

6. Trustworthiness Testing with Models of Complex Hybrid Systems

Jan B. de Meer¹

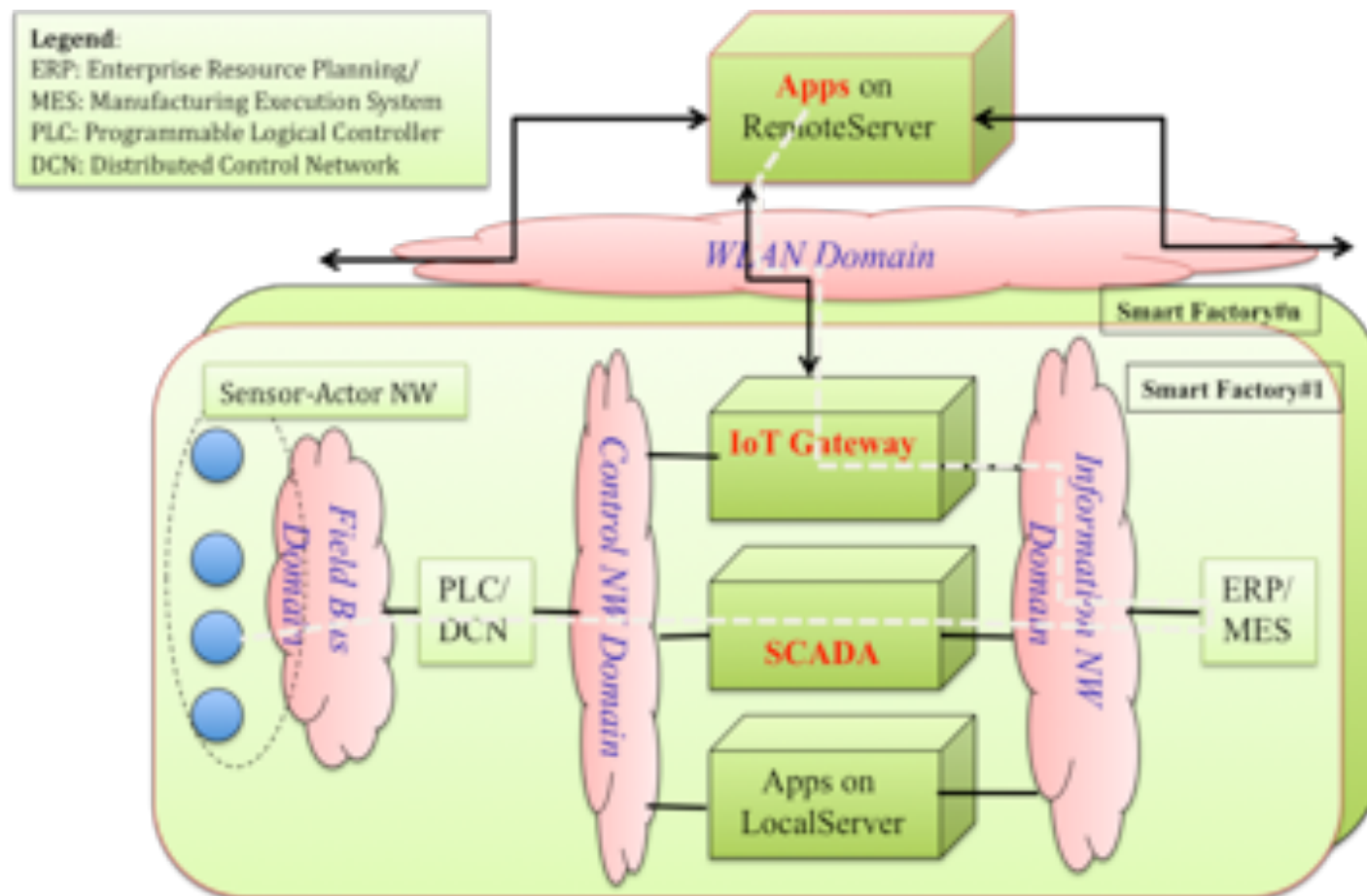
¹smartspacelab GmbH, AIT Group,
Berner Str. 21B, 12205 Berlin
demeer@smartspacelab.de

¹A-Liaison Officer ISO/IEC JTC1 - ETSI TC Cyber/ISG ISI-CSlang
DIN Delegate/ISO Expert to Security&Privacy, IoT, Smart City
DKE UAGs: I4.0Security, KI, Semantics
delegated by HTW Berlin;

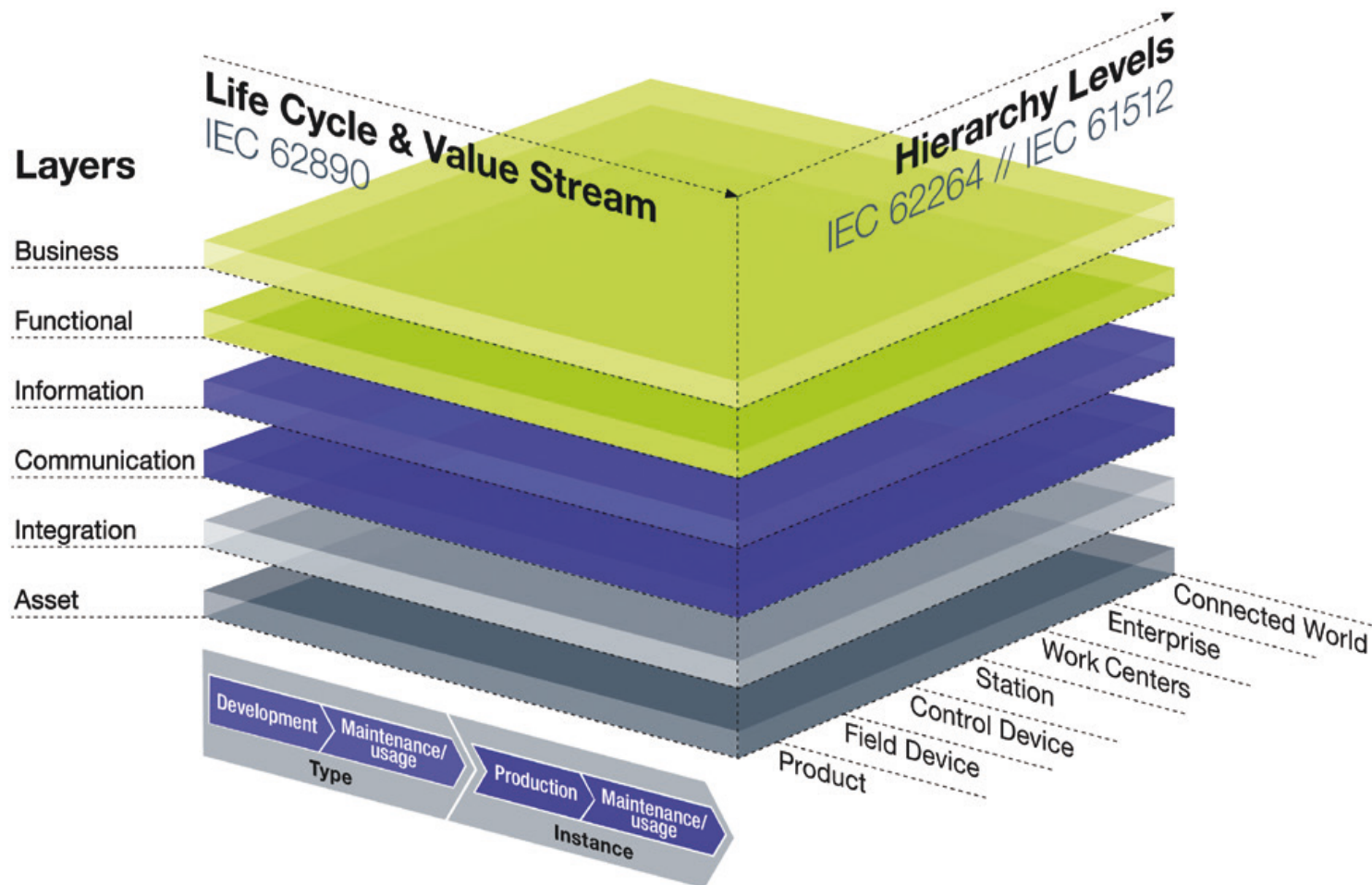
CONTENT OF SPEECH:

- 1) About Complex Hybrid Systems (CHS)?
→ Reference Models of IoT / I4.0 / Smart Grid / Smart City etc.
- 2) How to achieve Trustworthiness in Products / Complex Systems?
→ 'Pentagon of Trust'
- 3) SIEM Communication Approach
→ Data Lake Model filled with <n-tuples> Abstract Data Types
- 4) I4.0 Automation and Control System Model
- 5) Model-based Testing of CHS
→ Test/Evaluation Semantics by Graph Manipulation Tools

- ❑ **Complex Hybrid ,Industrial Control and Automation System' (IACS)**
according to IEC62443 multi-part Standard →

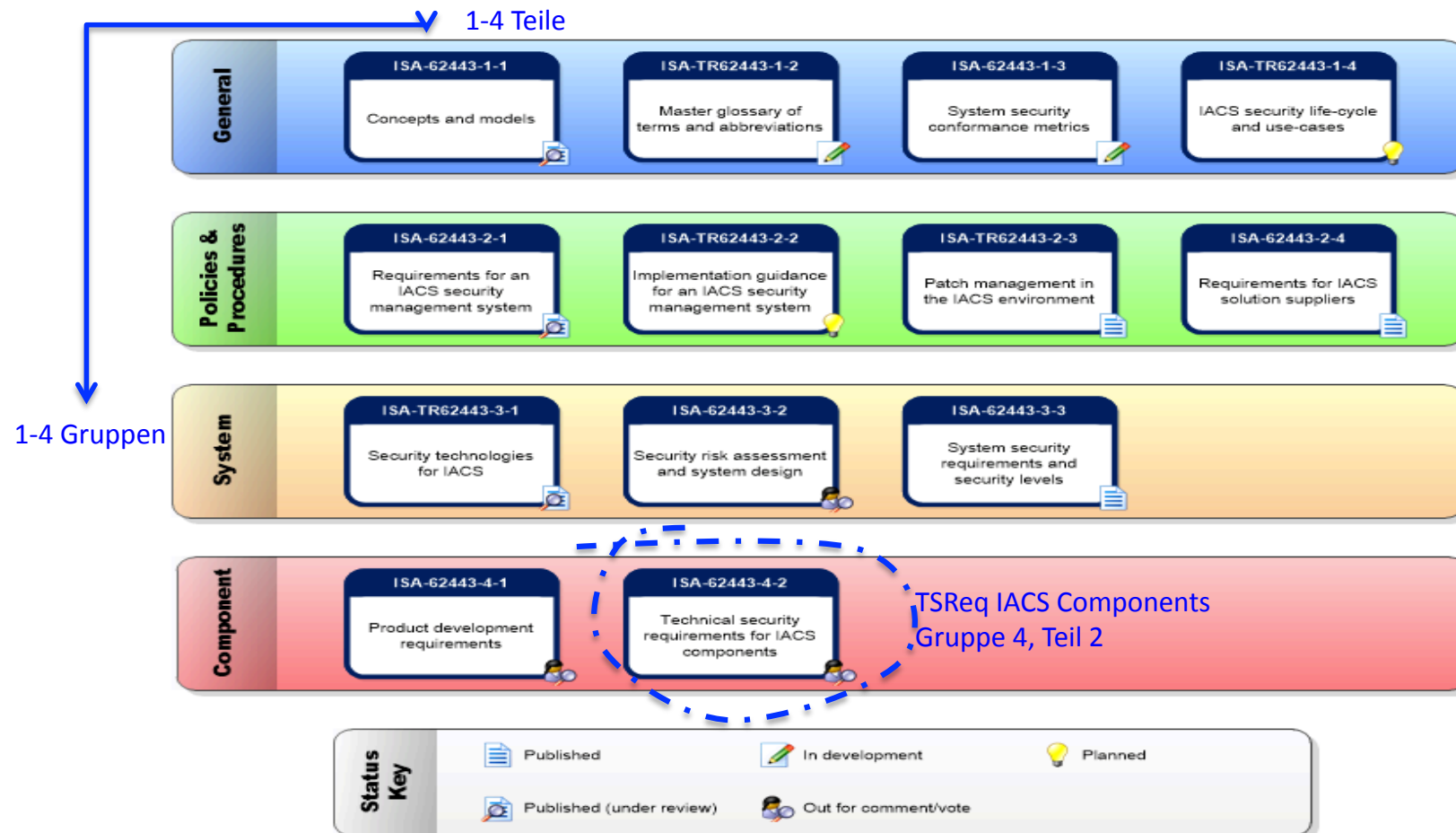


- BITKOM, VDMA, ZVEI: „Umsetzungsstrategie **RAM Industrie 4.0** (2015)“ of Industrial Automation and Control Systems (IACS)

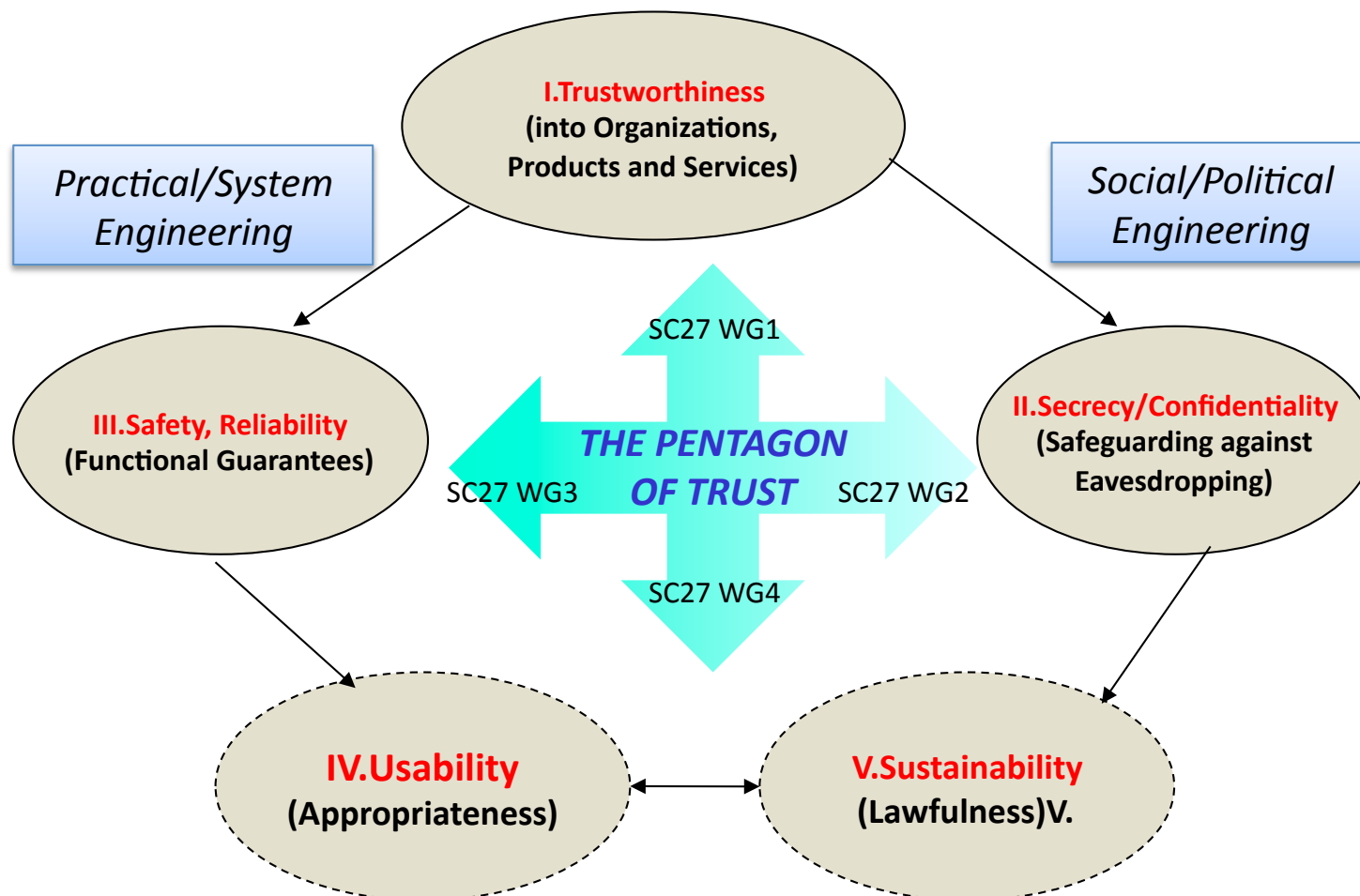


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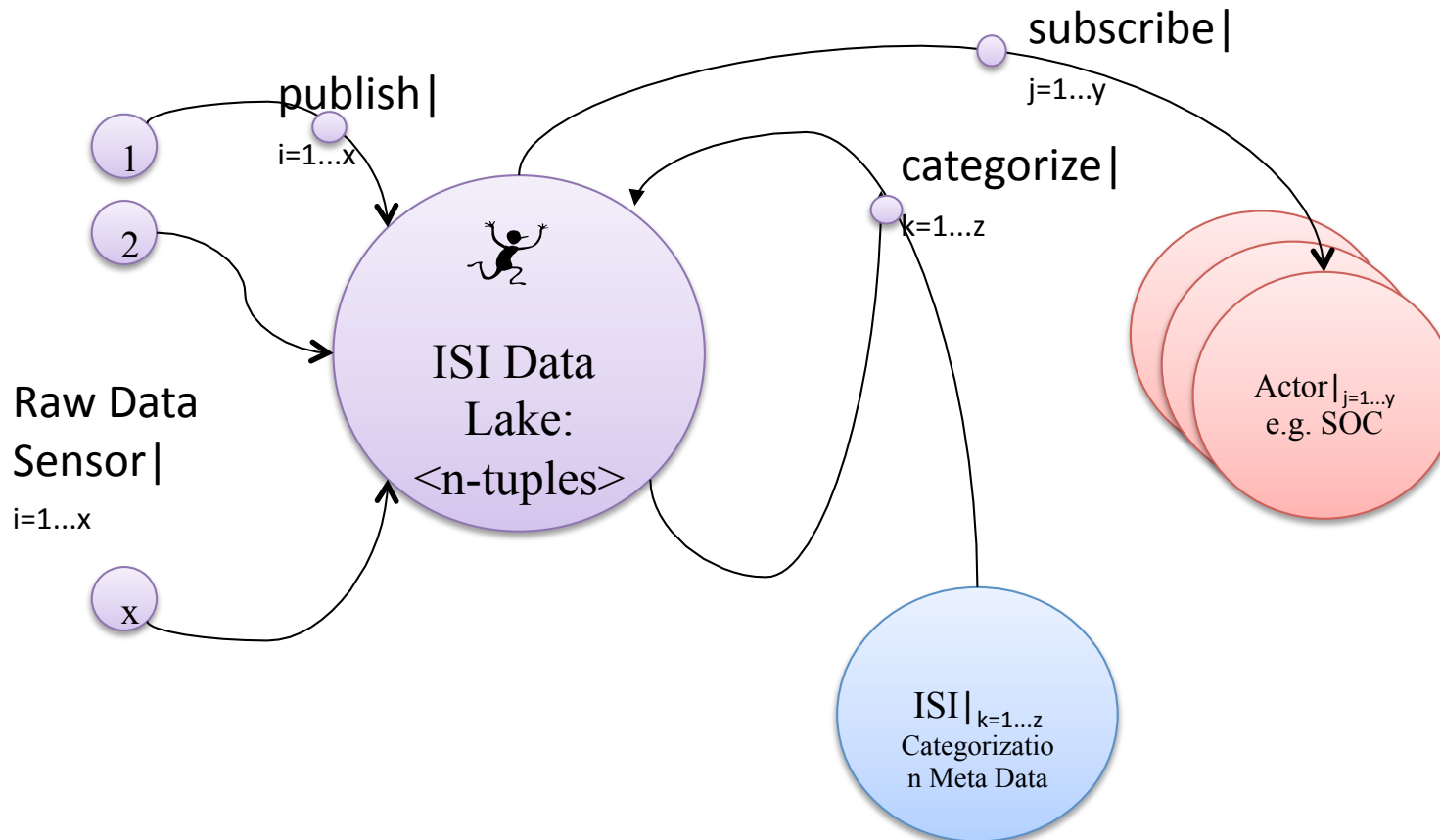
❑ IEC62443 Multi-part (Complex Hybrid) Standard on I4.0 ACS



□ **ISO/IEC JTC1 SC27 IT Security** → Test Requirements ,Pentagon of Trust'

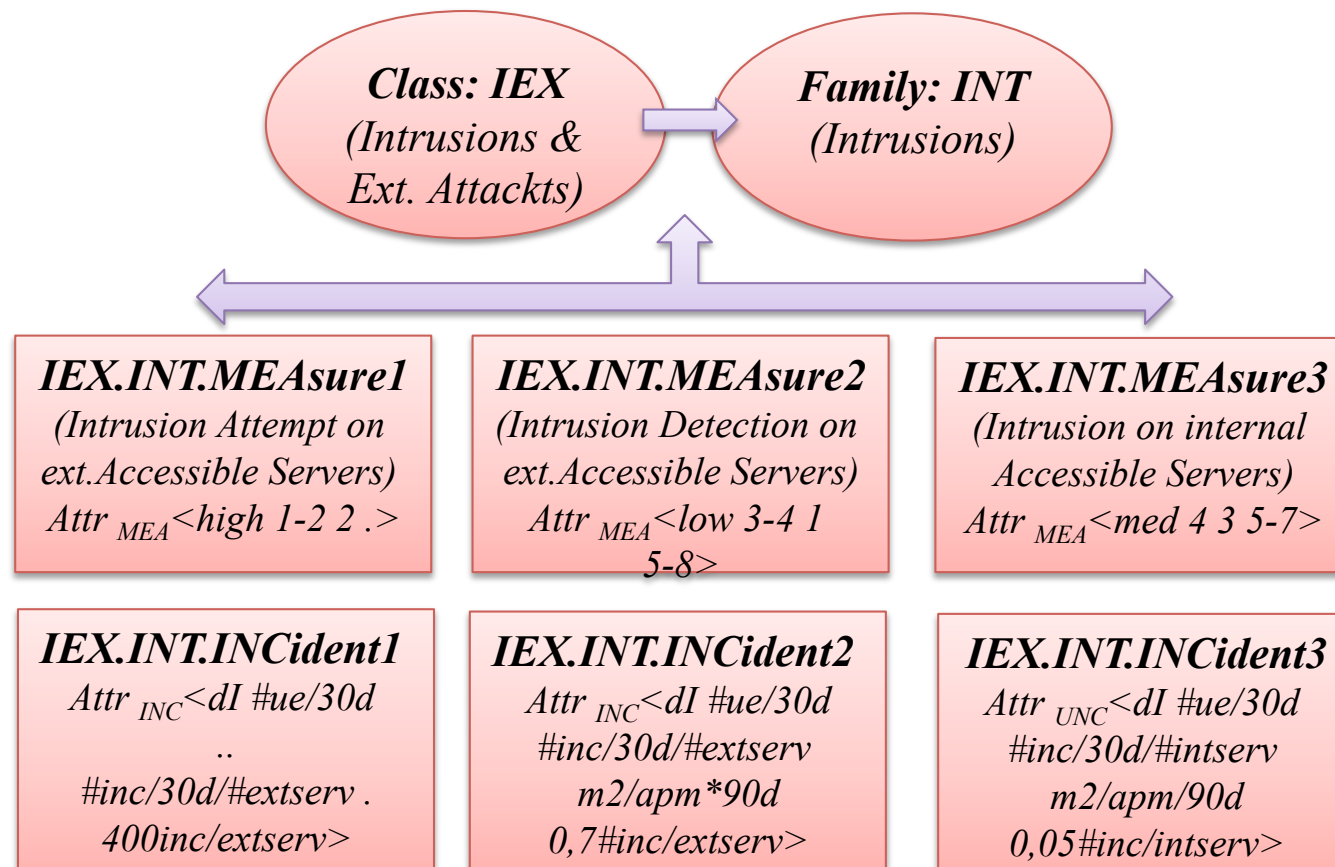


❑ **„Data Lake“ filled with <n-tuples> of ISI Data of Trustworthiness:**



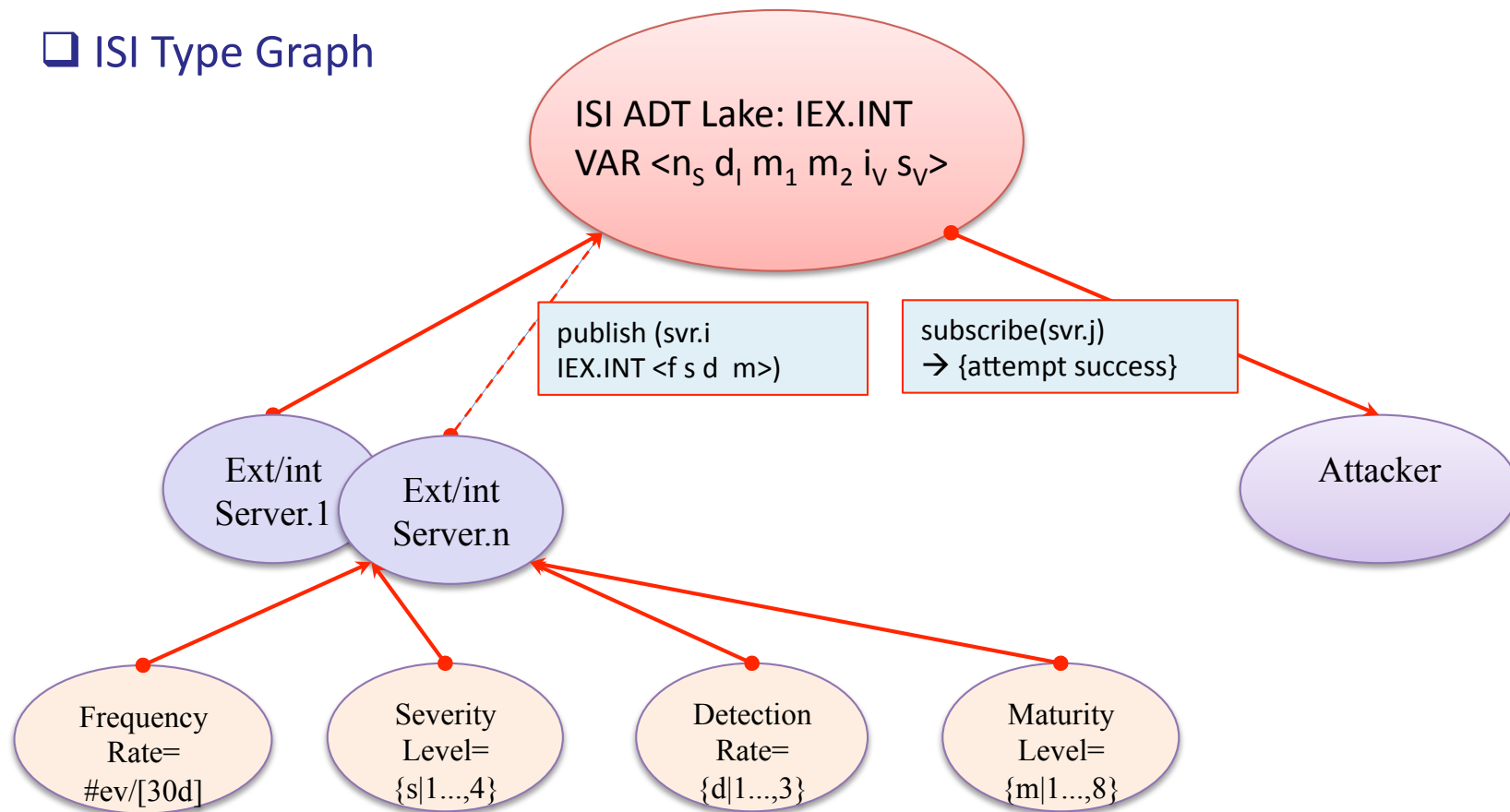


- **„Data Lake“ filled with <n-tuples>:**
Example: Informale Representation ISI Category IEX.INT →



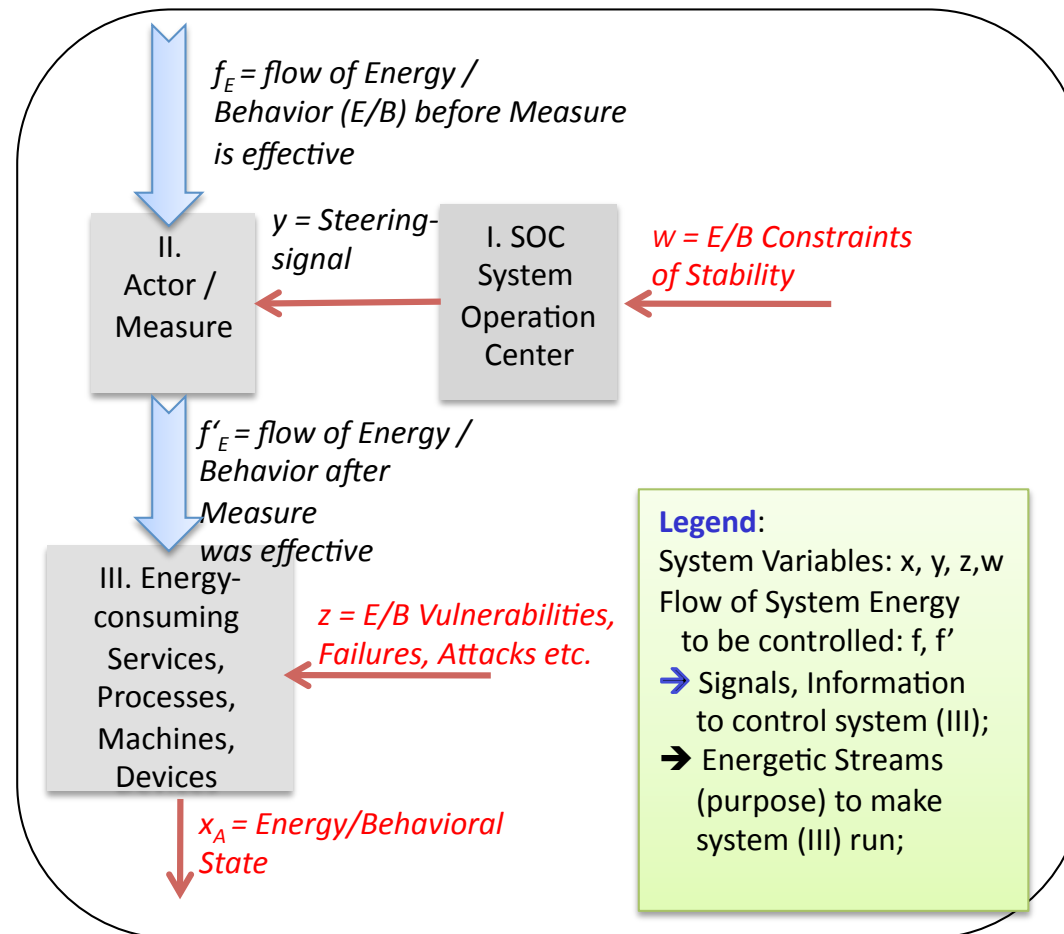
- **„Data Lake‘ filled with <n-tuples>:**
Example: Formal ‚Graph‘ Representation ISI Category IEX.INT →

□ ISI Type Graph



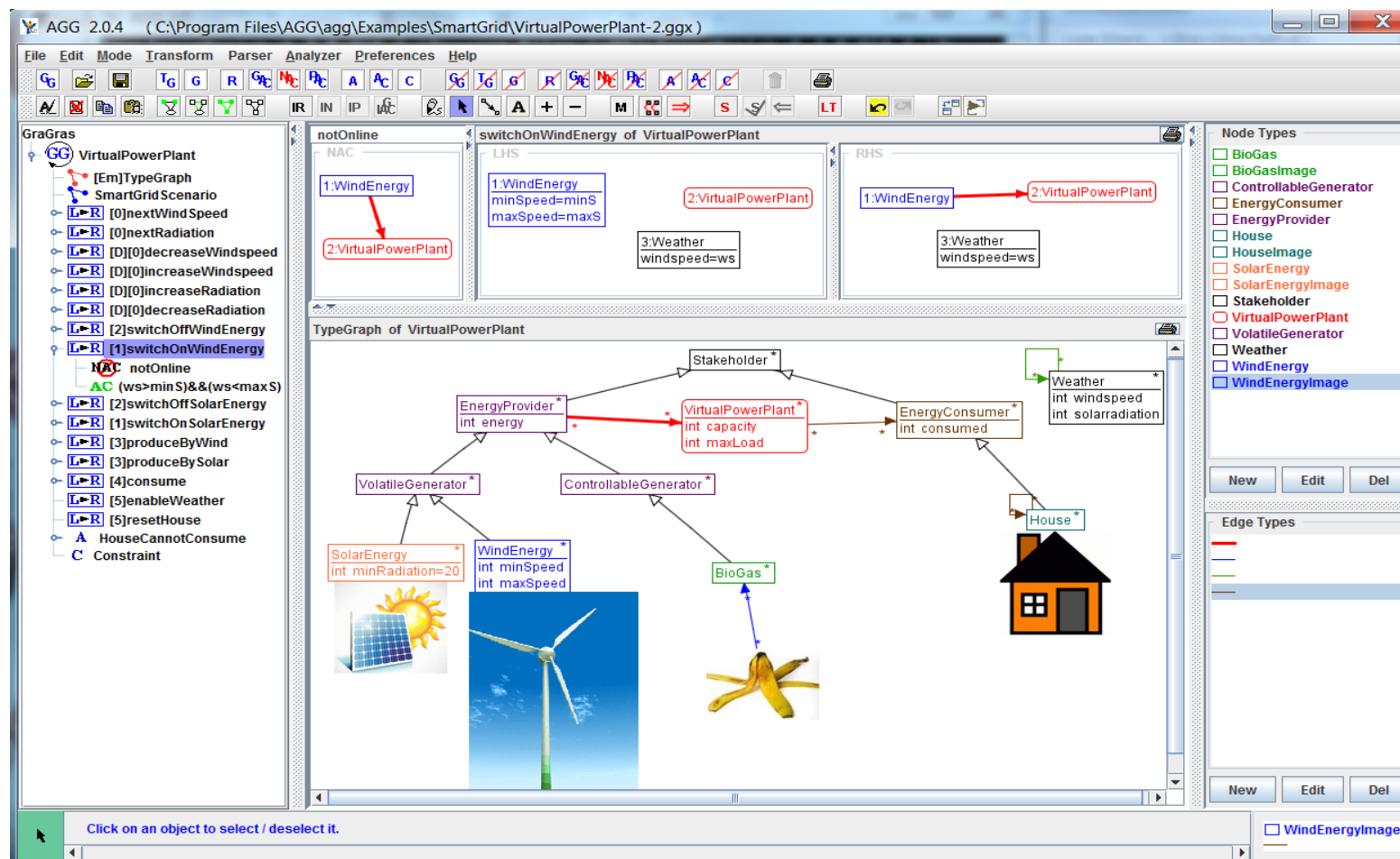
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□ **Industrial Automation Control System Model (EMAS of ISO 50001) →**



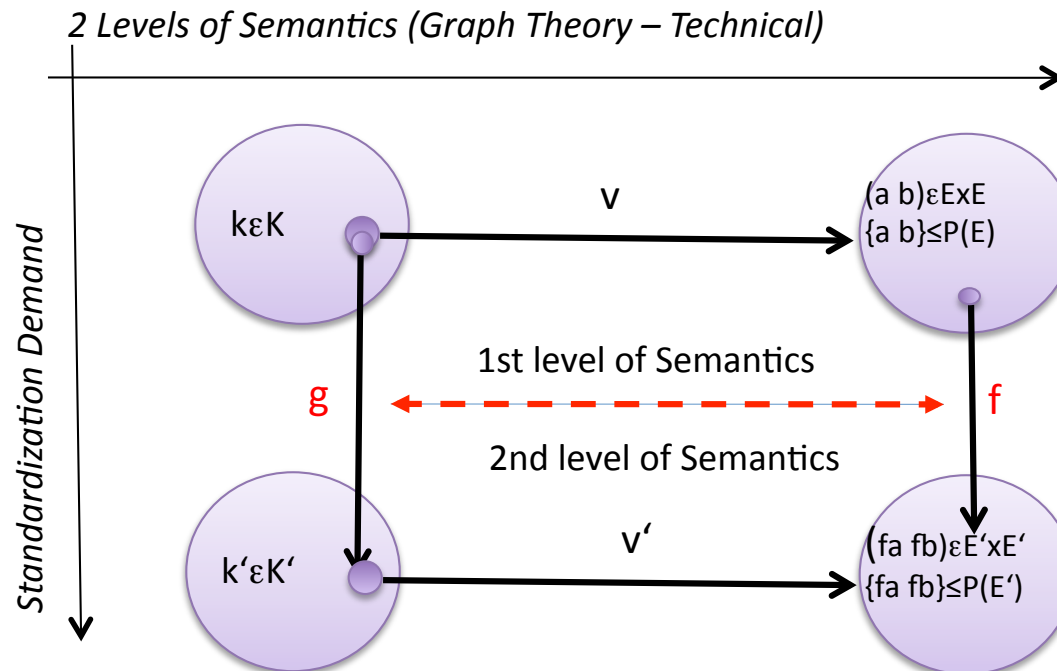
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- **Testing/Evaluation Semantics by Graph Manipulation Tooling:**
CHS Example: Smart Grid Type Graph →



□ A Graph is a Triple

- $\langle V \ E \ v \rangle$ of Vertices V and Edges E ,
- a Graph Manipulation Mapping: $v: V \dashrightarrow P(E) \mid E \times E$
- Homomorphic Mappings $f: V \rightarrow V'$ and $g: E \rightarrow E'$ such that \rightarrow



- ADT Graphs comprise **Information of Processes** (represented by Vertices/Nodes) and **Information of Relations** between these Processes (represented by Edges):
 - **Nodes (Vertices)** represent continuously **changing Processes** i.e. Functionality
 - **Edges** represent non-permanent, i.e. **switching relationships/conditions** that could be established between Processes, as a consequence of changing relationships;
 - **Example:** Publication of Sufficient Wind Energy (repr. By a Node Variable) has the consequence of connecting wind mills to to the Energy Distribution Network 'Virtual Poser Plant', subscribed to the set of volatile generators
 - (i.e. new realationships beetween Weather, WindMills, VPP)!
 - **New Standard under Development:** ETSI ISG ISI 006 → An ISI compliant Measurement and Event Management Architecture for Cyber Security and Safety
 - **CSlang** A Common (**Graph-based SIEM**) Specification Language

Fin de ma conference - merci beaucoup → Q?A!

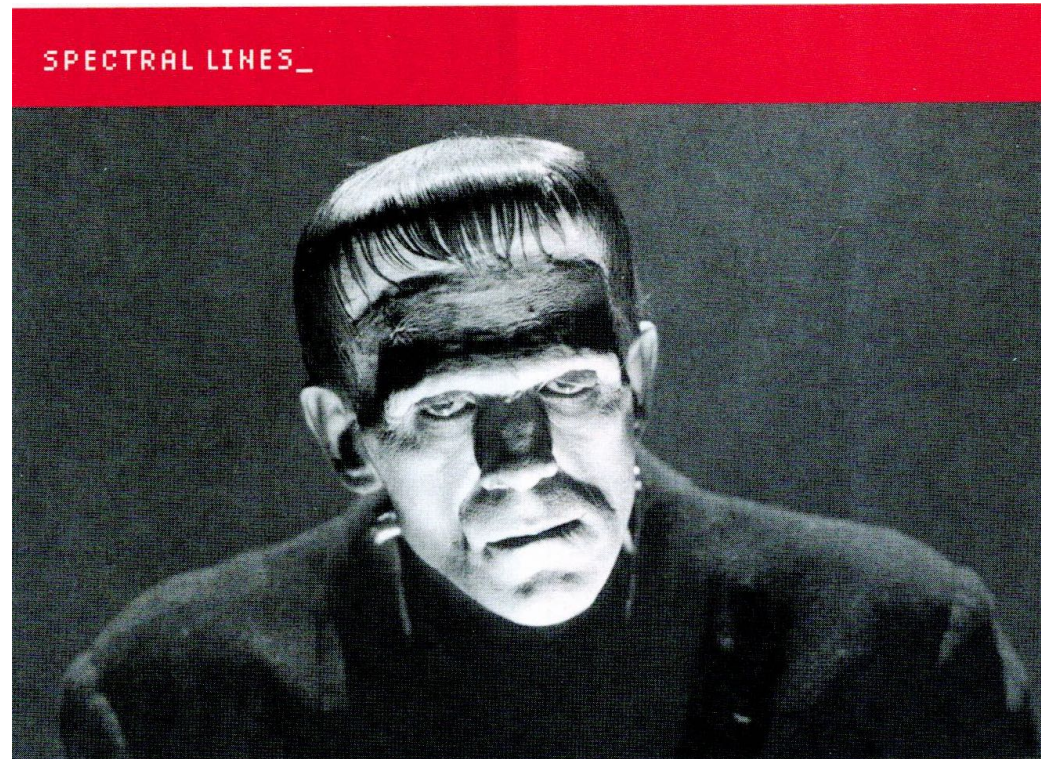


Jan de Meer
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smartspacelab.eu GmbH
Berner Str.21b, 12205 Berlin
www.smartspacelab.eu

Co-Chairing of GI JT WS
on I4.0 Standardisation



What *Frankenstein* Can Teach Engineers

Designing technology with the best intentions
can still lead to disaster

