Cyber-physical systems - a Key Enabler for the Digitalisation of European Industry

CPS Week

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Three dimensions of Value Creation from Digitisation

"Digital inside": Innovations in products (all types)

- ~40% AV growth
- ~50%
- ~40%
- ~80%

Digital transformations of processes

Radical/disruptive changes in business models
Technologies driving the change

Innovation in products, processes and business models

**IoT and CPS**
Sensors, connectivity, low power, cloud, HPC servers, etc

**Big data**
Analytics, storage, HPC, etc

**AI & Robotics**
Automation, machine learning

**3D printing**
Additive manufacturing, laser based manufacturing, etc
Digital transformation of all industry in Europe requires a strong digital sector in Europe.

Broad digital transformation of all industry offers a unique opportunity to strengthen Europe's digital sector.

"push-pull" or the "virtuous circle"
Some figures

- A potential **1 Trillion Euro added to GDP**
  - in the next 10 years from digitisation

- Loss of **600 B€** of GDP per year if Europe lags behind
  - If Europe is slow in digital transformation

- An annual 10 % increase in industry Added Value
  - (Roland Berger for BDI 2015)

- Up to an additional **1.5 trillion $** to US GDP by 2025
  - (Mc Kinsey for US admin)
Digitising Industry Initiatives across Europe

**EU-level initiatives**
- Application Public Private Partnerships: Factories of the Future (FoF), Sustainable Process Industry (SPIRE)
- ICT Innovation for Manufacturing SMEs (I4MS)
- Smart Anything Everywhere
- Digital Sector Public Private Partnerships – ECSEL, Photonics, Robotics, High Performance Computing (HPC), Advanced 5G networks for the Future Internet (5G), The Data Value PPP

**Multi-region Initiatives**
- Vanguard
  - United Kingdom
    - High Value Manufacturing Catapult
    - Innovate UK
    - EPSRC Manufacturing the Future
    - Action Plan for Manufacturing (Scotland)
  - Belgium
    - Made Different
    - Flanders Make/iMinds (Flanders)
    - Marshall 4.0 (Wallonia)
  - France
    - Industrie du Futur
    - FoF Ile-de-France
  - Portugal
    - PRODUTECH
  - European Initiatives
    - National Initiatives
    - Regional Initiatives
    - #DigitiseEU @DSMeu
    - DigitalSingleMarket
    - bit.ly/DigitiseEU
- Finland
  - FIMECC ppp Programmes
  - DIGILE
  - TEEKSS
- Latvia
  - Demola (Riga IT TechHub)
- Poland
  - INNOMED
  - INNOLOT
  - CuBR
  - BIOSTRATEG
- Germany
  - Plattform Industrrie 4.0
  - Mittelstand 4.0
  - Smart Service World
  - Autonomik fur Industrie 4.0
  - It’s OWL (Ostwestfalen-Lippe)
  - Allianz Industrie 4.0 (Baden-Württemberg)
- Slovakia
  - Smart Industry (SK)
- Czech Republic
  - Průmysl 4.0
- Austria
  - Produktion der Zukunft
- Austria
  - Produktion der Zukunft
- Poland
  - INNOMED
  - INNOLOT
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- Czech Republic
  - Průmysl 4.0
- Austria
  - Produktion der Zukunft
- Greece
  - Operational Programme in Region Western Greece
Digitising European Industry: Key role for ECSEL and EC programmes

Linking up and coordinating EU, national and regional initiatives

Boosting EU Innovation Capacity
- Widespread digital innovations in all industries: a pan-EU network of Digital Innovation Hubs
- Strengthening Leadership through Partnerships & Platforms
- ICT standards and Interoperability Testbeds

Smart Regulations for Industry

Preparing Europeans for the Digital Age

Platform-building:
- Artemis CRYSTAL, EMC2, ...
- ECSEL Lighthouse Initiatives

Standardisation
- CP-SETIS (CPS-IOS)
Platforms, standardisation, interoperability

- European leadership in open digital platforms for industry
- Building on strengths in vertical markets, develop Europe's presence in cross sector platforms
Standardized architecture for embedded automotive HW/SW

- Eases cooperation of car manufacturers, suppliers and tool developers
- Facilitates innovation through open standards
- "Cooperate on standards, compete on implementation"

Success story

- Bootstrapped by EU industry (manufacturers, suppliers)
- Worldwide use
- Strong framework programme support (FP6, FP7, ARTEMIS)

Challenges for AUTOSAR

- Connected Car
- Autonomous Car
- Fully electric vehicle

Similar platform in agricultural machinery: ISOBUS

- Emerging ecosystem of agricultural OEMs, suppliers, seed companies, IT/big data
- Standardise communication/data exchange between tractors, land machines, mobility and control SW
- Compete on components and their functionality.
The CRYSTAL platform for safety-critical systems

**What – reference architecture:**
- Open and driven by EU actors
- Builds on EU leadership on safety-/time-critical systems
- Builds on IOS Interoperability Specification + RTP Reference Technology Platform
- Reference solutions available
- Involved in international standardisation efforts

**Who – ecosystem:**
- 68 actors directly involved
- Cutting across sectors: rail, automotive, aerospace, health
- Involving market actors across the full value chains

**Potential next steps:**
- Synergies with EMC2 platform?
- Reinforce integration across verticals?
- Address new requirements, e.g. autonomy, energy, ...?
PPPs: preparing the supply of digital technologies across the value chains

- High Performance Computing
- Photonics
- 5G
- Robotics
- Big Data

Services

- Electronics
- Digital Products & Services
- Automotive, Industrial, Defence, Medical, Space

CyberSecurity

Factories of the Future & Process Industry

Internet of Things focus area
Connecting the tracks
Getting beyond silos

- Collaborate on digital industrial platforms
  - Across enterprises and groups of market actors – even competitors
  - On a pan-European scale – beyond national silos
  - Across PPPs and ECSEL JU
  - Pool MS and regional investments
  - Align MSs Research and Innovation Programmes
  - Reference architectures, testbeds and experimentation, validation
  - Gradually build ecosystems
- ECSEL and PPPs are strong instruments, e.g. lighthouse initiatives
- Good starting point
Programmes related to Cyber-Physical Systems in Europe

- Internet of Things
- Low power Computing
- Cyber-Physical Systems
- CPS in Manufacturing
- Societal Challenges
- Cyber-Physical Systems in Manufacturing
- ECSEL - CPS (Joint Technology Initiative) driven by ARTEMIS
- Member States Initiatives
- EFFRA SRA
- EPoSS IA SRA
- AENEAS SRA
- ITEA: Software Intensive Systems
- Photonics
- Robotics...
- 5G
- Big Data
- Cloud
- Low power Computing
- 5G
- Big Data
- Cloud
• Build on well identified market-pull demands related to societal needs
• Offer visionary solutions for those demands creating ecosystems along the relevant value and supply chains
• Have a strong pan-European dimension in each of the steps: demands, solutions, ecosystems, technologies, demonstrators.
• Have a strategic IP management policy when possible and agreed by the consortia.
• Whenever appropriate, work towards clustering of projects in the identified areas and therefore organize the attraction of other contributing projects as needed, through a transparent competitive process
• Establish a standardization strategy and drive it
• Address the relevant non-technical aspects (such as legislative, regulatory, social, etc)

Starting from 2016 Calls
Conclusions

• Digitising European Industry Action Plan
  • Complements and builds on EU, MSs, and regional structures
  • Support building the "glue" – providing EU added value
  • 19 April 2016: Communications by EC to EP and Council
  • 25 April 2016: Hannover Messe high-level conference

• CPS: one of the key technologies driving the change

• ECSEL and its Lighthouse Initiatives have a key role to play

• The ARTEMIS SRA 2016 well addresses the Challenges

• International co-operation is important
  • Pre-competitive research
  • Standardisation and interoperability
THANK YOU

Digitsing European Industry