KEEPCARING

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Deliverable D7

[User requirements CMP]

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Contents

Index

1. KEEPCARING project

Healthcare professionals working in hospitals -and those in training to embark on hospital careers- experience high levels of stress, especially in the surgical pathways. While interventions to improve wellbeing and resilience exist, not much is known about the right (combination of) intervention(s) for this specific setting. KEEPCARING aims to (re-)build wellbeing and resilience of healthcare workforce in EU hospitals by co-creating a multi-faceted non-digital, digital and AI-supported solution package to prevent burnout among (aspirant) healthcare professionals on the individual, team, and organizational level. Our multi-sector and interdisciplinary consortium will (1) study stress and stressors experienced by (aspiring) health care providers in their specific setting, (2) evaluate digital and non-digital solutions to reduce stress at an individual and team level, (3) study job crafting among (aspiring) health professionals as a way to reduce stress, and (4) finally, develop a change management platform that, using explainable AI, helps hospital managers as well as surgical caregivers to choose the solutions that match their context. All solutions as well as the portal will be developed in co-creation with end users, including 2 professional associations in our consortium. In addition, legal and ethical expertise is provided across Partners and in Advisory Board to ensure privacy and ethical guidance in this sensitive context.

KEEPCARING will provide solutions to improve wellbeing among health care professionals and students, thereby reducing burnout and improving the number of health care students entering the workplace. Our organizational solutions will empower individuals and employers to understand and act on stressful situations in their specific setting. Cost-effectiveness analyses will be used for policy recommendations to ensure sustainable uptake among policy makers, funders, and employers.

2. Introduction

The KEEPCARING Change Management Platform (CMP) will be an iterative, web-based, and responsive platform designed to incorporate the research findings of the KEEPCARING project. The platform aims to increase awareness about stress and resilience, and to enable users to identify problems concerning stress and burnout. It will also provide information and knowledge on specific solutions, including virtual reality (VR), team support groups, and an online course on self-regulation. Additionally, it will help hospital managers to identify burnout issues among their healthcare employees, and it will provide relevant information and effective solutions to promote workplace well-being and to increase stress resilience.

The co-design framework is the first step towards the design of the KEEPCARING CMP.
This deliverable (D7 – user requirements CMP) provides the framework of the CMP that allows users to become an active part of the creative design. This co-design framework has been designed to reflect stakeholders' needs and to identify the requirements for implementing the CMP's functionalities and services. It is designed to ensure user involvement in data collection, data presentation, and data utilization within the CMP.

The co-design framework has been implemented in two co-design events (one in Italy and the other internationally). These events allowed gathering relevant data from the analysis of insight, discussions, and suggestions from involved stakeholders (e.g., hospital-based doctors, nurses, medical students, nursing students, and hospital managers) on services and functionalities to be implemented in the CMP.

In detail, this deliverable will first provide an overview of user-centred design methods for the collaborative design of applications in Section 3. This analysis allows the identification of the most suitable method for the co-design of the CMP. This co-design framework is presented in Section 4. Following this, the co-design framework will be described and applied in two co-design events: the Italian co-design event in Section 5 and the international co-design event in Section 6. The results of these co-design events will be discussed in Section 7, highlighting the services and functionalities that stakeholders identified for

implementation in the CMP. Finally, Section 8 will provide a concluding discussion on the outcomes of the co-design activities.

3. State of the art on co-design methods in the health sector

This section provides an analysis of the state-of-the-art literature on co-design methods in the health sector (for user requirements management) to develop more effective digital solutions and services. The analysis mainly focuses on the methodologies used, the data collected, the application sectors, and specific use cases to assess which method is most appropriate to use in designing the services and functionalities of the online KEEPCARING CMP. Table 1 provides an overview of the analysed papers.

Many of the analysed studies focus on gathering user requirements and actively involving users in the design process. In particular, some papers focus on the co-design of digital health management tools, the development of platforms for sharing clinical information, and the creation of models to enhance the patient's journey. Some studies also analyse the challenges and benefits of co-design, proposing frameworks and guidelines for its optimal implementation. The goal is to create tools and platforms that meet the real needs of end users, such as patients, doctors, and other professionals.

The analysed papers present concrete use cases demonstrating the effectiveness of participatory design in creating digital solutions and innovative services. For example, they report cases of eHealth platform development to enhance patient support [1], clinical information management tools to improve communication among healthcare professionals [2] [3], and co-design models to enhance user experience [4].

The analysis of methodologies reveals a clear predominance of approaches that actively involve people in envisioning and creating solutions, including participatory design, user-centered design, and collaborative workshops [5] [6] [7] [8]. The analysis highlights that the collected data is predominantly qualitative, derived from interviews, user feedback, surveys, focus groups, and observations [9] [3] [10] [11]. These approaches emphasize the importance of gathering user needs directly to improve development and design processes.

In some cases, mixed methods are employed, combining qualitative and quantitative data, particularly when evaluating the impact of digital solutions and user interfaces [12]. The variety of methodologies used suggests that there is no single ideal approach but rather a combination of techniques that varies depending on the context and study objectives.

In summary, the analysis suggests that participatory methodologies are essential for developing effective and user-centered solutions and highlights the importance of collaboration between designers and users to enhance the usability and effectiveness of technologies and services.

Among co-design methods analysed, the Personas method stands out as a powerful tool for designing the services and functionalities of an online platform [13] [7] [14]. Personas allow the creation of fictional characters representing different user types, including details like demographics, goals, behaviours, and pain points. They help teams understand user needs, improve product design, and align decision-making.

Unlike other participatory design approaches like focus groups, the Personas method creates detailed fictional profiles based on real user data. Focus groups enable having in-depth discussions with small groups of users, for example, on the platform's current state, new features, or concepts. This method helps to understand user attitudes, perceptions, and preferences in a group setting; however, it gives generalised feedback. The Personas method instead ensures that design decisions are guided by specific user characteristics, stressors, and behaviours rather than generalized feedback.

Methods like focus groups, interviews, and surveys are a straightforward way to collect user opinions on specific design elements, features, or functionality. It is possible to ask users to rate or prioritize potential features, interface designs, or content structures. These methods enable have quick and easy way to collect large amounts of data and user feedback and provide raw data, but Personas helps to synthesize these insights into relatable user types. This makes it easier to translate findings into actionable design solutions. On the other hand, workshops can serve as the main platform for engaging users actively in the design. It is possible to structure workshops around specific design challenges or broader platform goals, such as user experience or feature prioritization. These workshops typically

involve brainstorming, ideation, prototyping, and user testing. They have some benefits like immediate feedback, direct involvement, and a sense of ownership over the design process, but they generate ideas without structured user representation. The method of Personas instead allows designers to simulate real-world interactions (e.g., how doctors or nurses would use the platform). This leads to better personalization and feature prioritization. The Personas method, in fact, provides a shared reference point for designers, developers, and decision-makers, ensuring that discussions about the platform remain user-focused and aligned with real-world scenarios.

The analysis of literature identifies the Personas method as the most suitable to ensure that the platform is built with real users in mind, leading to a more effective, engaging, and user-friendly tool tailored to daily challenges.

For our purposes, we empower the Personas method by adding a description of a situation where the persona would use the website or application. In our method, the persona is the main character in the story and the goal is what the actor wants to do, and the scenario is the setting of the story. Therefore, we create a narrative that describes how the persona behaves in the situation. The following sections will describe how the Persona-and-Scenario method [15] will be used in our co-design framework.

Table 1. Overview of state of art of user centric design methods (ordered by date of reference)

Article	**Used methods**	**Collected Data**	**Application sectors**	**Use cases**
[16] Harder et al. (2017)	Qualitative research design and focus group methodology	User needs and preferences for the content and features for the mobile application	Health care systems	Breast cancer treatment
[2] Tang et al. (2018).	Agile software development methodology.	Feedback allowed to build functionality that met the needs of	Health	Design and implementation of a clinical communication and collaboration

	User-centered design: user observation User co-design: design meeting with prototyping Participatory design User-centered design: usability testing User co-design Participatory design	users efficiently and rapidly		platform aimed at facilitating care of complex hospitalized patients by an interprofessional team of clinicians
[10] Marent et al. (2018).	Co-design workshops and individual interviews	Perspectives from both people living with HIV (PLWH) and clinicians on essential app functionalities, privacy concerns, and user needs in managing HIV.	mHealth, HIV Care	Development of EmERGE, an mHealth platform to support self-management and HIV clinical care integration.
[19] Ospina-Pinillos et al. (2019).	Co-design workshops; knowledge translation; language translation and cultural adaptation; and rapid prototyping and user testing of the MHeC-S alpha prototype.	Users' feedback	Mental health services, health care	Developing and culturally adapting a Spanish version of the Mental Health eClinic (MHeC-S)

[1] Kildea et al. (2019).	Agile development approach Usability testing and focus groups	Feedback from surveys, focus groups, patient preferences, staff input	Digital Health, Healthcare IT Systems	Design of the Opal patient portal for personalized cancer care
[17] Islind et al. (2019)	Design ethnography Participatory workshops Iterative prototyping and role-playing. Patient narratives, interviews, observations	. Design feedback on digital tools, patient data visualizations	Digital Health Platforms	Development of a digital platform to support post-cancer self-care and clinical collaboration
[8] Antonini (2021).	User-Centered approach	User needs User requirements	Healthcare sector	Patient and family involvement in palliative care delivery
[18] Bird et al. (2021).	Generative Co-Design Framework Participatory Action Research, Community-Based Participatory Research, Experience-Based Co-Design	Needs to shape virtual healthcare system	Healthcare	Care for children with chronic healthcare conditions and their families
[20]	Participatory Action Research (PAR)	Guidelines and protocols for	Healthcare, educational	Development of NABUCO, a nature-

Sterckx et al. (2021)	resulted in an iterative adaptive cycle of co-design, implementation end evaluation of NABUCO. (questionnaires, storytelling, digital and physical group conversations).	prevention and recovery of burnout	and governmental Organizations	based intervention for burnout prevention and recovery in various organizational settings.
[5] Saparamadu et al. (2021).	A user-centered design–based approach. Focus group	Situation analysis and information architecture, design activity 1 for wireframe designing, design activity 2 for wireframe testing, and user testing sessions 1 and 2.	Health	To build an mHealth app for health professionals, tasked to deliver medical laboratory-related information on a daily basis.
[11] Noorbergen et al. (2021).	Exploratory qualitative study consisting of 16 semi structured interviews.	The contextualized framework captures important considerations of the mHealth context, including dedicated prototyping and implementation phases, and an emphasis on	mHealth systems	To contextualize an existing co-design framework for mHealth applications and construct guidelines to address common challenges of co-designing mHealth systems

		immersion in real-world contexts. In addition, 7 guidelines were constructed that directly pertain to mHealth.		
[21] Chute et al. (2022).	Participatory design storytelling	14 common user requirements that resulted from a review of co-design projects	Digital health care systems	User requirements and themes for comanaged digital health and care services
[14] Turk et al. (2022).	Human-centered design Design thinking Interviews with patients to gather requirements and Delphi survey prioritization Co-creating personas, refining user requirements and co-creating user journeys	User requirements, user needs and behaviors across patient journeys, to identify nuances and highlight important patterns in stakeholder and end-user segment at various stages in the patient's journey.	Healthcare	Patients' health journey
[6] Savoy et al. (2022).	Electronic Co-design (Eco-design) workshops using videoconferencing software	Codeveloped 3 different types of feedback interventions	Health services interventions	Development of feedback interventions for abnormal test result follow-up with

				primary care clinicians at a medical center in Southern Texas
[7] Iniesto et al. (2022).	The most popular methodology was experience-based co-design. The most commonly used co-design method is the workshop, which often includes design methods such as brainstorming and reflective activities.	Users feedback	Health	To support stakeholder collaboration to design health care services as products and processes.
[12] Tong et al. (2022).	Qualitative methods including in-depth interviews and focus groups.	Key features and contextual information essential for those developing apps to support older adults in managing their health and health care	Health care	To design an mHealth tool to assist older adults in coordinating their care with health care professionals and caregivers.
[4] Johansson et al. (2023).	Participatory design Value sensitive design Exploratory study design with online workshops to	Requirements for cognitive accessibility through collaboration between designers and people with	eHealth services	To develop an empirically grounded framework for user participation in co-design processes, enabling the participation of users with the widest range

	iteratively collect and analyse data	cognitive impairments.		of user characteristics.
[22] White et al. (2023)	Co-design Workshop	Service information needs User needs	Healthcare	Culture Building, Health System Needs
[23] Silvola et al. (2023).	Participatory design of services	Characteristics of co-design and its applicability to the reengineering of healthcare services Peculiarities of the application of this approach in different geographical contexts.	Healthcare	Healthcare organization
[24] Laurisz et al. (2023).	Co-design	Knowledge on services and functionalities	Healthcare	Implementation of digital health platform
[25] Mallakin et al. (2023).	Web-based co-design	Information from the academic literature as well as relevant toolkits, handbooks, reports,	Healthcare	Designing Discharge after Emergency Care [D.DEC] project Patient-centered approach for

		guidelines, webinars, and presentations in the gray literature		discharge information in the emergency department.
[3] Sirimsi et al. (2023)	In-depth Focus groups Interviews Co-design workshops	Experiences of primary care professionals, strategies for interprofessional collaboration and integration - IPCI. Feedback from stakeholders	Healthcare	Development of a toolkit to improve interprofessional collaboration and integration in primary care For care providers (caregivers)
[26] Marlow et al. (2023)	Workshops with health professionals Qualitative and quantitative data (interviews, survey–Likert)	 Recommendations Esthetic and functional details for the graphical user interface (GUI)	Health	To identify health professional recommendations for the graphical user interface (GUI) of an artificial intelligence (AI)–enabled risk prediction tool.
[27] Woodward et al. (2024).	Think-aloud method; Prototype informed Workshops; Interview	Design elements; identified requirements; key findings	Health care systems	Prototype track-and-trigger chart for detecting and responding to possible fetal deterioration during labour. Avoiding Brain Injury in

				Childbirth (ABC) programme
[28] Jelen et al. (2024)			Health cardiovascular	To decrease inter-professional cardiovascular clinicians' distress and improve well-being within a Canadian quaternary hospital network.
[28] Park and Marquard (2024).	Nielsen and Norman's 4-phased design cycle and focused on the discovery and exploration phases to identify the context of nurses' use of the nursing summary (discovery) and to create prototype design layout using physical materials (exploration).	Nurse-generated nursing summary layouts and vital sign visualization designs	Health	Nurses' current use of nursing summaries and vital sign information within them and glean their ideas for design improvements.
[9] Jelen et al. (2024).	Individual interviews Focus group Virtual brainstorming with Miro	Clinician insights on workplace distress factors, personal experiences. Ideas and feedback for intervention	Cardiovascular care, Healthcare	To address clinician distress and develop supportive interventions in cardiovascular care settings.

		strategies, feedback on initial designs		

4. The co-design framework

This section describes the co-design framework that has been used to implement the co-design processes that involved specific skills and backgrounds of the different users, i.e. stakeholders (e.g. hospital-based doctors, nurses, medical students, nursing students, and hospital managers), who contributed their multidisciplinary expertise to create knowledge for the design of services and functionalities of the KEEPCARING CMP due to their multidisciplinary skills and backgrounds.

To define the co-design framework, we focused on techniques that support the design of applications more usable and useful [29] [30].

Therefore, we focused on user-centered design techniques to design the interaction process because these techniques focus on the users' needs and goals through their active involvement in the design process of the application. User engagement is a valuable source of knowledge about the context of use and should be used to explore design solutions for the applications. In addition, the active involvement of the users allows for creating an explicit understanding of users, their needs, and their expectations of the applications.

For our purposes, we combined the user-centered design techniques with the generative techniques [31] that aimed to map participants' latent needs and desires by allowing them to explore challenges and create alternative future scenarios or situations and contexts. This choice stems from the fact that co-design methods without generative techniques generally concentrate on engaging users in evaluating or refining existing ideas, products, or services. In contrast, co-design that incorporates generative techniques involves creative, future-oriented activities that reveal users' deeper needs and aspirations.

Combining generative techniques with user-centric design techniques allows users to map users' latent needs and desires by allowing users to explore challenges in application scenarios and to express deeper levels of knowledge about their experiences, challenges, and needs.

Several generative techniques may be applied in the co-design process. An example of generative techniques is the Persona-and-Scenario, which is undertaken to develop an understanding of participants' experiences and challenges, as well as a vision for the future via the creation of an ideal state [32]. Other examples of generative design approaches that allow users to creatively draw upon their experiences to make an artefact that illustrates a future state are: storytelling activities facilitated by illustrations and sketches [33]; and creative prototyping exercises, in which participants create a physical manifestation of a concept or an idea [34].

To meet the aim and objectives of our project activities, we use the Persona-and-Scenario method [35] [36] [15] for understanding users' needs and creating new interaction forms or functionalities that correlate with the users' needs and contexts.

In the Persona-and-Scenario method, a user persona is a fictional character that represents an ideal user, including their demographics, motivations, preferences, goals, and tasks. The Personas method complements both traditional and generative co-design techniques by synthesizing user data into relatable profiles that guide design decisions. While traditional co-design gathers users' explicit feedback and generative methods uncover deeper, often unspoken needs, Personas transform these insights into fictional yet data-driven characters that represent key user types. These profiles help keep the design process user-centered, ensuring that decisions consistently reflect real user goals, behaviors, and contexts, even when users are not directly involved in later stages of development. In contrast, a user scenario is a narrative that depicts how the user persona interacts with a specific application (in this case, the CMP) within a particular context and situation.

The Persona-and-Scenario facilitated the design of user needs and goals collaboratively, ensuring a user-centered design.

Therefore, to gather the needs of target users with the KEEPCARING CMP from their perspective, the Co-design framework has been based on the Persona-and-Scenario method.

The objectives of the co-design process were to:

1. Define parameters of information needed to be included in the CMP;
2. Establish a shared need for services and interaction functionalities that the CMP has to provide among participants
3. Map existing interaction needs and identify priority among users' requirements.

The co-design activity was conducted in an active workshop-style setting.
To achieve these objectives, we have established clear criteria and procedures for identifying and recruiting participants for the co-design events at both local and international level. This included the identification of users of the KEEPCARING CMP, as well as an informed consent procedure and associated forms.
Participants in the KEEPCARING CMP co-design events were volunteers. Children or minors who are unable to provide informed consent were not involved in these events.

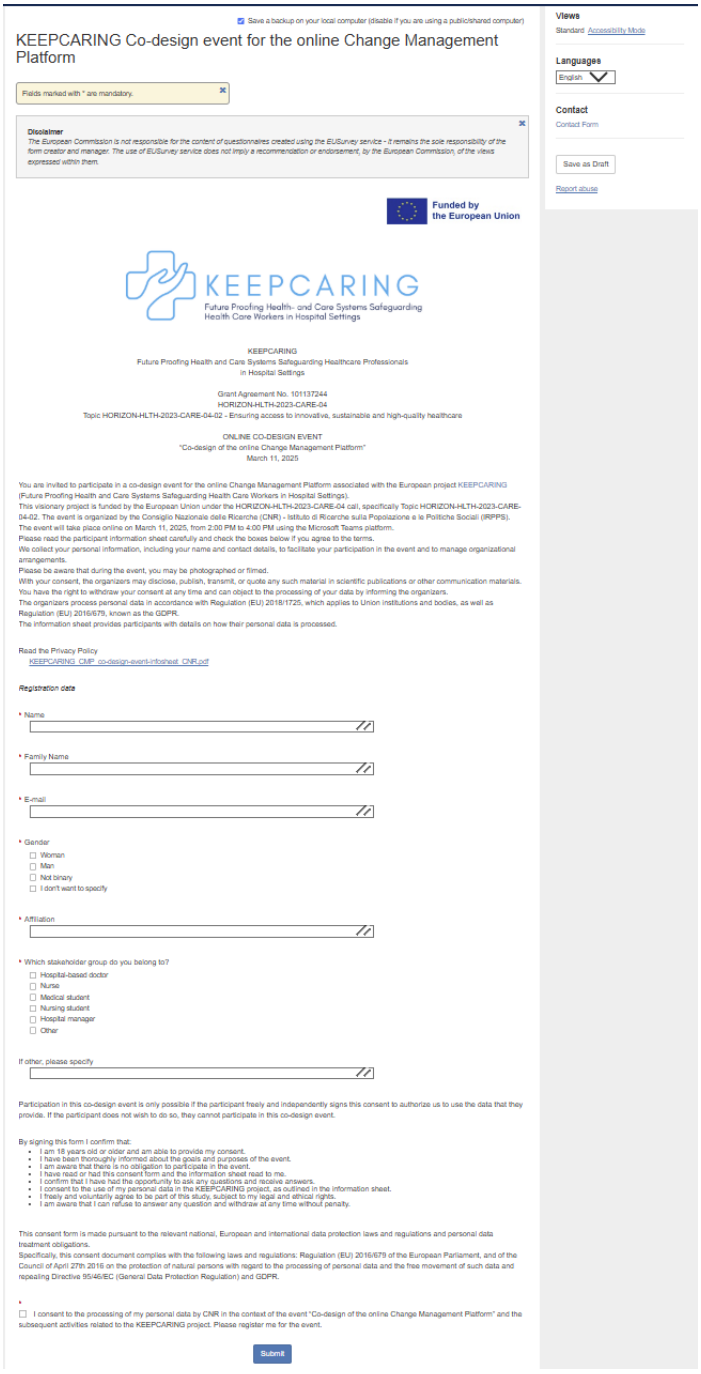
The criteria for participant recruitment at the co-design events were as follows:

- Complete presentation: we provided complete and accurate information about the project and clearly explained the purpose and functioning of the events.
- Lack of pressure: we ensured that the purposes and functions of the co-design events were thoroughly explained to potential participants, allowing them to make an informed decision about their participation.
- Respect for individuals: Participation was entirely voluntary, and informed consent was fundamental to our recruitment process.
- Age requirement: only individuals aged 18 and older were eligible to participate.

The recruitment procedures for participants in the co-design events involved several methods:

- Direct contact: members of the National Research Council (CNR) project team reached out directly to potential participants through various means, including face-to-face meetings, emails, and phone calls. They focused on engaging different stakeholders and networks, both locally and internationally, who might be interested in discussing the themes of the co-design events.
- Indirect contact: members of the CNR project team have disseminated invitations for local and international events through LinkedIn posts on both KEEPCARING project and personal accounts, in collaboration with ECHAlliance, partner responsible for the dissemination of the KEEPCARING project.
- Gender balance: the recruitment process aimed to achieve a gender balance, targeting 50% male and 50% female participants.
- Registration: all recruitment communications requested potential participants to register using the EUSurvey form (see Figure 1) and to indicate their intention to participate in the co-design event if they were interested in its objectives.

This approach ensures a diverse and engaged group of participants for the co-design events.



Save a backup on your local computer (disable if you are using a public/shared computer)

KEEPCARING Co-design event for the online Change Management Platform

Fields marked with * are mandatory.

Disclaimer

The European Commission is not responsible for the content of questionnaires created using the EUSurvey service - It remains the sole responsibility of the form creator and manager. The use of EUSurvey service does not imply a recommendation or endorsement, by the European Commission, of the views expressed within them.

Funded by the European Union

KEEPCARING
Future Proofing Health- and Care Systems Safeguarding Health Care Workers in Hospital Settings

KEEPCARING
Future Proofing Health and Care Systems Safeguarding Healthcare Professionals in Hospital Settings

Grant Agreement No. 101137244
HORIZON-HLTH-2023-CARE-04
Topic HORIZON-HLTH-2023-CARE-04-02 - Ensuring access to innovative, sustainable and high-quality healthcare

ONLINE CO-DESIGN EVENT
"Co-design of the online Change Management Platform"
March 11, 2025

You are invited to participate in a co-design event for the online Change Management Platform associated with the European project KEEPCARING (Future Proofing Health and Care Systems Safeguarding Health Care Workers in Hospital Settings).
This visionary project is funded by the European Union under the HORIZON-HLTH-2023-CARE-04 call, specifically Topic HORIZON-HLTH-2023-CARE-04-02. The event is organized by the Consiglio Nazionale delle Ricerche (CNR) - Istituto di Ricerche sulla Popolazione e le Politiche Sociali (IRPPS).
The event will take place online on March 11, 2025, from 2:00 PM to 4:00 PM using the Microsoft Teams platform.
Please read the participant information sheet carefully and check the boxes below if you agree to the terms.
We collect your personal information, including your name and contact details, to facilitate your participation in the event and to manage organizational arrangements.
Please be aware that during the event, you may be photographed or filmed.
With your consent, the organizers may disclose, publish, transmit, or quote any such material in scientific publications or other communication materials.
You have the right to withdraw your consent at any time and can object to the processing of your data by informing the organizers.
The organizers process personal data in accordance with Regulation (EU) 2018/1725, which applies to Union institutions and bodies, as well as Regulation (EU) 2016/679, known as the GDPR.
The information sheet provides participants with details on how their personal data is processed.

Read the Privacy Policy
KEEPCARING_CMP_co-design-event-infosheet_CNR.pdf

Registration data

* Name
* Family Name
* E-mail
* Gender
- Woman
- Man
- Not binary
- I don't want to specify

* Affiliation

* Which stakeholder group do you belong to?
- Hospital-based doctor
- Nurse
- Medical student
- Nursing student
- Hospital manager
- Other

If other, please specify

Participation in this co-design event is only possible if the participant freely and independently signs this consent to authorize us to use the data that they provide. If the participant does not wish to do so, they cannot participate in this co-design event.

By signing this form I confirm that:
- I am 18 years old or older and am able to provide my consent.
- I have been thoroughly informed about the goals and purposes of the event.
- I am aware that there is no obligation to participate in the event.
- I have read or had this consent form and the information sheet read to me.
- I confirm that I have had the opportunity to ask any questions and receive answers.
- I consent to the use of my personal data in the KEEPCARING project, as outlined in the information sheet.
- I freely and voluntarily agree to be part of this study, subject to my legal and ethical rights.
- I am aware that I can refuse to answer any question and withdraw at any time without penalty.

This consent form is made pursuant to the relevant national, European and international data protection laws and regulations and personal data treatment obligations.
Specifically, this consent document complies with the following laws and regulations: Regulation (EU) 2016/679 of the European Parliament, and of the Council of April 27th 2016 on the protection of natural persons with regard to the processing of personal data and the free movement of such data and repealing Directive 95/46/EC (General Data Protection Regulation) and GDPR.

*
- I consent to the processing of my personal data by CNR in the context of the event "Co-design of the online Change Management Platform" and the subsequent activities related to the KEEPCARING project. Please register me for the event.

Submit

Views
Standard Accessibility Mode

Languages
English

Contact
Contact Form

Save as Draft

Report abuse

Fig. 1: EUSurvey form for registering to the international KEEPCARING CMP co-design event

The EUSurvey form required participants to agree to informed consent modules. These modules have been provided in Italian for the local co-design event and in English for the international co-design event. The informed consent modules explained the nature and purpose of the co-design events, as well as any associated risks. Participants must read the informed consent information sheet (see Table 2), which was mandatory. The information included in the EUSurvey form and the informed consent information sheet was defined in accordance with CHINO, the partner responsible for ethical and legal issues within the KEEPCARING project.

Table 2: Informed consent information sheet for registering for the international KEEPCARING CMP co-design event

Information letter on Participation in the co-design event **"Co-design of the online Change Management Platform"** **KEEPCARING -** **Future Proofing Health and Care Systems Safeguarding Healthcare Professionals in Hospital Settings** **Grant Agreement No. 101137244** **HORIZON-HLTH-2023-CARE-04** **Topic HORIZON-HLTH-2023-CARE-04-02 - Ensuring access to innovative, sustainable and high-quality healthcare**

Introduction to the KEEPCARING project (www.keepcaring.eu)

The co-design event is part of a larger research project funded by the EU, KEEPCARING. The project addresses the stress and burnout among healthcare professionals in the European Union.
The KEEPCARING project was initiated to fundamentally improve the well-being of healthcare professionals across the European Union. The project seeks to co-create a comprehensive solution package specifically designed to reduce stress and enhance resilience in healthcare workers at every level—individuals, teams, and organizations. You can find the partners of the Project and have more information about it at https://keepcaring.eu/.

WHAT IS THE CO-DESIGN EVENT ABOUT?

As part of the KEEPCARING Project, this co-design event is the first step towards the creation of the KEEPCARING Change Management Platform (CMP), part of the project's solution package. The CMP will be a companion app for mobile devices presenting goals and mission, overview, innovative integrative solutions (active interaction with end-users, participative scenarios, assessment forms) and management approaches able to impact organizational models to support healthcare decision-makers in addressing stress and burnout among healthcare professionals.

For this co-design event "Consiglio Nazionale delle Ricerche ("CNR", "we", "us")" is the controller of the personal data that will be processed.

Before deciding whether you want to participate in the co-design event described, please, read this document carefully. Please ask all the questions you may have so you can be completely sure to understand all the proceedings of the co-design event including risks and benefits (see contact details section).

DURATION OF THE RESEARCH ACTIVITIES

The KEEPCARING Project activities run for 48 months, from 01/07/2024 to 30/06/2028.
The co-design event in which you will take part will last for a total of 2 hours

WHY WE NEED YOUR COLLABORATION

With your participation, you will provide a substantial contribution to associating end-user knowledge with the design and increasing the suitability between the mobile application and users' needs and requirements.

WHAT CAN YOU EXPECT?

If you choose to participate in this co-design event, you will take part in a live co-design session that will take place through the Microsoft Teams platform, on the 11th of March 2025 for a total duration of 2 hours.

To achieve the objectives of the co-design, three scenarios were created for the KEEPCARING CMP co-design events. For co-designing, each of the three interaction scenarios was described in writing to ensure shared understandings and meanings with participants.

To ensure an inclusive process that gave all participants an equal voice, they were al invited to share their perspectives on the types of interactions users need with the CMP, the situations in which these needs arise, and the tools and modes of interaction users should have with the platform. Three scenarios have been used to collaboratively discuss and explore user needs and requirements.

After presenting the three scenarios focusing on different use cases, users have been involved in a collaborative discussion by questioning users about the interaction forms or functionalities correlated with the users' needs in each interaction scenario.

The three interaction scenarios were:

1. Individual level: This involved hospital-based doctors, nurses, or students who use the CMP to upload personal data, job information, health data collected from wearable devices (e.g., smartwatches and smart clothing), and perceived stressors. We also discussed how the CMP can alert users in situations of stress, and can give insights into what kind of 'stress type personality' a user is.
2. Organizational level: This involves healthcare decision-makers who interact with the CMP to visualize anonymized data about employees. This includes information on work-related stressors such as long hours, heavy workloads, job insecurity, and conflicts with co-workers, as well as overall stress levels and high turnover rates. We will also explore how the CMP can provide information on the composition of the stress types among employees and suggest interventions to reduce job stress and promote a safe and resilient workplace.
3. Project Context: This is for end-users seeking knowledge about materials, publications, and project outcomes. We discussed their preferences for accessing this information and the e-course to empower self-regulation and improve self-awareness and coping skills (that will be defined in task 5.3).

In detail, the three scenarios presented during the local and international KEEPCARING CMP co-design events and the connected questions were as follows:

SCENARIO 1: Individual Level

Anna is a 46-year-old nurse working in the surgical field. She works 40 hours a week, often enduring heavy shifts and managing a high workload. Married with three children, she also takes care of her mother-in-law. After work, Anna frequently feels stressed, which leads to a lack of sleep. However, she feels supported by both her manager and her team.

Questions:

1. What relevant information should Anna put into the CMP to allow the CMP to identify potential stress and/or burnout situations?
2. How should Anna be notified about her stress and/or burnout situation detection?
3. What interaction modalities allow Anna to enter information on the platform and receive feedback to make the platform usable in a work context?
4. How can Anna feel safe and confident when inputting her information on the platform?

SCENARIO 2: Organizational level

Giulia is a 50-year-old woman and a hospital manager responsible for overseeing a multidisciplinary team of doctors and nurses. She is in charge of scheduling the team's shifts and requires tools to monitor their well-being. This will help her understand the necessary interventions to implement promptly.

Questions:

1. What types of information should the CMP provide to Giulia – on a generic hospital based level - for the implementation of appropriate interventions?
2. How should Giulia receive advice on solutions or strategies for stress mitigation, as well as recommendations for dealing with critical situations?

3. How should the platform suggest interventions or strategies to Giulia for dealing with critical situations in the work environment?

SCENARIO 3: Access to KEEPCARING content

Andrea is feeling stressed and wants to access the online courses and virtual reality videos offered by the platform. These resources are designed to support self-regulation, improve job crafting, and reduce stress.

Questions:

1. How would Andrea like to interact with the platform to navigate its content?
2. How does Andrea prefer the contents on the platform to be presented?

These interaction scenarios and the related questions have been collaboratively discussed and answered as described in the following section during the local and international KEEPCARING CMP co-design event to gather knowledge about the user needs and requirements for the KEEPCARING CMP.

5. The local co-design event

The local co-design event has been organized by CNR in Italy. The event involved hospital managers, hospital-based doctors, and experts in medical informatics to actively collaborate on the design of the services and functionalities of the KEEPCARING CMP. The main objective was to develop shared solutions based on the real needs of users.

The event took place on February 24th, 2025, and lasted two and a half hours. It was carried out in a hybrid form to encourage wider participation of stakeholders, allowing participation both in person at the National Research Council in Rome, Italy, and online via the Teams platform.

The event was attended by six stakeholders, three male and three female.

The following stakeholders participated in the local event:

- three hospital-based doctors,
- one hospital manager,
- two other experts (with expertise in medical informatics and biomedical robotics).

The event was organized by CNR, which initially presented the project's objectives, the platform, and the event's format to the participating stakeholders. Following the introduction, the stakeholders had the opportunity to introduce themselves. Each scenario was then described and explained, with questions provided for each scenario, one at a time. The online tool SLIDO was used to facilitate responses, allowing stakeholders to submit their answers through a link in the presentation slides or by scanning a QR code with their smartphones or PCs. Participants were given five minutes to answer each question and could also request clarifications. After five minutes, each response was displayed on the screen one at a time, while moderators guided a discussion among stakeholders to clarify their answers and to share their opinions, ideas, and suggestions for designing the services and functionalities of the KEEPCARING CMP.

The table below shows the scenarios, the questions for each scenario, and answers provided by all stakeholders for each question.

Table 3: Local KEEPCARING CMP co-design event: scenarios, questions, and participants' answers

SCENARIO	QUESTION	ANSWERS
Anna is a 46-year-old nurse working in the surgical field. She works 40 hours a week, often enduring heavy shifts and managing a high workload. Married with three children, she also takes care of her mother-in-law. After work, Anna frequently feels	1. What relevant information should Anna input to the CMP to allow CMP to identify potential stress and/or burnout situations?	- Overwork - Familiar commitments - Shift change - Type of work activity performed - Possible personalism - Occupation, - the type of team, - working hours, - emotional state, - any significant workplace events that may have caused high stress.

stressed, which leads to a lack of sleep. However, she feels supported by both her manager and her team. -		- Personal data such as age, professional role, and problematic family situations. - Work hours, - Perceived workload, - Perceived stress level. - Physiological data measured with wearable systems. - Sleep hours, - Home-work trip - Travel time (including parking), - Smoking habits. - Information on personal needs for work-life balance, data collected via smartwatches and devices. - Time spent at work.
	2. How should Anna be notified about her stress and/or burnout situation detection?	- Strategies/exercises for stress reduction should be developed and suggested positively. - Sleep deficit notifications via device -VO2 assessment - Heart rate - Indicators of stress, - Indicator of risk, - trends in monitored physiological parameters. - Anna is aware of her stress level. She would like to be notified when she exceeds a "risky" threshold (in terms of health or social impact). - An SMS or WhatsApp message could work as an alert. - Pre-set alerts on vital parameters such as blood pressure, heart rate, etc. - Access to the platform via PC or smartphone using checkbox forms. - Speech interaction.

		- The collection of physiological parameters through wearable systems allows for gathering information without user effort. - Feedback received via notifications.
	3. What interaction modalities allow Anna to enter information on the platform and receive feedback to make the platform usable in a work context?	- We are on a surgical path. Apart from the detection of the chosen physiological parameters, Anna does not have many possibilities to interact with the platform. She could at most press a button when feeling discomfort. - Preferably speech interaction, feedback should also be via Speech. - Speech would be ideal because it is more immediate (like WhatsApp dictation). - Manual entry might be seen as an additional task. - Via text or speech interaction. - Provide supportive content based on the detected stress state
	4. How can Anna feel safe and confident when inputting her information on the platform?	- She needs to feel protected to participate. On the contrary, she will feel monitored and fear sharing information about the work environment, personal matters, or anything that could potentially identify her. - It is also important to consider that there are digital divide issues to be considered. - Aggregated data derived from anonymous sources; personal data accessible only by Anna. - Data anonymization, - Encryption,

		- Password authentication, - Informed consent - The possibility to accept/reject specific features - The ability to delete entered data.
Giulia is a 50-year-old woman and a hospital manager responsible for overseeing a multidisciplinary team of doctors and nurses. She is in charge of scheduling the team's shifts and requires tools to monitor their well-being. This will help her understand the necessary interventions to implement promptly.	1. What types of information should the CMP provide to Giulia for the implementation of appropriate interventions?	- Beyond averages of vital parameters, it might be sufficient to monitor overtime hours worked and the ability to take vacation within the year. - Work absences - Increase in sick leave, - Data collected from devices. - Percentage of employees reporting stress levels, - Temporal trends (to understand if particular situations triggered stress), and whether employees report stress incidents on the platform—allowing for event counts and correlations between stress events and personal/work data entered into the platform. - Working hours - Absenteeism and illness - Injuries - Ward change requests - Requests for health visits
	2. How should Giulia receive advice on solutions or strategies for stress mitigation and recommendations for dealing with critical situations?	- Aggregated anonymously for general strategies, such as how to reduce workloads, prevent stress peaks, and improve employee well-being. - Increase in worked hours Failure to comply with regular shifts and increase in night shifts Overtime hours Failure to take or withdraw vacation

		- Weekly reports. - Reports on the platform using graphs and KPI trends, weekly or monthly reports via email, and notifications if there are critical cases.
	3. How should the platform suggest interventions or strategies to Giulia for dealing with critical situations in the work environment?	- Analysis of critical issues and sharing of objectives. - Notifications for exceeding critical thresholds, - Recommendations on the platform regarding actions to take based on available data, - Redistribution of work hours/shifts. - Only for shift planning, - Optimizing workforce management. - Data analysis to facilitate the identification of critical issues.
Andrea is feeling stressed and wants to access the online courses and virtual reality videos offered by the platform. These resources are designed to support self-regulation, improve job crafting and work skills, and reduce stress.	1. How would Andrea like to interact with the platform to navigate its content?	- Ability to select filters - Receive suggestions based on user characteristics. - Virtual assistant. The challenge is understanding when and in what context to use it. - Use of virtual reality. - PC, keyboard.
	2. How does Andrea prefer the contents on the platform to be presented?	- Icons, - Tree lists. - Personalized experience based on Andrea's needs.

6. The International co-design event

The international co-design event has been organized by CNR and involved international stakeholders. The event took place on 11 March 2025, it was carried out online via the Teams platform, and lasted two hours. The event was attended by nine stakeholders, five male and four female.

In particular, the following stakeholders participated in the online event:

- two hospital-based doctors,
- one hospital manager,
- one student,
- five others (with expertise in medical informatics and health sector organization)

Among the attendees was a representative from Region Zealand, a partner in the KEEPCARING project.

The event was moderated by three moderators, two researchers from CNR and one from EFN, who led the discussion.

The international event followed the same format as the national event. It was organized by CNR, which began by presenting the project objectives, the platform, and the structure of the event to the participating stakeholders. After this introduction, stakeholders had the opportunity to introduce themselves. Each scenario was then read and explained, with questions presented one at a time. To gather responses, the SLIDO tool was used, allowing stakeholders to submit their answers through a provided link or QR code, accessible on both smartphones and PCs. Participants were given five minutes to respond to each question and request any necessary clarifications. Once the time was up, the answers were displayed on the screen, and the moderators facilitated a discussion, encouraging stakeholders to elaborate on their responses, exchange viewpoints, and contribute ideas and suggestions for shaping the services and functionalities of the KEEPCARING CMP. The table below shows the scenarios, the questions for each scenario and the answers provided by all stakeholders for each question.

Table 4: International KEEPCARING CMP co-design event: scenarios, questions and participants' answers

SCENARIO	QUESTION	ANSWERS
Anna is a 46-year-old nurse working in the surgical field. She works 40 hours a week, often enduring heavy shifts and managing a high workload. Married with three children, she also takes care of her mother-in-law. After work, Anna frequently feels stressed, which leads to a lack of sleep. However, she feels supported by both her manager and her team.	1. What relevant information should Anna input to the CMP to allow the CMP to identify potential stress and/or burnout situations?	- Stress triggers work - Basic demographics (e.g., age, right, gender) - The type of hospital she's working in (e.g., multi-speciality hospital, super-specialty hospital, a clinic) - Stress triggers - Current emotional state (e.g., anxious, overwhelmed, or exhausted) - A free text box where she can describe how she is feeling - Daily Routine - Lifestyle - Ideal day at work - Worst day at work - Preferred Coping Strategies used at the workplace when she is stressed - What kind of help does she expect from the CMP (e.g., mediation guide, task management tool) - Workload - A familiar situation that itself is a source of stress. - She could also mention how she gets to work, emphasizing possible discomfort in commuting. - Stress situation - Work situation - Personal background - General situation for the work in the unit - Background for the job - Life expectation - Sleep deprived
	2. How should Anna be notified about her stress and/or burnout situation detection?	- Morning Message (e.g. sleep-deprived) - Emotion-Based Alerts: Exhausted need a plan

		- Smart Break Reminders: working long HR Overload Warning: Burnout Prediction SOS Mode - Using an interaction chat - If you could give feedback at stress level, it is an interesting tool to use. - Interviews and psychological support - A personal message on the smartphone is probably the best way to receive a notification - Suggestion to contact a therapist
	3. What interaction modalities allow Anna to enter information on the platform and receive feedback to make the platform usable in a work context?	- Voice input is probably the most practical and easiest way of interacting - Seamless interaction with workflow Input: - Calendar & Task Syncing; - Voice Commands - Facial Analysis - Wearable & Sensor Integration Output: - Dashboard with Analytics Inclusive of all Platform - Email Summaries - Anna needs to have confidence in the tool. and Anna should decide whether the information will be used or not. - Multimodal according to the different contexts (e.g., visual or sketch interaction according to the contents) - Multimodal interaction using voice or gesture according to the different situations
	4. How can Anna feel safe and confident when putting her information on the platform?	- Control, transparency, and security. The platform should feel like a personal well-being assistant, not a monitoring tool. But balancing personal privacy with workplace insights. - Trust in the platform is essential

		- The leadership is central here. Trust is the key. - Sensors and sensory detectors of moods. - Anonymisation and an independent body that checks for it is crucial.
Giulia is a 50-year-old woman and a hospital manager responsible for overseeing a multidisciplinary team of doctors and nurses. She is in charge of scheduling the team's shifts and requires tools to monitor their well-being. This will help her understand the necessary interventions to implement promptly.	1. What types of information should the CMP provide to Giulia for the implementation of appropriate interventions?	- The internal policies - Giulia should have full admission data from the tool. - Detection threshold parameters
	2. How should Giulia receive advice on solutions or strategies for stress mitigation and recommendations for dealing with critical situations?	- A dashboard based on priority: low, moderate & high. Also, the quick or term solutions - Giulia could use the guidelines in the organization. And react with good manners. - In direct private form or teleconsultation by experts in the field - Private messages on the smartphone
	3. How should the platform suggest interventions or strategies to Giulia for dealing with critical situations in the work environment?	- Collecting different situations interventions in a history collection - Real-Time Alerts & - Proactive Interventions - Critical Stress Alerts Data - Driven Workload Adjustments Team Morale - Peer Support Recommendations - Recognition &Motivation Long-Term Culture Change Suggestions - This depends on the organization and the context of the unit. It is complicated. - Detailing risk factors and how to prevent them
Andrea is feeling stressed and wants to access the online courses and virtual reality videos offered by the platform. These resources are designed	1. How would Andrea like to interact with the platform to navigate its content?	- Voice command: based on command an option of reading video and language so on Fetch with calendar or workplan Also, the app should be personalized using AI and ML, minimal input should be required - It is essential to design a multimodal ergonomic interface

to support self-regulation, improve work skills, and reduce stress.		- Multimodal interaction could be the most flexible and it depends on the kind of contents - Directly, voice commands
	2. How does Andrea prefer the contents on the platform to be presented?	- If lessons are interactive, it should be possible to access the content as in a game theory approach - It could be suggestions, more than advice. Or if advice it could be a talk with a person. - Provide emoji-based content reviews: When a user selects an emoji, the content should visually align with the emotion or theme it represents. - Ensure an aesthetically pleasing design with engaging visuals, a relevant thumbnail, and a concise summary to quickly convey the essence of the content, saving users time. - Video courses or interviews scheduled by experts

7. Results on user requirements

This section examines participants' answers and collaborative discussions during the local and international co-design events. The analysis allowed us to extract valuable insights regarding participants' ideas and opinions on the services and functionalities that the KEEPCARING CMP should offer to users. The analysis of participants' ideas and opinions supports a sustainable, user-friendly, and successful design of the KEEPCARING CMP by translating specific needs, expectations, and desires of participants to the co-design events into user requirements.

To achieve this goal, we have mapped participants' ideas and opinions into functional requirements, usability requirements, and user interface requirements. Before discussing the results, a brief introduction to these requirements' categories is provided.

Functional requirements outline the specific features and functionalities that an application must deliver to meet user needs. They describe the expected behaviours of the application, including inputs, outputs, and interactions (e.g. user authentication, data input and retrieval, reporting capabilities, and integration with external systems). On the other hand, usability requirements emphasize the user experience and the ease with which users can interact with the software system. These requirements include factors such as ease of use, intuitiveness, responsiveness, and accessibility. Usability requirements ensure that the software system is user-friendly, efficient, and aligned with user expectations (e.g. intuitive navigation, clear error messages, a consistent layout and design, and compatibility with various devices and browsers). Finally, user interface requirements focus on the visual design, layout, and presentation of a software system's user interface. These requirements address aesthetic elements, visual hierarchy, and the overall look and feel of the interface. This category of requirements ensures that the system offers an appealing and engaging user experience (e.g. colour schemes, font styles, button placement, and interactive elements such as dropdown menus or drag-and-drop functionality).

Below is the list of user requirements gathered from the ideas and opinions of participants.

Functional requirements

ID	*RF-01*
Title	**User registration and management**
Description	CMP allows the registration and management of users by filling out a personal card with personal information.
Level	Individual and Organizational
Input	User personal data
Output	A new user is created in CMP.

ID	*RF-02*
Title	**Contextual information collection**
Description	CMP must allow the evaluation of the user's stress or burnout state through a process of collecting detailed information useful for classifying the user state. Suggested information to be collected are: ▪ Basic demographics (e.g. age, right, gender) ▪ Type of work ▪ Work commitments ▪ Current emotional state (e.g. anxious, overwhelmed, or exhausted) provided by a free text box ▪ Personal perception of overload ▪ Working hours ▪ Assignment of tasks ▪ Competence ▪ Critical situations that have caused stressful situations ▪ Daily routine ▪ Lifestyle (hours of rest, sleep, smoker or not) ▪ Home-work trip (including parking) ▪ Physiological data measured by wearable devices ▪ Time spent at work ▪ Expected help ▪ Calendar and Task Syncing (with work commitments)
Level	Individual
Input	Specific information provided by the user
Output	CMP processes the provided answers and classifies the user's resilience and stress state considering knowledge of the stress-related factors and risks for burnout studied in WP2.

ID	*RF-03*
Title	**Interoperability with dedicated Apps for wearable devices**
Description	CMP must allow interoperability with dedicated Apps for wearable devices.
Level	Individual
Input	The app that can be connected to wearable device.
Output	App installed and synchronized with the CMP.

ID	*RF-04*
Title	**Parameter detection and alert communication**
Description	Through wearable devices worn by the user, CMP collects parameters to monitor and define the user's status. The suggested parameters to be monitored are: ▪ Sleep duration ▪ Heart rate ▪ Blood pressure ▪ VO2 assessment Considering knowledge about resilience, stress-related factors and risks for burnout studied in WP2, the suggested parameters to be monitored are: ▪ Indicators of stress ▪ Indicator of burnout ▪ Trends in monitored physiological parameters ▪ Sensors and sensory detectors of moods

Level	Individual
Input	Vital parameters from the reading of the wearable device. Also, data from sensors and sensory detectors of moods.
Output	CMP advices the users that, based on the data collected, their stress level has exceeded a safety threshold. The suggested notifications are: ▪ Message displayed on the App installed on the device ▪ SMS or WhatsApp message sent to the user's profile ▪ Predefined messages sent in correspondence with a particular parameter (e.g. sleep deficit) ▪ Morning Message (e.g. sleep-deprived) ▪ Emotion-based Alerts ▪ Suggestion of strategies/exercises for stress reduction (e.g. Smart Break Reminders) ▪ Pre-set alerts on vital parameters such as blood pressure, heart rate, etc. ▪ Suggestion a list of contacts (e.g. therapists)

ID	*RF-05*
Title	**Provision of support content based on the detected stress state**
Description	Based on the detected stress state, CMP should provide the user with support content developed in the KEEPCARING project (e.g. e-course on self-regulation – Task 5.3; VR for deep relaxation- Task 3.2).
Level	Individual
Input	Data related to the user's stress state
Output	The CMP suggests accessing materials for relaxation.

ID	*RF-06*
Title	**Privacy and security of personal data**
Description	The KEEPCARING CMP must guarantee the privacy and security of data. Required functions: ▪ Data anonymization ▪ Encryption ▪ Password authentication ▪ Informed consent ▪ The possibility to accept/reject specific features ▪ The ability to delete entered data
Level	Individual
Input	Personal and professional information of the user.
Output	Protection mechanisms for personal and professional data of the user through the use of data anonymization procedures, encryption, password authentication, informed consent, and the possibility of accepting/ rejecting specific functions, and the possibility of deleting the data entered.

ID	*RF-07*
Title	**Access to the dashboard for monitoring**
Description	CMP must provide access to a general dashboard to monitor the stress indicators and apply strategies and solutions to improve employee well-being. The dashboard should display the following suggested and aggregated information:

	▪ Working hours (e.g., to monitor overtime hours worked, to monitor the ability to take vacations) ▪ Data on absenteeism and illnesses ▪ Data on requests for department changes ▪ Data on requests for medical visits ▪ Percentages of users reporting stressful situations and temporal trends The dashboard should provide reports using graphs and KPI trends
Level	Organizational
Input	Select "View dashboard" command
Output	Display of the monitoring dashboard

ID	*RF-08*
Title	**Visualization of advice on critical situations**
Description	CMP must provide advice to monitor critical situations. The dashboard should display: ▪ Analysis of critical issues ▪ Notifications for exceeding critical thresholds ▪ E-mails summary ▪ Weekly reports
Level	Organizational
Input	Select "View advice" command
Output	Display the advices from the monitoring dashboard of the work team associated with the "manager" user. The dashboard should give priority to advice: low, moderate and high.

ID	*RF-9*
Title	**Suggestion of solutions and strategies for stress and burnout mitigation**
Description	CMP, based on the knowledge of work-related risk factors in WP2 and tested team and organization intervention in WP3-4, provides a list of recommended solutions and strategies for stress mitigation. The CMP give recommendations on strategies and solutions to take based on available data.
Level	Organizational
Input	Activation "Process solutions" command
Output	Display of the solutions and strategies proposed by the CMP

Interface requirements

ID	*RI-01*
Title	**Contents' visualization**
Description	The contents of the CMP have been proposed to be visualized in the following manner: ▪ Icons ▪ Tree lists ▪ Personalized visualization based on user's preferences (using Artificial Intelligence and Machine Learning techniques) ▪ Emoji-based content reviews: when a user selects an emoji, the content should visually align with the emotion or theme it represents

Level	Individual and Organizational
Input	Visualization of the contents commands
Output	Activation of the command for visualizing the CMP contents.

ID	*RI-02*
Title	**Contents' navigation**
Description	The contents of the CMP have been proposed to be navigated in the following manner: ▪ Selection by filters ▪ Suggestions based on user characteristics ▪ Virtual assistant ▪ Virtual reality
Level	Individual and Organizational
Input	Navigation contents commands
Output	Activation of the command for navigating the CMP contents.

ID	*RI-03*
Title	**Voice command activation**
Description	The user can activate the CMP features through voice commands. In addition, the CMP platform should recognize the user's language and customize the information shown.
Level	Individual and Organizational

Input	Voice commands
Output	Activation of the command and customization of the interface language.

ID	*RI-04*
Title	**Ergonomic and multimodal interface design**
Description	Interface of the CMP must be ergonomic and allow the activation of commands in different modes (e.g. touch, speech, visual).
Level	Individual and Organizational
Input	Ergonomic design principles
Output	Ergonomic and multimodal interface

Usability requirements

ID	*RU-01*
Title	**Interface usability**
Description	The communication style of the interface must be easy to understand and simple to use.
Level	Individual and Organizational
Input	Interface design guidelines based on usability principles
Output	Usable interface that uses intuitive graphic elements (e.g. icons). Design should be visually appealing, with engaging visuals, a relevant thumbnail, and a concise summary that quickly conveys the content's essence to save users' time.

8. Conclusions

This deliverable provides an overview of co-design methods used for the collaborative design of applications. The comparative analysis supported the selection of the co-design method implemented within the framework outlined in this deliverable, which was applied during two co-design events: one local and one international. Throughout these events, participants engaged in collaborative discussions regarding the services and functionalities that the KEEPCARING CMP should offer. The exchange of ideas and opinions yielded valuable insights into users' expectations for the CMP and led to well-defined suggestions for user requirements. These user requirements were detailed in this deliverable and categorized into functional, interface, and usability requirements. Additionally, the collaborative discussions during the co-design events highlighted several key aspects that should characterize the KEEPCARING CMP.

In summary, the CMP should provide various content visualizations tailored to the registration level of users. There are two levels of registration available: individual and organizational. Users registered at the individual level will need to input personal and work-related information into the platform. Additionally, the platform should collect physiological data from users' wearable devices. The CMP will then analyze this data to identify critical situations related to stress and burnout, offering alerts and advice to help mitigate these issues. For instance, the CMP might recommend e-courses on self-regulation or virtual reality interventions for deep relaxation. For organizational-level users, the CMP should include a dashboard to monitor stress indicators and implement strategies to enhance employee well-being. It should also identify critical stress and burnout situations, providing guidance to manage these challenges. When the CMP detects a critical situation, it will suggest a range of strategies and solutions, along with forecasts on their potential effectiveness in addressing these issues, for both the individual and the organizational levels.

A key aspect to consider is the accessibility and usability of the CMP. It should be user-friendly, especially for individuals who may be unfamiliar with or lack access to digital tools. The CMP should provide an easy visualization of contents (e.g., icons, personalized visualization based on user's preferences), as well as a guided navigation among CMP contents (e.g., by filters, virtual assistants, suggestions).

Furthermore, the CMP needs to be accessible by offering flexible interaction modalities. Multimodal interactions are important for accessing various content in different contexts, with voice input being identified as the most practical and user-friendly option. Additionally, the CMP should function as a personal well-being assistant rather than as a monitoring tool. This requires ensuring transparency and security in data management to build trust in the platform. Participants emphasized the need for the CMP to suggest proactive interventions while also providing personalized experiences. Another crucial aspect is the CMP's ability to engage users through visually appealing methods, such as elements of game theory. However, the CMP is intended for use primarily after work hours. During the working day, particularly in a surgical context, the use of the CMP should be limited. Interactions during this time should be quick and easy, utilizing methods such as speech or multimodal interaction.

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