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Strategic Research Agenda



REPORT OF THE HIGH-LEVEL GROUP
SEPTEMBER 2006

ASSURING THE FUTURE OF
MANUFACTURING IN EUROPE

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Cataloguing data can be found at the end of this publication.

ISBN 92-79-01026-3

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Printed in Belgium

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PREFACE



“Strong reasons make strong actions.”

William Shakespeare

Manufacturing is the dominant sector of the European economy. Since each job in manufacturing is linked to two additional jobs in high quality services, Furthermore, it also exerts a strong technology pull on research and innovation – so the EU depends strongly on the dynamism of its manufacturing industry! Putting knowledge and innovation at the heart of European growth is therefore a must.

Speeding up the rate of industrial transformation to high-added-value products, processes and services was the key message from a recent meeting of a group of leading European industrialists. This document presents a concise strategic master-plan for realising that goal, and thus keeping Europe at the forefront in manufacturing.

I would like to thank all the members of the High Level Group, and, especially the Support Group members, for the time and attention they have devoted to this exercise. I also wish to thank the European Commission services of the Enterprise, Information Society and Research Directorates-General for their support to the *Manufuture* initiative

Finally, I would like to express gratitude to those numerous contributors who have commented on the draft versions of this document.

A handwritten signature in black ink, appearing to read 'Heinrich Flegel'.

Heinrich FLEGEL

DaimlerChrysler, Chairman of *Manufuture* High Level Group

MANUFUTURE PLATFORM

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M A N U F U T U R E S R A



BACKGROUND

The *Manufuture* European Technology Platform was launched in December 2004 in Enschede, the Netherlands, with the publication of '*Manufuture – a Vision for 2020*'. This document resulted from detailed analyses carried out by a High Level Group formed a year earlier, composed of high-ranking representatives from European industry and the scientific community. The vision document recommended the preparation of a more detailed Strategic Research Agenda (SRA), paving the way for the definition of research priorities to be implemented via the EU's future RTD Framework Programmes, in coordination with initiatives at Member State, regional and individual stakeholder levels.

Produced with the help of a specially convened Support Group, the resultant SRA recommends employing the Seventh Framework Programme (FP7) as the means to move towards a new manufacturing paradigm and to outline a roadmap for industrial transformation, making synergistic use of all available resources. Its proposed solutions and research priorities – the so-called 'pillars' – are anchored in a number of recent strategic foresight studies, reports and workshops. Among the most significant are MANVIS (Manufacturing Visions – integrating diverse perspectives into pan-European foresight) and FuTMaN (Future of manufacturing in Europe 2015-2020 – the challenge for sustainable development).

The SRA is intended as a tool for further action, rather than an implementable roadmap in itself. A first version was presented at the *Manufuture* 2005 conference in Derby, UK, forming the basis for on-going consultation with all interested stakeholders in the run-up to the launch of FP7. This process was completed in June 2006.

The present document summarises the consensus reached, taking into account all of the received comments. Its findings, collated by the Support Group with the help of Commission staff, constitute an ambitious plan inviting European organisations to invest in a set of targeted research, innovation and education activities that could transform the competitive basis of producing and delivering products and services that reach a new level in satisfying society's desires and expectations.

The *Manufuture* initiative stems from the understanding that Europe's future will depend on the retention of a healthy manufacturing industry. There is thus an urgent need to take advantage of the historic opportunity provided by FP7 to help shape this future. As a next step, it is therefore recommended that the described methodology be used to produce specific technology roadmaps, both horizontal and sectoral, to define priorities for the first calls for proposals.

Acknowledgements

Acknowledgements are due to European Commission DG Industrial Technologies staff for contributing to the realisation of this SRA condensed version; to EPPLab-ITIA CNR of Italy for managing all the editorial operations, website communication and related consultation process; and to all contributors who sent amendments for the SRA improvement.

EXECUTIVE SUMMARY

The *Manufuture* Technology Platform aims to provide an analysis and methodology leading to a transformation of European manufacturing industry into a knowledge-based sector capable of competing successfully in the globalised marketplace.

The economic importance of sustaining a strong manufacturing base in Europe is evident from the fact that it provides jobs for around 34 million people, and produces an added value exceeding €1 500 billion from 230 000 enterprises with 20 and more employees. Today, however, it faces intense and growing competitive pressure on several fronts. In the high-tech sector, other developed economies pose the greatest threat. On the other hand, manufacturing in more mature traditional sectors is increasingly migrating to low-wage countries such as China and India. And these, too, are rapidly modernising their production methods and enhancing their technological capabilities.

Moreover, the short-range perspective of some shareholder considerations leads to a disproportionate loss of European technology to outside countries, causing a destruction of work-places that cannot be repaired by technology alone

A step further

A number of ‘vertical’ technology- or sector-specific action plans and Technology Platforms have already been established, or are in the course of preparation. *Manufuture* goes a step further by addressing underlying ‘horizontal’ approaches applicable across a broad spectrum of industries.

It advocates the use of existing and new science-based solutions to transform European industry in ways that will strengthen its ability to compete in terms of high added value, since purely cost-based competition is unsustainable. By formulating synergistic fields of action and research, it also pursues the goal of maintaining the Community’s social and sustainability standards, while making efficient use of Europe’s remaining resources.

In this SRA, the priorities for maximising added value are outlined in a strategic perspective linking the principal drivers of change with a series of ‘pillars’ of activity spanning the short- to long-term timeframe.

The SRA identifies the key drivers as:

- ▶ competition, especially from emerging economies;
- ▶ the shortening life cycle of enabling technologies;
- ▶ environmental and sustainability issues;
- ▶ socio-economic environment;
- ▶ regulatory climate; and,
- ▶ values and public acceptance.

The countermeasures for competitive and sustainable reaction to these challenges are seen in terms of five priority pillars and their associated enabling technologies:

- ▶ new, high- added-value products and services;
- ▶ new business models;
- ▶ new manufacturing engineering;
- ▶ emerging manufacturing science and technologies;
- ▶ transformation of existing RTD and educational infra-structures to support world-class manufacturing, fostering researcher mobility, multidisciplinary and lifelong learning.

Concentration on these actions will attract high value manufacturing industry, as well as the other fundamental actors such as universities and research centres, even from outside Europe.

Role for collective research

Collective research will certainly have a central part to play in realising the transformation, but technology alone will not meet the objectives of the Lisbon and Barcelona Councils. Understanding of business and financial mechanisms, implementation of new business models and restrengthening of the ethical and social core values of European enterprises will all be required – as will the realisation of scientific innovation in traditional technology areas. Only by involving the largest possible number of stakeholders – notably the existing and proposed Technology Platforms, whether applied at EU or national/regional level, and the innovative SMEs and other independent enterprises that figure largely in the structure of all manufacturing sectors – can today’s knowledge be applied to structure manufacturing as a new engineering science bringing sustainable results for Europe.

Traditionally, European products are associated with high quality, appealing design and cutting-edge technology. The effectiveness of the *Manufuture* research agenda in transforming industry will depend upon manufacturers’ readiness to leverage these strengths, while adapting continuously to the changes necessary in an open, fast-moving global industrial marketplace.

Developments in enabling technologies such as innovative materials, nanotechnologies, ICT and mechatronics give almost limitless possibilities to develop new products or add functionality to existing products. European industry must have access to these technologies and to the tools for incorporating them into product designs.

Research topics to be supported should nevertheless have real industrial relevance and produce measurable impact in terms of marketable products/services or more efficient manufacturing methods. Programmes should therefore be conceived in order to reward results rather than efforts – which implies a substantial parallel investment in the improvement of existing technologies.

From products to product/services

The market increasingly demands products that are customised, yet available with short delivery times. Consequently, the business focus must shift from designing and selling physical products, to supplying a system of products and services ('product/services' or 'extended products') that are jointly capable of fulfilling users' demands, while also reducing total life-cycle costs and environmental impacts.

Innovating production

A fundamental concept of the *Manufuture* vision is that of 'innovating production', which embraces new business models, new modes of 'manufacturing engineering' and an ability to profit from ground-breaking manufacturing sciences and technologies.

The 'virtual factory' of the future will manufacture in adaptable networks linking medium- and large-sized OEMs (original equipment manufacturers) with value-chain partners and suppliers of factory equipment/services selected according to needs at a given time. Its composition will not be limited by the presumption of physical co-location, nor by a need to maintain rigid long-term relationships.

This will demand a tremendous and concerted effort. At the heart of the new enterprises will be knowledge management, network management, and relationship management based on trust and ethics. The understanding that Europe and its population cannot forever live on a cushion of welfare underlines the fact that there is no other way into the *future* but to network globally in a reliable way.

Favourable climate

Reaching these objectives will depend on the implementation of supportive fiscal and legislative framework conditions at EU market level. A consensus of support for the *Manufuture* vision will naturally enable a European Manufacturing Innovation and Research Area (EMIRA) to be created as an integral part of the European Research Area. It will promote the interests of European manufacturing industry, take account of regional and national needs, promote participation in European programmes (Framework Programmes, Eureka and other initiatives) and recognise Europe's wider role in the global RTD network.