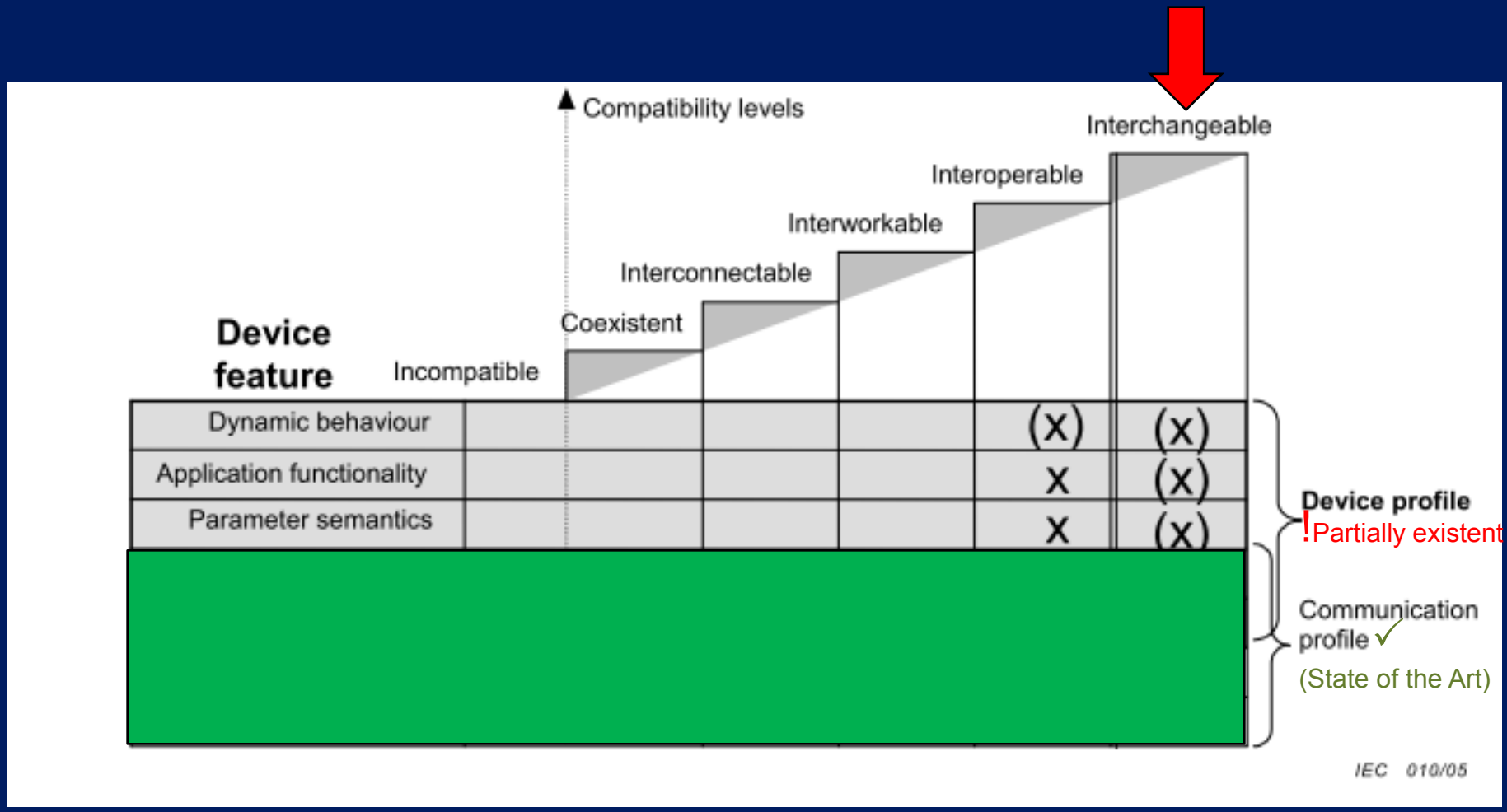
Quelle: Siemens

Die Informationspyramide



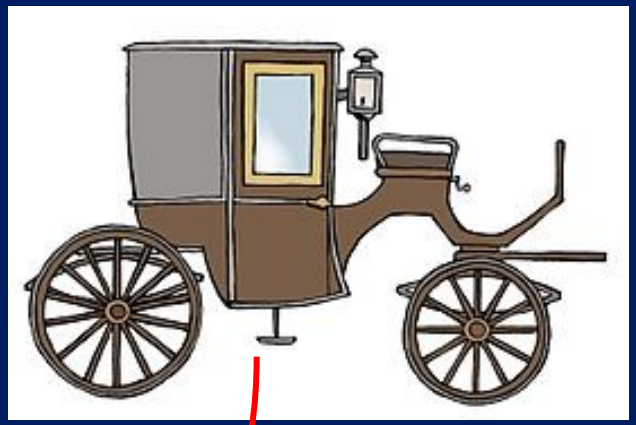
„Knowledge“ bedeutet auch die Trennung von Abläufen und Daten

Kompatibilitätsgrade nach IEC TR 62390



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

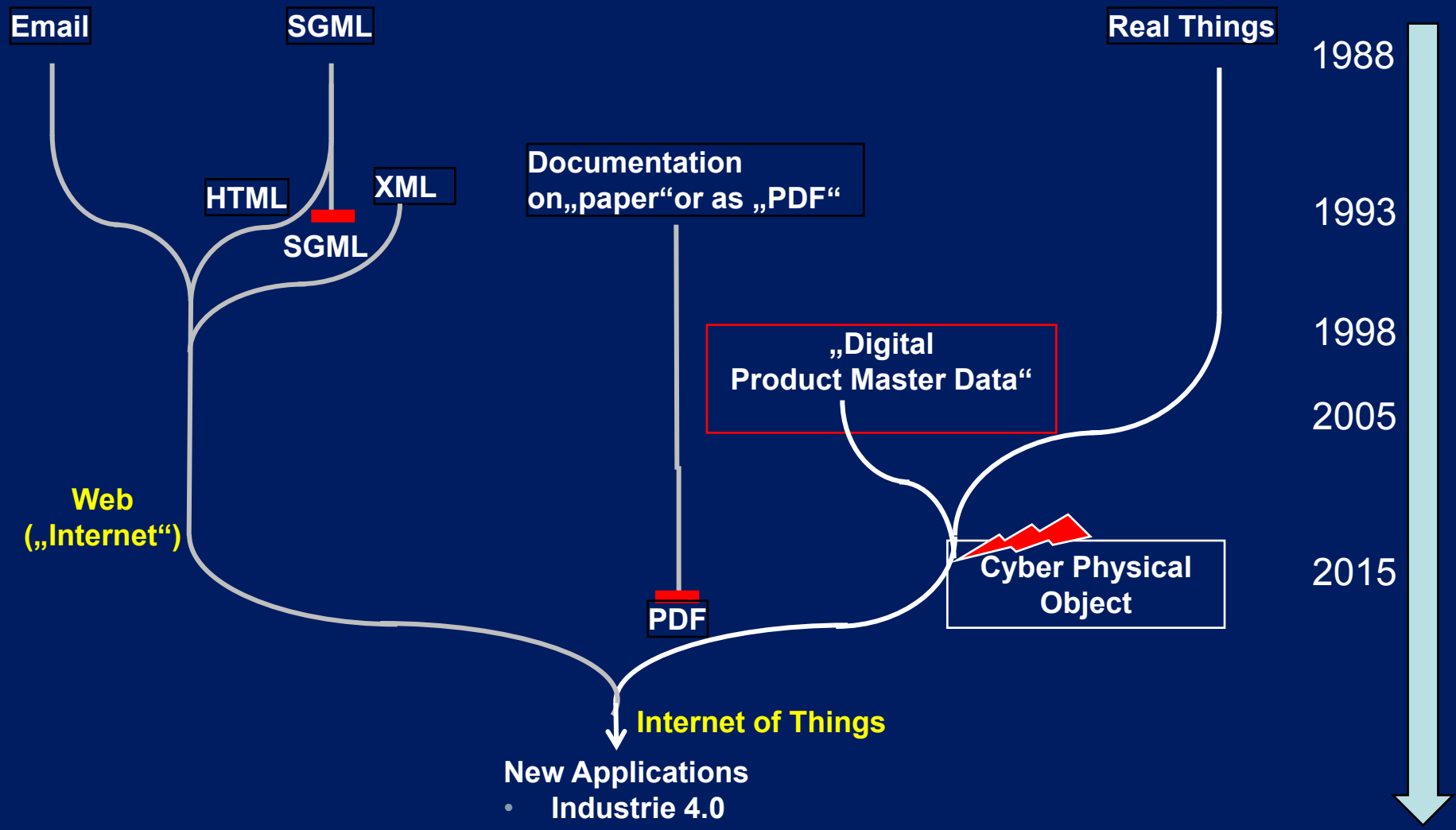
Zwei harmlose Dinge neu kombiniert……



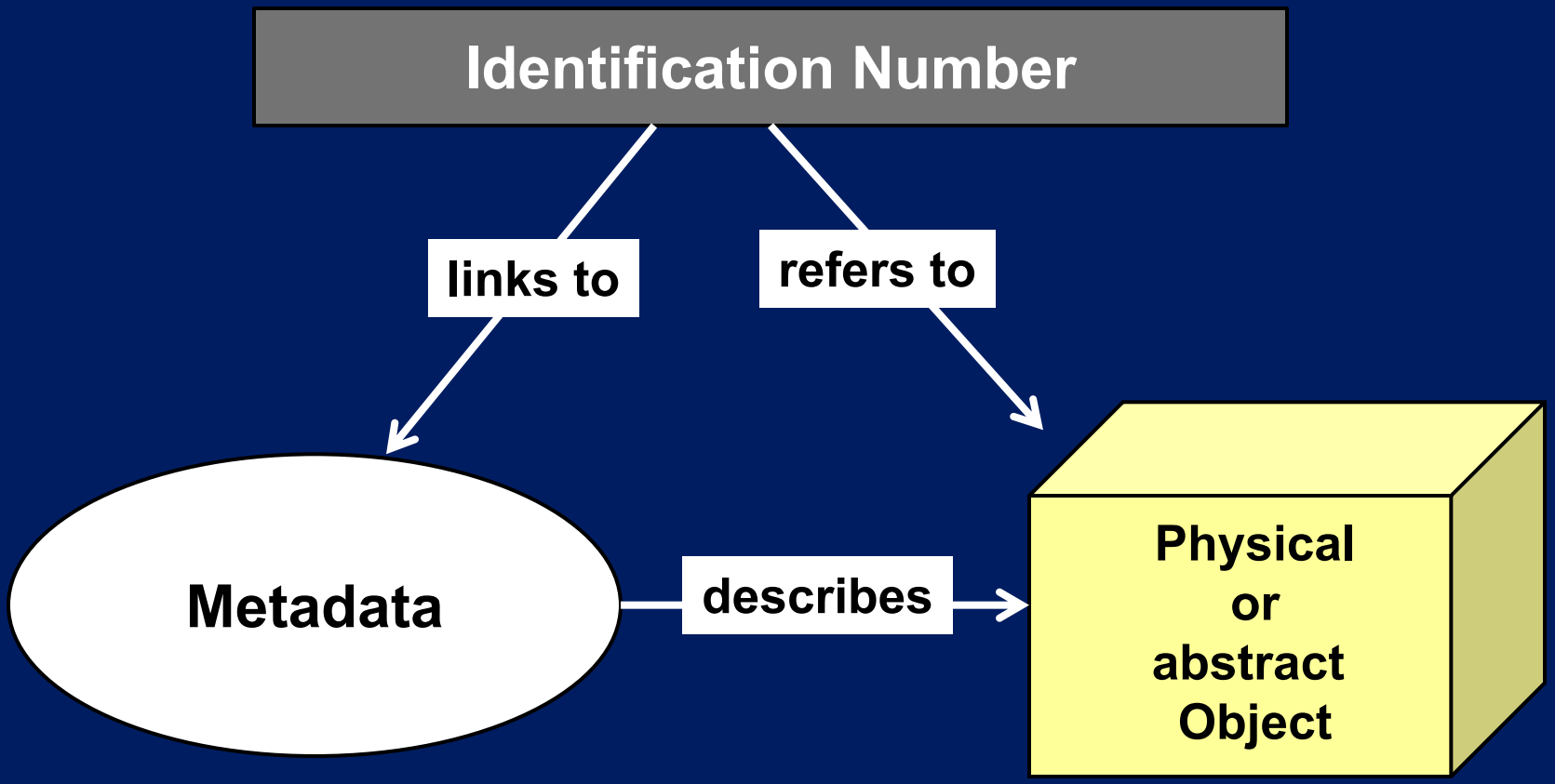
Gottlieb Daimler
Es werden höchstens 5000 Fahrzeuge gebaut werden. Denn es gibt nicht mehr Chauffeure, um sie zu steuern.

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

Technologie-Verlauf

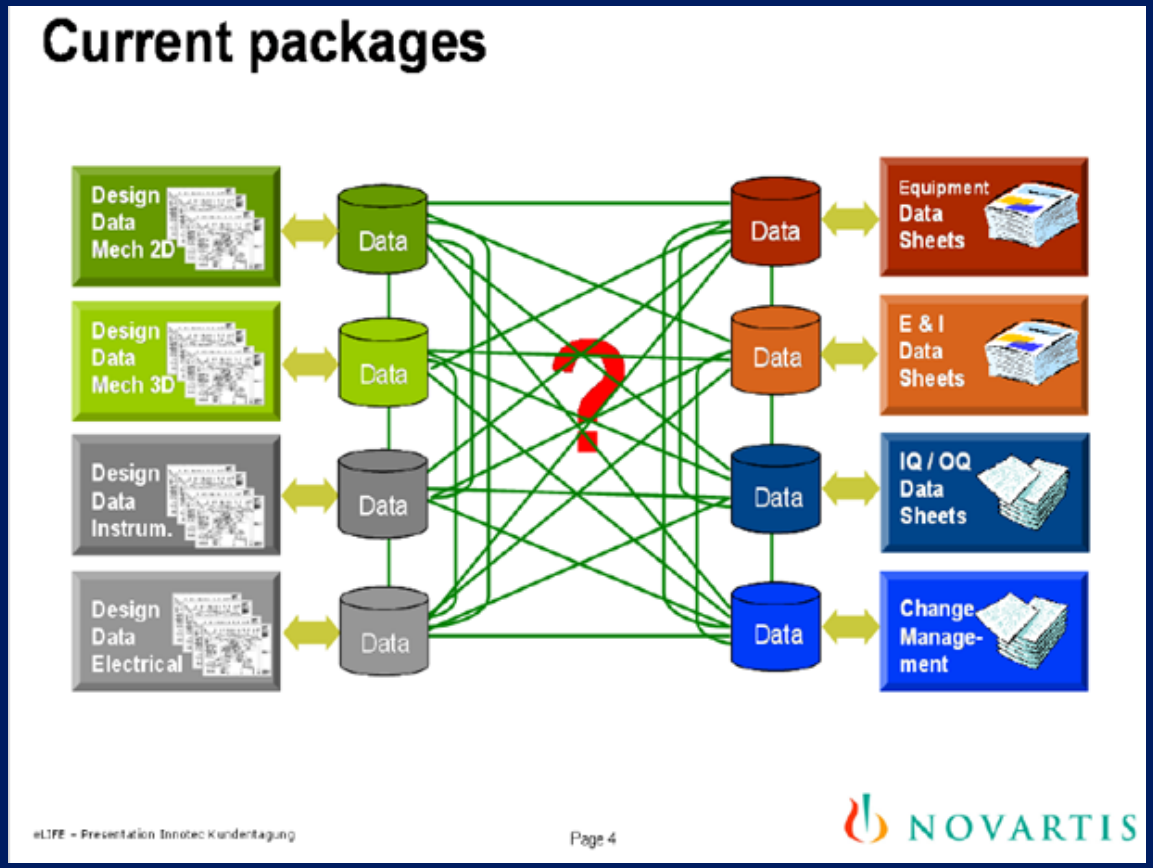


Cyber Physical Object nach IEC 62507



Das Schnittstellen-Dilemma (1)

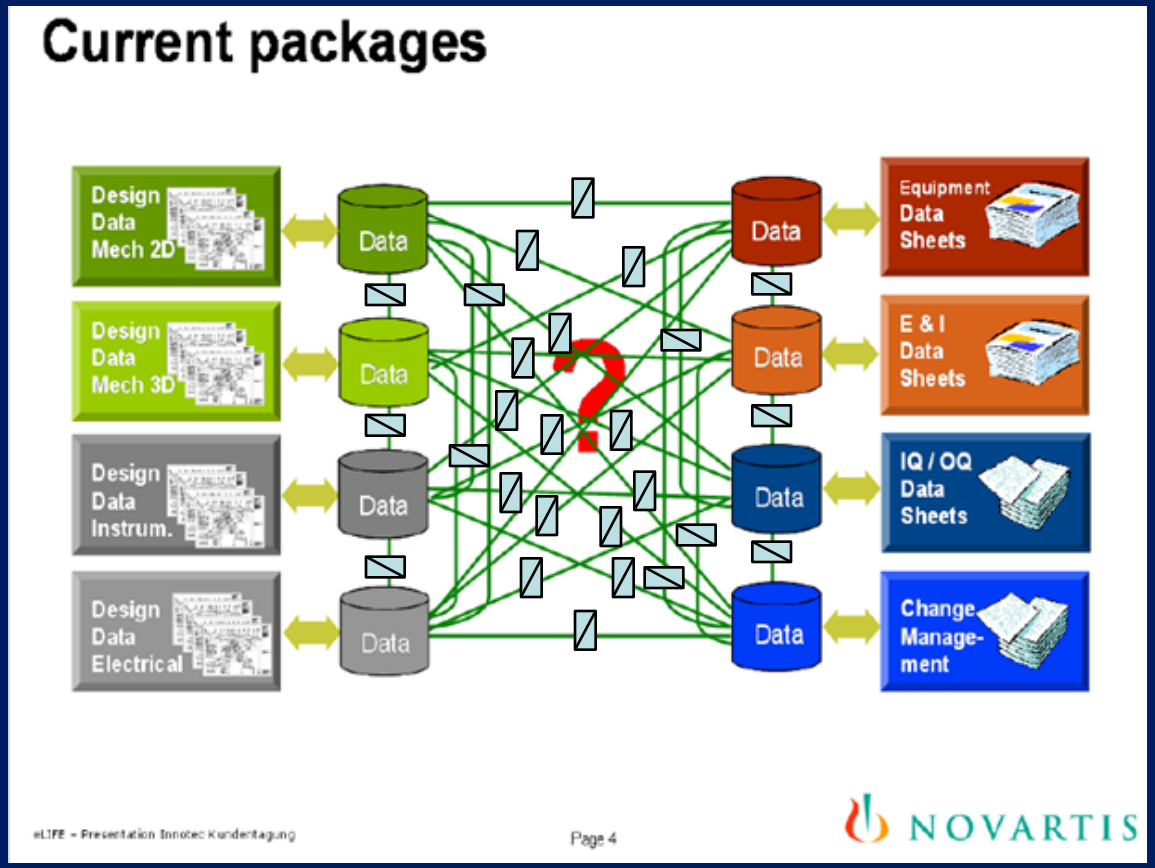
Jede Schnittstelle hat ihre eigene Semantik



Freigegeben von NAMUR (H.Dr. Tauchnitz) 2005

Das Schnittstellen-Dilemma (2)

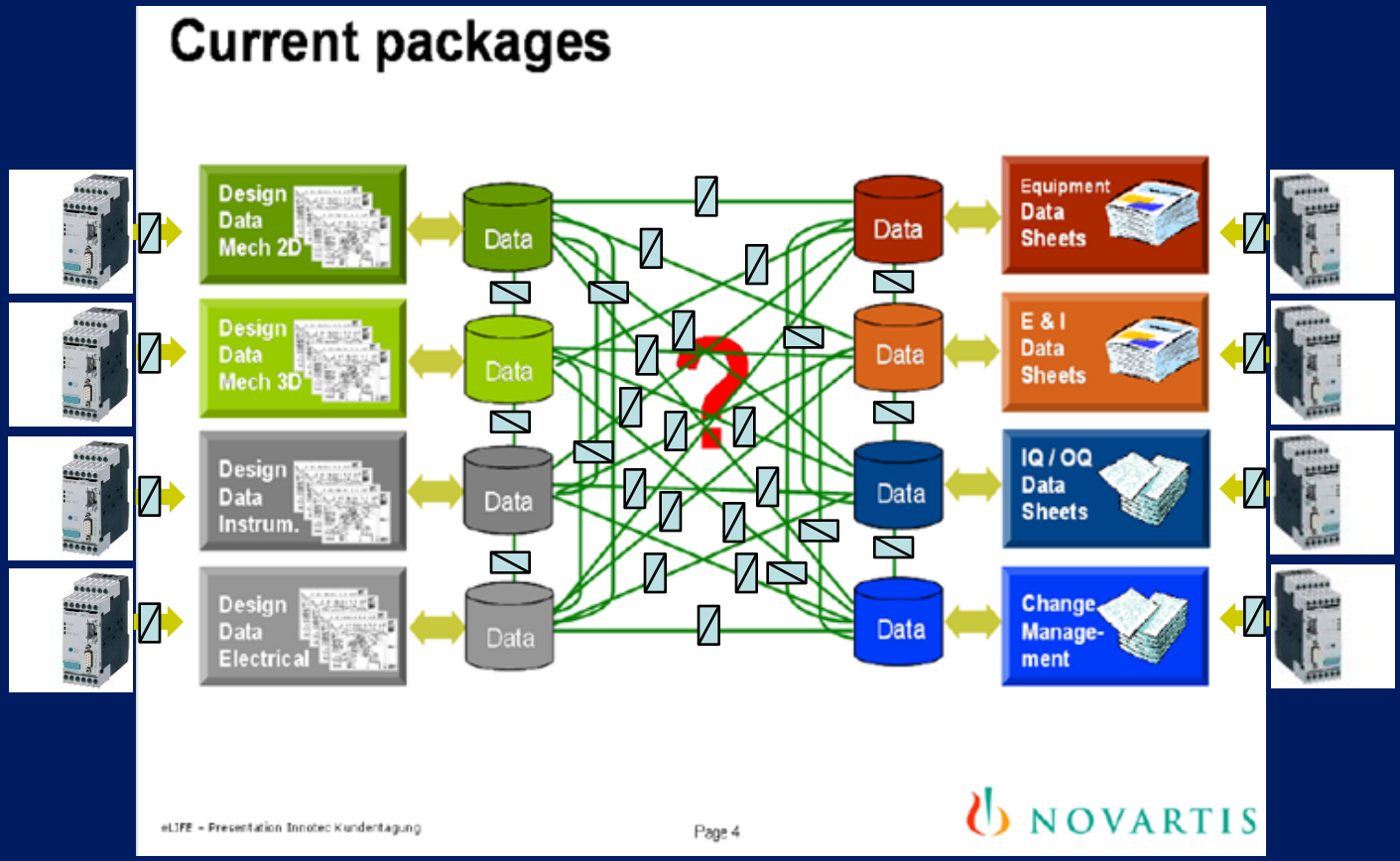
Zwischen den Werkzeugen sind „Übersetzer“ erforderlich



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

Das Schnittstellen-Dilemma (3)

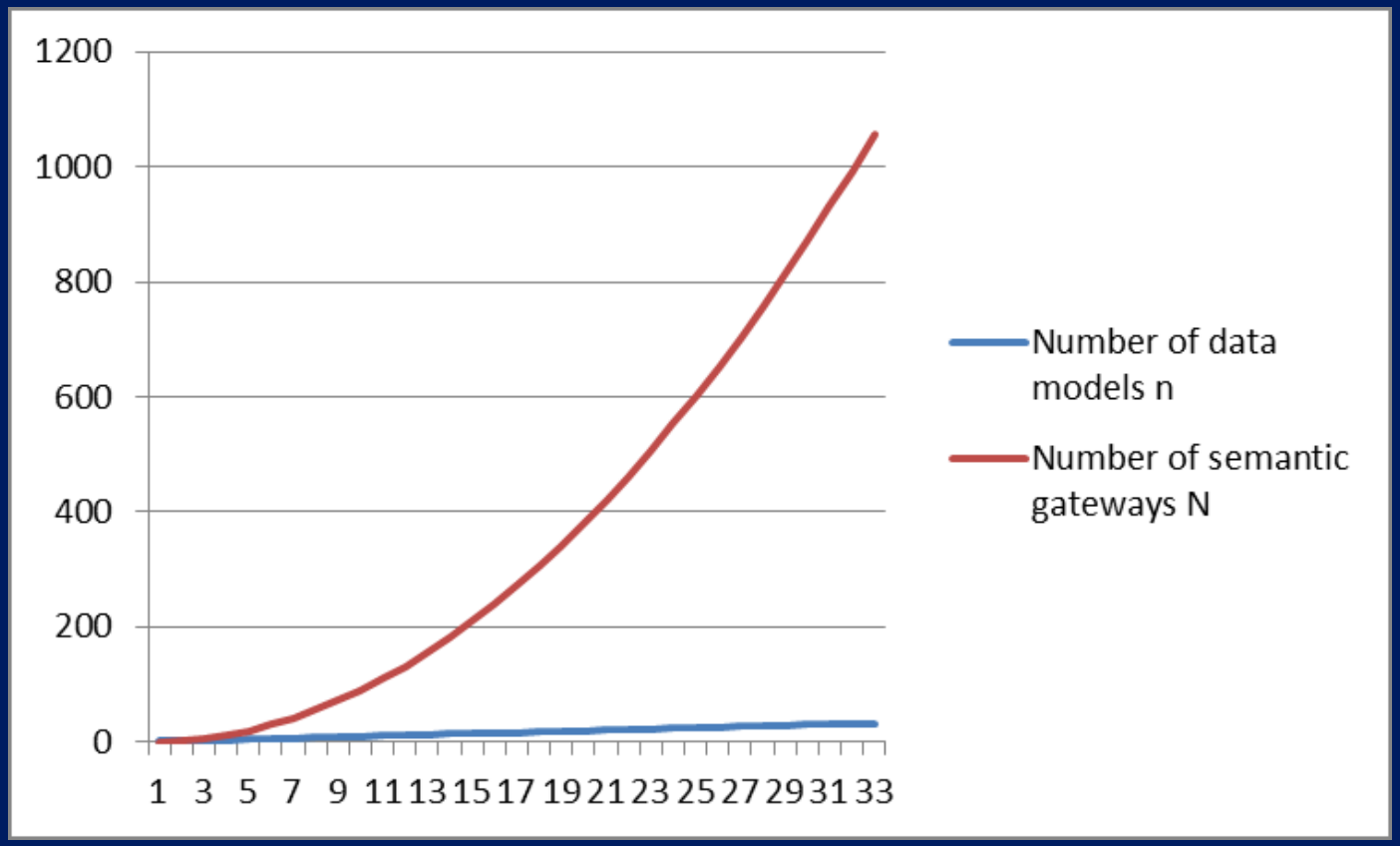
Jedes Werkzeug bildet Komponenten anders ab



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

Das Schnittstellen-Dilemma (4)

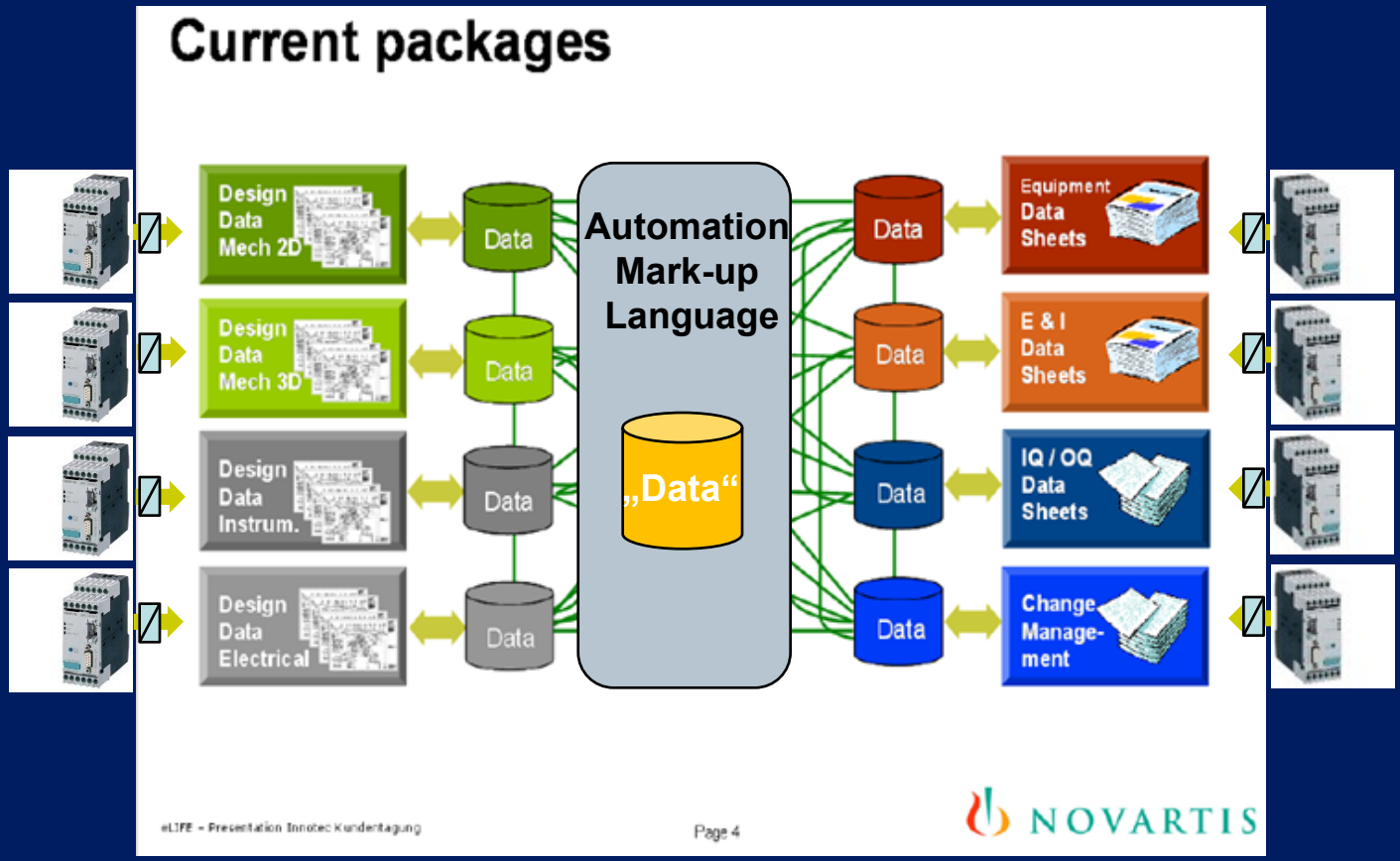
Die Zahl der semantischen Umsetzungen steigt quadratisch mit der Zahl der Schnittstellen



N=n(n-1)

Auf dem Weg zur Lösung des Schnittstellen-Dilemmas

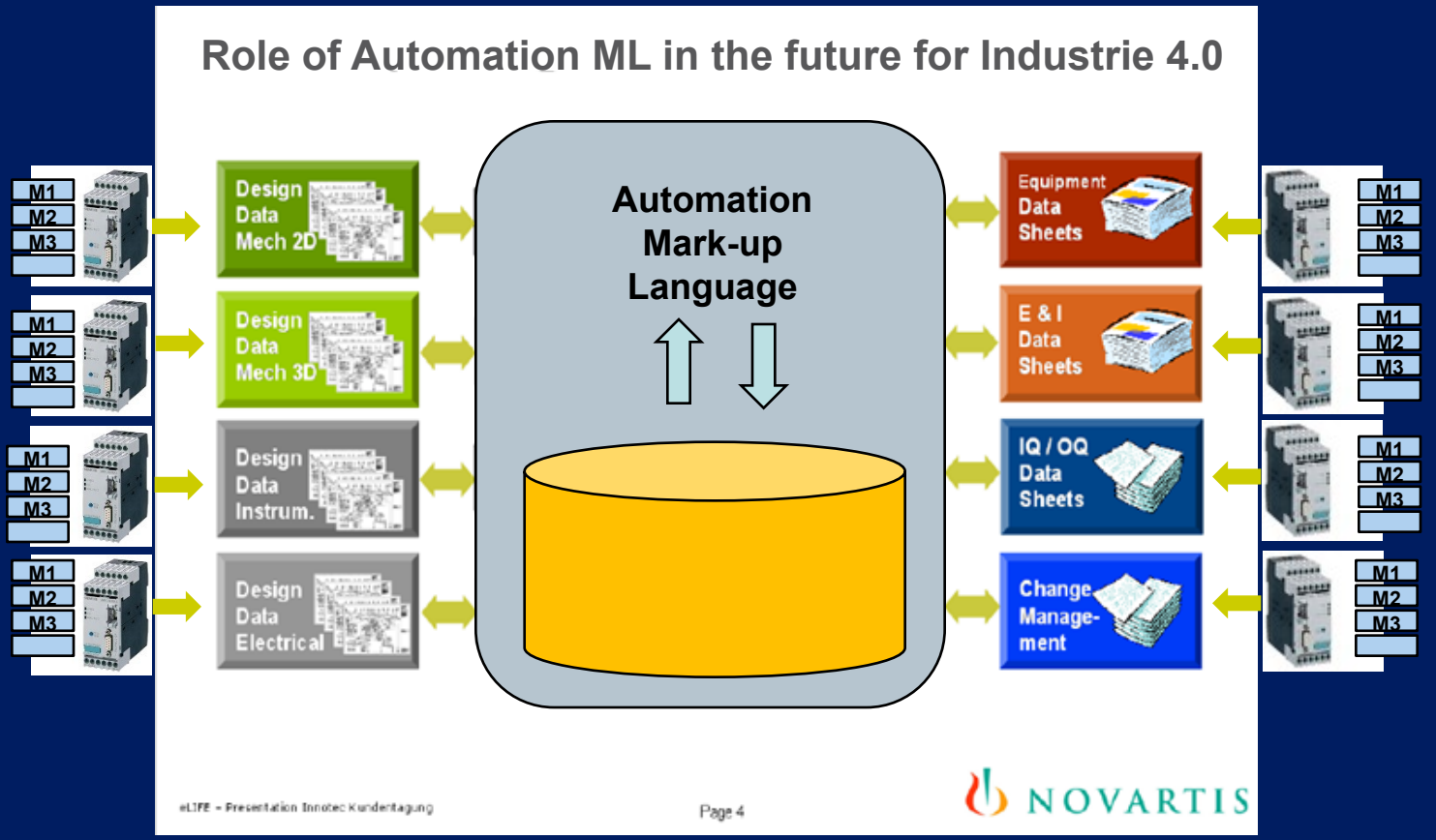
Zwischen den Werkzeugen wird auf eine einheitliche Semantik umgesetzt



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

Die Lösung des Schnittstellen-Dilemmas

Die Werkzeuge und Komponenten werden nach außen einheitlich *repräsentiert*

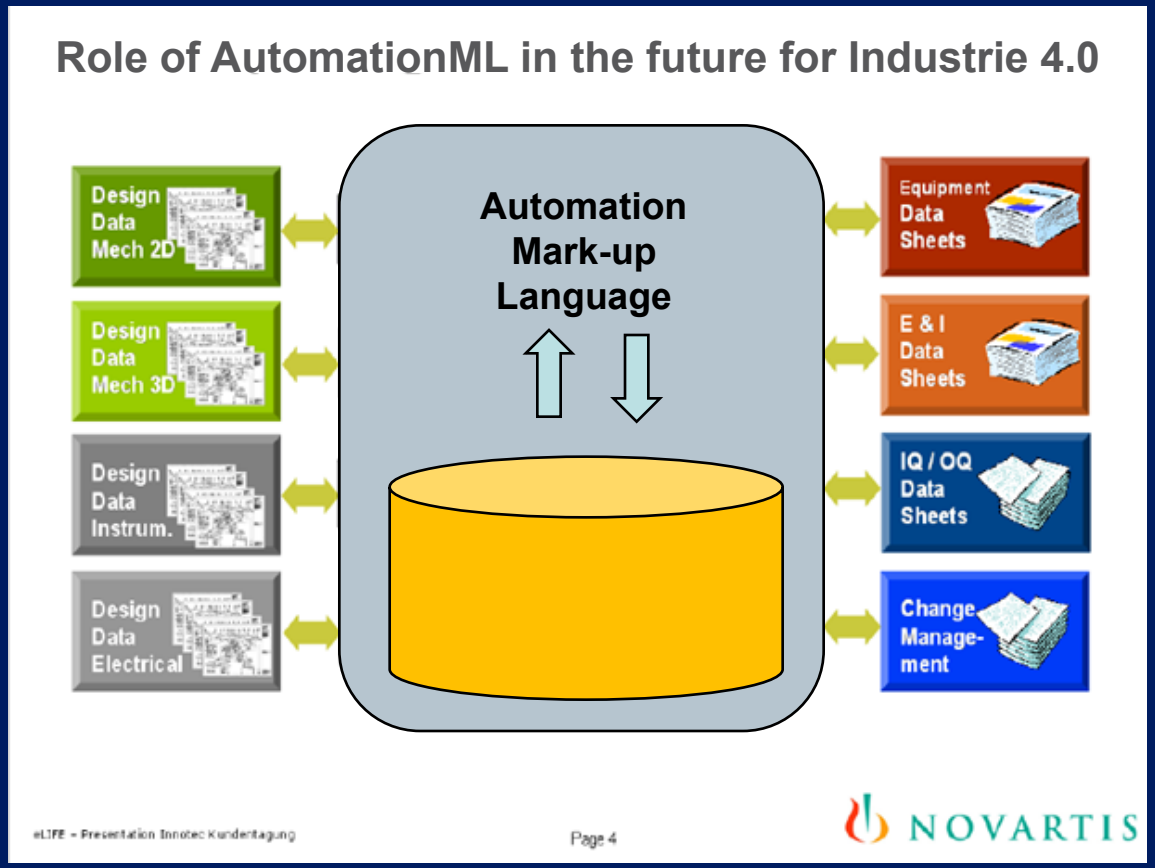


Wichtig: Die Eigenschaften der realen Produkte ändern sich dadurch NICHT

Anzahl N semantischer Konvertierungen bei n Instanzen: N=0

Die Lösung des Schnittstellen-Dilemmas

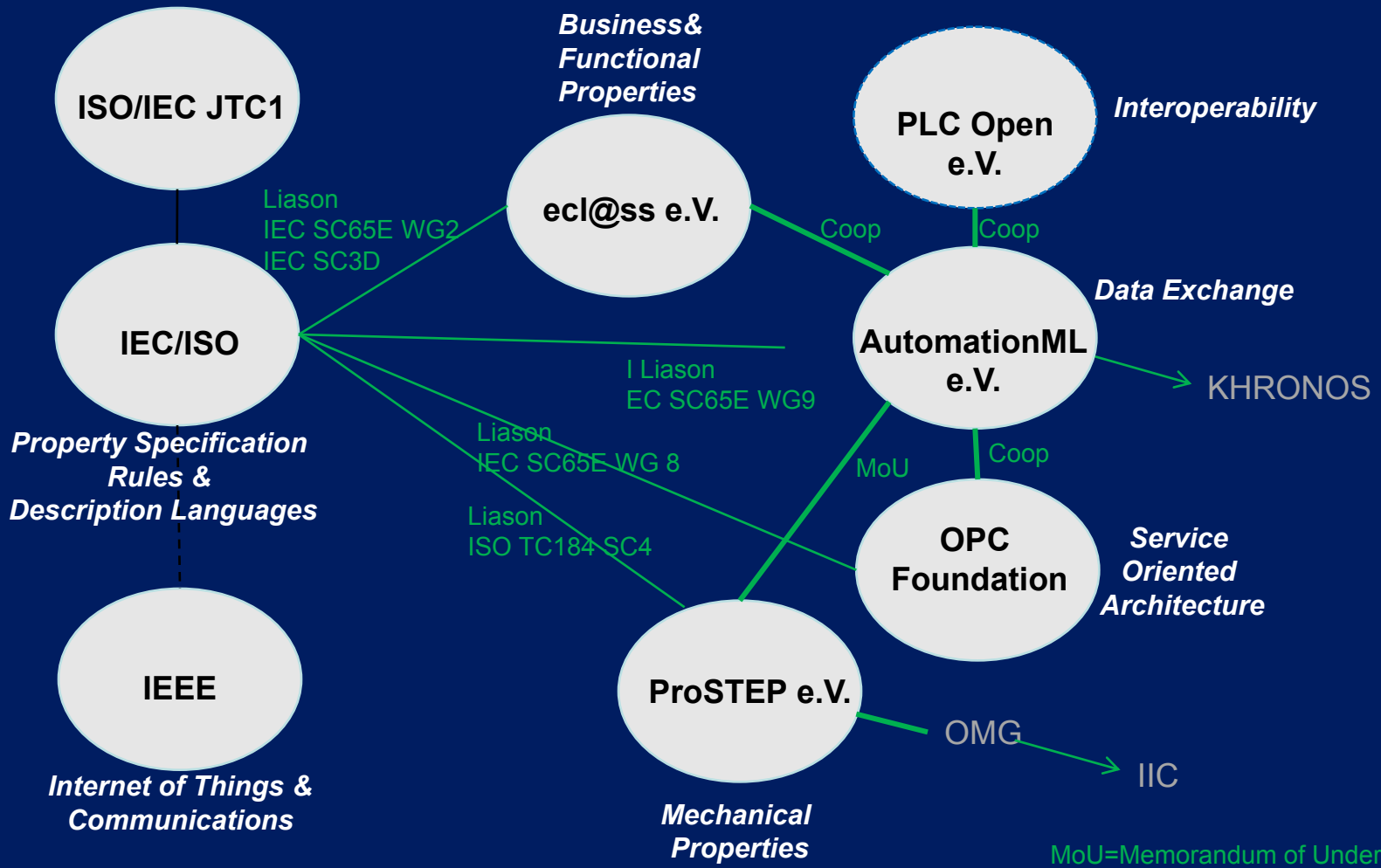
Alle Komponenten sind konsistent in einem Repository abgelegt



Wichtig: Die Eigenschaften der realen Produkte ändern sich dadurch NICHT

Anzahl N semantischer Konvertierungen bei n Instanzen: N=0

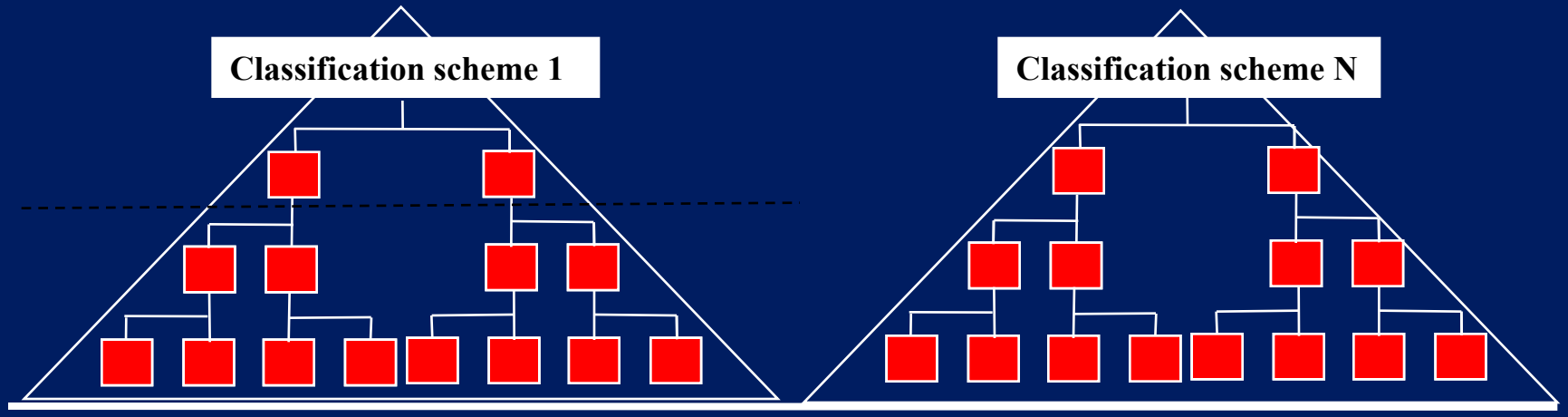
Konsortien und Vereinbarungen



MoU=Memorandum of Understanding
Coop=Cooperation agreement

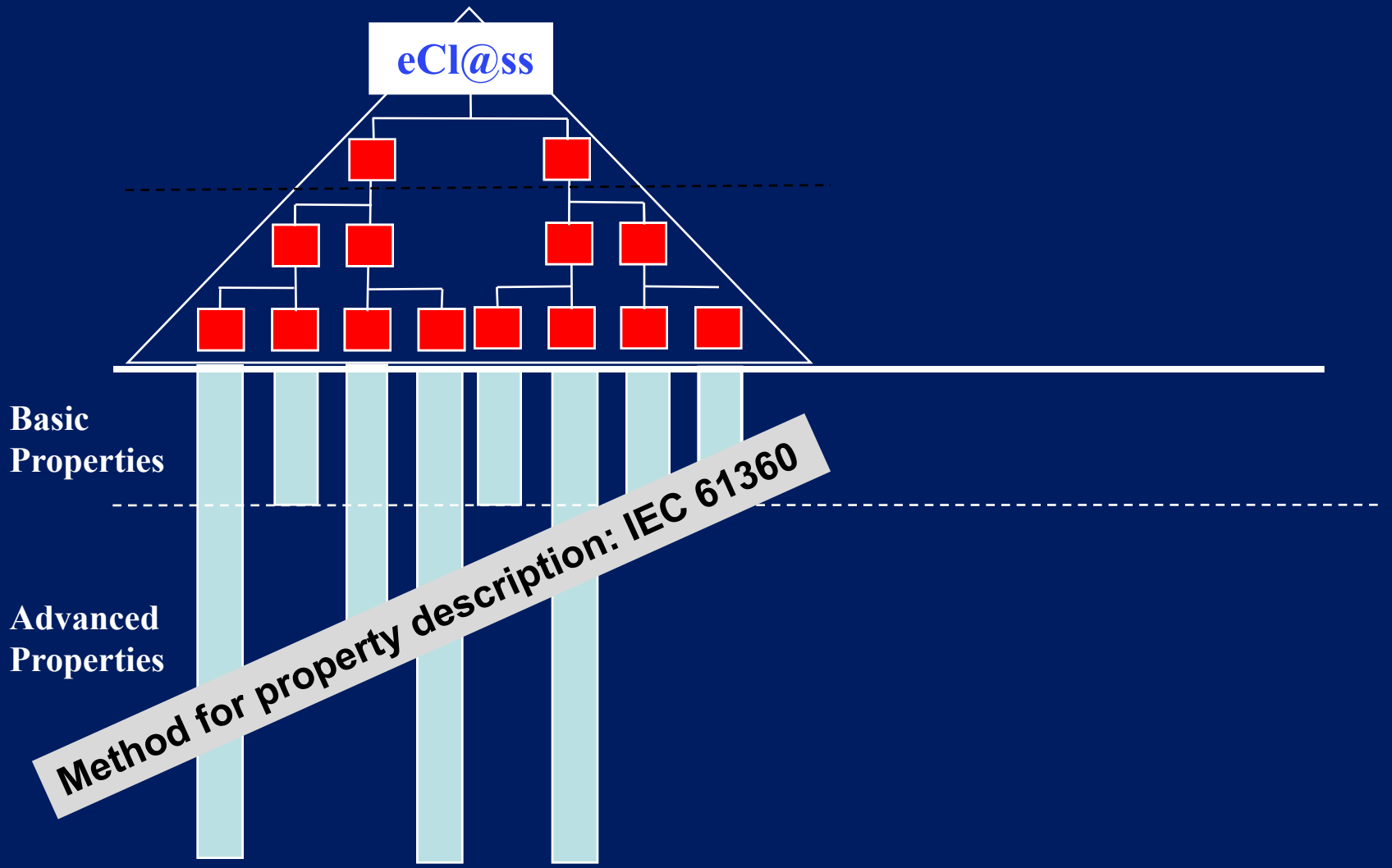
Existierende Konzepte und Normen (Auswahl)

Es gibt Klassifikationssysteme für unterschiedliche Zwecke …

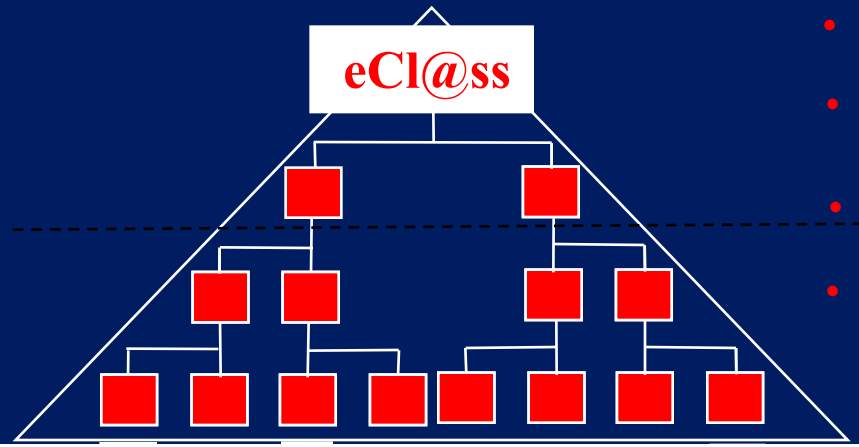


- Indentification of application areas i.e. procurement, customs, taxes….
- Identifies mostly product/service families (types)
- Is NOT an identification of any device/service

Klassifikation und Merkmale: ecl@ss* V9.0



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



- Indentification 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

Method for property description: IEC 61360

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

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

TC 65

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

TC 65

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

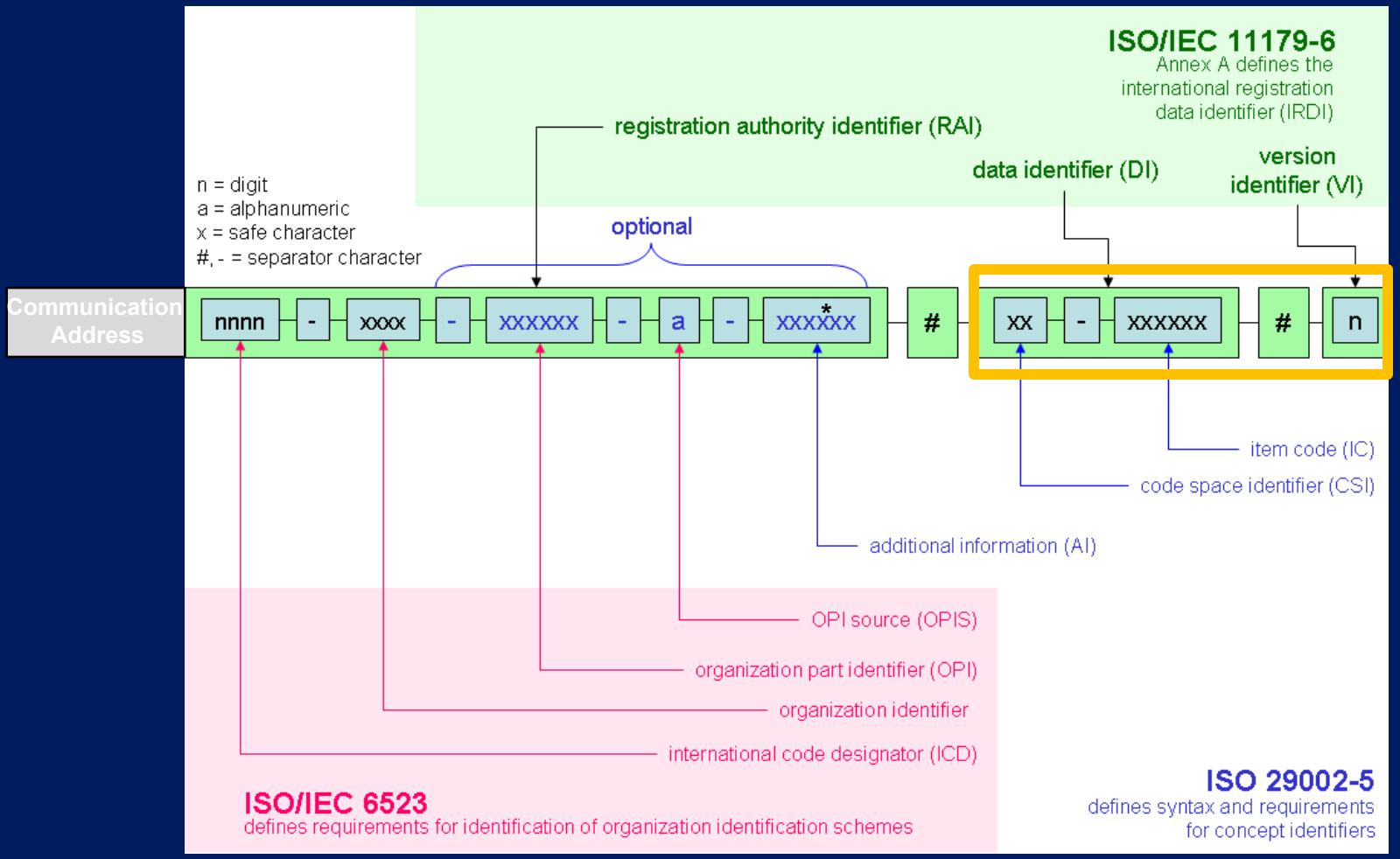
- Location of mainboard
- Location of communication Board

OPC-UA Dokumente

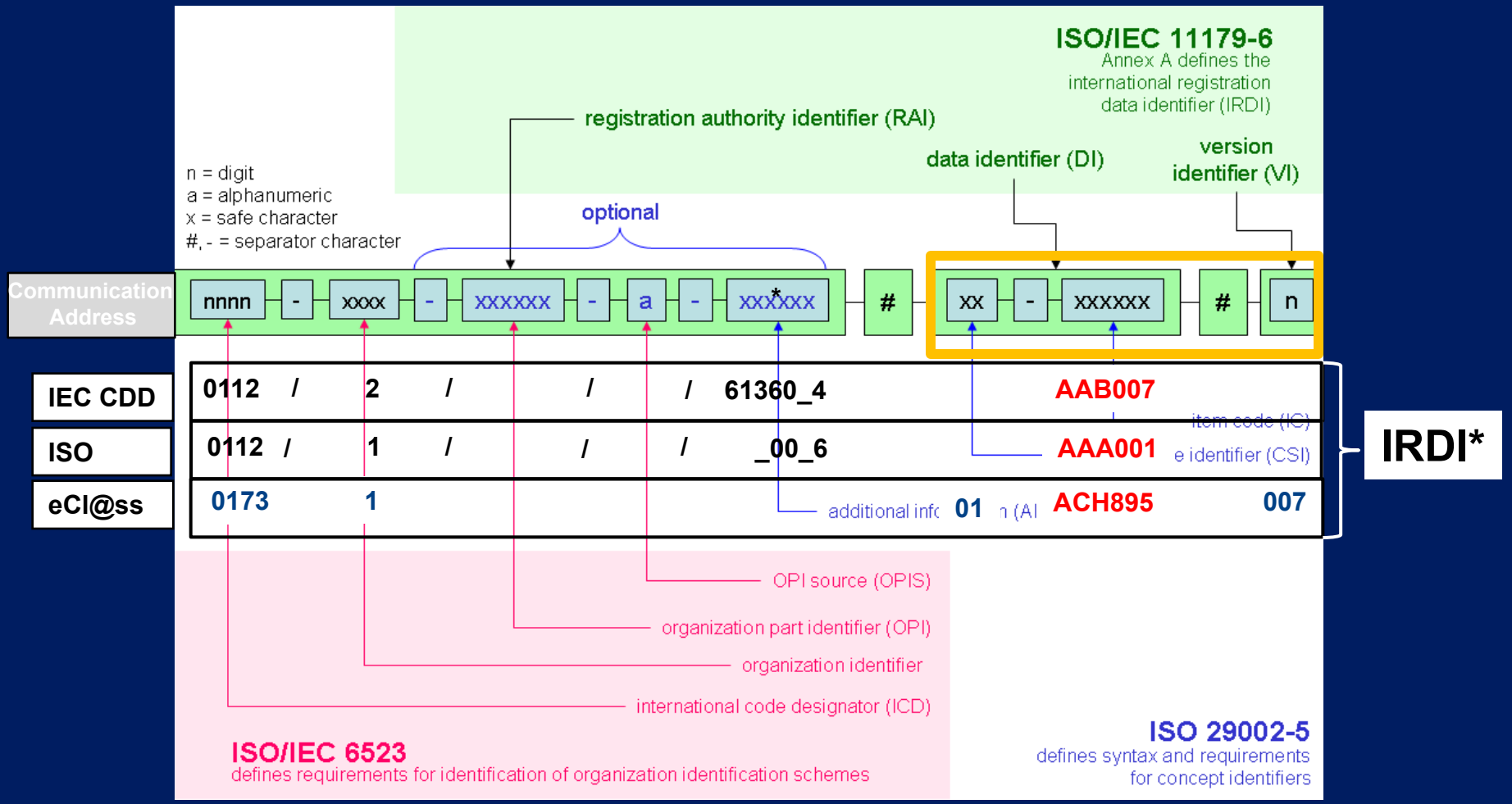
Reference	Edition	Date	**Stability**	Title
IEC 62541-1	1.0	2010-02-18	2013	OPC unified architecture - Part **1: Overview and Concepts**
IEC 62541-2	1.0	2010-02-18	2013	OPC unified architecture - Part **2: Security Model**
IEC 62541-3	1.0	2010-07-29	2013	OPC unified architecture - Part **3: Address Space 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

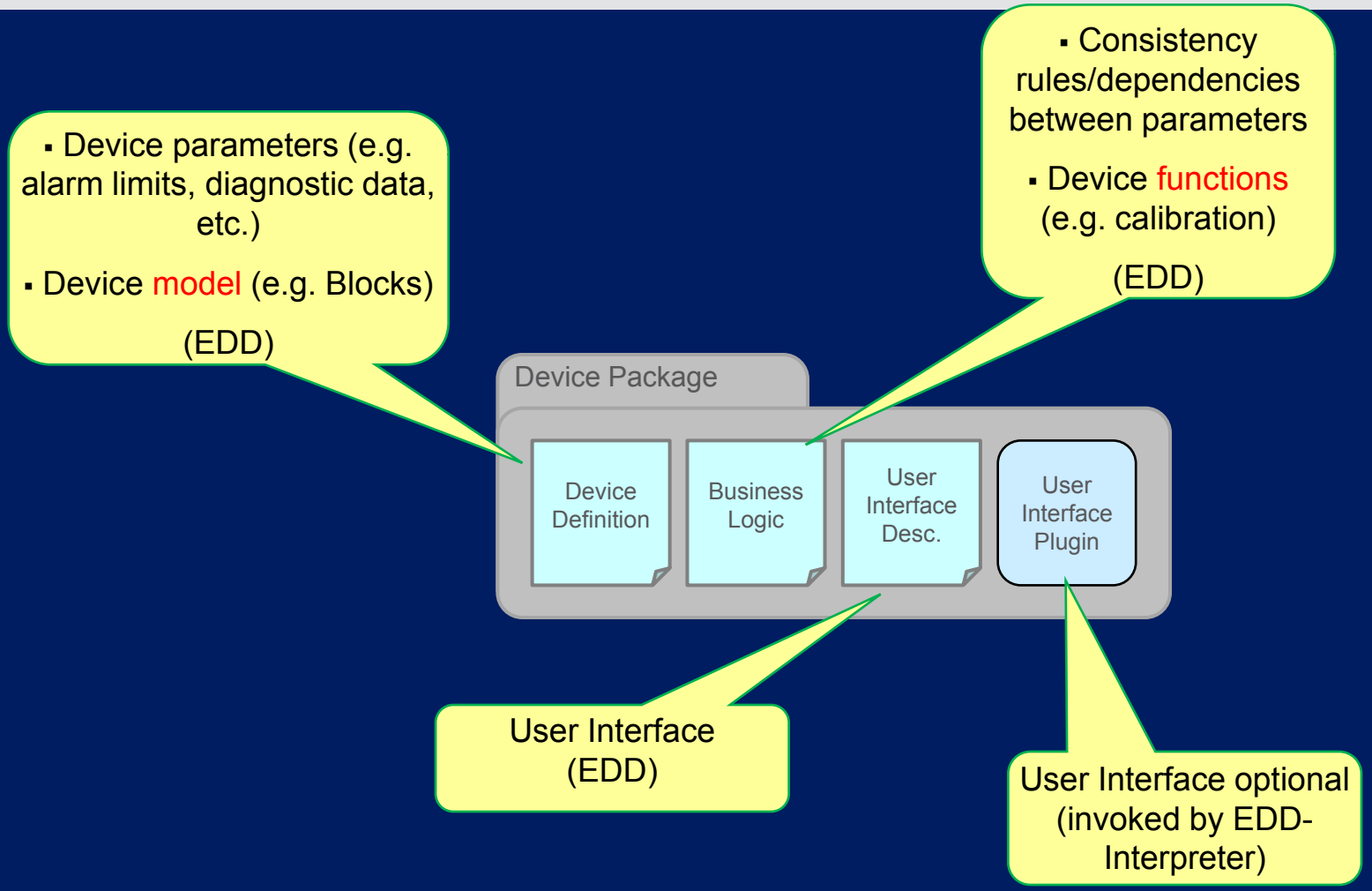


Addressierung/Identifikation der Merkmale: Beispiele



*International Registration Data Identifier

Integrationsmethodik mit FDI: Device Package



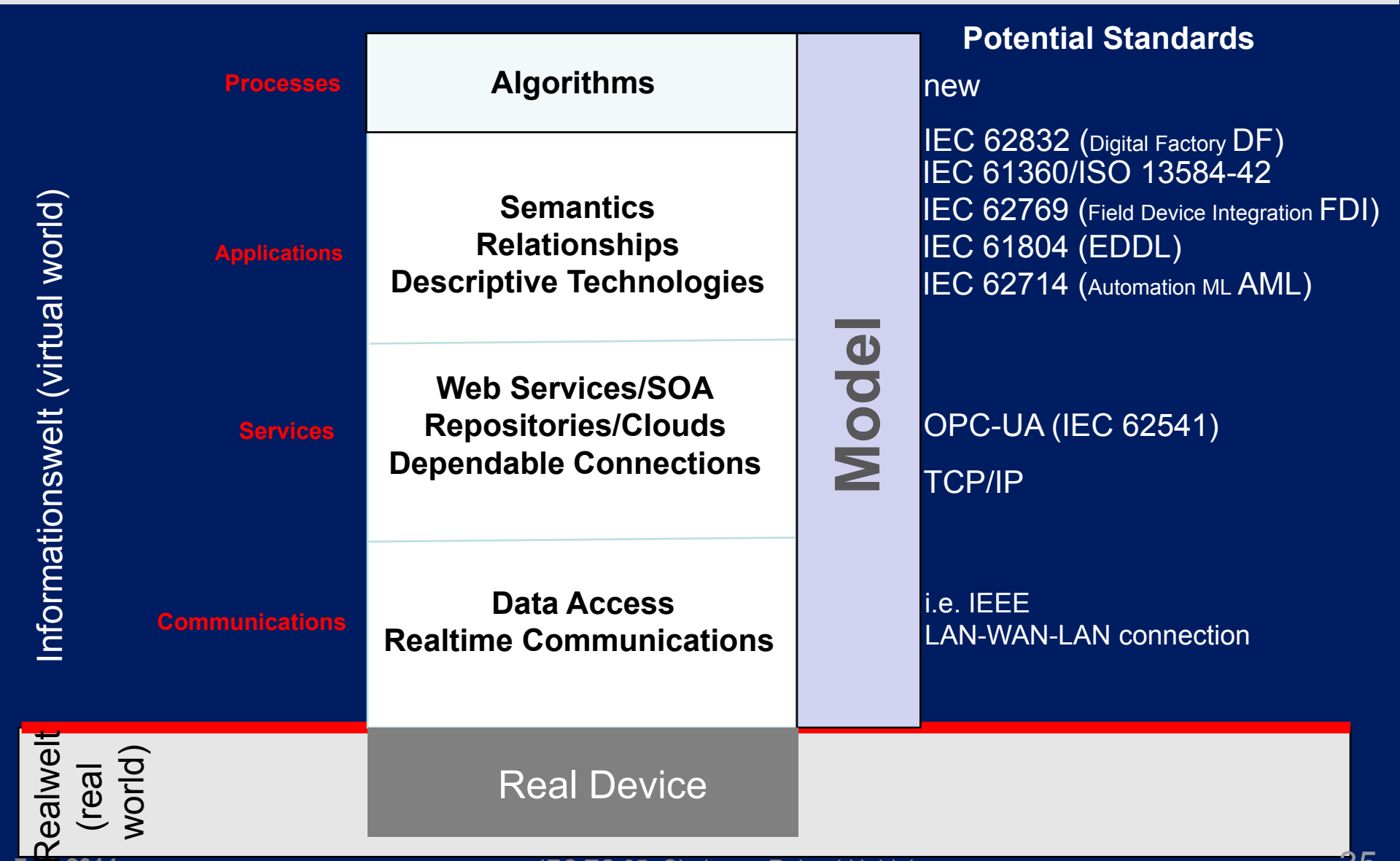
Security in Automation: Dokument-Struktur IEC 62443 / ISA-99

IEC 62443 / ISA-99

General	Policies and procedures	System	Component
1-1 Terminology, concepts and models	2-1 Requirements for an IACS security management system Ed.2.0 Profile of ISO 27001 / 27002	3-1 Security technologies for IACS	4-1 Product development requirements
1-2 Master glossary of terms and abbreviations	2-3 Patch management in the IACS environment	3-2 Security levels for zones and conduits	4-2 Technical security requirements for IACS products
1-3 System security compliance metrics	2-4 Requirements for IACS solution suppliers	3-3 System security requirements and Security levels	
Definitions Metrics	Requirements placed on security organization and processes of the plant owner and suppliers	Requirements to achieve a secure system	Requirements to secure system components

Functional requirements | Processes / procedures

Industrie 4.0: Kernthemen



- **Thank you very much**