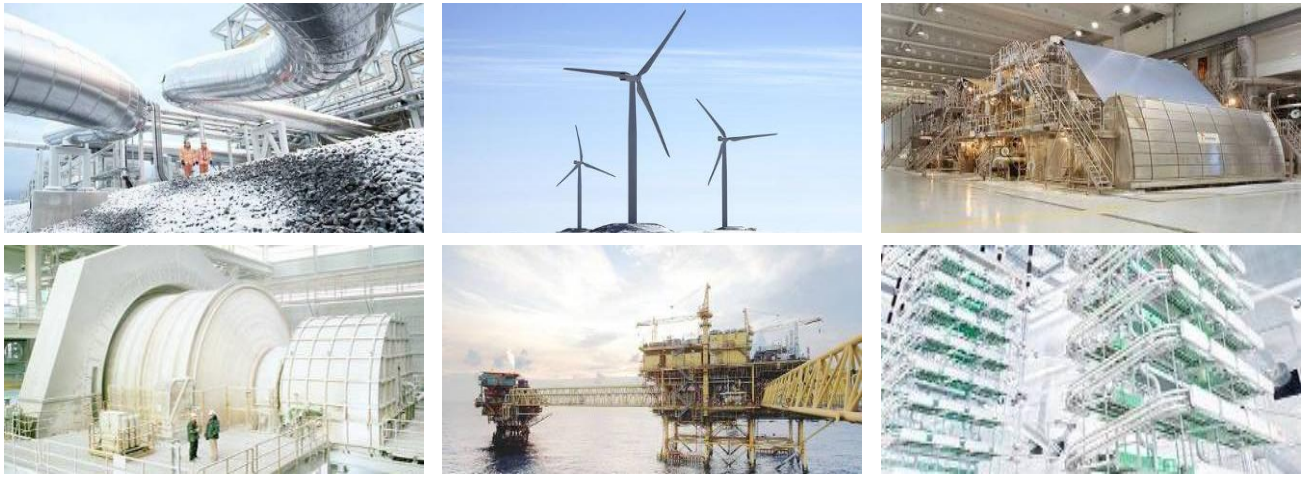
Kristian Sandström, Principal Scientist, ABB Corporate Research.

Balancing of system security and production flexibility

A global leader in power and automation technologies
Leading market positions in main businesses

- 145,000 employees in about 100 countries
- $39 billion in revenue (2012)
- Formed in 1988 merger of Swiss and Swedish engineering companies
- Predecessors founded in 1883 and 1891
- Publicly owned company with head office in Switzerland

Power and productivity for a better world
ABB’s vision



As one of the world’s leading engineering companies, we help our customers to use electrical power efficiently, to increase industrial productivity and to lower environmental impact in a sustainable way.

How ABB is organized
Five global divisions

Power Products

$10.7 billion
35,300
employees

Power Systems

$8.0 billion
19,600
employees

Discrete Automation and Motion

$9.6 billion
28,500
employees

Low Voltage Products

$6.6 billion
21,400
employees

Process Automation

$8.2 billion
28,300
employees

(2012 revenues, consolidated)

ABB's portfolio covers:

- Electricals, automation, controls and instrumentation for power generation and industrial processes
- Power transmission
- Distribution solutions
- Low-voltage products
- Motors and drives
- Intelligent building systems
- Robots and robot systems
- Services to improve customers productivity and reliability

Power and automation are all around us
You will find ABB technology…


orbiting the earth and working beneath it,


crossing oceans and on the sea bed,


in the fields that grow our crops and packing the food we eat,


on the trains we ride and in the facilities that process our water,


in the plants that generate our power and throughout our homes.

Ideal Concept 9: Balancing of system security and production flexibility

“Improve process uptime, reliability and safety through secure and redundant information exchange in the context of next-generation system-wide flexible control, maintenance and support systems.“

- European Roadmap for Industrial Process Automation

Trends Supported by the Ideal Concept

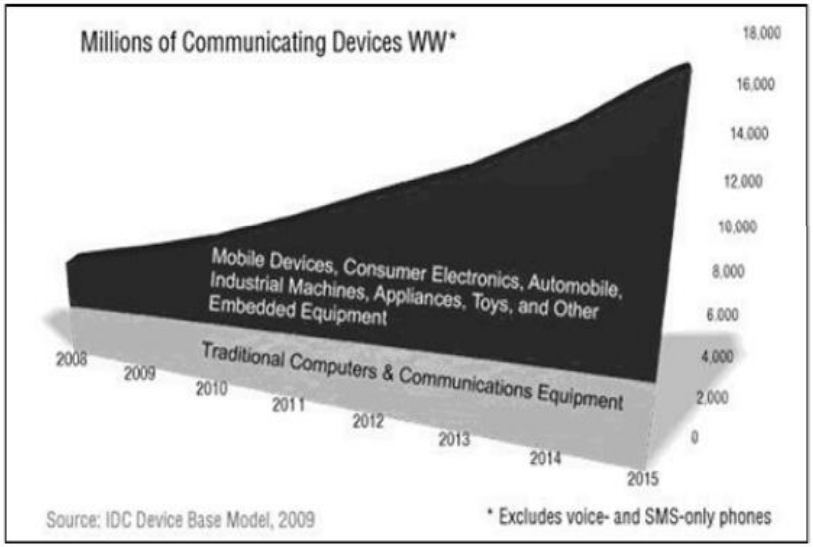
Trends

- Increased integration of production and business operations. Optimization through cross-layer integration.
- Increased availability and uptime. Integrated production and asset management.
- Rapid technology adaptation (e.g., spare parts, new technology introduction).
- Scope of automation is extending to enterprise systems. A System-of-Systems architecture is formed.

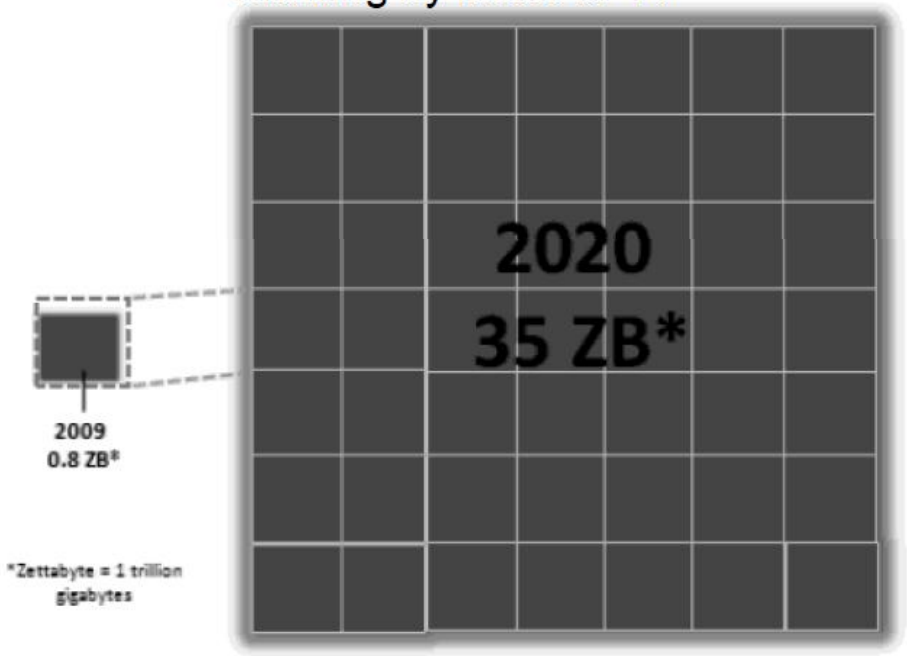
- European Roadmap for Industrial Process Automation

Trend: Data and scalability
Challenge: 2010s - The Digital Universe Decade

Growth of embedded vs conventional computers, 2008 to 2015



Growth of digital information created per year, 2009 and 2020
Growing by factor of 44



Source: IDC Digital Universe Study, sponsored by EMC, May 2010

This growth of produced data will have impact on the systems that manage this data.

(1 ZB (zetta byte) = 10^{12} GB)

Architecting Large Scale Industrial Systems

“Large scale industrial systems require specific attention to sustainable scalability and multi-tenancy challenges.“

Driving factors

- Globalization of businesses through widespread internet connectivity
- Ever increasing computing and data storage capabilities
- Portfolio synergies, business integrations.

Embedded Real-Time Systems

“The software in industrial control systems present a great investment and typically outlives the hardware by several generations“

Driving factors

- Rapid market evolution for hardware in terms of performance.
- Adaption to an changing environment, e.g., connectivity.
- Commodity software driving technology development, e.g., Linux.

Challenges
Safety and Security

- Flexibility
  - Agility for security, stability for safety. Combination of security and safety – trade-offs?
  - Updates beneficial for security but costly for safety.
- Efficiency
  - Make use of technology advancement (tech dev cycle vs. domain system life cycle vs. safety standards vs. speed of evolution in connectivity and cyber security)
  - Of-the-shelf components – certification
  - Cost efficient development.
- Any help from technology?

Virtualization Technology

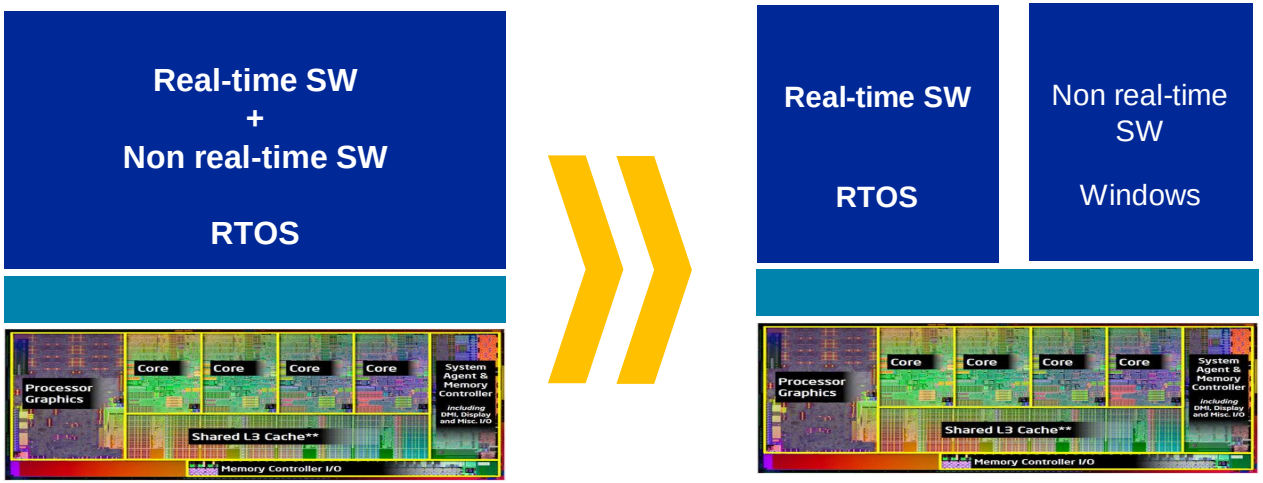
“Virtualization is a technology that has already profoundly changed how IT-systems are built and managed. The technology has an increasing role in embedded and control systems“

Driving factors**:**

- Hardware consolidation
- Cost efficient software development by facilitating strict separation.
- A transition path for multicore.

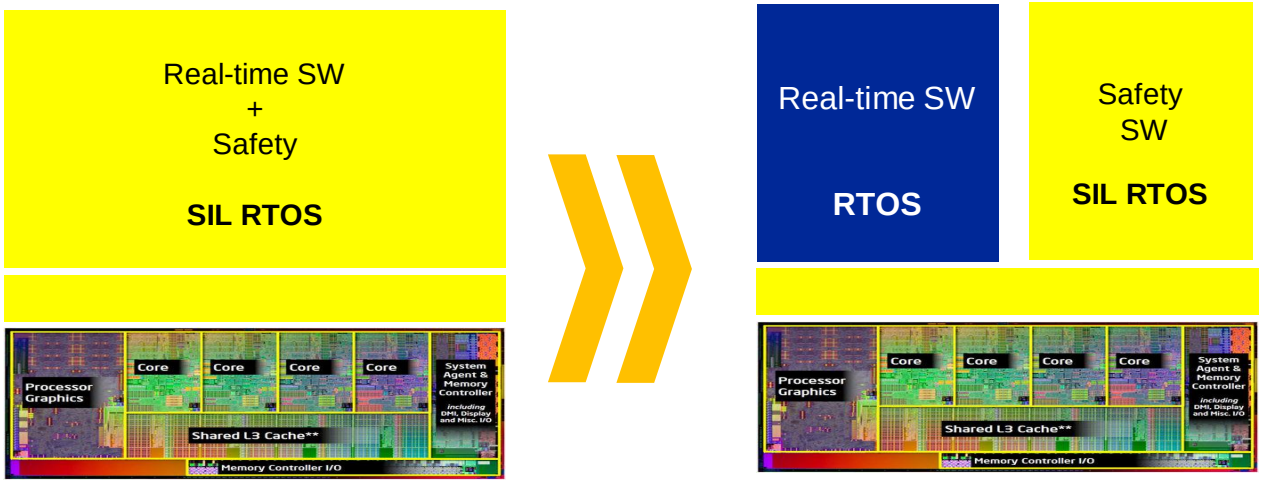
Use case: Mixed criticality
Combining real-time with general purpose

- E.g., Integrating process control and engineering station
- We would like to add new features in a controlled manner
- Leveraging general purpose technology



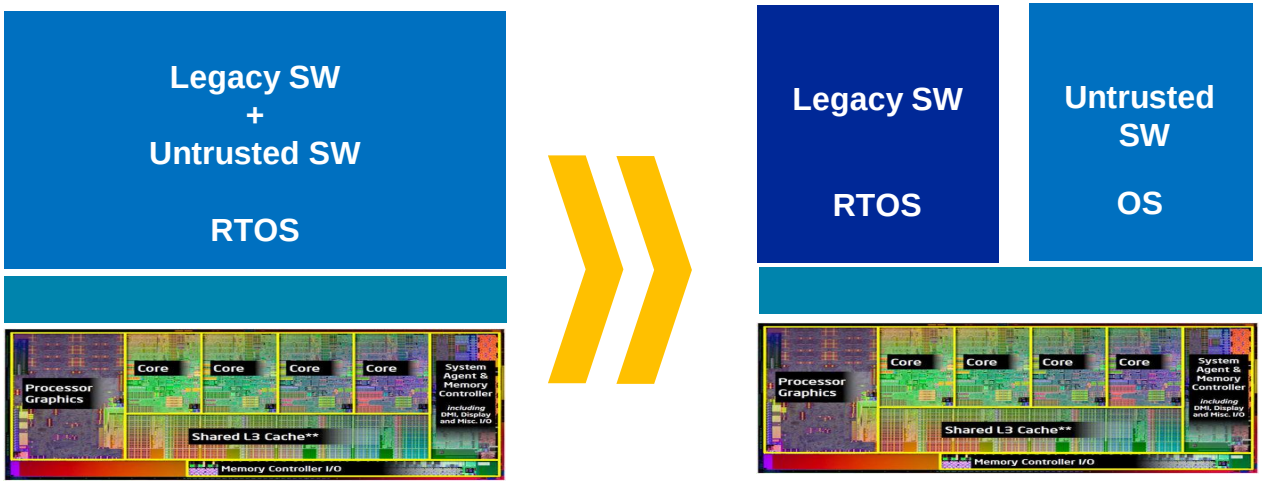
Use case: Mixed criticality
Combining real-time with safety

- E.g., Integrating process control and safety devices
- We would like to add new features without infecting certified SW
- Entire safety stack need to be certified.



Use case: Mixed criticality
Combining legacy with security

- E.g., increased connectivity
- Use of legacy SW in a secure manner.



Summary
Balancing of system security and production flexibility

- Challenging mix of trends for complex industrial automation.
  - Connectivity – IOT
  - Increase of security threats?
  - Maintained safety
  - New technologies - Mobile
- Need to address both safety and security – conflicts?
- Leverage new enabling technologies to reach the goals of flexible and cost efficient production systems.
- Development processes that combine safety and security.

Power and productivity
for a better world™