SEVENTH FRAMEWORK PROGRAMME

THEME FoF.NMP.2010-2

Supply chain approaches for small series industrial production

MICRO-DRESS [260113] «Customised Wearable Functionality and Eco-Materials – Extending the limits of Apparel Mass customisation»

D8.4 Final Project Report

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1 Executive Summary

Ecology and wearable functionality in garments can co-exist. Add this up to a consumer-centered business scenario, where you will be able to configure your wished sensors or monitoring devices, and also the degree of eco-friendliness of your outfits and enjoy smart, natural and healthy garments.

It may appear at first sight that the two main ideas of the Micro-Dress project (eco-friendliness and wearable functionality) are somehow contradictory, or at least not converging. However the project's on going work is targeted on proving that ecology and wearable functionality can co-exist. This becomes even more interesting in a user-centered business scenario, where the customer is directly involved in the design/configuration process, empowered by the freedom to configure both the technology related added value (user selectable sensors, actuators, physiology monitoring devices), as well as the degree of eco-friendliness of his/her outfits (natural and healthy garments, preserving the environment and energy resources).

In order to reach the consumers, the Micro-Dress offer is being investigated through two distinct models of companies offering customised garments: an international brand with vertical integration of its production and also the evolution of the traditional tailor, the so-called Micro-Factory, offering to the consumers customised garments, in an easy and affordable manner.

Addressing the business challenge

Mass Customisation companies will need to address certain production challenges in order to be able to provide consumer-selected ecological and smart outfits. These challenges are being investigated through the Micro-Dress project and the research is leading to the following results:

- Rapid manufacturing techniques for printing directly to the selected eco-fabrics the wished micro-electronics components
- Software tools for eco-certification of the fabrics that can be used by the companies to evaluate the eco-profile of their suppliers and also give their customers the opportunity to select the ecology degree of the fabrics they desire for their outfits
- Software tools to calculate and manage the CO_2 emissions related to the production of the fabrics
- A portable and rapid test that to allow the garment manufacturers to evaluate on site the chemical composition of the fabrics they are supplied for their production. This test can be also used for showing to customers the ecological degree of the fabrics they have selected for the manufacturing of their outfits
- A supply chain management model to address all the different aspects of supplying and integrating e-devices into the production of customised garments.
- This model has been made available to the companies through a web application in the form of an e-Supply Chain Management platform, offered to the companies in the pay-as-you-go model, known as Software-as-a-Service (SaaS).

The Micro-Dress project brought together a multidisciplinary consortium of nine partners, of which five are SMEs, two are prominent European institutes and two are leading textile and clothing groups. As the project evolved, the project website has been updated with the recent outcomes of our work. Visit the project's website to stay tuned with up to date results of the Micro-Dress project's research, at www.micro-dress.eu.

2 Summary description of the project context and the main objectives

Micro-Dress: complementary innovations for multiple EU apparel challenges

Micro-Dress is a Factories of the Future (FoF) project. FoF projects were launched under the European Economic Recovery Plan in order to address the economic crisis that saw EU manufacturing production decline by 20% in 2009.

FoF projects are intended to kick start more sustainable competitive manufacturing in the European Union. This involves addressing the multiple challenges facing EU manufacturers, including: low cost foreign competition; increasing environmental concerns; better quality foreign competition.

As summarized in the diagram below, the Micro-Dress project has addressed multiple challenges facing EU apparel sector through technology-push innovations, market-led innovations, and design-driven innovations. This has resulted in advances in luminescent textiles, ecological prediction, and wearable computing.

All of these advances were informed by, and evaluated with, two leading EU apparel companies that seek to prosper through innovation. Their guidance has emphasized the need to combat foreign competition with multiple, rather than individual, innovations.

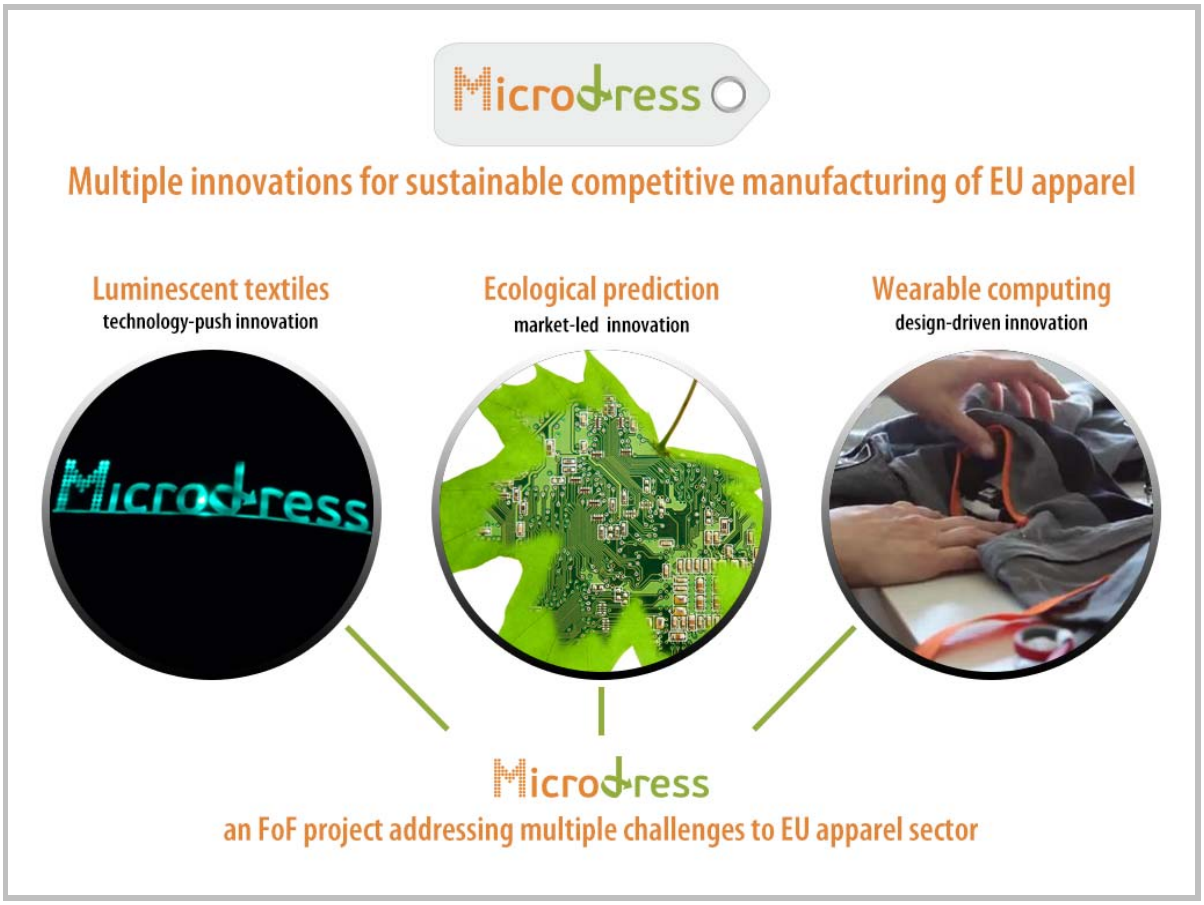

Figure 1: Micro-Dress: complementary innovations for multiple EU apparel challenges

Technology-push innovations – textiles with "wow" factor

With regard to continuing low cost competition, and increasing high quality competition, the Micro-Dress consortium has harnessed the potential of new direct-print/write manufacturing technologies in order to develop apparel that has "wow" factor. This is the distinctive appeal of apparel that has innovation and style. In particular, solar charged luminous textiles have been developed by IFTH and ARDEJE. These have been applied first in bags that can be solar charged, and when opened are illuminated from inside. Importantly for the "wow" factor, luminosity can be provided in personal motifs and/or patterns for individual customers.

Market-led innovations – prediction of ecological effects

With regard to environmental concerns, apparel markets are demanding more assurances concerning the ecological impact of garments and accessories. Within the Micro-Dress project, easy-to-use tools have been developed to enable EU apparel manufacturers to quickly demonstrate the superior ecological performance of their goods. The company, SENSION, has developed a low cost and rapid screening method that can be used "on-site" at, for example, a warehouse. This new application of biosensor technology is much faster than having to take samples to a laboratory for testing. In addition, the company, MTS, has developed a simple tool to calculate and forecast all possible environmental impacts due to chemical releases during textile based manufacturing. This will allow checking the important control parameters – rather than hundreds of parameters that may be irrelevant in a specific case. Overall, eco-efficiency optimization can be easily worked out by using the on-line prediction tool developed by IFTH. This enables companies to benchmark their own activities, and those of their entire supply chain.

Design-driven innovation – luxury wearable computing

Within Micro-Dress, creative design has been applied to the merging of apparel and micro-electronics in order to enable luxury wearable computing for the first time. In particular, DFKI has developed the Kinetic Jacket. This is a jacket that can monitor movements during for example, exercise or rehabilitation. Unlike previously available garments that have been impractical, the Kinetic Jacket is easy to wash because its integrated sensors can be removed easily. Also, VTT has developed the Automatic Messaging Card System™ (AMC™). This is an alternative to established wearable messaging devices that are characterised by utilitarian metals and plastics. By contrast, the AMC™ can be cased in luxury leathers, textiles, etc., while detailing can be in fine wood etc.

Integrating innovations

The operationalization of the Micro-Dress innovations can be facilitated by the easy-to-use Web-based integration platform developed by the project co-ordinator, Athens Technology Centre (ATC), which has been developed on the basis of the "Virtual Extended Enterprise (VEP)" concept. Micro-Dress VEP provides the effective management of the e-devices supply chain on the one hand, providing access to the innovative eco-tools at the same time, thus offering a total solution which extends the ERP software offer currently on the market.

Validation of innovations

Throughout the innovation process, guidance and evaluation has been provided by two EU apparel exporters, which seek to continue to prosper through innovation: LANTOL and ZEGNA.

Ermenegildo ZEGNA is a leader Brand in Luxury Menswear. From high quality fabric mill, through garment manufacturing, is now expanding a strong world-wide owned Retail distribution. This kind of business is a highly sophisticated one in terms of excellent quality, exclusiveness, “crazy” focus on details and strong consistency of products, sale ceremony, Boutique set up and location with Brand Image. ZEGNA background is classic tailoring with finest fabrics in the world, enhanced by materials innovation and also new technology. ZEGNA Brand is built on Masculinity, Quality, Naturalness and Contemporariness. Throughout ZEGNA long history of successful related diversification, these underlying characteristics have been expressed consistently. This has been achieved by maintaining Brand strong discipline across vision and detail for every aspect of the Company from the layout and design of a Flagship Store to the smallest packaging.

ZEGNA joined the Micro-Dress Project because it encompasses Made to Measure, technological innovation and Eco-Management, i.e. is exactly on ZEGNA target. During the Project ZEGNA has provided its expertise in Made-to-Measure business management, in design and manufacture of high quality garments and accessories. ZEGNA has also provided expertise in profitable global expansion through Brand development. ZEGNA has made proactive contributions to the development of eco-tools and to the development of e-devices. In particular, ZEGNA has supplied fabrics to MTS and SENSION; evaluated IFTH eco methodology and tested ATC web – based eco tool. With regard to e-devices, ZEGNA has participated in face-to-face and remote meetings starting with definition of requirements, through design evaluations, to evaluation of physical prototypes. Further, ZEGNA has provided Brand consistent materials for the manufacture of prototypes.

During Micro-Dress, ZEGNA has experienced close collaboration with a multi-disciplinary consortium with strong diverse expertise (chemistry, printing electronics, and software). In doing so, ZEGNA has gained valuable knowledge and insights that could not have been gained by studying the offerings of competitors. This is very valuable for ZEGNA as it is a Company that seeks to lead and not to follow. Moreover the interaction with diverse experts has brought opportunities to think widely and differently about possibilities for bringing new value to the final customer. Specifically, ZEGNA has gained early understanding of the potential of innovative eco-tools to enhance its Brand throughout eco-Supply Management. Innovating eco-tools can be management tools for raising standards by setting incremental targets for raw materials in different regions. Also, ZEGNA has gained early understanding of the potential of e-devices as Brand extensions: what can enhance the Brand, what can dilute the Brand and what can threaten the Brand. As is inevitable with any research and development, perhaps only a few ideas shown at the Pilot Demonstration will be fully commercialized as they are. However, a variety of new marketing and sales opportunities have been deeply considered and analyzed both for technical feasibility and for market potential. Moreover, ZEGNA has established new productive working relationships with Companies and Institutions across EU. These new relationships will be important as ZEGNA moves forward through its continued combination of classic tailoring enhanced by new technologies.

On the other hand, **LANTOL** which is situated in the textile-dominant area surrounding Tollegno and Biella, are linked to their century old manufacturing traditions, being proud to incorporate these features into today's product. LANTOL is keeping up with the times by taking advantage of all that technology has to offer; following new procedures, using innovative manufacturing systems and trend driven ideas. LANTOL takes great pride in developing eco-sustainable manufacturing processes that respect the law while creating the smallest environmental impact. They take a special blend of technology, fashion and nature to create this eco-sustainable environment.

LANTOL has been involved in the Micro-Dress project as the consortium's expert in woven fabrics, weaving, dyeing, finishing, as well as in eco-efficiency applied to textile industrial production. In this context, LANTOL has evaluated and tested e-Supply chain management platform (ATC) as a fabric supplier providing short-to-medium run of fabrics, while being the fabric supplier for the pilot Micro-Factory (DFKI) for the kinetic jacket and trouser manufacturing. Furthermore, they have povided fabrics and production technical data about fabrics and production, for testing and simulations of the impact on the environment of production, evaluated the EHS Online prediction tool for wool fabrics and garment producers (MTS). They have provided fabrics for testing biosensor (SENSION) for rapid test safety screening for azodyes, as a ZEGNA fabric supplier and these results have been integrated with ZEGNA e-SCM. In addition they have provided data and evaluated online prediction tool for global Eco-Efficiency optimization (IFTH, ATC), while they have provided fabrics for testing direct-printing on wool fabrics of EL devices (ARDEJE).

Evidently, LANTOL has experienced close collaboration with a multi-disciplinary consortium with strong technical expertise (chemistry, printing, electronics, and software), making it possible to gain significant experiences about modern testing methods and updated values for garment manufacturers as supplier. The knowledge gained includes, among others, the effective way to evaluate in practice the impact of industrial production on the environment, compared with its past and competitors as well as the new emerging Supply Chain Management methodologies, especially for innovative SMEs like the Micro-Factory (DFKI). Experiences gained on direct-print and direct-write before any competitors provide important insights about potential for intelligent fabrics. Finally, LANTOL has gained experience of the scientific development of eco-tools which provided the understanding of complex interactions of factors that are becoming increasingly important.

The knowledge gained from and with Micro-Dress partners will be transmitted to customers and suppliers in order to achieve better relationship and trust on supply chain management, material testing and eco-efficiency. Also, LANTOL will look for openings to deploy direct-print and/or direct-write in fabrics and its branded apparel, as well as to apply its new understanding to anticipate threats and identify opportunities in eco-branding. Competitors from outside of EU are following established paths of moving from competing on price only to improving quality – this is a major threat to LANTOL and to EU textile industry. The combination of intelligent textiles and eco-branding can enable strong differentiation - the challenge is to do so without compromising the Italian style that customers' value all over the world. Lastly, LANTOL will draw upon its Micro-Dress experiences to further develop its differentiation from competitors

3 Main Scientific and Technical results/foregrounds

3.1 The total Micro-Dress offer

The total Micro-Dress offer is a wide combination of a variety of applications, which all together form a very specific solution, for a niche market segment of the Mass Customisation landscape. As such, it is rather difficult to be exploited as a whole. The components of the total Micro-Dress offer have independently a great exploitation potential in a wide range of applications, outside the project framework.

The total Micro-Dress offer, with a mention in the individual project results which present a great potential is presented in the figure below.

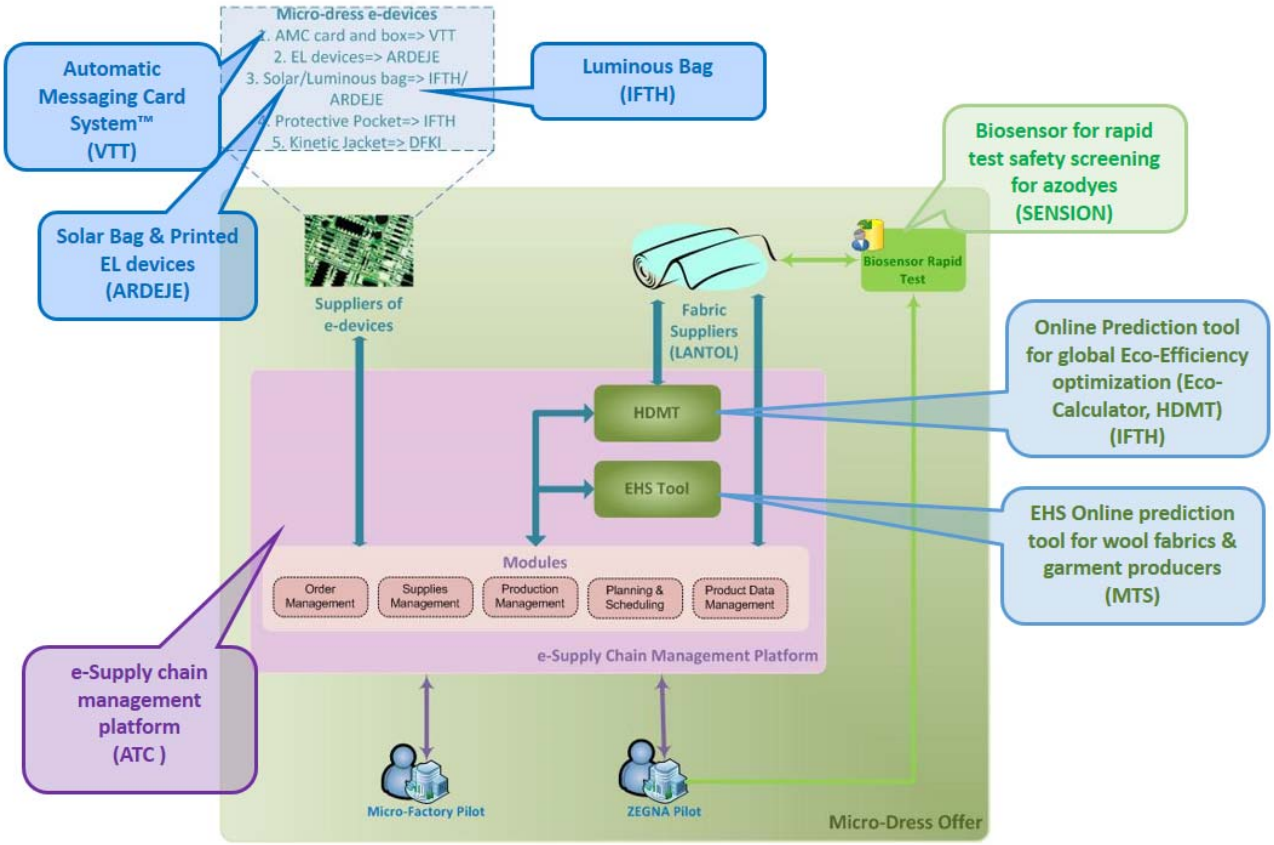

Figure 2: The total Micro-Dress offer

The following figure gives an overview of the Micro-Dress main scientific and technical results.

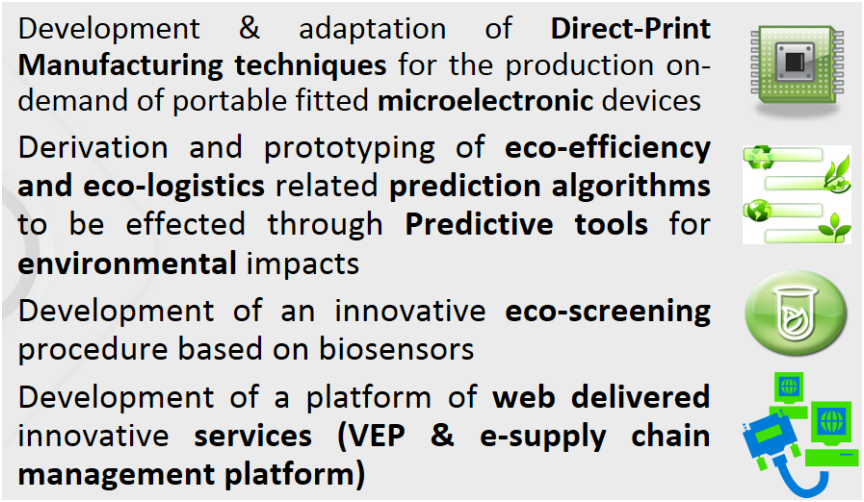

Figure 3: Micro-Dress Scientific & Technical objectives at a glance

The foregrounds of Micro-Dress, in association with the responsible partners are presented in the figure below.

Figure 4: Micro-Dress results & involved partners

3.2 Individual project foregrounds

3.2.1 EHS Online prediction tool for wool fabrics & garment producers

The EHS prediction tool enables textile factories to forecast various EHS impacts and express these in media related concentrations and/or material specific emission factors. Due to the fact that a total balance algorithm is behind it, it also enables him to estimate the residual concentrations of restricted substances on fabric. As a further consequence all later apparel manufacturers are able to calculate the accumulated EHS emission factors of their garments provided that all component/ fabric related factors are available.

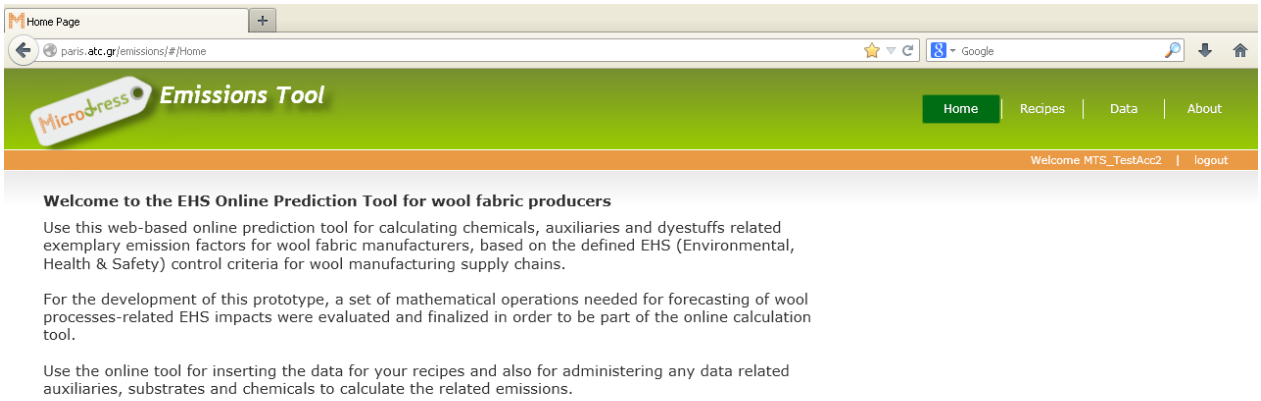

Figure 5: EHS Online prediction tool for wool fabrics & garment producers

3.2.2 Online Prediction tool for global Eco-Efficiency optimisation

This result provides a unique and certified methodology of evaluation and optimization of the supply chain with respect to the global eco-efficiency, offered through online tools.

The innovation content of the result consists in:

1. Benchmarking the company through its eco efficiency (represented by its eco-profile). Usually, the methods used to choose an eco-efficient supplier are based on specifications sheet which results are not quantified.
2. Enlarging this evaluation to the eco efficiency of the supply chain. The tool brings means to each tool user to optimize a supply chain of the desired product and helps the user in choosing the companies with respect to their eco efficiency
3. Putting at disposal to the user all these means on a web services platform allowing the user to select supplier through a unique methodology of benchmarking
4. At least, the tool proposes an upstream approach starting from the product specifications wanted by the user to final proposals of alternative supply chains.

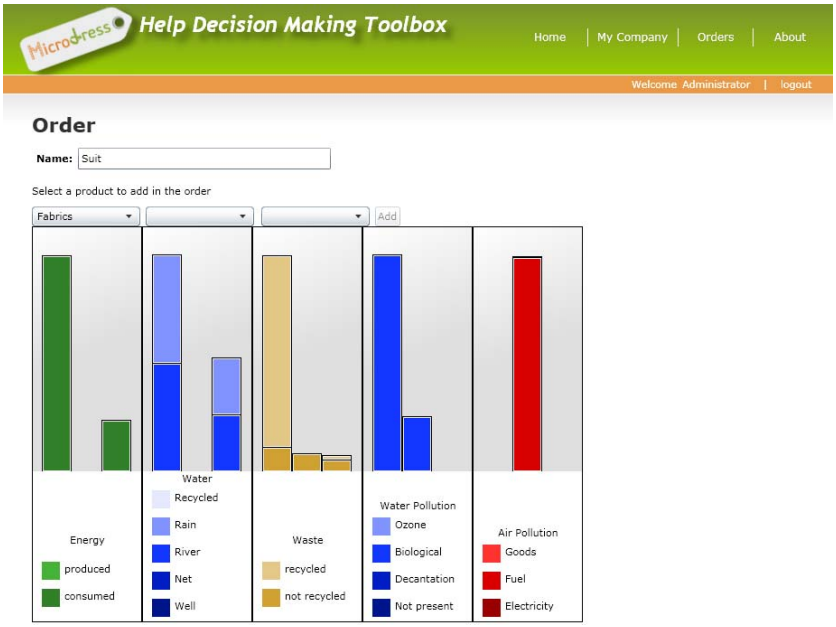

Figure 6: Online Prediction tool for global Eco-Efficiency optimisation

3.2.3 Biosensor for rapid test safety screening for azodyes

This results concerns novel immunological biosensors for screening of azodyes based on banned aromatic carcinogenic amines on textiles which are intended to be offered as rapid and cost effective screening methods are in development. The product is new and therefore no directly competing products are available presently to our knowledge. There are no direct competitors for the result. There is a trend but no actual competitor. As of that no fast competition is expected due to the very specific know-how required.

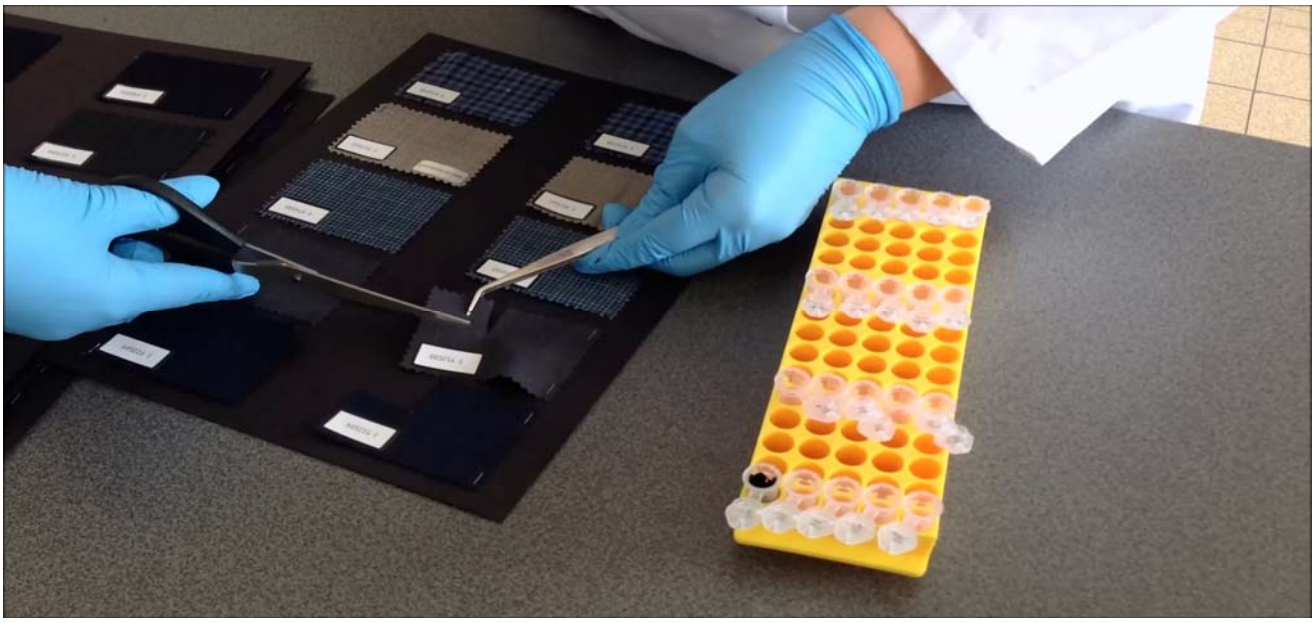

Figure 7: Biosensor for rapid test safety screening for azodyes

3.2.4 e-Supply chain management platform

The VEP introduces the supply chain management of the Micro-Dress business models, which is firstly introduced to the market through the project. In this respect, we cannot compare it to other available supply chain management SaaS platforms.

The innovative content of the e-supply chain management platform (VEP) is the performance of efficient transactions (order fulfillment, material procurement, order tracking and tracing) while successfully facing significant challenges related to:

- short-to-medium runs of fabrics delivered from a central fabric manufacturing node to a network of collaborating micro-factories.
- orders of individual customer configured portable e –devices
- web delivered innovative services, such as the eco-efficiency/eco-logistics prediction and eco-certification tools. All these services are seamlessly integrated through to the implementation of state-of-the-art web service technologies, offered to end users according to the Software as a Service (SaaS) model.

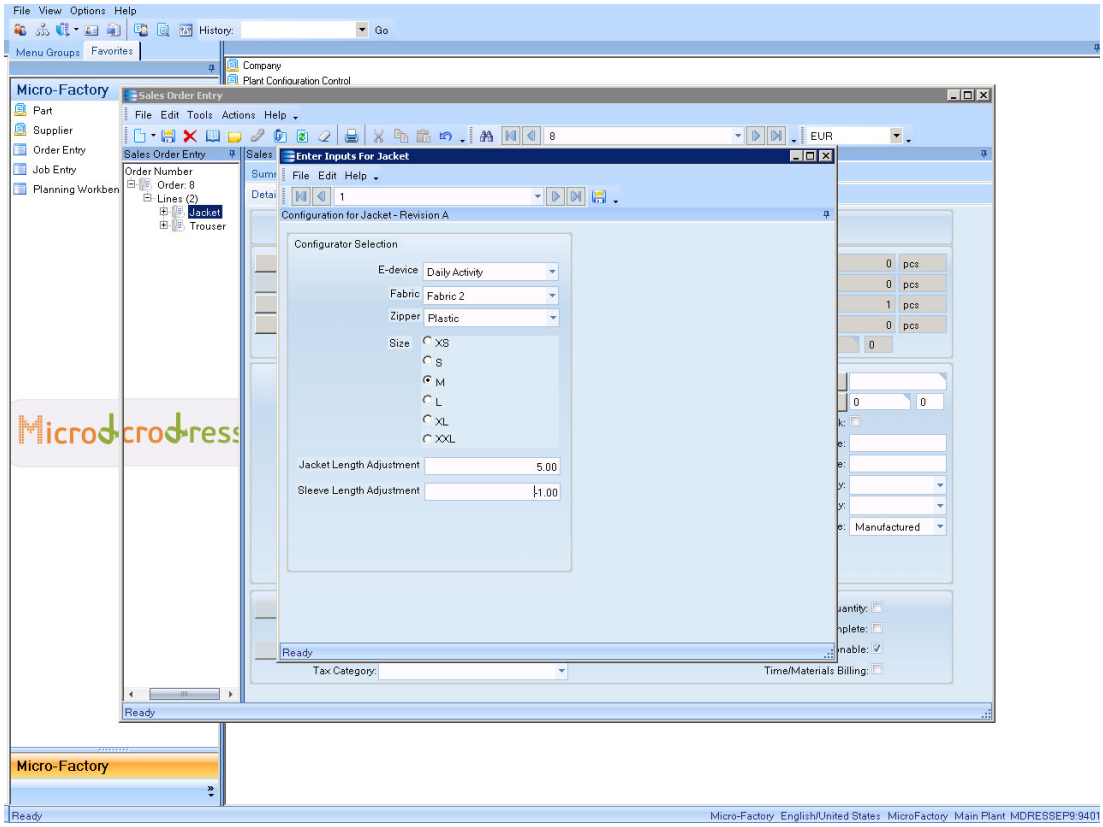

Figure 8: Micro-Dress e-SCM

3.2.5 Luminous Bag

The innovation content of this result is to combine different technologies to achieve an automatic lighting inside a bag with eventually photovoltaic cells. Potential customers for this result are luxury bag and suitcase companies. The potential benefit that this result brings to the aforementioned customers is comfort, safety, personalization, security. The Inside Lighting Bag is expected to rank

high against competing products in terms of price / performance although there are already existing products. Regarding the protection of this result, related actions are in progress, while there is already an existing patent.

Figure 9: Luminous Bag

3.2.6 Solar Bag

The innovation content in the way to propose Solar panels integrated in bags. From standard Photovoltaic modules (PV) up to Organic Photovoltaic modules (OPV) produce by inkjet printing, the result is to propose the best solution in terms of design integration, efficiency and portability (weight, flexibility, lifetime …). Inkjet capabilities allow printing of digital patterns on flexible materials. Integration of the PV or OPV devices in the final product is a key to address bag market.

Figure 10: Solar bag

3.2.7 Printed Electro Luminescent (EL) devices

The innovation content of the result is to create electroluminescent devices by ink jet printing technologies. Electroluminescent devices required a stack of functional material layers. Standard printing technologies are used to print all the layers and produce electroluminescent film. Combined inkjet capabilities to print each material on both textile and plastic substrates allow us to propose digital lighting pattern. Patent for this result is in progress. Both materials and process as well driving electronics have to be protected. ARDEJE is also in the process of creating a business plan.

Figure 11: Printed Electro-Luminescent devices

3.2.8 Automatic Messaging Card System™

System comprising: physical card with internal micro-electronics and internal embedded software; applications software. System automatically sends a message, which is predetermined by the customer, in responses to a predefined event. Messages that are important to the customer are sent automatically, i.e. without on-going effort. For example, a message can be sent automatically to e.g. care provider and/or close relative if the person with the AMC falls. For example, a message can be sent automatically to e.g. a diplomat participating in an important international meeting, where a diplomat cannot be checking her/his telephone, to inform that a specific call has been sent by e.g. national president. Face-to-face interviews have been carried out in order to better determine customers. These interviews have revealed that the care market has much less potential than the corporate market.

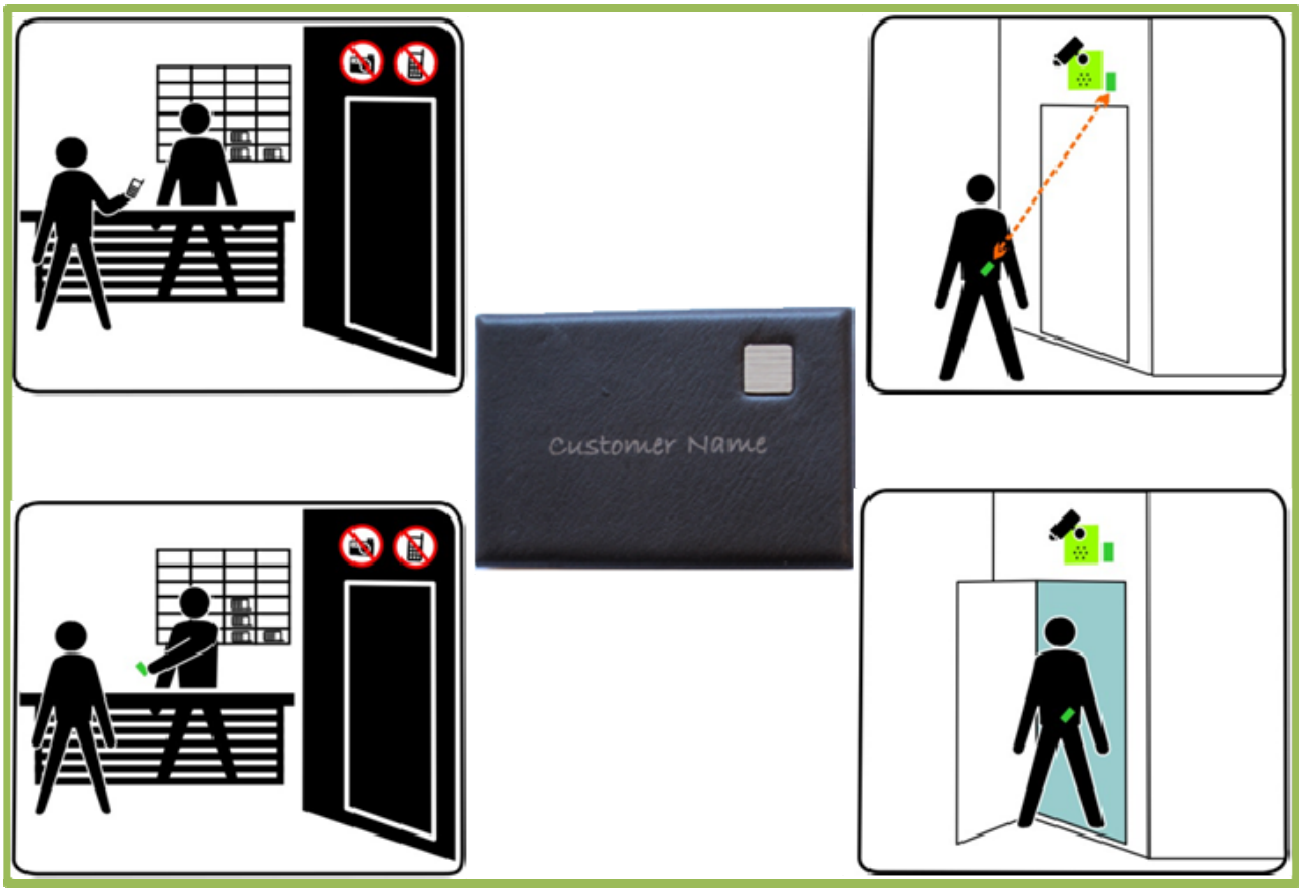

Figure 12: Automatic Messaging Card System™

4 Impact

4.1 Societal and business impact of the Micro-Dress results

Micro-Dress offer as a whole represents a very specialized solution for a niche market (Mass Customised apparel) which still evolves, not being stable as yet. Therefore, the total Micro-Dress offer has not significant impact. However, each separate result has the potential of a more generic application, addressing various market needs. Therefore, it is more effective to examine the impact of each of the results of the project in general, as described below.

4.1.1 EHS Online prediction tool for wool fabrics & garment producers

The EHS-IT-tool calculate and forecast all possible environmental impacts due to chemical releases during textile based product manufacturing. This allows the associated manufacturers to decide for the right abatement technology and appropriate operating parameters for existing or new technical equipment as well as targeted and tailor made control measurements in a highly specific way checking only the really needed control parameters and not hundreds of parameters that may be irrelevant in a specific process case.

The EHS-IT-tool allows to calculate and forecast:

- Air emissions in quality and quantity
- Waste water emissions in quality and quantity
- Workplace emissions in quality and quantity
- Material/product related residual chemicals in quality and quantity

The key advantage of the tool is, that no time and cost intensive standard mass analytics had to be performed. Only the **really** needed control parameters had to be checked.

4.1.2 Online Prediction tool for global Eco-Efficiency optimisation

There are more and more EU and international regulations regarding: environmental and occupational health aspects during manufacturing , consumer safety and disposal and/or reuse of garments. There are many tools and software used to calculate the product environmental impacts. But Eco-logistics tools, having a global impact are not particularly numerous and do not treat the performance of the logistic chain in terms of parameters related to sustainable development.

The innovation of the online Prediction tool for global Eco-Efficiency optimization is based in the following:

1. Benchmarking the company through its eco efficiency (represented by its eco-profile). Usually, the methods used to choose an eco-efficient supplier are based on specifications sheet which results are not quantified.
2. Enlarging this evaluation to the eco efficiency of the supply chain. The tool brings means to each tool user to optimize a supply chain of the desired product and helps the user in choosing the companies with respect to their eco efficiency
3. A web services platform allowing the user to select supplier through an unique methodology of benchmarking

4. At least, the tool proposes an upstream approach starting from the product specifications wanted by the user to final proposals of alternative supply chains.

The guide to the EU's sustainable development strategy, edited by the EC in 2007, encourages developing a more efficient and more sustainable transport chain. In the context of an expected increase in road traffic by 60% in 2013, the use of the inter-modality is necessary and recommended. Eco-conception projects in other industrial sectors show that it is possible to reach a reduction of industry's participation to global warming by almost 50%. But this estimate doesn't take into account issues related to reverse logistics which are more difficult to handle.

4.1.3 Biosensor for rapid test safety screening for azodyes

The test of the described development focuses on a biosensor test which detects selected aromatic amines on textile materials. These toxic amines can potentially occur in textile materials treated with azo dyes in the production process. The resulting biosensor technology is meant to be applied for screening purposes and presents a cost effective and rapid "on-site" screening method. The technology is supposed to be applied mainly close to the production process of textile materials.

The innovation is based on the application of a biosensor technology, which has been applied so far mostly in the medical and in the veterinarian field. The biosensors are based on specific antibodies, which are directed to the target structures (the aromatic amines to be detected) by the usage of certain haptens, which have been specifically designed for the biosensor development. To our knowledge the Immunoassay / biosensor technology has been the first time applied for the purpose of screening textile materials.

The present analytical methods, based on mass spectrometric technologies allow the detection of said compounds selectively and with high sensitivity. So in general, there is a way to detect said compounds. However these methods are time consuming and cost intense. The biosensor technology is adapted for the screening of high amounts of materials and is meant to allow the screening "on-site" in a routine process. Positive tested samples can subsequently be tested by further more cost-intense analytical methods. The business impact is finally based on more safety both for producers and consumers.

4.1.4 e-Supply chain management platform

The Micro-Dress e-Supply Chain Management (e-SCM) platform is developed on the basis of a Virtual Extended Enterprise (VEE). Apart from the customized supply chain modules, which address the needs of the two selected mass customisation business models, e-SCM also integrates eco related tools like the EHS Online prediction tool for wool fabrics & garment producers as well as the Online Prediction tool for global Eco-Efficiency optimisation.

The innovative content of the e-Supply Chain Management platform is the performance of efficient transactions (order fulfillment, material procurement, order tracking and tracing) while successfully facing significant challenges related to (a) short-to-medium runs of fabrics delivered from a central fabric manufacturing node to a network of collaborating micro-factories, (b) orders of individual customer configured portable e –devices, (c) seamlessly integrated web delivered innovative services, such as eco-efficiency/eco-logistics prediction and eco-certification tools, and (d) offered to end users according to the Software as a Service (SaaS) model.

With a global market share of 18%, SaaS offering of ERPs will continue to be on demand for the following periods. Significant business benefits, apart from the minimum investment risk which excludes the costs for SW and HW, are the secure remote data centers that support the emerging Virtual Extended Enterprises. Micro-Dress e-SCM presents a great fit for TCI companies that do not require much software customization and seek for lower impact entry-level ERP.

4.1.5 Luminous Bag

IFTH has developed a new process to integrate light into bags and other accessories. The result is the possibility to light up the inside of a bag.

A ribbon of LEDs is glued or sewed inside the bag and combined with a sensor that detect that the bag is open and a microcontroller that give some intelligence to the bag to switch on the LEDs to light up the inside of the bag. All the parts are very easy to integrate to a standard bag and can be customized at the request of the end user.

The process can be used for all kind of bags (travel, attached case, lady bag, fashion bag etc…). IFTH can sell the ribbon (by meters on bobbin) or a full kit with sensors, micro-controller and software. This luminous feature can be joined to a photovoltaic film on the outside of the bag to charge the battery with the sun light. Currently, IFTH is looking for brands who want to exploit this innovation.

4.1.6 Solar Bag and Printed Electro luminescent devices

Advancing climate warming is a major threat to industry. The challenge facing us is to produce or harvest energy and to convert it with the smallest footprint for the environment. Moreover, technical solutions have the greatest chance to have an impact if they are transparent to as many as possible. Moving in apparently opposite direction is the need for even more individual lifestyle. At this crossroad, lies an opportunity to develop customisable products with a very low carbon footprint. The solar bags and the electroluminescent devices are an illustration.

This project presents several innovative aspects. The first one is about the chemical composition of solar cells, based on organic compounds. Its level of toxicity is very low and can be recycle. The second aspect is the process used to print them, namely inkjet. It allows to design pattern enabling a smoother integration, preserving the aesthetic of the original product. The third aspect is about the mechanical properties allowed by such a material. It is more than flexible, with a small radius of curvature.

One of the key advantages of the inkjet printing technology is the low production costs. Indeed, virtually no ink is wasted. Moreover, it can be added in an existing production line without changing reengineering the all architecture. Adding lighting visibility, either for security or promotional reasons could be achieved at lower costs.

4.1.7 Automatic Messaging Card System™

The Automatic Messaging Card System™ (AMC™) is removable wearable computing that enables pre-defined messages to be sent automatically to pre-defined recipients in response to pre-define events. These can include: the wearer approaching a secure area and its door opening automatically; the wearer receiving notification that an important telephone call or text message has been received

while being in a secure area where phones are not allowed; the wearer falling down, not being able to move, and being in need of assistance.

The AMC™ is an example of design-driven innovation. That is innovation that is not impelled by technology-push or drawn by market-pull, rather superior performance comes from compelling design creations. Thus far, wearable computing has either been stylish but not subtle (e.g. dresses that light up), or practical but not personal (e.g. heart monitor armbands). By contrast, the AMC™ has been developed to be stylish, subtle, practical, and personal.

There is unmet and increasing global demand for wearable computing. The AMC™ is a versatile platform for meeting many individual functions. Further, it is not hampered by the manufacturing problems of weaving electronics into garments or the installation problems of Ambient Assisted Living systems. The AMC™ is intended for exclusive luxury niches such as casinos and other organizations that focus on quality rather than cost.

4.2 Main dissemination activities

A Draft Dissemination and Spread of Knowledge Plan was prepared. The overall objective of this plan was to describe the dissemination activities which were initiated throughout the project period. Activities included efforts to disseminate the results to the different target groups (EC – FoF community groups, scientific community, consumers, and wider public) as well as to the target companies and audiences. Furthermore, the document enumerates more traditional dissemination activities such as presentations at conferences, workshops, fairs, brochures, publications, websites as means for spreading out the objectives and results obtained throughout the course of the project.

Moreover, the definition of Micro-Dress foreground and results as well as identification of initial Micro-Dress partners' Exploitation Intentions has been performed and early IPR agreement was created. The result of this activity was presented in D7.3 "Early IPR Agreement on the Exchange of Knowledge for Use-Ownership". After the organisation of the Exploitation Strategy Seminar in Espoo on September 23rd 2012, as well as the discussions that followed among the consortium partners in a relevant exploitation exercise performed during the General Assembly Meeting in Valence, on June 21st 2012, the achieved and expected results coming from the project which have commercial/social significance and can be exploited as a stand-alone product, process, service, etc. have been reported in D7.5 "Final IPR Agreement on the Exchange of Knowledge for Use – Ownership", In this report an extended market analysis has being also performed for the tangible assets resulting from the Micro-Dress project.

As part of the dissemination activities, all consortium partners have actively participated in the project's online presence as well as have engaged in the Social media pages of the project. Some relative screenshots of these activities can be found below.

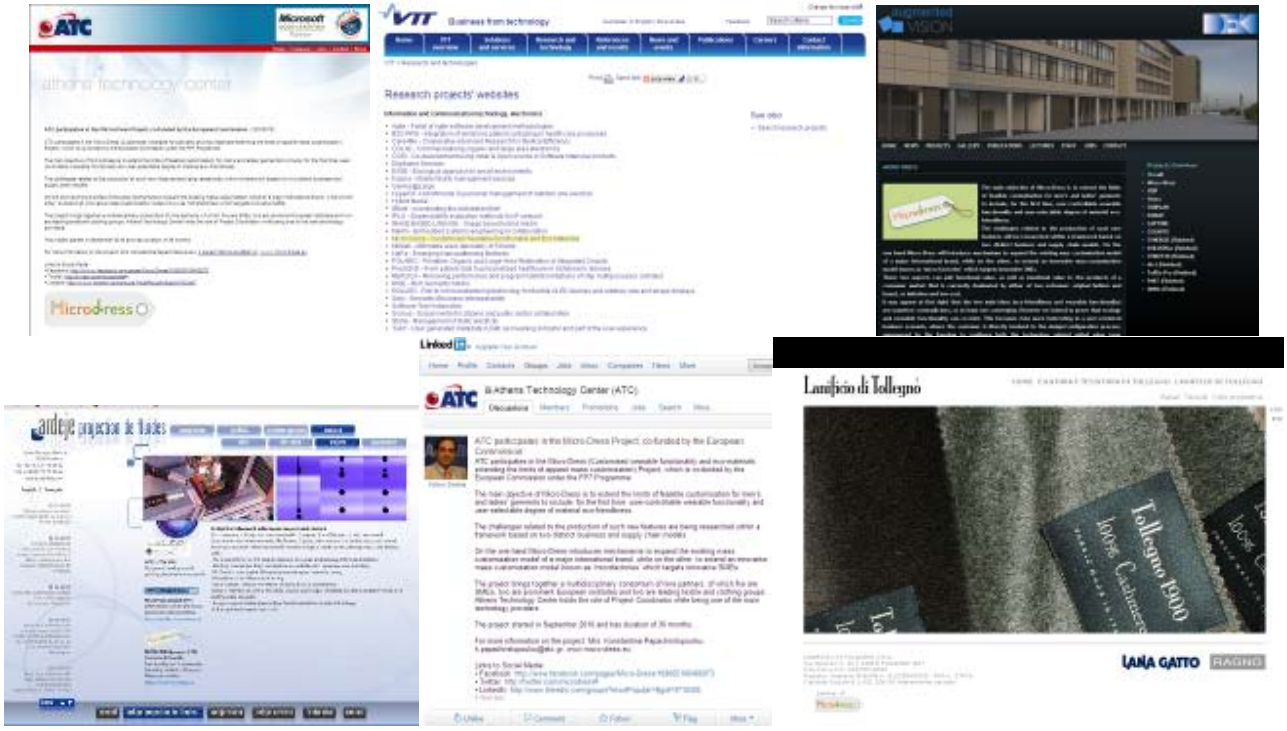

Figure 13: Links of partners to the project website

4.2.1 Public Conferences

In accordance with the DoW, Micro-Dress publicized its objectives, progress, and results through three public conferences. There was one conference event within each year of the project's three years duration. In order to optimize costs, participation, and industry impact - joint organization with related events of other similar projects under the umbrella of, for example, the Technology Platform for Textile and Clothing, were preferred. Participation covered prominent representatives of the European Fashion Industry, the research community, policy makers, and the media.

The conference event for the first year of the Micro-Dress project was the Create Your Own 2011 (CYO2011) Mass Customisation Conference and Exhibition, May 30th - 31st 2011. The Conference was held in Berlin, and explored the reality and future behind individualization, co-creation, and personalization — mega trends that are shaping the European consumption landscape. The event was mainly consumer oriented. The exhibitors for Micro-Dress were Konstantina Papachristopoulou of ATC and Christian Lott of DFKI. The Micro-Dress stand was two meters square in area, and had the Micro-Dress logo laser cut at the one cardboard presentation panel and the Micro-Dress poster at the other panel. Printed brochures were available for handing at the visitors. Christian Lott of DFKI presented to the exhibition visitors the kinetic jacket linked to a computer. In total about 35-40 visited the Micro-Dress stand. The questions were focusing on both the functionality and the potential applications of the kinetic jacket. Also the topic of how to integrate the sensor technology invisibly into the jacket was often discussed. The interest was in particular high when discussing about mobile applications potentially running on smart phones.

The organisation of the second's year dissemination conference in the framework of the 7th Annual Textile ETP conference (Brussels, March 29th & 30th) has taken place. The event entitled "From FP7 to HORIZON 2020: Making EU Research & Innovation Programmes fit for Small & Medium-sized

Companies" featured presentations from 28 FP7 textile research projects across a wide range of subjects and also explored in detail how the European Commission and the European Technology Platform try to make European research, innovation & networking support programmes more accessible and manageable for industry, especially small and medium-sized companies from the textile and apparel sector. The FP7 projects presented covered areas such as new fibre and textile material developments incl. composites, textile functionalisation and processing, new developments in protective textiles and other technical textile markets, new technologies and business models for consumer textile products incl. mass customisation, textile sustainability and recycling. Micro-Dress was represented there by ATC (Konstantina Papachristopoulou) with an exhibition stand prepared by VTT (Stephen Fox) and by DFKI (Christian Lott) with a presentation of the project at the conference. Printed brochures (2nd version) were available for handing at the visitors. In total about 300 visited the conference and were mostly Policy makers, EU, Industry, Higher education & research representatives.

The conference event for the third year of the project was the INNOV'EN SEINE Micro-Dress Final event, May 23rd 2013, Paris. The event was jointly organized with PROsumer.NET kindly hosted by Institut Francais Textile-Habillement (IFTH). The purpose of the event was to present Micro-Dress achieved results and prototypes to a wider audience, by demonstrating the outcomes of three years research activities towards extending the limits of garments feasible customisation to include extended functionality and eco-efficiency. In total about 40 people participated in the event and were mostly Industry representatives and policy makers.

4.2.2 Project Web Site

Early in the project, the public project website has been launched (http://www.micro-dress.eu). More information can be found below, in Section 6.

4.3 Exploitation of Micro-Dress results

The Draft Plan for the Use of Foreground Knowledge was created based on the early IPR Agreement and the final ESS Synthesis Report. The aforementioned activity is presented in D7.4. This document gives an overview of the range of opportunities and possibilities arising by Micro-Dress results and examines the following issues:

- Preliminary list of scientific (peer reviewed publications), as well as the list of dissemination activities undertaken so far;
- Identified applications for patents, trademarks, registered designs, etc. until now;
- Exploitable foreground with specified timetables for commercial use or any other use;
- Progress of the exploitable results and date of achievement;
- Results IPR and Exploitation Rights distribution which have been discussed and agreed by all partners.

Consequently, the Final plan for the use and dissemination of foreground (PUDF) was created and represents an enhancement of the range of opportunities and exploitation possibilities expected to be generated from Micro-Dress results. The aforementioned activity is presented in D7.6. This document includes:

- An overview of the dissemination activities and the scientific (peer reviewed) publications undertaken by the project partners until the end of the project;
- An overview of Micro-Dress exploitable results as well as a List of applications for patents, trademarks, registered designs, etc.;
- An extended and concrete market analysis for the exploitable results which represent tangible assets and have the potential to reach the market shortly after the end of the project;
- The revised and final Exploitation shares among the Micro-dress consortium partners, based on the actual work performed by the end of the project.

Following the recommendations of the P.O and the PTA raised at the final review meeting, the analysis of the risks for the Micro-Dress offer as a whole, as well as for each of the tangible assets has been added to the final PUDF. The tangible results have been grouped according to their category (Software, Chemical product, and Physical prototypes). For each of the results, the identified risks have been characterized by their impact. Finally, for each identified risk, the related mitigation is also presented.

5 Micro-Dress public website and related contact details

The Micro-Dress public website can be found at http://www.micro-dress.eu/.

Figure 14: Micro-Dress project public website

Furthermore, any person can join us and get involved with the project through our Social Media pages:

Twitter account: https://twitter.com/microdress

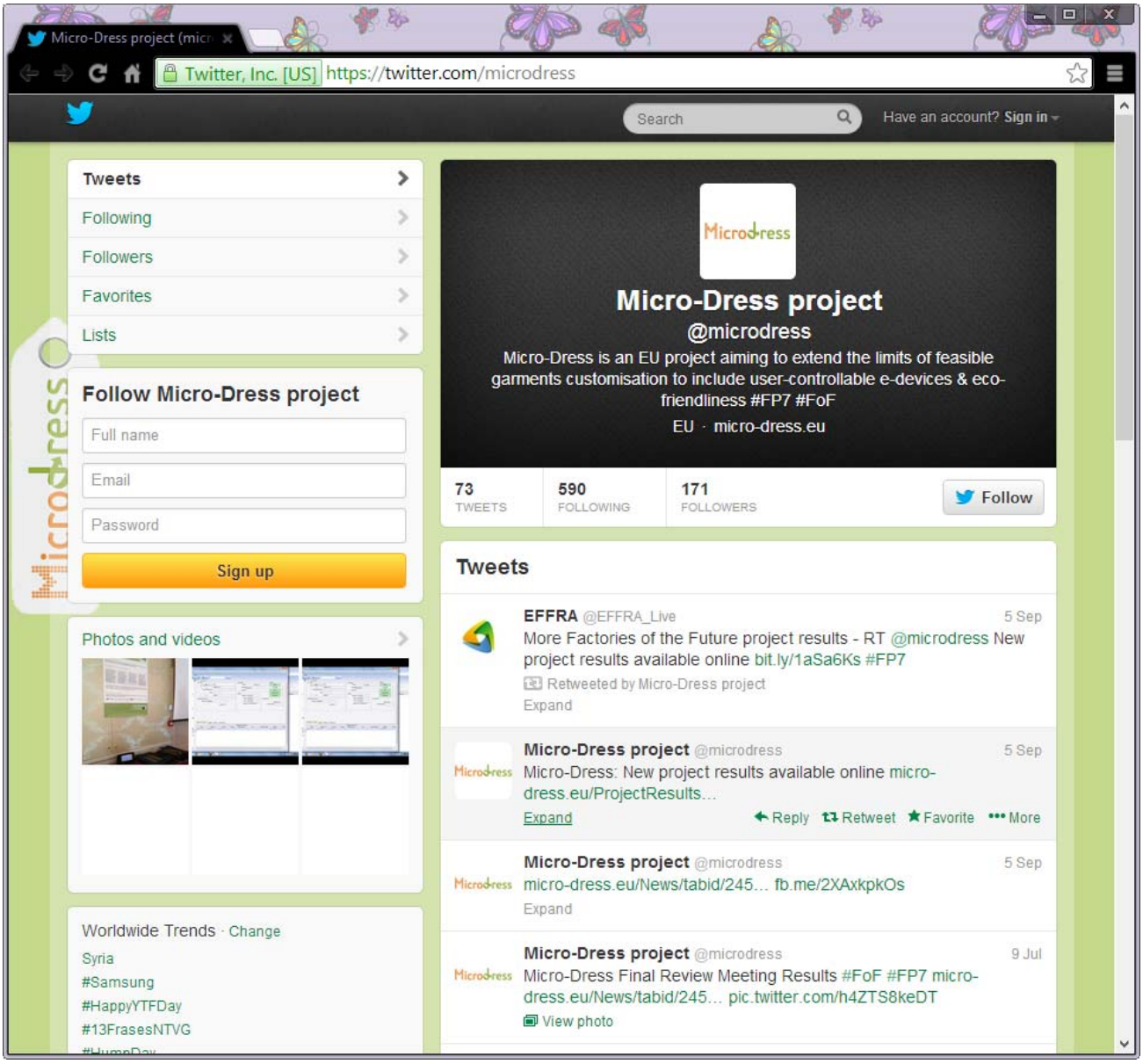

Figure 15: Micro-Dress twitter account

Facebook page: https://www.facebook.com/pages/Micro-Dress/169065106466973

Figure 16: Micro-Dress Facebook page

LinkedIn group: http://www.linkedin.com/groups/MicroDress-3712425

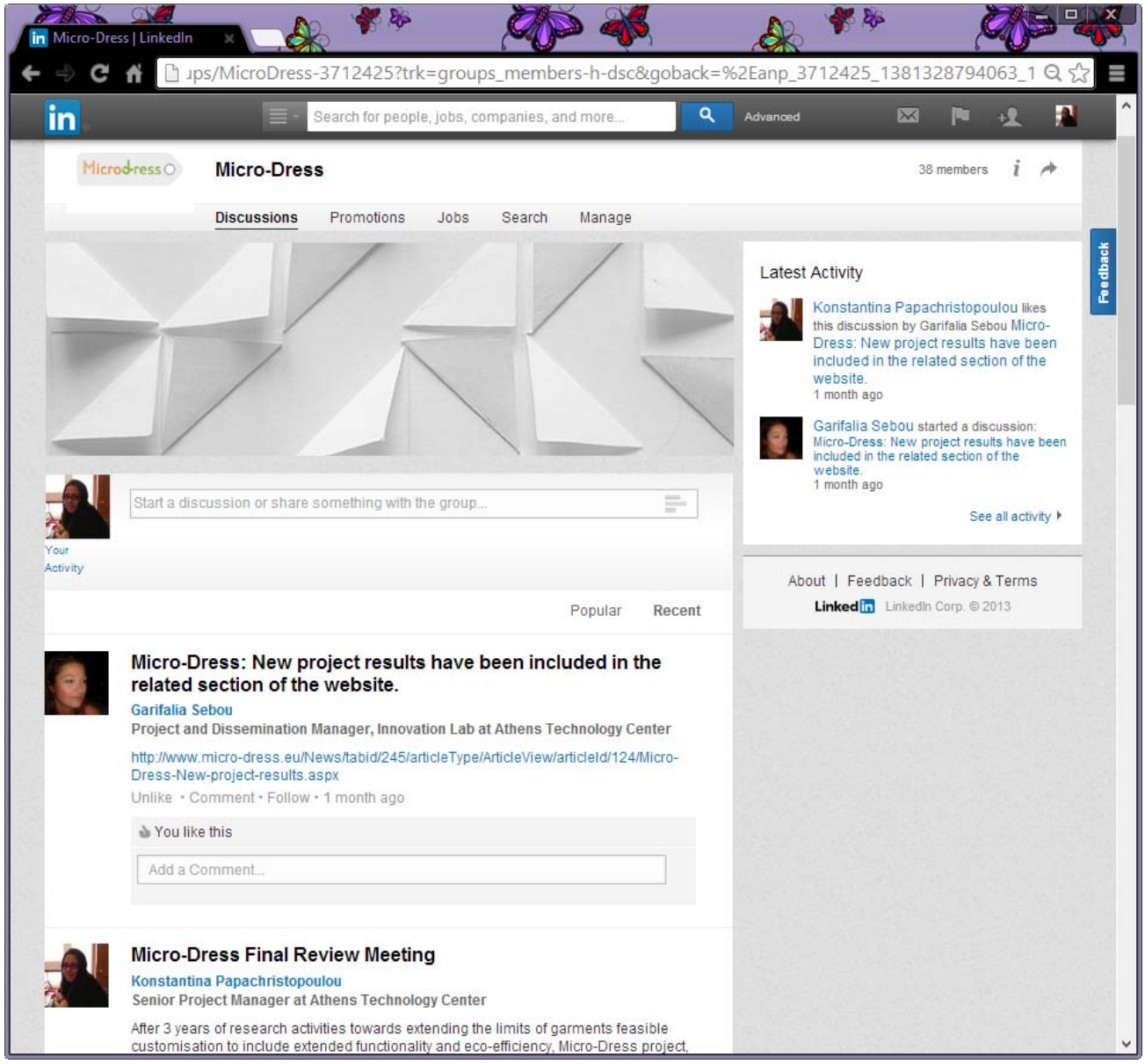

Figure 17: Micro-Dress LinkedIn group

Micro-Dress Project partners can be contacted directly. Their contact details can be found online at http://www.micro-dress.eu/TheConsortium.aspx

Figure 18: Micro-Dress consortium partners contact details

The following table summarises the Micro-Dress consortium contact details:

Partner	Country	Contact details
Athens Technology Center S.A. (ATC) www.atc.gr	Greece	Contact person: Mrs. Konstantina Papachristopoulou e-mail: kpapachristopoulou at atc.gr
Teknologian tutkimuskeskus VTT www.vtt.fi	Finland	Contact person: Dr. Fox Stephen e-mail: Stephen.Fox at vtt.fi
IN.CO. S.p.A. (ZEGNA) www.zegna.com	Italy	Contact person: Dr. Luca Sangiovanni e-mail: luca.sangiovanni at zegna.com
Filatura e Tessitura di Tollegno Spa (LANTOL) www.tollegno1900.it	Italy	Contact person: Mr. ClementeGermanetti e-mail: Clemente.Germanetti at tollegno1900.it
DFKI GmbH av.dfki.de/	Germany	Contact person: Mr. Constantin Thiopoulos e-mail: Konstantinos.Theiopoulos at dfki.de
Institut Francais Textile-Habillement (IFTH) www.ifth.org	France	Contact person: Mr. Philippe Guermonprez e-mail: pguermonprez at ifth.org

Partner	Country	Contact details
Modern Testing Services GmbH (MTS) www.mts-germany.eu	Germany	Contact person: Dr. Dieter Sedlak e-mail: d.sedlak at mts-germany.eu
Sension, biologische Detektions- und Schnelltestsysteme GmbH (SENSION) www.sension-gmbh.de	Germany	Contact person: Dr. Peter Schneider e-mail: Pschneider at Sension-gmbh.de
Ardeje SARL (ARDEJE) www.ardeje.com	France	Contact person: Mr. Pascal Pierron e-mail: pierron at ardeje.com

Table 1: Micro-Dress consortium partners contact details