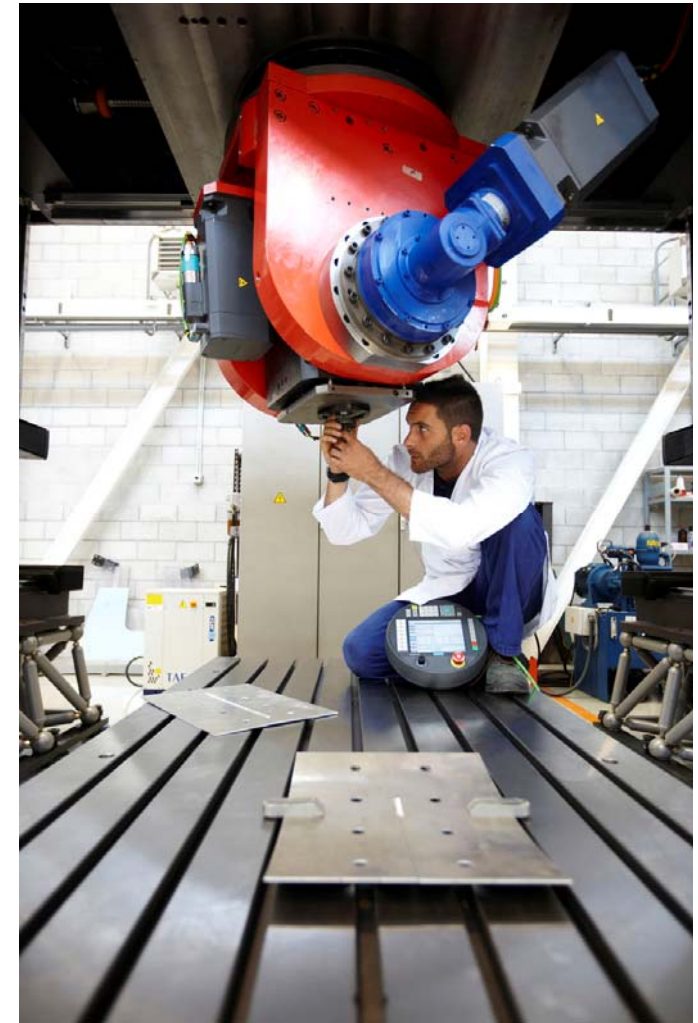


Strategic Multiannual Roadmap Factories of the Future PPP

From Economic Recovery to Sustainability
Valencia, 2010-04-13



Methodology for the updated multi-annual roadmap

- “Leadership” coordination action related to Manufuture revisited to identify research needs
- Collection of research needs as defined by “connected” platforms
- Comments coming from diverse sources after Infoday on 13th July 2009: private companies, national platforms, research organizations
- Work distributed in the four groups, related to the Factories of the Future sub-domains
- Feedback provided to the related Technology Platforms and to the Manufuture HLG



RTD Needs provided by the following Sub Platforms

- Agriculture Engineering and Technologies-AET
- Clean Environment Technology-CET
- European Concept
- Foot wear
- Micro Nano Manufacturing-MINAM
- Rapid Manufacturing-RM
- European Tooling



RTD Needs or Inputs provided by the following European Technology Platforms

- Advanced Engineering Materials and Technologies-EuMat
- ARTEMIS
- ENIAC
- EPOSS
- European Steel Technology Platform (ESTEP)
- Future Textiles and Clothing-FTC
- Industrial Safety
- NESSI
- Photonics 21
- Robotics-EUROP
- Food for Life
- Sustainable Chemistry
- Waterborne



Manufacturing Related Remaining ETPs (Based on SRAs)-Also Invited

- Advisory Council for Aeronautics Research in Europe-ACARE
- European Construction Technology Platform
- European Rail Research Advisory Council (ERRAC)
- European Road Transport Research Advisory Council-ERTRAC
- European Space Technology Platform-ESTP
- Forest Based Sector Technology Platform-Forestry
- Photovoltaics



RTD Needs Selection Criteria

- Innovative Enabling Technology-Must
- Factory Oriented Technology-Must
- Cross Sectorial Application Fields



Second consultation phase

- Based on the Roadmap version available at the end of November, finished in January 2010
- Feedback provided by a number of stakeholders:
 - National Technology Platforms: Switzerland, Portugal, UK, Austria, Spain, Sweden
 - Stakeholders at Public Administration: European Commission, France
 - Related Technology Platforms: Steel, Agricultural Engineering, Food, Photonics
 - Relevant industrial companies: Bosch, Fiat, KUKA robotics
- Further review by AIAG members



Structure

Background

1. Vision and strategic objectives
2. Main industrial needs and related R&D challenges
 - 3.1 Sustainable Manufacturing
 - 3.2 ICT enabled Intelligent Manufacturing
 - 3.3 High Performance manufacturing
 - 3.4 Exploiting new materials through manufacturing
3. Timeline and budget
4. Expected impact on the Factories of the Future Initiative
5. Implementation through stakeholders involvement
6. Other relevant issues



Roadmap document structure I

Introduction

- Factories of the Future: next generation of production technologies, Strategic Roadmap (2011-13) based on stakeholders consultation process, for collaborative research projects oriented towards industrial application.

Background

- The “Factories of the Future” initiative: the European response to the crisis, addressing simultaneously competitiveness and sustainability.
- The aim of this roadmap to inspire industries to develop and demonstrate innovations leading to its sustained competitiveness.



Roadmap document structure II

Vision and Strategic Objectives:

- Europe is a main player globally, manufacturing industries contribute to it
- A key challenge and a proactive response: COMPETITIVE and SUSTAINABLE MANUFACTURING.



Basic content and structure of the multi-annual roadmap: 2011-2013

Main R&D Challenges:

- SD1 Sustainable Manufacturing
- SD2 ICT enabled Intelligent Manufacturing
- SD3 High performance manufacturing
- SD4 Exploiting new materials through manufacturing



SDI Sustainable Manufacturing I

Environmental friendliness

- (a1) High efficiency and near to zero emissions in manufacturing processes.
- (a2) Alternatives to energy-intensive processes based on advanced production and manufacturing systems.
- (a3) Improved use of renewable resources at factory level.
- (a4) Production using environment-neutral materials.

Economic growth

- (b1) Methodologies and tools for sustainable maintenance of production equipment.
- (b2) Innovative re-use of equipment and integrated factory lay-out design
- (b3) Decision support methodologies for the design of manufacturing systems based on integrated product-process approaches and economic/technical risk analysis.



SDI Sustainable Manufacturing II

Social well-being

- (c1) Adaptive and responsive human machine interface.
- (c2) New human-robot interactive cooperation in advanced factory environments.
- (c3) The new human-centred production site.
- (c4) Development and adaptation of organisational structures and leadership for sustainability.



SD2 ICT enabled Intelligent Manufacturing I

(a) Smart Factories: Agile manufacturing and customisation

- (a1) Adaptive and fault tolerant process automation, control and optimisation technologies and tools
- (a2) Intelligent production machines and “plug-and-produce” connection of automation equipment, robots and other intelligent machines, peripheral devices, smart sensors and industrial IT systems
- (a3) Large-scale testing and validation of robotics-based and other automated manufacturing and post-production automation processes in real-world environments
- (a4) Novel methods of interaction with, and automatic tasking of, intelligent cooperative automation and robotic control systems that support flexible, small batch and craft manufacturing
- (a5) Laser applications
- (a6) New metrology tools and methods for large-scale and real-time handling and processing of manufacturing information



SD2 ICT enabled Intelligent Manufacturing II

(b) Virtual Factories: Value creation, global networked manufacturing and logistics

- (b1) Increasing management efficiency of global networked manufacturing
- (b2) ICT for sustaining the value of products
- (b3) Product/service systems
- (b4) Managing volatile manufacturing assets

(c) Digital factories: Manufacturing design and product life cycle management

- (c1) Knowledge and analysis
- (c2) Enhanced, interoperable models for products and processes
- (c3) Design environments
- (c4) Lifecycle management



SD3 High performance manufacturing I

a) Flexible adaptive production equipment, systems and plants for rapid (re)configurations and optimal energy use

- (a1) New high performance manufacturing technologies in terms of efficiency (volumes, speed, process capability), robustness and accuracy.)
- (a2) Plug and play components based on intelligent materials or combinations of passive and active materials (engineered materials) to increase the adaptability of production systems
- (a3) New hybrid production systems for manufacturing and assembly/disassembly, based on improved robotics and/or automation technology for cooperative production tasks between humans and robots
- (a4) Adaptive machines and production systems for optimal energy consumption



SD3 High performance manufacturing II

(b) High precision micro-manufacturing machines and systems

- (b1) Rapid Micro-Manufacturing technologies
- (b2) 3D Micro-parts Production
- (b3) Micro-factory and Micro-Manufacturing Systems

(c) Tools for production planning and in-situ simulation for open reconfigurable and adaptive manufacturing systems

- (c1) Methodologies and tools for reconfigurable manufacturing systems design for healthy, green and safe customer products.
- (c2) Knowledge based tools for process planning
- (c3) Integrated shop-floor simulation
- (c4) Advanced interactive graphical user interface



SD3 High performance manufacturing III

(d) Zero defect manufacturing

- (d1) Quality monitoring and proactive process improvement for geometric shape data and material quality
- (d2) Intelligent Measuring Systems for Zero-Defect Manufacturing
- (d3) Advanced decision-making tools for zero defect manufacturing
- (d4) Development of a new generation of knowledge-based self-learning systems



SD4 Exploiting new materials through manufacturing I

(a) Net-shape manufacturing for advanced structural and functional materials

- (a1) Complete manufacturing chains for nanophased components
- (a2) Manufacturing of engineered metallics and composite materials
- (a3) Up-scaled systems for high performance manufacturing of textile-based structures for high value added and XXXL size applications

(b) New material functionalities through manufacturing processes

- (b1) Roll-to-roll manufacturing of large area and high throughput flexible plastics electronics
- (b2) Manufacturing processes for new flexible components



SD4 Exploiting new materials through manufacturing II

(c) Manufacturing strategies for renovation and repair

(d) Product design using sustainable material processing technologies

- (d1) Modelling and simulation of manufacturing processes
- (d2) Manufacturing processes using advanced materials for energy generation and supply
- (d3) Manufacturing of highly miniaturised components
- (d4) New technologies for casting, material removing and forming processes



Expected impacts

- Stimulate the innovation activities in more European manufacturing related companies, specially SMEs
- Cooperation between the academia and the industry. with the industry as a driver
- Focusing in the manufacturing SMEs in Europe, close link with regional clusters with an important amount of jobs.
- European manufacturing equipment builders' export share will increase
- The use of this equipment will also lead to ecological and economical advantages



Multi-annual Roadmap Milestones

- July 2009: Complete Draft of the MR
- September-October 2009: Input from the wider range of stakeholders and from the Member States representatives
- Meeting of the AIAG in late October
- Mid November 2009: Updated version of the MR
- December 2009: additional input
- January 2010: Final Version adopted by AIAG





Links:

www.manufuture.org

www.effra.eu

Factories of the Future AIAG members:

INESC, PATRAS UNIV., AGORIA, TWI, FESTO, TNO,
DAIMLER, VDMA, SAP, COMAU, TRUMPF, RUROBOTS,
CRF, CETIM, FATRONIK-TECNALIA

Involved European Commission members:

DG RTD G2, DG INFSO E2 & E5

