Draft Project plan for the CEN Workshop on Design methodology of Advanced Human–Robot Collaborative Cells in Personalized Human–Robot Collaborations

Requests to participate in the Workshop and/or comments on the project plan are to be submitted by 2022.10.07 to asuo@une.org[1]

Recipients of this project plan are kindly requested to name all patent rights known to them to be relevant to the Workshop and to make available all supporting documents.

Madrid, 2022-08-29 (Version 3.0 rev)

[1] Applications for participating in the Workshop and comments on the project plan that are not received by the deadline do not need to be taken into consideration. Once constituted, the Workshop will decide whether or not to consider the comments received in good time.

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1 Status of the project plan

Draft project plan for public commenting before the kickoff meeting (Version 3.0).

This draft project plan is intended to inform the public of a new Workshop. Any interested party can take part in this Workshop and/or comment on this draft project plan. Please send any requests to participate or comments by e-mail to asuo@une.org

All those who have applied for participation or have commented on the project plan by the deadline will be invited to the kick-off meeting of the Workshop on **2022-10-07**.

2 Workshop proposer and Workshop participants

2.1 Workshop proposer

Person or organization	**Short description and interest in the subject**
Name: Ms. Simona Neri Organization: EURECAT – Technology Centre of Catalonia Postal address: C/Bilbao, 72 – 08005 – Barcelona - España Email: simona.neri@eurecat.org Phone: +34 932 381 400 Webpage: www.eurecat.org	Eurecat is the result of the merging process of the main Catalan Technology Centres, a process which started in 2015 and still ongoing which counts already with the sum of capacities of seven originals Centres and beyond. Eurecat is currently participating in more than 70 EU funded collaborative projects, mainly in the Horizon 2020 Programme. Eurecat R&D, innovation and training activities span from Industrial Technologies (metallic, plastic and composite materials, manufacturing processes, autonomous and professional robotics, functional printing and fabrics, simulations and sustainability) to Digital Technologies (Digital Humanities, Big Data Analytics, IT Security and Smart Management Systems, e-health, data mining and multimedia technologies) and Biotech (Omic science and Nutrition & health). Additionally, EURECAT has been accepted by the European Commission as a KETs (Key Enabling Technologies) Technology Centre in order to collaborate with SMEs on close-to-market research and innovation activities. The Workshop is an initiative of the H2020 project SHAREWORK. EURECAT is coordinating the project and has developed the methodology in which this CWA will be based.

2.2 Other potential participants

This CWA will be developed in a Workshop (temporary body) that is open to any interested party. The participation of other experts would be helpful and is desired. It is recommended that:

- Manufacturers of robotics devices
- Manufacturers of software and hardware for robotics devices
- Smart manufacturers
- Technical providers of HRC solutions
- Professional in robotics sector
- Professional in AI sector
- Professional in machine learning sector
- Scientists in the area of HRC
- Academic and research

- Policy makers
- EU institutions related to HRC
- Participants in related Technical Committees

take part in the development of this CWA.

The following persons or organisations are potentially participating at the kick-off meeting prior to the publication of the draft project plan.

Person	**Organisation**
Workshop proposer: Ms. Simona Neri	EURECAT -Spain
Néstor García Magí Dalmau	EURECAT
Dionisis Andronas	LMS, UNIVERSITY OF PATRAS -Greece
Paul Eichler,	FRAUNHOFER IWU -Germany
Andrea Orlandini Marco Faroni Alessandro Umbrico	CNR -Italy
Julen Urain	TUDA (TECHNICAL UNIVERSITY DARMSTADT) -Germany
Nils Mandischer	RWTH -Germany
Alexandra Jaunet	STRANE -France
Francesca Canale	STAM -Italy
Mikel Anasagasti	GOIZPER -Spain
Jaume Altesa	ASLTOM -Spain
Andrea Scala	CEMBRE -Italy
Gerard Guerrero	SEAT -Spain
Spyros Koukas	INTRASOFT -Luxembourg
Giuseppe Fogliazza Filippo Parma	MCM -Italy
Workshop secretariat: UNE Workshop secretary: Amanda Suo	UNE, Spanish Association for Standardization -Spain

3 Workshop objectives and scope

3.1 Background

This workshop is created by initiative of the SHAREWORK project (‘Safe and effective human-robot cooperation towards a better competitiveness on current automation lack manufacturing processes’). It is 4-year (2018 - 2022) project funded by the European Union’s Horizon 2020 Framework Programme for Research and Innovation under

Grant Agreement No 820807. It brings together 15 partners from 6 different European countries (Spain, Germany, France, Luxembourg, Italy and Greece).

A key objective of SHAREWORK project is to make implicit and explicit communications between robots and humans smooth and fruitful. Explicit communications leverage multi-modal technologies and, in particular, Augmented Reality tools. Implicit communications require the robotic system to reason on the operator's intentions and act consequently.

This workshop is proposed to meet this objective, and to allow interaction with the project stakeholders so that the knowledge generated in the project is transmitted to the industrial community and the stakeholders can also specify their requirements. It includes some of the results obtained by the research and innovation project.

SHAREWORK's main objective is to endow an industrial work environment of the necessary "intelligence" and methods for the effective adoption of Human Robot Collaboration (HRC) with not fences, providing a system capable of understanding the environment and human actions through knowledge and sensors, future state predictions and with the ability to make a robot act accordingly while the human-related barriers are overcome.

SHAREWORK project develops the needed technology for facing the new production paradigm compiling the necessary developments in a set of modular hardware, software and procedures to face different HRC applications in a systematic and effective way. A knowledge base (KB) to include system "know-how" data as well as real-time environment information is developed. An environment run-time perception and cognition updates this KB with object detection, human tracking and task identification. A human-aware dynamic task planning system reacts based on previous knowledge and environment status by reassigning tasks and/or reconfiguring robot control. This data allows robot intelligent motion planners to control robots. A multimodal human-robot communication system provides interfaces for bidirectional communication between operator and robot. Finally, methods for overcoming human-related barriers and data reliability and security concerning the entire framework are applied for a successful integration in the industry.

The SHAREWORK project developed an effective control system for anthropocentric HRC in fence-less environments. The project's developments follow the SHAREWORK architecture, a modular, distributed, service-oriented architecture (SoA) that defines a set of 15 different software and hardware modules designed as stand-alone, interacting components communicating through well-defined interfaces. The architecture has been designed to be fully interoperable and support various module configurations that can be customized according to industrial needs. The SHAREWORK project architecture includes modules that understand the environment and human actions through knowledge and sensors, predict future state conditions, implement smart data processing, provide augmented reality and gesture and speech recognition technology.

This architecture is proposed in the CWA as a guideline to design HRC cells.

This workshop will not develop requirements related to safety of machinery.

No legal issues related to this proposal have been identified. The modelling process can provide an estimate of the final product performance according to applicable standards or legislation, but it is not a substitute for the usual conformity assessment processes. But it can be considered useful for meeting the requirements of the applicable regulation, for example, the Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL LAYING DOWN HARMONISED RULES ON ARTIFICIAL INTELLIGENCE (ARTIFICIAL INTELLIGENCE ACT) AND AMENDING CERTAIN UNION LEGISLATIVE ACTS.

3.2 Scope

The planned Workshop defines the guideline for a methodological framework consisting of the integration of planning, perception, and communication in human-robot collaboration (HRC) systems.

This WS will develop a CWA, namely:

'Design methodology of Advanced Human–Robot Collaborative Cells in Personalized Human–Robot Collaborative Systems'

Intended Scope:

"This CEN Workshop Agreement (CWA) defines a technical/methodological framework for human-robot collaboration (HRC) systems that integrates planning, perception, and communication. Specifically, it provides guidelines for the design methodology and deployment actions to provide a user-aware approach to HRC cell that increases the adaptability and flexibility of HRC systems. This is a user-centric methodology to shape robot behavior based on a single user's specific characteristics (e.g., age, skills, experience) and preferences (e.g., left-handed versus right-handed), implementing personalized robot behavior that can better serve the human operator and increase the perception and acceptance of the technology.

This CWA will not define requirements related to safety aspects.

This document is informative and is not aimed at substituting or simplifying production procedures required by standards. The objectives of this document are the following:

— Define the design methodology and deployment actions needed to provide a user-aware approach to HRC that enhances the flexibility of HRC systems.

— Present user models and knowledge-based formalism to represent users and production information;

— Explain how the framework embeds user-awareness, with a particular focus on the planning and communication modules;

— Present an example of integration of the framework into a manufacturing scenario.

3.3 Related activities

The scope of the planned CWAs is not at present the subject of a standard. However, the topic is under the scope of CEN/TC 310 Advanced Manufacturing Technologies (and ISO/TC 299 Robotics). The CEN/TC will be consulted according to CEN/CLC/Guide 29 and invited to take part in the Workshop and use the resulting CWA as the initial step for further standard developments.

4 Resource planning

This workshop is financed by the SHAREWORK project. This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 820807.

All costs related to the participation of interested parties in the Workshop's activities have to be borne by themselves. The meetings will be held by teleconference, so no major expenses are expected.

5 Workshop programme

5.1 General

The kick-off meeting is planned to be held online on 2022-10-07.

All the Workshop meetings (kick-off meeting and Workshop meetings) and web conferences will be held virtually, during which the content of the CWA(s) will be presented, discussed and approved.

The CWA will be drawn up in English (language of meetings, minutes, etc.). The CWA will be written in English.

5.2 Workshop schedule

The following project schedule is for orientation only.

Table 1: Workshop schedule (preliminary)

CEN/CENELEC Workshop	Jul 22	Aug 22	Sep 22	Oct 22	Nov 22	Dec 22
Initiation						
1. Proposal form and Project plan submission						
2. Open commenting period on draft project plan and draft CWA						
Operation						
4. Kick-off meeting						
5. CWA development						
7. CWA finalised and approved by Workshop participants						
Publication						
8. CWA publication						
Dissemination						
Milestones				**K** **V**	**V A** **P O**	

K Kick-off
V Virtual Workshop meeting
A Adoption of CWA
P Publication of CWA
D Online distribution of CWA

6 Workshop structure and rules of cooperation

6.1 Participation in the Workshop

The Workshop will be constituted during the course of the kick-off meeting. By approving this project plan, the interested parties declare their willingness to participate in the Workshop and will be formally named as Workshop participants, with the associated rights and duties. Participants at the kick-off meeting who do not approve the project plan are not given the status of a Workshop participant and are thus excluded from further decisions made during the kick-off meeting and from any other decisions regarding the Workshop.

As a rule, the request to participate in the Workshop is closed once it is constituted. The current Workshop participants shall decide whether any additional members will be accepted or not.

Any new participant in the Workshop at a later date is decided on by the participants making up the Workshop at that time. It is particularly important to consider these aspects:

a. expansion would be conducive to shortening the duration of the Workshop or to avoiding or averting an impending delay in the planned duration of the Workshop;
b. the expansion would not result in the Workshop taking longer to complete;
c. the new Workshop participant would not address any new or complementary issues beyond the scope defined and approved in the project plan;
d. the new Workshop participant would bring complementary expertise into the Workshop in order to incorporate the latest scientific findings and state-of-the-art knowledge;
e. the new Workshop participant would actively participate in the drafting of the manuscript by submitting concrete, not abstract, proposals and contributions;
f. the new Workshop participant would ensure wider application of the CWA.

All Workshop participants who voted for the publication of the CWA or its draft will be named as authors in the European Foreword, including the organisations which they represent. All Workshop participants who voted against the publication of the CWA, or who have abstained, will not be named in the European Foreword.

6.2 Workshop responsibilities

The Workshop Chair is responsible for content management and any decision-making and voting procedures. The Workshop Chair is supported by the Workshop Vice-Chair and the responsible Workshop secretariat, whereby the Workshop secretariat will always remain neutral regarding the content of the CWA(s). Furthermore, the Workshop secretariat shall ensure that CEN-CENELEC's rules of procedure, rules of presentation, and the principles governing the publication of CWA(s) have been observed. Should a Workshop Chair no longer be able to carry out her/his duties, the Workshop secretariat shall initiate the election of a new Workshop Chair. The list below covers the main tasks of the Workshop Chair. It is not intended to be exhaustive.

- Content related contact point for the Workshop
- Presides at Workshop meetings
- Ensures that the development of the CWA respects the principles and content of the adopted project plan
- Manages the consensus building process, decides when the Workshop participants have reached agreement on the final CWA, on the basis of the comments received
- Ensures due information exchange with the Workshop secretariat
- Represents the Workshop and its results to exterior

The Workshop secretariat, provided by a CEN/CENELEC national member, is responsible for organising and leading the kick-off meeting, in consultation with the Workshop proposer. Further Workshop meetings and/or web conferences shall be organised by the Workshop secretariat in consultation with the Workshop Chair. The list below covers the main tasks of the Workshop secretariat. It is not intended to be exhaustive.

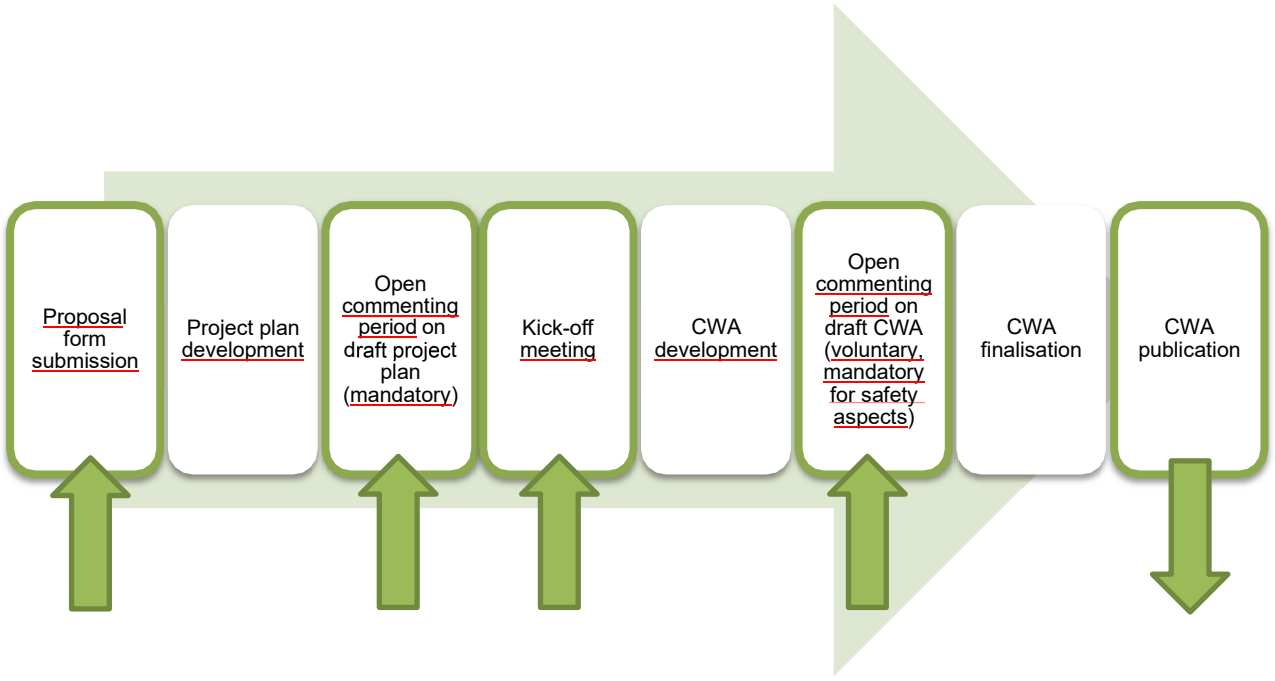
- Administrative and organisational contact point for the Workshop
- Ensures that the development of the CWA respects the principles and content of the adopted project plan and of the requirements of the CEN-CENELEC Guide 29
- Formally registers Workshop participants and maintains record of participating organisations and individuals
- Offers infrastructure and manage documents and their distribution through an electronic platform
- Prepares agenda and distribute information on meetings and meeting minutes as well as follow-up actions of the Workshop
- Initiates and manage CWA approval process upon decision by the Workshop Chair
- Interface with CEN-CENELEC Management Centre (CCMC) and Workshop Chair regarding strategic directions, problems arising, and external relationships
- Advises on CEN-CENELEC rules and bring any major problems encountered (if any) in the development of the CWA to the attention of CEN-CENELEC Management Centre (CCMC)
- Administrates the connection with relevant CEN or CENELEC/TCs

6.3 Decision making process

Each Workshop participant is entitled to vote and has one vote. If an organisation sends several experts to the Workshop, that organisation has only one vote, regardless of how many Workshop participants it sends. Transferring voting rights to other Workshop participants is not permitted. During voting procedures, decisions are passed by simple majority; abstentions do not count.

If Workshop participants cannot be present in the meetings when the CWA or its draft is adopted, an alternative means of including them in the voting procedure shall be used.

7 Dissemination and participation strategy



Proposal form submission, Open commenting period on draft project plan, CWA publication

These stages of the workshop will be disseminated to the following relevant stakeholders and bodies for consultation:

- The standardization Technical Committees identified in subclause 3.3.

- ROobot (enhanced SenSing, INtelligence and actuation to Improve job quality in manufacturing) project consortium, where there is a EG working on standardization protocols
- European Robotics Initiative for Strengthening the Competitiveness of SMEs in Manufacturing by integrating aspects of cognitive systems, that are working on the standardization activities

In addition to the CCMC website, these stages of the workshop will be advertised on the SHAREWORK communication channels to raise awareness.

8 Contacts

- **Workshop Chair:**
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- **Workshop Secretariat:**
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