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European Technology Platform *for the future of* textiles *and* clothing

A vision for 2020



The European Apparel and Textile Organisation



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Technology
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Executive Summary

In a global economy privileged access to natural, capital or low-to-medium qualified human resources, and even to markets does not in itself provide for sufficient sustainable competitive advantage. The future European textiles and clothing sector, in a knowledge-based economy will increasingly depend on the industry's ability to relentlessly innovate in its products, to use the most advanced, flexible and resource-efficient processes and to focus its organisational structure and business operations on the constantly evolving needs of its customers. In all this, research and innovation play an ever increasing role.

While there is wide-spread recognition of those facts among companies in the sector, industrial reality often does not reflect this recognition owing to a number of important limiting factors. In an industry

dominated by a vast majority of SME's, fragmentation and general lack of (financial) resources is certainly the number one problem. To this may be added a general lack of long-term company and industry strategies, a fragmentation, duplication and discontinuity of research efforts, shortcomings in the ability to translate research results into product- and process-innovation, a shortage of highly qualified "knowledge workers", difficulties in effectively protecting innovation-related IPR and a number of research and innovation hindering regulatory framework conditions.

In order to tackle all these limiting factors, the European textile and clothing High Level Group has recommended the setting-up of a European technology platform for the future of textiles and clothing. This platform will have as its objective to:

- Pool and coordinate research excellence across Europe involving industry, academia and research policy makers;
- Develop a long-term strategic vision for the future of the industry and to set-up a corresponding roadmap for a structured development from today's situation towards the future vision;
- Significantly improve access to necessary resources and general research and innovation framework conditions.

The technology platform will be built on 3 main pillars, reflecting each a crucial element of long-term development of the textile and clothing industry in Europe:

1. A move from commodity fibres, filaments and fabrics towards specialty products from flexible high-tech processes,
2. The establishment and expansion of textiles as the raw material of choice in many industrial sectors and new application fields
3. Ending the era of mass manufacture of textile products and moving towards a new paradigm

of customisation, personalisation, intelligent production, logistics and distribution

In each pillar a number of permanent expert groups will be set up to develop a long-term vision and strategic road-map for a particular technology or application field. These groups will be formed by recognised industrial and academic experts in the respective field, but may also involve further important stakeholders vital for the development of a future vision and implementation of a strategic agenda of actions. The overall governance of the platform will be ensured by a balanced high level governing council composed of representatives of all pillars and expert groups. The ultimate goal of the European technology platform for the future of textiles and clothing is to make a substantial contribution to the long-term competitiveness of this industrial sector in Europe ensuring employment, economic growth and export income for an enlarged European Union, and thereby contributing to the central objectives to the EU's Lisbon agenda.



1. Introduction -

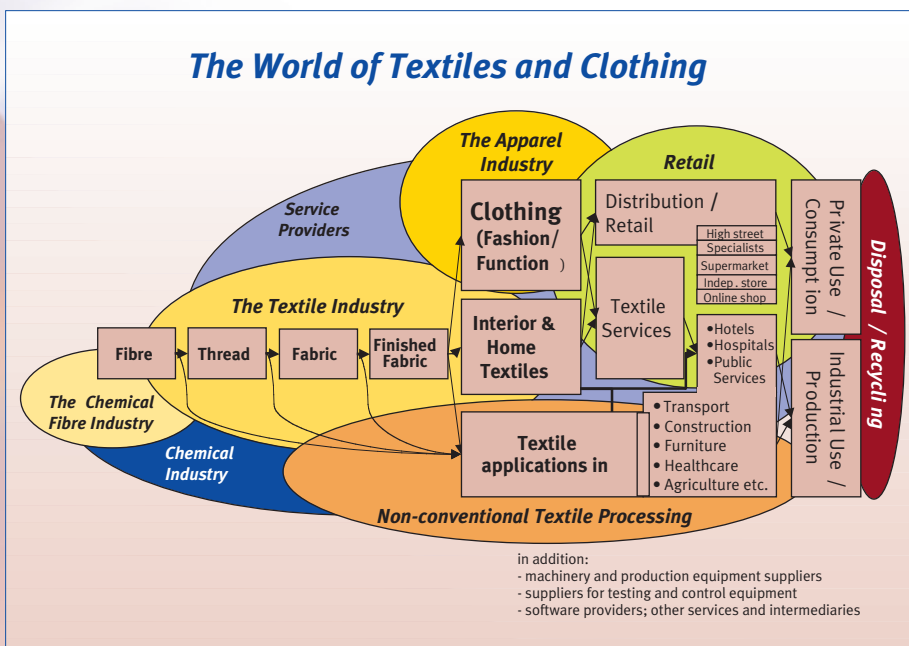
Today's Textile & Clothing Industry in Europe

The European Textiles and Clothing industry has a longstanding tradition of leadership in terms of innovation, fashion and creativity, and despite increasingly fierce global competition and significant relocation of manufacturing to low-wage countries; it continues to represent one of Europe's major industrial sectors with an annual turnover of 215 billion Euro and a total workforce of 2.6 million in 2003¹. It is a major player in world trade, the first in textile exports and the third in clothing. With a total of approximately 200,000 companies in the enlarged EU, of which some 95 % are SMEs, it covers a fascinating industrial landscape, producing a myriad of different consumer and industrial products, using countless

knowledge-intensive and highly specialised production processes and related technologies.

Unlike certain industries in Europe, the textile and clothing industry is a world leader in technology usage, process and product innovation, including fashion creation and other "non-technological" innovation activities. In this context too, it is fortunate that European textile machinery manufacturers themselves lead the world, that Europe's fashion industry enjoys world pre-dominance, and that the "technical" textiles sector of production is equally recognized for its pioneering role. In the textiles area, which enjoys

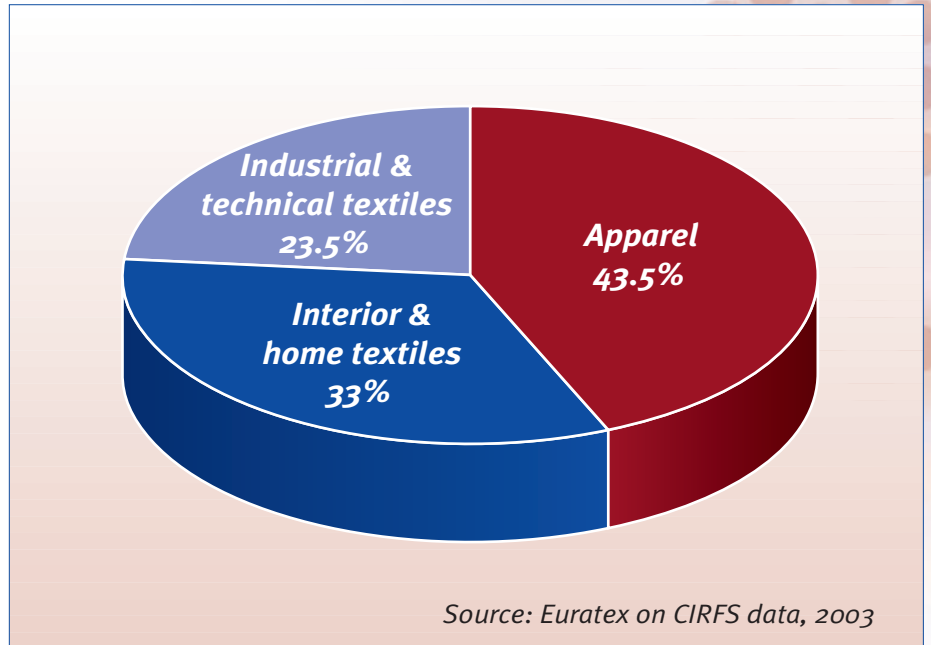
an export surplus with the rest of the world rapid productivity gains have maintained a degree of competitiveness, which has been enhanced by innovative products and processes in particular in the growing field of technical textiles, covering end-uses in transportation, road-building, land-reclama-



¹ Euratex estimated figures for EU-25

Figure 1: overview of the complexity and variety of actors in the textile-clothing business, source: Tex-Map project

Figure 2: breakdown of textile production into 3 sub-sectors by volume of fibre usage



tion, housing, sporting equipment, protective wear, surgical and medical devices and others.

The major end-use however still remains apparel where European manufacturers have led the world in terms of fashion and creativity, across all forms of clothing. Nonetheless, in comparison to the spinning and weaving of textiles, clothing manufacturing is highly labour-intensive, and steps are urgently needed to overcome this disadvantage as compared to lower wage countries.

While labour cost disadvantages are the most notable challenge to be overcome by the European industry if it is to retain its leading edge in global competition, there are a great number of other equally challenging conditions that the industry currently faces. These include trade barriers in certain important export markets, strict environmental and safety legislation imposed by European political will but not adequately rewarded by European consumer choice; a growing shortage of qualified human resources which is most acute in higher education graduates in textile engineering; the disappearance of the fruit of European industrial creativity and intellectual property through rampant illegal copying of designs and brands.

In recognition of this particular set of circumstances and the importance of the industry's contribution to the economy, creativity and employment in the enlarged European Union, the European Commission set up in early 2004 a High Level Group to recommend measures to increase the long-term competitiveness of the European textile and clothing industry. This group, which also set up sub-groups to look specifically into measures for research, development and innovation as well as education concluded in its June 2004 report:

“In both the textiles and clothing sector the wealth of existing expertise must be harnessed to strengthen the positive elements, and to overcome the deficiencies. In that respect those positive elements should be applied to best effect across the enlarged European Union, to enable existing and future resources within R&D programmes to be concentrated on the most advantageous areas, inspired by best practices in programmes at regional, national and European level with fragmentation giving way to added value across the board. As a specific measure, the speedy set-up of a European Technology Platform for Textiles and Clothing was recommended.”



2. Textile Research

The European textile and clothing industry does not have the reputation of being a particularly research intensive sector and its companies on average spend a relatively small percentage of their turnover on research as compared to other industries. Nevertheless this industry, in its more than two centuries' existence, has managed to achieve tremendous and uninterrupted increases in productivity and product quality, a trend that is ongoing and has even accelerated over recent decades.

This has been achieved by continuous improvements in production technology and innovation in symbiosis with machine developers and the most innovative user

companies, in most cases European companies in geographical proximity to the machinery manufacturers.

In product innovation too, European companies are in many areas recognised world leaders and have carved out this leadership by creative application and combination of textile materials and chemicals, by skilful selection and combination of materials and processing options and by unabated creation of new designs, styles or product functionalities. A major part of these types of innovation activities would not be considered as research, but rather as non-technological innovation in which textile and especially clothing companies invest heavily.

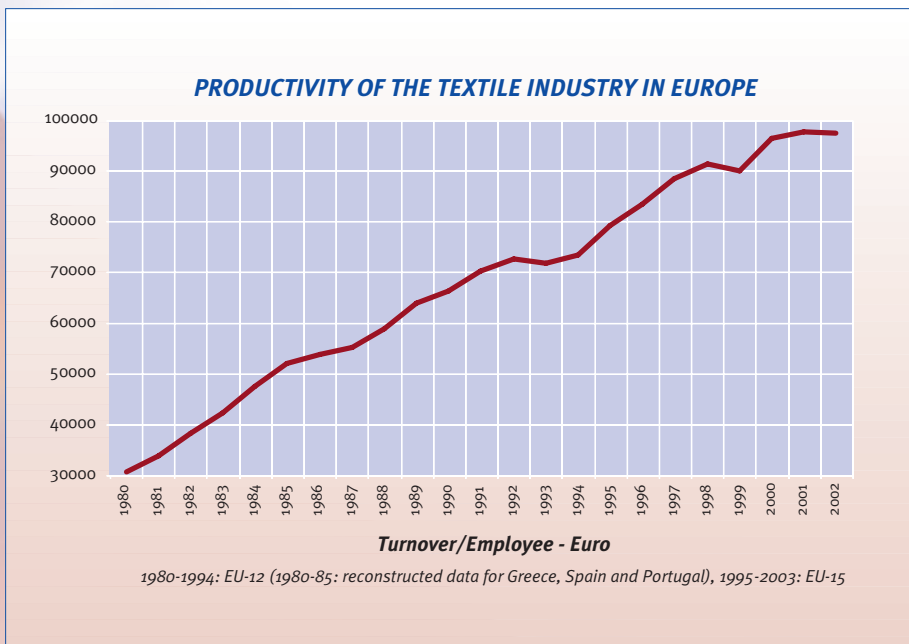


Fig. 3: Development of productivity in the European textile industry, source: Euratex on national data



However, due to the structure of the industry, which is dominated by a vast majority of very small to small or medium-sized companies, research and innovation activities, with the exception of a handful of larger groups, often lack continuity, strategic direction, human and knowledge resources and, above all, funds. Hence most textile and clothing companies have no permanent R&D personnel or departments and no regular R&D budgets. Traditionally this void has been filled by national or regional, mainly publicly or part-publicly funded research and technology centres or university departments dedicated to textiles and clothing. These structures exist in almost all European countries and may often play the role of temporary R&D department, research advisor or technology consultant for companies that lack such capacities in-house.

The manifest fragmentation of the industry is directly reflected in the European textile research landscape. With few exceptions textile research centres and university departments are themselves relatively small structures with insufficient resources to carry out long-term cutting-edge research work. Their missions include services to the regional or national industries where they seek to cover a broad spectrum of activities, sometimes dominated by material testing and technology support services rather than fully-fledged research. Due to the region-

al or national focus of research operators, arising from the origin of the major proportion of their funding, duplication of research efforts with corresponding waste of resources is a common phenomenon in European textile research.

Trends to consolidation within the industry, rising demand for complex knowledge-based high-tech processes and technologies, faster innovation cycles and growing competition even in advanced products from previously low-tech producers outside Europe, make existing textile research structures and capacities in Europe appear increasingly inadequate. Consolidation of existing research structures and targeted development of newly required expertise and services seems inevitable.

Therefore a clear need exists for a strategy and capacity development effort at European level. Based on industry requirements, innovation targets need to be set and corresponding research programmes and projects implemented to bring together the highest level of scientific excellence and the necessary industrial capacities for a rapid exploitation of research results.

A pre-requisite for better research co-ordination is a scientific excellence “mapping” across Europe. Companies need to easily find their most suitable



research and innovation partners even beyond national borders. In the medium term this should lead to the pooling of resources and the emergence of real centres of excellence with a sharply defined profile and a world-class long-term research agenda.

All this can only be achieved if adequate and stable funds can be made available. Action is needed to ensure that these are raised and brought together from all possible sources, including the industry itself, regional, national and European grant and loan-based programmes and schemes as well as the private capital market. The latter source in particular is notoriously underdeveloped in the textile-clothing sector. A joint effort must concentrate on facilitation of access to funds for university spin-offs and other research exploitation start-ups as well as for innovative SMEs in general.

A further challenge that the European textile and clothing sector needs to tackle in a coordinated way is the adequate provision of highly qualified human and knowledge resources. The industry has to ensure that the high-calibre knowledge worker and well qualified young professional find in textiles and clothing the attractive working conditions and competitive remuneration packages they expect. University and other providers of higher education and advanced technological know-how need to prepare their graduates with the right combination of scientific-technological excellence and industrial application capabilities. The industry is in dire need of qualified personnel, as the higher education graduate looks and moves elsewhere. This paradox has to be overcome. The sharply declining number of graduates in almost all textile-related education courses can only be reversed if industry and education providers move in lockstep providing clear and promising career paths.



3. European Technology Platform for Textiles and Clothing

3.1 A Vision for the Future

Fibre and textile-based materials and products have always played a vital role in human life and there is no reason to believe that their importance will shrink in the 21st century. On the contrary, while there are no serious substitutes for textiles in sight in the conventional application fields of clothing and interior decoration, textiles or textile-based composites are predicted to replace many of today's metal and plastic materials used in the automotive industry, ship building or aeronautics, in the machinery and machine tools industry, in the electronics, electro-technical and medical devices sector, in construction or agriculture and to a lesser extent wooden or leather materials in furniture, sports goods and other smaller application areas.

With a growing world population, and rapid growth in textile consumption in developing countries, a whole range of new application areas for textiles and constantly rising user requirements in terms of functionality, variety, precision, performance, reliability, user and environmental friendliness of textile products, textile production in both volume and value is set to rise. This will mean, on a global scale, that the industry that produces fibres, textiles and textile-based products will evolve and grow.

While a significant part of this growth will take place in those regions of the world that experience the fastest growth rate in conventional textile consumption i.e. Southern and Eastern Asia and Latin America, considerable growth opportunities especially in the highest quality and most innovative product categories exist too for the European textile and clothing industry both on its home market as well as on many export markets. These opportunities can only be harnessed by building on Europe's existing strengths which are innovation and quality leadership, creativity and scientific excellence, diversified industrial capacities and corresponding skills, partnerships with leading supplier and customer sectors, a large and sophisticated home market and the global reach and recognition of European brands.

While this set of strengths constitutes a sound foundation from which to pursue industrial activity in the future, they will need to be accompanied by a faster and more effective translation of scientific results into innovative commercial products, more flexible, small batch oriented, resource efficient manufacturing processes, more customer orientation and value chain cooperation in product development, better development and exploitation of multidisciplinary knowledge and skills especially in the new application fields of textiles, a more strategic development



of private and public research and higher education capacities, more customer value creation through individualised product-service offerings and a better protection of intellectual property - all areas in which European industry still has a long way to go.

The vision of the future of the European textile and clothing industry can therefore only be built around the concept of dynamic, innovative, multidisciplinary knowledge-based, flexibly integrated and customer oriented networks of businesses. This conceptual *skeleton* will need to be filled through the work of the European Technology Platform for the Future of Textiles and Clothing with concrete recommendations, initiatives, time tables and resource provisions in order to move from today's situation towards this long term vision in a strategically coordinated way.

3.2 Objectives and Deliverables of the Technology Platform

The Technology Platform for the Future of Textiles and Clothing and its working groups have as their objective to develop a long-term vision for the transformation of today's European textile and clothing industry into a sustainable competitive global industrial player that will continue to provide significant

employment and economic value added to Europe for decades to come. This transformation process will focus on the exploitation of research, innovation and knowledge-orientation across all business functions and sub-sector activities of the industry including all possible new business opportunities for fibre and textile based materials, products and production processes in novel application fields.

The Technology Platform will therefore develop strategic technological roadmaps, identify technology gaps and marketing barriers of all types and recommend actions to fill these gaps and overcome barriers in the most effective and fastest way. It will address its recommendations to the appropriate counterparts and actively promote joint action to achieve the progress required.

The Technology Platform will further serve as a means to overcome the existing fragmentation of textile-clothing research in Europe and will ensure that research capacities and activities are developed which are strategically guided by the principles of scientific-technological excellence, industrial relevance and resource efficiency. An important principle of this process will be the connection and valorisation of existing expert networks, platforms, clusters and similar cooperative structures wherever they already exist, at European, national or regional level.



This will avoid a situation in which such activities exist without sufficient knowledge of each other, engaging in parallel, repetitive research work often creating an atmosphere of competition where there should be cooperation. The technology platform will attempt to overcome such inefficiencies while at the same time preserving the important and often highly efficient element of national, regional or local implementation.

It will put special emphasis on resource aspects of strategic research and innovation initiatives and intervene in cases where capital, human or knowledge resource shortage prevent the necessary technological or organisational advances for successful industrial transformation and competitiveness from taking place. In this respect, the central objective is a significant improvement in the professionalism of acquisition, allocation and management of financial resources for cooperative research and innovation in textiles and clothing. Access to funds, the perceived number one inhibitor for more research especially by SME's, needs to be ensured through better knowledge of available funding sources and of the procedures for obtaining them.

Focus on Three Main Areas

In order to reflect industrial reality, to accommodate significant differences in industrial innovation processes and to allow industrial partners to identify themselves more easily with its activities, the Technology Platform will be structured in 3 main focus areas; (1) Move from commodity fibres, filaments & fabrics, towards specialty products from flexible high-tech processes, (2) Establishment and expansion of textiles as the raw material of choice in many industrial sectors and new application fields and (3) End the era of mass manufacture of textile products, and move towards new era of customisation, personalisation, intelligent production, logistics and distribution

From Commodities to Specialty Products

The manufacturing of fibres and textiles traditionally encompasses a number of major processing steps which include the production of man-made fibres or the preparation of natural fibres, spinning, weaving, knitting, dyeing and finishing or the production of non-wovens. It further involves, depending on the fibre or the intended end use, a number of intermediary processing operations including scouring, bleaching, sizing, desizing, washing, drying etc. All



these processes have been known and industrially used for decades or even centuries and have over these periods experienced massive advances in terms of productivity, product quality or resource efficiency.

More recently a whole range of highly effective or promising technologies for functionalisation of fibre and textile surfaces have been developed which include but are not limited to coatings, micro-encapsulations, enzyme, plasma, laser, ultrasound, ultraviolet treatments, spraying and ink jet techniques and including processes on the nanometre scale (nanotechnologies).

While more traditional processes need to continue to gain in speed, flexibility, resource efficiency, reliability or quality control, many of the newer processing technologies still need to make the step from lab or pilot level to full industrial scale or achieve levels of cost, speed and reliability that make their industrial application economically viable. Further fields of progress across all processing technologies include digitalisation and continuous process and quality control as well as low or remote maintenance.

All these advances in processes and related technology must move primarily into the direction of

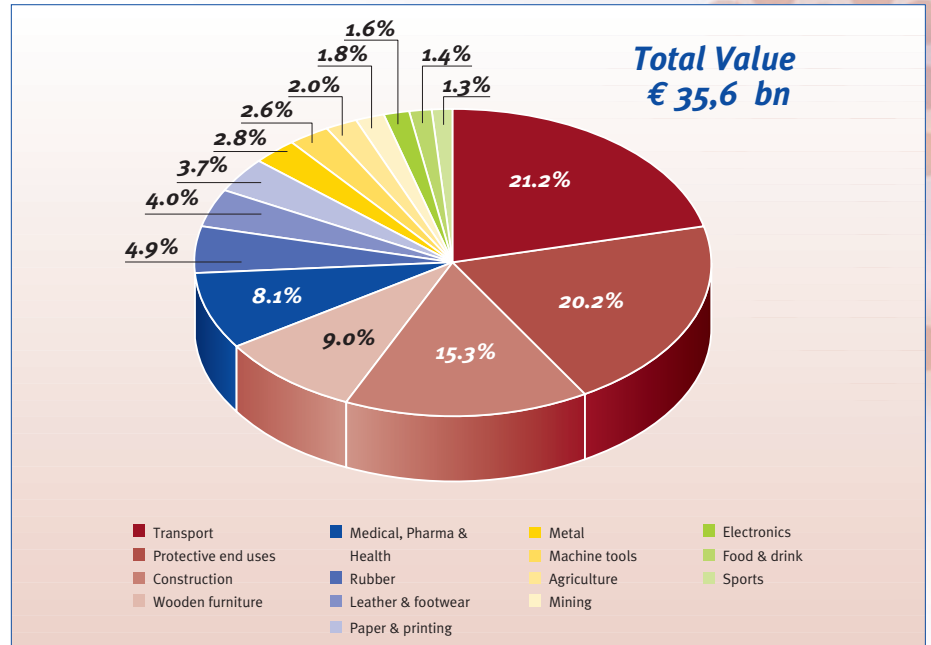
enabling European textile and clothing companies and their customers to produce and use highly specialised (multi-)functional fibre and textile-based materials and products. Such products will be knowledge-based, well-targeted to their exact onward processing and final use often oriented to attractive niches and market segments and will thereby escape fierce commodity price competition. They will help Europe's producers with their established reputation for processing know-how, product innovation and quality to regain ground in markets which are the playground today of non-European commodity producers.

The main innovation partners that help industry to move successfully in specialty processes and products must be primarily the machine and machine tool manufacturers as well as the chemical industry. Their role will be vital and their involvement in the appropriate expert working groups needs to be ensured.

➤ ***New Textile Applications***

Clothing and interior textiles have in the past made up the dominant part of textile-based products in the market with a few further textile applications constituting small niches. With important advances in textile materials research, processing technologies and changing functional requirements of products in

Figure 4: Western Europe's consumption of technical textiles by application (Source: Euratex estimate for 2004 based on Eurostat, 2004 and OETH, 2000)



other industries over the last two decades, textiles have found an ever broader range of application

in sectors as diverse as road, rail, marine or aerospace vehicles, engineering, construction, agriculture, power and environmental technologies, health care, defence and security etc. As a result the products for such purposes, known globally as technical textiles, today represent close to half of total textile production in Germany, Belgium or Nordic countries and have reached significant proportions of production also in countries which retain important conventional textile manufacturing capacities such as Italy, France, Spain and Portugal.

Although many of such non-conventional applications will always remain highly specialised niches, they represent in aggregate a sizeable and growing opportunity for high value-added products manufactured in Europe. They often require the in-depth material knowledge, engineering capacities, high manufacturing and quality control standards found within European textile companies, as well as close development collaboration with end-use customers in other European industries than their own. With continued fierce price competition and little overall market growth in conventional textile products, more and more textile manufacturers are looking to the

technical textiles field for business expansion or reorientation. However, as these markets have structures and procedures that differ greatly from the clothing or home textiles business, the process of transformation is challenging.

Competition in these markets comes not so much from low-cost textile producers outside Europe but rather from manufacturers of comparable products and components made of metal, plastics, wood etc. that technical textiles attempt to replace.

The main innovation partners in technical textiles are naturally in the first place the potential users of these products and materials in other industrial sectors or application areas. They set the functional, technical and performance requirements of such textile-based products and determine the pace of innovation in technical textiles through their launch timetable of new product generations or their initiatives in the normative and regulatory fields. The production of technical textiles often requires significant adaptation of processes and manufacturing technology, for which machine and equipment developers are vital. Finally the successful introduction of new



textile-based products in sectors like transportation equipment and construction or even more so in the medical field requires the clearance of significant normative and regulatory barriers where standards bodies and public authorities play a crucial innovation-enabling (or -disabling) role. The respective expert groups have to ensure the active involvement of all these stakeholders in their work.

➔ ***From Mass Production to Customisation***

The vast majority of clothing and other textile-based goods are manufactured long before they are sold to the end user, whether he or she is private consumer or industrial customer. Product developers, manufacturers and distributors collectively try to guesstimate actual demand and exact customer preferences. The vagaries of this process due to various unpredictable factors involved regularly lead to substantial forecast errors resulting in destruction of economic value in the form of either unsold articles or missed potential sales due to unavailability of the right product at the right time at the right place.

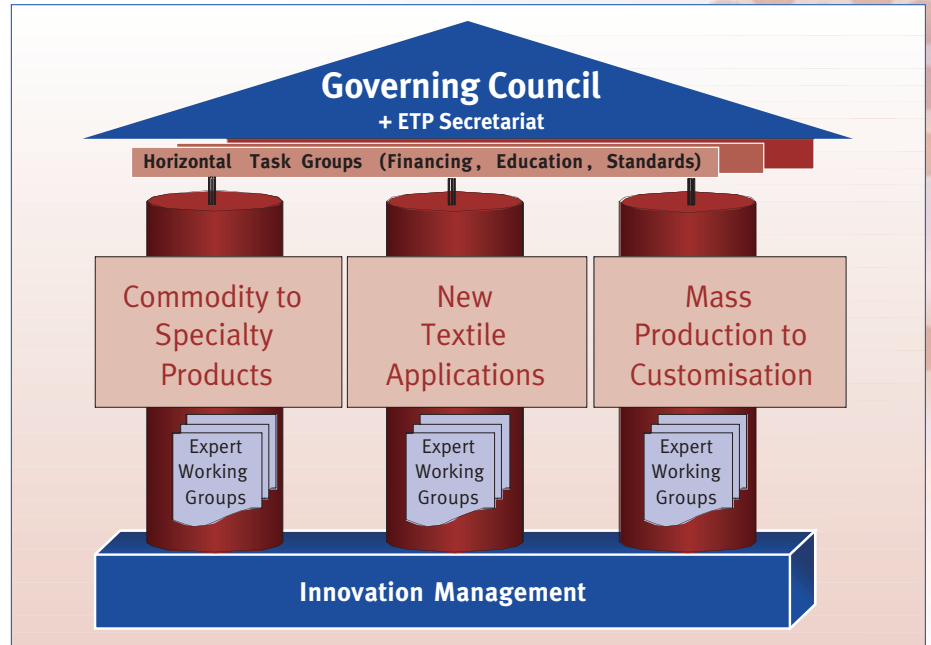
Today too little advantage is taken from the fact that every customer is different and that the uncompromisingly optimal satisfaction of individual preferences has a high economic value and can translate into a

corresponding mark-up in the form of the selling price of the good. Textile-based consumer goods and especially fashion clothing not only serve functional purposes but often play a major role in personal identification and expression. They therefore represent ideal products for customisation and personalisation and offering them exactly according to a consumer's specifications adds significant value. The same is true of textile-based industrial goods (technical textiles)

The decades dominated by mass-production of textiles and clothing, the latter reinforced by globalised large-scale retail operations, in order to satisfy basic needs for clothes and home furnishing as well as standard industrial uses are coming to an end in the developed world. The "everyday fashion catwalk" requires individual touch and perfect fit; functional "wellbeing-inspiring" interiors need personal touch too and industrial textile users search for guaranteed closely focussed functionality and differentiation from the competition. The European textile and clothing industry with its geographical and cultural proximity to its customers should be best placed to deliver this.

Recent advances in technologies for better capturing, exploiting and managing customer needs and preferences, sophisticated CAD and virtual prototyp-

Figure 5: Structure of the European Technology Platform for the Future of Textiles and Clothing



ing solutions, flexible customised production systems, intelligent logistics, Internet-

based communication systems between manufacturers, distributors and end users etc. enable textile and clothing manufacturers to develop successful mass customisation operations comparable to other sectors like personal computers or automobiles.

The main research and innovation partners for the move from mass-production to customisation are the industry's service providers for distribution, logistics, communication, financial transactions etc., as well as customised production equipment manufacturers and IT and software providers for product development, production organisation and supply chain management. Their involvement in the relevant expert groups therefore is essential.

3.3 Structure and governance of the ETP

The above-described 3 focus areas will constitute the 3 founding pillars of the platform. Within each pillar a number of permanent expert working groups will be created, which will be led by industry, but also animated by representatives of research, higher education, public authorities or other relevant stake-

holders instrumental in the development of a long term vision and the implementation of a strategic roadmap in the respective field.

In addition to the 3 thematic pillars and their expert working groups, a limited number of horizontal task groups will be formed in order to deal with issues related to framework conditions for effective research and industrial innovation that cut across several or all thematic pillars and expert groups. Such horizontal issues include the mobilisation of financial resources, the development of adequate education and training structures as well as standardisation issues.

A specific horizontal structure will deal with Innovation Management. In this forum strategies and means will be developed to help a faster and more effective translation of research results and technology innovations into product, process and organisational innovation of Europe's textile and clothing companies. This group will also constitute the platform's link to the EU's policies and working groups dealing with the improvement of general innovation framework conditions for companies in Europe.



Above the 3 thematic pillars and the horizontal task groups, an overall Governing Council will oversee the strategic development of the Technology Platform as a whole. This Council will be comprised of the industry chair persons of each permanent expert working group and horizontal task group and the respective presidents/chair persons of the 3 main collective European organisations involved in research policies for the textile and clothing industry, i.e. Euratex, Textranet and Autex. The chairman of the Governing Council will be a high level industry representative. The work of the Governing Council will be supported by a permanent secretariat for which EURATEX will take initial responsibility.

The main role and responsibilities of the Governing Council will be:

- the representation of the Technology Platform in public and vis-à-vis the Political Mirror Group described below
- the creation or termination of expert working groups and horizontal task groups and the appointment of their respective chair persons
- the development and updating of the Technology Platform's overall mission and long-term strategic innovation targets

- the initiation or approval of partnerships with other Technology Platforms, public or private funding programmes or bodies, public authorities or other relevant stakeholder groupings and the definition of goals and terms of such partnerships

The tasks of the Expert Working Groups will be:

- the development of a long-term vision, innovation targets and a strategic research agenda for the respective thematic field,
- the development into a point of scientific, industrial and political reference,
- the initialisation, preparation and acquisition of specific research programmes and projects and,
- a regular reporting of activities to the Governing Council.

Based on the structure established through the Textile-Clothing High Level Group, a Political Mirror Group will be set up composed of high level representatives of the European Commission and EU member states.



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