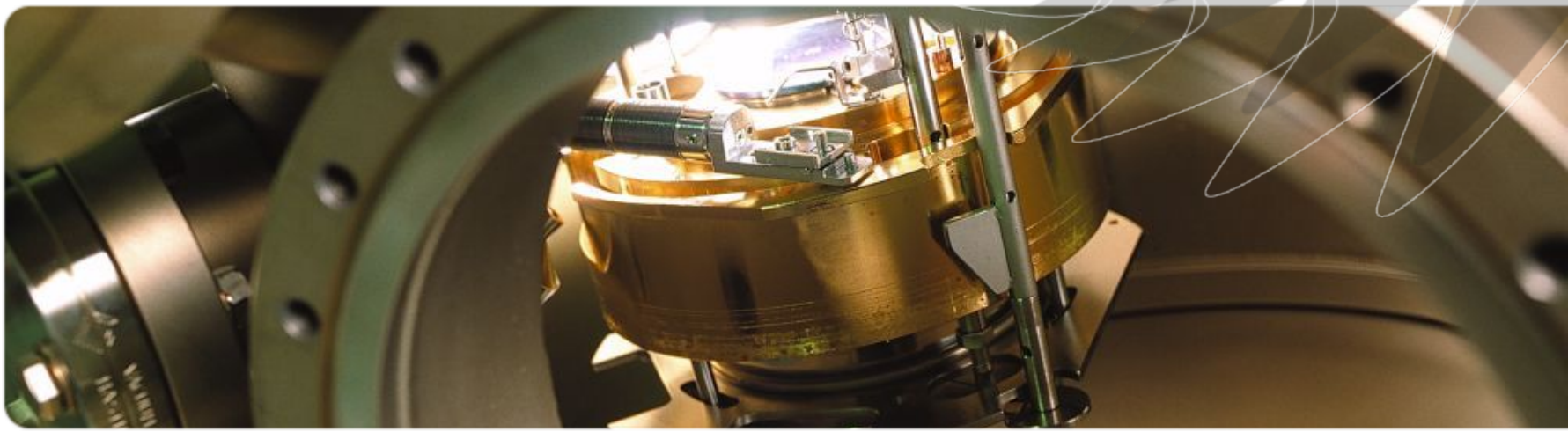
World Manufacturing Forum 2014

Megatrends & European Manufacturing



Speaker:
Maurizio Gattiglio
Chairman

WMF
World Manufacturing Forum

EFFRA
EUROPEAN FACTORIES OF THE FUTURE RESEARCH ASSOCIATION
a MANUFUTURE initiative

Manufacturing

What Manufacturing Means for Europe

- Despite the crisis, manufacturing (physical and digital) is a highly important part of Europe's economy:
  - 20 % Direct jobs
  - 67 % Exports
  - 65 % Business R&D Expenditure
- Is playing an ever increasingly important role in meeting challenges faced by Europe
- Creates and secures employment both directly & indirectly
- Importance of manufacturing now recognised by EU and its Member States
- Development of more competitive & sustainable industry needs support = 'Factories of the Future'
- A diverse sector: Small, medium & large enterprises

ft.com > world >

Europe

Home UK World Companies Markets Global Economy Lex Comment

Africa Asia-Pacific Europe Latin America & Caribbean Middle East & North Africa UK US

March 3, 2014 9:59 am

Eurozone manufacturing continues to fuel recovery

By Claire Jones in Frankfurt and Tobias Buck in Madrid

Factory activity in the eurozone expanded for the eighth straight month and, although the pace of recovery slowed from January's two-and-a-half year high, there were further signs that the improvement in the region's core was spreading to the periphery.

The final estimate of a poll of purchasing managers confirmed that the region's manufacturers continued to contribute to the currency bloc's nascent recovery. The manufacturing purchasing managers' index, compiled by data company Markit, hit 53.2 in February, still above the crucial 50 mark that signals growth but below the January high of 54.

WMF World Manufacturing Forum

EFFRA EUROPEAN FACTORIES OF THE FUTURE RESEARCH ASSOCIATION a MANUFUTURE initiative

Challenges

Megatrends

- Europe's manufacturing technology platform Manufuture has identified eight megatrends*:
  - Changing demographics
  - Globalisation & future markets
  - Scarcity of resources
  - Climate change
  - Dynamic technology & innovation
  - Global knowledge society
  - Mass customisation
  - Sharing global responsibility

- These have a considerable impact & drive structural trends in nearly all manufacturing sectors.

(*Manufacturing 2030/Factories of the Future 2020)

Challenges & Europe

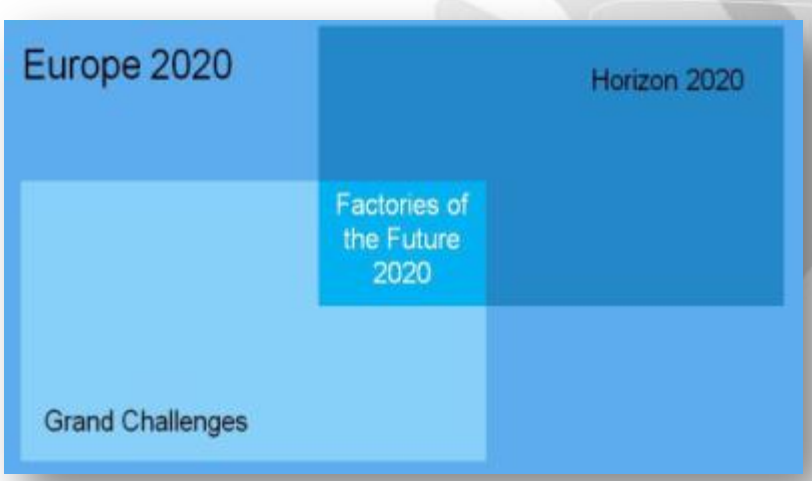
Grand Challenges

- European response: Europe 2020 – The EU's 10 year growth strategy
- This identifies grand challenges which are a result of the 'Megatrends'
  - Climate change
  - Energy security
  - Food security
  - Health
  - Ageing population
- It includes specific targets which include:
  - 3% of the EU's GDP to be invested in R&D
  - Greenhouse gas emissions reduced by 20%
  - 20% increase in energy efficiency
  - 20% of GDP from manufacturing activities
- Realised through research, development & innovation through initiatives such as 'Factories of the Future' & supported by Horizon 2020

Solutions

Factories of the Future

- Factories of the Future: An EU public-private partnership supporting pre-competitive research, development & innovation in production technologies
- Covers multiple sectors (e.g. automotive, clothing, medical, robotics, photonics, ICT)
- Collaborative projects with organisations from across Europe
- International cooperation in some projects via IMS
- Initially launched under FP7, continues under Horizon 2020: €1.15 billion
- 151 projects launched
- 1,000 organisations have participated to date
- Strong emphasis on demonstration



Solutions

Factories of the Future 2020

- Guiding document for the ‘Factories of the Future’ partnership
- Developed by EFFRA & industrial stakeholders
- Refined through public consultations
- Identifies challenges & opportunities resulting from ‘megatrends’
- Also identifies technologies & enablers required to meet these

- Focused on SMEs (i.e. Robotics and ICT for SMEs)
- Establishes six ‘domains’ of research priorities
- Annual partnership call topics are based upon this roadmap

Solutions

Factories of the Future 2020

Challenges & Opportunities

- Manufacturing Future Products
- Economic
- Social
- Environmental

Sustainability

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

Technologies & Enablers

- Advanced Manufacturing Processes
- Mechatronics for Advanced Manufacturing Systems
- Information & Communication Technologies
- Manufacturing Strategies
- Knowledge Workers
- Modelling, Simulation & Forecasting

Factories of the Future

Challenges & Opportunities

- These are the challenges facing manufacturing in Europe
- Reflect the overall 'megatrends' & common to other parts of the World
- Challenges cannot be solved in isolation nor opportunities realised in isolation
- Both require collaborative approach & combined efforts – concentration of expertise & know-how

Challenges & Opportunities: A Closer Look

Manufacturing Future Products

- The grand societal challenges generate the need for a wide range of products that should be manufactured at an affordable price.
- Manufacturing, and particularly new models of manufacturing, are key enabler technologies to realise these products and solutions.
- Manufacturing not only of physical good for export, but new products both digital and physical based on ICT intensive manufacturing and embedded CPS
- Future Products which can be exported worldwide "travelling" in the Cloud, without need of important infrastructures, for low environmental impact
- "Not-food zero kilometres" future products

Challenges & Opportunities: A Closer Look

Economic Sustainability

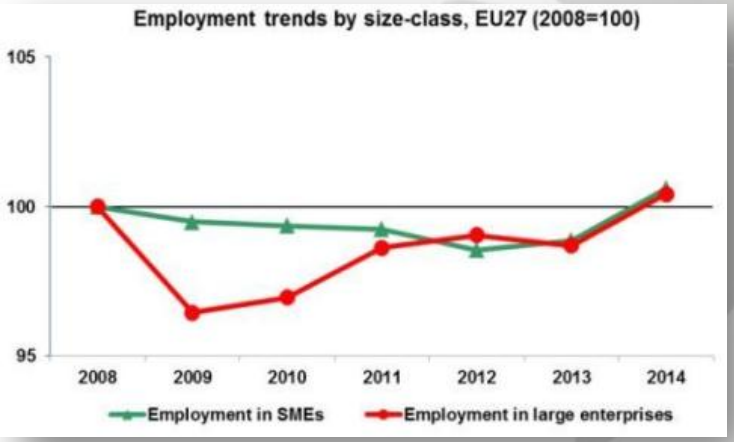
- Long-term competitiveness requires creation of value through production of products of the future – meeting the changing needs of society & opening new markets.
- Sustainability & positive impacts on society requires a competitive industry which creates high skilled jobs & invests in environmentally-friendly factories

Issues:

- Addressing economic performance across the supply chain
- Realising reconfigurable, adaptive and evolving factories capable of small-scale production
- High-performance production, combining flexibility, productivity, precision and zero-defect while remaining energy- and resource-efficient
- Resource efficiency in manufacturing — including addressing the end-of-life of products

Challenges & Opportunities: A Closer Look

Social Sustainability



- Ever present need for organising and designing manufacturing in a way which ensures that manufacturing enterprises will remain socially sustainable while still achieving global competitiveness. Research & Innovation is needed.
- Human capability & machine intelligence will be integrated within production systems that can achieve maximum efficiency as well as worker satisfaction.

Issues:

- Increase human achievements in future European manufacturing systems
- Creating sustainable, safe and attractive workplaces for Europe 2020
- Creating sustainable care and responsibility for employees and citizens in global supply chains

WMF World Manufacturing Forum

EFFRA EUROPEAN FACTORIES OF THE FUTURE RESEARCH ASSOCIATION a MANUFUTURE initiative

Challenges & Opportunities: A Closer Look

Environmental Sustainability

- Climate change, the depletion of &, uncertainty of access to, raw materials & resources, growing populations, pollution and consumption levels will push changes & demand action
- Rise in consumption, demand for resources & use energy requires new approach

Issues

- Reducing the consumption of energy, while increasing the usage of renewable energy
- Reducing the consumption of water and other process resources
- Near-to-zero emissions, including noise and vibrations, in manufacturing processes
- Optimising the exploitation of materials in manufacturing processes
- Co-evolution of products–processes–production systems or 'industrial symbiosis' with minimum need of new resources

Achieving Solutions

Technologies & Enablers

- ‘Factories of the Future 2020’ identifies existing technologies & enablers.
- The development, application or integration of these is required to overcome challenges & capitalise on opportunities

Key Technologies & Enablers

- Advanced Manufacturing Processes
- Mechatronics for Advanced Manufacturing Systems
- Information & Communication Technologies
- Manufacturing Strategies
- Modelling, Simulation & Forecasting Methods & Tools
- Knowledge Workers

Technologies & Enablers

- Advanced Manufacturing Processes
- Mechatronics for Advanced Manufacturing Systems
- Information & Communication Technologies
- Manufacturing Strategies
- Knowledge Workers
- Modelling, Simulation & Forecasting

Achieving Solutions

Research & Innovation

- Research priorities address manufacturing challenges & opportunities & identify which technologies and enablers should be developed and deployed.
- Each of these domains embody a particular aspect of the required transformations towards the factories of the future
- These priorities will ensure that call topics under the 'Factories of the Future' partnership & projects are industry relevant.

Research & Innovation Priorities

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

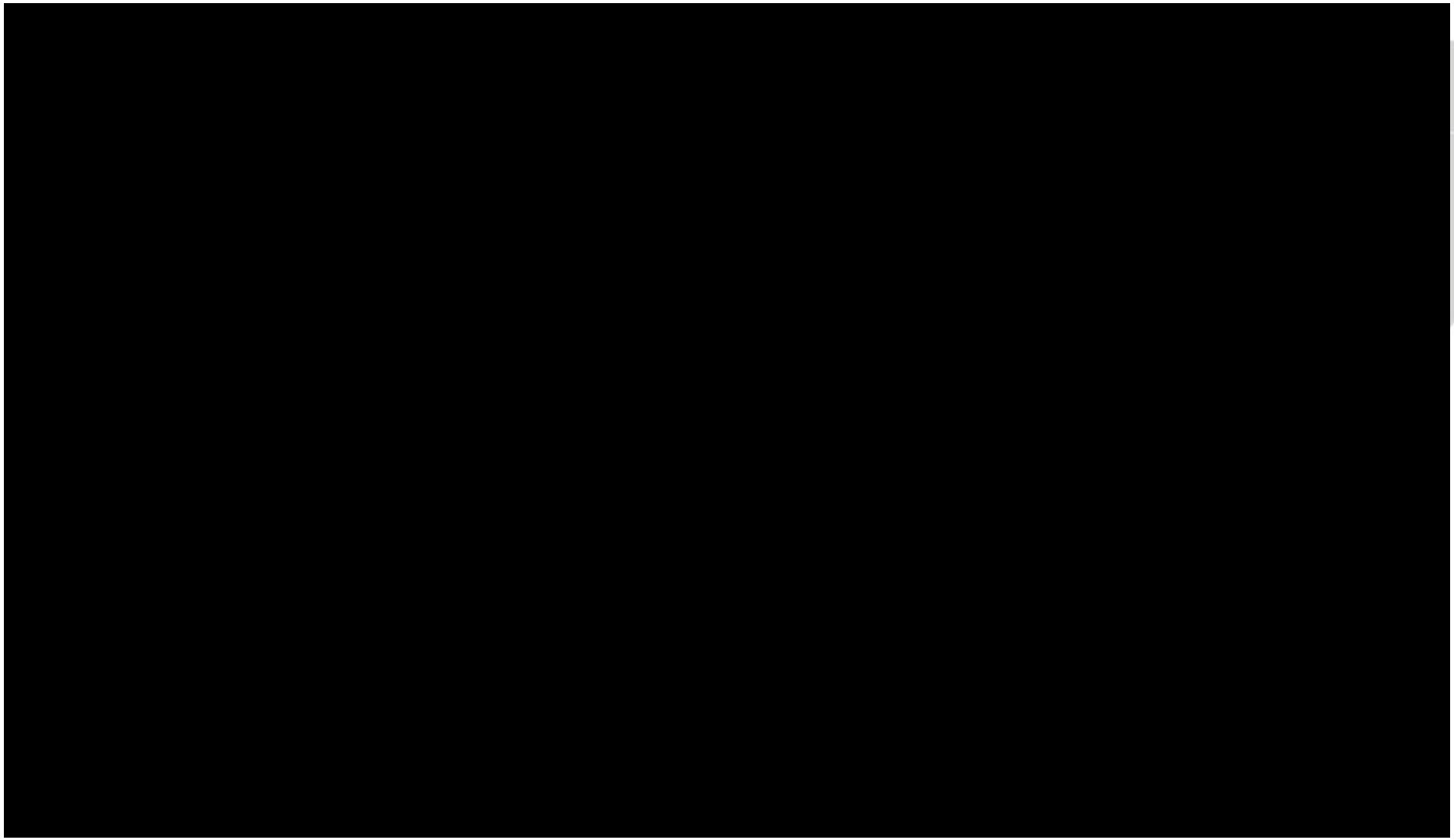
Domain 2: Adaptive and Smart Manufacturing Systems
Innovative manufacturing equipment at component & system level, including mechatronics, control & monitoring systems

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



Thanks to Siemens, member of EFFRA European Factories of the Future Research Association

Achieving Solutions

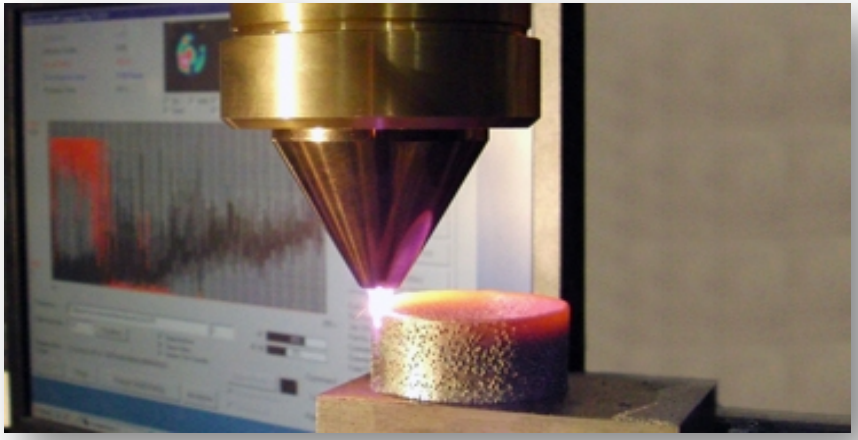
Generating Impact

- Generating impact requires the exploitation, deployment & commercialisation of project results
- Greater emphasis on getting solutions into the market to achieve real impact
- Significant effort required to leverage additional funding for follow-up activities
- Large-scale demonstrators & piloting activities
- Strengthening & widening of links with national/regional initiatives to ensure complementarity & greater exploitation of results
- Stronger links with other initiatives & activities in Europe & greater links with international efforts

Achieving Solutions

Impact

- Innovative SMEs
- High-level of customisation & quality
- Rapid adaptable production lines
- Re-manufacturing
- Focused on zero defects
- Interconnectivity, communication & data storage via cloud



- Factories closer to customers
- Energy & resource efficient
- Adaptable workplaces for changing worker demographic
- Continous skills improvements: multi-skilled jobs

WMF World Manufacturing Forum

EFFRA EUROPEAN FACTORIES OF THE FUTURE RESEARCH ASSOCIATION a MANUFUTURE initiative

Meeting Challenges: Measuring Progress

EFFRA Innovation Portal

- Unique & public online resource deployed by EFFRA
- Contains info on all ‘Factories of the Future projects & consortia
- Built with info & input from project consortia
- Allows ‘mapping’ of projects along priorities of ‘Factories of the Future 2020’
- Facilitates potential clustering by projects: Identification of common interests
- Provides brokerage facility for ‘Factoris of the Future’ calls e.g. expressions of interest in topics by organisations

www.effra.eu/portal

WMF World Manufacturing Forum

EFFRA EUROPEAN FACTORIES OF THE FUTURE RESEARCH ASSOCIATION a MANUFUTURE initiative

Meeting Challenges: Measuring Progress

Monitoring

CHALLENGES | edit

1. Manufacturing the products of the future — 60/100
   - 1.1. Novel materials — 60/100
2. Economic sustainability — 90/100
   - 2.1. Realising reconfigurable, adaptive and evolving factories capable of small scale production — 90/100
   - 2.2. High performance production, combining flexibility, productivity, precision and zero-defect while remaining energy-efficient — 80/100
   - 2.3. Resource efficiency in manufacturing, including addressing the end-of-life of products. — 50/100

TECHNOLOGIES | edit

1. Advanced manufacturing processes — 50/100
   - Milling and deburring of high added value parts.
   - 1.1. Methods for handling of parts, metrologe and inspection — 50/100
     - In particular in the automotive case study at SIR
2. Mechatronics for advanced manufacturing systems — 100/100
   - 2.1. Control technologies — 80/100
   - 2.2. Cognition-based intelligent features within machinery and robots — 50/100
   - 2.3. Intelligent machinery components, actuators and end-effectors — 70/100
     - The High Dynamic Compensation Mechanism
3. Information and communication technologies
   - 3.1. ICT solutions for modelling and simulation tools — 80/100
     - 3.1.1. CAE models interoperability to allow fast and complete complex process of virtual verification — 80/100
       - Simulation of manufacturing process by virtual mock-up. Verification of robot-kinematics

RELEVANT FACTORIES OF THE FUTURE RESEARCH DOMAINS AND PRIORITIES | edit

(The content of this section is being collected)

1. Domain 2: Adaptive and smart manufacturing systems — 100/100
   - 1.1. Sub-Domain 2.1 Adaptive and smart manufacturing devices, components and machines — 100/100
     - 1.1.1. Embedded cognitive functions for supporting the use of machinery and robot systems in changing shop floor environments — 80/100
     - 1.1.2. Mechatronics and new machine architectures for adaptive and evolving Factories — 50/100
     - 1.1.3. Mechatronics and new machine architectures for high performance and resource-efficient manufacturing equipment — 50/100

- ‘Mapping’ projects on the Portal
- Project consortia map their projects along the challenges and technologies of the ‘Factories of the Future 2020’ roadmap
- Facilitates understanding of progress
- Assists refinement of research priorities
- Enables clustering of projects

www.effra.eu/portal

WMF World Manufacturing Forum

EFFRA EUROPEAN FACTORIES OF THE FUTURE RESEARCH ASSOCIATION a MANUFUTURE initiative

European Factories of the Future Research Association

Who We Are

- Industry-led association
- Represents private side of 'Factories of the Future' public-private partnership
- 135 members from across Europe
- Membership:
  - SME & large industrial enterprises
  - Universities
  - Research & Technology Organisations
  - Associatons
- Supports & disseminates project activities
- Promotes partnership & project activities
- Orgnises focused events (conferences, workshops etc)
- Supports the 'Factories of the Future' network
- Provides services to members (newsletters, events, first-point-of-contact, working groups & advanced portal access)

Political Agenda: Campaign

Manufacturing at Heart

Campaign to highlight the essential role of manufacturing in Europe.

Priorities:

- Smarter research & development
- Completion of the single market
- Dynamic labour markets
- Stable environmental laws
- Balanced energy policy
- Proper access to finance
- Modernised Infrastructure
- Bridge the skills gap

www. manufacturingatheart.eu

WMF World Manufacturing Forum

EFFRA EUROPEAN FACTORIES OF THE FUTURE RESEARCH ASSOCIATION a MANUFUTURE initiative

Thank You

maurizio.gattiglio@primaindustrie.com

@EFFRA_Live

EFFRA.Live

EuropeanFactories

EFFRA.EU