

D4 Unit InfoDay  
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The Factories of the Future  
ICT Objective 7.3

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# The economic context for the FoF PPP

## Objective 7.3

- In 2008 Europe was shaken by the **global financial crisis** and faced the biggest recession since the 1930s (forecasts from 2% to 4% contraction for the economy in the Euro Zone, Feb 2009).
- One issue is clear: the crisis goes far beyond the visible economic turmoil. It is an existential crisis of values and a strong **innovation** spirit is the only way out.
- For businesses: lessons to be drawn, opportunity towards **sustainable value creation** to be considered.
- It's time for businesses and manufacture to rethink their **founding values involving new factors** such as energy shortage and climate change. > to be supported by and fully integrated into next **generation enterprise and manufacture systems** to avoid a global collapse as a result of inconsiderate pollution and use of energy.

Sources: FInES Position Paper and FoF AIAG Research Roadmap



## Some findings of the Community Innovation Survey (CIS4): past and present figures

- Recovery in productivity growth: **ICT-driven organizational changes** are starting to stimulate efficiency gains in the EU manufacturing sector, where high pressure from global competition is stimulating firms to re-organise work.
- At EU-27 level nearly 24% of innovative enterprises considered the hampering factor “**Innovation costs are too high**” to be highly important. This hampering factor accounted for 9% of responses in Portugal and 40% in Spain.
- The importance of technology in winning overseas customers : exporters have markedly **higher R&D intensity** than non-exporters and born global companies in turn spend significantly more on R&D per employee than other exporters.

Sources: Europe's Digital Competitiveness Report 2010 and 4th  
Community Innovation Survey by Eurostat, 2006



## Today ICT R&D is no longer sufficient

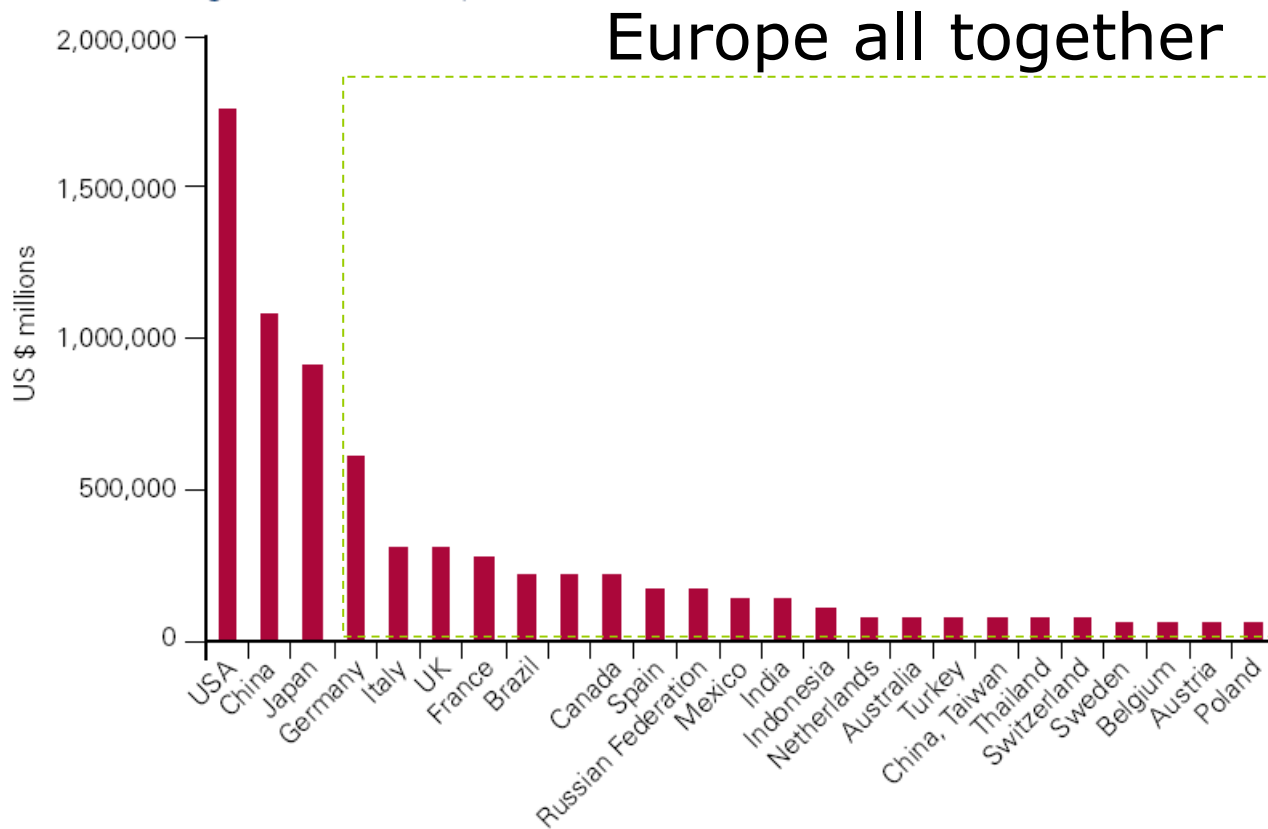
- ICT take-up by European businesses is increasing and Europe is beginning to see signs of **efficiency gains** in all sectors.
- Nevertheless, the latest academic research also shows that in order to make the most of the productivity potential of ICT, **investment in ICT on its own is not sufficient.**
- Complementary **organizational changes**, in particular involving management practices and decentralization, **innovation**, as well as **skills** also matter.

Source: Europe's Digital Competitiveness Report 2010



# European manufacturing compared to other regions of the world

Manufacturing GVA in 2006 (top 25 countries)



Source: UNCTAD, 2004, Handbook of statistics





“Europe needs to get its story  
line back”.

Pekka Himanen at the ICT event, Opening  
session



## Example of UK's Manufacturing Sector: 'Manufacturing matters'

- £150 billion per annum to the economy
- Half of UK exports, 50% productivity growth since 1997
- 75% of business R&D
- 6th largest manufacturing output in the world
- Consistently in top rankings of high tech exports
- Attracts more foreign direct investment than any country apart from the USA
- Investment in **intangibles** by manufacturers increased to £32 billion in 2004, more than double the figure for traditional gross capital expenditures.

“For the medium term, we have identified trends in global manufacturing that provide new challenges and opportunities, not least in the transition to a low carbon economy.”

Source: “Manufacturing: New Challenges, New Opportunities”, BERR, September 2008



# Case of ICT Manufacturing: some facts & figures

- The European ICT manufacturing industry represents **13 % of the value added by total manufacturing**, one of the largest industrial sectors.
- ICT companies are often **global** in nature, meaning that their value added in one country only represents one part of their global value added. The most knowledge-intensive part often remains domestic.
- Representing **5 % of EU GDP**, but a **25 % share** in total business R&D.
- In ICT manufacturing, **employment and value added** are un-correlated, heterogeneous parameters which strongly vary from one country/sector to another.



# On the impact of ICT, in general, and of the Internet, in particular

- According to Mrs Reding, “we are at the start of a new phase of **internet driven innovation and growth**” led by :
  - Social networks - a shift from “Web 2.0 for fun” to Web 2.0 for productivity and services, in particular “Web 2.0 networking” in the business world;
  - The Internet of Things;
  - The mobile Internet.
- “Business semantics will improve, potentially tapping into **collective intelligence**, and be embedded into business logic. **Convergence** will extend beyond the technology domains today to convergence between business contexts, applications, semantics and Web 2.0/X.0 technologies; all mediated by **services.**”

Source: V. Reding speech at the Future of the Internet initiative of the Lisbon Council

Source: FInES Position Paper 2009



## ICT R&D is not sufficient

- ICT take-up by European businesses is increasing and Europe is beginning to see signs of **efficiency gains** in all sectors.
- Nevertheless, the latest academic research also shows that in order to make the most of the productivity potential of ICT, investment in ICT on its own is **not sufficient**.
- Complementary **organisational changes**, in particular involving management practices and decentralisation, as well as skills also matter.
- Accompanied by an expanded notion of sustainability and value creation, **flexibility and agility** will be key parameters to develop new business models for the Future Internet era.

Source: Europe's Digital Competitiveness  
Report 2010



“Business ‘wherever I want’”  
(quote) S. De Panfilis, Cluster Meeting 7th  
October 2010

- Decrease of location or mobility will enable enterprises to offer individualized solutions more and more through **dynamic virtual organizations** that originate in networks of firms.
- Future Internet will make it much easier for companies to find each other, **integrate** their systems very quickly and thus create a **secure environment** to exchange sensitive information.
- Enterprise systems will become part of “ecosystems”, “clouds” or “virtual networks” for ubiquitous, ad-hoc use.

Source: FInES Position Paper 2009



# Advantages of collaboration networks

- A driving force for the change.
- There are a multitude of advantages attributed to such networks:
  - Value chain streamlining (better integration and new opportunities arising from the interaction of partners and customers)
  - Opening up new markets through domain-specific knowledge of individual partners
  - Alliance between complementary partners
  - Use of economies of scope (cost reduction by joint activities)
  - Use of economies of scale (cost reduction by increasing a company's output)
  - Critical mass through aggregation of the partners (e.g. public tender offers).

Source: FInES Position Paper 



# Advantages of FI scenarios

- Cross-industry collaboration provides motivation to work together in **new ways, across disciplinary boundaries**, and between all stakeholders.
- The concept of the Knowledge Economy recognises that physical **value (wealth) creation chains** depend also on the intellectual capability to design products and manufacture systems.
- As product life cycles are shortened, and the technological content of products explodes, the **ability to design** both products and their manufacturing systems becomes a major proportion of economic activity.
- In manufacturing but also more generally for the economy as a whole, where **knowledge becomes a defining attribute**, knowledge is considered to be itself a **commodity**; and there is a knowledge exploitation chain, which has an interesting duality with the conventional physical value chain.

Source: FInES Position Paper 



# Promoting user-centred products, services and tools

- Future scenarios (FI tech) should critically include a **novel user-centred approach** to the design, development and commercialisation of new products and services.
- > the active participation of the user community in the product creation process supports the **alignment between stakeholders/user expectations, needs and product specifications**.
- The product and service cycle (consumer insight, conceptual design, product design, production and marketing) should be developed and exploited as a **unique development process** where the user community is designing its own product and at the same time is marketing it.

Source: FInES Position Paper 2009



## Who hosts Objective 7.3?

- The ICT part of the FoF PPP Programme is managed by DG INFSO
- Each Objective is attributed to a different research domain/unit in DG INFSO
- Objective 7.3 falls under “Enterprise Networking and RFID” domain, in particular within the **Future Internet Enterprise Systems (FIeS)** area
- A full domain
  - With 18 RTD projects, 750 + community members, 10 TF
  - The only INFSO domain dealing with ICT usage & adoption by enterprises
  - Supporting the networked enterprise model - systemic/multidisciplinary perspective
  - Delivering a.o. a Position Paper and a Research Roadmap
  - [http://cordis.europa.eu/fp7/ict/enet/ei\\_en.html](http://cordis.europa.eu/fp7/ict/enet/ei_en.html)




## Vision and positioning of FInES

- Promoting a new generation of **ICT-enabled enterprise systems** and **sustainable businesses**
- The cluster promotes a **multidisciplinary** research approach to support disruptive concepts. It calls for better and smarter innovation, where **scientific breakthrough** should come in balance with the stepwise engineering focus, enforced by a more **business-oriented approach**.
- Importantly, the articulation of a long term vision goes hand in hand with targeting **short and medium term capabilities** to support industry, as recovery from the current crisis begins.



# 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**
  - Web-based applications become as rich as the desktop: it is the emanation of **the WYSIWYG enterprise**



# FInES Research Roadmap - main content

- Vision
  - To develop an environment based on new business values which will foster the future enterprises.
- Some of the values
  - Efficient use of physical resources
  - Environmental footprint
  - Exploitation and use of knowledge
  - Business transparency and reputation
- The FInES Research Challenges
- Future Internet Enterprise Systems - Emerging and Supporting Technologies with a SoTA (Sustainability Opportunity Threat) analysis



## What do we want to achieve with this Objective?

- To support the **collaborative and adaptive virtual enterprise environments** based on increased business intelligence and enriched knowledge and asset management tools.
- To foster **innovation**, efficiency and the emergence of **'smarter' virtual factories and enterprises**
- To help **EU industry** adapting to the new economical scenic (global competition) by improving their technological base
- To turn the crisis in an **opportunity** for business and social transformation.



# Objective 7.3

## Virtual Factories & Enterprises

### Key drivers

- General trends
  - A new generation of “digital natives”
  - New forms of ICT-enabled collaboration
  - A new “architecture of participation”
  - Focusing on value proposition and delivery
- Policy & Governance
  - Knowledge, ownership, control
- Technology: Infrastructure Models
  - Technological innovations along with new business models may transform society’s activities, habits and cultures
- Business & Economics: A new Value System

### What do we want to achieve & why?

- Environmentally and socially responsible competitive business
  - integrated ICT for distributed enterprise
  - Better management of supply chains
  - product/service integration, new business models
  - energy-transparent product lifecycle
- Openness to new ideas and solutions (innovation and creativity)
  - Powered by intellectual capital, fair rules



## The area of 'Virtual factories and enterprises'

- addresses “end-to-end integrated ICT allowing for innovation and higher management efficiency in **networked operations** and supporting the emergence of 'smarter' **virtual factories and enterprises.**”

Source: ICT Work Programme 2011-2013



# 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

**Call FoF in 2010**

**45 M€**

**IPs/STREPs**



# Thank you

## FInEs contacts:

- Contact: [INFSO-FINES@ec.europa.eu](mailto:INFSO-FINES@ec.europa.eu)
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- Web page: [http://cordis.europa.eu/fp7/ict/enet/ej\\_en.html](http://cordis.europa.eu/fp7/ict/enet/ej_en.html)

## FoF on the web:

[http://ec.europa.eu/research/industrial\\_technologies/lists/factories-of-the-future\\_en.html](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](http://cordis.europa.eu/fp7/ict/micro-nanosystems/docs/ict-fof-project-summaries-2010_en.pdf)

## FoF at the ICT 2010 Conference in Brussels

[http://ec.europa.eu/information\\_society/events/ict/2010/](http://ec.europa.eu/information_society/events/ict/2010/)

## FoF call & contacts:

<http://cordis.europa.eu/fp7/dc/index.cfm>

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# Back-up : figures



- Comparing this ranking with the ranking in terms of value added, though, reveals that these emerging countries in manufacturing employment are typically hosting mainly lower-end activities, or that the value added does not stay in the country. Indeed, the combined share of Poland, the Czech Republic, Hungary, Romania, Slovak Republic and Bulgaria in EU ICT manufacturing comes to 17 % for employment but only to 4.6 % for value added. In contrast, the Netherlands, Sweden, Finland and Ireland together account for 10 % of employment and almost 21 % of value added in ICT manufacturing, i.e. nearly as much as France and Italy together.



- Data for the latest available years (2003-2007) show a recovery in productivity growth in the EU, mostly driven by efficiency gains in market services (especially trade finance and business services) and manufacturing (Figure 1.11). Although it is too early to draw definitive conclusions, it appears that ICT-driven organisational changes are starting to stimulate efficiency gains in the EU economy as well, albeit at a lower level than in the US. Moreover, these factors seem equally at work in the EU manufacturing sector, where high pressure from global competition is stimulating firms to re-organise work.

