Smart Industry: Impact of software innovation

Co-summit theme speech

Heinrich Daembkes, ARTEMIS-IA
Rudolf Haggenmüller, ITEA 3
Smart industry
The impact of software innovation

ITEA ARTEMIS-IA
HIGH-LEVEL VISION
2030
OPPORTUNITIES FOR EUROPE

The impact of software innovation on revenue and jobs

VERSION 2013
The global market of digital technology is 3300b$ of which 2600b$ are in software innovation.
The global number of jobs in digital technology is 50m, of which 44m are in software innovation.
Value Chain based on Electronics and Embedded Systems

- Internet service providers
- Games

ICT KETs provide the knowledge & technologies that generate more than 10% of global GDP
2010 World GDP = $73300B (ppp based)
2010 EU GDP = $15040B (ppp based)

Services
Electronics only: WW ~$6400B / Europe ~$1640B

Automobile / Industrial / Defense
Medical / Space / entertainment / ...

Digital prod/services
WW $3000B / Europe $850B

Semiconductors, Photonics $600B
($100B) / Europe

Embedded Systems: Transferring semiconductors into application / products

Equipments

Materials

Source: DECISION, ESIA, Future Horizons, IMF, WSTS — 2010 figures
All domains define their products via software:

- Smart Mobility
- Smart Energy
- Smart Manufacturing, smart industry
- Smart Cities and Society
- Smart Health

Different parameter characteristics and formats:

- In development processes and tool / tool chains
- In product features
- In services
- In production (→ IoT, Industrie 4.0)
- In supply chain
- “In service” support
After the steam engine, the assembly line, the success of digital technology we are observing the 4th industrial revolution: the merging of real world with virtual worlds.

- Smart industry is characterised by:
  - Strong individualisation of products
  - High flexibility of production
  - Integration of customers and suppliers in business processes and value chains
  - Coupling of production with high-value services
Smart industry
Challenges for industry

• Increase productivity
• Reduce energy and resource consumption
• Increase flexibility
• Decrease costs
• Reduce time to market
• Satisfy demand for higher product variety and product individualisation

The development and smart application of powerful, industrial software becomes the critical success factor in the global competition in the manufacturing and process industry.

Siegfried Russwurm in: Industrie 4.0, Springer-Verlag 2013
Siemens - Elektronikwerk Amberg

Showcase

• 75% of the effort is done by computers
• 8 times more production in 12 years by the same number of people
• Quality: 99,9988%
ITEA - a tool for the 4th industrial revolution

Merging the real world with virtual worlds

The merging of real world with virtual worlds since many years has been addressed in ITEA projects:

- METAVERSE: an award winner leading to a global standard merging virtual worlds with the real world
- MODELISAR: an award winner creating a global standard on comprehensive modelling and simulation in automotive
- ATAC: Outstanding project on bringing software test automation to industrial practice
- AVANTI: Running project on virtual commissioning, the step after virtual production, creating a competitive advantage
- SAFE: Safety engineering, implementing and improving a global standard
ARTEMIS Industry Association
An Association that supports the industry into the 4th revolution

The ARTEMIS programme:

• 56 projects enabling the integration of software

• Defining the properties and the performance of products:
  - Reliably, for certifiable Safety-Critical Systems
  - Scalably, for IoT applications and more
  - Cost-effectively, for competitive solutions on a global scale

• Including 3 major Innovation Pilots
  - CRYSTAL – Workflows and Tools for ultra-reliable applications while reducing system design and validation costs
  - Arrowhead – collaborative automation for efficient, flexible industry and rational energy use.
  - EMC2 – Embedded Multi-Core systems for mixed criticality applications, keeping European Electronic Systems industries in the lead
Software innovations

Challenges to meet

• Mechanics “melting” with ICT:
  – Digitalisation
  – Highly automated cars, aircrafts, production equipment
• Big data: Analysis and handling
• Involvement of human, user friendliness
• Remote diagnosis and service
• Transparency issue
• Education & training
• Cooperation models:
  Large SW companies – ES/CPS users
• Transition from “analog biz” models to “digital biz” models

All based on software!
Smart industry
Call for actions

- An increase of research in Embedded & Cyber-Physical Systems is required for:
  - Mastering Complexity
  - Meeting environmental Challenges
  - Competitiveness of Europe
  - Cost Efficiency

‘European investment in CPS should increase by 100% over the coming years in order to safeguard the leading position of Europe.’

- CPS are key to the future requirements of all industrial sectors. E.g for the automotive sector, where an increasing amount of electronic systems will lead to an entire system depending on embedded systems.
- We need to partner with related communities: e.g. IoT, factories of the future, high performance computing, NESSI, big data
- Our **Software Innovation Forum** will be the right platform
Smart industry
Challenges for Europe

• Industry plays a central role in the economy of the European Union, accounting for 15% of value added. It serves as a key driver of research, innovation, productivity, job creation and exports.

• Industry generates 80% of the EU's innovations and 75% of its exports. Including its effect on services, industry could be considered the social and economic engine of Europe.

• In 2011, European industry value added has been around EUR 1500 billion.

• In 2011, in Europe there have been 25 million industrial employees.

• 40% of jobs in the European manufacturing sector are service-related.

• In 2012, the EU Commission set the goal of boosting manufacturing’s share of value added in Europe from 15% to 20% by 2020. This would result in an increase of industrial employees by 6 million and an increase of annual industrial value added by EUR 500 billion.

*Think Act - Industry 4.0, Roland Berger Strategy Consultants, 2014*
To reach the goal of 20% share of smart industry in European value added, we have to strengthen our software innovation power:

- We need a more global approach to software innovation
- We have to include customers and end-users into our software innovation projects
- We need a comprehensive approach addressing product and service innovation.
- Smart industry needs smart people. We have to address talent development in our projects on company- and country level.
- We have to further shorten the time from project idea to project kick-off.

PAs and industry should double their investment in R&I for system and software programmes, keeping Europe on the high side.
Thank you for your attention

We are grateful for the support of: