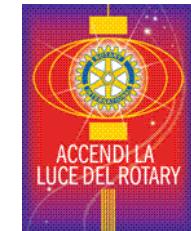




ROTARY INTERNATIONAL  
Distretto 2090 - Club Fermo

FORUM

Sviluppo territoriale e competitività:  
nuovi modelli nella formazione tecnica



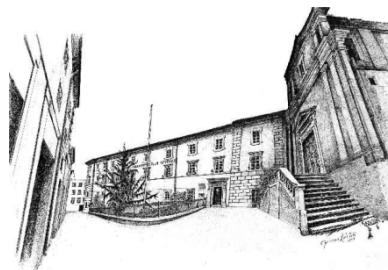
## Nuovi scenari nel manifatturiero e risposte possibili

**Francesco Jovane**

Professore Emerito Politecnico di Milano  
Vice Presidente Piattaforma Europea "Manufuture"

Sabato 28 Febbraio 2015

Aula Magna Istituto Tecnico Tecnologico "G. Montani"



**IL FUTURO E' UNA SFIDA INELUDIBILE.....**

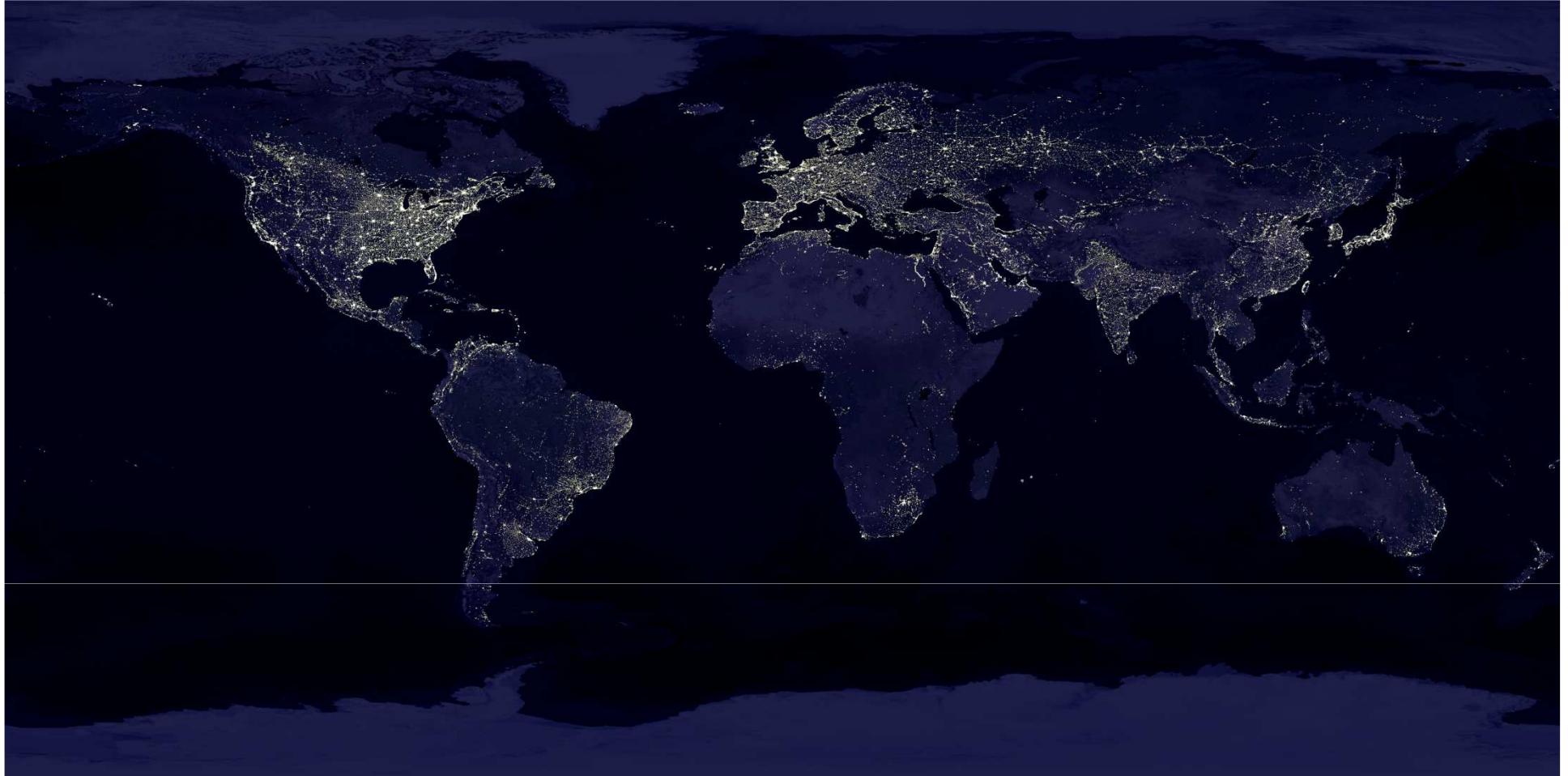
**Nuovi scenari si profilano nel manifatturiero:  
Ricerca, Innovazione, Formazione sono risposte “possibili”**

La presentazione interesserà scenari e risposte.

La formazione tecnica è una risposta necessaria:  
Il Progetto Fenice e l'Istituto Montani possono giocare  
un ruolo determinante.

# Indice

- *going global*
- nuovi scenari per il Manifatturiero
- generare risposte nel 7° Programma Quadro
- generare risposte in Horizon 2020
- verso un nuovo paradigma, *Competitive Sustainable Globalization*
- *Competitive Sustainable Globalization*, ruolo delle Regioni
- nuovi scenari nel manifatturiero e risposte possibili:  
*la Formazione!*



.....VERSO IL TERZO MILLENNIO.....

**going global**



facebook

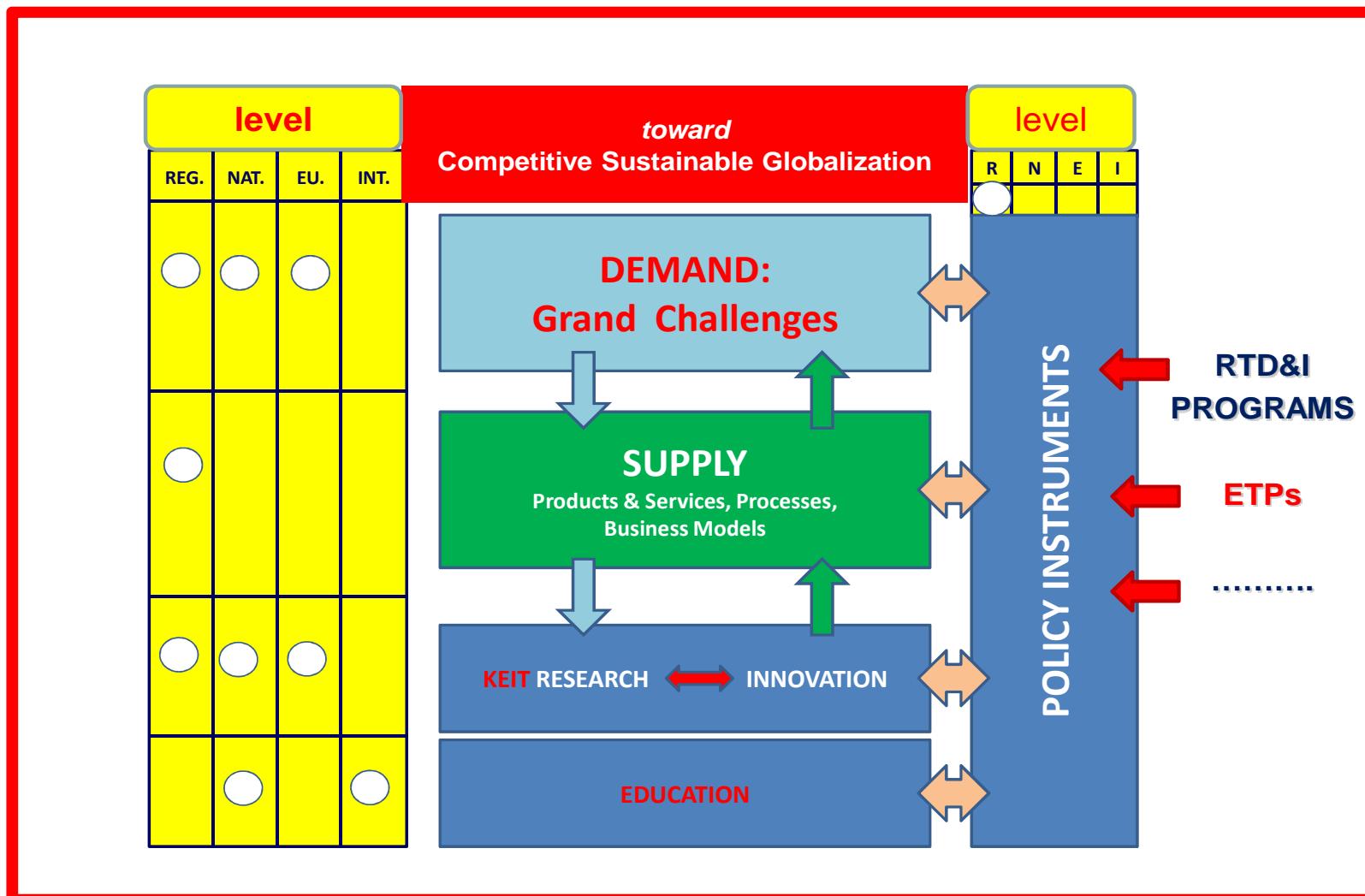
Facebook 2008  
www.facebook.com

SOCIAL NETWORKS

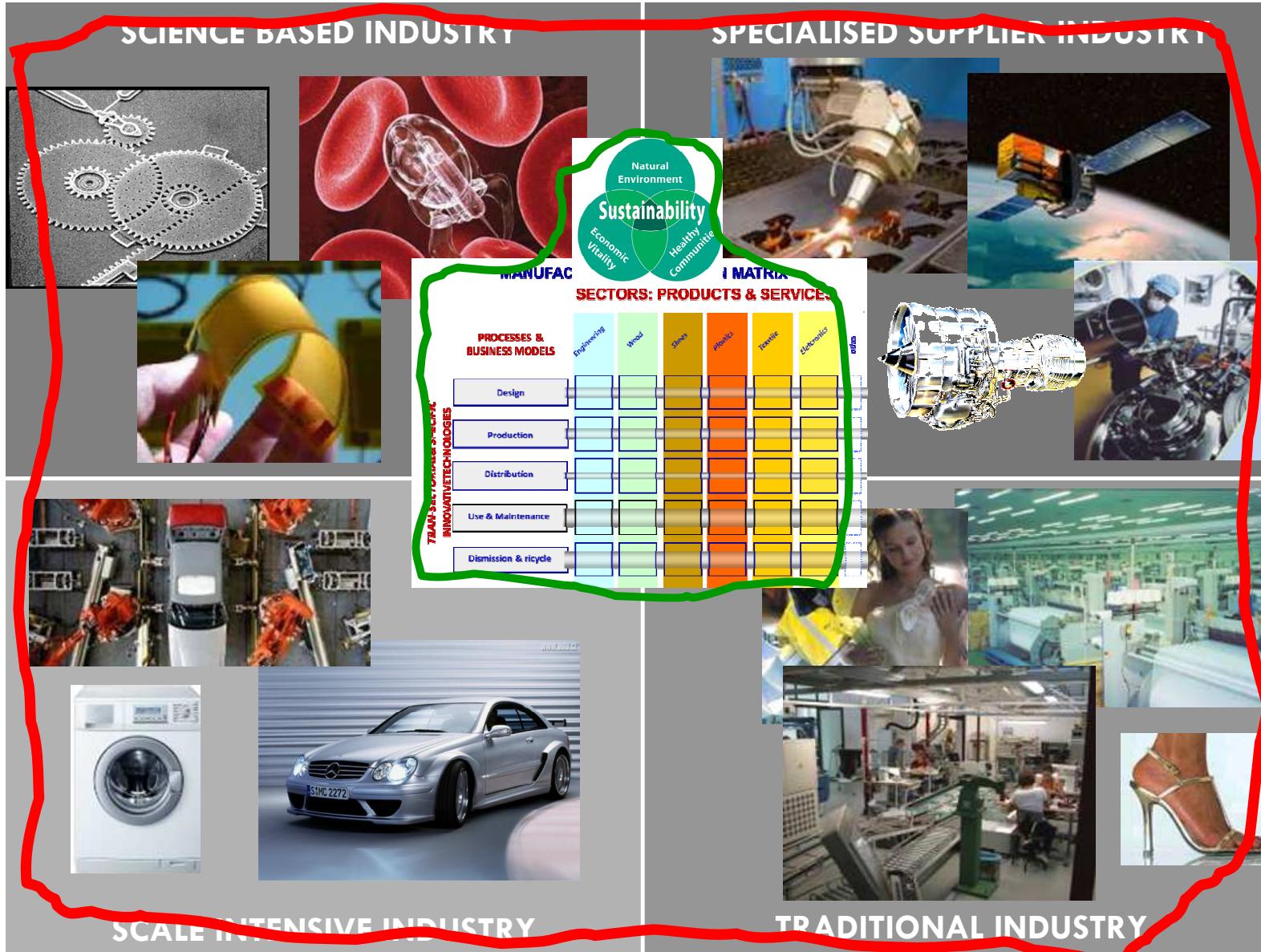
**going global**

# **Nuovi scenari per il Manifatturiero**

# GOING GLOBAL



# MANUFACTURING: globalization enabler



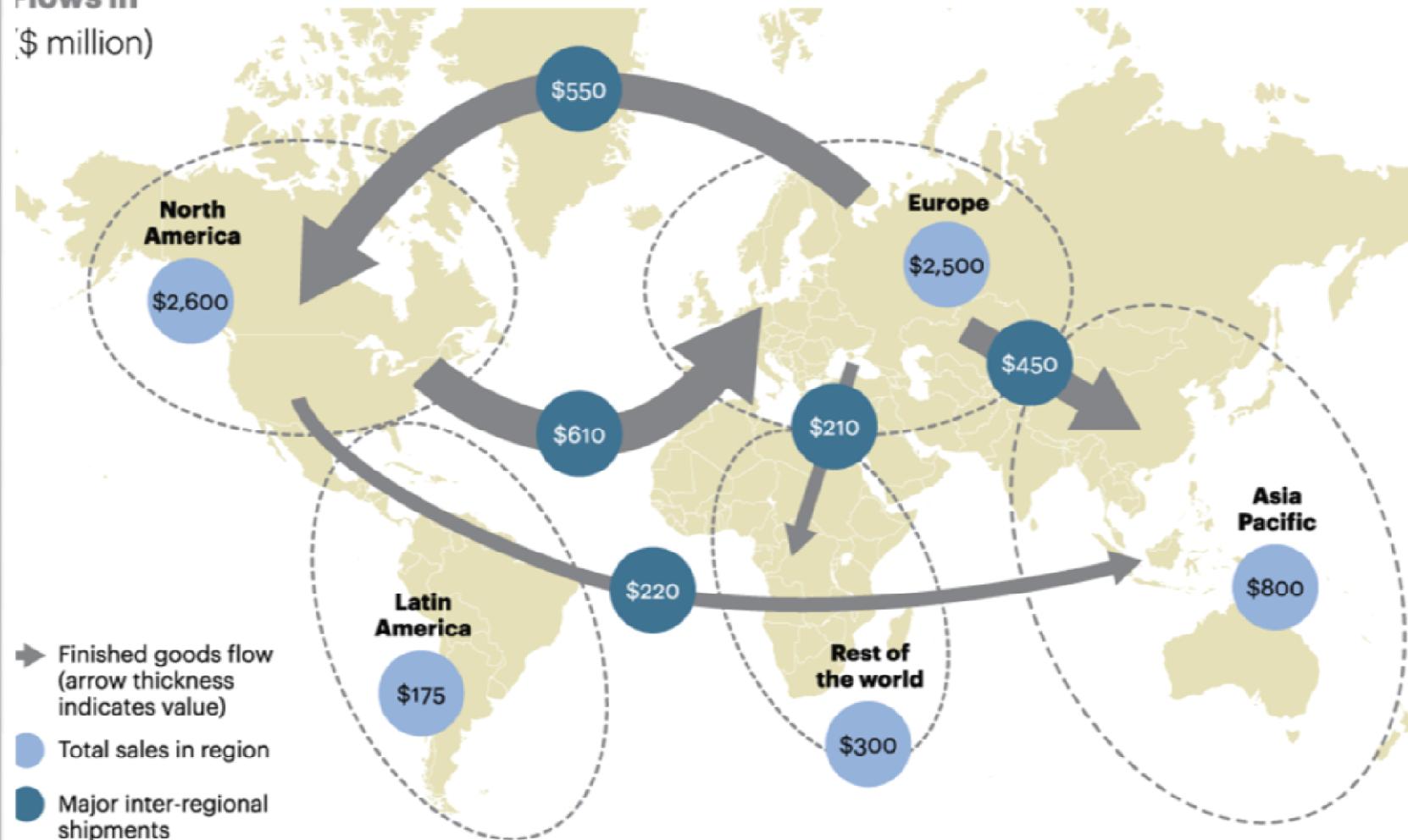
going global



# going global

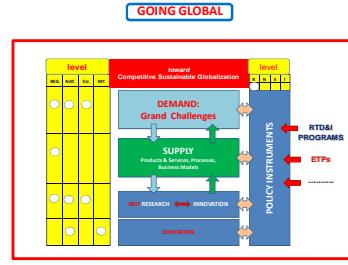
## Imbalance of finished goods flows among regions

Flows in  
(\$ million)



Note: Sanitized client example; only finished goods flows greater than US\$100 million are shown

Source: A.T. Kearney analysis



**generare risposte**  
**nel 7° Programma Quadro**



## MANUFUTURE 10<sup>TH</sup> ANNIVERSARY

### Special Event

**SCIENCE and TECHNOLOGY:  
the Manufuture Strategic Crossroad for new  
INDUSTRY and SOCIETY**

November 6<sup>th</sup>, 2014

9:00 - 13:15

Hosted by Rosselli Foundation  
Palazzo Massimo  
Rome, Italy

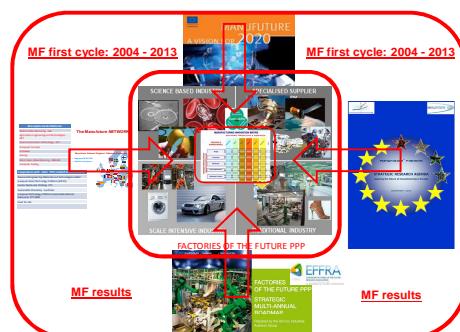
## Dalla strategia di Lisbona 2000 a Manufuture, a Factories of the Future PPP

La EU, con la strategia “Lisbona 2000”, definiva indispensabile la presenza in Europa di un Manifatturiero avanzato e competitivo, in quanto un’economia fondata esclusivamente sui servizi non avrebbe avuto futuro.

La EU , fondando sulla visione Manufuture sviluppata in Italia, promuoveva nel 2004 la nascita della Piattaforma Tecnologica Manufuture.

Questa ha generato, nel decennio 2004-2014: *Strategic Intelligence* (Vision 2020, Strategic Research Agenda and Roadmaps) ; the *Implementation Framework* (EMIRA, Network of National/Regional Manufuture Platforms); the *Pilot Spin-off Initiatives* “Factory of the Future PPP, che prevedeva un investimento di 1,2 BEURO.

Manufuture ETP activities



# Factories of the Future PPP ( within FP7 )

Past Finish Line = New Start

Substantial progress since FoF PPP launch:

First Industry-developed multi-annual roadmap (2009)

151 Projects Launched (2009 to 2012)

Participation of 1,000+ organisations

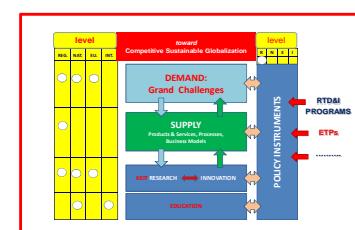
Approx. €1.2 billion total investment

Reinforced “manufacturing community” feeling

Commitment of industry to European RD&I:

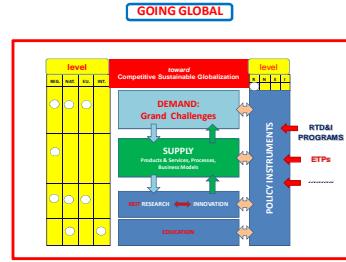
PPP Declaration (Aarhus, 2012)

New roadmap – “Factories of the Future 2020”



# Call 2013: FoF-NMP Call Topics

- 
1. *Improved use of renewable resources at factory level (DEMO-targeted CP)*
  2. *Innovative re-use of modular equipment based on integrated factory design (DEMO-targeted CP)*
  3. *Workplaces of the future: the new people-centred production site (Small or medium-sized CP)*
  4. *Innovative methodologies addressing social sustainability in manufacturing (CSA (Support action))*
  5. *Innovative design of personalised product-services and of their production processes based on collaborative environments (Large-scale integrated CP)*
  6. *Mini-factories for customised products using local flexible production (DEMO-targeted CP)*
  7. *New hybrid production systems in advanced factory environments based on new human-robot interactive cooperation (Large-scale integrated CP)*
  8. *Innovative strategies for renovation and repair in manufacturing systems (Large-scale integrated CP)*
  9. *Advanced concepts for technology-based business approaches addressing product-services and their manufacturing in globalised markets (Small or medium-sized CP)*
  10. *Manufacturing processes for products made of composites or engineered metallic materials (Small or medium-sized CP)*
  11. *Manufacturing of highly miniaturised components (SME-targeted CP)*

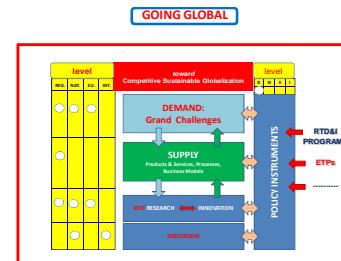


**generare risposte  
in Horizon 2020**

## Roadmap: 'Factories of the Future 2020'

# RD&I Roadmap 2014-2020

- Roadmap will cover R&D and innovation activities
- Guiding principles: industry competitiveness, from research to industrial application and market uptake
- Ongoing comprehensive multi-sector consultation process: MF ETP, related ETPs and other interested parties

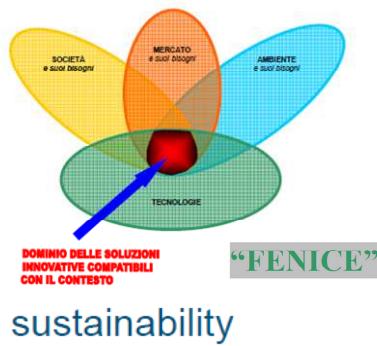


## Roadmap: 'Factories of the Future 2020'

# Baselines

### Challenges & opportunities

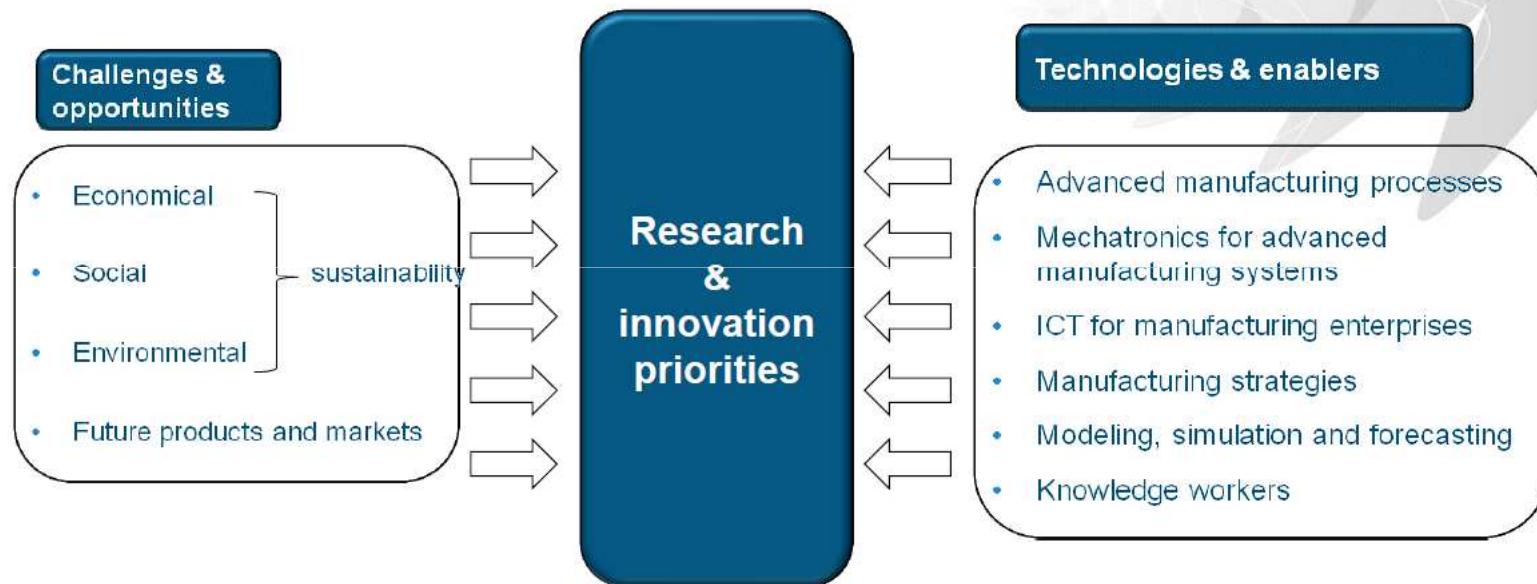
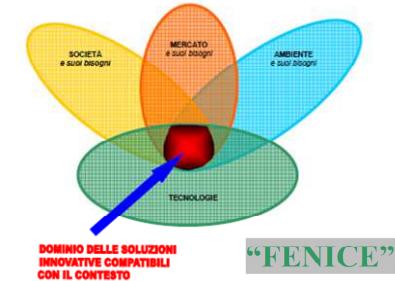
- Economical
- Social
- Environmental
- New products markets



### Technologies & enablers

- Advanced manufacturing processes
- Mechatronics for advanced manufacturing systems
- ICT for manufacturing enterprises
- Modeling, simulation and forecasting
- Manufacturing strategies
- Knowledge workers

Roadmap: 'Factories of the Future 2020'  
**The right technologies**  
 for the right challenges or opportunities:  
 the R&I priorities



+ Measuring the (potential) impact of technologies

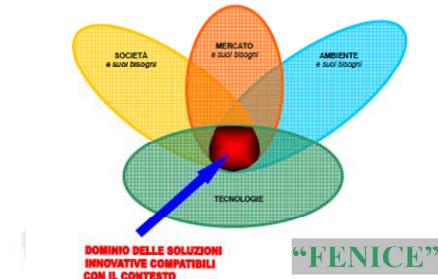
## Roadmap: 'Factories of the Future 2020'

# Research Priority Domains

### Research & innovation priorities



- Domain 1: Advanced Manufacturing processes**  
Innovative processing for both new and current materials or products
- Domain 2: Adaptive and smart manufacturing systems**  
Innovative manufacturing equipment at component and system level, including mechatronics, control and monitoring systems
- Domain 3: Digital, virtual and resource-efficient factories**  
Factory design, data collection and management, operation and planning, from real-time to long term optimisation approaches
- Domain 4: Collaborative and mobile enterprises**  
Networked factories and dynamic supply chains
- Domain 5: Human-centric 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



### Technologies & enablers

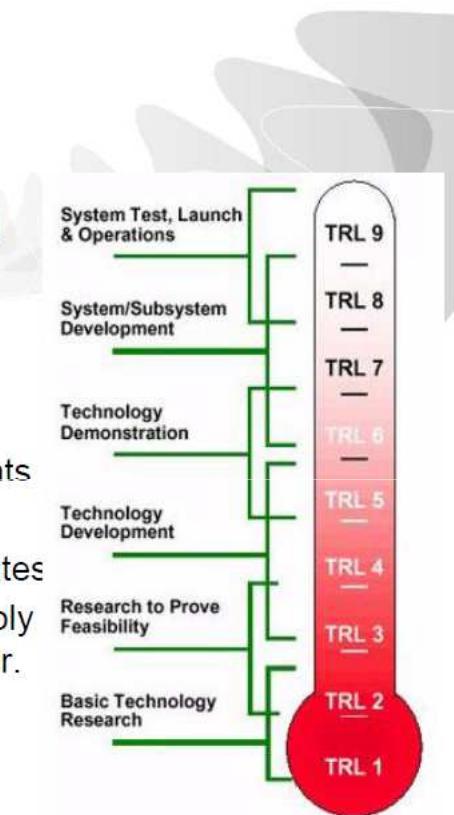
- Advanced manufacturing processes
- Mechatronics for advanced manufacturing systems
- ICT for manufacturing enterprises
- Manufacturing strategies
- Modeling, simulation and forecasting
- Knowledge workers



## Roadmap: 'Factories of the Future 2020'

# Innovation Through Dissemination & Demonstration

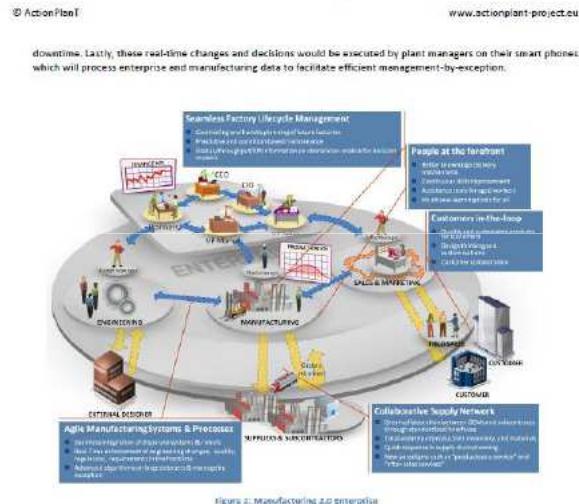
- FoF PPP : Going from research activities to exploitation
  - long, non-linear process that can be described in a simplified way using the Technology Readiness Level (TRL) scheme
- Closing the gap through two complementary levels
  - Industrial Lab
  - Industrial Productionwhich have a significant role as education & training environments
- Moreover:
  - Understanding the context within which the technology operates
    - regulations, standards, barriers to adoption and just simply market awareness of the value the technology will deliver.
  - User driven Innovation should therefore become a business model in itself and a continuously run business process (*the factory innovation*)
  - More effective ways of monitoring and evaluating projects and programmes results and impacts, especially after their financial execution



## Roadmap: 'Factories of the Future 2020'

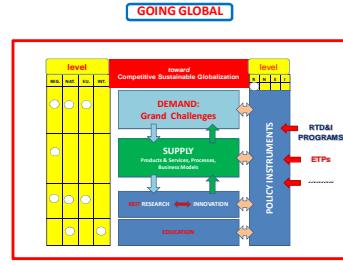
## Considering the ActionPlanT Draft Roadmap

# Information and Communication Technologies



- Towards agile manufacturing systems and processes
  - The new seamless factory life-cycle management
  - People at the forefront
  - Fostering collaborative supply networks
  - Aiming at customer centric design and manufacturing

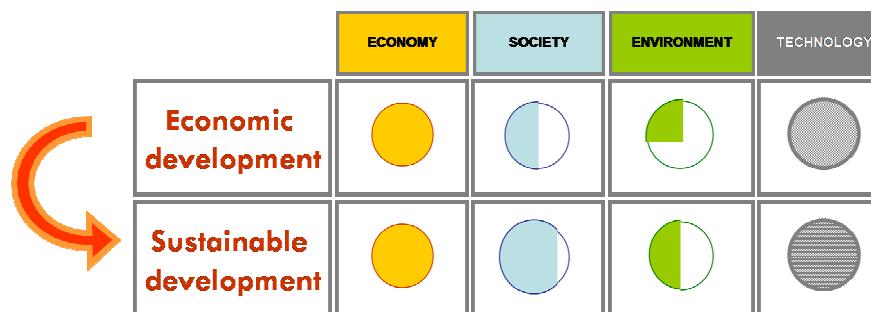


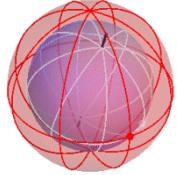


# verso un nuovo paradigma Competitive Sustainable Globalization

## Current Globalization (2/2)

- There is *growing concern* about the *current model of globalization* and *related pattern of growth*. They are – mainly - *propelled by profit pursuit, focusing on competitiveness and relying on the self-regulating market order*. This has *proved both ineffectual and costly*, in particular, in terms of *unemployment and environment*.
- To respond to the *Economic Social Environmental Technological Grand Challenges*, facing both the *developing* and the *advanced world*, we must *move from Economic to Sustainable Development*.

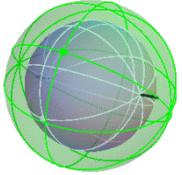




## ComCompetitive Sustainable Globalization

*Current Globalization is led, in the New Industrialized Countries (NIC) by Global Firms, looking globally for competitiveness, as these Countries offer low labour cost, tax advantages, less binding environmental and social regulations. This Globalization is creating many large-scale problems, such as unemployment and slow growth, particularly, in Early Industrialized Countries (EIC). This globalization is not adjustable towards Sustainability*

NIC are also moving towards Research, Innovation and High Education. It is expected that *in 2025 the majority of consumption will take place in New Industrialized Countries (NIC) developing economies, thus creating new market opportunities for global manufacturing companies.*



## Competitive Sustainable Globalization

Socio-economic and environmental sustainability at global level may be built by progressively implementing sustainable development at National/Regional level. Such cumulative process may be defined as globalization of sustainability: i.e. Sustainable Globalization. EICs are taking this approach.

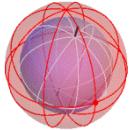
To pursue jobs and growth, along with other initiatives, *it is necessary to move to a National/Regional re-industrialization*, fostered and supported by *Innovation ecosystems(IE)*, addressing Sustainable Development as well as Economic Competitiveness.

EICs local manufacturing will have to face, locally and globally, a product demand almost steady, but highly differentiated. This being integrated in global value chains. A new type of Manufacturing Industries must emerge, based on new Enabling Technologies.

# Competitive Sustainable Globalization Paradigm:the EU case

Within Early Industrialized Countries, the EU is a special case, a “subset” of globalization. EU participates, through its global Companies to competitiveness driven globalization, while it is moving towards a National/Regional re-industrialization based on Innovation, progressively pursuing Sustainable Development: i.e. implementing CSG.

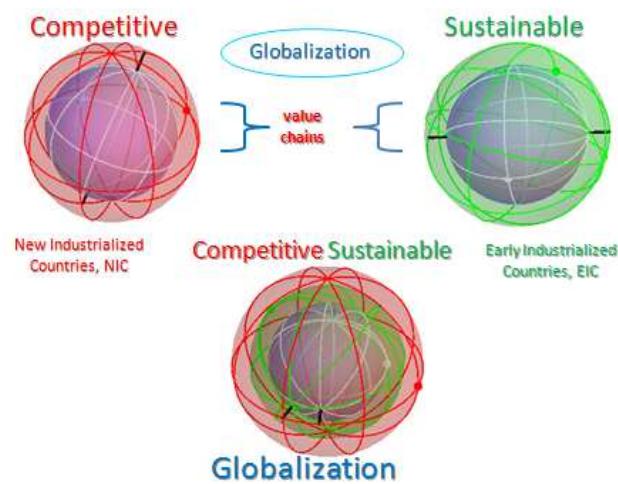
*Concerning CSG, EU has launched within Horizon 2020, the NMP European Program, investing in LET for Societal Challenges. Beside this, the EU Strategic Specialization Strategy Initiative – addressing the 1768 European Regions- is a move towards multilevel integration within the European Research Area and a drive for National regional Industrial Renaissance.*



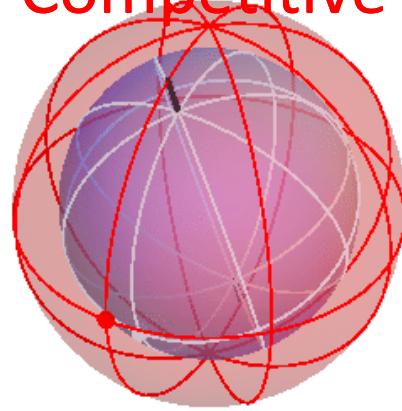
# Competitive Sustainable Globalization Paradigm

The two mechanisms Global Competitiveness and Global Sustainability are, somehow interrelated, as they operate within interlinked global value chains at global level.

Hence *a new paradigm* is emerging: i.e. *Competitive Sustainable Globalization(CSG)*.



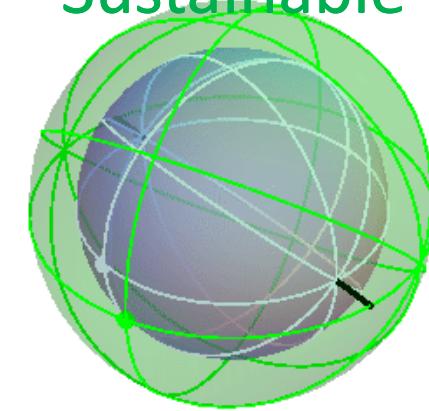
**Competitive**



**Globalization**

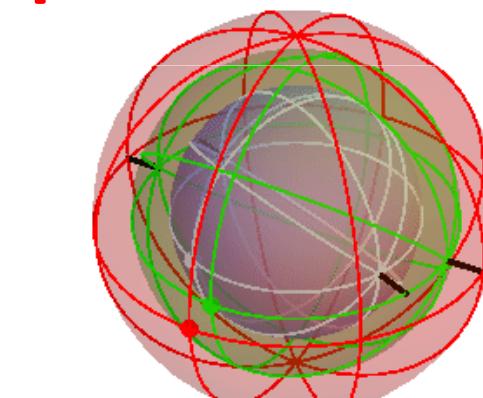
**value chains**

**Sustainable**



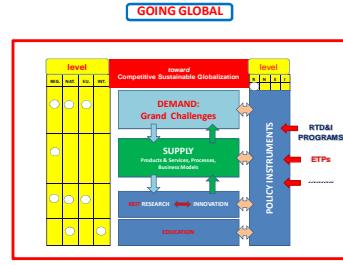
## **Competitive Sustainable**

New Industrialized  
Countries, NIC



Early Industrialized  
Countries,  
EIC

**Globalization**



# Competitive Sustainable Globalization

## ruolo delle Regioni

# Sustainable Globalization

- The incipient, but slow, move by entities - such as Countries - towards Sustainable Development may progress faster and “globalize” if entities such as Regions / Megacities were the relevant actors.
- They have the necessary power, the strategic governance capability, the resources , the necessary closeness to the “field & Stakeholders”. They can effectively play the top down/bottom up loop approach, necessary to implement the *Sustainable socio-economic Development* paradigm .
- Then , we can define *Sustainable Globalization* as the progressive globalization of Sustainable Development, through the mechanism aforementioned. It can be effective and generate *sustainable growth*, if enabled and supported, within global Networks / Value Chains, by “*regional*” Manufacturing.

The EU is moving towards a National/Regional re-industrialization based on Innovation, progressively pursuing Sustainable Development and, hence, *Sustainable Globalization*.

To this end, the EU has launched the Smart Specialization Strategy (SSS) Initiative that addresses the 1768 European Regions. It is a move towards multilevel integration within the European Research Area and a drive for National regional *Industrial Renaissance*.

The *Marche Region SSS* is a good example.

## The 1768 European Regions

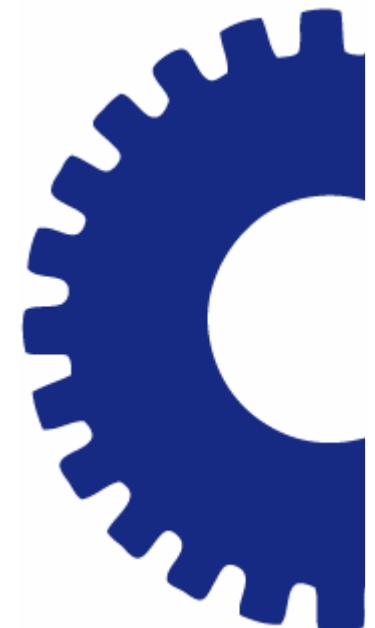


# **Strategia per la ricerca e l'innovazione per la smart specialisation**

**Regione Marche**



**Assessorato Attività produttive  
Ricerca e Innovazione**





## Analisi del contesto socio-economico e del potenziale di innovazione



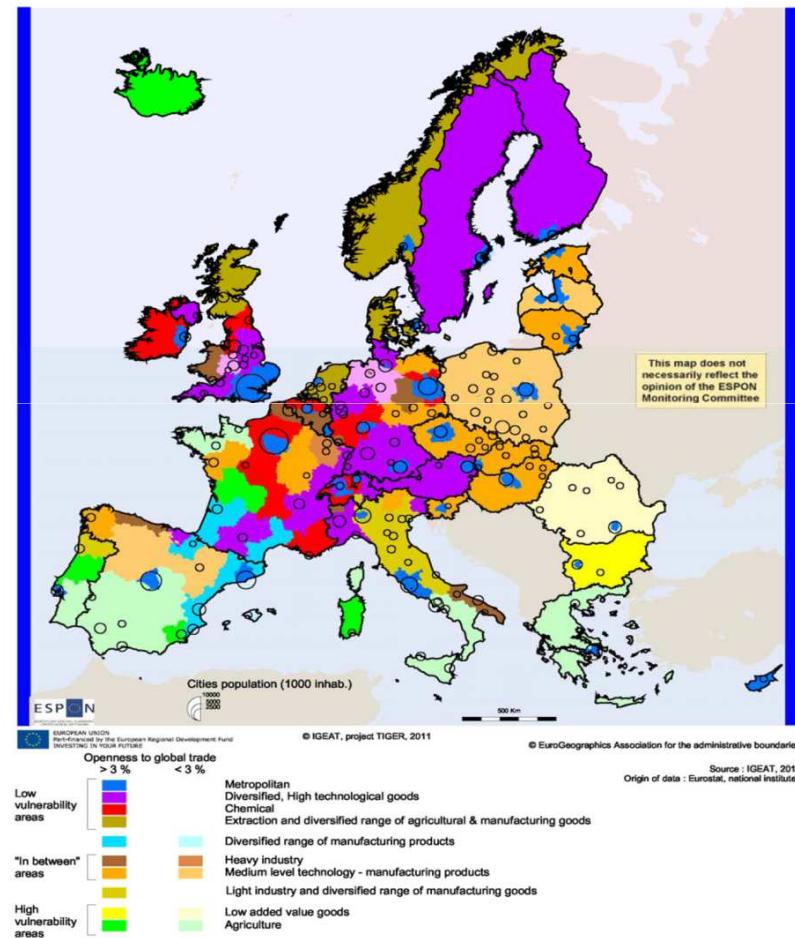
Percorso per l'identificazione della smart specialisation



## Sfide

- Esposizione rischi ambientali
- Difficoltà approvvigionamento energetico
- Invecchiamento popolazione
- Specializzazione in settori tradizionali
- Esposizione concorrenza Paesi emergenti
- Limitata attività in ricerca e sviluppo
- Bassa capitalizzazione delle imprese
- Difficoltà di accesso al credito
- Rischio “fuga dei cervelli”
- Bassa diffusione ICT

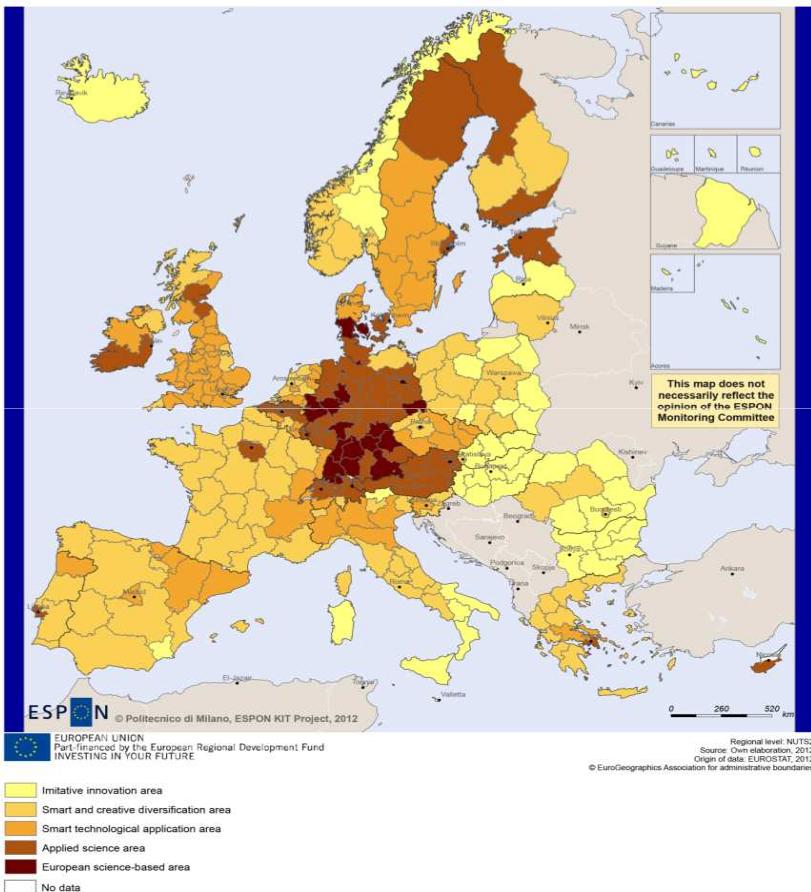
Vulnerabilità



Principali sfide (analisi swot)



## Opportunità



- Crescita domanda prodotti di qualità
- Trend positivo per servizi avanzati innovativi
- Aumento delle innovazioni non tecnologiche
- Presenza di nicchie di eccellenza
- Specializzazione scientifica nei settori NBIC
- Potenziale inespresso di ricerca e sviluppo
- Aumento addetti R&S nelle imprese
- Presenza di capitale umano qualificato
- Cluster tecnologici e progetti Smart Cities

Principali opportunità (analisi swot)



## Promuovere la transizione dall'attuale sistema distrettuale verso una nuova organizzazione industriale in grado di:

- sviluppare nuove attività in ambiti innovativi e ad alto valore aggiunto;
- sostenere le vocazioni produttive tradizionali con un miglioramento qualitativo e un *upgrade* tecnologico;
- sfruttare la *related variety* del sistema industriale regionale;
- rafforzare la competitività regionale nei mercati globali.

Dalla specializzazione produttiva alla specializzazione intelligente

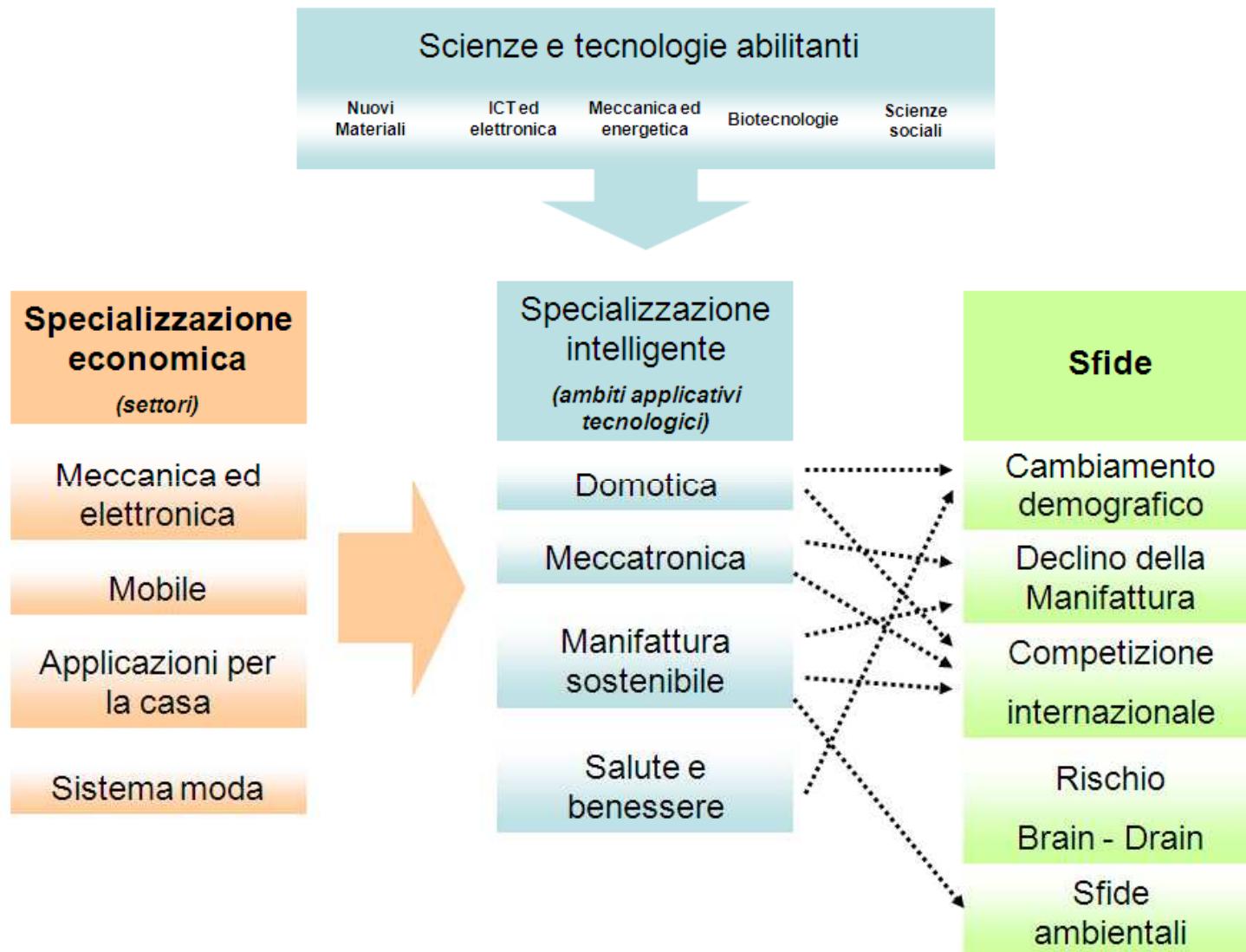


## Strategia di Specializzazione Intelligente per la Ricerca e l'Innovazione

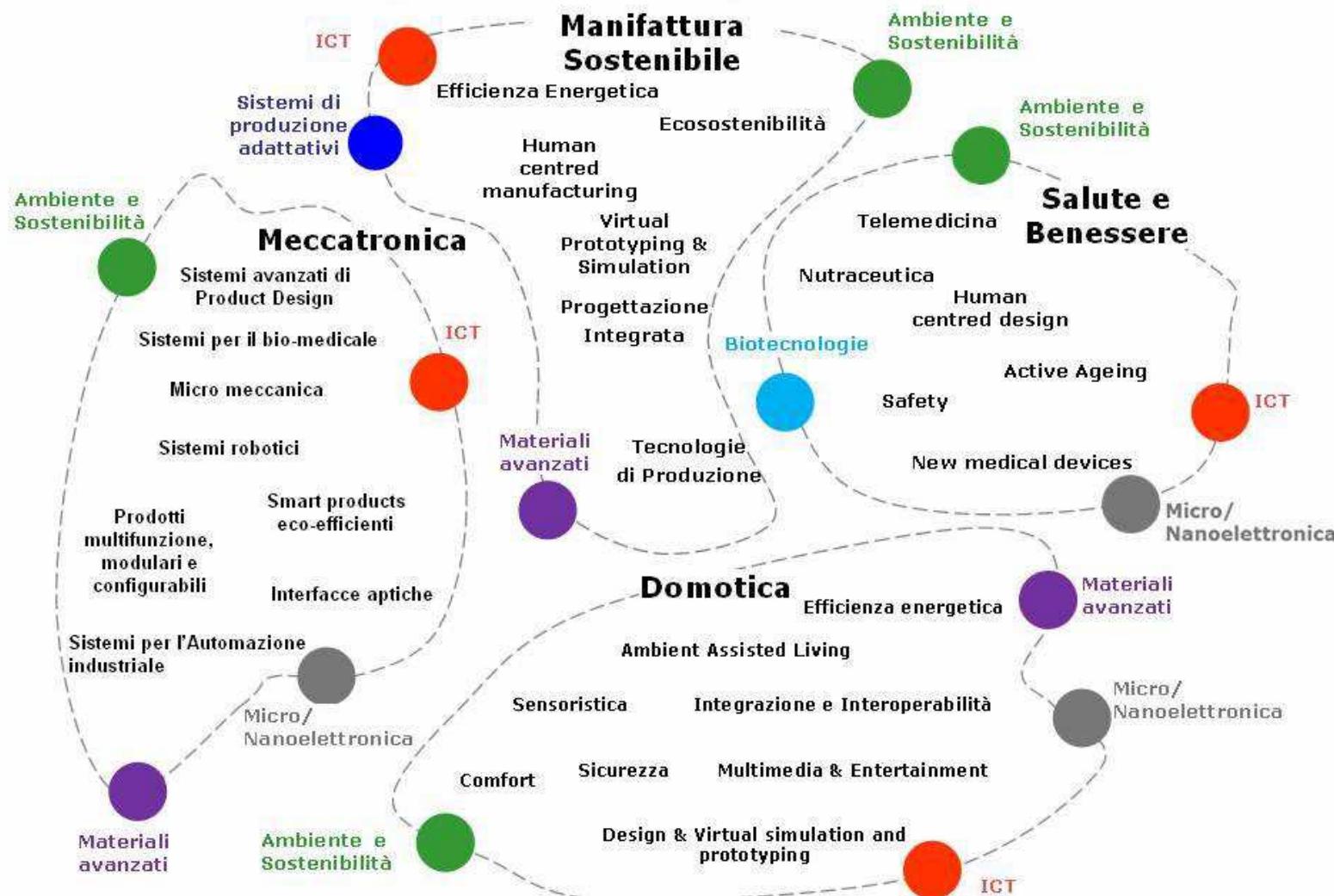
**La strategia riafferma la centralità del settore manifatturiero ed è rivolta a rivitalizzare il tessuto produttivo marchigiano attraverso la focalizzazione su alcuni ambiti tecnologici avanzati:**

- domotica
- meccatronica
- manifattura sostenibile
- salute e benessere
- ICT (come tecnologia abilitante trasversale)

Visione strategica



Visione strategica

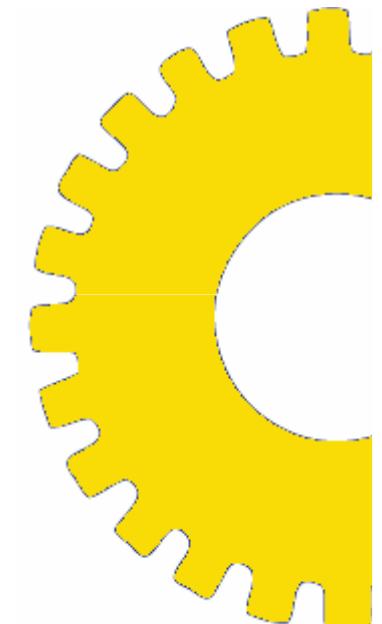


Le aree di specializzazione



## Principali leve della Smart Specialisation Strategy

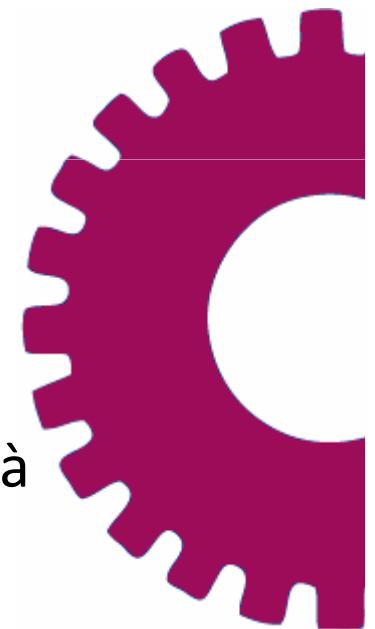
- Modernizzazione del sistema produttivo manifatturiero
- Efficientamento energetico delle imprese
- Internazionalizzazione del sistema Marche
- Benessere della società e centralità della persona
- Qualificazione del capitale umano





## Cambiamenti attesi per rendere il tessuto produttivo:

- più innovativo
- più internazionalizzato
- basato sulla qualità
- profondamente interrelato
- orientato al miglioramento degli asset aziendali
- capace di combinare crescita economica e sostenibilità
- in grado di assorbire occupazione qualificata

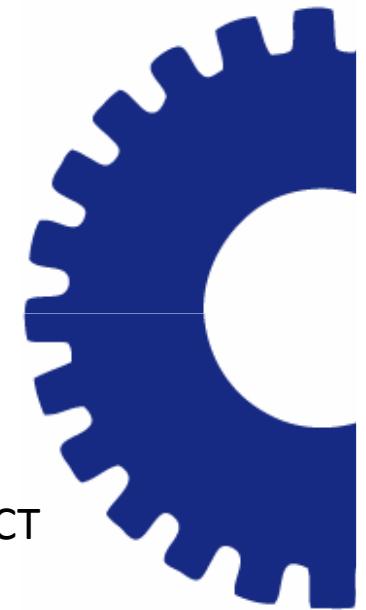


Cambiamenti attesi

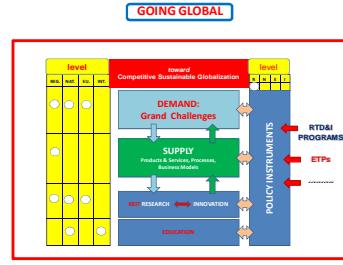


## Focalizzazione delle priorità

- I Promuovere gli investimenti in ricerca e innovazione
- II Promuovere soluzioni innovative per le sfide delle comunità locali
- III Sostenere lo start up e la crescita di nuove imprese
- IV Ingegnerizzazione ed industrializzazione
- V Promuovere la qualità del sistema produttivo
- VI Promuovere la valorizzazione delle filiere del made in Italy
- VII Migliorare la dotazione infrastrutturale e la fruizione di servizi avanzati ICT
- VIII Supportare progetti per l'accessibilità a fonti energetiche alternative
- IX Supportare il processo di internazionalizzazione delle imprese attraverso azioni di sistema
- X Promuovere soluzioni innovative nel settore agricolo ed agroalimentare



Priorità



# Nuovi scenari nel manifatturiero e risposte possibili: *la Formazione!*



## MANUFUTURE Workshop

### "Manufacturing Education: A view to the future"

Friday 23<sup>rd</sup> January 2015

Crowne Plaza Brussels - Le Palace Hotel, Room Vision

Rue Gineste 3, Brussels 1210, Belgium

#### Agenda

Manufacturing education & training - the European Commission view

Challenges & outlook - the manufacturing industry perspective

The EIT approach to education & training

A research outlook, EC funded projects

Novel approaches & paradigms, skills development & innovation

Conclusions



#### MANUFUTURE Workshop

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The Workshop is organized by the **Laboratory for Manufacturing Systems and Automation** under the auspices of the **MANUFUTURE** European Technology Platform.

People make the difference. The world leading research efforts and results need to be translated to successful products using efficient production methods. Talent-driven innovation is the major enabler of this process.

Thus, skills and competencies are critical for a sustainable development of industrial competitiveness. Skills gaps and shortages hinder though today industry's innovation performance world-wide.

Moreover, new approaches to skills development and competence building are required in view of the foreseen change of employment pattern in industry towards more knowledge- and skills-intensive jobs.



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The Workshop will look at the relevant challenges addressed today by manufacturing education and elaborate on a multi-perspective view to the future, including employment, education and training trends, social sustainability aspects, novel knowledge and skills delivery paradigms, relevant emerging technologies and research activities.

It will provide a forum to manufacturing education stakeholders, including industrial companies and associations, research organizations, academia, training organizations, policy makers and public authorities, in order to exchange experiences, assess current status and envision the future of manufacturing education in Europe.

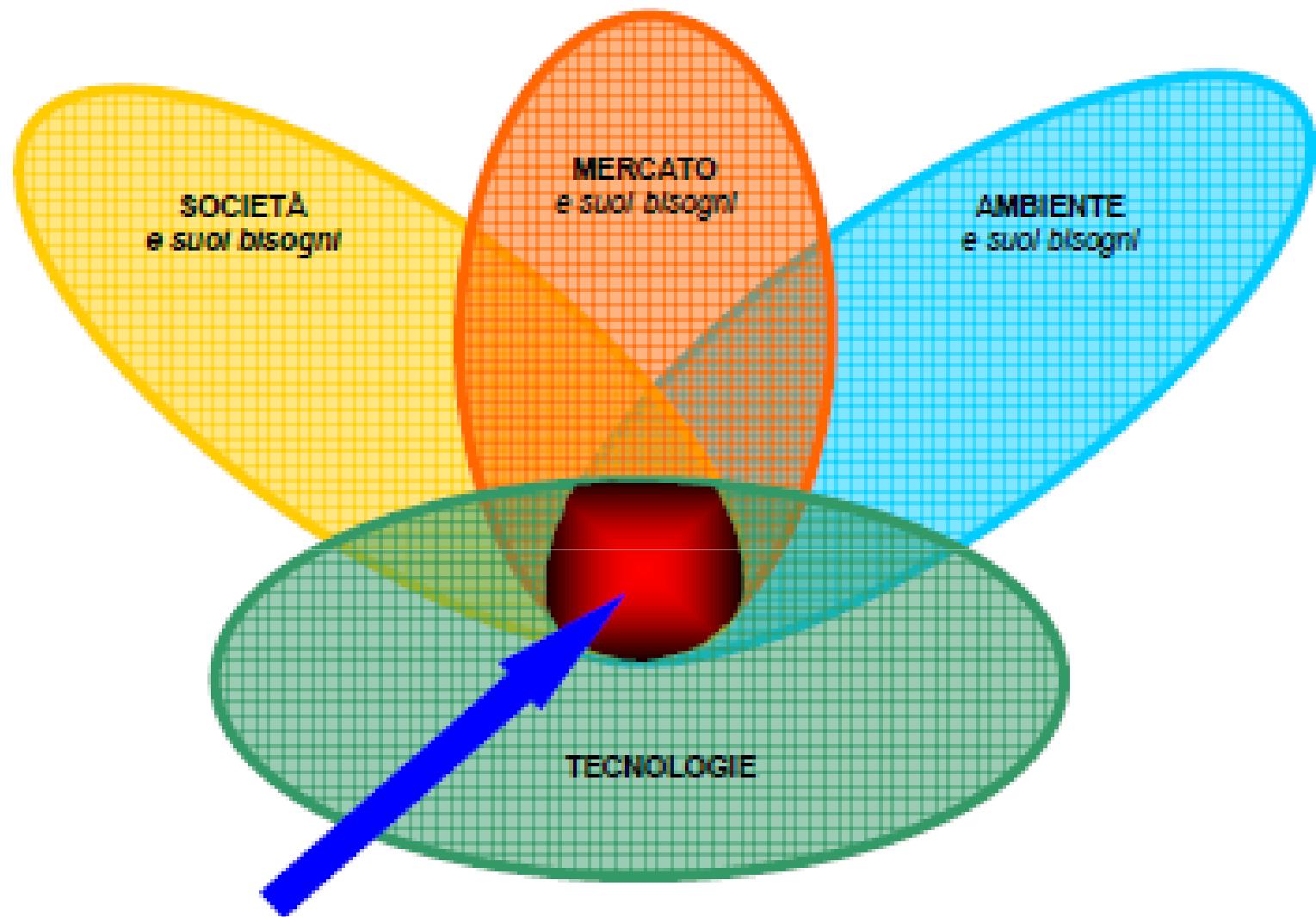
**EUROPEAN FACTORIES OF THE FUTURE  
RESEARCH ASSOCIATION**

**Industry Workshop on:  
Education, Research, Innovation &  
Entrepreneurship – Towards the EIT Added  
Value Manufacturing KIC**

**Thursday 5th March 2015, 09:00-16:00**

**Diamant Building | Brussels**





**DOMINIO DELLE SOLUZIONI  
INNOVATIVE COMPATIBILI  
CON IL CONTESTO**

**“FENICE”**

## **La formazione tecnica è una *risposta* necessaria**

Il *Progetto Fenice* è stato metodologicamente sviluppato in piena coerenza con gli scenari europei e regionali fin qui illustrati.

Il Workshop sulla Formazione per il Manifatturiero Innovativo - organizzato dalla piattaforma Manufuture lo scorso gennaio a Bruxelles- e numerosi altri eventi e studi in merito, delineano scenari e risposte con i quali il Progetto Fenice e le azioni dell'Istituto Montani sono in sintonia.

Il *Progetto Fenice* e l'*Istituto Montani* possono, quindi, giocare un ruolo determinante per generare risposte formative avanzate per la formazione tecnica per l'innovazione.

## **La formazione tecnica è una *risposta* necessaria**

*Il Progetto Fenice* appare di grande attualità ed efficacia per il “modello” proposto all’*Istituto Montani* per assicurare la sua evoluzione innovativa permanente, per tutte le componenti in gioco.

Naturalmente, le componenti del sistema formativo, che coprono lo HW (Strutture, Attrezzature, Programmi di insegnamento, etc) e il SW (Know how dei docenti, modalità di insegnamento e comportamentali, aspetti della comunicazione sia interna che esterna, etc.)

devono essere orientate ed aggiornate proattivamente alle tecnologie abilitanti il cui possesso è la base per assicurare il successo nella competizione globale e promuovere lo sviluppo economico territoriale

## **La formazione tecnica è una *risposta* necessaria**

Occorre quindi:

esplorare la possibilità, per l’Istituto Montani : “visionario e coerente attore”; di contribuire a dibattere il tema del ruolo della formazione tecnica per l’innovazione tecnologica, nell’ambito della Piattaforma Tecnologica Europea Manufuture, connessa con gli ambienti più avanzati della Ricerca e dell’Innovazione:

operare per l’auspicato “rinascimento” dell’Industria Europea, Italiana contribuendo al necessario “corpo di Innovatori” che integri dai *tecnici*, ai laureati, ai dottori di ricerca.

***Il futuro è una sfida ineludibile***

**IL FUTURO E' UNA SFIDA  
INELUDIBILE.....**

