Cognitive Cybernetics

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Head of Industrial IT Asia
A scientific discipline introduces itself
Motivation
Cognitive Cybernetics
Cognition
Pedagogy
Didactics
Curriculum
Agenda

Motivation

Cognitive Cybernetics

Cognition

Pedagogy

Didactics

Curriculum
Sustainability as motivation
Treiber: Cyber-Physical Systems

Anzahl der Geräte

1,000,000,000,000

1,000,000,000

1,000,000

1,000


Web 0  Web 1.0  Web 2.0  Web 3.0

Vernetzung von Unternehmen

Vernetzung von Dokumenten

Java, XML

Business Services

Internet der Dinge und Dienste

Verknüpfung der digitalen mit der physikalischen Welt

Vernetzung von Geschäftsmodellen
1. Industrielle Revolution
Einführung mechanischer Produktionsanlagen mit Hilfe von Wasser und Dampfkraft

2. Industrielle Revolution
Einführung arbeitsteiliger Massenproduktion mit Hilfe elektrischer Anlagen.

3. Industrielle Revolution
Einführung von Elektronik, Informations- und Kommunikationstechnologie zur Automatisierung der Produktion.

4. Industrielle Revolution
Einführung von „intelligenten“ Produktionsanlagen und Produktionsprozessen zur flexiblen, agilen und service-orientierten Produktion.

Industrieller Evolution
Einführung von „kognitiven“ Produktionsanlagen, Produktionsprozessen und Produkten zur selbstgesteuerten und autonomen Produktion (zum Teil) durch die Produkte selbst.

Zeit

Beginn 20. Jhpd
heute
morgen

Komplexität

Mechanischer Webstuhl
1784

Fließband
1870

Speicherprogrammierbare Steuerung (SPS)
1969

Produktionsanlagen
1990

Cognitive Products
2030

Industrie 1.0

Industrie 2.0

Industrie 3.0

Industrie 4.x

Industrie X.X
Cognitive Cybernetics... is as a scientific discipline

- an extension of the "classic" Cybernetics
- the science of cognitive control and regulation of
  - artificial - technical systems (machines, etc.)
  - socio-technical systems (organisms, organizations, processes, structures)
- the basis for the cognitive aspect of the socio-technical systems by means of cognitive models
- cognitive, functional and procedural implementation of problem-solving systems based on natural methods analogous and Cognitive Computing Techniques
- the realization of solution systems and their management in the context of a methodology and a management approach
Agenda

Motivation

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Curriculum
From Cognitive Model...
... Cognitive Solutions
...Cognitive Solutions...
...Cognitive Solutions Platform
Kognitive Industrial IT Lösungen
(Cognition Interoperation Solutions)

Cognitive Solution

Hardware

Software

Brainware

Orgware
Agenda

Motivation
Cognitive Cybernetics
Cognition
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Curriculum
# Pedagogical principles

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Unilateral shedding (expertise)</td>
<td>▪ Holistic qualification and personality development (professional, social, methodological competence)</td>
</tr>
<tr>
<td>▪ individual work</td>
<td>▪ Teamwork / group work</td>
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<tr>
<td>▪ Follow individual instructions</td>
<td>▪ Independent thought and action</td>
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<tr>
<td>▪ Arranging reproducible factual knowledge</td>
<td>▪ Complexes, problem-oriented tasks</td>
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<tr>
<td>▪ Far-reaching separation of theory and practice</td>
<td>▪ Far-reaching integration of theory and practice</td>
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<tr>
<td>▪ Centering on the faculty</td>
<td>▪ Centering on the students</td>
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Trivalant Study

- Theory (=Study)
- Research (=Project)
- Practise (=Company)
Profiles by trivalent study

Problem-solving skills

- Transfer ability theoretical knowledge into practice
- In each vocational problems methods safely and solve targeted
- Aptitude for independent, lifelong learning
- Understanding of interdisciplinary relationships
- Ability to introduce innovations and initiate change processes
- Independent thinking and responsible personalities
- Effective cooperation in groups
Agenda

Motivation
Cognitive Cybernetics
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Study Cognitive Cybernetics

...and its highlighting features

- Triality (theory-practice research)
- Cooperation
- Sustainability and flexibility
- Degrees and qualifications
- Attractiveness of graduates for the labor market
- Degree program as a learning organization
- Problem-solving skills as a didactic key objective
- Curriculum as a binding framework plan
- Innovative and Cooperative Research as the third pillar
Trivalent Study

- **University**
  - lectures
  - Tutorial
  - seminars
  - conferences

- **Company**
  - Internships
  - Department Pass

- **Projects**
  - Research Institute

- **Research**
Agenda

Motivation
Cognitive Cybernetics
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## accompanying disciplines

<table>
<thead>
<tr>
<th>Business Administration</th>
<th>Education</th>
<th>Blended learning</th>
<th>Heilbronn</th>
<th>Vietnam</th>
<th>Singapur</th>
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### Entrepreneurship
- ✔
- ✔

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## Core disciplines

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Curriculum & Topics

- **MOTIVATION:**
  - Challenge artificially - technical, and socio-technical systems
  - Cognitive Cybernetics as logic (history) and practical (…) consequence

- **THEORY:**
  - Fundamentals of Cybernetics
    - Cybernetic systems
    - Biology, philosophy, ontology, mathematics cybernetics
  - System and problem solving methodology
  - Cybernetisation of structures and processes
Curriculum & Topics

- THEORY:
  - System theory
  - Model theory
  - Data - Information - Knowledge Theory
  - Complexity theory
  - Simulation theory
  - Cognitive theory
  - Interoperation theory
Curriculum & Topics

- **Practice:**
  - Models of Cognitive Cybernetics
  - Methodology of Cognitive Cybernetics
    - Development
    - Project management
  - Techniques of Cognitive Cybernetics
  - Didactics Cognitive Cybernetics
  - Solution Patterns of cognitive cybernetics
  - Add ons
    - Open Source Frameworks
    - Tools ( Tooling )
    - Components algorithms
Curriculum & Topics

- **Implications:**
  - Technologisation science
  - Technologisation the life and work
  - Industry 4.0
  - Cybercrime
Our Input...

... As an investment in a sustainable future for young people

- Study material
  - Manual „Cognitive Robotic“
  - Manual „Cognitive Organization“
  - Manual „Cognitive Cybernetics“

- Scholarships
- Professorship
- Position of program management
- Arrangement of cooperation
Let's move it!

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