

Industry 4.0

Hype or Opportunity?

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Agenda



- **The Fraunhofer IML**
- **History of industrial revolution**
- **Current situation in industrial production**
- **Industry 4.0**
- **Smart Factories**
 - Smart Maintenance
 - The human factor
- **Summary**

The Fraunhofer IML

- Founded in 1981
- More than 200 scientists and 250 student assistants
- Turnover of 24.3 million €
- There of 40% from industry, trade and services
- Branches and project centers in Frankfurt am Main, Prien am Chiemsee, Hamburg
- Cooperation with HSG St. Gallen (Switzerland), Georgia Tech (USA), Lisbon (Portugal), Shanghai (China), Rio de Janeiro (Brazil)



Fraunhofer IML: Developments towards Industry 4.0

Intelligent Bin



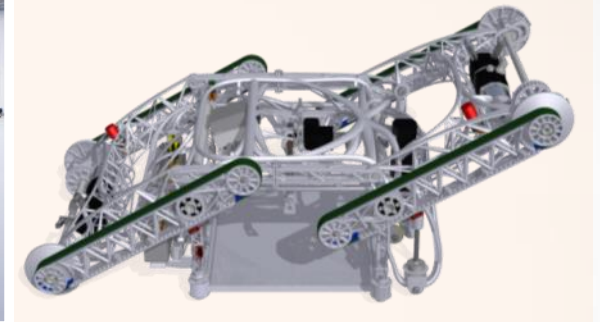
- self-provider
- communicative
- able to store energy

Cellular Transport Systems



- autonomous drive
- self-control
- swarm intelligence

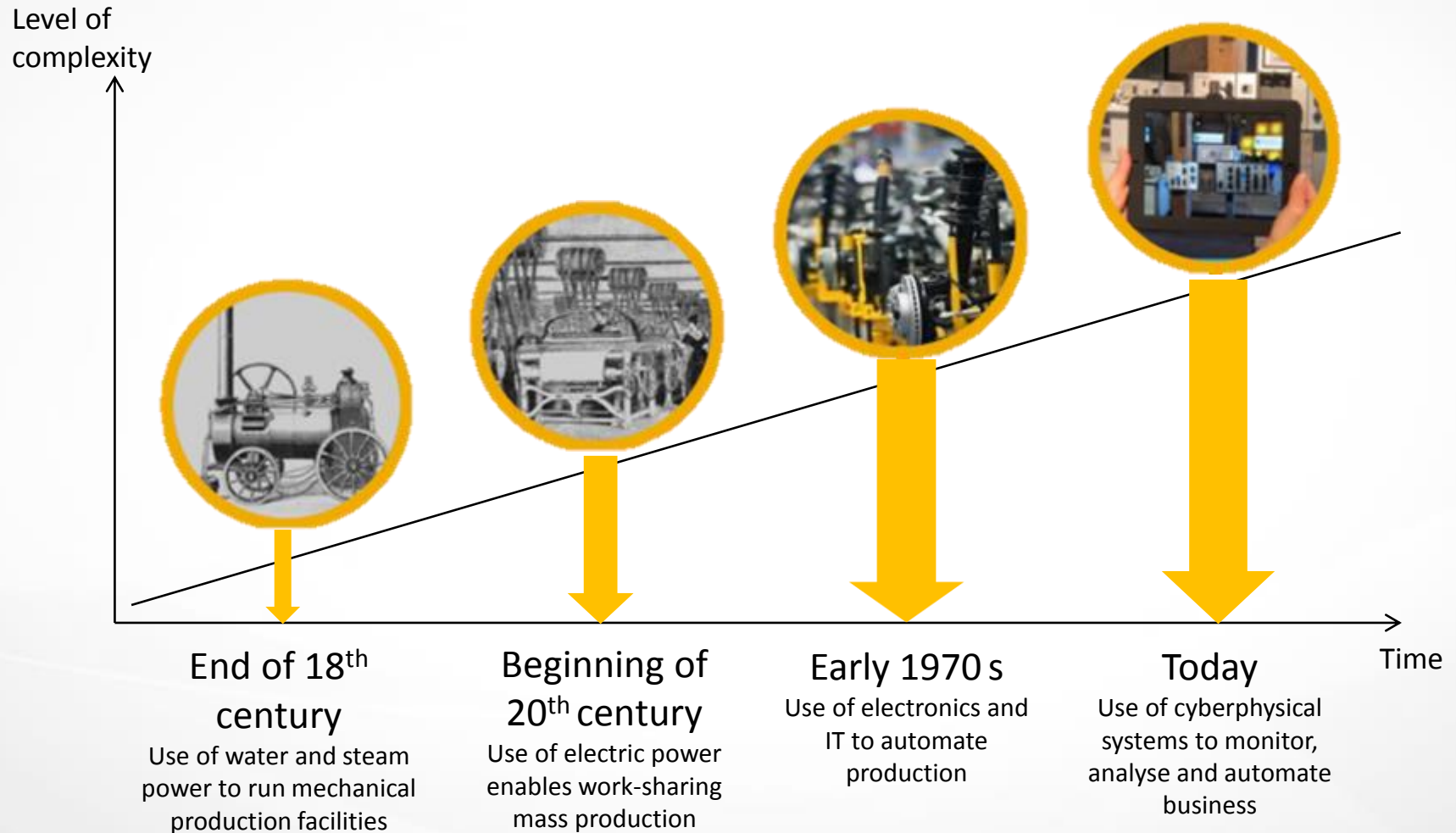
Rack Racer



- autonomous climbing
- diagonal drive inside the rack
- bionic design



History of industrial revolution



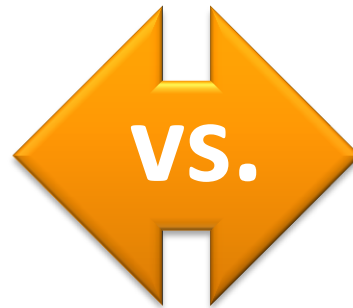
Current situation in industrial production

■ Trend in production:

- Standardisation and industrial automation
- Effect: realisation of economies of scale
- Problem: Lower diversity of production



Source: <http://blogs.telegraph.co.uk/finance>



■ Trend in demand :

- Request for customised products
- Problem: high cost of production

Example: Ford F150



Source: Ford

Current situation in industrial production

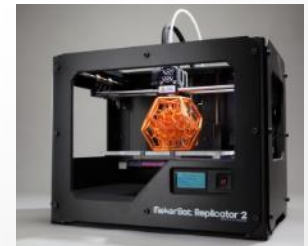
- The complexity will increase

- Example: Frankfurt Airport

- German law specifies 22,000 maintenance objects
- 88,000 pages of documentation

BUT

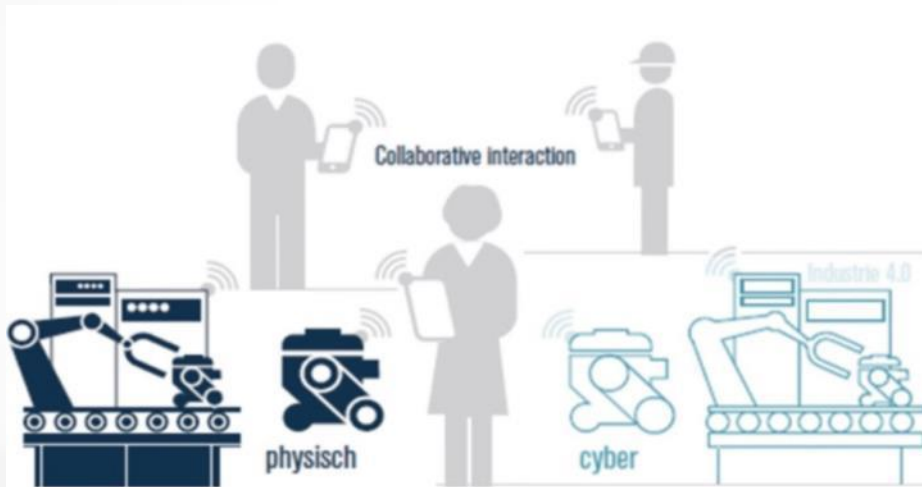
- The techniques, the technology and the tools to manage the complexity are currently available



What is Industry 4.0?

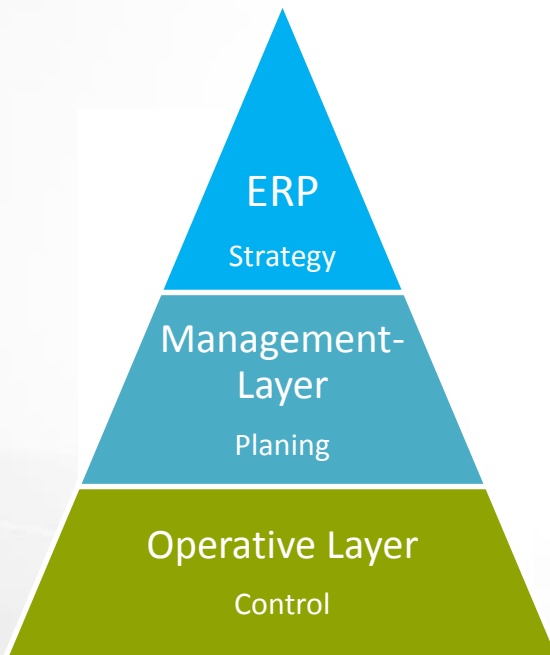
■ A Vision!

- Real time imaging of reality into virtual space and conversely application of the unlimited virtual solution-space in reality
- Selective application and combination of technologies provide new situations- and enterprise-specific possibilities
- Holistic system-thinking of integrated supply chains overcome physical and economic limits



Industry 4.0 – necessary change

Conventional System



Transformation
of organisation



Migration of
Cyberphysical Systems

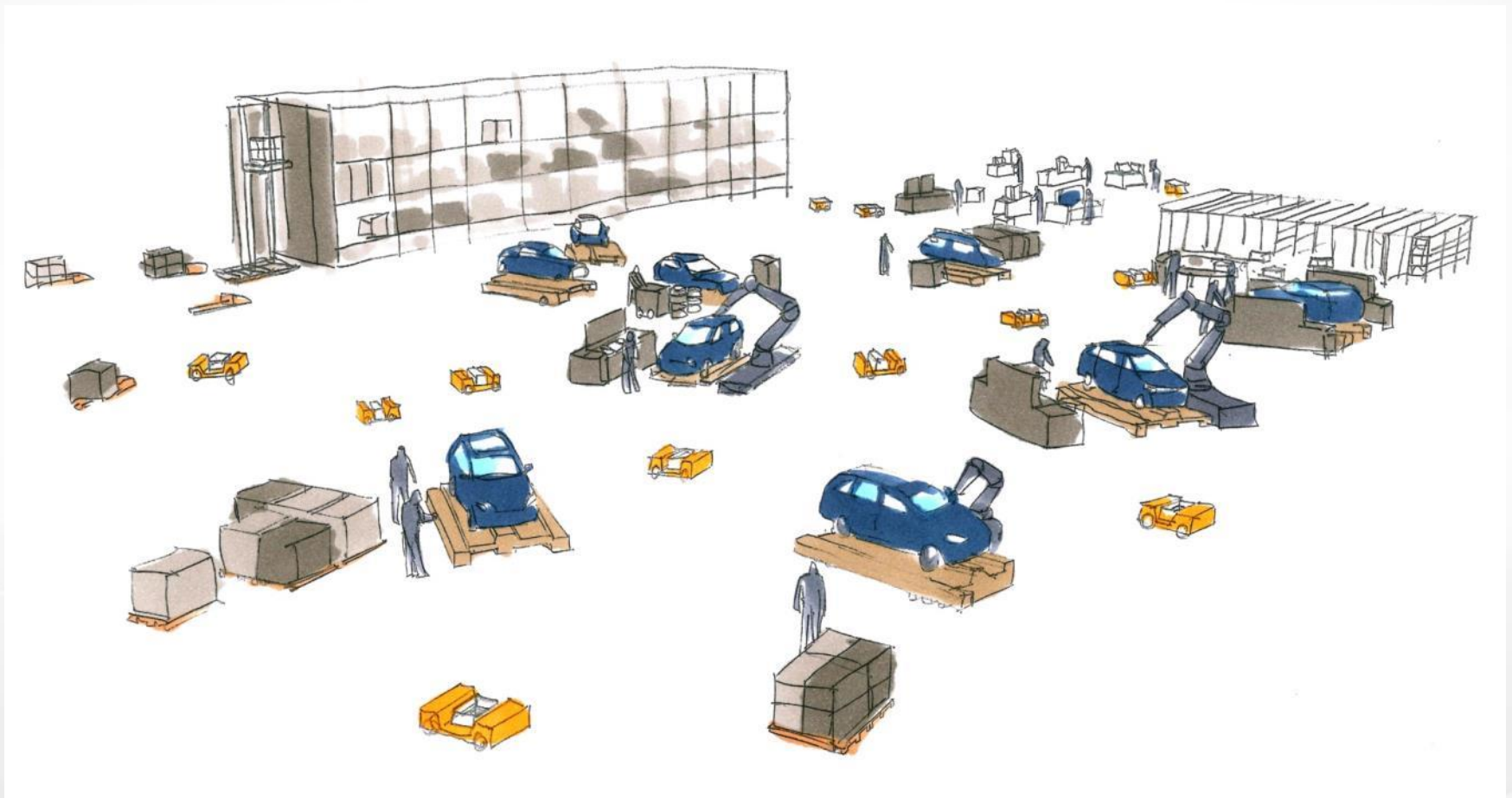
Industry 4.0

Internet of Service
Cloud, Bos & Service

Industry 4.0



The Smart Factory

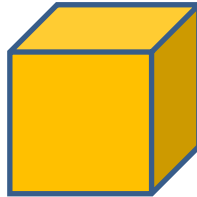
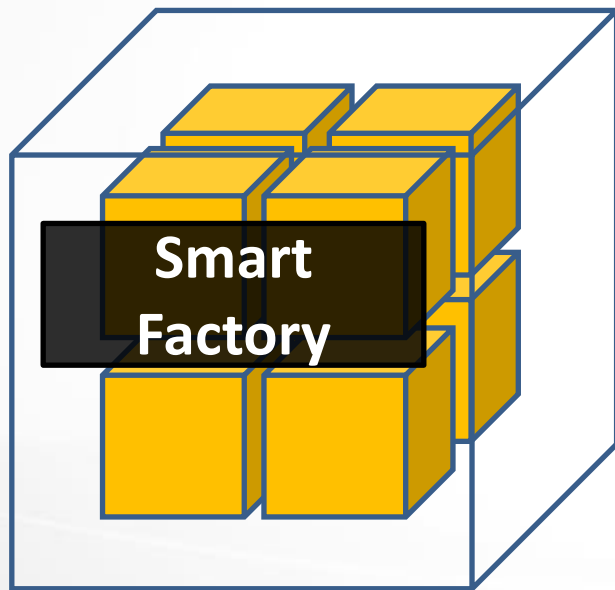


**MANAGING
AGING PLANTS**
Conference & Expo



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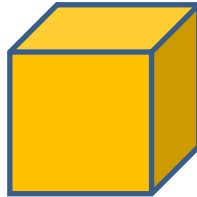
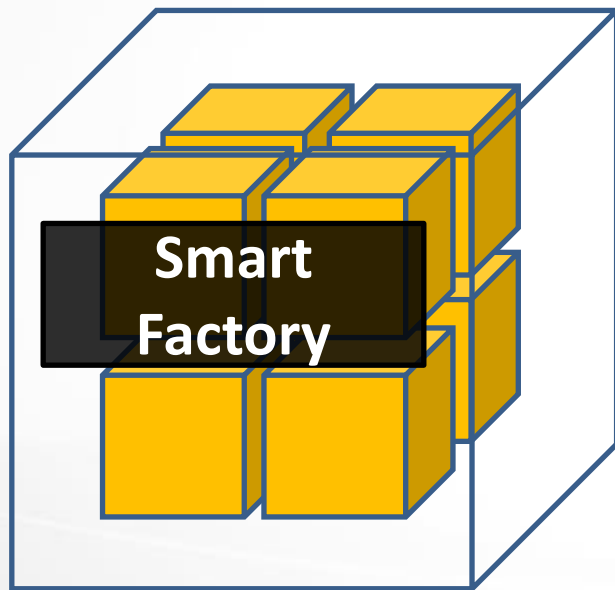
Düsseldorf, Germany 2015



Smart Products

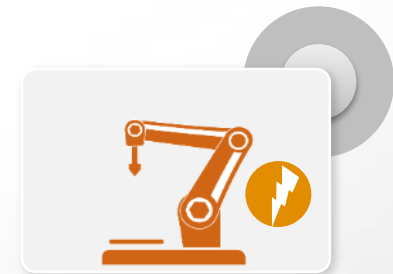
- Objects become „intelligent“
- They can communicate with their environment
- Organise their way through production
- Store their whole life history

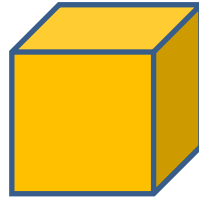
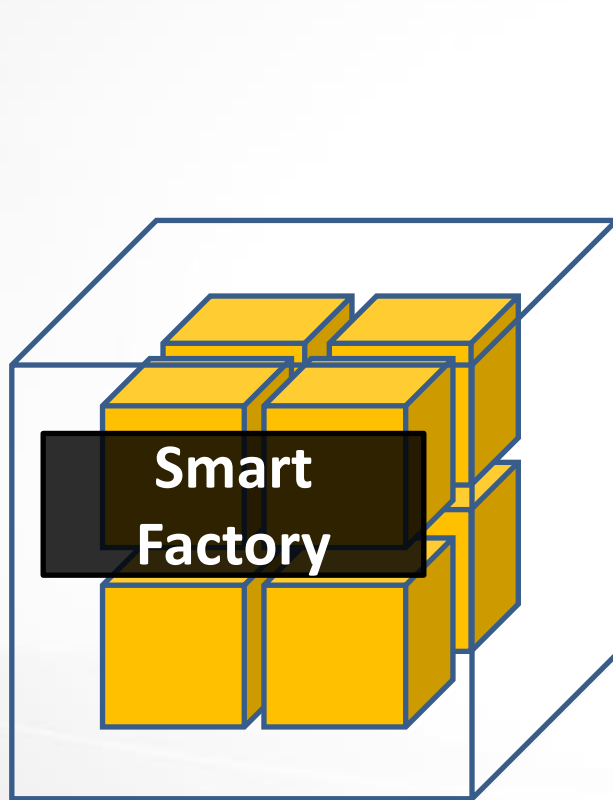




Smart Service

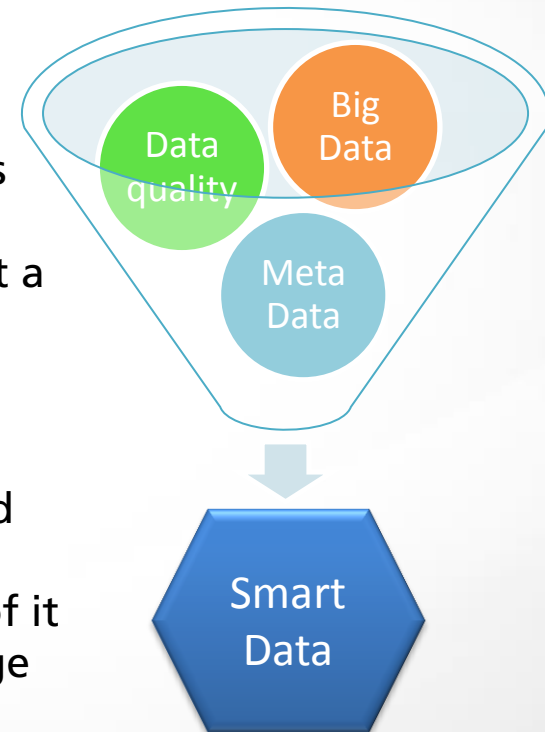
- Machines get some kind of intelligence
- Machines can communicate with each other and their environment
- Sensors detect atypical conditions of machines
- Machines will be able to order the required service

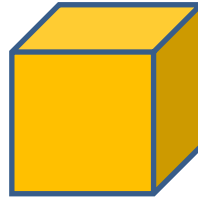
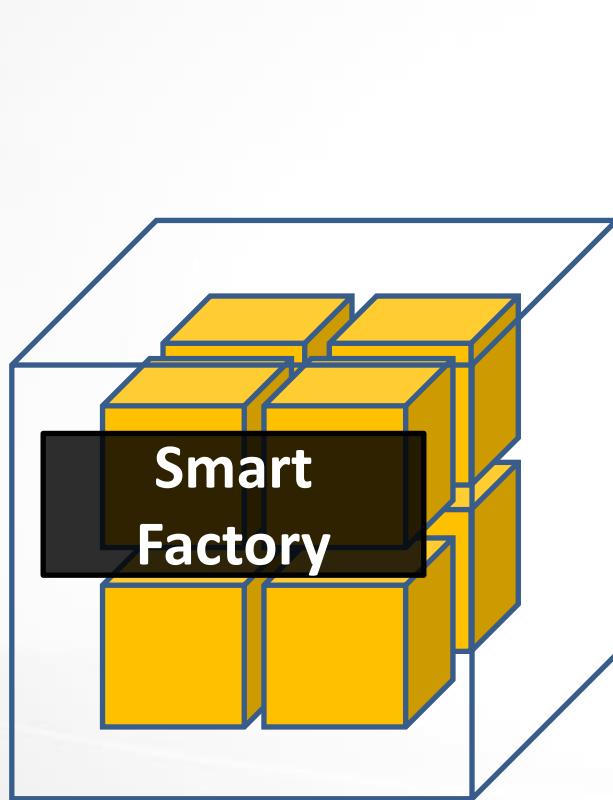




Smart Data

- Collecting / generating data is just the first step and right now not a big problem any more
- Interpretation and getting the right information out of it is the big challenge of tomorrow





Smart Maintenance

- Maintenance must adapt to the upcoming changes with the implementation of the Smart Factory
- Using tools (Assistance Systems) and methods to:
 - get all required information
 - interpret this collected data and
 - enable the staff to perform maintenance tasks



Smart Maintenance for Smart Factories



Next Service!

Machine



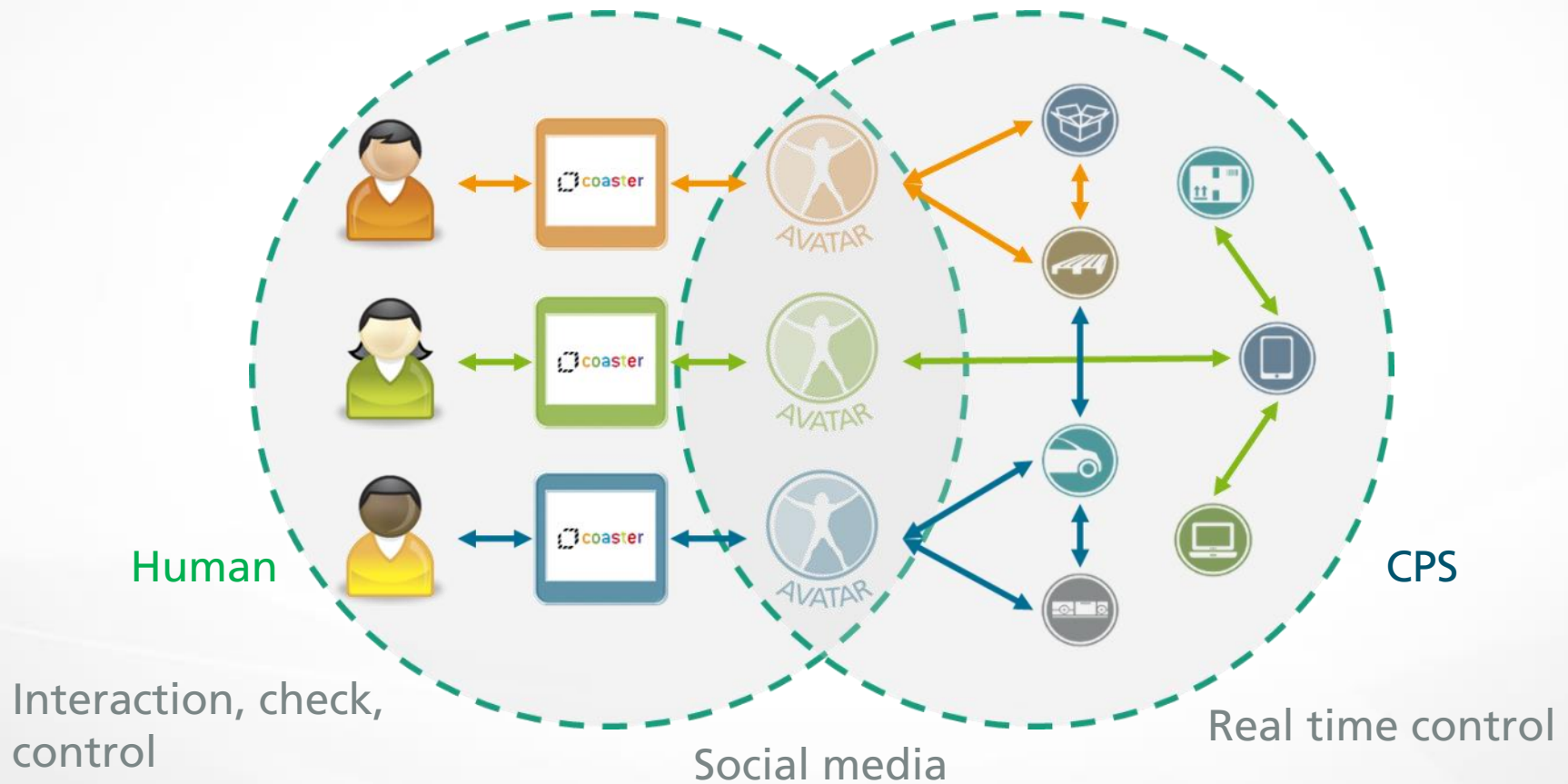
- The Smart Factory will be the core of Industry 4.0 and needs Smart Maintenance to be successful
- Smart Maintenance will enable a pro-active maintenance strategy
- The challenges for Smart Maintenance will be:
 - skilled and trained maintenance staff
 - securing knowledge in a multi-generation workforce
 - coping with huge amounts of data / information
 - the application of new technologies

No Future without employees

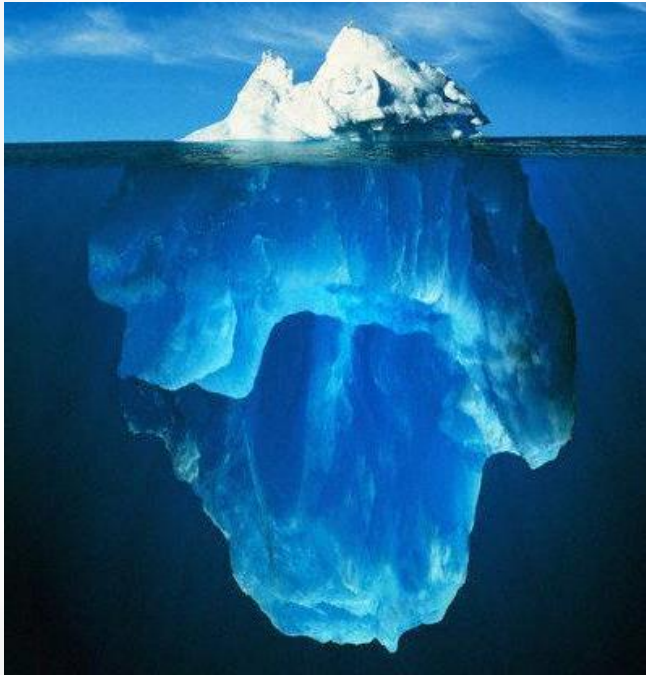


- Advantages of employees' skills
 - Flexibility
 - Creativity
 - Ability to improvise
 - Ability to experiment
 - Intuitivity
- Assistance Systems can help:
 - Collect, filter and prepare Data / information
 - Integrate the staff into the cyberphysical environment

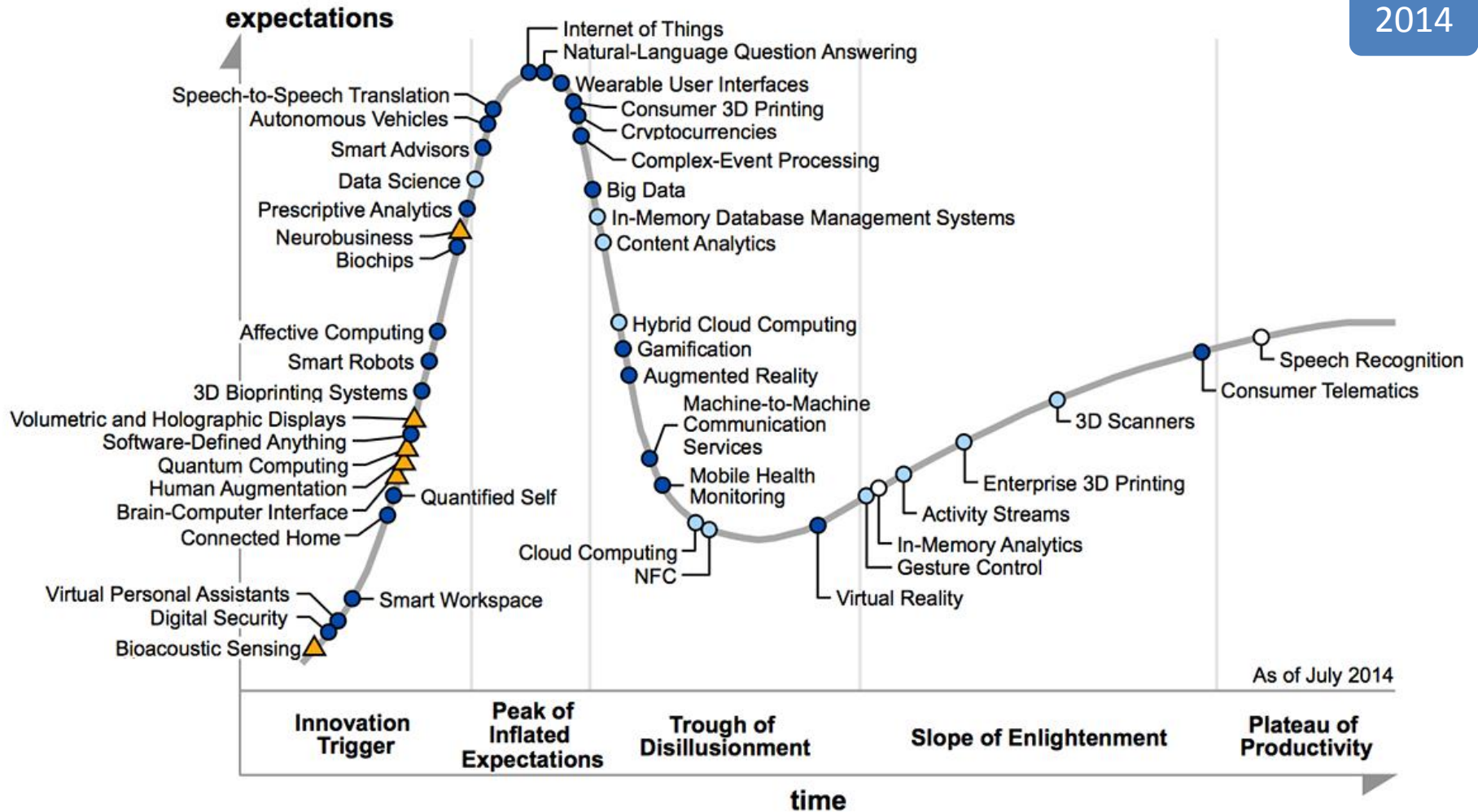
The «Human-Machine-Interface»



Summary



- Industry 4.0 - Hype or opportunity?
 - Hype-Topic, but definitely an opportunity
 - Right now we are seeing only the tip of the iceberg
 - There are still a lot of obstacles in our way (e.g. IT-Security)
 - Setting the course is now essential to make the change-process a success at all levels



Plateau will be reached in:

○ less than 2 years ● 2 to 5 years ● 5 to 10 years ▲ more than 10 years ⊗ obsolete before plateau

Thank you for your Attention!



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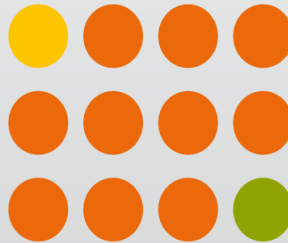
Plant and Servicemanagement
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Backup

Comprehensive
solution of
Fraunhofer IML

Total Productive Management



Process-oriented
continuous
improvement

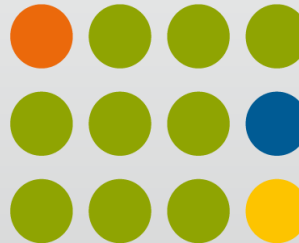
Establishment of
working groups

Key figures

Set-up workshops

Basic inspections

Maintenance Logistics



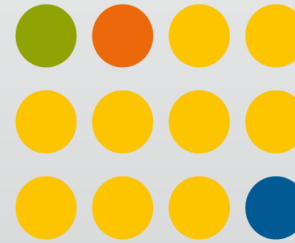
Optimization of
maintenance processes

Introduction of
new technologies

Condition Monitoring
Selection of procedures
and providers

Testing ground
Condition Monitoring

Spare Parts Management



Take stock of spare parts

Introduction of new
strategies

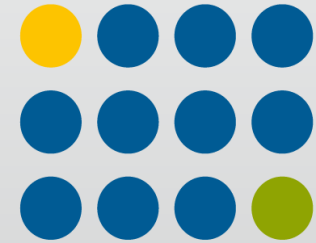
Stock optimization

Software tools

Certification

Warehouse planning

Service Management



Analysis and concept
of services

Market survey of
services

Outsourcing

Cooperation

After-Sales Services



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