Industrial IT and Automation

Hans-Petter Halvorsen
Evolution
Industrial IT and Automation

- Industrial IT is the integration of Automation and Information Systems across the business.
- You could say Industrial IT is use of IT in industrial applications, everything from Process Control Systems, Sensor Technology, Data Acquiring, Data Logging and Monitoring and Software and Systems Engineering.
- You need to have knowledge of Data Acquisition, Database Systems, Data Communication and Networks, Automation and Control, etc.
- Terms such as Internet of Things (IoT), Smart Technology, Cloud Computing and Industry 4.0 are very popular these days.
Industrial IT

Programming

Visual Studio, C#, LabVIEW, MATLAB

Logging

Network

Mobile Devices

Tools & Analysis

Data Fusion

Sensor Technology

Smart Sensors

State Estimation

Modeling

Automation

Application Examples:

Factory Automation

Process Control

Home Automation

Mobile Apps

Oil & Gas

PID, MPC

Monitoring
Industrial IT and Automation Topics

- DAQ Systems
- Virtualization
- Data Communication
- OPC
- Internet of Things (IoT)
- SOA and Web Services
- Sensor Technology
- System Engineering
- SCADA Systems
- Modbus
- Home Automation
- Modelling and Simulation
- Mobile Technology
- Modelling and Simulation
- Vision Systems
- Wireless Systems
- Industrial Control Systems
- Cloud Computing
- HIL Simulation and Testing
- Data Communication
- Smart Sensors
Cloud Computing

Internet of Things (IoT)

Industrial IT and Automation

Industry 4.0

Smart Technology

IIoT
Cloud Computing

Hans-Petter Halvorsen, M.Sc.
Cloud Computing

• Cloud computing, also known as “on-demand computing”

• A kind of Internet-based computing, where shared resources, data and information are provided to computers and other devices on-demand.

https://en.wikipedia.org/wiki/Cloud_computing
Internet of Things (IoT)

Hans-Petter Halvorsen
Internet of Things (IoT)

• The Internet of Things (IoT) is the network of physical objects—devices, vehicles, buildings and other items which are embedded with electronics, software, sensors, and network connectivity, which enables these objects to collect and exchange data.

• The Internet of Things allows objects to be sensed and controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit.

https://en.m.wikipedia.org/wiki/Internet_of_Things
Smart Technology

Hans-Petter Halvorsen
Smart Technology

- Smart Phones and Smart Watches
- Smart Sensors
- Smart Houses, Smart Home, Home Automation
- Smart Factories
- Smart Cities
- Smart Grid
- ...

- Internet of things
Smart Grid

- Electricity is a resource that must be used as soon as it is produced, you cannot store it in large quantities.
- Smart Grid is the collective term for a new generation power grid, where one makes use of new communication technologies to exploit energy infrastructure better.
- Smart Grid is characterized by different systems and components which have in common that they have merged with the Internet.
Industry 4.0

Hans-Petter Halvorsen
Industry 4.0

• “We stand on the brink of a technological revolution that will fundamentally alter the way we live, work, and relate to one another.”
• “In its scale, scope, and complexity, the transformation will be unlike anything humankind has experienced before.”

http://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond
Industry 4.0

• A “Buzz Word”? 
• “Same shit – new wrapping”?

Industry 4.0 is the new buzzword for the combination of industry and the current Internet of Things (IoT) technology is Industry 4.0.
Industry 4.0

• First things first – this isn't a new technology. Nor is it a business discipline.
• It is in fact a new approach to achieve results that weren't possible 10 years ago thanks to advancements in technology over the past decade.
• Some will also tell you that it's in fact the fourth industrial revolution.

http://www.techradar.com/news/world-of-tech/future-tech/5-things-you-should-know-about-industry-4-0-1289534
Industry 4.0

• The First Industrial Revolution used water and steam power to mechanize production.
• The Second used electric power to create mass production.
• The Third used electronics and information technology to automate production.
• Now a Fourth Industrial Revolution is building on the Third, the digital revolution that has been occurring since the middle of the last century. It is characterized by a fusion of technologies that is blurring the lines between the physical, digital, and biological spheres.

http://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond
Industry 4.0

First mankind 20 mill Years ago
Year Zero

1784
1870
1969
2011->

Today
Industry 4.0

Water, Steam and Mechanical production

Industry 1.0

Industry 2.0

Industry 3.0

Industry 4.0

Internet of Things

Robotics

Electronics, IT and Automation

20 mill Years ago
Year Zero
~1784
~1870
~1969
~2011->

First mankind
<table>
<thead>
<tr>
<th>Revolution</th>
<th>Year</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1784</td>
<td>Steam, water, mechanical production equipment</td>
</tr>
<tr>
<td>2</td>
<td>1870</td>
<td>Division of labour, electricity, mass production</td>
</tr>
<tr>
<td>3</td>
<td>1969</td>
<td>Electronics, IT, automated production</td>
</tr>
<tr>
<td>4</td>
<td>?</td>
<td>Cyber-physical systems</td>
</tr>
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</table>
Industry 4.0

The fourth industrial revolution
Industry 4.0

The fourth industrial revolution

- 1.0: Mechanization of production using Water and Steam Power.
- 2.0: Mass production with the help of Electric Power.
- 3.0: The Digital Revolution. From Analog to Digital Devices and Signals. Use of Electronics and IT to further Automate Production
The Industrial Revolution

• The Industrial Revolution was the transition to new manufacturing processes in the period from about 1760 to sometime between 1820 and 1840.

• This transition included going from hand production methods to machines, new chemical manufacturing and iron production processes, improved efficiency of water power, the increasing use of steam power, the development of machine tools and the rise of the factory system.

• Textiles were the dominant industry of the Industrial Revolution

https://en.m.wikipedia.org/wiki/Industrial_Revolution
The Industrial Revolution

“A Watt steam engine. James Watt transformed the steam engine from a reciprocating motion that was used for pumping to a rotating motion suited to industrial applications.”
Electrical Power

• The electrical industry started with introduction of electric lighting in 1882.
• Throughout the 1880s and 1890s, growing economic and safety concerns lead to the regulation of the industry.
• Once an expensive novelty limited to the most densely populated areas, reliable and economical electric power has become a requirement for normal operation of all elements of developed economies.
The Digital Revolution

The Digital Revolution, known as the Third Industrial Revolution, is the change mechanical, and electronic technology to digital technology which began anywhere from the late 1950s to the late 1970s with the adoption and proliferation of digital computers and digital record keeping that continues to the present day.

From Analog to Digital Devices and Signals.

Use of Electronics and IT to further Automate Production

https://en.m.wikipedia.org/wiki/Digital_Revolution
Industry 4.0

The fourth industrial revolution

A “Smart Factory”

https://en.m.wikipedia.org/wiki/Industry_4.0
Industry 4.0 Background

- The term was first used in 2011 in Germany.
- In October 2012 a Working Group on Industry 4.0 presented a set of Industry 4.0 implementation recommendations to the German federal government.
- The high-tech strategy document outlined a plan to almost fully computerize the manufacturing industry without the need for human involvement.
Industry 4.0

- Industry 4.0 is not just about digitizing and improve existing processes.
- It is also about developing new business models.
- We are talking about an Internet-driven revolution.
- Digitization will hit all industries and will be the basis for its future competitiveness.
- Adopting algorithms, robots and application of big data analysis will over the next 10 years can change not only the industry but the whole social development.

https://www.ikt-norge.no/kommentar/industri-4-0-norge-ma-med/
The Fourth Industrial Revolution: what it means, how to respond

http://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond
Industrial Internet of Things (IIoT)

Hans-Petter Halvorsen
Industrial Internet of Things (IIoT)

- Another word for Industry 4.0
- IoT – Consumer oriented, Smart Home Solutions, etc.
- IIoT – Industrial use of IoT Technology
- "The main difference is that where consumer IoT often focuses on convenience for individual consumers, Industrial IoT is strongly focused on improving the efficiency, safety, and productivity of operations with a focus on return on investment,"

Hans-Petter Halvorsen

University of Southeast Norway

www.usn.no

E-mail: hans.p.halvorsen@usn.no
Web: https://www.halvorsen.blog