Project no. 319055

SUSTA SMART

Report – Overview of new work item proposals (for PPE, Construction and Consumer goods)

Public version of the deliverable D3.1

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Executive Summary

This document provides an overview of the new work items for standardisation developed from the standardisation needs identified in WP 2, the priority given to them, an estimate of the time and efforts needed to develop them and a suggestion to which standardisation body would be most suited for following them up.

This deliverable is public. It is the goal to present the proposals to the relevant standardization bodies and other stake holders.

1. Introduction

The work in WP2 resulted in the formulation of a roadmap for standardisation of smart textiles with integration of electronics and ICT in the focus domains of Personal Protective Equipment, Construction Products and Consumer Goods.

In WP 3 the needs and the timing where translated into concrete standardisation deliverables as well as guidance documents and tools, which will be presented to the relevant standardisation actors.

In deliverable D3.1 the concrete standardisation deliverables are discuss in the form of overview tables: one for general topics and one for each focus domain, with the individual proposals being listed in the appendix. For developing the proposals the template used for a New Work Item Proposal in CEN was adapted, so that for one the project results could be better processed, but for another these proposals already form documents that are ready to be presented to the respective standardisation committees.

For each proposal a preliminary title, scope, assignment to a technical body and the criteria priority, need for resources, timeframe for development are listed, which is important information needed for the standardisation committee/ working group to estimate the urgency and effort needed, as well as to decide if the proposal fits into its scope and work programme.

The aim of this deliverable is to have the documents ready and assigned to the respective standardisation bodies.

2. Proposals for new work items– Template

When officially submitting new work item proposals to a technical committee a specified template has to be used. This template is different for the European and the international standardisation organisations, meaning that there are different templates for CEN, CENELEC and ETSI on European level and ISO, IEC on international level. Also all national standardisation bodies have their own template. But in essence these templates are quite similar. Since most proposals will be suitable for submission to CEN technical committees, it was decided to use a modified version of the CEN template for a new work item proposal.

Table 1: Template for the Proposals for New Work Items, modified from the CEN template for use in SUSTA-SMART reporting

Proposal XX-N					
Title: **Scope:** **Keywords** (Descriptors) characterising the scope (multiple ticks are possible and/or necessary)					
Proposal concerns :		Proposal sets :		Proposed format :	
- Product - System - Service - Interface	☐ ☐ ☐ ☐	- Requirements - Characteristics - Guidance - Test method - Terminology etc.	☐ ☐ ☐ ☐ ☐	- standard - technical specification - technical report - other (e.g. CEN Guide, CWA)	☐ ☐ ☐ ☐
Justification and impact on smart textile with integrated electronics & ICT(problems or difficulties to be solved by the standard, impacts and benefits to be expected from the standard)					
Market relevance (for which type of stakeholder is this important):					
Priority ☐ high ☐ medium ☐ low			**Need for resources** ☐ high ☐ medium ☐ low		
Listing of relevant existing documents supporting the proposal (scientific reports, existing national standardisation documents, studies, ...):					
Required participation in the work (type of expertise needed, standardisation body/technical committee to become involved):					
Additional comments / information:					

This template was developed for the CEN-CLC BT WG 8 report and is further modified to be suitable for the SUSTA-SMART proposals.

Since all relevant information is collected information is collected in the above form, it is easy to prepare the actual request for a new work item from it.

The deviations of Table 1 from the actual template include the items 'priority' and 'need for resources'. These are quite important in the frame work of SUSTA-SMART, as these are important issues to provide when presenting the deliverables to the respective standardisation committees.

Concerning the 'priority' the criteria high, medium and low were determined in the standardisation road map and are therefore taken from the deliverables of WP2.

Concerning the 'need for resources' the following criteria were used

- low: it is possible to start the project but funding is desirable for delivering results in short time.
- medium: funding is needed as (1) results may not be obtained without funding and/or will take substantially longer (e.g. arranging inter-laboratory testing) and (2) the number of available experts will be limited.
- high: Funding is essential as without funding the project will not go through because results cannot be obtained (e.g. financing of inter-laboratory testing) or number of available experts will be too limited.

These criteria are identical to the ones proposed in the CEN-CLC BT WG 8 report. As they are also suitable for the proposals made in SUSTA-SMART for the other two focus domains, it was decided to use these criteria here as well.

Examples for high funding requirements are the development and verification of test methods and evaluation criteria where expensive apparatus is involved or a lot of time and other resources are needed to perform the testing. In these cases it is difficult to find laboratories willing to participate in the necessary inter-laboratory testing if there is no finding available to cover (most of) the costs.

3. Proposals for new work items for the 3 focus domains

Overview tables

In this section an overview is given over the work item proposals prepared in the framework of the SUSTA-SMART projects.

The first table contains work item proposals that directly link to the current work in CEN TC 248 WG31 'Smart Textiles'. They are related to measuring some basic characteristics of smart textiles containing electronics and ICT.

Then follow three overview tables, one for each SUSTA-SMART focus domain. The overview tables summarize the individual work item proposals.

The abbreviation used as 'proposal reference' in the tables are: 'SMT' for Smart Textiles in general, 'PPE' for Personal Protective Equipment, 'CON' for Construction Products and 'CSG' for Consumer Goods.

These overview tables list the different criteria given to the work item proposals, being 'priority' and 'need for resources', which were already discussed in the previous section, and additionally the "timeframe" needed to work out these proposals is listed. Here the terms short, medium and long are used with the following definition:

- short: maximum 3 years
- medium: 3 to 5 years
- long: 5 to 10 years

The difference in timing can have different reasons, but mostly is related to the type of deliverable (standards will take longer due to the necessary approval procedure) as well as the need for developing and verifying test methods or evaluation criteria for properties to be tested.

Where possible, the work item proposals have been allocated to a specific TC (indicating the working group where possible). In the cases where the work item is outside the scope of the existing TC's in this domain this is indicated and discussed.

Smart Textiles with integrated electronics and ICT (in general)

Concerning further standardisation work for Smart Textiles with integrated electronics and ICT there are two important issues. For one it will be necessary to define the terminology: such materials are also referred to as 'textile electronics' or 'electronic textile', which already implicates that we are dealing here with materials that have both textile and Electronics/ICT properties. This brings up the second issue, namely that further standardisation work cannot be handled by textile experts alone.

This is also indicated in the table below. It also explains the time-frame for the moment allocated to the proposal SMT-1, which included the time needed to find the necessary experts or establishing a new joint working group.

Table 2: Overview table New Work Item proposals for Smart Textiles with integrated electronics and ICT in general

Priority	Need for resources	Time-frame	Proposed title	Proposed scope	Proposal reference	For body
High	Low	Low/medium	Smart Textiles with integrated electronics and ICT (Textile Electronics/ Electronic Textile) - Definitions, categorisations and standardisation needs	Provide definitions in the field of Textile Electronics/ Electronic textiles, categorisation of the different types of textile electronics and assessment of the standardisation needs, pointing out the differences to 'standard' electronic components.	SMT-1	CEN TC 248 WG31, with assistance of experts in the field of textile electronics & ICT (joint WG?)
High	Low/medium	Low	Electrically conductive textiles - Determination of the electrical resistance of textile-based tracks under different pre-conditioning and measurement conditions	WI 00248533 *Textiles and textile products - Electrically conductive textiles - Determination of the electrical resistance of textile-based tracks* describes a method for determining the linear resistance of a conductive textile track (including yarns, woven, knitted, printed, etc. structures. This standard is written for standard pre-conditioning and measurement conditions. To fully characterise conductive tracks it will be necessary to perform different types of pre-conditioning (e.g. washing) and different types of measurement conditions (e.g. temperature, humidity).	SMT-2	CEN TC 248 WG31, with assistance of experts in the field of textile electronics & ICT (joint WG?)

Priority	Need for resources	Time-frame	Proposed title	Proposed scope	Proposal reference	For body
High	Low/medium	Low	Electrically conductive textiles - Determination of the capability of transporting data or electrical signals through textile-based tracks	WI 00248533 describes a measurement method for DC power transmission. Assessment of the capability of signal transport requires AC measurements (with different types of signal types). Also a method for assessing the quality of the transmitted signal is needed. This standard will form the basis for assessing the suitability of a textile track for data-communication applications	SMT-3	CEN TC 248 WG31, with assistance of experts in the field of textile electronics & ICT (joint WG?)
High	Low/medium	Low	Electrically conductive textiles - Determination of the capability of transporting data or electrical signals through textile-based tracks- under different pre-conditioning and measurement conditions	SMT-3 describes the measurement method under standard pre-conditioning and measurement conditions. To fully characterise the conductive tracks it will be necessary to perform different types of pre-conditioning (e.g. washing) and different types of measurement conditions (e.g. temperature, humidity).	SMT-4	CEN TC 248 WG31, with assistance of experts in the field of textile electronics & ICT (joint WG?)

PPE

The work item proposals taken up into this table were developed in the framework of the CEN-CENENELC BT WG 8 report in response to Programming Mandate M509/EN. This report contains a lot more proposals than the ones listed below, but only the proposals related to smart textiles have been taken over here.

Items denoted with *: these proposals are outside the scopes of the current Technical bodies in the PPE sector. In the CEN-CENENELC BT WG 8 report it was therefore proposed to establish a new drafting body do work out these standardisation deliverables.

For the most urgent items, which will also form the basis for the other items (e.g. providing definitions, etc.) it was decided that a first initiative would be taken from the PPE sector forum to provide a first guidance document.

Table 3: Overview table New Work Item proposals for Personal Protective Equipment (PPE)

Priority	Need for resources	Time-frame	Proposed title	Proposed scope	Proposal reference	For body
High	Low	Short	Personal Protective Systems – Definitions, categorisations and standardisation needs	Provide definitions in the field of personal protective systems as well as categorisations of different types of personal protective systems, which included different elements of current personal protective equipment as well as other items that are essential to the functioning of the complete system. Examples are (1) the integration of (smart) functionalities, including electronics and ICT and (2) elements that are currently not taken into account but are like underwear and gear used for attaching the wearer to e.g. a rope, a wall, etc. The focus will be on the functioning of the ensemble instead of the individual parts.	PPE-1	PPE sector forum as a guidance document, to be worked out in detail later*
High	Low	Short	Roadmap for standardisation of Smart Personal Protective Systems with integrated technology	Definition of terms, categorisation & guidelines for standardisation of Smart Personal Protective Systems (as will be defined in Proposal INT-1)	PPE-2	PPE sector forum as a guidance document, to be worked out in detail later*

Priority	Need for resources	Time-frame	Proposed title	Proposed scope	Proposal reference	For body
Medium	High	Long	Methods to translate material tests into PPE/PPS performance levels	Develop methods and models showing the relationship between materials test and PPE/PPS performance level towards protection and including ergonomics and comfort.	PPE-3	Basic principles should be set in general * – specifics by relevant TCs
Medium	High	Long	Modification of ISO 20471 for High-visibility clothing to allow for the use of LED lamps	Requirements of the standard need to be revised to be applicable to other materials including active lighting	PPE-4	CEN TC 162, possibly assisted by WG 31 smart textiles?
Medium	Medium/High	Long/Medium	Tests for performance evaluation of smart materials and solutions	Re-evaluation of test methods and necessary adaptations when using smart materials in place of standard materials.	PPE-5	Depending on type of material, for textiles e.g. CEN TC 248 (WG31 smart textiles)
Low	High	Long	Use of Auto-ID-Systems for Life Cycle Data Management of PPE	Use of existing auto-ID technologies for recording life-cycle data from various PPE regarding time-dependent features.	Proposal PPE-6	Horizontal issues applicable for all types of PPE *

Construction Products

Table 4: Overview table New Work Item proposals for Construction Products

Priority	Need for resources	Time-frame	Proposed title	Proposed scope	Proposal reference	For body
High	Low	Short	Smart textile based products for the construction sector – Definitions, categorisations and standardisation needs	Provide definitions in the field of Smart textile based products for the construction sector as well as categorisations of different types of products according to their features. The main categories to be considered for these products are: 1) Building applications; 2) Earthwork applications.	CON-1	CEN/TC248 WG31, with assistance from CEN/TC250
High	Low	Short	Roadmap for standardisation of Smart Textile based products for the construction sector with integrated technology	Definition of terms, categorisation & guidelines for standardisation Smart Textile based products for the construction sector (as will be defined in COS 5)	CON-2	CEN/TC248 WG31, with assistance from CEN/TC250
High	High	Short/Medium	Tests for verifying the durability in harsh environmental of multifunctional geo-textiles having embedded electronic components.	Standard for establishing the durability in harsh environment of the whole system consisting of a geotextile structure having embedded electronic components (sensors-optical fibers) and able to perform standard functions such as filtration, drainage, separation and reinforcement as well as new functions as the monitoring of the displacements of the structure. Evaluation of how deterioration of whole system in harsh environment affects its performances in terms of reinforcement as well as in terms of monitoring capabilities	CON-3	CEN/TC189 with assistance from CEN/TC248 WG31

Priority	Need for resources	Time-frame	Proposed title	Proposed scope	Proposal reference	For body
High	High	Short/Medium	Tests for verifying the durability in harsh environmental of multifunctional textiles (fiber reinforced polymer-FRP) to be used as retrofitting of existing building and having embedded electronic components.	Standard for establishing the durability in harsh environment of the whole system consisting of a textile structure (fiber reinforced polymer-FRP) having embedded electronic components (sensors-optical fibers) to be used as retrofitting of existing building and able to perform reinforcement functions as well as the structural health monitoring of the building. Evaluation of how deterioration of whole system in harsh environment affects its performances in terms of reinforcement as well as in terms of monitoring capabilities.	CON-4	CEN/TC250 with assistance from CEN/TC248 WG31
High	High	Short/Medium	Definition of application guidelines for multifunctional textiles (fiber reinforced polymer-FRP) to be used as retrofitting of existing building and having embedded electronic components.	Standard for defining the application guidelines of multifunctional textiles (fiber reinforced polymer-FRP) having embedded electronic components in order to determine the procedures for applying this product as retrofitting to the existing building.	CON-5	CEN/TC250 with assistance from CEN/TC248 WG31
High	High	Short/Medium	Definition of application guidelines for multifunctional geo-textiles having embedded electronic components.	Standard for defining the application guidelines of multifunctional geo-textiles having embedded electronic components in order to determine the procedures for applying this product on the soil for stabilisation and monitoring purpose.	CON-6	CEN/TC189 with assistance from CEN/TC248 WG31
High	High	Medium/Long	Tests for performance evaluation of smart material based products and solutions for the construction sector	Test methods (adaptations of existing ones or creation of new ones) in order to fully characterize the smart material based products and solutions for the construction sector having embedded sensors.	CON-7	CEN/TC250 with assistance from CEN/TC248 WG31

Consumer Goods

Table 5: Overview table New Work Item proposals for Consumer Goods

Priority	Need for resources	Time-frame	Proposed title	Proposed scope	More details in form	For body
High	Low	Short	Roadmap for standardisation of Smart Textile based products for the consumer goods sector with integrated technology.	Definition of terms, categorisation & guidelines for standardisation of smart textile based products for the consumer goods sector.	CGS-1	CEN/TC248 WG31
High	Low	Short/Medium	Tests to verify products properties or features on consumer goods with embedded electronic components and measure its performance.	Standard to measure the properties or features provided by a product must be defined in order to test functionalities and properties on a measurable way for the characterization and evaluation of the provided features.	CGS-2	CEN/TC248 WG31
High	Low	Short/Medium	Definition of application profiles or guidelines for the development of consumer goods applications embedding electronics.	Standard for defining the application guidelines of consumer goods textile products considering the different technologies that can be involved, as well as the electronics, sensors and actuators that are involved, in order to fully exploit the smart textiles.	CGS-3	CEN/TC248 WG31 s
High	Low	Short/Medium	Definition of a smart clothing profile according the clothing area network standard for the transmission of the data of embedded sensors and components.	Standard on how to use the different communication technologies (with special regards to RF technologies such as BLE) that can be embedded on a consumer goods product In order to increase interoperability with the creation of dedicated smart clothing user profiles.	CGS4	CEN/ TC248 WG31 with assistance from ETSI TC Smart BAN
High	Low/Medium	Short/Medium	Definition of tests methods for the establishment of durability and washability features	Standard for the definition of the smart textiles features involved in the development of consumer goods as far as the ageing and the washability issues are concerned in these products.	CGS-5	CEN/TC248 WG31

Priority	Need for resources	Time-frame	Proposed title	Proposed scope	More details in form	For body
Medium	High	Medium	Tests for ergonomics evaluation on the integration of electronics in smart textiles consumer goods products, regarding specially to flexibility and/or strechability.	Development of test methods focusing on the definition and measurement of the product features in terms of comfort and user friendly aspects, as well as recommendations on how the electronics must be embedded in order to achieve these features.	CGS-6	CEN/TC248 WG31 with assistance from CEN/TC122

4. Conclusions

In this deliverable concrete standardisation deliverables were formulated, resulting from the work performed in WP2 (road map for standardisation) and in WP3 (concrete standardisation projects, timing and assignment to standardisation body). Here the template used for a New Work Item Proposal in CEN was adapted, which facilitates processing of these documents by standardisation bodies.

The standardisation deliverables were grouped in four overview tables, one for general topics and one for each focus domain.

The aim is to present the tables and the proposals for work items to the respective standardisation bodies indicated in both the proposals and the overview tables.