Enterprise Interoperability

Georg Weichhart

PROFACTOR - Flexible Production Systems
Pro^{2}Future – Cognitive Robotics and Shop Floors
IFAC – TC 5.3 Enterprise Integration and Networking

Pro^{2}Future

8th International Conference on Information Society and Technology, Kopaonik, Serbia
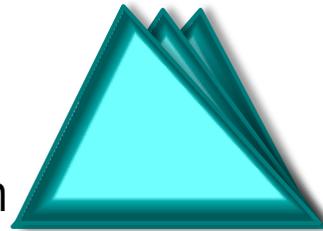
FROM **RESEARCH** TO **PRODUCTION**

WWW.PROFACTOR.AT

Organisational Semiotics

↗ Using approach of Charles S. Peirce

Sense made of sign
/ Interpretant
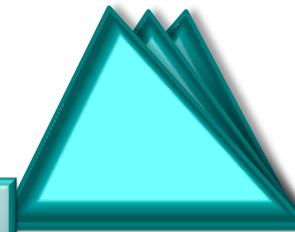
Form of the Sign
/ Representamen

Referent
/ Object
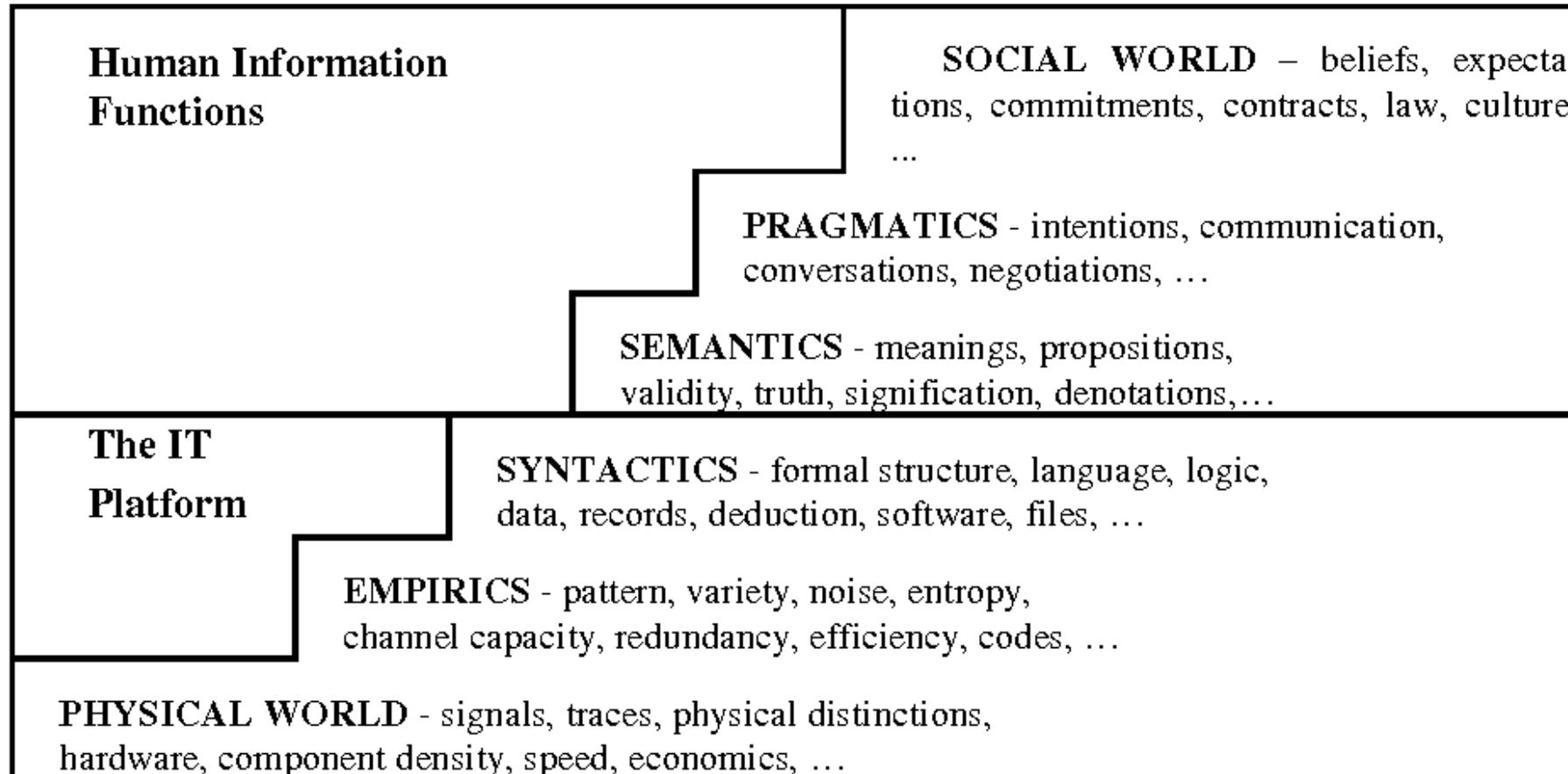
* Dad
* Husband
* Teacher
* Researcher
* Team leader …

Georg

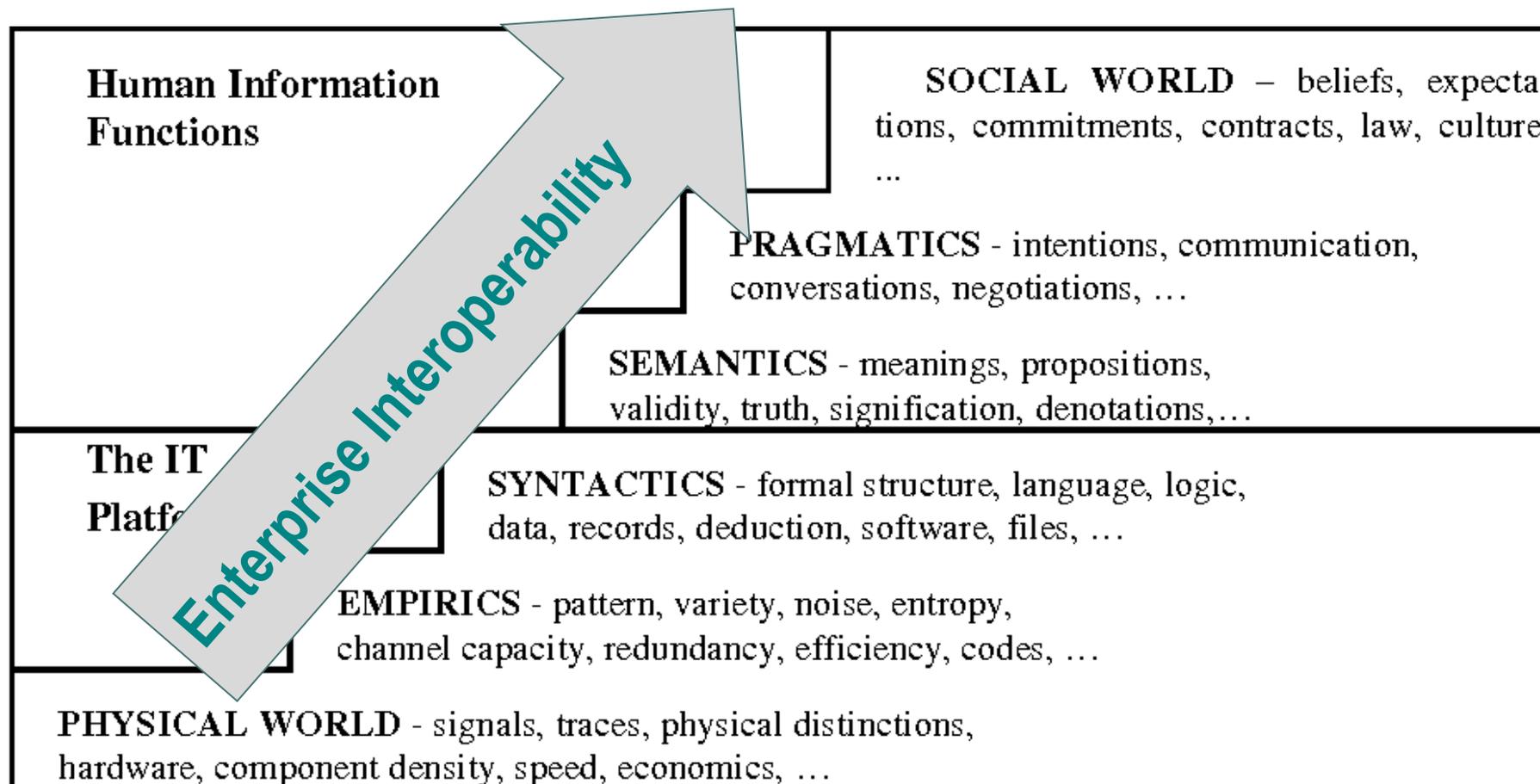↗ For the remaining presentation

↗ The sign is a model

↗ A model includes signs

Ronald Stamper's Semiotic Ladder

Human Information Functions		
		SOCIAL WORLD – beliefs, expectations, commitments, contracts, law, culture, ...
		PRAGMATICS - intentions, communication, conversations, negotiations, ...
		SEMANTICS - meanings, propositions, validity, truth, signification, denotations,...

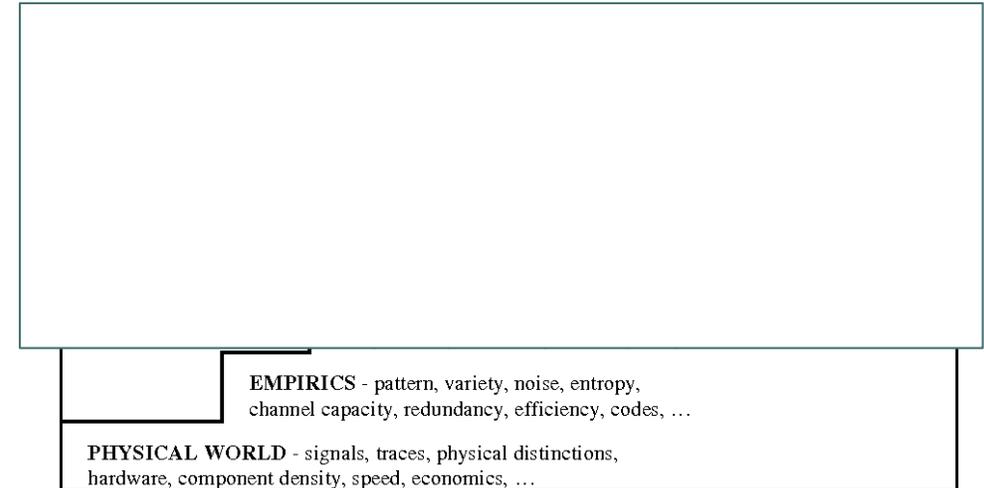| The IT Platform		
		SYNTACTICS - formal structure, language, logic, data, records, deduction, software, files, ...
		EMPIRICS - pattern, variety, noise, entropy, channel capacity, redundancy, efficiency, codes, ...
		PHYSICAL WORLD - signals, traces, physical distinctions, hardware, component density, speed, economics, ...

Organisational Semiotics

Physical World

↗   Workers, Machines, Tools, Production Resources

↗   Product Types (what kind of product)

↗   Product Instances (concrete entity)

↗   All connected through a production process

↗   Physically connected

PHYSICAL WORLD - signals, traces, physical distinctions,
hardware, component density, speed, economics, …

# Empirics

↗ What is relevant to be considered?

↗ What concepts do we model?

↗ What attribute of the concepts do we model?

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Syntactics

↗ Formal Logic

↗ **Data** Structures

↗ Interaction Protocols

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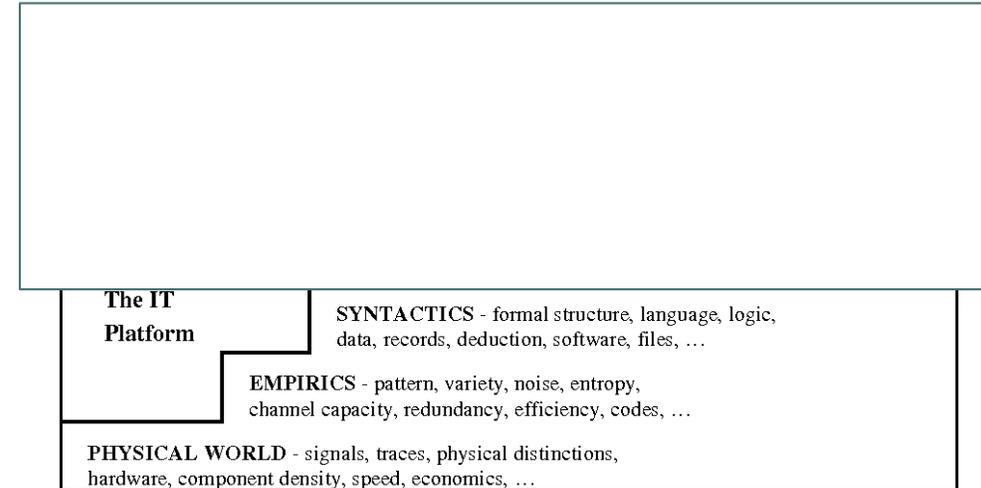
↗ A lot going on in the Industry 4.0 area:

↗ Interoperability through technical Standards
   ↗ OPC UA (Machine Interfaces); MQTT, …(Protocols & Message Queues)

↗ Provide a link to the machines and their states

Semantics

↗ Define Meaning (Information)

↗ Make clear what real world object an id refers to

↗ Formal definitions of concepts to avoid ambiguity

↗ Documenting the meaning of syntactic structures (e.g. Temperature in C)

conversations, negotiations, …

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↗ Interoperability through a common level of abstraction and / or a common reference
  ↗ Ontologies
  ↗ Standards emerging in the Industry 4.0 domain
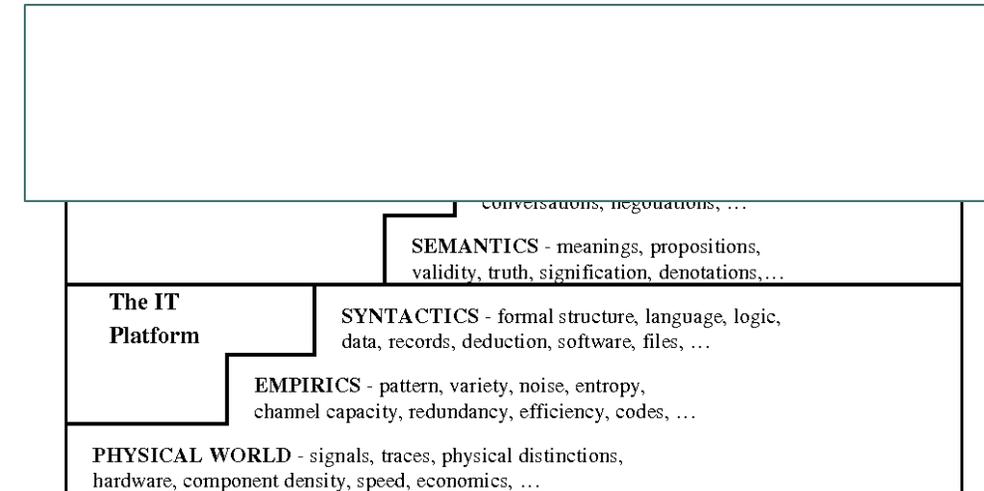
Pragmatics

↗ Something should happen / has happened in the real world

↗ Process models
  ↗ Business Process Modelling Notation (BPMN)
  ↗ Modelling the behaviour
  ↗ Manual integration of tasks of different roles
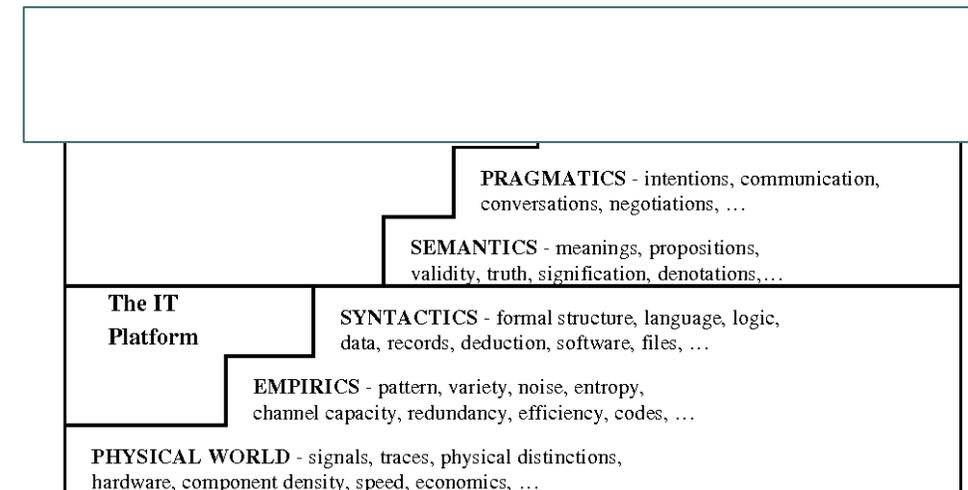   - single point of view

↗ Integration of "Hardware" through e.g. OPC UA
  ↗ Bridge between business world and shop floor
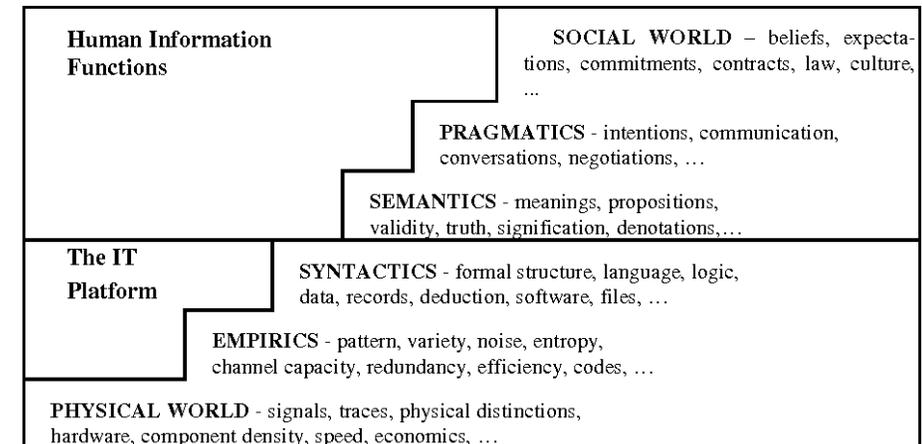 ↗ Bridge between manual and automated execution

↗ Interoperability – in the sense of loosely coupled systems (or system-of-systems) …..
  ↗ Subject-Oriented Business Process Management – to some extend …

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↗ Knowledge is not a static artefact but
generated through the interaction of people

↗ Knowledge evolves

↗ Integration :-(
  ↗ Single point of view
  ↗ Interconnected requires to change a lot

↗ Interoperability :-)
  ↗ Multiple models
  ↗ Multiple points of view
  ↗ Loosely coupled system-of-systems
  ↗ Model and Knowledge Management required

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EI2N 2018

↗ 13th **OTM / IFAC / IFIP** International Workshop on **E**nterprise **I**ntegration, **I**nteroperability and **N**etworking

↗ http://otmconferences.org/index.php/workshops/ei2n-2018

↗ Abstract Submission Deadline: July 3rd

↗ Full Paper Submission Deadline: July 10th