

# Automation for Scientific Use – Strategies for transferring industrial standards, components and strategies to a scientific environment

Parallel Workshop session at DENIM 2016,  
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# Overview workshop



- |                                |        |       |
|--------------------------------|--------|-------|
| • Introduction                 | 20 min | 8:30  |
| • 4 Topics (15 to 20 min each) | 70 min |       |
| • Coffee Break                 | 30 min |       |
| • 4 Topics (15 to 20 min each) | 70 min |       |
| • Wrap up and Summary          | 20 min | 12:00 |

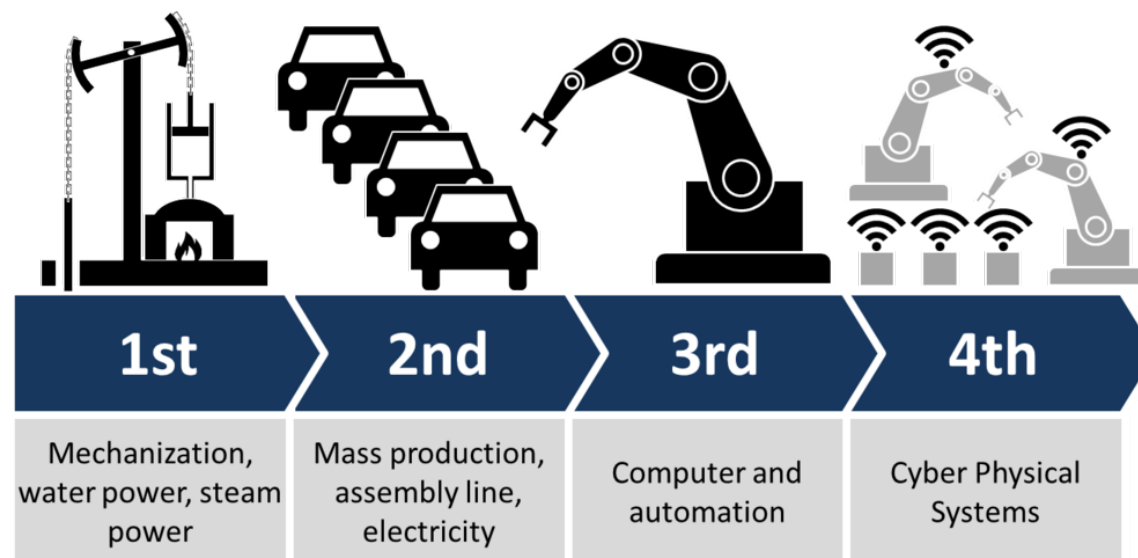
- The two different worlds of Industry and Science
  - A typical career path ?!
- Some Personal Experiences....
  - What a difference an engineer can make
  - A translator between the worlds
  - Are we living in the seventies?
  - ...until it hurts!
  - We are a small, small business! ... and a strange one as well.

# Industry and Science – A special relationship

- Mutual understanding is essential
- Life cycle of technical installations
  - 70% of SIEMENS products are younger than 5 years
- Every Instrument is a prototype, but....

# Industry 4.0

- Industry 4.0 or the fourth industrial revolution, is the current trend of automation and data exchange in manufacturing technologies. It creates what has been called a "smart factory". Within the modular structured smart factories, cyber-physical systems monitor physical processes, create a virtual copy of the physical world and make decentralized decisions.
- It includes cyber-physical systems, the Internet of things and cloud computing ([https://en.wikipedia.org/wiki/Industry\\_4.0](https://en.wikipedia.org/wiki/Industry_4.0))



# Industry 4.0 – Design Principles

- **Interoperability:** The ability of machines, devices, sensors, and people to connect and communicate with each other via the Internet of Things (IoT) or the Internet of People (IoP).
- **Information transparency:** The ability of information systems to create a virtual copy of the physical world by enriching digital plant models with sensor data. This requires the aggregation of raw sensor data to higher-value context information.
- **Technical assistance:** First, the ability of assistance systems to support humans by aggregating and visualizing information comprehensibly for making informed decisions and solving urgent problems on short notice. Second, the ability of cyber physical systems to physically support humans by conducting a range of tasks that are unpleasant, too exhausting, or unsafe for their human co-workers.
- **Decentralized decisions:** The ability of cyber physical systems to make decisions on their own and to perform their tasks as autonomous as possible. Only in case of exceptions, interferences, or conflicting goals, tasks are delegated to a higher level.

# 5 big Domains @ Industry 4.0





## **Big Data Analytics consists of 6Cs in the integrated Industry 4.0 and Cyber Physical Systems environment**

1. Connection (sensor and networks)
2. Cloud (computing and data on demand)
3. Cyber (model & memory)
4. Content/context (meaning and correlation)
5. Community (sharing & collaboration)
6. Customization (personalization and value)



Thank you!



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## Topics for round table discussion

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# Some under laying assumptions

- Automation industry is offering a huge market of commercial products to use on Neutron instruments.
- It's about to choose what components/technology to use and to understand the relationship to the industrial supplier.
- Industry has implemented dedicated workflows and procedures that typically are quite effective in their intended environment.
- They can be quite different from ours in science and we need to understand the differences and communalities to be able to choose what to transfer.

1. Innovation
2. Standardisation
3. Technical Standards
4. Relationship to Industrial Suppliers
  
5. Workflow of Projects
6. Quality Control / Acceptance Tests
7. Documentation
8. Service, Maintenance

# General Questions

- What are the differences between industry and science?
- What are the communalities?
  
- How do I do in my own daily business?
  
- How do I transfer industrial approaches into science?
- What explicitly I don't want to transfer?

- What is innovation for you, how you would define it?
- What is driving innovations in your facility, what's the driver in industry?
- How do you handle innovations in your job?
- Do you have a budget for this ?
- What's Your innovation cycle (for different technologies 5, 10, 20 y) ?
- What about “old” products with a proven record?
- How do you keep yourself updated ?

- Do you have standardised components ?
- Do you have a list of certified components ?
- Do you have a PLM system ?
- How do you handle obsolescence ?
- What about customized solutions? What is the balance between customised/standardised?



# Technical Standards

- What standards are you using ?
- CE, EN, IEC ?
- Safety regulation?
- How do you use them (rules, guidelines) ?
- How do you keep yourself updated with the releases?

- How do you handle industrial supplier ?
- How do you select a supplier (smaller, innovative companies? how long on the market? other criteria)
- How specialised are your suppliers ?
- How do you establish relationship ?
- Do you find always 3 supplier for tender ?
- Do you know relationships between suppliers (who is producing for whom)? Do you care?

# Workflow of projects

- What about requirements / specifications lists?
- What about project planning ?
- What about resources planning ?
- What about the tendering process ?
- What should we take over from industry ?
- What are the limitations / differences to industry?
- Do you foresee remote diagnostics / remote configuration? What about IT security with this?

# Quality Control / Acceptance Tests

- How do you implement quality control ? Do you have a quality management system (ISO 9000 etc.)?
- How often do you perform Factory / Site Acceptance Tests?
- How does the tests look like?
- How do you prepare, how do you conduct?
- How firm are you with the results?
- Difference experience from your job in industry?

- What documentation you keep?
- What documentation you expect from a supplier?
- How about change control?
- What can we learn from industry?

# Service, Maintenance

- Your experience with industrial suppliers?
- How is service organized in your facility?
- Do you have a ticket system?
- Do you practice preemptive maintenance?
- Do you have service contracts with companies?