Project no. 319055

SUSTA SMART

Report – Standardisation input documents and efforts at European and international level

Public version of deliverable D3.2 & D3.3

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1 Executive Summary

This document consists of two parts; for one a report on the efforts made by the SUSTA-SMART partners at European and international level to present the identified needs for standardisation and the resulting proposals for standardisation deliverables. This includes an overview over the standardisation where a cooperation is has been developed with or which have been informed about SUSTA-SMART results. It includes also suggestions which other committees still need to be contacted in order to fully valorise the SUSTA-SMART project results.

The second part contains a short overview over three guidance documents which where developed in the course of the project because they were found to be helpful documents for improving the working together of researchers and standardisers. The full documents are available separately.

2 Introduction

This document is a merged document of the originally proposed deliverables D 3.2 Report- Standardisation input documents and efforts at CEN level and D3.3 Report – Standardisation input documents and efforts at international level.

There a several reasons for the choice for merging these two deliverables. For one, most efforts towards presenting standardisation input documents will take place at EU level, due to the already established connections of SUSTA-SMART partners with European standardisation organisations. For another, smart textile specific standardisation efforts are still only ongoing on European Level. Additionally, for all three sectors there is cooperation between European (CEN) and International (ISO) standardisation efforts, so that it seems therefore most feasible to start at a European level before introducing items internationally.

In the course of the project it was realised, that for future projects some guidance for better combining research and standardisation efforts could be helpful. Three documents were prepared, which will be briefly described in this text. The full guidance documents are available separately.

3 Efforts made to introduce the proposals for standardisation deliverables to the standardisation actors

3.1 Involvement of SUSTA-SMART partners in European and International standardisation committees and working groups.

Important for introducing New Work Item proposals and other input documents is active participation in standardisation bodies. Among the SUSTA-SMART partners already a strong level of involvement in for SUSTA-SMART important technical committees and working groups is given, but as the project results have shown, it will be necessary to expand this involvement, not only towards existing committees and working groups, but also towards initiating new committees and working groups to deal with issues that are not covered by the current structures.

In the following we will first discuss the involvement of SUSTA-SMART partners at European and international level, followed by some first initiatives taken/ interactions with standardisation committees towards working out the new work item proposals discussed in deliverable D3.1.

3.2 Specific initiatives taken

3.2.1 CEN-CLC BT WG 8: Protective textiles and personal protective clothing and equipment

In answer to the Programming mandate M509/EN the CEN-CENELEC BT WG 8 working group, established under CEN and CENELEC BT, prepared a detailed report on the standardisation and related needs. This report was accepted by CEN and CENELEC BT in February 2014 and sent it to the European Commission for further evaluation. It is expected that actions will be proposed on how to work out the action points defined in the report. This report is an important road map for the standardisation and related needs for personal protective equipment and clothing, including the integration of technology (e.g. electronics and ICT), therefore several of the proposals made are of relevance for SUSTASMART. Since SUSTASMART partners participated in developing these proposals, they will also be reported in this project.

Concerning the integration of technology, the most important other input is related to the fact, that PPE with integrated technology no longer has to comply only to the Directive 89/686/EEC on personal protective equipment, but, depending on the technology integrated and the envisioned application also to other directives. Some examples are:

- Integrated sensors for measuring physiological parameters of the wearer, with the data being used to assess the health status of the wearer: These sensors will have to comply to the Directive 93/42/EEC on Medical Devices (currently under revision & pending for approval)
- Certain electronic equipment will have to be compliant with the Directive 2004/108/EC on electromagnetic compatibility
- Systems containing textile sensors which interact with machinery (e.g. cutting off the machinery when getting too close to a moving part, radiation, etc.) will have to be compliant to the Directive 2006/42/EC on Machinery

This requires a multi-disciplinary approach to assessing the safety and reliability of such personal protective equipment as well as for assessing the conformity with EU legislation. Most notified bodies do not have this experience, which means that also training must be offered to for one make notified bodies aware of these issues and for another give them guidelines on how to deal with them.

These issues not only apply for PPE, but also for Construction Products and, to a more limited extent, to consumer goods and will therefore be also relevant for these sectors as well.

3.2.2 CEN TC 248 WG31: Smart textiles

2 new work item proposals were submitted to TC 248 in November 2013: PWI 533 and PWI 576 (original PWI 533 was first split into PWI 576, 576 and 577) were both activated, thus becoming Work Items WI 00248533 “Textiles and textile products — Electrically conductive textiles — Determination of the electrical resistance of textile-based tracks” and WI 00248576 “Textiles and textile products — Textiles containing phase change materials (PCM) — Part 1: Determination of the heat storage and release capacity of fibres, yarns and fabrics”, respectively. The draft texts of these two WI will be provided in deliverable D3.1. Both WI were approved at the last CEN TC 248 meeting October 31st, 2014.

3.2.3 Getting involved in CENELEC/ IEC activities

Smart Textiles with integrated ICT and electronics is reaching a borderline where one can speak about electronic textiles or textile electronics. This means that no longer only textile experts can further develop standards for this category of devices but that a joint effort from textile and electronics expert is needed. First steps are being taken by SUSTA-SMART partners to start such an initiative.

3.2.4 CEN TC 250 Structural Eurocodes

The EN Eurocodes are important documents for structural design codes. They are developed and maintained under the guidance of CEN TC 250 "Structural Eurocodes". The work programme of this TC includes (1) he establishment of general policies, programmes and strategies for the Eurocodes, and (2) overseeing their implementation[1].

CEN TC 250 is made up by the Coordination Group, Management Group, two Horizontal Groups, seven Working Groups and nine Subcommittees[2]. With respect to SUSTA-SMART, the most relevant working Group is CEN TC 250 WG 4 – “Fibre reinforced polymer structures”, also referred to as FRP. The aim is to present proposals for new work items regarding the integration of monitoring functions into FRP to this WG.

[1] THE EUROCODES AND THE CONSTRUCTION INDUSTRY- MEDIUM-TERM STRATEGY 2008 – 2013 (January 2009)- CEN/TC 250 – N 798-JRC; Joint Research Centre European Commission

[2] http://eurocodes.jrc.ec.europa.eu

4 Tools and guidance documents

In the course of the SUSTA-SMART project it became apparent that Supporting Standardisation should go further than analysing standardisation needs in Research and Development projects and, presenting the results to the relevant standardisation actors.

For one, the road map developed in this project was found to have the potential to be turned into a more general document. It could become a guidance tool on how to develop and keep up to date roadmaps for standardisation of products crossing the border between technologies, being here textile and electronics.

Secondly, it was found that if the average proposal writer would have provided a more accurate description and planning on how to deal with standardisation related issues in the project, the realisation of these efforts could have been substantially increased. Also chances were missed to take up tasks into projects to support on-going standardisation efforts as these were not sufficiently known to the research community.

Finally, it was also realised that standardisation is for some products closely linked to certification and conformity assessment. For the SUSTA SMART focus sectors Personal Protective Equipment and Construction products, this is quite important, as there are a lot of legal requirements towards these products. When adding new functionalities, here electronics and ICT, to the now commonly used products, certification and conformity assessment may no longer be straight forward, due to the more complex nature of these products.

These guidance documents are written by researchers, with guidance from standardisers, and are written in the first place for fellow researchers. But in a second step, they also are of possible interest to members of the standardisation and certification community, and possibly for policy makers and the developers of future calls for proposals to better understand how research and standardisation can be linked.

The Guidance documents are described briefly below, they are available on the project website as well as some partner websites.

4.1 Guidance document 1: Road map for standardisation: guidance on how to develop other roadmaps & how to update.

One of the main objectives of SUSTA-SMART was to map the relevant standardization issues in FP6/FP7 projects related to the 3 project target domains (Personal Protective Equipment-PPE, Construction Products and Consumer goods), to syntheses and prioritize these needs and finally to develop a detailed roadmap for Smart Textiles in the three domains.

In order to draw up the roadmaps, an accurate roadmapping process has been conceived at the beginning of the project and it consisted in the following steps that have been also described in Figure 4.1 :

- Screening of relevant research projects and standardization needs identification
- Synthesis of standardization needs and prioritization
- Roadmap Development &Release
- Follow up

The detailed description on how the road map was developed is given in the deliverables of WP2 (D2.1, D2.2 and D2.3). In this deliverable a summary will be given, focussing on the general findings and how to use the general version of this road map for standardisation issues in smart textiles.

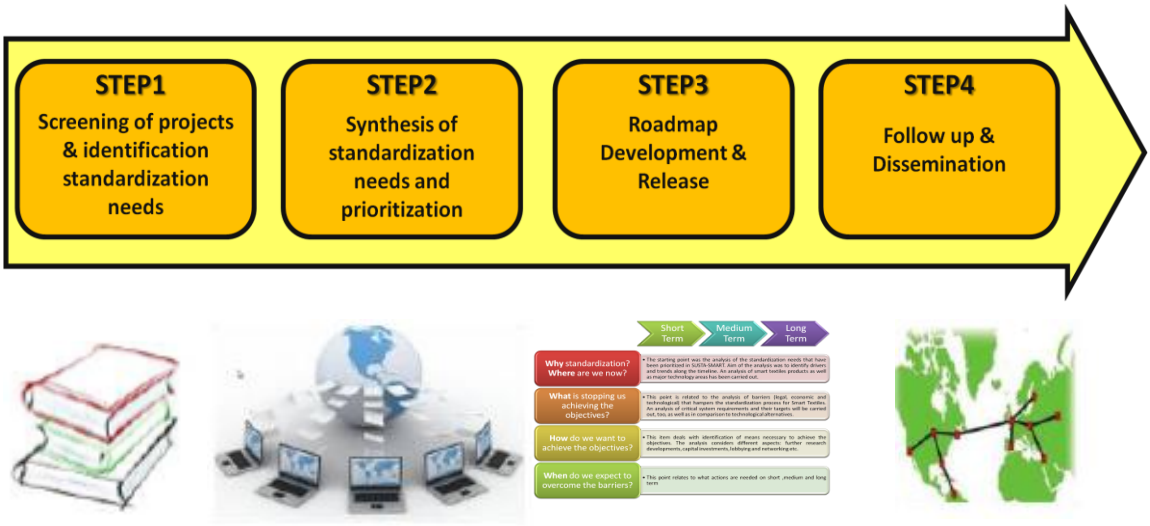

Figure 4.1: SUSTA-SMART roadmapping process

STEP1 aims at carrying out the screening of relevant smart textile related EU funded projects having as target one of the three domains of SUSTA-SMART with the objective to identify all the standardization needs raised during the project development.

The scope of **STEP2** was to analyse, categorize and group the standardization needs. In particular common aspects and synergies have been identified. The needs have been analysed in two different phases:

- First phase: Standardization needs related to the smart textile materials as “stand-alone” elements
- Second phase: More complex smart textile based systems

The prioritized needs became the starting point for the development of the standardization roadmap that was performed in **STEP3**. The approach followed is illustrated in Figure 4.2.

Smart textiles result from the combinations of non-textile materials/components/systems with textile materials. Standards may be applied to each of the components but obviously the behaviour of the smart textile **cannot be considered as a simple combination of the textile and the non-textile components.** Therefore there is the need of **adapting old standards** or of **creating new ones** in order to treat the smart component/system as a whole.

It became clear that the projects analysed were situated at different stages in the production chain of smart textiles. For this reason, the focus for the SUSTA-SMART project was moved towards breaking down the needs along the production chain of a given smart textile product. The first objective was to determine the complete production chain and the second was to identify which aspects of the production chain were important for each of the identified projects. In this way it was possible to emphasize the market perspective of the respective smart textile product and how standardization could pave the way to fully exploit them.

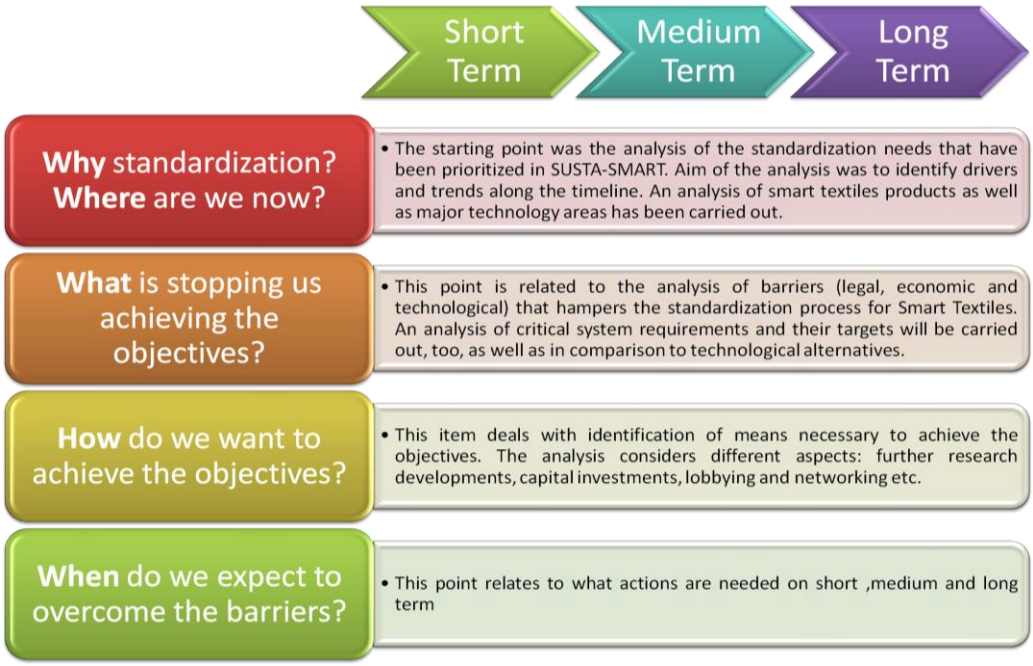

Figure 4.2: approach during the roadmap development phase

The next actions performed in the development of the roadmap were:

- The analysis of barriers (from a legal, economic and technological point of view) that hampers the standardization process for Smart Textiles (question: ***What is stopping us from achieving the objectives?***). In this context an analysis of critical system requirements and their targets were carried as well as a comparison with respect to technological alternatives.
- The identification of means necessary to achieve the objectives. The analysis considered different aspects: further research developments, capital investments, lobbying and networking etc. (question: ***How do we want to achieve the objectives?)***.
- The actions needed on short, medium and long term (question: ***When do we expect to overcome the barriers?***)

This approach allowed defining the roadmaps for the 3 target domains (Personal Protective Equipment-PPE, Construction Products and Consumer goods).

The final **STEP4** consisted in the dissemination of the 3 roadmaps.

4.2 Item 2: Guidance document for Proposal Writers (EU H2020)

This first draft of this guidance document was developed at the beginning of the SUSTA-SMART project, and was presented in deliverable D1.1 *Procedure for standardisation strategy and development of monitoring system*. This first draft was then further developed in the course of the project with input from Workshop 3 of the SUSTA-SMART project, discussions with the members of the CEN-CENELEC Research Help Desk and by testing its applicability when writing EU FP7 and EU H2020 projects.

The final version, as presented in this deliverable now contains for one a glossary and a short chapter on the distinction of the terms ‘standardisation’, certification’ and ‘conformity assessment’. Secondly, it contains a chapter explaining some general issues proposal writers have to consider when preparing their documents. One important point is that if standardisation is foreseen to play a

major role in the project (including dissemination), it is necessary to involve the required partners as early as possible in the project preparation phase and surely throughout the execution phase of the project. The guidance document further provides some suggestions on how to estimate the work load, including suggestions for different tasks and a complete work package. Also an example for the budgeting of the development of a standardisation deliverable is given.

Since also standardisers are sometimes in need of research for supporting their standardisation efforts (e.g. for developing test methods and evaluation criteria), it is interesting to them also that proposal writers get into contact with the relevant standardisation actors early in the project preparation process to see if there are some common interests. Both researchers and standardisers are quite often not aware of such synergies.

The goal of this guidance document is to provide a text which is useful to not only the writers of proposals but also standardisers and others which are working to advance standardisation by research or to ensure that test methods & evaluation criteria exist for novel products.

The aim is to further develop this document together with the CEN-CENELEC Research helpdesk and to make it available to those who could benefit from this guide. The complete follow up plan for this document will be presented in D3.4 *Report - Follow up strategy*.

4.3 Item 3: Certification & Conformity assessment of 'complex' products

The importance of certification and conformity assessment comes from the requirements of the consumer (who wants to know whether a product has the claimed properties and is safe to use) and the requirements of the EU (who wants to ensure that not only the consumer and/ or the user of a product are safe, but that also towards manufacturing, use and disposal/recycling no danger arises towards individuals or the community). In order to ensure the latter the EU has issued various legal documents.

Certification has a non-legal basis, a certificate simply stating that the product has passed certain criteria, while conformity assessment is the process of proving that the product is conform with EU law. Test certificates can be a means for conformity assessment though, as they can be used to prove that a product meets the legal requirements. Test and evaluation standards can be used to provide the evaluation criteria for certificates and conformity assessment procedures.

Smart textiles with integrated electronics and ITC are complex products from a certification and conformity assessment (to EU legislation) point of view. For one, there are the legal requirements of the basic textile project, in the case of the SUSTA-SMART focus domains being Personal Protective Equipment (PPE), Construction Products and Consumer Goods. For another, smart textiles with integrated electronics and ICT also can be considered electronics and ICT products, with the textile being part of the casing, functional or non-functional structure. Additionally, depending on the functionality added, other directives may apply, e.g. for medical devices (when medical sensors are used) or privacy of personal data (when such information is collected for supervision).

In the course of the SUTA-SMART project and the related actives it became clear that, for one, there is a need to educate researchers on the difference between standardisation, certification and conformity assessment. This is important for using (1) the correct terminology, (2) understanding the different procedures and (3) for preparing accordingly a correct work plan for Research and Development projects.

For another there is the need to educate also Notified Bodies and other stakeholders on how to deal with the complex nature of many smart textile products.

5 Conclusions

5.1 Efforts made to introduce the proposals for standardisation deliverables to the standardisation actors

Quite some project results to the attention of standardisation actors. This was made possible due to the involvement of SUSTA-SMART partners in key standardisation bodies. The most successful dissemination was possible for the results regarding Smart Textiles in general (including Consumer Goods) and Personal Protective Equipment, as here the SUSTA-SMART consortium had the strongest influence. This is why it was finally decided to focus first on this sector.

First steps could be taken towards the work that needs to be done concerning electronics and ICT, but the topic of textile electronics is outside the current scope for the existing standardisation bodies. Concerning Construction Products the results will be presented to the standardisation actors at a later moment.

5.2 Tools and guidance documents

The tools and guidance documents are available as separate documents.