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DRAFT

Project Plan for the CEN Workshop on A Methodology for Measurement of Worker Satisfaction in Adjustable Automated Industrial Work Systems

Workshop
(to be approved during the Kick-off meeting on 2019-08-30)

1. Status of the Project Plan

This initial draft Project Plan is published to engage interested stakeholders to participate in the CEN Workshop. It will be approved in the kick-off meeting of the Workshop. This draft Project Plan follows the requirements in CEN-CENELEC Guide 29[1].

2. Background to the Workshop

A4BLUE[2] is a 3 year research project funded by the European Commission's Horizon 2020 – The Framework Programme for Research and Innovation (2014 - 2020) under Grant Agreement GA 723828. It brings together 9 partners from 5 different European countries.

The main objective of the A4BLUE Project is the development and evaluation of a new generation of sustainable and adaptive work systems that are adjustable in order to deal with the evolving requirements of manufacturing processes and human operators.

A4BLUE has developed methods and tools to determine the optimal degree of automation of the new assembly processes by combining and balancing social and economic criteria to maximize long term worker satisfaction and overall process performance.

One key project deliverable is a new Model of Worker Satisfaction for the specific context of modern automated work systems along with a Psychometric measurement tool. The methodology used to develop this deliverable is based on fundamental social science procedures but its application in this specific industrial context to develop a valid and reliable psychometric measure of human satisfaction when working with adjustable automated work systems, is a novel output that sets a standard for industry. Currently, there is no available model or tool for industry to use to optimise satisfaction in automated work system design, despite the ongoing significant rise in industrial automation and human-system interactions. However, this new worker satisfaction model identifies the principal components of automation system design that need to be addressed to optimise human satisfaction, and the accompanying psychometric tool offers industry a much-needed means of directly measuring satisfaction

[1] ftp://ftp.cencenelec.eu/EN/EuropeanStandardization/Guides/29_CENCLCGuide29.pdf
[2] http://a4blue.eu/

impacts. Thus, this deliverable may not only be the basis for further research but, as satisfaction influences acceptance and performance, it provides a practical tool that can be directly applied to enhance the implementation of new automation in future human-centred factories,.

Publishing a CEN Workshop Agreement (CWA) is a way of sharing and disseminating the new model and psychometric tool developed in A4BLUE, so it can be known and used by European industry and research. Taking into account that no standardization developments in this area have been found, neither at European nor International level, the CWA could constitute an interesting first step for further standardization on this subject.

ISO/TC 260 “Human resource management” is developing some interesting standards such as ISO/AWI 23326 “Human Resource Management - Employee engagement - Guidelines” or ISO/AWI TS 23817 “Human resource management - Compliance and ethics metrics cluster”, but Human Resource Management (HRM) does not address Human Factors (HF) issues such as worker satisfaction.

ISO/TC 159 “Ergonomics” does already address user satisfaction in various standards, particularly within the ISO 9241 series for ‘Ergonomics of human-system interaction’ in which satisfaction is considered one of three principal performance dimensions of usability (along with efficiency and effectiveness). The importance of reliably measuring and optimising satisfaction is mentioned in various clauses, such as in ISO 9241-11:2018 ‘Usability: Definitions and concepts’, in ISO 9241-210:2010 ‘Human-centred design for interactive systems’, and in ISO TR 16982:2002 ‘Ergonomics of human-system interaction. Usability methods supporting human-centred design’. At the current time, the ISO/TC 159 SC4 subcommittee (Ergonomics of Human-System Interaction) are also currently working on a new document to improve the design and application of advanced systems: ISO/NP TR 9241-810 ‘Ergonomics of human-system interaction -- Part 810:Robotic, intelligent and autonomous systems’. However, all of these documents deal with satisfaction quite generally in relation to human-system interactions but not in relation to specific contexts / applications. This means there are no current standards that provide system designers and integrators with the practical guidance and tools they need to measure and maintain optimal levels of satisfaction amongst operators working with automated / intelligent systems in industry. Moreover, there appears to be no current or expected work on worker satisfaction related to this particular context of system interaction. This gap presents a real and present need for reliable, context-specific guidance given that:

a) Dimensions of satisfaction differ across situations, i.e. the specific factors that bring satisfaction to people in one situation will differ from those that satisfy people in another. Thus, to ensure a systems maintain satisfaction there is a need to understand its specific dimensions in relation to this particular context;
b) Levels of industrial automation, including adjustable or adaptive systems, will inevitably continue to rise. Thus, to ensure systems maintain workforce wellbeing and performance in future factories there is a need to measure satisfaction reliably for this particular context.

At the European level, CEN/TC 122 is mainly adopting ISO/TC 159 standards into EN ISO standards. However, no independent Ergonomic / HF standards are being developed at the European level.

There is no legislation that needs to be considered in the CWA development.

3. CEN Workshop proposers and Workshop participants

The workshop proposer is Cranfield University as the A4BLUE project partner who has been responsible for the development of the project's Methodology for the Development of a Measure of Worker Satisfaction for Adjustable Automated Industrial Work Systems.

A4BLUE partners who will participate in the workshop:

- IK4-TEKNIKER (Coordinator) (Spain)
- RWTH Aachen University (Germany)
- Cranfield University (United Kingdom)
- AIRBUS Operations SAS (France)
- ENGINEERING – INGEGNERIA INFORMATICA SPA (Italy)
- Illogic (Italy)
- CiaoTech S.r.l. (Italy)
- Compañía Española de Sistemas Aeronáuticos (Spain)
- INGENIERÍA Y SERVICIOS DE AUTOMATIZACIÓN Y ROBÓTICA KOMAT, S.L. (Spain)

UNE, who participate in A4BLUE Project as subcontractors responsible for standardization activities, will provide the Workshop Secretariat.

Participation in the Workshop is open to all interested stakeholders, and the opportunity to participate widely advertised in advance by its proposers and by CEN and its member bodies.

The invitation to the kick-off meeting will be circulated to the ACE Factories Cluster members in particular. The cluster is formed by five projects funded under the European Union's Horizon 2020 research and innovation programme that are developing solutions for manufacturing work environments that adapt to each individual worker: A4BLUE itself, Factory2Fit, HUMAN, INCLUSIVE, and MANUWORK.

Simultaneously, CEN will make available the CWA Project Plan "Methodology for the development of a Meausure of Worker Satisfaction for Adjustable Automated Industrial Work Systems" and issue the call for participation through the CEN webpage.

4. Workshop scope and objectives

This Workshop aims to develop a CEN Workshop Agreement on the Methodology for the Development of a Measure of Worker Satisfaction for Adjustable Automated Industrial Work Systems that has been applied by Cranfield University (United Kingdom) within the A4BLUE Project to create a reliable tool for evaluating this specific context.

The methodology consists of a developmental sequence of studies designed to begin with initial exploration of the context / system in question to identify the specific dimensions of satisfaction that are most relevant, and then to develop a robust tool to measure these dimensions with assured reliability and validity. The initial exploratory work enables discovery of previously unknown factors and / or confirmation of those that have been previously assumed or expected. When these factors are unearthed, they may then be transposed into items in the creation of a bespoke survey tool which is then tested within a series of participant trials until sufficient data is achieved for statistical data reduction and reliability analysis. When initial reliability and validity is demonstrated the survey tool is re-applied in further participant trials to assess and demonstrate that is accurately measuring what it is intended to measure across comparable but varying situations via further reliability testing. The final tool is then ready to be used in further research and design to evaluate the impact of other adjustable automated industrial work systems.

This methodology can be used to guide the development of other tools for the measurement of human-centred systems. It can be used by any research or design practitioners.

5. Workshop programme

The language to be used during the Workshop is English. The CWA will be drafted and published in English.

The estimated duration of this workshop is 6 months. During the Workshop lifetime, one face-to-face meeting and one or two on-line meetings are foreseen. The final number of meetings will depend on the works evolution.

The programme to reach the CEN Workshop Agreement entails the following steps:

1. Public availability of Project Plan, open to public commenting. Any received comment will be considered at the kick-off meeting.
2. The kick-off meeting will take place on the August 30th 2019, at the London premises of the British Standards Institute (BSI). The kick-off meeting will approve the Workshop Project Plan, appoint Workshop Chair and discuss the first CWA draft.
3. An internal reviewing period on CWA will be carried out to allow for inclusion of comments from Workshop participants. Participants may actively contribute to the draft content.
4. The Workshop Secretariat will organize the first CEN Workshop plenary meeting for all registered participants.
5. Once an agreed final draft is available, a 60-day Public comment phase will take place, noticed at the CEN webpage.
6. A second plenary meeting (on-line meeting) for registered Workshop participants will be organised by the secretariat, if necessary, for the resolution of comments received during the public enquiry.
7. The chairman will check by correspondence that a consensus has been reached on the final draft of the CWA.
8. CWA will be sent to the CEN-CENELEC Management Centre for publication.

Table 1 shows a tentative schedule for the development of the CWA:

Table1- Tentative schedule

2019							2020
Step	July	August	Sept	October	Novem	Decem	January
Public availability of business plan and agenda	3rd week	3rd week					
Workshop Kick-off meeting (face-to face meeting)		4th week					
Internal review of the draft CWA in the WS			1st week 2nd week				
WS Plenary meeting for registered participants for discussion (on-line meeting)			3rd week				
Public comment phase on Draft CWA				2nd week	Novem	2nd week	
WS Plenary meeting for registered participants for resolution of comments, if needed (on-line meeting)						4th week	
Publication of CWA							January

6. Workshop structure

The following hold the responsibility of the workshop:

6.1 CEN Workshop Chairperson

A proposal for the chairperson will be made by the Workshop proposers; he/she or any other candidate nominated during the period of publication of this Project Plan or at the Kick-Off will be approved at the Kick-off meeting by the parties present. His / her responsibilities include:

- Chairing the CEN Workshop meetings,
- Monitoring the progress of the CWA,
- Interface with CCMC regarding strategic directions, problems arising, external relationships, etc.
- Guides the work towards consensus.

6.2 CEN Workshop Secretariat

The CEN Workshop Secretariat is providing the formal link to the CEN system. The following main activities will be carried out by the Workshop Secretariat:

- Is responsible for administrative tasks of the CEN Workshop Agreement
- Forming the administrative contact point for CWA project,
- Makes and follows up on action lists,
- Ensures that the Workshop Agreement follows the directives,
- Administrating the liaison with relevant CEN/TCs, if applicable.

UNE will provide the Workshop Secretariat.

7. Resource requirements

All costs related to the participation of interested parties in the Workshop's activities have to be borne by themselves. There is no fee for registered participation in the Workshop.

The A4BLUE Project will contribute to the drafting of the CWA, providing text and comments, if necessary.

UNE will provide the Workshop Secretariat subject to formal approval of the Project Plan at the kick-off meeting. Secretariat costs will be covered by A4BLUE project.

On-line meetings will be used as much as possible.

8. Related activities, liaisons, etc.

UNE has made a scan to verify the existence of standards and standards under development relating methodology for workers satisfaction. No standards or standards under development have been found, neither at European or International level.

At European level the following technical committees that will be informed of the preparation of the CWA:

- CEN TC 122 "Ergonomics"
- CEN TC 310 "Advanced automation technologies and their applications".

At International level the following technical committees that will be informed on the preparation of the CWA

- ISO TC 159 "Ergonomics" (widely dealing with "Ergonomics of human-system")
- ISO/TC 260 "Human resource management"
- ISO TC 184 "Automation systems and integration".

Information of the CWA will also be addressed to the members of the ACE Factories Cluster which is formed by A4BLUE, Factory2Fit, HUMAN, INCLUSIVE, and MANUWORK projects, funded under the European Union's Horizon 2020 research and innovation programme, that are developing solutions for manufacturing work environments that adapt to each individual worker.

9. Contact points

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Annex A
Template for the self-assessment
A Methodology for the Development of a Measure of Worker Satisfaction

1. **Does the proposed CWA conflict with an EN or an HD for CENELEC?**

   ☒ NO
   ☐ YES → **WARNING**:Work on the proposed CWA shall not be initiated.

2. **Does the proposed CWA intend to define requirements related to safety matters?**

   ☒ NO
   ☐ YES Is the proposed CWA within the scope of

   ☐ CEN? → The CWA proposal shall be submitted to CEN/BT for decision.

   ☐ CENELEC? → **WARNING**: Work on the proposed CWA shall not be initiated.

3. **Is the scope of the proposed CWA within the scope of an existing CEN/CENELEC technical body?**

   ☒ NO
   ☐ YES → The relevant CEN/CENELEC technical body shall be consulted on the CWA proposal:

   - If this technical body responds positively and sees no harm in the CWA being developed, the CWA proposal may be processed.
   - If the technical body is opposed to a CWA being launched, the CWA proposal shall be submitted to the CEN/CENELEC BT(s) for decision.

4. **Does the proposed CWA intend to define requirements related to management system aspects?**

   ☒ NO
   ☐ YES → The CWA proposal shall be submitted to the CEN/CENELEC BT(s) for decision.

5. **Does the proposed CWA intend to define requirements related to conformity assessment aspects?**

   ☒ NO
   ☐ YES → CEN/CENELEC Internal Regulations - Part 3, 6.7 applies.

If all these questions are answered NO, the CWA proposal may be processed.
If not, special conditions apply as given above.