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Towards a Common Vision on European Manufacturing

Swiss Manufacturing of the Future

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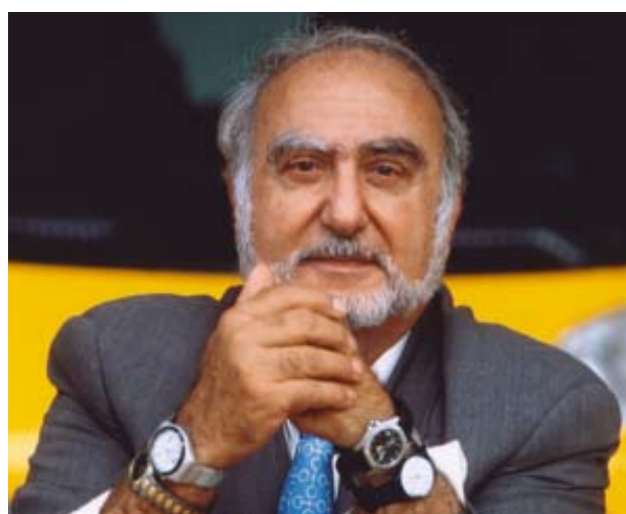
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Glossary

Cybelec	SME
SwissMEM	Swiss mechanical and electrical engineering industries
ETHZ	Federal Institute of Technology Zurich
EPFL	Federal Institute of Technology Lausanne
ZFH	Zurich University of Applied Sciences at Winterthur
CTI	The Innovation Promotion Agency
OPET	Federal Office for Professional Education and Technology
SER	State Secretariat for Education and Research
seco	State Secretariat for Economic Affairs

Preface



By the mid-twentieth century, Switzerland was one of the leading industrialised nations in the world, boasting a large number of small, medium-sized and large companies. Relative to its number of inhabitants and surface area, Switzerland had a much higher proportion of large international firms than other countries. At that time, the word “unemployment” was unheard of in Swiss public debate. A major activity of firms was importing workers from abroad – mainly from Italy – and securing the required work permits.

Today, our industrial fabric is starting to fray around the edges. Around 140,000 people are currently out of work in Switzerland. Although several of our neighbours including Germany, France, Italy, and the UK have much higher unemployment rates, the level in Switzerland is too high for our social security system to support.

The service sector – the linchpins of which are finance and tourism – is heavily reliant on industrial activity. Statistics show that every job loss in industry leads to the loss of one and a half to two jobs in other sectors of the Swiss economy.

The finance and tourism sectors alone cannot be expected to provide Switzerland with the jobs it needs. Nor can they allow Switzerland to gain the independence needed to develop and manufacture new products by mobilising the requisite know-how. For this reason, it is imperative that we once again endeavour to reinforce our industrial fabric.

In my opinion, the difficulties faced by Swiss manufacturing are not linked to higher production costs in Switzerland, or to a dearth of technical expertise, or to education, or even to the lack of raw materials. I am convinced that they are due to the dramatic loss of entrepreneurial spirit throughout our society. Nowadays, an entrepreneur does not command the same respect that he once did. The entrepreneur as an artist, who develops new products, creates jobs, communicates and constantly puts his creativity to work, reveals new ways to overcome challenges. This type of entrepreneur has lost much of his former status. I believe that if we are to promote a “ManuFuture” for Switzerland and Europe, we have to create the necessary conditions which promote this entrepreneurial spirit and thus contribute to a resurgence in entrepreneurial activity.

Future generations should be imbued with this spirit and regain, like those that went before them, a taste for starting their own companies. Their place is not simply in a bank, sitting in front of a computer screen trading on the stock exchange. We need more entrepreneurs and we need an entrepreneurial spirit! We also need a commitment to and passion for the job of the entrepreneur! If we are to achieve this, we must inform people better about the beauty and potential that this profession offers – a little like what we are doing here. Universities and other third-level education institutions must also be actively involved in promoting this entrepreneurial spirit. In addition, there are existing models used to reach this goal.

1. Being an entrepreneur does not mean being the richest or most powerful captain of industry in our country. And it need not even mean being the boss of a large or medium-sized company. Anyone, whether it is a gardener, a foreman, a baker, a carpenter or a civil servant, can also be an entrepreneur in his own way. The sole requirement is an entrepreneurial approach to his job.
2. Being an entrepreneur is not only about good management. An entrepreneur is an artist with an abundance of imagination and innovative spirit. He is open to new ideas and capable of calling both himself and society into question. An entrepreneur is also someone who is captivated by beauty and who cares deeply about the fate of our planet.
3. An entrepreneur is dynamic and courageous. He invests a large part of his creativity into making his ideas a reality and fights every day to overcome both human and material challenges. His energy is an inspiration to those who work with him.
4. An entrepreneur makes prudent use of the goods which the planet, society and regions have to offer, treating them with the same care he would afford his own property. He is committed to creating goods which are sustainable in the medium and long term. An entrepreneur is not focused solely on immediate, ephemeral or artificial profits, like quick gains on the stock market. His strategy does not centre around immediate financial profits, but on long-term development.
5. An entrepreneur knows how to motivate his troops and serves as a role model.
6. Last but not least, an entrepreneur is passionately committed to his work. It is a job from which he derives not only financial gain but also pleasure. Couch potatoes will never make good entrepreneurs!

Industrial growth is achieved through greater entrepreneurial spirit and increasing numbers of entrepreneurs. Several other conditions must also be met to sustain such growth. Entrepreneurial initiative must be complemented by a favourable business environment aimed at facilitating and promoting entrepreneurship.

Following our discussions within the High Level Group of the European Union, Professor Boër declared his readiness, to create a working group in charge of defining complementary measures. The present document provides a description of the initial work carried out by this group.

Nicolas G. Hayek
President and member of the Board of Directors of Swatch Group AG

Executive Summary

Both knowledge stemming from Research and Development (R&D) and labour costs are major factors in a growing global divide. As a consequence, and considering that all stages in a product's life cycle are now interrelated, this means a massive global redistribution of value chains. Confronted with a new situation, Swiss manufacturing faces a transitional phase in which it needs to adapt and transform.

In order to make this transition in a productive way and to ensure both technological and social sustainability in the process, the regions involved need to find a sensible new approach. In a competitive climate there must also be cooperation on a range of issues that are of common concern. The fusion of both concepts, competition and cooperation, is often called "coopetition".

In this new global scenario, Europe is defining its leadership role in the emerging horizontal field of Advanced Manufacturing. To this end, the ManuFuture Initiative was launched in 2003 by the European Commission (Directorate General Research and Directorate Industrial Technologies). Its mission is to propose a strategy based on research and innovation capable of:

- Speeding up the rate of industrial transformation
- Securing high added value employment
- Winning a major share of world manufacturing output in the increasingly knowledge driven economy



The ManuFuture 2003 Conference came to the conclusion that EU manufacturing not only matters but is critical to wealth generation and job creation. Thus "a healthy and wealthy Europe needs a healthy and wealthy manufacturing sector!" The actions carried out throughout 2004 by the ManuFuture High Level Group (HLG) and an Expert Group set up by the EC have led to the development of the ManuFuture VISION for 2020¹ and the EU ManuFuture Technology Platform. It was formally launched during the ManuFuture 2004 Conference in Enschede, NL.

¹ "Assuring the future of manufacturing in Europe" Report of the High-Level Group, Publication Office of the European Commission, November 2004 (http://www.europa.eu.int/comm/research/industrial_technologies/manufuture/home_en.html)

Technology Platforms unite stakeholders around a common vision focusing on the definition of a strategic research agenda. They aim to mobilise the necessary critical mass for a sustained research and innovation effort.

The Strategic Research Agenda (SRA) for EU has been developed. Its multiperspective approach aims at:

- Creating an integrated knowledge-sharing community with strong links between academia and industry
- Building a world-class R&D infrastructure
- Adopting new business models, organisational concepts and working methods
- Establishing a favourable economic and regulatory climate to encourage research investment and entrepreneurship
- Restructuring education and training to reflect the life-long learning needs of tomorrow's "knowledge workers"
- Working to increase public awareness of the value of science, and of rewarding career opportunities in science and technology fields

The ManuFuture Platform SRA, as well as other platforms' SRAs, will be implemented in the 7th European Research Framework Programme and the respective annual work programmes.

Within the European ManuFuture Technology Platform, several national Technology Platforms already exist or are in development (Italy, Spain, Portugal, Poland, The Netherlands and Germany are well advanced at the moment). The objective is to create a sustainable network of national² Technology Platforms and to utilise synergy effects on regional, national and European levels.

² The Technology Platform for Manufacturing in Switzerland has the official logo of "ManuFuture-CH" and is in this brochure called "Swiss ManuFuture Technology Platform" or simply "Swiss ManuFuture".

Currently in Switzerland there are approximately 76,000 companies with around one million employees still operating in the manufacturing sector. With some 300,000 permanently employed workers and accounting for 42% of Switzerland's total exports volume (59 billion Swiss francs) the mechanical, electrical and metal industries (known in German by the abbreviation MEM) play a central role in the Swiss economy. Therefore, Swiss ManuFuture will concentrate on the MEM sector.

In line with European policy, Swiss ManuFuture centres on a strategy based on research and innovation. Switzerland is already active in these areas; the Confederation has set up the Swiss National Science Foundation and under the auspices of the Federal Department of Economic Affairs there is the promotion agency for innovation, CTI. The working group acknowledges the promotion activities executed to date, but calls for these activities to be decisively stepped up.

In addition, Switzerland has a solid basis on which to build. Our professionals (key phrase "World Skills competition") and researchers (key phrase "Nobel prize") are extremely well qualified compared to their international counterparts. "Swiss made" is still considered as a quality seal; Switzerland has very well developed infrastructures and a long tradition of cultural diversity. However, this basis is not sufficient to keep one step ahead of the international field with regard to powers of innovation.

Switzerland has the potential to stand up against global competition – even in the manufacturing sector. What is required, however, is the faith of the broad population that this goal can be achieved – each and every individual can and should contribute to Switzerland's becoming an innovation nation.

Roadmap 2005

The Swiss ManuFuture Technology Platform has been proposed and accepted by the European HLG (High Level Group). The main focus, as suggested by Nicolas G. Hayek, will be on entrepreneurship and more flexible governmental rules and regulations.

For 2005 the following actions have been envisaged and accomplished:

- Set up a working group composed of few but representative people from industry, education, interest group and federal sectors to analyse the European documents and prepare the Swiss vision for the future of manufacturing
- Strong participation in the management bodies of the EU ManuFuture Technology Platform
- Get substantial and high level support at the political, industrial, banking and educational levels
- A Swiss ManuFuture conference was held in November 2005, where the results of the Working Group were presented and widely publicised and where the Technology Platform for manufacturing in Switzerland "Swiss ManuFuture" was officially launched.



Why ManuFuture? Why Swiss ManuFuture?

The Swiss ManuFuture vision and action plan document is based on the following three observations:

1. A sustainable and balanced economy is only possible if it includes a strong manufacturing component. Indeed, an estimated 75% of the EU GDP (Gross Domestic Product) and 70% of the employment is related to manufacturing. A purely service-based economy is therefore unrealistic.
2. Successful product development cannot be achieved if it is not closely linked to manufacturing technology. Thus, delocalised manufacturing can quickly lead to waning product development and engineering skills and of competitiveness.
3. Manufacturing jobs contribute fundamentally to the social and cultural balance of our country. A society that loses its ability to fabricate goods, will quickly lose its capacity to create and innovate, with all the economic and social consequences.

The Mission of Swiss ManuFuture

The mission of Swiss ManuFuture is consistent with the EU mission, while adapting it to specific issues of the Swiss manufacturing sector and MEM industries, and actively pursuing its implementation. In particular, the Swiss ManuFuture Technology Platform will address the following main issues:

- Increasing support for R&D and closing the gap between long-term basic research and short term product-oriented R&D
- Efficient promotion of innovation and rapid technology transfer
- Enhancing intra- and inter-company organisation, operation and collaboration
- Manufacturing education and training at all skill levels
- Promotion and positive image building of the Swiss manufacturing sector

Three Areas of Action

The first area of action is **scientific and technological research**, to stimulate product innovation, to supply the knowledge content/added value for the products and to support the development of new manufacturing technologies. The second area of action, which is particularly crucial for Swiss companies, is **capacity building in advanced production methods and market access** for their products. The third area of action concerns the **improvement of education, the distribution of information and the improvement of the support measures** for manufacturing.



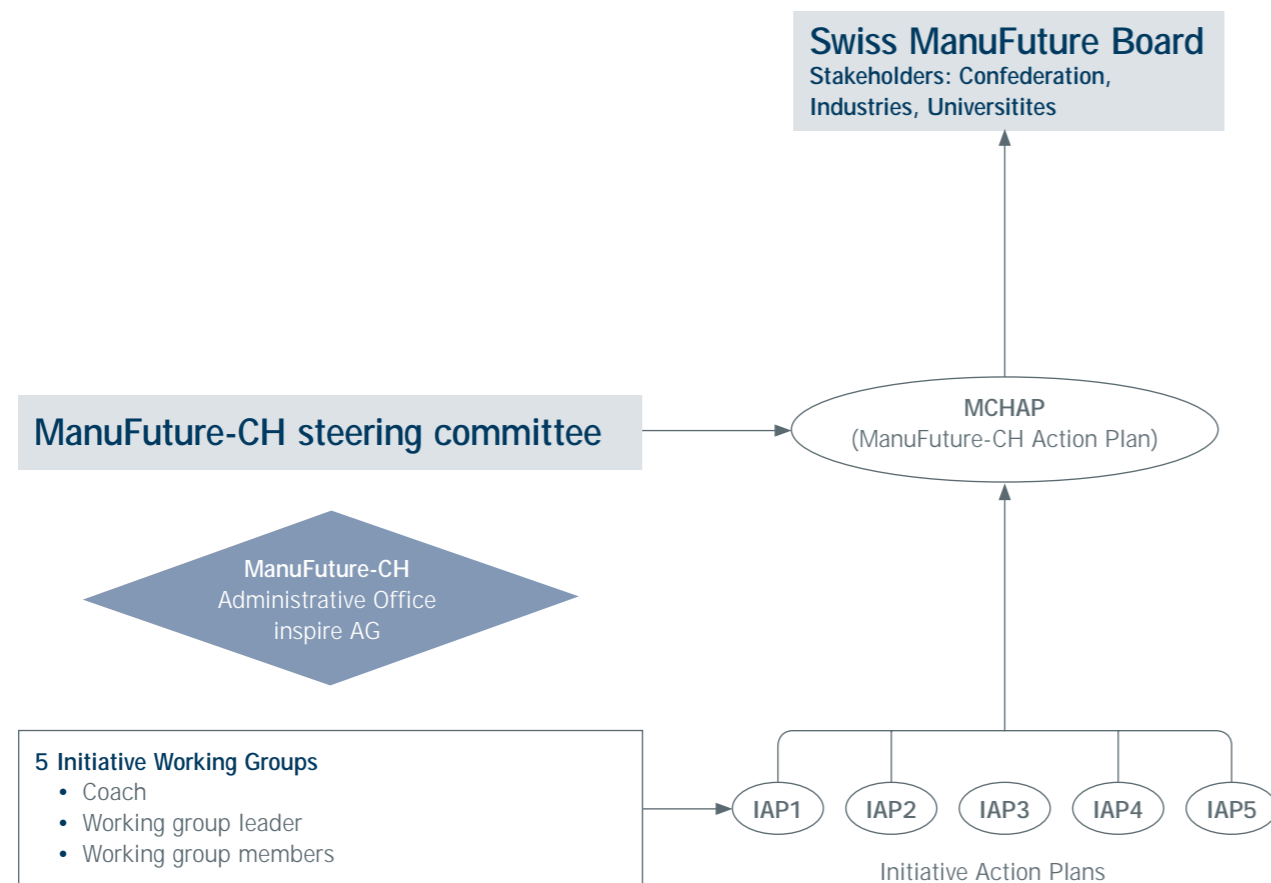
Action Plan with Five Initiatives

The action plan of the Swiss ManuFuture Technology Platform focuses on five complementary tasks, consistent with the ManuFuture approach and following the above described areas of action, namely:

1. Promotion of manufacturing and entrepreneurship
2. Manufacturing education
3. Research and development for innovative products and manufacturing
4. Organisation and management models for "coopeting" of manufacturing SMEs in global markets
5. Support measures for manufacturing innovation

Five Initiative Working Groups have been set up including members from all the stakeholders (industry, associations, federal agencies, promotion agencies, education, marketing, etc.). They are working intensively and preparing a detailed action plan for each initiative that will be integrated in one document for the fall of 2006.

Swiss ManuFuture Organigramme



Swiss Manufacturing of the Future

The Role of Research and Education for Swiss and European Leadership



By any indicator, manufacturing is a strategic sector vital for the economy. Thus, the challenge goes beyond simply “bearing the strain”. In order to regain a leadership position by 2020, Europe with Switzerland in its middle must reinvent its manufacturing industry. This is the only way to continue to contribute in a competitive yet sustainable way to world markets, and to a more stable world economy.

To achieve this objective the EU and Switzerland must capitalise on their existing strengths. On this basis, Europe needs to:

- Transform manufacturing from resource-intensive to knowledge-intensive
- Develop new business models and attitudes
- Strengthen links between science and economy
- Develop appropriate research infrastructures
- Adopt new approaches to education and training

These efforts should take into account the opportunities and constraints associated with social issues, environmental concerns and resource shortages, as well as with the paradigm of the life cycle of customised products.

Although everyone experiences in some form the accelerating political, social, cultural and economic changes that our planet is undergoing, not all are aware of the fact that these changes are really occurring in a closed system. Amplified by fast technological progress almost around the globe, this has compelling consequences for our future. The belief that a region or a nation can live in autarchy is an illusion.

Economic imbalance and cultural heterogeneity can lead to dangerous tensions threatening global stability. We see a growing competition for energy, water and raw materials, because resources in a closed system are finite. In the next decades, during a vital transition phase, we will face the daunting challenge of reducing these tensions while promoting worldwide social well-being.

In this context, economic development plays a key role. Thus the emergence of Asian as well as Central and Eastern European (CEEC) economies must be viewed as a positive development, even though it puts Western economies under enormous strains, in particular in the manufacturing sector. During this phase of reshaping the world economies, Europe and Switzerland must find ways of bearing these strains.

European Platforms as Framework

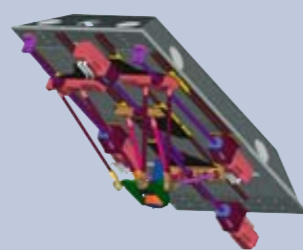
To tackle these issues, a number of technology platforms are being established on a European level. They actively involve all main stakeholders for specific industrial sectors. Among these, the ManuFuture Platform deals with issues of high relevance for the whole spectrum of manufacturing. Proposed solutions can be applied in a synergistic manner. Strategic interests dictate that Switzerland actively contributes to the EU ManuFuture Platform with its own Swiss ManuFuture Technology Platform. It will address issues specific to the Swiss industrial and manufacturing sector. Other countries are following the same path and are developing their own specific Technology Platforms with their own characteristics. However, all are designed within the framework of the EU ManuFuture Platform.

In Switzerland, mechanical and electrical engineering, the metal working industry and the production of precision instruments (the so-called MEM industries) contribute heavily to our gross national product with some 300,000 employees and 59 billion Swiss francs in export volume representing 42% of total Swiss exports. The MEM industries, together with related fields such as information and communication technologies also develop high performing production facilities for numerous other industrial sectors, such as the agricultural, automobile, chemical-pharmaceutical, electronic, food and textile industries. Considering this additional enabling function, the Swiss ManuFuture Technology Platform will focus on MEM industries.

Why ManuFuture? Why Swiss ManuFuture?

Succeeding in reshaping and strengthening the European and Swiss manufacturing sector is essential. A sustainable and balanced economy is only possible if it includes a strong manufacturing component. Indeed, an estimated 75% of the EU GDP and 70% of the employment is related to manufacturing. A purely service-based economy is therefore unrealistic.

Meeting new Market Demands



An exploratory project financed by CTI and realized by EPFL/IPR and the Willemin Macodel Company helped define completely new kinematic concepts to meet tough manufacturing and market challenges.

Follow-on projects, also sponsored by CTI, led to the development of a revolutionary parallel kinematics machine-tool with unprecedented performances and applications, complete with man-machine CNC interface and calibration technology.



Products that have low knowledge content need to be manufactured in other countries where the costs are lower in order to be competitive on the global market. However, successful product development cannot be achieved if it is not closely linked to manufacturing technology. Thus, delocalised manufacturing can quickly lead to waning product development and engineering skills and the disappearance of competitiveness.

We should not lose the manufacturing know-how we have acquired. We should keep producing in a strong national manufacturing industry particularly with the innovative products invented and designed in Switzerland. Manufacturing jobs contribute fundamentally to the social and cultural balance of our country. A society that loses its ability to fabricate goods will quickly lose its capacity to create and innovate, with all the economic and social consequences.

The current situation in the EU and in Switzerland requires special and strong measures to adapt the manufacturing sector to a set of realities including the new global economic environment, social and political changes, the accelerating rate of scientific and technological development as well as new product concepts and models. The EU ManuFuture Technology Platform and the various associated national ManuFuture Technology Platforms respond to this urgent need.

Specifically, the overall mission of the EU ManuFuture Technology Platform is to propose a strategy based on research and innovation capable of speeding up the rate of industrial transformation in Europe, securing high added value employment and winning a major share of world manufacturing output in the future, knowledge-driven economy.

The Mission of Swiss ManuFuture

The mission of the Swiss ManuFuture Technology Platform is consistent with the EU mission, while adapting it to specific issues of the Swiss manufacturing sector such as the MEM industries. Its implementation is actively pursued. In particular, the Swiss ManuFuture Technology Platform will address the following main issues:

- Increased support for R&D and closing the gap between long-term basic research and short-term product-oriented R&D
- Efficient promotion of innovation and rapid technology transfer
- Enhancing intra- and inter-company organisation, operation and collaboration
- Manufacturing education and training at all skill levels
- Promotion and image building of the Swiss manufacturing sector nationally and globally

A single institution or federal organisation alone cannot successfully address such diverse issues. Rather, a broad community involving all stakeholders in the different aspects of manufacturing must collaborate towards finding sustainable solutions.

Therefore, the Swiss ManuFuture Technology Platform is intended as a programme to strengthen existing funding instruments for research, development and technology transfer, which will cooperate in an innovative and goal-oriented way.

Manufacturing in Switzerland Today



In Switzerland there are over 317,800 companies with 3.7 million employees. The approximately 307,000 companies with less than 250 employees, the small and medium-sized enterprises (SMEs), represent 96.6% of the total. The manufacturing sector totals 76,000 companies with one million employees, somewhat less than one third of all companies and employees.

The MEM industries as producers of investment goods enable other industries to produce (consumer) goods. As such they are an important corner stone of our economy. This is also reflected in the figures: MEM industries alone consist of approximately 17,000 companies with about 10% of the total Swiss workforce. In the last decades, the MEM industry sector has undergone profound changes. As a consequence, the majority of the MEM industrial sector is made up of SMEs, many of them subcontractors to large international conglomerates.

The economies of Central and Eastern European countries are growing fast and are competing with Switzerland and the EU-15 countries on various grounds. Furthermore, the growing economies in Asia offer other opportunities than simply low wages. Of greater importance for numerous companies of the MEM industries in the western world is their proximity to these emerging Asian markets, which are difficult to master without presence in the region.

Labour-intensive production has started moving eastward. This movement will continue and, especially in Eastern and Central Europe, the demand for production processes with higher added value will grow. The global economic climate will become ever more competitive. In the short term, the disparity in wages among competing economies will be the overriding driver for change and the cause of attrition of the manufacturing sector in Europe, beside rapid scientific and technological development. In the longer term, it is anticipated that the wage disparities will wane and that new drivers will shape the product development and manufacturing sector. Among them, energy and transportation costs, scarcity of resources, environmental issues, customisation and customer service are likely to gain in importance, setting paradigms and opening new opportunities.

Focus on Swiss MEM Industries

In order to develop further in a sustainable manner, the Swiss MEM industries will have to focus on innovation and the production of complex and "intelligent" parts and systems to be used in production processes worldwide. At the same time, they need to effectively protect their process know-how. Such knowledge-driven MEM industries are important for a successful Swiss economic and societal future.

The Swiss MEM industries can build on solid foundations in various aspects:

- Highly skilled and educated workforce
- Reputation for quality and precision of "Swiss made" products
- Good global infrastructures (transportation, communication, finance)
- High quality scientific research and research infrastructures
- Relatively homogeneous social fabric
- Good record on environmental issues and measures
- Tradition of cultural pluralism

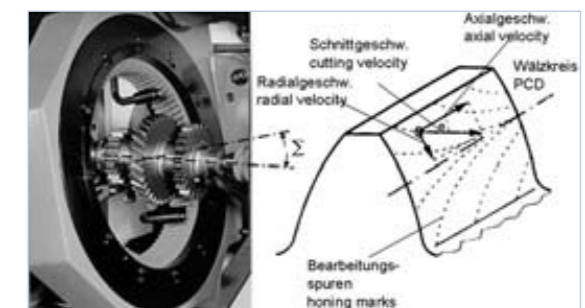
However, Switzerland needs to improve on several weak spots in order to strengthen the MEM industries:

- The educational system must adapt to the new global context and demands, and to the needs of manufacturing industries.
- Many companies operate with outdated management techniques, a situation that contributes to their demise.
- There is more competition than pre-competitive cooperation among Swiss companies of the same sector. This means they present a weaker front to outside competitors.
- The support for Swiss innovation and for economic promotion abroad is of questionable efficiency.
- In Switzerland, there is insufficient public financial support particularly for short- and mid-term research to bridge the gap between basic science and marketable products. This fact greatly hinders the innovation process.
- Manufacturing industries have a rather negative image. They are seen as being a polluting industry (even though much improvement in ecology has been achieved) and an industry without a future. This perception has to be changed.

The Swiss ManuFuture Technology Platform aims to improve the capacity to innovate and to put competitive products on the market. The European ManuFuture initiative needs the support of national programmes. Otherwise, the European approach will change little. Therefore, the Swiss initiative must directly contribute to an enhanced exchange of knowledge between companies of the MEM industries and relevant scientists in Switzerland. Previous national initiatives of a similar kind some 10 to 15 years ago were successful. We should build on this success.

New Process of Direct Honing

Honing greatly enhances gears due to the introduced fishbone shaped surface marks and the introduced stress field. Because honing is an extra step in the process, chain honed gears are expensive. Together with ETH Zurich, the Fässler AG developed a new machine that allows direct honing: it increases the material removal rate so that honing is possible directly from the hardened state without prior grinding. The breakthrough is mainly due to the highly dynamic synchronization of fast running tool and workpiece axis coupled by the process. Besides, direct honing reduces the accumulated division error of the workpiece. After three PhD thesis on this topic, the machine was introduced in the market during the EMO 2003 in Milan.



Swiss ManuFuture Strategy and Approach

The ManuFuture strategy results from an analysis of the factors that are presently determining the European manufacturing sector and those that will shape its future. The former factors include chiefly product cost and as such global competition. The latter include new markets, an accelerated pace of scientific research, technological development and innovation, customised products associated with broader service concepts, very short time-to-customer, scarcity of resources, environmental and social factors.

Consequently, a sustainable strengthening of the European and Swiss manufacturing sector must rely on a strategy that focuses on these key issues:

- New products (investment goods) with proportionally low labour content and high “knowledge-based” added value (e.g. embedded intelligence, high functionality)
- New manufacturing and organisational approaches to fabricate, distribute and service these products
- Using technological superiority to increase performance and to reduce costs of both products and manufacturing infrastructure
- Opening new markets to sell these products

The Swiss ManuFuture approach is designed to initiate and support actions that will produce these changes. In doing so, it will apply a few guiding principles to foster a climate conducive to constructive debate.

Swiss ManuFuture will seek input from all stakeholders in the Swiss manufacturing community to define concrete, regionally oriented actions. Linkages will be formed with other relevant international initiatives such as EU ManuFuture and Intelligent Manufacturing Systems (IMS) in order to create and exploit synergy effects.



Swiss ManuFuture proposes an ambitious long-term vision of a dynamic Swiss industrial sector. Yet, on the operational level, it will rely on existing instruments more specifically the Swiss National Science Foundation (SNSF) and the Swiss Innovation Promotion Agency (CTI) for long- and short-term actions. It will focus mainly, but not exclusively, on the crucial mid-term issues that critically influence technology generation and transfer for sustained industrial growth.

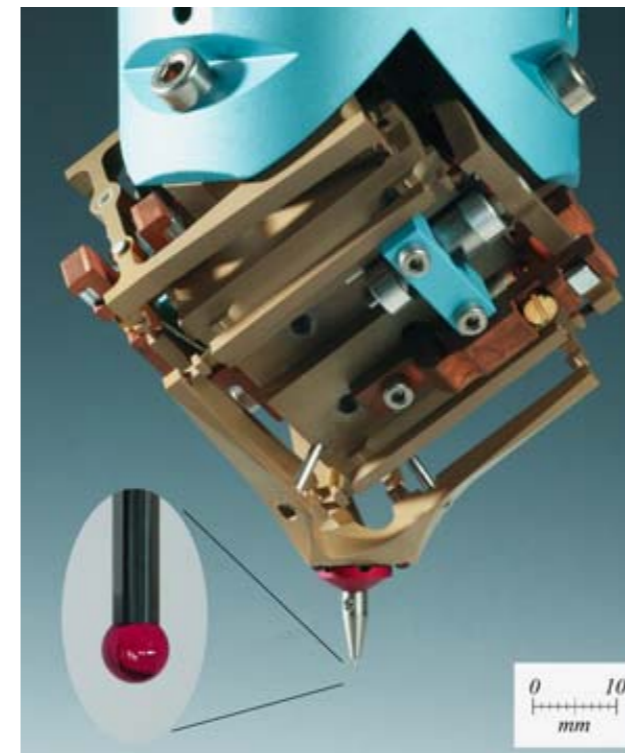
Three areas of action

Swiss ManuFuture will deal not only with scientific and technological problems, it will also address organisational and social issues that have a strong impact on the Swiss manufacturing competitiveness. Its actions will be very much coupled with practical issues faced by Swiss SMEs. Clearly defined criteria will be used to evaluate the platform’s effectiveness. Consistent with the strategy, the Swiss ManuFuture approach delineates three main areas for action:

The first area is **increased scientific and technological research** to stimulate product innovation, to supply the knowledge content and added value for the products and to support the development of new manufacturing technologies. Efforts must be transdisciplinary, focusing on the convergence of revolutionary disciplines (e.g. intelligent mechatronic systems, reconfigurable and evolvable systems, micro-electronics and micro-technology, nano-technology,

bio- and biomedical technology). Modelling and simulation methods for these new products and production systems as well as visualisation and planning by virtual reality systems and knowledge management will be required to accelerate the design and validation processes. Switzerland’s research is well positioned with respect to the ManuFuture vision and strategy, but it lacks in intensity and it does not yet sufficiently translate into innovative products.

The second area of action particularly crucial for Swiss companies is to **adapt manufacturing to new production methods and to strengthen access to new markets for their products**. Manufacturing facilities will have to be highly flexible and adaptive in order to fulfil customer requirements. A world-wide manufacturing network, based on partnerships with other companies, may be required to satisfy global market demands as well as customisation and service expectations. Digital supervision and information processing will also be key elements of new manufacturing systems and networks. These manufacturing trends require a profound rethinking of the organisation of companies in order to integrate efficiently and advantageously in local and global manufacturing networks and to profit from collaborative concurrent product design and manufacturing.



Action Plan with Five Initiatives

The third area of action concerns the **improvement of education, the distribution of information and the improvement of the support measures for manufacturing**. High technology, knowledge-based products and manufacturing rely on fast changing scientific results and innovations and require a highly educated workforce at all skill levels as well as mechanisms to facilitate continuous knowledge acquisition by this workforce. The educational system must be adapted to meet these requirements. In Switzerland, manufacturing needs more visibility in the universities, Swiss Federal Institutes of Technology and Universities of Applied Science both in terms of academic curricula and R&D effort. Vocational education and training in manufacturing must be promoted and more apprenticeship positions should be opened. For the Swiss ManuFuture approach to succeed, all stakeholders must be highly motivated and indeed convinced of the importance of their contributions. Better and simpler government regulations should be sought in order to better support the manufacturing activities in Switzerland. Thus, respecting confidentiality regulations, objective and regular information about ManuFuture and its concerns must be provided to the participants. This is necessary to promote collaboration, to stimulate a steady, fruitful and constructive debate and to secure strong steady support for ManuFuture.

In summary, Swiss ManuFuture represents a bold and innovative initiative, federating all interested parties to revitalise the Swiss manufacturing sector. Swiss ManuFuture capitalises on current strengths of the Swiss manufacturing sector to promote long-term investments in manufacturing and to secure sustained economic and social prosperity for Switzerland.

In this desired climate of innovation and openness, the action plan presented in the next section only represents a general framework intended to help start and stimulate the manufacturing debate and rebuilding effort. It will be up to all stakeholders to shape this action plan. They need to inject specific substance and they have to implement it for it to be effective and efficient.

Dressing Process for Grinding

Breakthrough for metallic bonded grinding wheels is achieved with the development of a suitable dressing process, which was found to be the Ecodress process, working electrochemically. It was initiated by Agathon AG and developed jointly with Agie AG, Diametal AG, Blaser Swisslube AG and IWF of the ETH Zurich. Today it has become a standard in the grinding of tool inserts.



The action plan of the Swiss ManuFuture Technology Platform focuses on five complementary initiatives, consistent with the ManuFuture approach, namely:

1. Promotion of manufacturing and entrepreneurship
2. Manufacturing education
3. Research and development for innovative products and manufacturing
4. Organisation and management models for "coopeting" manufacturing SMEs in global markets
5. Support measures for manufacturing innovation

The scope of the five initiatives will differ and each will have its own objectives, organisation, planning and budget. The scope of each initiative will be defined in an initiative road mapping task. In addition, the five initiatives will be supported and coordinated by a platform management task.



INITIATIVE 1 Promotion of Manufacturing and Entrepreneurship

Objectives

Inform the population at large and all specific stakeholders of the importance and nature of manufacturing and of its impact on our future well-being. Entrepreneurship is an important part of manufacturing as well as manufacturing is an important moment for the product life cycle on which the entrepreneur has to work on. It is important to establish a more positive image and get a stronger general commitment for manufacturing and entrepreneurship.

Stakeholders

MEM industries and other industrial sectors, manufacturing workforce and trade unions, vocational education and training communities, high school students, political establishment, media.

Planning

A significant one-time promotion and information effort is planned over the next three and a half years that will result in a permanent information mechanism about manufacturing and entrepreneurship.

INITIATIVE 2 Manufacturing Education

Objectives

Develop a coherent vision of manufacturing education across the whole vocational education and training community (use results of previous studies such as Global Entrepreneurship Monitor (GEM)) to provide Swiss MEM industries with a highly skilled and knowledgeable workforce for all types of key manufacturing activities. Perform specific actions and programmes to implement this vision, in particular implement curricula and new educational methods (e.g. teaching factory).

Stakeholders

MEM industries, manufacturing workforce and trade unions, education community, cantons and Confederation, EU partners.

Planning

As this task involves many organisations (Confederation, cantons, universities, industries) and tackles issues that are already being addressed at the national level (but not specifically from the manufacturing point of view), it will require careful planning and organisation over the first year or so of the platform. Over the next four years manufacturing education and training will be specifically addressed with respect to vocational education and training, and education at university level: Universities of Applied Sciences, cantonal universities and Federal Institutes of Technology. The work will touch upon the definition of curricula, teaching methods, the relationship between industry and the education community and continuous education.

INITIATIVE 3 Research and Development for Innovative Products and Manufacturing

Objectives

In collaboration and in synergy with SNSF and CTI, establish a strong mid-term (two to four years) research and development programme to bridge the gap between long-term basic research and short-term competitive research in strategic areas such as materials, nano-technologies, micro-electronics, bio- and biomedical technologies, to provide the innovation seed for new, high value added products and the manufacturing technologies to put them on global markets.

Stakeholders

MEM industries, UAS, universities, Federal Institutes of Technology, other research institutions, EU partners.

Planning

The initial phase will focus on defining the main axes of the research programme as well as the criteria and procedures to evaluate proposals and projects. A parallel effort will deal with the formation of consortia of usually competing companies (for instance, Computerized Numerical Control (CNC) specialists and manufacturers) to work on strategic issues of general interest to the branch, and with the development of the framework, which will entice companies to join such consortia. The second phase will see the launch of actual projects.

INITIATIVE 4 New Organisation and Management Models for Manufacturing SMEs in Global Markets

Objectives

Establish new management and business models for efficiently positioning Swiss SMEs on the manufacturing world market. Develop and evaluate the legal intellectual property rights (IPR), organisational, management and technological framework for the successful establishment of networks of "coopeting" SMEs.

Stakeholders

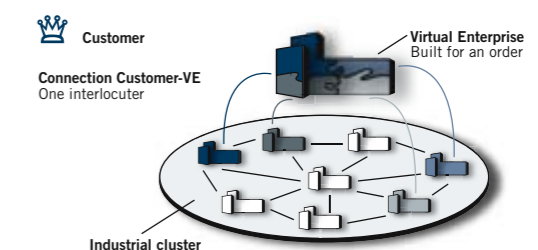
MEM industries, universities (UAS, Federal Institutes of Technology, cantonal universities), the manufacturing workforce and trade unions, cantons and Confederation.

Planning

In addition to the general organisation of the task, the initial phase will include an evaluation of the costs, benefits and hurdles associated with various types of "coopeting" modes and SME networks. This preparatory work will facilitate the launching of networking projects, in which several aspects of sharing and pooling of resources will be addressed (e.g. common administrative facilities, pooling of different manufacturing infrastructures, common sales and services infrastructure) in real market situations. Later in the programme, the results of the various projects will be analysed and documented with recommendations to serve as a basis for the establishment of new networks.

SMT SwissMicroTech – A new business model for SMEs

To face global competition it is necessary for SMEs to join forces. A business model based on the so-called Virtual Enterprise concept has been developed and implemented, thanks to CTI support, to a network of highly specialized, high precision manufacturing SMEs and the concept is presently extended to partners in China.



Roadmapping of the Initiatives

INITIATIVE 5

Support Measures for Manufacturing Innovation

Objectives

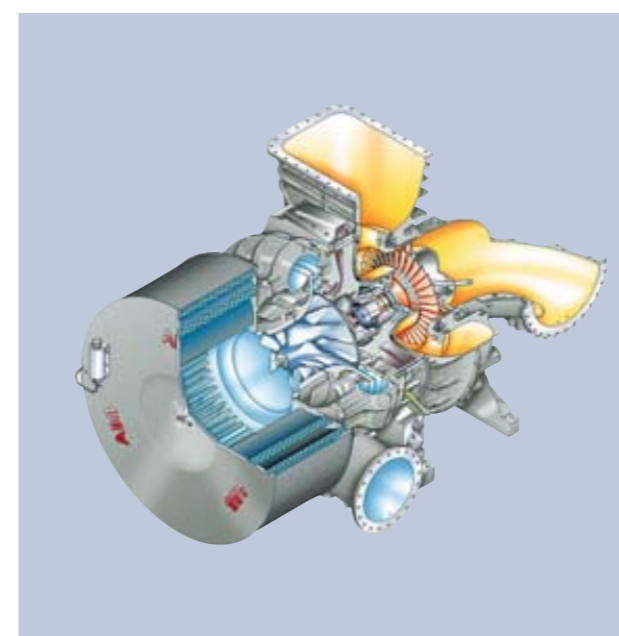
Establish an institutional framework to promote innovation and accelerate technology transfer.

Stakeholders

Confederation, cantons, research and education institutions, MEM industries, manufacturing workforce and trade unions.

Planning

This task should be initiated and performed quickly so that its action can positively impact the rest of the Swiss ManuFuture Technology Platform as soon as possible. A review of the current status of support measures as well as obstacles to innovation and business should be established during the first year or so. It will serve as a basis for introducing institutional changes and support measures. The report of the SATW (Schweizerische Akademie der Technischen Wissenschaft) "Innovationssystem Finnland – was kann die Schweiz lernen?" provides a good starting point for identifying institutional changes. Support measures should address tax, trade, financial, environmental and social issues.



As indicated above, the scope of each of the five initiatives (i.e. content, planning and budget) will be defined separately by initiative roadmapping tasks. Roadmaps and budgets for each of the initiatives will be submitted by the third quarter of 2006. It is envisioned that individual Initiative Management Teams, composed of representatives of all stakeholders in the initiative, will assume responsibility for roadmapping their initiative and winning the broad and firm endorsement of all stakeholders.

The Platform Management will supervise and coordinate roadmapping activities and ensure coherence of the five roadmaps in an integrated platform roadmap. The methodology to develop the roadmaps may include surveys, web-based discussion forums, workshops or other efficient ways of gaining input from stakeholders.

Financing

The Swiss ManuFuture Technology Platform will have two main sources of direct financing:

- Whenever project objectives allow it, funding for projects should be sought through EU funding, that is, whenever they coincide with objectives of actions launched by the EU ManuFuture Platform at the European level within the 7th European Research Framework Programme.
- Switzerland-specific actions should be funded through industry and federal organisations, which have to receive a special additional budget earmarked for the Swiss ManuFuture Platform.

A combination of the above funding will also be possible, particularly when there will be projects involving two or more nations participating in the EU ManuFuture Platform or other manufacturing nations around the world. For example, such combination funding could be possible for projects under the EUREKA programme umbrella "Factory" or projects generated under the label of the IMS (Intelligent Manufacturing System) programme or for Europe-wide initiatives called ERAnet, launched by the European Commission in order to link the most important national R&D funding agencies around common important topics that need a coordinated approach between the European Commission and national efforts.

Besides this direct financing, specific tasks of the platform may benefit from the financial or administrative support of other Swiss federal agencies with which they will interact. They will also benefit from in kind contributions by stakeholders and in particular by industry.