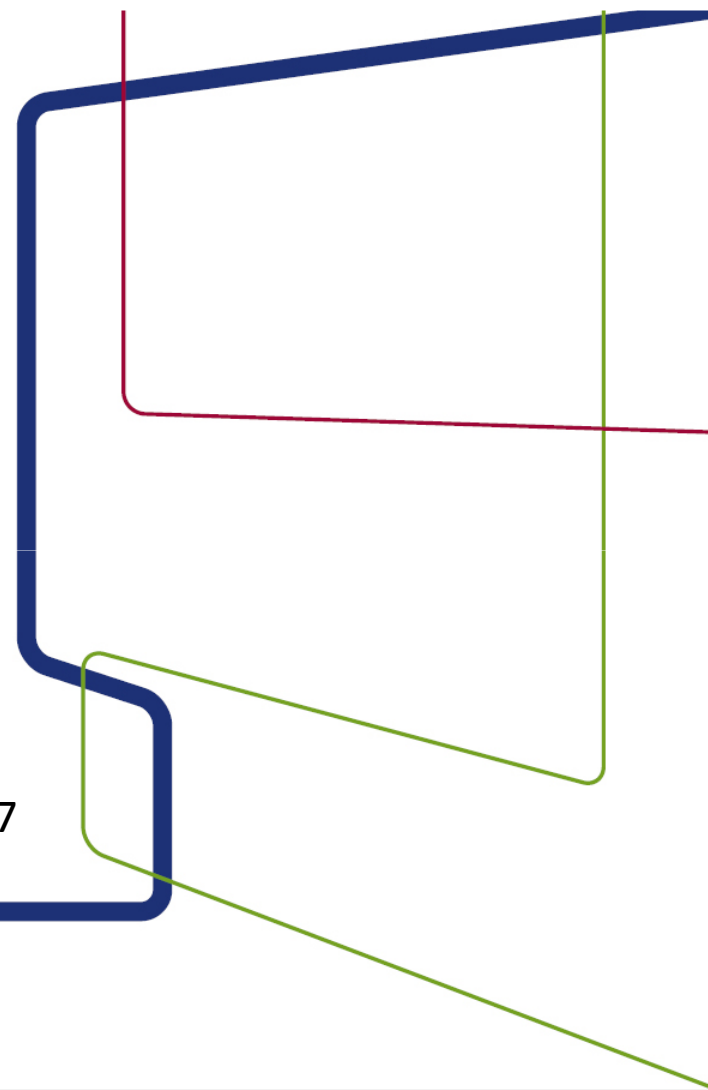




Paolo Canonico

Como 30.11.2017



The Starting point in 2004

A Vision for 2020



- Move from commodities to specialty products made in high-tech processes
- Increased use of textiles as material of choice in many industrial sectors and technical application niches
- Move from mass production to customisation, personalisation, on-demand production and services



Lower Volumes – Higher Values

Industry Evolution 2004-2015

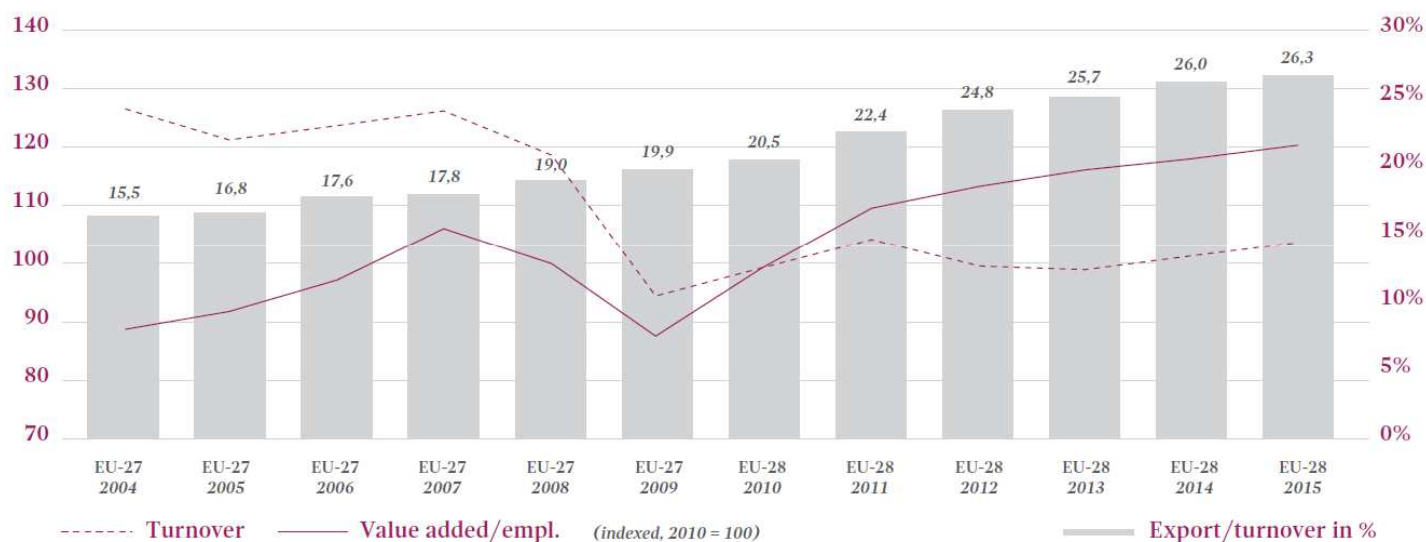


Fig. 1: Evolution of industry turnover, exports and labour productivity between 2004 and 2015 (source: Euratex)

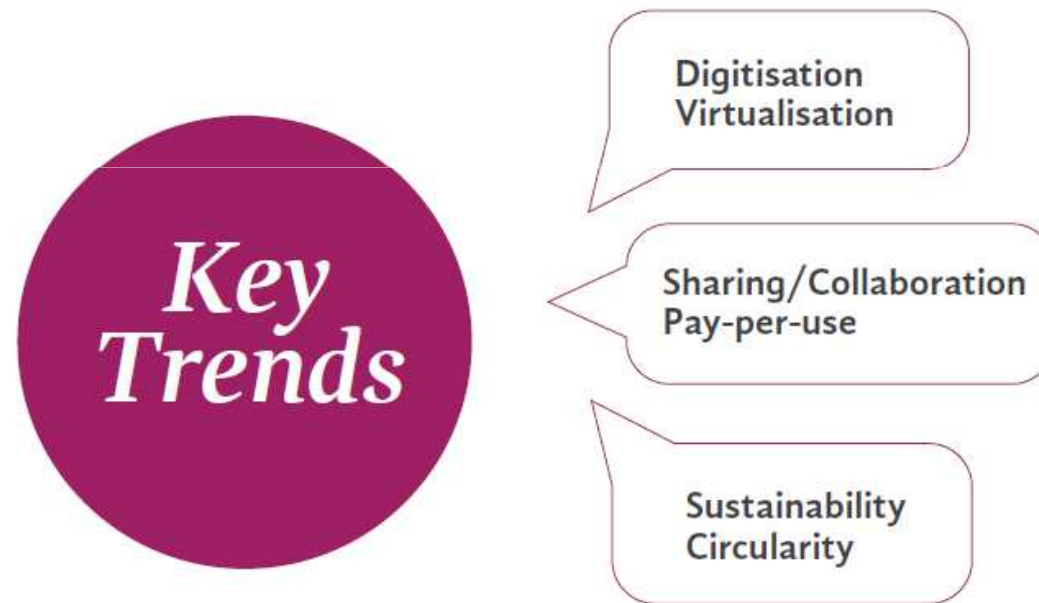
Turnover -19% | Value Added +36% | Exports +37%

Near-term Trends

- Growth of **global** consumer markets
- Growth of **technical** end **markets** for textiles
- Faster **time-to-market** + smaller orders = opportunities for efficient local production
- More demand for **system solutions** (material+technology, product+service)

Positive Drivers for European Industry

Long-term Trends









Strategic Innovation Themes & Research Priorities

The Building Blocks for the 4th Industrial
Revolution of Textiles & Clothing

4 Strategic Innovation Themes

	Smart, high performance materials
	Advanced digitised manufacturing, value chains and business models
	Circular economy and resource efficiency
	High value added solutions for attractive growth markets

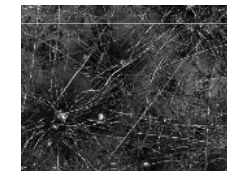
Innovation Theme I

Smart, high-performance materials

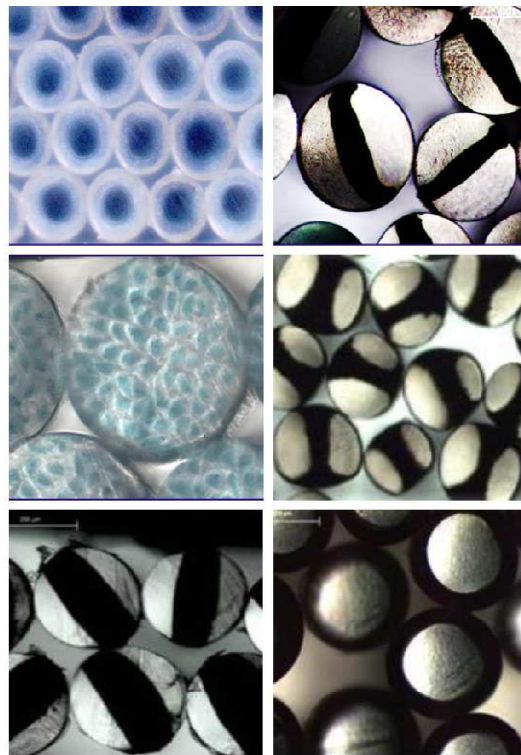


Research Priorities

- 1.1 High-performance **fibres** and textile **materials**
- 1.2 Novel 1, 2 and 3-dimensional **fibre** based structures
- 1.3 Multifunctional textile surfaces and related processing **technologies**
- 1.4 **E-textiles** for **smart structures**, functional interiors or smart wearable systems



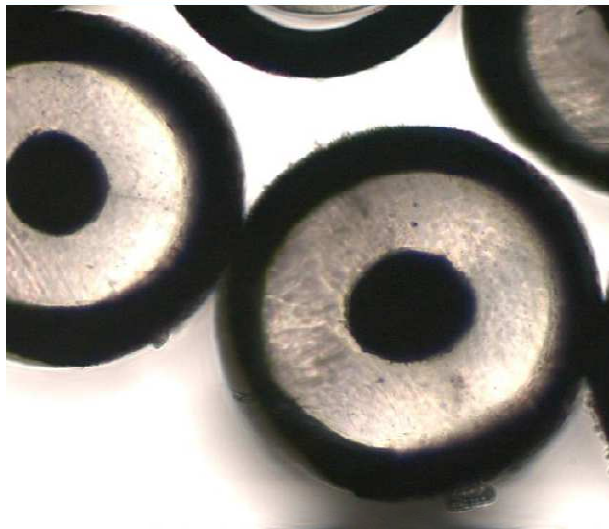
Nano-structured polymer based conductive fibers



- Development of conductive fibres for smart materials applications.
- Thermoplastics and carbon-based conductive polymer (CPC)

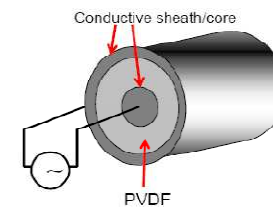
Smart yarns

Intelligent Multi-reactive textiles Piezoelectric Fibres

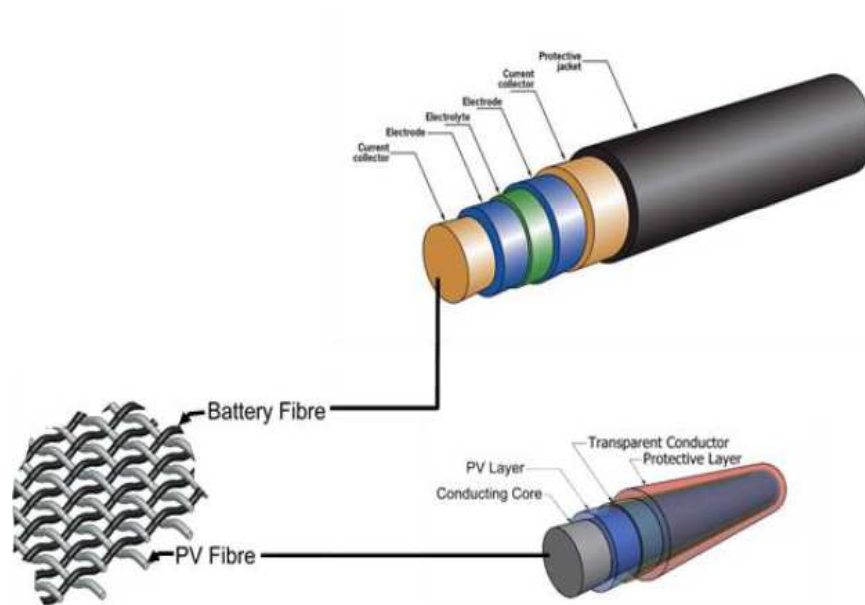


- Development of new Tri-component piezoelectric fibres for sensor / energy harvesting applications – Processing of Fibre devices!

3-component fibers or
coated bi-component fibers



Multi layers yarn



Development of photovoltaic energy harvesting fibres and energy storage fibres (battery) integrated by weaving or knitting with control electronics into a textile.

New yarn properties by Electrochemistry, Plasma and LASER-Treatment



- **Conductive**, semi conductive (n or p), antielectrostatic,
- **Heat conducting**,
- **Magnetic**,
- **Light emitting** (electroluminescence, fluorescence, phosphorescence),
- **Light reflective** (UV, VIS NIR, IR,...),
- **Photosensitive**,
- **Absorptive**,
- **Interactive**
 - Release of active substances
 - Thermo-, photo-, electro**chromic**,
 - Properties changes
(volume, elastic modul, conductivity, hydro-, oleophobic, hydro-, oleophile, etc.)

Innovation Theme II

Advanced digitised manufacturing, value chains and business models



Research Priorities

- 2.1 New **manufacturing technologies** for efficient realisation of complex textile and composite structures
- 2.2 Digitisation and **flexibilisation of production** processes and factories
- 2.3 **Virtual modelling** and design of fibre, and textile, based materials and products
- 2.4 Digitisation of the full **textile-fashion value chain**
- 2.5 New digitally-enabled **business models**



Research Priorities

- 3.1 Novel flexible process technologies to save **water, energy and chemicals**
- 3.2 High-tech textile recycling for **circular economy** concepts
- 3.3 Sustainable substitutes for hazardous or restricted textile processing and **chemicals and bio-chemistry** based textile processing
- 3.4 Bio-refinery concepts utilising European **biomass** or waste for textile fibres
- 3.5 Greater use of EU-origin **natural fibres**



Innovation Theme IV

High value added solutions for attractive growth markets



Research Priorities

- 4.1 Textile-based functional and smart products for **health**, **sports** and personal **protection**
- 4.2 Textile solutions to resource and protect a **growing global population**
- 4.3 Textile solutions for safe and **energy-efficient buildings** and smart interiors
- 4.4 Textile solutions for light-weight, clean and safe **transport systems**
- 4.5 Personalised **fashion** and functional wear products

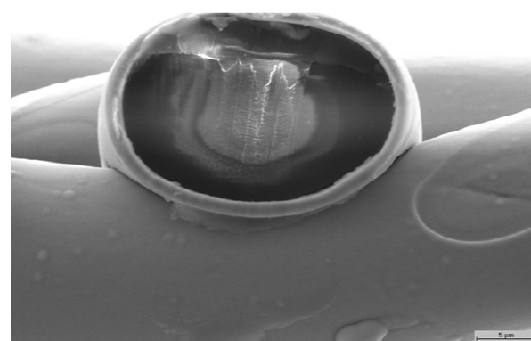
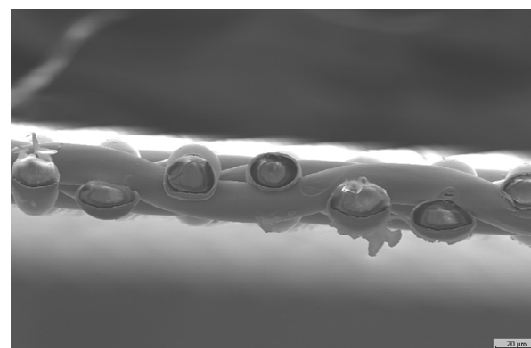
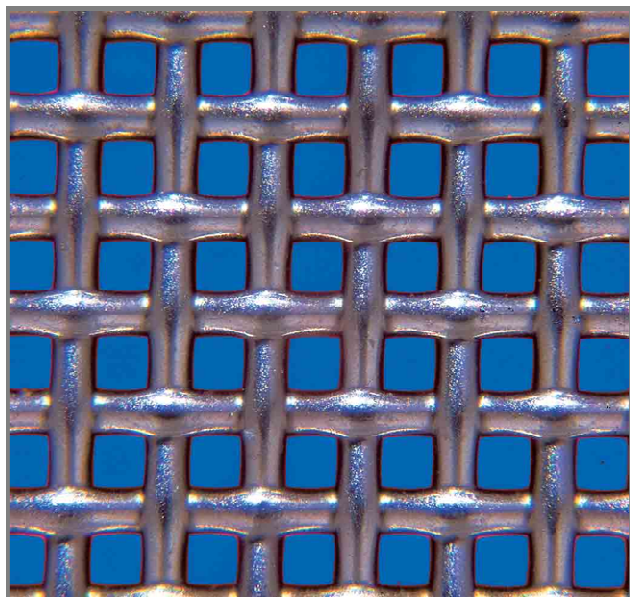


Smart textiles

- High flexibility/foldability/elasticity
- Breathability
- High mechanical and fatigue resistance
- Low thickness
- Possibility of insulation: Solder Mask and Epoxy resin
- Possibility of producing shaped patterns
- Possibility of cables embedding

Surface modification

METAL COATINGS FOR CONDUCTIVE FABRICS



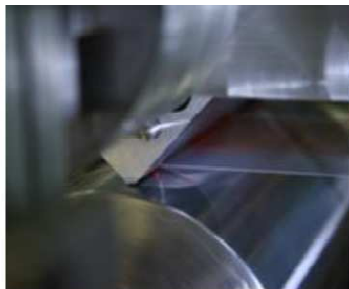
Added value by Coating Processes



- Foulard
- Gravure printing
- Knife coating
- Doctor Blade
- Slot die coating
- Micro-roller coating
- Thermal curing (1m)
- Lamination

Printing Technologies

Slot die Coating;
Knife/Doctor blade;
Spray and Dip coating



R2R Gravure



Lamination &
Encapsulation



Screen Printing
(Sheet and Rotary)



Inkjet Printing

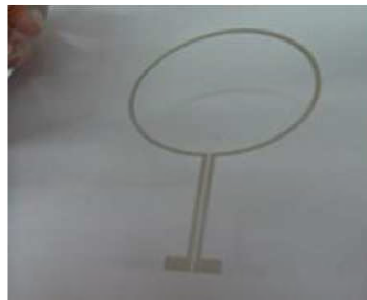


LTE thermal evaporation

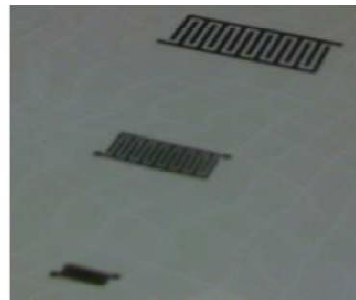


Flexible electronic

Printed capacitive sensors



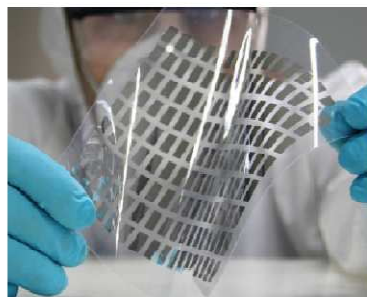
Printed Biosensors



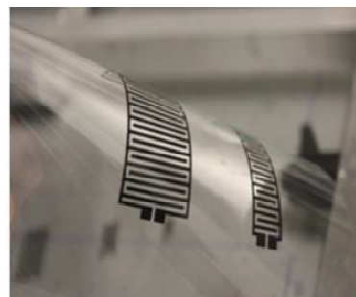
Stretchable circuits



Printed touchpads



Printed Biosensors



Stretchable elements



3 key factors for e-textiles

- Electronics devices smaller and smaller, in future also flexible and lighter
- Software is becoming more important than hardware, therefore new solutions have to be powerful and focused on the efficiency of the software
- The connection of the sensor to the electronic device is still an issue to be solved

Implementation

How to make the 4th Industrial Revolution of
Textiles & Clothing happen?

Knowledge & Skills

- 600,000 job openings in T/C sector until 2025
- Enormous **generational shift** to achieve
- Balance of **new knowledge** (scientific, digital, sustainable, new business models) and **traditional skills** (design, production, quality management, service)
- Sectoral **education** and **training** programmes and facilities need modernisation
- **Integration** of practical oriented learning at all levels (schools, colleges, learning labs and factories, at the workplace, on-line)

Europe needs a new generation of textile workers and entrepreneurs

Regional Excellence



- More and stronger textile innovation clusters needed
- More investment in open technology infrastructure (technology centres, pilot plants, design and maker labs)
- More innovation business support services (coaching, technology scouting, financing, IPR, business start-up & incubation)
- Better exploitation of Smart Specialisation policies and related structural funds

**Regional competences and infrastructures
are the key to SME innovation**

European Support



More opportunities for collaborative research & innovation in HORIZON 2020 through:

- Smaller, simpler projects
- Stronger economic impact evaluation for less science-driven projects
- SME funding instruments that match size and speed of SME operations
- ETP's as a managers of small-scale funding programmes

HORIZON 2020 needs to better serve research & innovation of manufacturing SME's

Key Messages - I

- The digital, high-tech, smart and sustainable T/C industry **transformation** is in full swing
- **Global markets** for innovative textile and clothing products are huge & **growing** (€ 2 trillion+) and offer massive opportunities for innovators
- **Co-operation** among Industries and Research Centers/University is a key factor
- **Multidisciplinary approach** is needed and co-operation among industries of different sectors is required
- Advanced technologies, new business models, human resource development & regional excellence are the **key to success**

Key Messages - II

Knowledge is a relationship

In today's world, innovation is, above all, based on relationships and collaboration. Consult the outside world, involve key players as the process develops, and ***share and compare your knowledge.***

Innovation is a proactive culture

The future is never as we expect it to be. Choose a direction, choose a method, but then ***stay open to the unexpected.***

Customers are the best partners

Customers and clients represent reservoirs of knowledge in local markets, essential to anticipating responses to future demands. ***Their participation is critical to innovation.***

Why not is better than why

Why not is the key to leaving your comfort zone. Broaden your horizons, expand your knowledge, and ***go beyond the limits of what you already know.***