Manufacturing Europe’s Fourth Industrial Revolution

Speaker:
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European Factories of the Future Research Association (EFFRA)

Who We Are

- **Industry-led association** representing private side in the ‘Factories of the Future’ Public-Private Partnership with European Commission

- **approx 180** members from across Europe (growing)

- Members include **large, small & medium industrial enterprises, research organisations, universities, industrial associations and clusters**

- **Full time secretariat**: Connecting with members, coordinating research agenda & liaising with the European Union
Background

Manufacturing & Europe

How important is manufacturing?

- Despite the continued fall-out from crisis, manufacturing means a lot for Europe:
  - 20% Direct jobs
  - 67% Exports
  - 65% Business R&D Expenditure
  - Manufacturing in Europe remains diverse

- Importance of manufacturing now recognised by EU and its member states...

- ....but also by Europe’s competitors

- Realising the potential of 4th industrial revolution needs support = ‘Factories of the Future’
Factories of the Future PPP

Progress

- **1.150 M€** program within Horizon 2020, of those **110 m€** for I4MS (ICT for Manufacturing SMEs) program
- **250+ projects**
- **1500+ organisations participating**
- **60% industrial participation**
- **>30% of funding to SMEs**
- *Partnership is addressing all multiple topics to transform manufacturing (from CPS to zero-defect factories)*
Materialising Factories 4.0: Factories of the Future 2020

Recap: The Roadmap

Research & Innovation Priorities

Domain 1: Advanced Manufacturing Processes
Innovative processing for both new & current materials or products

Domain 2: Adaptive and Smart Manufacturing Systems
Innovative manufacturing equipment at component & system level, including mechatronics, control & monitoring systems

Domain 3: Digital, Virtual & Resource Efficient Factories
Factory design, data collection & management, operation & planning, from real-time to long term optimisation approaches

Domain 4: Collaborative & Mobile Enterprises
Networked factories & dynamic supply chains

Domain 5: Human-Centred Manufacturing
Enhancing the role of people in factories

Domain 6: Customer-Focused Manufacturing
Involving customers in manufacturing value chain, from product process design to manufacturing associated innovative services

Challenges & Opportunities

- Manufacturing Future Products
- Economic
- Social
- Environmental

Sustainability

Technologies & Enablers

- Advanced Manufacturing Processes
- Mechatronics for Advanced Manufacturing Systems
- Information & Communication Technologies
- Manufacturing Strategies
- Knowledge Workers
- Modelling, Simulation & Forecasting
Factories of the Future 2020

Strategic Roadmap

- One living document covering 2014-2020
- Developed by EFFRA & through broad public consultation
- Identifies megatrends which drive structural changes in manufacturing sectors
- Establishes research priorities which will allow industry to meet these challenges
- Priorities focus on development, application & integration of enablers & technologies
- ‘Factories of the Future’ call topics based upon research priorities = industry relevant
- Not static: we are developing the Roadmap further
Factories of the Future: I4MS
ICT in ‘Factories of the Future 2020’

Manufacturing for custom-made parts

M2M Cloud connectivity for future manufacturing enterprises

‘Plug-and-play’ interfaces for factory workers in dynamic work environments

ICT solutions for energy-efficient product life cycles

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Integrated high-performance computing

Collaborative demand & supply planning, traceability & execution

EFFRA
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Calls for proposals

FoF 1 – 2014: Process optimisation of manufacturing assets
FoF 2 – 2014: Manufacturing processes for complex structures and geometries with efficient use of material
FoF 3 – 2014: Global energy and other resources efficiency in manufacturing enterprises
FoF 4 – 2014: Developing smart factories that are attractive to workers
FoF 5 – 2014: Innovative product-service design using manufacturing intelligence
FoF 6 – 2014: Symbiotic human-robot collaborations for safe and dynamic multimodal manufacturing systems
FoF 7 – 2014: Support for the enhancement of the impact of FoF PPP projects
FoF 8 – 2015: ICT-enabled modelling, simulation, analytics and forecasting technologies
FoF 9 – 2015: ICT Innovation for Manufacturing SMEs (I4MS)
FoF 10 – 2015: Manufacturing of custom made parts for personalised products
FoF 11 – 2015: Flexible production systems based on integrated tools for rapid reconfiguration of machinery and robots
FoF 12 – 2015: Industrial technologies for advanced joining and assembly processes of multi-materials
FoF 13 – 2015: Re-use and re-manufacturing technologies and equipment for sustainable product lifecycle management
FoF 14 – 2015: Integrated design and management of production machinery and processes
FoF 15 – 2016: Novel hybrid approaches for additive and subtractive manufacturing machines
FoF-02-2016: Machinery and robot systems in dynamic shop floor environments using novel embedded cognitive functions
FoF-03-2016: Zero-defect strategies at system level for multi-stage manufacturing in production lines
FoF-04-2016: Continuous adaptation of work environments with changing levels of automation in evolving production systems
FoF-05-2016: Support for the further development of Additive Manufacturing technologies in Europe
FoF-06-2017: New product functionalities through advanced surface manufacturing processes for mass production
FoF-07-2017: Integration of unconventional technologies for multi-material processing into manufacturing systems
FoF-08-2017: In-line measurement and control for micro-/nano-enabled high-volume manufacturing for enhanced reliability
FoF-09-2017: Novel design and predictive maintenance technologies for increased operating life of production systems
FoF-10-2017: New technologies and life cycle management for reconfigurable and reusable customised products
FoF-11-2016: Digital automation
FoF-12-2017: ICT Innovation for Manufacturing SMEs (I4MS)
FoF-13-2016: Photonics Laser-based production
Factories of the Future: Going Forward

Factories 4.0 & Beyond

- ‘Factories of the Future 2020’ is not the end of the story – EFFRA is preparing complementary agenda to tackle new challenges
- Future of industry (e.g. Industry 4.0) requires continuation of successful programme
- Factories of the Future is already realising the potential of this next industrial revolution
Factories of the Future: Going Forward

Factories 4.0 & Beyond

Building on the vision of the FoF 2020 roadmap and public consultation in 2016

Key priorities for FoF 18-19-20

- Agile value networks: Lot-size one-distributed manufacturing
- Excellence in manufacturing: Advanced manufacturing processes and services for zero-defect processes and products
- The human factor: Human competences in synergy with technological assets
- Sustainable value networks: Manufacturing in a circular economy
- Interoperable digital manufacturing platforms: Connecting manufacturing services
Factories of the Future: Going Forward

Factories 4.0 & Beyond

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Research headlines for FoF 18-19-20

- HL02 - Quality Controlled and Integrated Additive Manufacturing
- HL12 - Reconfigurable cells, self-reconfigurable cells through smart sensors/devices
- HL19 - Digitisation of the Supply Chain – Manage complex customer-driven value networks
- HL22 - Manufacturing as a Service (MaaS) – Servitisation of autonomous and reconfigurable production
- HL01 - Manufacturing for complex and/or multi-material components
- HL03 - High precision manufacturing
- HL08 - Upgrading of factories
- HL30 - New methodologies for introducing innovative production technologies
- HL10 - Supporting the human in the workplace – Manufacturing training/re-skilling
- HL11 - Human machine/robot cooperation for flexible and evolving factories
- HL24 - User Centric Product and Production Equipment Engineering
- HL23 - Collaborative Engineering
- HL04 - Material and resource efficiency in manufacturing
- HL06 - Energy efficiency on factory level
- HL28 - European Circular Economy Open Platform
- HL16 - Digital Factory Modelling and Simulation
- HL17 - Multiple Source (Big) Data Mining and Real Time Analysis
- HL18 - CPS: Integration with physical legacy machines in factories
- HL26 - Security, Privacy and Liability – Cybersecurity and Industrial Safety
- HL25 - Digital Platform Interoperability
Factories of the Future & EFFRA
Connecting National & Regional Programmes

CATAPULT
High Value Manufacturing

PRODUKTION2030

MADE
Manufacturing Academy of Denmark

FLANDERS MAKE
MADE DIFFERENT

smart industry

INDUSTRIE 4.0

fimecc
Finnish Metals and Engineering Competence Cluster

Industrie du Futur
Réunir la Nouvelle France Industrielle

Fabbrica Intelligente

Factories of the Future
Public Private Partnership

EFFRA
EUROPEAN FACTORIES OF THE FUTURE RESEARCH ASSOCIATION & MANUFACTURE initiative
Factories of the Future PPP: On-Line resource

EFFRA Innovation Portal

One reference resource…

- for progress monitoring
- for on-line brokerage
- for sharing information among projects
- for promoting projects, results and demonstrators to the wider community
- for portfolio management and analysing coverage of FoF 2020 roadmap
- for supporting roadmapping exercises
- for supporting online brokerage

www.effra.eu/portal
Inaugural Conference

Factories of the Future Conference 2016

Materialising Factories 4.0

- 500 Participants
  - Industrial companies of all sizes
  - Universities
  - Research Organisations
  - Representatives of the Commission
  - Clusters
  - National & Regional Initiatives

- 80 Speakers
  - Industry, research & innovators

- Pitch Session
  - Organised in cooperation with FoF-Pitch CSA
  - Projects presented their results to potential business & innovation partners.
Inaugural Conference
Factories of the Future Conference 2016
Materialising Factories 4.0

Topics Discussed:
- Digital Technologies & the Factory Floor
- Energy & Material Efficiency
- Digital Technologies & Networked Factories
- Human-Centred Manufacturing
- Data Security, Liability & Integrity in Connected Factories
- Life-Cycle Management & Business Models in a Product-Service Economy
- High Precision Manufacturing
- High-Performance Computing & Simulation
- Additive Manufacturing
- Next Generation Robotics & Mechatronics in Manufacturing
Manufacturing High on Agenda

Advanced manufacturing is high on political agenda
Re-enforced by Commissioner opening conference 2016

In his opening speech, Commission Oettinger stated:

- Manufacturing is at centre of transformation of industry
- The role of the PPP is key & should be supported
- National & regional activities can coordinate through the PPP
- Cooperation between DG RTD & DG Connect crucial
- Digitisation is realised possible through research & innovation
- FoF projects are clearly delivering
Factories of the Future: Impact

Upcoming Event

1 December: FoF-Impact Concluding Event: Factories of the Future – Making Innovation Happen

The FoF-Impact project will hold its concluding event on 1 December at the Diamant Building (Brussels). This event will focus on the successful industrial exploitation of FoF project results is organised by EFFRA through the FoF-Impact Coordination Action in cooperation with the Co-FACTOR, EFFECTIVE, FOCUS and FOFAM Coordination Actions.

Event Aims

- Show the tangible outcome of the FoF-7-2014 CSAs, in particular in terms of services that stimulate industrial exploitation
- Promote services offered by other service providers
- Promote exploitable results

By addressing the three points, the event will not only discuss services, but will also be a service to the projects. This event will also feature ‘Pitch’ sessions which will focus on providing short and to-the-point presentations (‘pitches’) about innovative manufacturing technologies and approaches.

The workshop will host an exhibition area in which projects will promote their achievements.

Agenda | Registration
Thank You!

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