



# ICT for Manufacturing

Brussels 21<sup>st</sup> of October 2014

**FoF in Horizon 2020  
Work programme 2015**

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HORIZON 2020



# FoF PPP in Work Programme 2015

**FoF 8: ICT-Enabled Modelling, Simulation, Analytics & Forecasting Technologies**

**Rolf Riemenschneider**

**FoF 9: ICT Innovation for Manufacturing SMEs**

**Anne-Marie Sassen**

**FoF 10: Manufacturing of Custom Made Parts for Personalised Products**

**FoF 11: Flexible Production Systems Based on Integrated Tools for Rapid Reconfiguration of Machinery & Robots**

**FoF 12: Industrial Technologies for Advanced Joining & Assembly Processes of Multi-Materials**

**FoF 13: Re-Use and Re-Manufacturing Technologies & Equipment for Sustainable Product Lifecycle Management**

**FoF 14: Integrated Design & Management of Production Machinery & Processes**

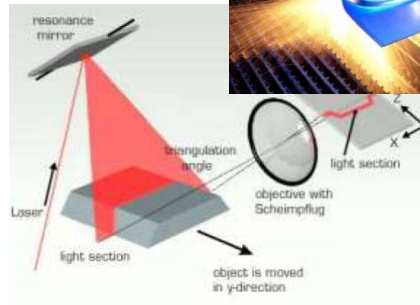
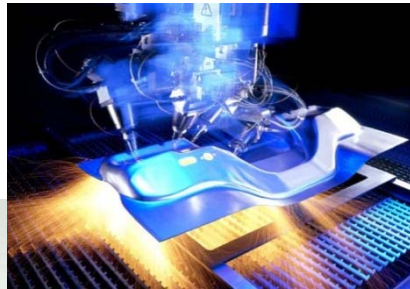
**2015**

# Innovative ICT makes the difference



# EU Suppliers are World Market Leaders

## Laser-based manufacturing

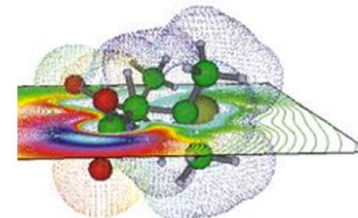
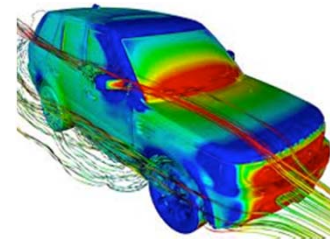


## Robotics

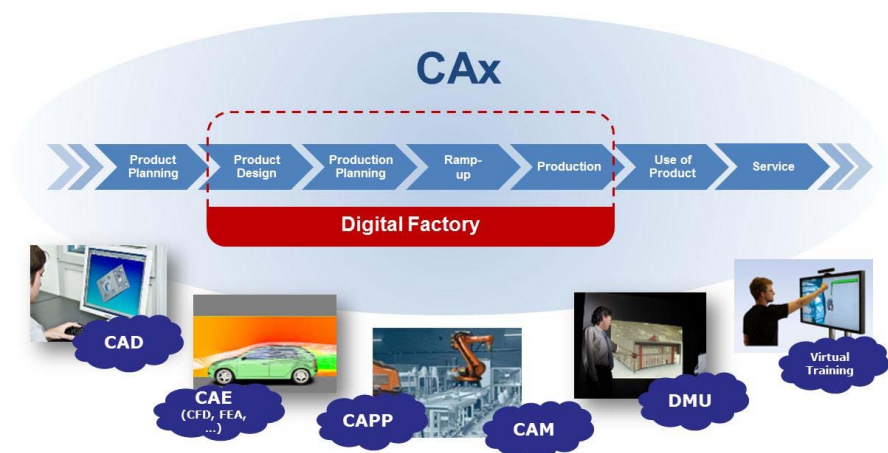


Research and Innovation

## Cyber-physical systems for process (chain) optimisation



## Modelling, Simulation, Analytics



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Future  
Internet  
PPP

ECSEL Joint  
Undertaking

ICT

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

Photonics  
21 PPP

Big DATA  
PPP

euRobotics  
PPP

## **Data will become the 'New Oil' \*)**

- *Increasingly complex and large sets of data, supported by advanced analytical tools, will enable manufacturing firms to better understand and optimise all stages of their value chains, from design to distribution including supply chain management, production processes and marketing.*

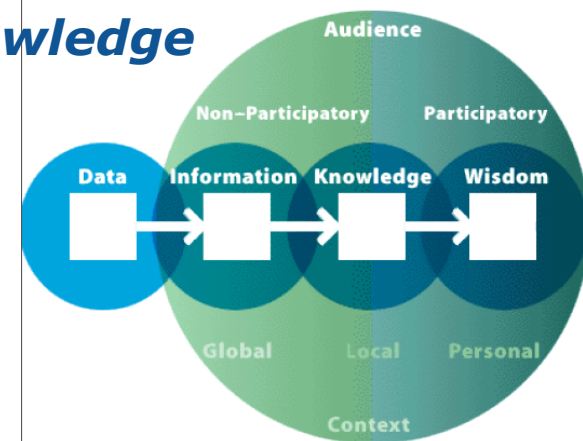
## **MIT Technol. breakthrough '13: Deep Learning**

- *With massive amounts of computational power, machines can now recognize objects and translate speech in real time.*

## **Transforming data into information and knowledge**

- *By organizing/structuring data into a meaningful form*
- *By applying tools for data analytics of unstructured data*

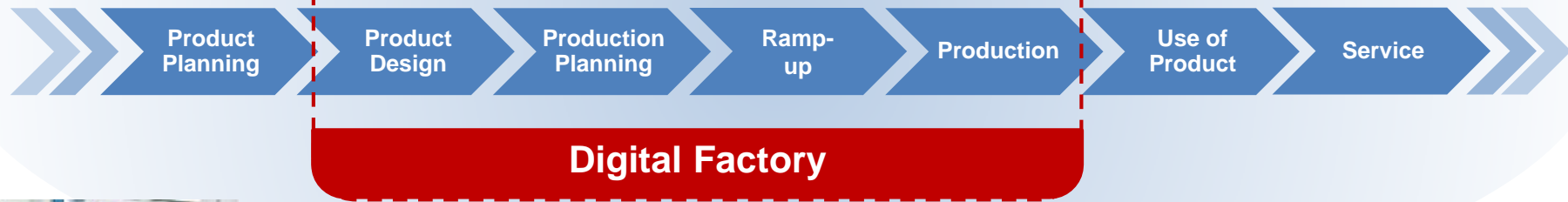
**\*) JRC Foresight study 2013: How will standards facilitate new production systems in the context of EU innovation and competitiveness in 2025?**



# Modelling, simulation, analytics & forecasting



## CAX



**CAD**

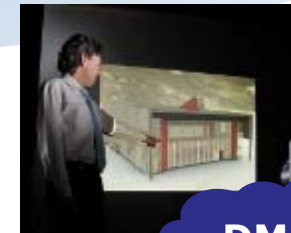


**CAE**  
(CFD, FEA,  
...)



**CAPP**

**CAM**



**DMU**



**Virtual  
Training**

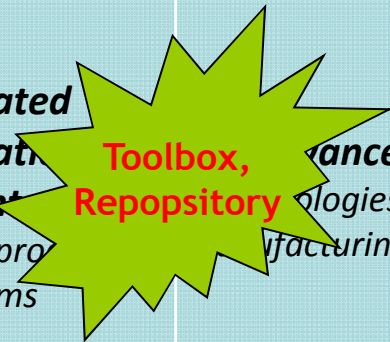
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# FoF-8 topic overview



## FoF 8: ICT- enabled modelling, simulation, analytics and forecasting technologies

<b>Research &amp; Innovation</b> (31 M€)	<b>Innovative Modelling, Simulation , Analytics and Forecasting tools</b>	<b>Integrated modelling, simulation and information management systems</b>	
	<b>Modelling &amp; Simulation methods</b> involving phenomena- driven continuous multidisciplinary multi-objective design tools	<b>Integrated knowledge-based systems</b> covering the complete product life cycle, with advanced analytics, smart decision support systems	<b>Integrated information management systems</b> for product –production systems
<b>Support Action</b> (1 M€)	<b>Road mapping and constituency building</b>		



## What we ask for : Modelling and simulation methods (i)

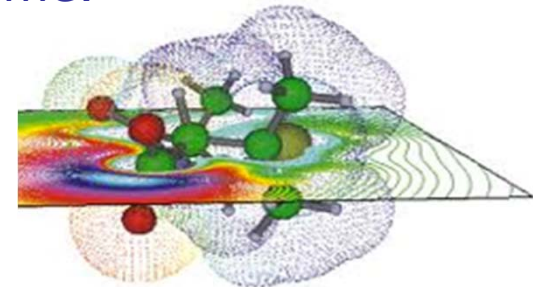
Small projects (2-4 M€)

**RIA**  
**100%**

- i. Modelling and simulation methods for multiple phenomena (physical, mechanical, energetic, chemical, energy, material characteristics, cost, ...) which include multi-scale and integrated discrete/continuous models, multidisciplinary and multi-objective design optimisation tools taking a holistic approach;

New developed methods can integrate virtual and physical experiments building on the combination of simulated, experimental, and real world data in real time.

- ✓ driven by industrial use-cases
- ✓ including proof-of-concept/demo for validation on real process chains.





## Development of integrated knowledge-based systems (ii)

Small projects (2-4 M€)

**RIA**  
**100%**

- ii. *Development of integrated knowledge-based systems covering the full product life-cycle which are based on advanced analytics, smart decision support systems and self-learning capabilities exploiting "big data" coming from smart sensors, historical process files, or human-authored data;*

→ *Important aspects to be addressed are interactivity, real-time, data-fusion, imprecise computing, compressed sensing, advanced visualisation, security and privacy.*

- ✓ **driven by industrial use-cases**
- ✓ **including proof-of-concept/demo for validation on real process chains.**



# FoF-8 topic overview



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<b>Research &amp; Innovation</b> (31 M€)	<b>Innovative Modelling, Simulation, Analytics and Forecasting tools</b>		<b>Integrated modelling, simulation and information management systems</b>	
	<b>Modelling &amp; Simulation methods</b> involving multiple phenomena- discrete and continuous models, multidisciplinary and multi-objective design tools	<b>Integrated knowledge-based systems</b> covering the complete product life cycle, with advanced analytics, smart decision support systems	<b>Integrated information management systems</b> for product –production systems	<b>Advanced CAx</b> technologies for novel manufacturing processes
<b>Support Action</b> (1 M€)	<b>Road mapping and constituency building</b>			

## What we ask for : Research and Innovation Actions - main themes

### 2. Integrated modelling, simulation and information management systems benefiting from recent advances in ICT.

Large projects: 5-8 M €

**RIA**  
100%

#### (i) Integrated information management systems- for product-process-production systems

- well embedded into their social, environmental and economic context

#### (ii) Advanced computer aided t

- *modelling, simulation and decision support systems tailored for novel manufacturing processes*
- *additive manufacturing*

- *integrated modelling, simulation and information management systems benefiting from recent advances in ICT.*

- ✓ including pre-normative/standardisation activities
- ✓ reference implementations and demonstration and validation in min two industrial use cases

## Obj. FoF8 a)

Integrated modelling, simulation and information management systems

European  
Commission

### Expected impact:

- ***Increased productivity for higher mass customization capacity for big enterprises as well as SMEs***
- ***Improved cost efficiency, accuracy, reliability and speed of simulation for manufacturing processes and products***
- ***Reduced time to production enabled by tool interoperability and data integration***
- ***Enhanced interoperability of integrated product and production systems enabling (e. g. data analysis, simulations techniques)***

- ✓ An outline of exploitation plan and
- ✓ Business Scenario
- ✓ No TRL justification

Research and  
Innovation



***What we ask for : Support Action (CSA)***

*Main tasks include:*

- ***Roadmapping activities and constituency building for novel concepts in manufacturing enabled by ICT on***
  - ✓ *wider adoption of virtual, integrated, scalable, semantic factory models*
  - ✓ *merging design and production models*
  - ✓ *integrating novel ICT for creativity*
- ***Stimulating EU-US cooperation on research and innovation related to modelling and simulation***



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**2015**



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**DG CONNECT (FoF on DAE Web):**

**<http://ec.europa.eu/digital-agenda/en/smart-manufacturing>**

**Horizon 2020 on the web:**

**[http://ec.europa.eu/research/horizon2020/index\\_en.cfm](http://ec.europa.eu/research/horizon2020/index_en.cfm)**

**LEIT ICT-FoF-8 call on the web:**

**<http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2187-fof-08-2015.html>**