LEIT – Factories of the Future

Work Programme 2014/15
ICT for Factories of the Future

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Complex Systems & Advanced Computing (A3)
Innovative ICT makes the difference

EU Suppliers are World Market Leaders

Laser-based manufacturing

Cyber-physical systems for process (chain) optimisation

Robotics

Modelling, Simulation, Analytics

CAX

Digital Factory

CAE (CAE, CAA)
CAPP
CAM
DMU

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**Factories of the Future**

**Digital Factories: First time right – made in Europe**
- SW for innovative products through digital design & validation tools
- Responding to higher variance and shorter innovation cycles

**Smart Factories: Factories from Computers**
- Process optimization through embedded ICT and real-time data processing
- A quantum leap of interoperability and configurability for customized production at any time and location

**Virtual Factories: Managerial control through the Cloud**
- IoT for fully integrated production, supply chain, logistics and customization needs in real time
- From supply chains to business ecosystems
Key role of SMEs in value chains: users and suppliers
- SME need more than €s
- 150 application experiments along value chains clustered
- Clustered around networks of competence centres
- Open Calls for experiments during course of projects
Direct Contribution to **FoF PPP**
driven by EFFRA Roadmap
**WP 2014/15: 102M€**
Total H2020: up to 450M€

Indirect Contribution to **SPIRE PPP**
and their SRA
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Collaborative projects in 3 areas + 1 CSA:

a. Research and Innovation Actions:
   i. CPS-based process optimisation for adaptive and smart manufacturing
   ii. Collaborative and mobile manufacturing
   iii. Towards zero-failure laser-based manufacturing:

b. Support Action (CSA)

What do we want?
• Industry-driven
• Whole value chain
• R&D including validation/demonstration
Obj.FoF-1 Process optimisations of Manufacturing assets (Intra-plant manufacturing)

Scope

a) R&I Actions: Small projects, 100% EU funding

CPS-based process optimisation for adaptive and smart manufacturing

• Need: Scalable CPS architectures that exploit backend simulation and predictive modelling as well as advanced local control algorithms, distributed control up to the enterprise level to optimise local decision making and optimization

• Actions: Development of methods for real-time analysis, modelling and control to mimic and optimize manufacturing processes at local and backend levels

b) Coordination and Support Actions

• Consensus building for a factory-wide interoperability framework for CPS engineering and manufacturing environments

Expected Impact:

**Reduced complexity of production systems** by at least an order of magnitude through an interoperable de-centralised architecture approach and interoperability frameworks.

**Productivity increase of about 30%** through the enhanced utilisation of resources and information taking a holistic view in a collaborative value chain.
**Scope**

a) R&I Actions: Large projects, 100% EU funding

**Collaborative and agile**

• Need: CPS/Cloud to master supply network complexity
• Actions: development of collaborative tools that allow data sharing and synchronisation of business processes across the supply chain – particular focus on cloud enabled service platforms that allow data sharing without knowledge sharing / covering end-to-end integration of entire manufacturing processes and supply networks.

**Targets:**

• Data sharing
• Knowledge elicitation
• Integration across the value chain, Logistics

**Expected Impact:**

*Increased capability for better and faster reaction to market changes* by being able to use holistic global and local optimization algorithms in a collaborative value chain.

*Productivity increase of about 30%* through the enhanced utilisation of resources and information taking a holistic view in a collaborative value chain.
Scope

R&I Actions: Small projects, 100% EU funding

a.iii) Towards zero-failure laser-based manufacturing:

• Need: Fast & accurate process monitoring system

• Actions: development of (in-line) process monitoring sensors, measurement and non-destructive testing tools including the related high speed data processing and reduction.

Expected Impact:

**Strengthened market position** of European producers of laser-based manufacturing equipment, their suppliers and of the users of the equipment.

**Reinforced capacity to manufacture high-quality and innovative products** and to penetrate new application areas.

Targets:

• Sensors data, feedback control
• Incl. validation/demonstration
• covering whole value chain
3 challenges in ICT WP2014/5

- Process Chain Optimization
- Cyber Physical Systems – CPS, lasers
- Big Data, Simulation and Tools
- Advanced Computing
- Innovation Pilots & SMEs
- Innovation

FOF - 1
FOF - 8
FOF - 9

WP2015
ICT-enabled modelling, simulation analytics and forecasting technologies

Collaborative projects in 2 areas + 1 CSA:

a) R&I Actions:

i. Innovative modelling, simulation, analytics and forecasting for manufacturing at large
   - **Modelling and simulation methods** involving multiple phenomena (physical, mechanical, energetic, chemical, ...); including multi-scale and integrated discrete/continuous models, multidisciplinary and multiobjective design optimisation tools taking holistic approach

ii. Integrated modelling, simulation and information management systems
   - **Integrated information management systems for production systems** and advanced CAx, modelling, simulation and decision support toolboxes for new manufacturing processes

b) Support Action (CSA)
   - Build R&D constituencies & develop research and innovation agendas
   - Stimulate EU-US collaboration on R&I related to modelling and simulation
ICT Innovation for Manufacturing SMEs (I4MS Phase 2)

Collaborative projects in 3 areas + 1 CSA:

a) Innovation Actions:

i. Highly flexible and near-autonomous robotics systems (application experiments)

ii. HPC Cloud-based modelling, simulation and analytics services for modelling multiple interconnected phenomena (application experiments)
   • Integrating multiple tools across the process chain, exploiting big data, integrating novel mobile interfaces for data management and decision support for real-time responses and addressing security and privacy issues

iii. Integration of CPS modules in manufacturing processes and process chain (application or assessment experiments)
   • Increase automation in production SMEs and create novel value added services linked to process surveillance and maintenance

b) Support Action (CSA)
   • Network of Innovation multipliers to reinforce investment in research and innovation
Coordination and Support actions

Road4Fame
SRI roadmap for Future Architectures and Services for Manufacturing
http://road4fame.eu/

PATHFINDER
Future simulation, planning and forecasting technologies
http://www.pathfinderproject.eu/

Manuskills
Advanced ICT training methodologies for new manufacturing skills
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THANK YOU

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http://ec.europa.eu/research/horizon2020/index_en.cfm

Factories of the Future (FoF) on the web: