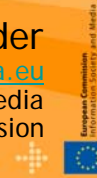


Factories of the Future PPP - Perspectives in the ICT Theme

APMS Int. Conference 2010
11 October 2010, Cernobio, IT

Rolf Riemenschneider
Email: INFSO-FOF@ec.europa.eu
DG Information Society and Media
European Commission

ICT Convergence 2010, 29/09/2010APMS Cernobbio, 11 oct 2010



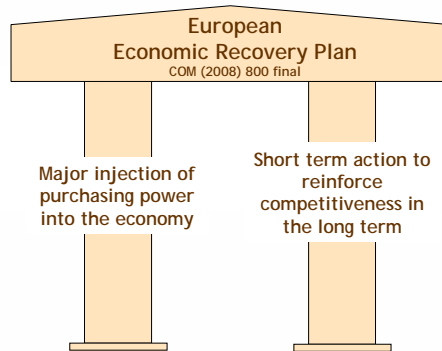
Outline

- FoF: Background & Rationale
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- General remarks, Useful links

ICT Convergence 2010, 29/09/2010APMS Cernobbio, 11 oct 2010



Recovery Plan: Strategic Aims



- Stimulate demand, boost consumer confidence
- Maintain jobs
- Increase competitiveness
- Speed up shift towards low carbon economy



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3/43

Factories of the Future (FoF): Context

- What:
 - Part of the Recovery Plan
 - To help manufacturing, in particular SMEs, across a broad range of sectors be competitive after the crisis is over
- How:
 - Industry-driven R&D projects
 - 4 annual co-ordinated calls until 2013 between the two relevant FP7 Themes, ICT and NMP
 - Total FP7 budget (2010-2013): 245 M€ (ICT) + 400 M€ (NMP)
- Who:
 - Industry in the lead:
 - R&D priority setting
 - Experts to evaluate proposals
 - Implementation of industry-driven projects
 - Technology providers & industrial users (large & SME), academic researchers



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4/43

Factories of the Future PPP

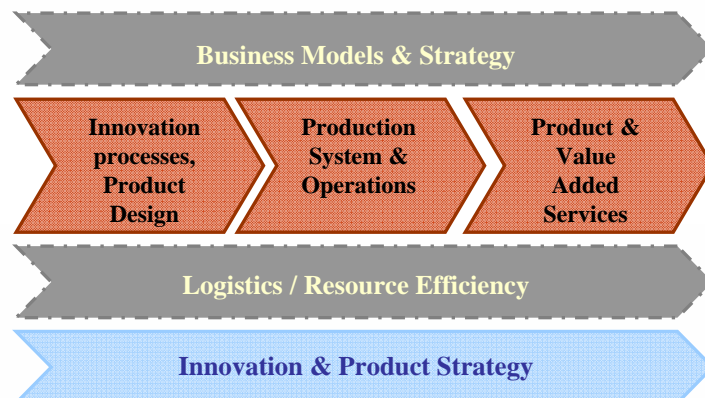
- **Manufacturing sector**
 - 21% of the EU's GDP and 30 million jobs (before crisis)
 - 28% of final energy consumption
 - Need to produce more with less resources and waste
 - Themes: NMP, ICT → *coordinated calls*
- **Goal: Cross-sectoral enabling manufacturing technologies**
 - Sustainable manufacturing
 - ICT-enabled intelligent manufacturing
 - High performance manufacturing
 - Exploiting new materials through manufacturing



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Innovation in Production Technologies



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FoF in ICT: Expected Impact

- Technology leaders to gain market share, e.g.
 - Automation/industrial robotics & laser technology solutions for factory environments
 - Product/production design tools (eg software for modelling, simulation, visualisation)
 - Software for enterprise/supply-chain management in globalised context
- European industrial end users to
 - **INNOVATION** is the capability to differentiate products/processes/services in order to obtain a competitive market position
 - ICT is at the forefront of innovation enabling growth and productivity.
 - Integrate latest technology into their production environments
 - Build on new competencies (knowledge, organisation, skills, business models)
 - Use technologies that enable energy-efficient and “waste-less” production



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Factories of the Future Multi-Annual Roadmap 2010-2013

Sub-Domains:

1. Sustainable Manufacturing
2. ICT-enabled intelligent manufacturing
3. High-performance manufacturing
4. Exploiting new materials through manufacturing



http://ec.europa.eu/research/industrial_technologies/pdf/ppp-factories-of-the-future-strategic-multiannual-roadmap-info-day_en.pdf



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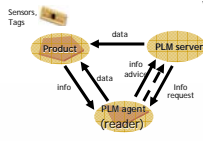
Vision: ICT is key to Factories of the Future



Smart Factories:

- **Goal:** More automation, better control & optimisation of factory processes
- **Means:** Software, lasers & intelligent devices embedded in machines & factory infrastructure

- Less waste
- Less energy use
- Faster time-to-market
- Better quality



Virtual Factories:

- **Goal:** To manage supply chains; to create value by integrating products & services
- **Means:** Software to holistically interconnect & manage distributed factory assets; new business models & value propositions

- High-value products
- Keep jobs in Europe
- Process transparency
- IPR security
- Lower CO₂ footprint



Digital Factories:

- **Goal:** To "see" the product before it is produced
- **Means:** Software for the digital representation & test of products & processes prior to their manufacture & use

- Reduce design errors
- Better & efficient products
- Less waste + rework
- Faster time-to-market

FoF-ICT-WP2011-12, APMS Cernobbio, 11 oct 2010

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First FoF ICT Call (2009) Key Figures & Essentials

- Focus on “Smart Factories”
- Proposals were expected to:
 - use advanced ICT-based technologies in production
 - be industry-driven
 - Have a strong validation element with quantifiable targets
- 34 eligible proposals received
- Requested funding ca. € 160 million (vs. € 35 million available)
(-> ratio 1:5)
- “Downstream research”: Industrial implementation horizon 2013-15

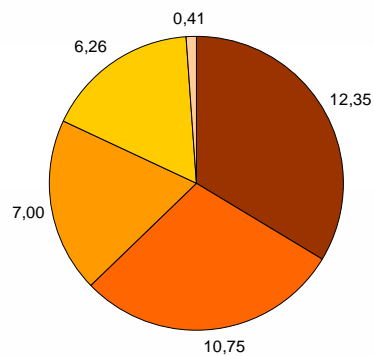


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FoF ICT Call 2009: Funding per Organisation Type

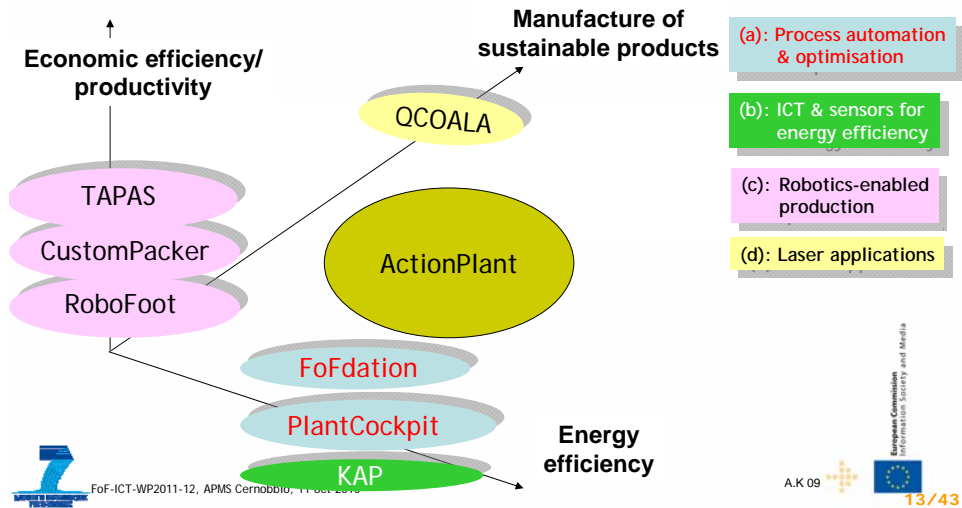
Funding (M€) of the selected proposals



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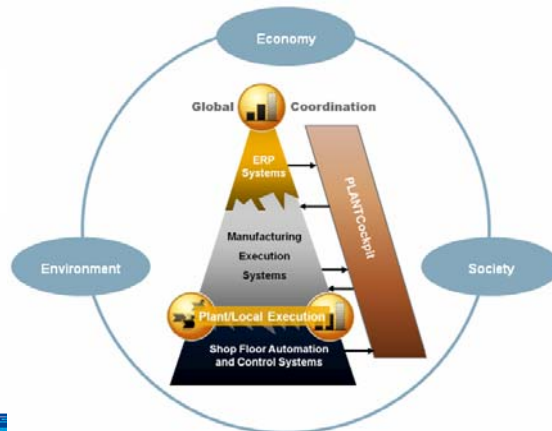
2009 FoF ICT Call on "Smart Factories": Successful Proposals



Provision of

- a **central view** on production logistics (processes, data)
- by flexible integration of systems at **all control levels** (ERP, MES, field control)
- to improve the **efficiency and responsiveness** of manufacturing enterprises

PLANTCockpit - Vision



PLANTCockpit ENABLES

Monitoring:

- Business & technical information
- Real-time & historical information
- Alarms and Events
- KPIs

Controlling:

- Various kinds of adjustments
- Rescheduling

Optimization and Decision Support:

- Processing time
- Energy and waste reduction

12 Partners, 8 countries

SAP Dresden (DE)

Acciona (ES), BMW(DE), Comau(IT), Dechler(NL)

Intel (IRL), Iconics(CZ), EPFL (CH),

TU Dresden, Tampere Uni(FIN),

Politec Milano (IT)



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14/43

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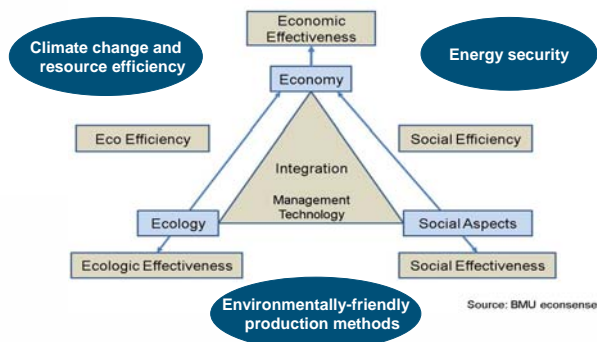
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15/43

Public-Private Partnerships for Manufacturing Europe 2020 « grand challenges »

Challenges of Sustainable Enterprises



- manufacturing industries must address these issues for reaching global competitiveness
- public-private initiatives offer the right ambient for speeding up the integration of social, environmental and economics



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16/43

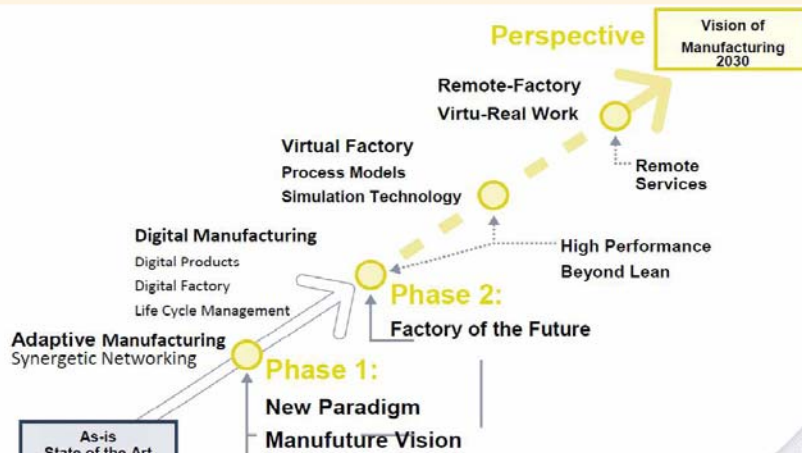
J.M.Barroso: EUROPE 2020
 - a new economic strategy for Europe
 (http://ec.europa.eu/commission_2010-2014/president/)

- 3 Priorities for sustainable growth and jobs:
 - Growth based on knowledge and innovation
 - Innovation
 - Education
 - Digital Society
 - An inclusive high-employment society
 - Employment
 - Skills
 - Fighting poverty
 - Green growth: a competitive and sustainable economy
 - Combating climate change
 - Clean and efficient energy
 - Competitiveness



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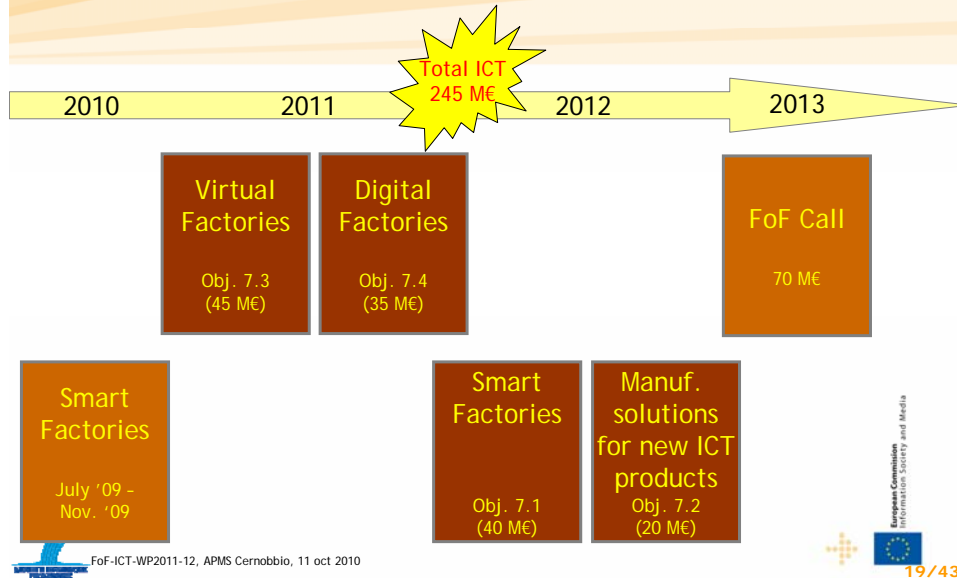
Industrial Research Roadmap:
 The Manufacturing Perspective




Source: www.manufuture.org



Factories of the Future & ICT Work Programme



ActionPlant European Forum for ICT in Factories of the Future

 8 Partners, 7 Member States:

- SAP Dresden (DE)
- Fraunhofer IPK (DE)
- EPFL (CH)
- Fatronik (ES)
- Intercim (FR)
- Uni Patras (EL)
- Politec Milano (IT)
- AGORIA (BE)



EU contribution ~ 1,5 ME

Duration: 24 months

Contact:

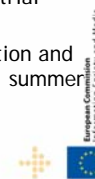
www.actionplant-project.eu/

FoF-ICT-WP2011-12, APMS Cernobbio, 11 oct 2010



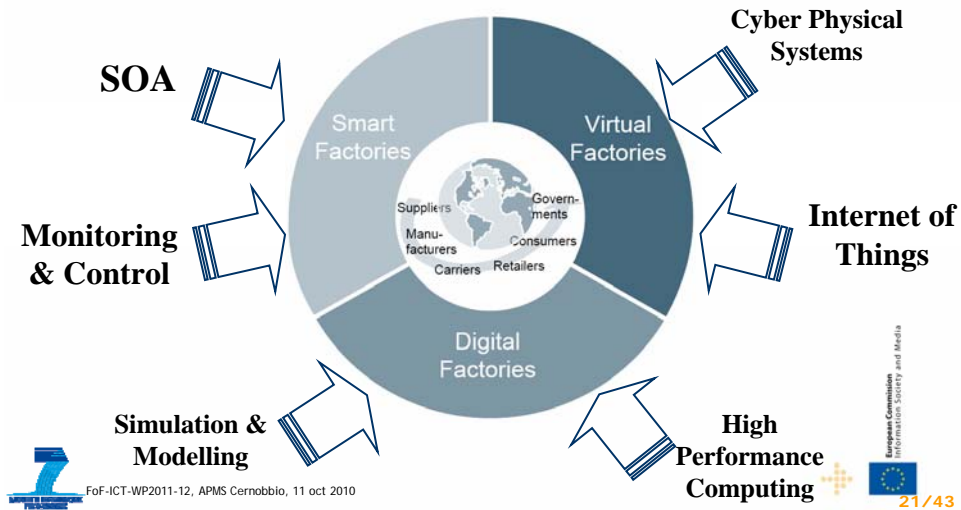
Coordination and Support Action

- Analyse technology and business trends
- Create a European vision for ICT-enabled manufacturing
- Identify future R&D priorities based on validated use cases and services
- Develop a concept for industrial learning
- Platform for public information and learning through workshops, summer schools.



20/43

ActionPlanT European Forum for ICT in Factories of the Future

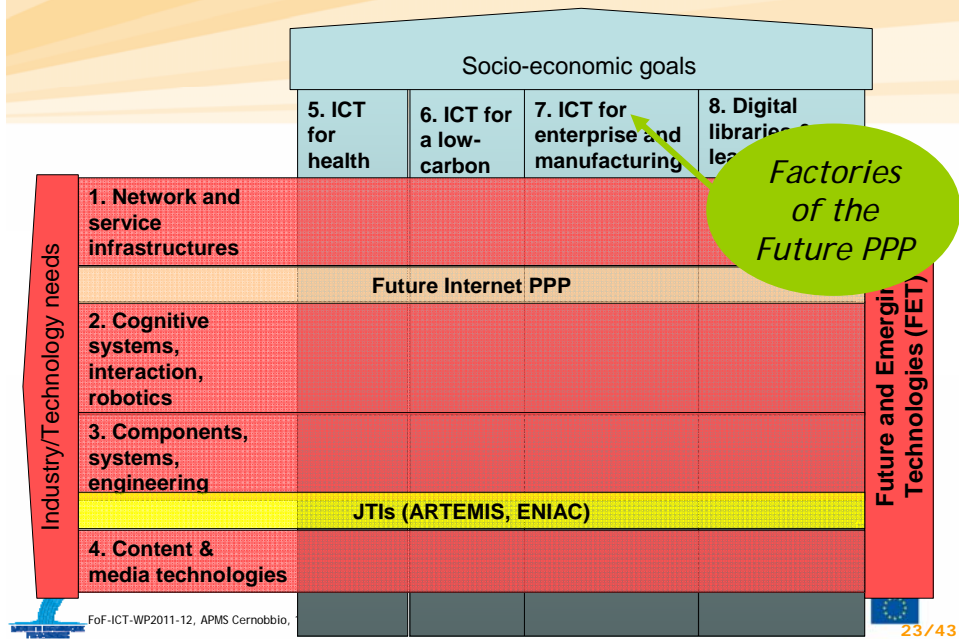


Outline

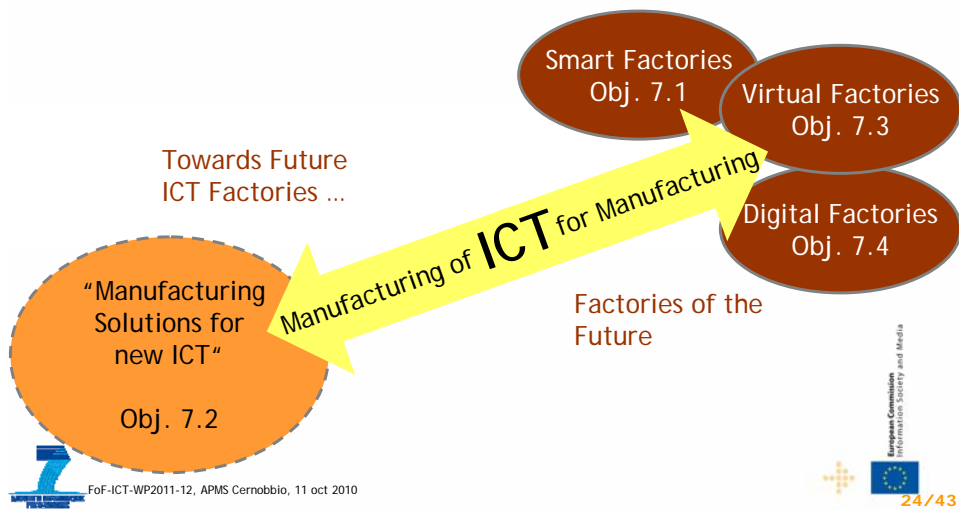
- FoF: Background & Rationale
- Outcome of first FoF ICT Call in 2009
- The FoF ICT Calls in 2011
 - Obj. FoF-ICT-2011.7.3 Virtual Factories and enterprises
 - Obj. FoF-ICT-2011.7.4 Digital factories: Manufacturing design and PLM
- General remarks, Useful links



2011-2012 ICT Work Programme Challenges



ICT Work Programme 2011-12: Challenge 7



Challenge 7: ICT for Enterprise and Manufacturing

Research objectives:

- 7.1: Smart Factories: Energy-aware, agile manufacturing and customisation (*FoF-2012*)
- 7.2: Manufacturing solutions for new ICT products (*FoF-2012*)
- 7.3: Virtual Factories and enterprises (*FoF-2011*)
- 7.4: Digital factories:
Manufacturing design and product lifecycle management (*FoF-2011*)



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Objective 7.3 Virtual Factories & Enterprises

Where do we stand?

- Manufacturing is undergoing radical change:
From the simple provision of products towards a provision of product-enabled functionality
- Key industry players:
SAP, Alcatel-Lucent, ATOS Origin, BT, Telefonica, France Telecom, T-Systems, ...
- Intelligent products offer opportunities for value creation & jobs
- Fragmented markets

What do we want to achieve & why?

- End-to-end integrated ICT for distributed enterprise/factory productivity
- Better management efficiency & environmental sustainability of supply chains
- Improve product/service integration: New business models; value proposition
- Carbon-tracing of products from "cradle-to-grave":
Towards an energy-transparent product lifecycle



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Vision: the (Future) Internet is the Enterprise

- **Continuous Internet:** connected to anyone, anywhere, anytime
- Continuously evolving **ecosystems** of enterprises in the future

• A new participative web, hosting a new wave of services, using user-friendly technologies is **empowering the enterprise** of the future

• For the enterprise, the Internet becomes the platform through which knowledge is manipulated dynamically, experienced in the business context and *re*-presented in a radically different way to **create new value**

• The Internet blurs the boundaries between the intra and extra-muros enterprise domain; **collaboration** becomes rooted in the **essence of entrepreneurship**



FoF-ICT-WP2011-12_1672810_2984180 11 oct 2010

27/43

Objective 7.3 Virtual Factories & Enterprises

Target outcomes

- a) Distributed, adaptive, interoperable virtual enterprise environments
 - Integration of novel management methods & ICT to help virtual factories/enterprises move beyond existing operational capability
- b) Real-time management of volatile manufacturing assets
 - Manage inventories, stakeholder relationships, product configurations, knowledge & skills across the value chain
- c) Component-based tools & architectures enabling innovative & dynamic composition of services
 - Sustainable lifecycle management of product-based services
- d) Internet-based user-centric collaboration, sharing and/or mixed reality tools
 - Incl. new manufacturing business models & practices to enhance & sustain product-based services across the value chain



FoF

Call FoF in 2010

45 M€

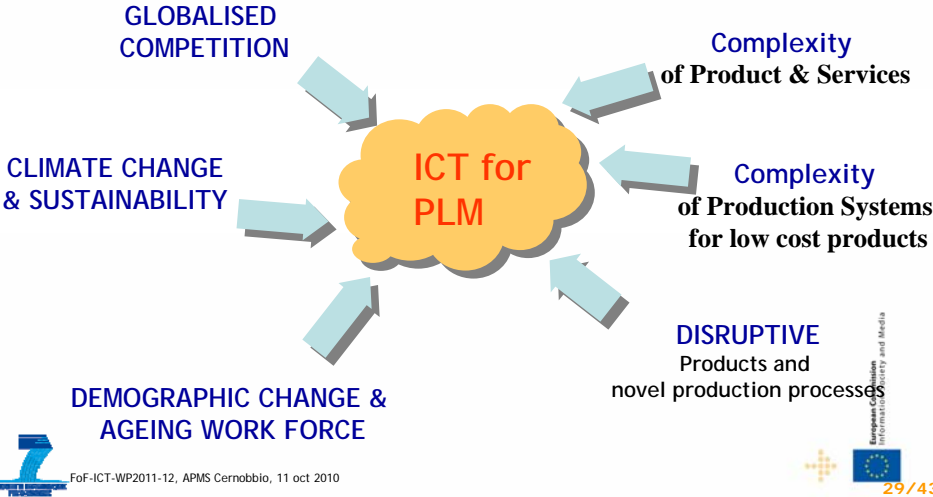
IPs/STREPs



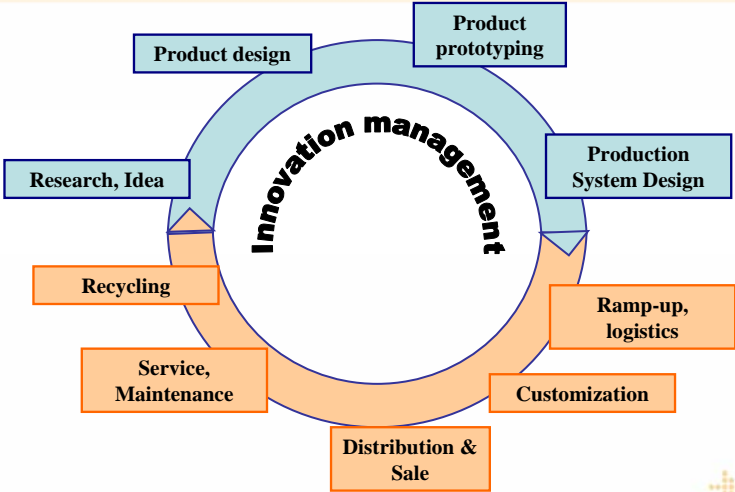
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28/43

Industrial ICT challenges for Product Lifecycle Management



Challenges for Product Life Cycle Management



Objective 7.4: Digital Factories Manufacturing design & product lifecycle management

Where do we stand?

- PLM market size: 15 B\$/yr
- Market dominated by “island solutions”
- Key industry players: Dassault Systèmes, Delcam, Siemens PLM Systems, SAP, Eigner+Partner, many high-tech SMEs
- EU leadership threatened by competitors from the USA & India
- Today's complex products (e.g. avionics) require thorough testing at early (digital) prototype stage

What do we want to achieve & why?

- Strengthen EU competence
- Reinforce EU leadership in knowledge-driven platforms, tools, methodologies, product development & manufacturing design
- New products to be realised with shorter time-to-market, shorter time-to-production
- Improve drastically accuracy, reliability & speed of products/process simulation techniques, permitting design decisions earlier (thus reducing costs)



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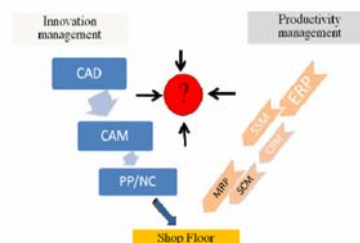
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31/43

FoFdation: The Foundation for the Smart Factory of the Future

Engineering platform and standards to bridge
PLM, SCM, ERP and SCADA automation

- Aerospace (Airbus) & automotive domain (FIAT)
- A universal manufacturing information system based on open data exchange standards (e.g. STEP-related) for CNC automation



Courtesy: FoFdation project



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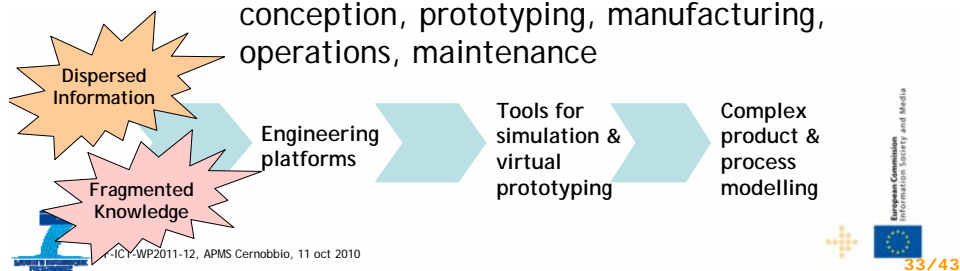
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32/43

Objective 7.4: Digital Factories: Manufacturing Design and PLM

Objective:

- Better knowledge creation & design of manufacturing systems
- Bridging simulation, modelling, lifecycle & knowledge management from product conception, prototyping, manufacturing, operations, maintenance



Objective 7.4: Digital Factories Manufacturing design & product lifecycle management

Target outcomes

- Comprehensive engineering platforms**
 - Cross-disciplinary information sharing, workflow integration, knowledge capture
- Simulation & virtual prototyping tools for product/process design**
 - E.g. better models with forward & backward compatibility, model auto-generation, meshing, optimisation
 - Combination of cross-disciplinary models such as CAD, CAE, VR, volume, fluid, structure, polygonal and process models
- Holistic modelling & simulation of full complex products/processes**
 - With multi-physics features, allowing tolerance changes
 - Product/process behaviour simulation from micro to macro scale

| Call FoF/2010 | 35 M€ | IPs/STREPs/CSA |
|---------------|---------|------------------------------------|
| • CP | 33,5 M€ | of which 50% to IPs; 30% to STREPs |
| • CSA | 1,5 M€ | for c. only |

Expected impacts

- Reinforced European leadership in knowledge-driven platforms, tools, methodologies, product development and manufacturing.
- Accelerated product design and manufacturing, enabling new products to be realised with a considerably shorter time-to-production and time-to-market.
- Drastically improved accuracy, reliability and speed of simulation techniques for manufacturing processes and/or full complex products permitting design decisions earlier in the design process.



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35/43

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36/43

**Closing:
02 Dec,
2010**

Call Topics NMP programme FP7-FOF-NMP-2011

- **Attention: Different Instruments (*Large, Small, SMEtargeted*)**
 - **FoF.NMP.2011-1**
The eco-factory: cleaner and more resource-efficient production in manufacturing - Large
 - **FoF.NMP.2011-2**
Cooperative machines and open-architecture control systems - Small
 - **FoF.NMP.2011-3**
Robots for automation of post-production & other auxiliary processes - Small
 - **FoF.NMP.2011-4**
High tech solutions in the production processes for customised, green, safe and healthy consumer products - SMEtargeted
 - **FoF.NMP.2011-5** Towards zero-defect manufacturing - Large
 - **FoF.NMP.2011-6**
Manufacturing chains for nano-phased components and coatings - Large



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Instruments: FP7-ICT compliant: 1 stage -- ,funding per objective'

- **Large-Scale INTEGRATED PROJECTS (IPs)**
 - Large scale integrating collaborative projects (IP) are objective-driven research projects,
 - aiming at developing new knowledge, new technology, products, demonstration activities or common resources for research
 - Large scale integrating projects have a comprehensive 'programme' approach: including a coherent integrated set of activities dealing with a range of aspects and tackling multiple issues;
 - 1 stage evaluation: Full Proposal PLUS Hearings
 - The size, scope, duration, funding and international dimension of IP projects can vary - no formal limit
 - Average: 3-5 years, 5 -10 Mill. € funding



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Instruments: FP7-ICT compliant 1 stage -- 'funding per objective'

- **Small or medium-scale focused research actions (STREP)**
 - STREPs are objective-driven research projects with a sharply focused approach,
 - aiming at generating new knowledge, including new technology, or common resources for research in order to improve European competitiveness,
 - 1 stage evaluation: Full Proposal (NO Hearings)
 - In general, STREPs are NOT targeted to special groups, such as SMEs (if not specified in WP).
 - The size, scope, duration, funding and international dimension of STREPs can vary - no formal limit
 - Average: 18 month - 3 years, 1 - 4 Mill. € funding



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39/43

FoF ICT Objectives 7.3 & 7.4 Must Have

- "Virtual Factories" (7.3) focus:
 - Integration of the distributed manufacturing enterprise (incl. supply chains)
 - Integration of products & services
 - Management of volatile manufacturing assets
- "Digital Factories" (7.4) focus:
 - Engineering platforms
 - Tools for simulation & virtual prototyping
 - Tools for complex products & process modelling & simulation

- **Proposals must:**
 - use advanced ICT-based technologies in production
 - be industry-driven
 - have a strong validation element with quantifiable targets
- "Downstream research":
 - Industrial implementation horizon 2013-15



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40/43



Up-coming events

- **PAST - ICT Conference Sept 2010**
http://ec.europa.eu/information_society/events/ict/2010/
 - Networking - room 1101 - 11 a.m.
Towards Lean and Sustainable Manufacturing
 - Proposers session - room T 007 - 14.00h
Manufacturing Design & PLM (Digital Factories)
- **FoF beyond 2013: Which role for ICT?**
 - 14 October 2010, Brussels, Beaulieu 33
- **ICT Proposers' Day 2011**
 - 19 - 20 May 2011, Budapest



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41/43



ICT Proposers' Day 2011
19 - 20 May, Budapest
Networking for European ICT R&D



- **Aim of the event:**
to prepare for Calls 8 and 9 (together >1 billion €)
 - by networking and partnerships building
 - by first-hand information from >100 EC officials
- **Structure:**
 - thematic sessions with presentations of proposal ideas
 - information stands & meeting points
- **Registration:**
free of charge, open from January 2011

MS Cernobbio, 11 oct 2010

<http://ec.europa.eu/ictproposersday>



42/43

Thank you

FoF on the web:

http://ec.europa.eu/research/industrial_technologies/lists/factories-of-the-future_en.html

FoF ICT projects launched in 2010:

http://cordis.europa.eu/fp7/ict/micro-nanosystems/docs/ict-fof-project-summaries-2010_en.pdf

FoF call & contacts: <http://cordis.europa.eu/fp7/dc/>

email: INFSO-FOF@ec.europa.eu

7.3 Objective: Christina.Martinez@ec.europa.eu
Erastos.Filos@ec.europa.eu

7.4 Objective: Rolf.Riemenschneider@ec.europa.eu
Alkis.Konstantellos@ec.europa.eu
Erastos.Filos@ec.europa.eu



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43/43