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Project Full Title:	Hospital Smart development based on AI

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DELIVERABLE

D1.2 – Stakeholders' Requirements and Analysis Report – First version

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Executive Summary

This deliverable aims to describe the HosmartAI participatory methodology following a user-experience design approach and the initial user requirements. This document documents the hybrid participatory design, agile and lean methodology adopted that will be followed by the pilot and the technical partners to actively engage stakeholders throughout the project lifecycle. It presents an analysis of the pilot sites conditions to support the establishment of the local stakeholders' groups (eight sub-groups, one per pilot site, as the main source for requirements) and planned engagement strategies, describing the methodology for collaborating in the form of sprints for eliciting user requirements.

Furthermore, this deliverable presents the main tools and process for the user requirements elicitation, for analysing, harmonizing and prioritizing primary and secondary users' needs with a patient-centred care delivery perspective.

In order to identify the user requirements and usability issues, a series of steps were followed for the HosmartAI Open Integration Platform (hereafter referred to as 'HosmartAI platform' or 'platform') and for each of the eight pilot use cases defined. The detailed steps will be further explained, however, the identification of the first version of user requirements was accomplished by the creation of user stories, and a desk research for each pilot and for the HosmartAI platform, that included researching previous relevant EU projects, literature on the relevant subjects, internal discussions using the user stories created and real consultations within the co-creation sessions.

The first version of the analysis has identified 73 functional and 56 non-functional user requirements. The first set of requirements presented in this deliverable will be updated after the first contact with end users and other stakeholders and will be frequently subject to reviews throughout the project following the sprint schedule, and with further updating deliverables expected in M11 and the last set of user requirements in M31.

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Definitions, Acronyms and Abbreviations

Acronym/ Abbreviation	Title
DoA	Description of Action
DT	Design Thinking
EC	Ethical Committee
ICT	Information and communications technology
KPI	Key Performance Indicator
MVP	Minimum Viable Product
PC	Project Coordinator
PD	Participatory Design
PU	Public
RDi	Research, development and innovation
WP	Work Package

Term	Definition
Beneficiary	EC term used to designate the legal entity which has signed the Grant Agreement. This term is often substituted by the common language term 'partner'.
Consortium	Group of beneficiaries that have signed the Consortium Agreement and the Grant Agreement (either directly as Coordinator or by accession through Form A).
Consortium Agreement	Contractual document signed by all the beneficiaries (and not the EC), explaining how the Consortium is managed and works together.
Deliverable Leader	Responsible for ensuring that the content of the deliverable meets the required expectations, both from a contractual point of view and in terms of usage within the project. Is also responsible for ensuring that the deliverable follows the deliverable process and is delivered on time.
Description of Action	Annex 1 to the Grant Agreement. It contains information on the work packages, deliverables, milestones, resources and costs of the beneficiaries, as well as a text with a detailed description of the action. The DoA is made of Part A (structured data collected in web forms and workplan tables) and Part B (text document describing the action elements).
Dissemination	EC term for communication of information to a wide audience.
Grant Agreement	Contractual document which defines the contractual scope of the HosmartAI project. It is signed between the EC and the beneficiaries.

1 Introduction

1.1 Project Information

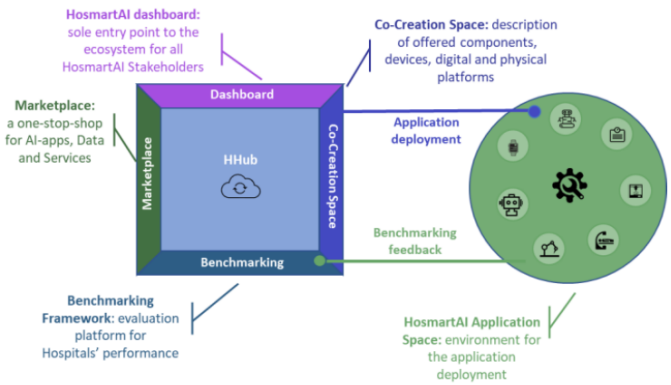
VISION

The HosmartAI vision is a strong, efficient, sustainable and resilient European **Healthcare system** benefiting from the capacities to generate impact of the technology European Stakeholders (SMEs, Research centres, Digital Hubs and Universities).

MISSION

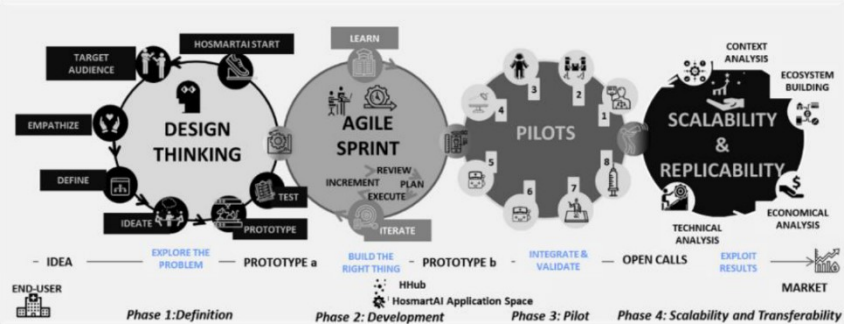
The HosmartAI mission is to guarantee the **integration** of Digital and Robot technologies in new Healthcare environments and the possibility to analyse their benefits by providing an **environment** where digital health care tool providers will be able to design and develop AI solutions as well as a space for the instantiation and deployment of an AI solutions.

HosmartAI will create a common open Integration **Platform** with the necessary tools to facilitate and measure the benefits of integrating digital technologies (robotics and AI) in the healthcare system.



A central **hub** will offer multifaceted lasting functionalities (Marketplace, Co-creation space, Benchmarking) to healthcare stakeholders, combined with a collection of methods, tools and solutions to integrate and deploy AI-enabled solutions. The **Benchmarking** tool will promote the adoption in new settings, while enabling a meeting place for technology providers and end users.

Eight Large-Scale Pilots will implement and evaluate improvements in medical diagnosis, surgical interventions, prevention and treatment of diseases, and support for rehabilitation and long-term care in several Hospitals and care settings. The project will target different **medical** aspects or manifestations such as Cancer (Pilot #1, #2 and #8); Gastrointestinal (GI) disorders (Pilot #1); Cardiovascular diseases (Pilot #1, #4, #5 and #7); Thoracic Disorders (Pilot #5); Neurological diseases (Pilot #3); Elderly Care and Neuropsychological Rehabilitation (Pilot #6); Fetal Growth Restriction (FGR) and Prematurity (Pilot #1).



To ensure a user-centred approach, harmonization in the process (e.g. regarding ethical aspects, standardization, and robustness both from a technical and social and healthcare perspective), the **living lab** methodology will be employed. HosmartAI will identify the appropriate instruments **(KPI)** that measure efficiency without undermining access or quality of care. Liaison and co-operation activities with relevant stakeholders and **open calls** will enable ecosystem building and industrial clustering.

HosmartAI brings together a **consortium** of leading organizations (3 large enterprises, 8 SMEs, 5 hospitals, 4 universities, 2 research centres, and 2 associations – see Table 1) along with several more committed organizations (Letters of Support provided).

Table 1: The HosmartAI consortium

Number[1]	Name	Short name
1 (CO)	INTRASOFT INTERNATIONAL SA	**INTRA**
1.1 (TP)	INTRASOFT INTERNATIONAL SA	**INTRA-LU**
2	PHILIPS MEDICAL SYSTEMS NEDERLAND BV	**PHILIPS**
3	VIMAR SPA	**VIMAR**
4	GREEN COMMUNICATIONS SAS	**GC**
5	TELEMATIC MEDICAL APPLICATIONS EMPORIA KAI ANAPTIXI PROIONTON TILIATRIKIS MONOPROSOPIKI ETAIRIA PERIORISMENIS EYTHINIS	**TMA**
6	ECLEXYS SAGL	**EXYS**
7	F6S NETWORK IRELAND LIMITED	**F6S**
7.1 (TP)	F6S NETWORK LIMITED	**F6S-UK**
8	PHARMECONS EASY ACCESS LTD	**PhE**
9	TERAGLOBUS LATVIA SIA	**TGLV**
10	NINETY ONE GMBH	**91**
11	EIT HEALTH GERMANY GMBH	**EIT**
12	UNIVERZITETNI KLINICNI CENTER MARIBOR	**UKCM**
13	SAN CAMILLO IRCCS SRL	**IRCCS**
14	SERVICIO MADRILENO DE SALUD	**SERMAS**
14.1 (TP)	FUNDACION PARA LA INVESTIGACION BIOMEDICA DEL HOSPITAL UNIVERSIATRIO LA PAZ	**FIBHULP**
15	CENTRE HOSPITALIER UNIVERSITAIRE DE LIEGE	**CHUL**
16	PANEPISTIMIAKO GENIKO NOSOKOMEIO THESSALONIKIS AXEPA	**AHEPA**
17	VRIJE UNIVERSITEIT BRUSSEL	**VUB**
18	ARISTOTELIO PANEPISTIMIO THESSALONIKIS	**AUTH**
19	EIDGENOESSISCHE TECHNISCHE HOCHSCHULE ZUERICH	**ETHZ**
20	UNIVERZA V MARIBORU	**UM**

[1] CO: Coordinator. TP: linked third party.

21	INSTITUTO TECNOLÓGICO DE CASTILLA Y LEON	**ITCL**
22	FUNDACION INTRAS	**INTRAS**
23	ASSOCIATION EUROPEAN FEDERATION FORMEDICAL INFORMATICS	**EFMI**
24	FEDERATION EUROPEENNE DES HOPITAUX ET DES SOINS DE SANTE	**HOPE**

1.2 Purpose, context and scope

The Stakeholders' Requirements and Analysis Report – First Version constitutes the first version of the report on HosmartAI stakeholders' requirements deliverable, led by INTRAS (T1.2 leader), and marked as one of the means to verify the first milestone of the HosmartAI project (MS1): "Identification of HosmartAI, Requirements and User Stories, Initial preparation of the Data Handling Plan, Communication roadmap".

Firstly, the deliverable's scope aims to give a description of the community engagement and how the HosmartAI consortium built a stakeholders' enlistment. Secondly, to give an introduction to the HosmartAI participatory design methodology, an adaptation of the hybrid approach of design thinking, agile, lean start-up methodology, that has been designed and tested in a distributed consortium of the CAPTAIN H2020 project, and will accompany the core phases of the project until M31. And lastly, the deliverable provides the method for the user requirements elicitation process implemented in M5-6, providing the first version of the analysis, identifying the functional and non-functional user requirements for the HosmartAI platform and the eight pilot use cases.

It should be noted that the HosmartAI participatory design methodology is designed in a way of a live methodology, that will continuously be modified according to the revision at the end of each sprint, with the final aim to agile this methodology the most efficient as possible within the project's framework.

Regarding the user requirements elicitation and their corresponding first analysis, the first collection was based on a familiarization exercise with the methodology's criteria, so that pilot and platform leaders could proceed with the sprints and the user requirements adaptation autonomously. In the future, the prioritization at a high level carried out in the present deliverable will be further reported and analysed by partners.

1.3 Structure of the document

As explained above, this deliverable aims to present the HosmartAI participatory methodology, the systematic approach for user requirements elicitation and analysis, and present the first version of the user requirements. For this, the present deliverable is structured in 8 chapters:

- Chapter 1 gives an introduction to the overall HosmartAI project and the structure of the present document.
- Chapter 2 comprehends the analysis of the stakeholders that should be included in the Project and the most efficient procedure to engage these stakeholders.

- Chapter 3 describes the hybrid methodology which HosmartAI will follow.
- Chapter 4 presents the methodology adapted to the HosmartAI project. Which includes the sprints planning and the sprints sub-phases.
- Chapter 5 describes the plan defined by the HosmartAI team to implement the sprints, each sprint focus and timeline, and a more detailed overview of the first sprint implementation, tool kit and guidelines (seeing that the following sprints will depend on this first one).
- Chapter 6 presents the first version of the user requirements for the HosmartAI platform and its 8 pilots with an initial analysis of these user requirements.
- Chapter 7 provides a summary of the present document with the major conclusions for the stakeholders' requirements and analysis report.
- Chapter 8 lists the references used to compose this deliverable and the literature used within the desk research.

2 Stakeholders' community engagement: strategy as a core element for the HosmartAI design methodology

Stakeholders will be involved at two areas: at pilot level and at HosmartAI Artificial Intelligence platform level. Co-creation will be used for both. The selection of two levels comes from the inclusion of stakeholders directly associated with the HosmartAI developments and solutions. The "WP6 – Dissemination, Communication and Ecosystem Building" and "WP7 – Business Case Development, Marketing and Exploitation Activities" of the HosmartAI project will explore the stakeholders' groups more in-depth, with this analysis providing a first identification of the stakeholders.

An analysis of the pilot sites' conditions will support the establishment of the local stakeholders' groups and the setup of appropriate engagement strategies.

For this analysis, two consultations were requested from HosmartAI pilot and platform leaders, an initial questionnaire (consult Appendix B) and a workshop during the consortium meeting on 30th June 2021 (consult Appendix A). **The first consultation, initial questionnaire or initial feedback questionnaire, consisted of a phase where the objective was to have a first understanding and gather a general idea of stakeholders' preferences** for technical, pilot and business partners, their backgrounds on the methodology adopted by HosmartAI, the barriers foreseen, the mitigation strategies, etc. This consultation was extracted according to a common analysis, general information, without getting into specifics in each pilot.

The second consultation consisted of a workshop that was carried out during the consortium general meeting on 31st June 2021. This workshop served as a focus group to discuss the major subjects within the stakeholders' community engagement, and from it, the responsible partners (EIT and HOPE) were able to further explore and concrete the preferences from each pilot and platform. The workshop was a specific tool (the last tool to be applied) for the stakeholder community engagement analysis and consisted of only three questions: Could you select which kind of those will be the most important to help you in the co-creation? Could you identify the main barriers to involve those stakeholders in the co-creation throughout all HosmartAI? Do you already know if those stakeholders are well connected to their representation at the EU level?

In outline, the first consultation identified a list of six groups of stakeholders: information technology (IT), clinicians, healthcare professionals, hospital management, technology providers and policy makers. The second consultation enabled additional analysis to prioritize on the platform and in each pilot the stakeholders that are most important and relevant for co-creation. The analysis of these contributions provided the following list: healthcare professionals, hospital/facility administration, IT professionals at the facility, patients, technology providers, researchers, decision makers, patient associations. These two consultations will be further explained in this chapter.

2.1 Value co-creation: benefits and challenges

Nowadays, the core position of co-creation (integrating co-design and co-production) as a strategy for social and health innovation is unquestionable. It can be very rewarding by giving the public a more direct say in shaping the projects and the delivery of innovations designed "with" and "by" the people, rather than simply on their behalf. Still, it is highly challenging and, due to different limitations, barely implemented in the RDi cycles.

There are many expected benefits of involving users in a participatory process, including low-cost innovation and 'unique and personalized' users' experiences leading to user acceptance, improved user relationship management, productivity and efficiency gains. On the other hand, there are also many limitations that hamper or block its implementation. To name a few: i. initiatives and projects are not dedicating enough efforts to assess the direct and indirect impact or transferring such results to a wider public, being required more evidence on cost-benefit analysis of co-creation strategies; ii. there is still a practice of "tokenism" that takes political or commercial advantage of the power of such concepts but does not implement them accurately, limiting the participatory involvement to only perfunctory or symbolic effort to be inclusive. **Therefore, systematizing the introduction of a user-centred design culture is a challenge that requires a continuous and evolving effort to ensure that value is created ensuring users' long-term engagement**.

In the healthcare field, the concept of the method of co-creation is based first of all on acknowledging a silo culture and then difficulties to work across silos. From that, co-creation has a built-in provision to sort immanent conflicts of interests and opinions up front. It does so by having the participants in the process learn each other's perspectives in the course of the development of innovation.

Co-creation and experience co-creation in healthcare, start from the idea that efficient health care processes can be realized:

- through multidisciplinary collaboration;
- with participants' commitment and involvement in a self-management way;
- in the context of an ecosystem of support and information online;
- based upon (mobile) instruments/devices registering and storing data about the patient;
- directly relating (selected) protagonists in healthcare to the patient and to each other;
- such that arrangements of collaboration, interaction and medical social and psychological interventions are enabled to be executed in consent, in an efficient and timely way,
- with the conviction that innovation of healthcare can only be created in a sustainable way, which implies that these ways of arranging healthcare processes are monitored, evaluated and continuously adapted to new insights from interdisciplinary research.

For several pilots, the stakeholders' groups will include patients and/or informal carers. Those stakeholders will need a specific consideration going beyond the usual concept of

empowerment. For these groups, it also involves co-designing and co-producing innovative services with and for them, in a true win-win relationship (patients and carers) benefit from better personalized care and the HosmartAI partners from their lived experience and continuous feedback that allow the innovative solutions to be better accepted and tailored to users' needs.

In this sense, RDi projects are already developing solutions in a smarter, leaner way by validating concepts with potential users before embarking on the full development of a prototype. Without the insights gained through the lived experiences of patients, informal carers, policy makers and professionals, etc., the RDi processes for improving health and wellbeing services run the risk of developing costly services and products that do not meet the needs of those who will be using them. It is also understandable that the best ideas come from involved people and engagement and one-off consultations are not enough. Real and continuous involvement has to be part of everyday practice, at all levels, requiring investment to enable people representing the target groups of the RDi projects and policy investments, to have a seat at the table, speak about what matters to them and help professionals develop relevant services that meet their needs.

These discussed limitations and requirements grounded the need for defining a mixed framework based on best practices in the implementation of participatory approaches and co-creation processes.

2.2 Stakeholders' enlistment

The present section enlists the stakeholders' groups at the pilot and platform level that were gathered from the partners' inputs on the initial questionnaire (consult Appendix B) and during the consortium meeting on 30th June 2021 (consult Appendix A).

2.2.1 Building the stakeholders' groups at pilot level

Each of the 8 pilots will constitute a stakeholders' group made up of individuals representing each of the categories of stakeholders identified by pilot leaders, relevant to the innovation to be built.

For the constitution of the 8 stakeholders' groups, that represents the first step in the process, it is crucial to count on the personal feedback, experiences, and expectations of each of the potential participants.

The enlistment of stakeholders at the pilot level is done per pilot case. Within the initial questionnaire, pilot partners identified the stakeholders they consider relevant. After this consultation (consult Appendix B), during the consortium meeting workshop on 30th June 2021 additional analysis was made to prioritize in each pilot the stakeholders that are most important and relevant for co-creation (consult Table 2). The result from this dynamic can be consulted in Appendix A. This analysis identified the following stakeholder groups to address on the pilot level:

Table 2: Stakeholder groups identified for co-creation processes per pilot

Category	P1	P2	P3	P4	P5	P6	P7	P8	Plattform
Health Care Professionals	yes	yes	yes	yes	yes	yes	yes		
Hospital/facility administration	yes	yes		yes	yes	yes			
IT professionals at facility		yes	yes			yes		yes	yes
Patients		yes			yes	yes			
Technology providers				yes	yes				yes
Researchers					yes			yes	
Decision makers					yes				
Patient Associations					yes				

Cross-checking the individual groups, it becomes evident that several stakeholder groups are important for several pilots. This is true especially for the groups:

- Healthcare Professionals (including physicians as well as care staff)
- Hospital/ Facility administration
- IT Professionals at the respective facilities
- Patients
- Service and technology providers (MedTech companies, pharma companies)

The replies confirm the results of the initial questionnaire (consult Appendix B) that by and large identified as important the same stakeholder groups, with the addition of the stakeholder group of policy makers. Taken together (see Figure 1), the image that emerges from the pilots is that Healthcare Professionals (HCP) are at the centre of attention, with Hospital administration, policy makers, and IT staff following. Technology providers and patients also play an important role for most pilots. Individual pilots additionally replied with stakeholders such as patient associations and researchers as well as project internally work package partners and leaders.

Each pilot requires an individual group of stakeholders in order to succeed within their individual mission. The insight that some stakeholder groups are shared in importance among the pilots is good news for efficiency gains. On the foundation of these results, HosmartAI can develop strategies for the shared stakeholder groups and exchange learnings throughout the course of the project.

The decision-maker groups (policy makers and hospital administration) alongside the technology providers are stakeholders whose engagement will feed directly back into T7.2. (Business modelling and market access strategy). Furthermore, technology providers are the key stakeholders for T1.3 (Technical requirements).

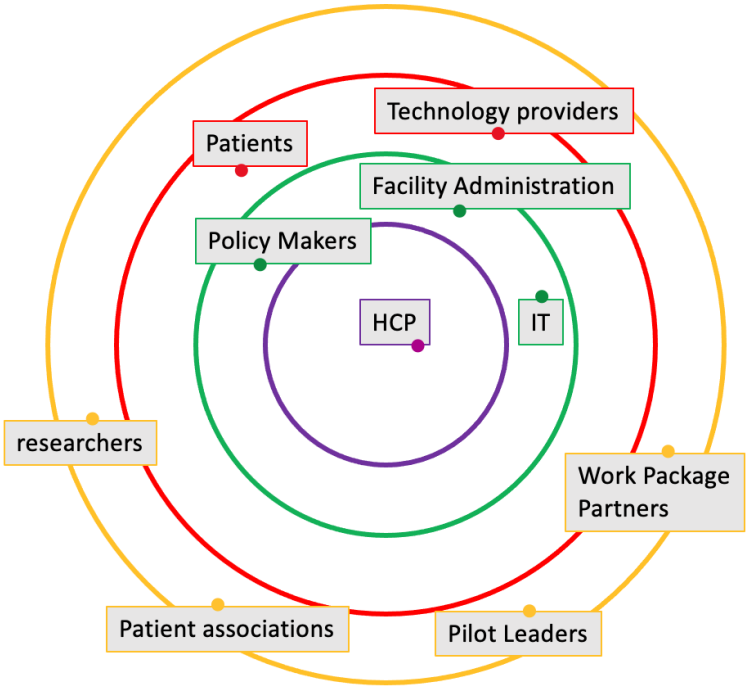


Figure 1: Attention mapping of stakeholders across all pilot stakeholder groups

2.2.2 Building the stakeholders' group at AI platform level

The DoA defined relevant stakeholders at HosmartAI Artificial Intelligence platform level. EIT will focus on engaging technology, business, and innovation stakeholders. HOPE will focus on organisations representing at European level patients, professionals, providers, policy makers, and payers.

The enlistment of stakeholders at this level will also build on the type of stakeholders identified at the pilot level. HOPE and EIT will then identify with the help of those stakeholders the relevant European stakeholders connected to them.

The links with those European stakeholders, with the help of HOPE and EIT, will be created by the pilot level stakeholders, with the purpose first to inform them about the project, then to involve them and finally to communicate with them the results of the project to ensure a dissemination beyond the area covered by the pilots. As turned out in the aforementioned workshop on 30th June 2021, half of the pilots (4) already have some connections to European stakeholders. The other four pilots cannot provide such connections at this point. This connection will be further explored as explained in the previous subsection.

Concerning patient's representation at the European level, HOPE will approach in particular the European Patient Forum, the European umbrella organisation, which has been working on patient empowerment and developed an expertise in patients' participation in European projects.

2.3 Community Building and engagement

This section takes a closer look at the mechanisms of community building and engagement of the identified stakeholders. It explores interests and barriers of commitment and engagement, but also of disengagement and exit. Based on the findings from the initial questionnaire and the workshop carried out on 30th June 2021, engagement strategies and interaction mechanisms are discussed, including cases of stakeholders dropping out, to provide the project and partners with the understanding of a tool set necessary to achieve the project's ultimate results.

2.3.1 Motivation and incentives for active and long-term involvement

On the basis of the experience acquired from previous projects, several elements of motivation and incentives have been identified from the initial questionnaire consultation. Those motivation and incentives are sometimes specific to some kind of stakeholders. They will then be used when relevant:

- To feel useful in the development of a system that can improve their peers' quality of life;
- To be in touch with health care professionals;
- To be in touch with patients and carers;
- To increase social connection and peer support;
- To try new experiences, i.e., the use and knowledge of new technologies;
- To increase confidence in daily activities and reduce the need for assistance;
- To increase the sense of safety, improve quality of their life, and maintain physical and cognitive health;
- Event to provide official recognition for the active involvement in the co-creation activities;
- Rewards from their participation: socialize, share knowledge and experiences;
- Meet with peers to socialize;
- Actively involve and provide their opinions on the matter;
- Interact and use resources, they would not have access to without any costs (for caregivers);
- Get constant feedback about changes and improvements introduced in the technology.

2.3.2 Barriers to participate and mitigation measures

On the basis of experience of previous projects several barriers have been identified from the initial questionnaire:

- Lack of time;
- Social or cultural issues;
- Relative concerns or social prejudices against activities targeting vulnerable populations;
- Feelings of non-competence;
- Lack of feedback;

- Medical issues or increased caregiving responsibilities;
- Denial of participation, i.e., due to saturation;
- Loss of interest;
- Privacy and data protection;
- Inadequate competency with technology skills required.

On a workshop at the consortium meeting on 30th June 2021, an analysis was made by each pilot to identify the barriers relevant for their respective pilot (see Table 3). These are the results:

Table 3: Perceived barriers to Co-creation processes with stakeholders

mentions	Category	P1	P2	P3	P4	P5	P6	P7	P8	Platform
5	HCP workload	yes	yes		yes			yes		yes
5	inherent conflicts of interest		yes		yes	yes			yes	yes
4	accessability for participants	yes		yes		yes	yes			
3	lack of motivation		yes	yes			yes			
3	privacy issues			yes	yes	yes				
3	technical interoperability					yes			yes	yes
2	limited resources	yes			yes					
2	lack of understanding		yes							yes
2	complexity of project			yes						yes
1	geographical distance			yes						
1	language barriers			yes						
1	quality of results					yes				
1	integration &acceptance					yes				
1	standardization					yes				
1	other technical issues									yes

The results must be regarded with some precaution. The discussion among partners at the workshop disclosed that some pilots had paid much more attention to the thought of potential barriers. However, some partners have more experience in implementing projects in facilities, thus being able to provide deeper insights into the process.

Nevertheless, across all projects, a very similar expectation of barriers exists. The most important topic that was discussed was the anticipated high workload of healthcare professionals and lack of resources that is expected to be a risk in implementing the pilots. Interestingly, this fear is shared across the several European countries the pilots are set in.

Another barrier not to be underestimated is the expectation that conflicts of interest may arise. As the foundation of the pilots are new solutions of AI and robotics, fears of job cuts may arise, social and psychological reservations might hit the implementation of the pilots. Hospital administration may find themselves in a situation between cost-effectiveness and human employment. Other conflicts may be that pilots pose a threat to existing suppliers. Very particular for pilot 8 is the case of harmonizing research frameworks with external researchers.

Half of the pilots fear that co-creation is not easily accessible enough for co-creators. Especially digital literacy is mentioned to become a potential challenge to co-creation.

On a more technical side, pilots expect interoperability issues and privacy issues to pose risks to the co-creation processes. While they are important to solve, overall, the main challenges seem to be social challenges and resource challenges.

Mitigations measures have been identified that will inform the strategies:

- Adapting methodology to facilitate participation in equal conditions;
- Keep participants informed, updated and aware that their contribution is essential for the project;
- Introduce new technology features frequently to fight boredom;
- Recruit a large enough number of stakeholders to account for possible dropouts;
- Resolve concerns of relatives since the beginning;
- Introduce flexibility with respect to the timetables;
- Emotional management through sensible working methods;
- Focus on what people can do and their strengths (Appreciative theory);
- Ensure that as little of their time as possible is taken while maximizing their input;
- Flexible management mechanisms, such as online, individual interviews, respond to videoed clips of prototype devices, etc.

2.3.3 Continuous engagement strategies

As the different stakeholders' groups will play an important role as co-creators, it will be up to them by essence to finally decide on the strategies proposed to them. The collection of this information was enabled by the initial questionnaire (consult Appendix B).

The strategies for each pilot should at least include tasks such as:

- Communication and interaction with primary end users, coordination of the inter-professional team;
- Facilitating end user sessions and deal with day to day needs of the pilots;
- Promotion of awareness and dissemination of the results of the project.

The above roles and tasks are part of the activities that are undertaken by the pilot partners, whereas for the activities below, a distribution of tasks may be organized among the stakeholders:

- Contact points that provide advice to stakeholders, usually scientific or medical personnel may help to build initial trust between pilot partners and the stakeholders;
- Contact point for a group of participants could be one of the primary end users (acting as ambassador);
- Sharing responsibilities and peer support may foster long-term commitment.

Apart from what partners can contribute based on professional experience, **there will be at least one information event for each of the 8 pilots stakeholders' groups**.

The information gathered during those events will inform the methodology and specifically it will facilitate a proper orientation and definition of particular involvement conditions and participatory "hooks" of the people to the entire process of "participatory design" in a way they feel comfortable, confident, pleased and stay with a thinking that this is worthwhile (essential to maintain high levels of participation).

The participation of stakeholders in the information event for stakeholders' groups should not require proper ethical approvals, since no data are collected and is aimed at presenting the HosmartAI project to the stakeholders and favouring participants' engagement. Local EC could be informed/consulted on the constitution of those stakeholders' communities, their purpose, activities and resources, as well as the guiding methodologies used to conduct or moderate the sessions.

The strategy at HosmartAI Artificial Intelligence platform level will be built on the overall communication and dissemination strategy. As for the pilots, there will be one first information event.

2.3.4 Interaction mechanisms and organization

One important factor that has been identified by partners in the initial questionnaire (consult Appendix B), which could affect the active involvement of stakeholders both at pilot and platform levels is the frequency and duration of meetings and participation in group-based or individual-based activities. An initial planning will be performed and detailed information about the frequency and the duration of meetings will be determined as part of co-creation. A trade-off between sparse meetings and intense periods should be kept in mind when setting the dates for sessions. With respect to the duration of the sessions, a maximum time period of 1.5 hours or 2 hours is suggested. But this depends on the type of interaction that is designed for each session.

An interaction session with technology should not last for too long, because it will cause mental fatigue to the participants. However, a design thinking session could last more time probably, since participants will express ideas and their opinions in a more relaxing atmosphere.

With respect to the formation of group activities versus more person-centred sessions, it seems that the participatory/group activities are the ones to suggest the most appropriate type of participation. Group-based activities may involve the needs definition of end users, feedback focus groups, whereas personal sessions may include the interaction of patients/carers with the technology per se or the provision of feedback in the form of a personal interview. Therefore, the decision relies on the scope of each pilot and of course on the desires of stakeholders.

2.3.5 Exit strategy plan during the participatory activities

During the co-creation activities in the different sprints it is expected that, for different reasons, members of the stakeholders' groups will drop out. Actions have been identified to ensure that stakeholders stay engaged within the activities which will continue beyond the end of the project.

The actions that the consortium will carry out to avoid the cases of early dropout were gathered from the initial questionnaire and are listed hereafter:

- Evaluation of possible dropout percentage;

- Inclusion of a contingency number of participants from the beginning – it is recommended that pilot partners will include <25% than the final agreed number of participants;
- Informative material about obligations and rights of leaving the stakeholders' group;
- In the case of drop out, it is provided a questionnaire to understand the reasons and how to optimize the participants' engagement;
- Inform participants about the exact period and the end date of the participatory engagement;
- Ensure that participants are aware of the ending strategy and to prepare them for transition and closure;
- A social farewell thank-you and gathering;
- An open invitation to participants for further dialogue, if desired;
- Certificate of attendance.

2.4 Considerations for the participants of the stakeholders' groups as co-researchers in the co-creation activities

Within co-creation activities, it is good practice to apply participatory research methods. These methods aim to conduct the planning and research process collaborating with people whose environment and meaningful actions are under study [REF-01], in other words, the end users.

This consultation has a clear objective: to develop solutions that are both scientific and practical to the end user, to the benefit of both parties. Starting to actively involve participants in the research can provide detailed insider knowledge and insights from individuals who lived these experiences [REF-02], enabling the critical thinking and actively question of the situation and strategies of a given state [REF-01].

In accordance with the research and good practices within the co-research activities, a high responsibility must be complied – ensure that no harm or disadvantage befalls to the participants in the process when giving them the command of this research [REF-02].

Having this good practice of co-research into consideration, it is established that within co-creation activities, each partner performs this ownership according to each entity.

3 The Hybrid Methodology of HosmartAI: design thinking, lean and agile/scrum

3.1 The HosmartAI Participatory Design Process

Participatory Design (PD) is considered as one of the most important requirements of good and effective design as it relies on the active involvement of the stakeholders in the design process. In PD the stakeholders become participants and co-designers in the design process and not just passive receivers of the developments' outcome. This kind of participation is the main differentiation of PD from the other traditional methodologies such as user-centred design, although the term participation has a different meaning from project to project and from study to study [REF-03].

3.1.1 The focus of requirements elicitation

Within this project, the user requirements elicitation will be elicited by focusing on the digital innovation that HosmartAI wants to achieve. As further explained, the HosmartAI project aims to build a major solution (within the five clinical domains) that is more efficient and accepted by the users.

3.1.2 A vehicle for requirements elicitation

The methodology presented in this document aims to describe the tools that will work as a vehicle for collecting, analysing and transferring to interested partners (technical partners, business development partners, etc.) user requirements from a wider pool of stakeholders.

The requirements will be gathered in an agile, iterative way and the methodology is designed to be flexible enough so that different tools can be tested in different stages, but also well-defined so that every part involved knows what to expect and when.

The first implementation of this methodology was designed and piloted in the CAPTAIN H2020 project. Based on an empirical methodology, lessons learnt and best practices from CAPTAIN have been taken into consideration by HosmartAI for properly adopting to the needs of large consortia working remotely for about 3-4 years.

As a vehicle for requirements elicitation, the methodology is designed to support any type of requirements, such as technical, business development and exploitation, etc. **For the scope of this deliverable, only the technical requirements are considered**. Typically, the requirements for a technological product can be divided into functional and non-functional requirements. A definition of a functional requirement is "Any requirement that specifies **WHAT** the system should do", while the non-functional requirements are defined as "Any requirement that specify **HOW** the system performs a certain function".

3.1.3 Methodology overview

Although there will be development of technology for the 8 individual pilot sites, the methodology presented in this deliverable will focus on the HosmartAI system as a whole rather than dealing with all the developments on a pilot site level. To this end, the

methodology will set the timeframe and expected output for the independent technologies but the primary goal will be to frame the delivery of the HosmartAI system to its stakeholders.

3.2 Agile Methodology

The participatory design of HosmartAI is a **hybrid approach leveraging on concepts from Design Thinking, Lean Startup approach, and SCRUM agile framework**. This hybrid approach will be applied in Chapter 4.

3.2.1 Benefits of Participatory Design in HosmartAI

The **Design Thinking** (DT) part of the methodology, that will be further explained below, will allow unmet needs to be identified and transformed to value propositions. **Lean** approach will enable delivering a partially functional prototype frequently enough to the stakeholders in order to collect feedback, validate the set assumptions and readjust. Finally, the use of **SCRUM** will help organising work across the partners of the consortium to collaborate towards delivering high value. This hybrid approach will facilitate HosmartAI to solve effectively and with high flexibility the complex project's developments required to achieve its goals.

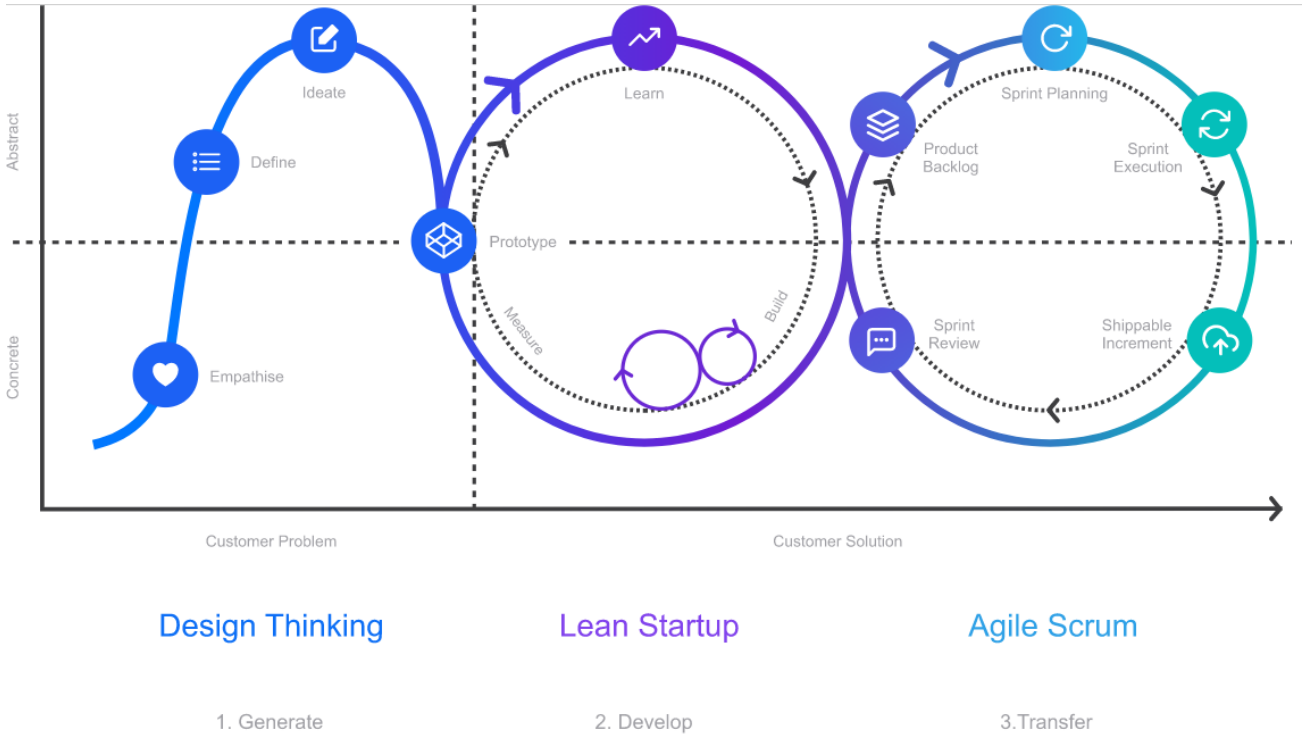


Figure 2: Hybrid methodology

Phase I of the project can be linked with Design Thinking Methodology. It can be split into different sessions, some including the "design team", meaning consortium partners, and in others involve also some stakeholders. Strong focus should be paid on WP4 (HosmartAI Platform Integration, Deployment and Validation) as it is a new platform.

Phase II and III are cyclic processes that can follow the Lean Startup and Agile methodology.

During the CAPTAIN H2020 project, where the hybrid methodology was first applied, some insights were gained that should become lessons learned for improvement in HosmartAI. Even though the Design Thinking step can be a distinctive, linear one, the other two steps are cyclic processes that do not happen consecutively. They are more methodological guidelines for how the team should work to achieve optimal outcomes rather than distinctive steps.

Even though this methodology is highly applicable in companies, a European consortium has some particularities that create challenges. A European consortium is a team consisting of different smaller teams (the partners) that have different ways of working and different speeds. In the CAPTAIN project, the face-to-face meetings and working groups helped to align the work that is done and create a sense of coherence among the team.

Furthermore, it is not usual in a European project to change deliveries and events that have been scheduled. This was also a challenging part of the CAPTAIN project. Each change introduced was thoroughly discussed among the partners and had to align with the stakeholders' view. This was difficult to achieve and effort was paid in the internal management and communication of the consortium in order to ensure clarity and trust.

Design Thinking (DT) is a 5-step method – Empathize, Define, Ideate, Prototype, Test – that helps a designing team to come up with practical, meaningful and creative ideas that solve real issues for a particular group of people. The process developed helped to solve problems with innovative new solutions, investigating both known and ambiguous aspects of an existing problem.

In the following diagram it becomes clear how a co-creation process with users can be done accompanying all stages of a project and considering different methods in each phase.

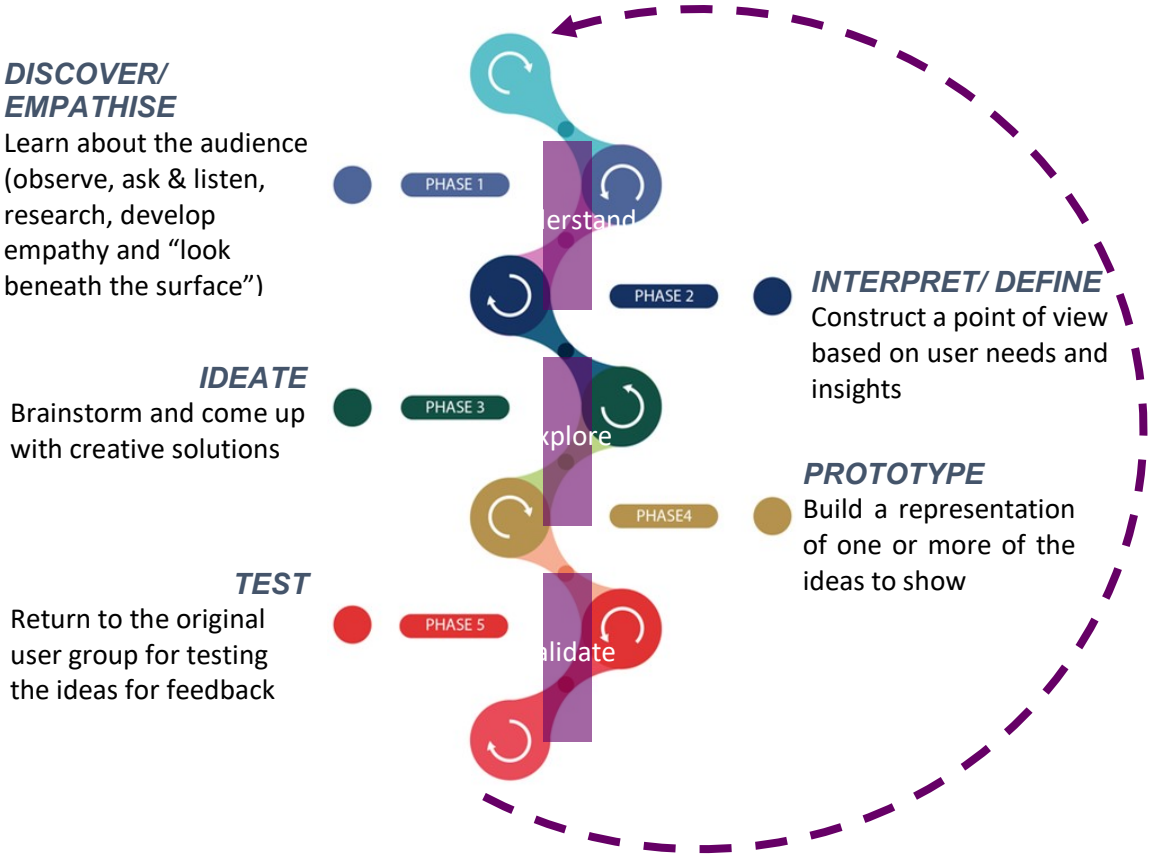


Figure 3: 5 steps of the design thinking process

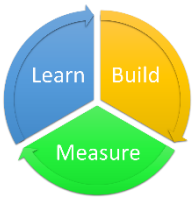
The DT represents a creative and systemic thinking solution that aims to go beyond the ones developed by conventional analytical methods. This method is a way that designers can use to think in a structured way, so that people non-experts in design can use its creative tools with the purpose of solving their needs [REF-04].

This approach has as main goal to challenge the way innovation happens in the social and health sector. Taking into consideration the needs and the perspective of the person/patient at the beginning of a design and development process, opportunities are built so that these perspectives can lead the process of creating ideas, influencing the decision making in a process of co-creation.

The Lean Startup, included in this hybrid approach, represents the via to continuously test the project's vision. This mean will enable that the development of the HosmartAI solution will be carried out within a process/methodology.

The main component of this approach is to provide a **build-measure-learn feedback loop**. Starting with identifying and understanding the problem to be addressed, developing an MVP,

using the DT approach. The consortium begins to **learn** once the MVP is ready and demonstrated to the end users, in order to work on it for optimizing the solution. Then, the consortium can produce knowledge by **measuring** and **learning** from testing and evaluating the needed components. For this learning to be efficiently achieved, actionable metrics are defined and included to demonstrate cause and effect.



Like this, the consortium can explore and work on the optimized solution to **build** a solution that is accepted and wanted by end users. To achieve this point, the HosmartAI consortium will constantly adapt their plans.

3.2.2 Scrum frameworks and Scrum events

The definition of the scrum frameworks and events comes from the technical partners' decision required (happening on the T1.3 and follow with WP2, WP3, and WP4) on how to:

i. Create product(s) backlog(s) – due to the number of different solutions how and who will be the technical partners main responsible for this for each solution.
ii. Prioritize and refine based on value and implementation risk.

3.2.2.1.1 Product backlog

The Product Backlog is a prioritized list of all the things that need to be done for the HosmartAI system. Requirements never stop changing and consequently the Product Backlog is a living artefact that exists as long as the product exists.

The list for the HosmartAI project will be: Product Backlog, Sprint Backlog, in progress, to be tested, in testing, Done. The refined requirements will be placed in the right order in the HosmartAI backlog board of Microsoft Teams by the technical manager after discussion with the team.

3.2.2.1.2 Prioritization and refinement based on value and implementation risk

The input of the HosmartAI stakeholder community has been gathered and the process of prioritization takes place in order to be placed into the product backlog.

The prioritization is done based on the multiplication of the two values and the requirements are placed on the Product Backlog.

3.2.3 Sprint

The sprint phases are marked by the definition of the technical specification for the technical components to be developed and tested in the sprint that is being carried out. This definition is made and communicated by the technical partners.

Weekly SCRUM

'Weekly scrum' refers to the meetings held to discuss the Sprints, where the technical partners involved will update the team on what has been done and the next steps to take. These meetings, included in the WP1 biweekly meetings, will be organized and moderated by

INTRAS. Minutes will be taken and will be further used for consultation of the commitments for implementation.

4 The HosmartAI agile schema: sub-phases

The agile methodology will be applied during the whole task and several sprints (that constitute the approach) will be conducted in order to optimize the HosmartAI technologies.

Following the guidelines provided by the hybrid methodology, an adaptation of the CAPTAIN H2020 project methodology was carried out in order to adjust the sprint approach into the framework of the HosmartAI project, that in contrast to the CAPTAIN project, has 8 different large-scale pilots and one platform to consider within these sprints planning. The sprint methodology comprehends 10 sub-phases – sprint planning, design of the technology, development of the technology, design of the co-creation/testing protocols, lab technical assessment, pre-review, technical field testing, review, feedback synthesis, and retrospective – that are recommended to be followed within each sprint. A summarized explanation of each sub-phase and the specifications for the HosmartAI case follows.

4.1 Sprint Planning

The sprint planning represents the first sub-phase and is aimed at answering three major questions:

- Why is this sprint valuable? (Goal)
- What can be done for this Sprint? (select items from the Product Backlog)
- How will the chosen work get done? (Developers plan the work necessary to turn Product Backlog items into Increments of value)

Within this period, the consortium should discuss the goal of this sprint, the technologies needed for this goal, the pilot and relevant data to test this. The objective is to define what can be delivered in the sprint and how that work will be achieved. This sub-phase may include a sub-step of EC interrogation.

The main responsible for this first sub-phase is INTRAS (the sprint master).

4.1.1 Sprint planning meeting

In the sprint planning session, the consortium will define the objective of the sprint, which technology should be developed/evaluated, which use-case should be satisfied and the data to be collected during testing. Identify the technological partners that are involved in the design and development of the technology. So, the Sprint planning sub-phase will include the creation of product backlog and the sprint planning meeting. A summary explanation of this process and a graphical representation follow (see Figure 4: Sprint BacklogFigure 4).

The whole consortium will run a Sprint Planning Meeting. During each sprint planning meeting, the product owner describes the highest priority features to the team. The team should ask enough questions that they can turn a high-level user story of the product backlog into the more detailed tasks of the sprint backlog.

Two defined artifacts that result from a sprint planning meeting: (i) the **Sprint Goal**, (ii) the **Sprint Backlog**.

In order to decide which requirements will be moved to Sprint Backlog ('Sprint Planning' shown in Figure 4) the team takes into account the 'Definition of READY', 'Definition of Done', the 'Product Backlog' and the 'Retrospective Commitments' (team's capacity and quality assurance explained on sub-phase 3). Possible dependencies between the requirements are clarified during this meeting.

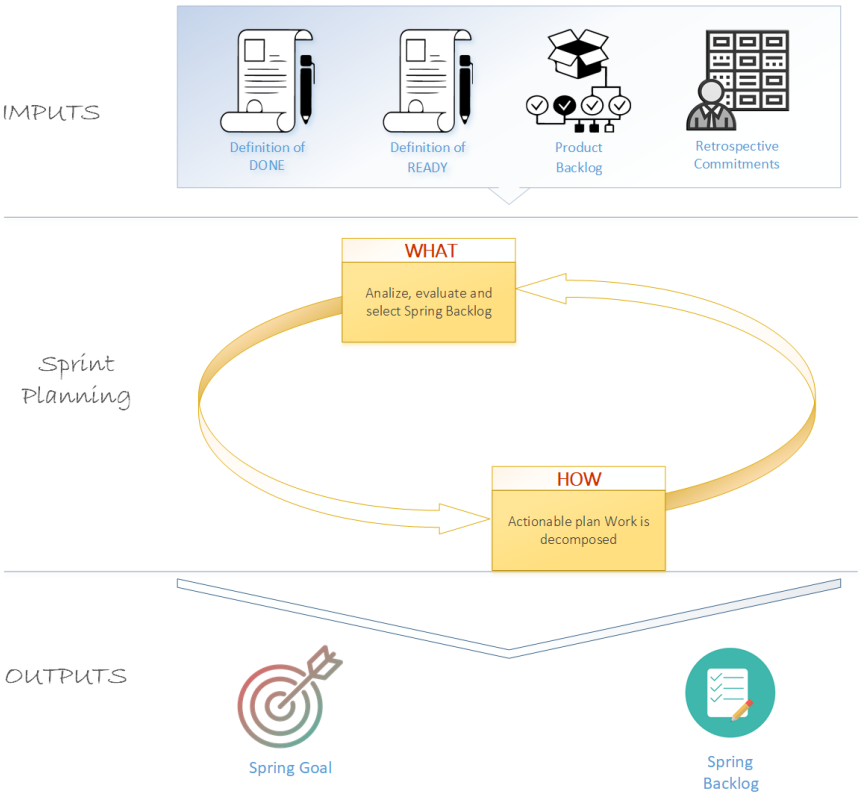


Figure 4: Sprint Backlog

4.1.2 Creation of Sprint Backlog

Within the Sprint Planning Meeting, the sprint approach counts on the creation of a Sprint Backlog. This element includes all aspects to be implemented according to the current sprint, where to store the backlog and, technical instructions regarding the component to be tested after the implementation.

The Sprint Backlog will be created according to the speed and workload for each partner (partners' PMs can be consulted within the confidential deliverable D9.1). In the future, once the backlog is created and the prioritization and refinement phase is completed, the requirement management will be defined.

With respect to storing the lists of all aspects to be implemented, JIRA is planned to be used. This tool allows all consortium members to access the list and propose an item that is ready to be implemented in the Sprint Backlog. The item that is ready will be added to the 'To Do' list once the following criteria are checked out:

1. All the components that it is dependent on, or may influence the implementation, are already defined as DONE.
2. Has high priority for implementation.
3. It is approved by the team and the technical manager during the Sprint Planning Meeting.

4.2 Design of the technology

The second sub-phase considers the latest available specifications and releases from previous sprints. Within HosmartAI, the consortium will focus on the prioritisation process to differentiate functionalities elicited by stakeholders.

The main responsible are the technical partners from WP2, 3, and 4.

4.3 Development of the technology

The third sub-phase envisions working with the relevant competencies to implement the required technology and the integration of the partner's contribution components.

The main responsible are the technical partners from WP2, 3, and 4.

Technical assessment

Following the end of each sprint planning, the final components must be tested to ensure their quality. This phase includes the definition of 'Done' and quality assurance.

A component is considered 'Done' once the following criteria are met:

1. The technical partner responsible for the component has run all the appropriate tests described in the Sprint Backlog.
2. Technical quality assurance: Technical assessment of the performance of the individual modules, covering the functional and operational requirements performed.
3. Integration of the component with the rest of the system and makes sure that there is no malfunction.
4. Acceptability assessment will be performed during the "field testing" described in the sub-phase 6 (Pre-Review). A maximum of couple stakeholder will be invited to interact with the component. Once there is no major issue, the component is considered as DONE.

Technical quality assurance

The quality assurance is a process that will include the analysis of the components tested. This analysis will be carried out through measurements collected within the sprints, which will enable the optimization of the technological modules and minimize technical inconveniences during the testing sessions with stakeholders. A report will be developed to register the outputs for each component.

4.4 Design of the co-creation/testing procedure

The fourth sub-phase will explore the technical needs and questions that may orient the co-creation/testing procedures. The product of this discussion should be materialized into a detailing procedure to be followed by the pilots and by the development of the HosmartAI platform. The procedure consists of a document addressed to facilitators with the guidelines to carry out the co-creation sessions. This sub-phase is strictly connected to the previous one and can be started during the course of the 3rd sub-phase.

The main responsible for this sub-phase are the technical partners (associated to each pilot) and the T1.2. leader. Together, these partners will define adequate and high value actions for co-creation with end users and other stakeholders.

4.5 Lab technical assessment

This sub-phase covers the real position to proceed with a set of trials and tests of the module functionalities. Within this period, technical partners are expected to further discuss the feasibility of testing procedures and refine them according to the feedback provided. The measurements collected through this process will be analysed and will serve to optimize the technological modules and to minimize technical inconveniences during the subsequent testing session with stakeholders.

The main responsible are the technical partners from WP2, 3, and 4.

4.6 Pre-review

This sub-phase is the preparation of the co-creation sessions. It consists in optimizing the action with sufficient participation in order to collect quick feedback on the components planned to be shown that present any identified technical issue. Furthermore, these sessions can include delivery of technology, installation, setting and preliminary testing before the session with stakeholders.

The main responsible for this sub-phase are the pilot partners.

PRE-REVIEW details

The 'pre-review' consists of the preparation of the co-creation sessions and the technical field testing phases that connect with each pilot and platform flows (consult Chapter 8). Within this sub-phase, the team will define the co-creation sessions procedure to be followed during the review and the field testing. Furthermore, the pre-review requires that the technical partners design a questionnaire regarding the input needed during the review. This questionnaire will be included in the detailed description of the co-creation session, along with the schedule of each action and proposed ways of gathering the outputs. All involved partners will read the proposal, contribute to optimize it, and clarify any points needed before the document is finalized.

For the purpose of field testing, a representation of stakeholders (2-3 people) will go through the review session to test it and highlight any non-functional parts or problems in the defined

session procedure, in order to apply the final procedure with the methodology description to the big scale review involving all partners.

4.6.1 Evaluation Tools

4.6.1.1 Technical Partners Evaluation

Features that are extracted from JIRA like time to complete a task, planned to completed ratio, engagement of the team (e.g. how many users are in JIRA and how many of them actually use it).

4.6.1.2 Partners and HosmartAI Stakeholder Community Evaluation

Happiness (consult Appendix F): The measurement of subjective happiness will be done by a simple vote at the end of each session where each participant has to choose one of 5 emoticons representing different emotions.

The same voting can also be done by the partners of the consortium in order to assess the happiness of the team.

The **Participation** metric (consult Appendix G) refers to how much each participant contributed to the overall session and discussion. It is not about judging the participants but assuring that each person feels free to express his/her own opinion. It will be measured by a score that is assigned to every participant by the facilitator based on the participation rate of each participant.

Last but not least, the engagement and participation of the partners, as well as how impactful they perceive their work is an important measure for maintaining the motivation in the team. Throughout CAPTAIN experience we understood that partners are being more focused and work collaboratively when they see a joint goal and an actual outcome. This will be measured with questionnaires that will take place after the end of each Sprint.

An example of forms for evaluation of participation from stakeholders but also partners can be found in Appendix F and Appendix G.

4.7 Technical field testing

This sub-phase is not mandatory and may not be in each sprint. However, if possible, partners can try to test and carry out these sessions with 2 or 3 stakeholders, in order to early identify technical issues that compromise the testing phase, such as bugs or incompatibilities. At each sprint planning, it will be determined whether it will be carried out.

The main responsible for this sub-phase are the pilot partners.

4.8 Review

This sub-phase represents the co-creation sessions and is planned ahead in order to tackle the various issues that can emerge from organizing a co-creation session with participants (e.g., unavailability for personnel vacations). These sessions may be individual or by group according to the needs. Nevertheless, it is recommended to carry out group sessions to make the most of the resources. Within these sessions, pilots will follow the procedures previously

defined for involving stakeholders in co-creation/testing. Reports of the results of these sessions should be developed.

The main responsible for this sub-phase are the pilot partners.

In this review process, the selected community of stakeholders will be involved in three or four reviews and the remaining will be involved with the consortium. This review will promote the interaction between the solutions developed and the feedback from these stakeholders.

A review session consists of a co-creation session phase that lasts, carried out on a group or an individual format, with approximately 60 to 90 minutes. The sessions are expected to be held at the partner's facilities, however, the team considers the possibility of conducting these sessions in the pilot context, such as the hospitals, seeing that these settings can be the most convenient for stakeholders.

The HosmartAI team members responsible for carrying out the co-creation sessions (facilitators) will gather the information previously planned through structured interviews, questionnaires, and nonverbal feedback. The team will use the detailed description developed in the pre-review, in order to have step-by-step procedures for different scenarios of interaction, with the data to be collected and the equipment needed.

At the end of the co-creation session, facilitators and stakeholders involved will fill the corresponding evaluation tools questionnaire (consult Section 4.6.1).

4.9 Feedback synthesis

Within this sub-phase, the results' reports are summarized and described according to the indications previously defined. This sub-phase aims to provide a feedback document for the technical partners. It also represents an internal milestone for checking the advancement of the sprint and completion of sprint activities by the pilot partners.

The main responsible for this sub-phase are the pilot partners.

POST-REVIEW

The post-review, which can be implemented in parallel to this sub-phase, is highlighted by consolidating the feedback of the review, in order to address the demands of the technical partners that were discussed and agreed upon during the pre-review. This process is carried out by technical and pilot partners, that conduct a meeting to present the feedback gathered and to discuss the aspects that may arise. The outcome of this post-review will be a refined version of the user stories previously defined or new ones.

4.10 Retrospective

The final sub-phase collects the previous sub-phase feedbacks from pilots. This sub-phase is connected with a review loop (that is crossed WP's) on requirements prioritization (T1.2 and T1.3) and implementation/ modification of the most strategic components (WP2, WP3, WP4) according to stakeholders' indications.

The main responsible for this sub-phase is the sprint master that is INTRAS.

The retrospective process represents the discussion about the faults that arise during the whole process. The actionable metrics measured following the review session will be the major input for this phase. These conclusions will serve for future sprints and for the reports on the user requirements.

5 First Requirement elicitation

In this chapter, the elicitation details for the first version of the requirements are provided.

5.1 Preparation for implementation

As it has been evoked in previous sections, the definition, specific purpose and implementation of each sprint is pilot-specific and ever based on the results of the previous sprint. In this section, several guidelines are agreed in order to establish a common framework and foundations for the work to be undertaken within the sprints.

5.1.1 Objectives

This task (T1.2. – HosmartAI Stakeholder's engagement and Participatory Design) will be active during the participatory design phase where the consortium figures out the user needs, act as co-creators, interact and give feedback with all the intermediate released versions of the solutions expected for both the HosmartAI Open Integration Platform and the eight Lighthouse Pilots.

After gathering the considerations from each pilot leader and the HosmartAI platform leaders within the initial questionnaire (consul Appendix B), and following discussions regarding these results, the consortium established that within the HosmartAI project, 3 to 4 sprints will be developed, depending on the need. The implementation of the sub-phases described above will be flexible, according to the need of each sprint. The table below (see Table 4) lists the planned time periods for each of these sprints. As described in this table, the first two sprints with no MVP are oriented on what to do (understand the problem, limitations, and how to address these) and to get feedback for the design of the interventions. The 3rd and the 4th sprint will focus on testing the available MVPs with patients and healthcare professionals. These sprints will be highly interconnected with the WP1, WP2, WP3, WP4, and WP5, and the respective deliverables, as can be seen in Figure 5 below.

Table 4: Planned HosmartAI sprints.

Sprint	Start	End	Duration	Focus related with the project stages
1	M7 (July 21)	M10 (Oct 21)	4 months	Co-design with real users and other stakeholders. Action to better understand the problem; what seems a good value proposal (e.g. expected functionalities); understand limitations (e.g. environment; working flow dynamics) and how to address them; orientations on "To Dos" and "Not To Dos").
2	M11 (Nov 21)	M16 (April 22)	6 months	Co-design to continue eliciting requirements, and get feedback for the design of the interventions (e.g. what kind of information to display)
3	M17	M24 (Dec 22)	8 months	Testing available MVP and continue co-creation

	(May 22)			▪ MVP: M19 (1st implementation platform)
4	M25 (Jan 23)	M30 (Jun 23)	6 months	Testing available MVP and continue co-creation ▪ MVP: M25/26 (expected intermediate versions)
Final MVP				M31 to be explored in T5.2

The following sections describe the initial plan to implement these major objectives.

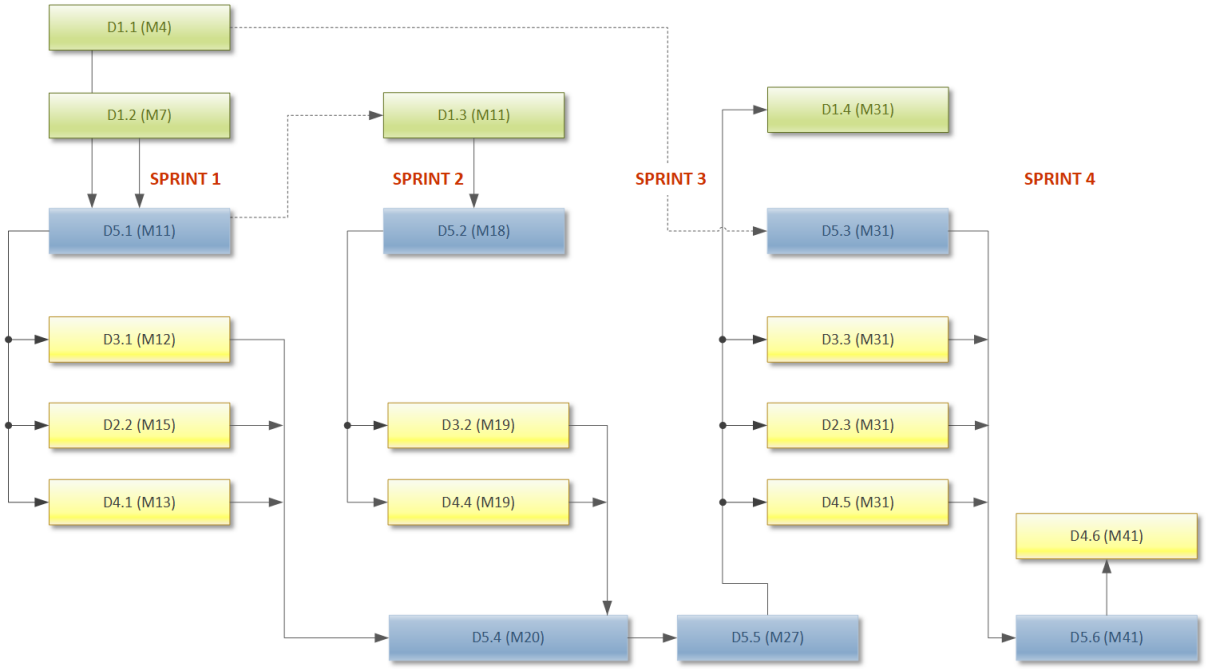


Figure 5: Connection between the sprints and the deliverables within HosmartAI project

5.1.2 Start and duration

This task is active since M5 and the involvement of stakeholders started at M5/6 and will finish at M31. Preliminary activities are foreseen to solve regulatory and technical issues related to the task.

5.1.3 Sub-tasks, proposed timeline and responsibilities

According to the sprint approach, the planning and implementation of each sprint, is dependent and connected with the previous sprint. For this purpose, and seeing that this deliverable comprises the first version of the user requirements and the beginning of the methodology's implementation, the 1st sprint is described in the present and the following sections in more detail, as opposed to the 2nd, 3rd and 4th sprint, that are less developed, as they are dependent of the outcomes of this first one.

The first sprint will comprehend the theory and the generic concept of the HosmartAI project. The deployment of this sprint started at M7 and is foreseen to end at M10, as shown in Figure 6. This sprint will greatly contribute to achieving the first milestone of the HosmartAI project – MS1 (Identification of HosmartAI Requirements and User Stories, Initial preparation of the Data Handling Plan, Communication roadmap). This sprint's results are materialized (or contribute) to this deliverable and to the following reports of the requirements, specifications and Reference Architecture. Additionally, it represents a solid ground for the WP5 (Large-scale Pilot Demonstration and Evaluation) and its deliverable D5.1. (Detailed Pilot Specification and Report on Pilot Sites Preparation – First version), which will, in turn, contribute to the D3.1 (Design of AI-based Solutions and Autonomous Smart Components), D2.2 (First set of Common AI, Benchmarking and Security Pillars) and the D4.1. (Platform Architecture Design and Open APIs - First version).

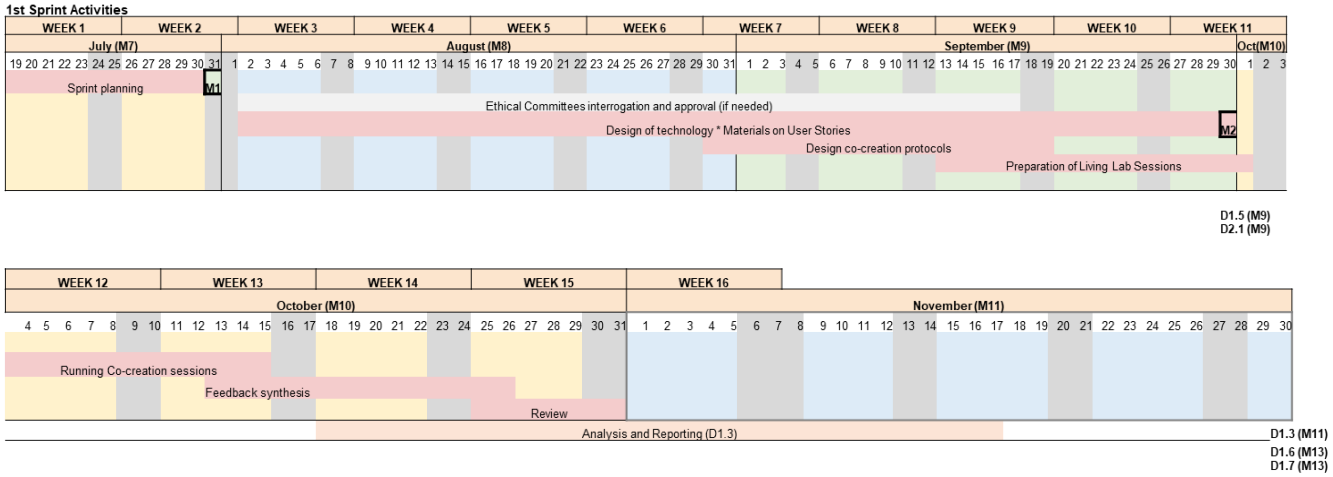


Figure 6: Proposed timeline for the first sprint

The 2nd sprint will focus on healthcare professionals. Within this period (M11-M16), the consortium will continue working with the collaboration of the stakeholders and users to continue eliciting requirements and get feedback to optimize the interventions.

The 3rd sprint (M17-M24) will focus on healthcare professionals and patients, and if necessary, this focus will continue through the 4th sprint (M25-M30). Within this sprint or sprints, the available MVP will be tested through the co-creation process.

As mentioned in the previous chapter, passing through all sub-phases within each sprint is not mandatory. Nevertheless, Table 5, shows a prevision of the time frame of each sub-phase. This prevision is a suggested period of time to carry out each sub-phase, a time that is flexible according to the sprint and to each pilot. Within sub-phase 2 and 3, design of technology and development of technology, respectively, the four sprints will be distinguished, since the first MVP will only be available at the M19. In other words, within the 1st and the 2nd sprints, the presumed technology will be represented by the development of user stories, while the 3rd and 4th sprints will include the actual technologies.

Table 5: Sprint sub-phases breakdown with proposed duration and allocated responsibilities

Sprint Events	Time frame	Main responsible
1. Sprint planning	~ 2 weeks	[SPRINT MASTER]
2. Design of technology	~ 1 week	[WP2, 3, 4]
3. Development of technology	~ 2 weeks	[WP2, 3, 4]
4. Design the co-creation/testing procedures		[T1.2 leader & technical pilot partners]
5. Laboratory technical assessment	~ 2 weeks	[WP2, 3, 4]
6. Preparation of the living lab sessions	~ 3 weeks	[Pilot partners]
7. Technical field testing	~ 1 week	[Pilot partners]
8. Running Co-creation/testing sessions	~ 2 weeks	[Pilot partners]
9. Feedback synthesis	~ 2 weeks	[Pilot partners]
10. Sprint Review	~ 1 week	[SPRINT MASTER]

5.1.4 Participants

Activities will be carried out with the Stakeholder community network created and maintained according to the methodology described in Chapter 2.

Each of the pilot partners created a local stakeholder community including primary and secondary users. The primary users indicated by the pilot leaders were the healthcare professionals, the radiotherapy units, patients, clinicians and researchers. Whilst the secondary users indicated were the healthcare managers, the hospital units, the healthcare professionals' experts, and more specifically, psychologists and neuropsychologists and medical doctors. The exact numbers for each user group indicated by each partner can be consulted in Appendix B.

Within the initial survey, the consortium planned to involve the participants by asking them to follow procedures, to participate in consultations through co-creation sessions (individually or by group), focus groups, surveys and showcasing.

One or more motivators/facilitators will coordinate the activities during the co-creation-testing sessions.

5.1.5 Settings

As previously explained, design thinking, co-creation and testing activities are expected to be held in the partner's facilities. However, there is a possibility of conducting these sessions in

the pilot context, such as the hospitals, seeing that these settings can be the most convenient for stakeholders.

The defined pilot leaders and settings for the eight lighthouse pilots participating in the project are the following:

- AHEPA, AUTH (Pilot #1): AHEPA Hospital & Hippokrateion (Greece)
- CHUL (Pilot #2): CHUL Hospital (Brussels)
- IRCCS (Pilot #3): IRCCS Rehabilitation Centre (Italy)
- SERMAS (Pilot #4): SERMAS Hospital (Spain)
- UKCM (Pilot #5): UKCM Hospital (Slovenia)
- INTRAS (Pilot #6): INTRAS Care Centre (Spain)
- PHILIPS (Pilot #7): UZ Brussel (Brussels)
- VUB (Pilot #8): UZ Brussel (Brussels)

5.1.6 Setting the scene for sprints preparation

As already explained, this document comprehends the 1st sprint in more detail, whilst the planning of other sprints will be developed in the future.

Sprint planning

For the starting of the 1st sprint, between M2 and M7 of the HosmartAI project, the process for defining the methodology passed through:

- WP1 regular meetings;
- WP1-2-3-4-5 bi-lateral meetings;
- The Initial Feedback Questionnaire for partners (include identification of stakeholders networks, stakeholders' engagement strategies);
- Guidelines developed for:
    - Creation of user stories;
    - Information event for Stakeholder networks;
    - Definition of information collection tools;

Some partners advance with consultation sessions (e.g. INTRAS - in Spain, under national rules with no need for EC approval for such action) to identify participants' preferences in realizing co-creation activities and using possible evaluation tools. This involved:

- EC consultation for settings' activities;
- Shared guidelines and each pilot partner will be then responsible for training motivators in their own organization (if required, virtual workshop or meeting can be organized according to pilot partners' request for further information or for sharing specific experiences among all partners).

5.1.7 Tools

In each sprint, one toolkit will be produced. In this first version, it will be presented the toolkit developed for the first sprint.

Between M2 and M7 of the HosmartAI project, four tools were created in order to collect information for all HosmartAI partners.

The first tool was the HosmartAI T1.2. Initial Feedback Questionnaire (see Figure 7 and consult Appendix B), also addressed as 'initial questionnaire' within this document, that consisted of a questionnaire for all partners (pilot, technical and business partners) in order to collect initial information for the sprints included on Task 1.2. This questionnaire included a summary regarding the sprints methodology explaining basic concepts for partners who are beginners in this methodology. Following this theoretic introduction, partners were asked to select their role in T1.2. – technical, pilot, or business partner – and a list of questions was provided to each of these types of partners. As explained in Chapter 2, these questions aimed at collecting initial considerations regarding stakeholders and users to be included in the sprints, background, time to prepare for these sprints, recruiting activities and ethical aspects to have in account.

Figure 7: Initial Feedback Questionnaire overview

The second tool consisted of one template for the creation of the user stories (consult C.1). This template was provided to the pilot and platform partners. These partners were asked to fulfill the information, however, the template was flexible and other templates used by the working organisations could be used, as long as the information for carrying out the methodology was provided.

The third tool consisted of one template for an initial collection of the user requirements (consult D.1). This third template was provided to the pilot and platform partners, in order to collect an initial list of user requirements. However, in a later phase, to increase efficiency and agile the process, these initial lists were gathered in a fourth tool that consisted of an excel document that gathered all initial user requirements for revision and further addiction from the HosmartAI technical partners (consult D.2). This final tool was further used to prioritise and categorise the initial list of user requirements.

5.1.7.1 Information collection tools

The information for collection tools will be defined according to each sprint planning.

Sprint planning should describe how data will be collected, stored, and accessed and how data will be available for assessment. However, as it has been explained, according to scrum methodology, this information cannot be fully available before the beginning of the specific sprint. An assessment framework that includes all of the expected assessment domains, activities, measures, etc. will be set, but the details of what exactly will be assessed in each sprint may not be available until the planning for that sprint is complete. The assessment framework could include: technology usability and acceptability (user experience); requirement acceptability; economic assessment (Micro and Macro); participant assessment (physical, cognitive, social, affective….), etc. Then, the outputs defined will be executed by WP5 via T5.1 (Detailed Pilot Specifications and Pilot Sites Preparation) and T5.2 (Pilot roll-out and execution). Evaluation of the impact of the co-creation sessions is then done in T5.3 (Pilot monitoring and evaluation, lessons learnt and recommendations).

5.1.7.2 Informed consent for co-creation

The development of an informed consent is a crucial step for carrying out co-creation sessions. This consent will be signed by the participants who are part of the co-creation sessions and will allow each team pilot and platform to carry out their activities and extract the results needed for the objectives of the sprints.

After discussion with the consortium, it was deliberated that a common informed consent would be created and provided to partners. Partners were and will be then allowed to modify this informed consent in order to adapt it to each pilot and platform needs, countries and entities criteria for working with these types of participants. The general informed consent can be seen in Appendix E.

In respect to the need for an informed re-consent in a new sprint, if users agree to everything for the first sprint, with no substantial changes in the subsequent sprints, no re-consent should be needed. In case the full set of information that needs to be collected across all sprints is not known from the beginning, re-consent will be required at the points where new information will be collected (sprint planning).

If a new device is introduced and tested in a sprint, this might be a reason to go for an ethical approval and a re-consent. System upgrades (e.g. new component release) and variation in the typology of collected data (e.g. sensitive data) can generate the need for re-consent.

Each pilot and platform partner has the responsibility to assess the need for re-consent, according to their national, local and organization's ethical frameworks. Within the questionnaire for initial feedback from partners, it was possible to gather that two pilot partners expect to ask the participants to re-consent before each sprint, whilst 4 of them consider that the first consent is sufficient and it represents the normal procedure implemented in their institutions. The other 2 pilots require more time to check the proper procedure to follow.

The reasons indicated for not having a need to request for a re-consent were that the participants would only need to sign the informed consent once; that the participants involved in the co-creation sessions would be healthcare professionals working on the

university clinics; and for the strong possibility of having different participants for each co-creation session.

For the partners that indicated that there was a need to request a re-consent, suggested that the regular security and data protection, although in regulation, partners expressed the preference in requesting an additional consent to develop systems that are enabling research on this data; and that it constituted the organisation practice.

5.1.7.3 Ethical Committee interrogation and approval

For the purpose of defining the needs for the Ethical Committee (EC) interrogation and approval, pilot and platform partners were initially asked to consult their local and internal Ethical Committee about the need of an approval for the interactions with users and other stakeholders planned in the sprints, considering that stakeholders are engaged on a voluntary base. With this information gathered, partners were then asked to fulfil the table below (see Table 6) to explore the need for an ethical evaluation and approval. The time for consent revision and possible EC consultation/interrogation is included in the calculation of the sprint duration.

It could be the case that not all sprints activities require to obtain an ethical evaluation and approval (e.g. possibly no sensitive data are collected during the 1st and 2nd sprints devoted mainly to design thinking activities).

Table 6: EC Procedures to be followed

Pilot/Platform	EC Procedure to be followed
Platform	The platform will not need any EC approval.
1	Pilot #1 requires EC approval.
2	Pilot #2 needs to collect sensitive PROSPECTIVE data only during its implementation. Patients will be recruited to test the solution which contains a Chatbot (preferences and PREMs).
3	Pilot #3 requires EC approval.
4	Pilot #4 has no need for EC approval for working with in vitro.
5	For patient participation, pilot #5 requires approval of the in-hospital ethical committee. We do require a generic outline and kinds of questions to be asked. We would favour anonymous data collection, and a letter of consent must be signed by each individual. For other stakeholders, ethical approval is not required however would be beneficial; a letter of consent, however, is required. Since in our case, the co-creation we relate to user-experience, interface, and behaviour design, we could foresee one protocol for the co-creation as a whole, and we do not have to mix it with the study protocol.
6	Pilot #6 needs a favourable decision from its organization's internal committee, seeing that this pilot comprehends working with vulnerable groups.
7	Pilot #7 requires EC approval.

8	Pilot #8 requires EC approval. The ethical approval for the study is being finalised and will be submitted in the last week of August 2021.

5.2 The HosmartAI requirements elicitation process

The 1st version of the requirement elicitation consisted in a familiarization exercise with the methodology and the criteria. For this, the T1.2 leader guided the WP1 partners, mainly through the WP1 regular meetings, to carry out a desk research, the construction of user stories and finally, a technical partner and pilot leader to rate the value and implementation risk for the development of the prioritization.

In the next tasks, a team composed of 3 people from each pilot and from the platform will be asked to evaluate and classify each requirement; so the team can perform a mean of these values and further include it on the Project's backlog.

This task and its leadership provide partners with the methodology and the familiarization with this approach, so partners can implement the methodology in a systematic and autonomous way. After this phase, the responsibilities of implementation, monitor and report of the requirements and sprints fall upon the leadership of the technical partners in tasks T1.2 and T1.3.

5.2.1 Methodology for identification and analysis of 1st version of user requirements

As explained on the HosmartAI deliverable D1.1, three main domains are clearly identified: i) Screening and preventive measure recommendation, ii) Diagnosis, treatment, and surgical support and iii) Optimization of hospital resource utilization.

Following the identification of the needs and challenges from the different healthcare domains within HosmartAI and the state of the art on how the consortium could tackle these issues, resumed in the Project's public deliverable D1.1 and the flow for each pilot (being developed in other project tasks), the consortium had the necessary conditions to carry out the identification and analysis of the user requirements.

5.2.2 User requirements identification and analysis

The user requirements focus on identifying, at an early stage, important user needs. These requirements will become an initial input for the participatory design and agile requirements elicitation process and will be permanently re-evaluated and changed/improved based on end user input and consultation according to the methodology reported in Chapter 3.

This phase included two main activities that run until M6:

i. The creation of user stories, including personas and user scenarios.

ii. Desk research. It represented an important step to understand and scientifically substantiate the primary and secondary user needs. For the purpose of this study,

partners explored user requirements from previous relevant projects, publications, user stories consultations and internal discussions.

Following on these guidelines and the tools previously provided (Section 5.1.7), HosmartAI pilots and platform leaders identified several user requirements and different user stories for each pilot and platform. These results can be consulted in detail on C.2 and D.3.

5.2.2.1 User Stories

The creation of user stories represents a fundamental element of this methodology provided that it changes the focus from the technical requirement to the actual desired functionality of the solution. This exercise is an important step included in the agile approach that helps the Project's members involved in the creation of a given solution to understand how to find the most efficient way to help the end user.

These user stories are representations of the final beneficiaries of the solution designed for a determined problem, usually the customer. This representation assumes a character, named persona, that describes the features from the perspective of an end user. After the creation of these personas, the team is invited to follow this or these scenarios to understand how the solution that is being developed can help this persona and what are the functionalities that would most likely be desired.

Within HosmartAI project, two user stories for each platform and pilot, at least, were created. Once the HosmartAI partners have different backgrounds and seeing that this methodology was new to some, it was created and provided some templates for the creation of user stories and personas (consult C.1). However, these templates were flexible and partners were entitled to make changes to the tables contents or use different templates. As can be seen on the template provided, partners were advised to create these personas and user stories by internal discussions, for example, in the shape of a workshop.

The final user stories created assumed the template: As a < type of user >, I want < main goal >, so that < main purpose >. For this, I <proposed the solution>. In the participatory design fields, this template is called an epic. For the detailed users' stories consult C.2.

At the end, these user stories can be used as a base of discussion or first foundation for the sprints carried out within the HosmartAI project, in order to ensure the highest level of detail and quality in the solution, as possible for the different features of the user stories.

5.2.2.2 Personas and user scenarios

As previously explained, the creation of user stories involves developing personas and user scenarios as well.

The main objective when creating a persona is to form a reliable and realistic representation of key end users or stakeholders, describing their characteristics, needs, expectations and even demographic data based on data about real users.

Used within the consortium to better understand and always keep in mind users' and stakeholders' desires, needs, expectations and fears.

The persona assists the designers and stakeholders to personalize their users and discuss by name and reason about a group based on characteristics, also helping to make the right questions and build empathy with the end users.

The process of building a persona requires deep understanding and research of the targeted users. The user research does not refer only to the demographic and ethnographic, but basically, find out who the users are and why they need the proposed system/product/technology.

After concentrating on the results of the user research, the design team along with the stakeholders must brainstorm to organise the elements and information gathered into personas, each of one depicting a specific case scenario.

5.2.2.3 Desk research

A survey of relevant projects in the area of Information and Communications Technology (ICT) for HosmartAI Open Integration Platform and the eight Lighthouse Pilots was conducted by each of the pilot clusters (partners involved in each pilot case).

As explained in Section 5.1.7, at an early stage, a template for a literature study was provided for each pilot and HosmartAI platform (see D.1). As can be consulted on D.1, this template had as its objective to explore in detail the relevant projects and literature that could serve as a basis for each pilot and platform user requirements. Nevertheless, within the WP1 regular meetings was decided that a joint excel would be more efficient, making the process more agile. For this, a desk research was requested from partners in a joint excel template (consult D.2) that simplified this research and the monitor and contribution from technical partners. The contributions of the technical partners were provided two weeks after the pilot and platform leaders' contribution.

5.2.2.4 Requirements prioritization criteria

As described above, the SCRUM product backlog methodology will be used. The backlog is a simple list with all aspects to be addressed and solved within the HosmartAI developments. These items can be either user-centric or technology-based. Backlog is a living document that is constantly changing within the whole project. If needed, new requirements could be added and existing ones may be reprioritized or modified. Also, the existing requirements in the backlog shall not contain detailed information in terms of technical aspects.

In order to increase the transparency among all the involved parties (technical partners, pilot partners, dissemination and exploitation partners, stakeholders, etc.) and develop a trustful environment, when prioritizing requirements, it ensures that the project focuses on the most important elements first, and that everyone understands and agrees what the project's most important elements are.

The input of the HosmartAI stakeholder community has been gathered and the process of prioritization takes place in order to be placed into the product backlog. The requirements extracted are checked by the technical coordinator and placed into the shared folder of

HosmartAI consortium. Each partner (pilot and technical) was given two days to rank the requirements, using the joint user requirements document tool previously described.

One way of prioritization is to rank requirements by assigning a score at each requirement (e.g. from 1 to 3) for:

- **Value:** focuses on the user's benefit of any given requirement; the requirements that will return the greatest value are given the highest priority.
- **Implementation risk:** a focus on the difficulty of implementation places the highest priority on the requirements that are the easiest to implement. The benefit of this approach is that it allows a project to get some project benefits deployed quickly, enabling end users and other stakeholders to become familiar with the project and give critical feedback before moving forward to deploy more difficult aspects of the project.

The requirements were classified by each partner who assigned 2 values, one for value, another for the implementation risk, as shown in the table below (consult Table 7). The technical partners ranked the implementation risk, while partners with knowledge and experience from interaction with end users ranked the value requirement.

Table 7: requirements ranking scale

Parameter	Description	Levels
Value	How valuable will be for the user in case the requirement is implemented	High (3) Medium (2) Low (1)
Implementation risk	How great is the risk for the requirement not to be satisfied due to the maturity of the technology or restrictions of the available technology	High (3) Medium (2) Low (1)

As explained above, each team will perform a mean of these values and further include it on the Project's backlog.

At the end of the consultation, a mean value is calculated for both implementation value and implementation risk that are presented in the tables in the following chapter.

The average of all the scores provided by each partner gives a value score and an implementation risk for each requirement. The prioritization is done based on the multiplication of the two values and the requirements are placed on the Product Backlog.

The goal is to look for a balanced approach, going for High-risk/High-value first, Low-risk/High-value second, and finally Low-risk/Low-value. High-risk/Low-value items should be avoided. Although this balanced approach will be a continuous task throughout the lifecycle of HosmartAI (measuring, learning and optimizing), an initial view of the requirements that must be considered for implementation is firstly presented per pilot case.

6 First version of the HosmartAI user requirements

In this chapter, the 1st recompilation of prioritization and requirements elicitation is provided.

Within the present chapter, it is presented the 1st recompilation of prioritization and user requirements of the HosmartAI project. The final detailed document can be consulted in D.3.

As explained in Chapter 5, this first version of user requirements was identified by the pilot and technical partners through a desk literature study, other EU projects, the user stories, internal discussions and real consultation.

A total of 129 user requirements were identified for this first version of the HosmartAI user requirements (see Table 8). The HosmartAI platform identified 7 user requirements, while Pilot 1 identified 12 user requirements; Pilot 2 - 26 user requirements; Pilot 3 - 10 user requirements; Pilot 4 – 4 user requirements; Pilot 5 - 20 user requirements; Pilot 6 – 41 user requirements; Pilot 7 - 4 user requirements; Pilot 8 – 5 user requirements.

Table 8: summary of requirements classification

		Value			Implementation risk			Requirement type	
Pilot	# Requirements	High (3)	Medium (2)	Low (1)	High (3)	Medium (2)	Low (1)	Functional	Non-functional
AI Platform	7	6	1	0	2	3	2	5	2
Pilot 1	12	9	2	1	5	4	3	8	4
Pilot 2	26	15	11	0	3	16	7	9	17
Pilot 3	10	8	2	0	1	9	0	3	7
Pilot 4	4	4	0	0	3	0	1	4	0
Pilot 5	20	15	5	0	1	5	14	9	11
Pilot 6	41	23	18	0	4	21	16	30	11
Pilot 7	4	4	0	0	4	0	0	4	0
Pilot 8	5	5	0	0	2	3	0	1	4
	129	89	39	1	25	61	43	73	56

Following the user requirements list that included the title, description, evidence of extraction and the uptake method, the pilot and technical partners were invited to the categorization process where each team member had to classify or review the score of value and implementation risk, the requirement type (functional or non-functional), to categorise this user requirement and the most important actor involved.

User requirements prioritization

For the purpose of prioritizing the user requirements established, two classifications were gathered: value and implementation risk. Regarding the value, as can be seen in the graphic below (see Figure 8), there is a predominance of requirements that represent a high value for the platform, close to 70%.

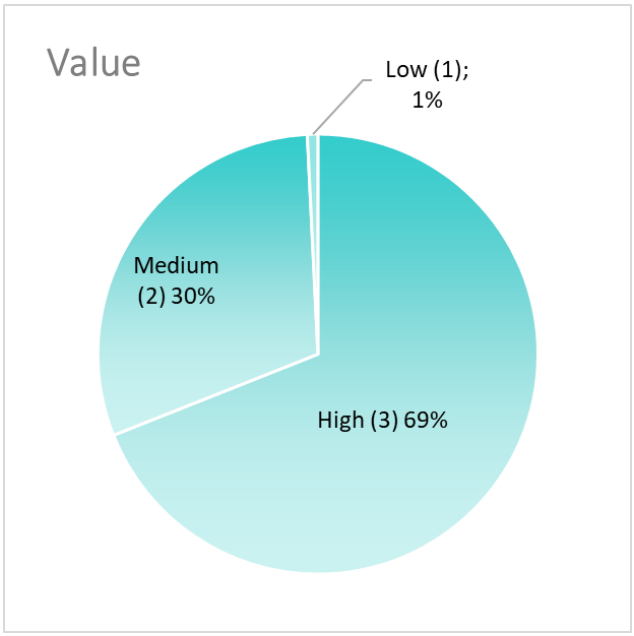


Figure 8: User requirements prioritization – value

Regarding the risk of implementation, it can be observed (see Figure 9) that the requirements that represent a high implementation risk account for only 20% of the total, compared to 33% of low risk and 47% of medium risk.

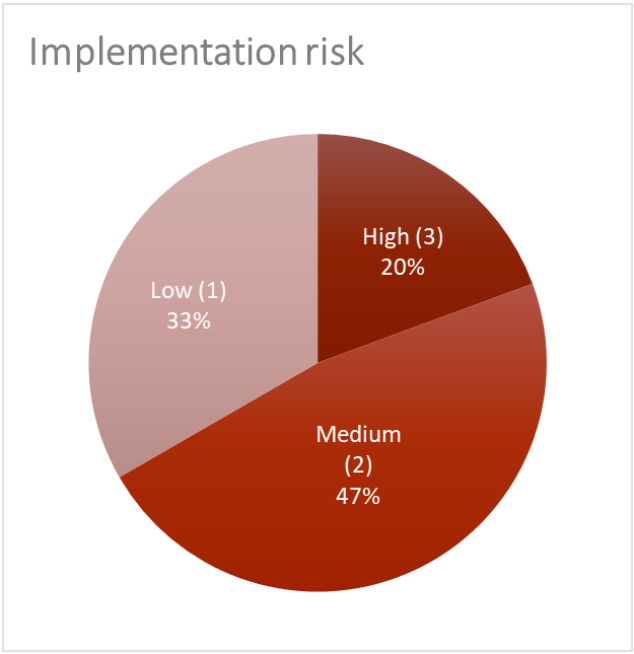


Figure 9: User requirements prioritization – risk of implementation

Requirement type

In respect to the functional and non-functional user requirements, the graphic below (see Figure 10) shows a balanced result between functional (57%) and non-functional (43%) requirements.

The categories of each requirement types are further discussed on the next two subsections.

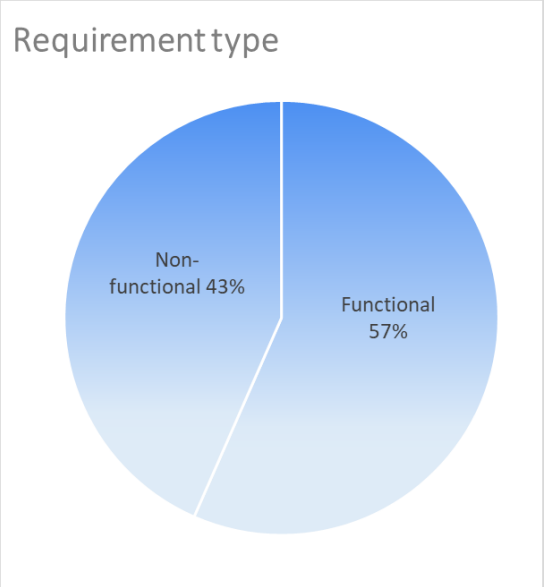


Figure 10: Requirement type diagram – functional and non-functional requirements

Actors involved in the requirements

Given that the end user who could benefit from these solutions represents a crucial piece to the design thinking and the co-creation sessions, it became relevant to explore how many and what types of stakeholders we are upholding within these user requirements. After all, it is extremely relevant to take into consideration different stakeholders (e.g., clinicians, patients, managers), since the solutions to be developed and optimized are for these stakeholders, which reverts of great importance to have representatives from all groups. These result in six actors involved on the technical requirements and one non-applied for the user requirements that did not fit with any of these groups (see Table 9 and Figure 11). The "N/A" option also refers to the cases that various stakeholders/actors are involved with the same importance in each requirement.

Table 9: summary of requirements classification (most important actor)

		Most important actor involved on the requirement						
Pilot	# Requirements	Healthcare professionals	Hospital units	Patients	Clinicians	Researchers	Healthcare managers	N/A
AI Platform	7	4	0	1	0	2	0	0
Pilot 1	12	12	0	0	0	0	0	0
Pilot 2	26	0	3	5	2	11	5	0
Pilot 3	10	1	0	6	2	0	1	0

Pilot 4	4	4	0	0	0	0	0	0
Pilot 5	20	5	2	7	0	6	0	0
Pilot 6	41	10	0	16	3	1	0	11
Pilot 7	4	0	0	0	3	0	1	0
Pilot 8	5	2	0	0	0	2	1	0
	129	38	5	35	10	22	8	11
		29%	4%	27%	8%	17%	6%	9%

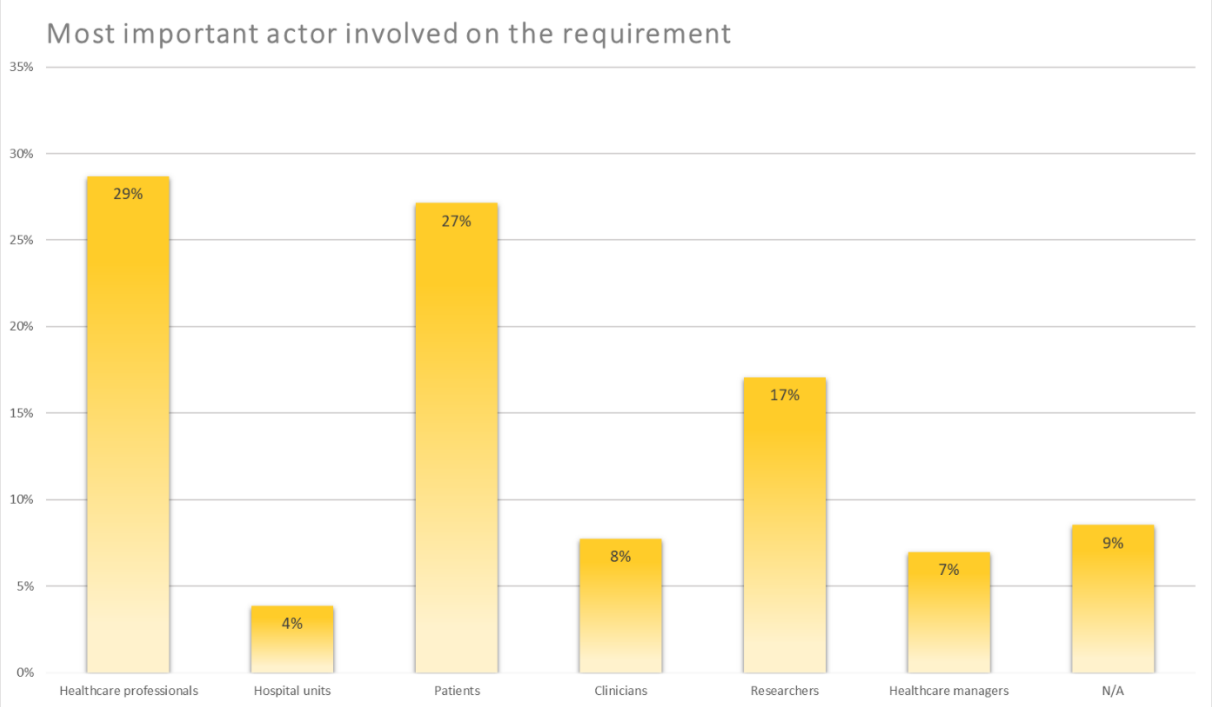


Figure 11: Actors involved - diagram

6.1 Functional Requirements

The functional requirements identified from the desk research and the creation of personas and user scenarios have been grouped into the following categories:

- **(B) Bio-parameters:** Related to components that measure or manage bio-parameters.
- **(C) Communication:** Related to communication with caregivers, friends, relatives, etc. It includes a description of use cases that enable, facilitate, and manage the communication, motivate, propose, and guide through new communication channels.
- **(I) Information:** Related to access to various information.
- **(UM) User monitoring:** Related to user's unobtrusive monitoring.
- **(EM) Environment monitoring:** Related to information about environmental parameters.

- **(UG) User guidance:** Related to pieces of advice and recommendations done by the system.
- **(UI) User Interface:** Related to how the user interface should function.

The requirements below (Table 10 and Figure 12) include also an identification of the sources they came from (personas, EU projects and research papers).

Table 10: First version of the functional requirements - table

	functional requirements						
Pilot	User monitoring	Bio-parameters	Communication	Information	Environment monitoring	User Interface	User guidance
AI Platform	1	0	0	1	0	3	0
Pilot 1	0	3	1	4	0	0	0
Pilot 2	1	1	1	1	1	5	0
Pilot 3	0	0	0	0	1	1	1
Pilot 4	0	1	0	0	0	3	0
Pilot 5	3	0	1	0	0	4	0
Pilot 6	8	2	3	1	1	14	1
Pilot 7	2	0	0	0	0	2	0
Pilot 8	1	0	0	0	0	0	0
	16	7	6	7	3	32	2

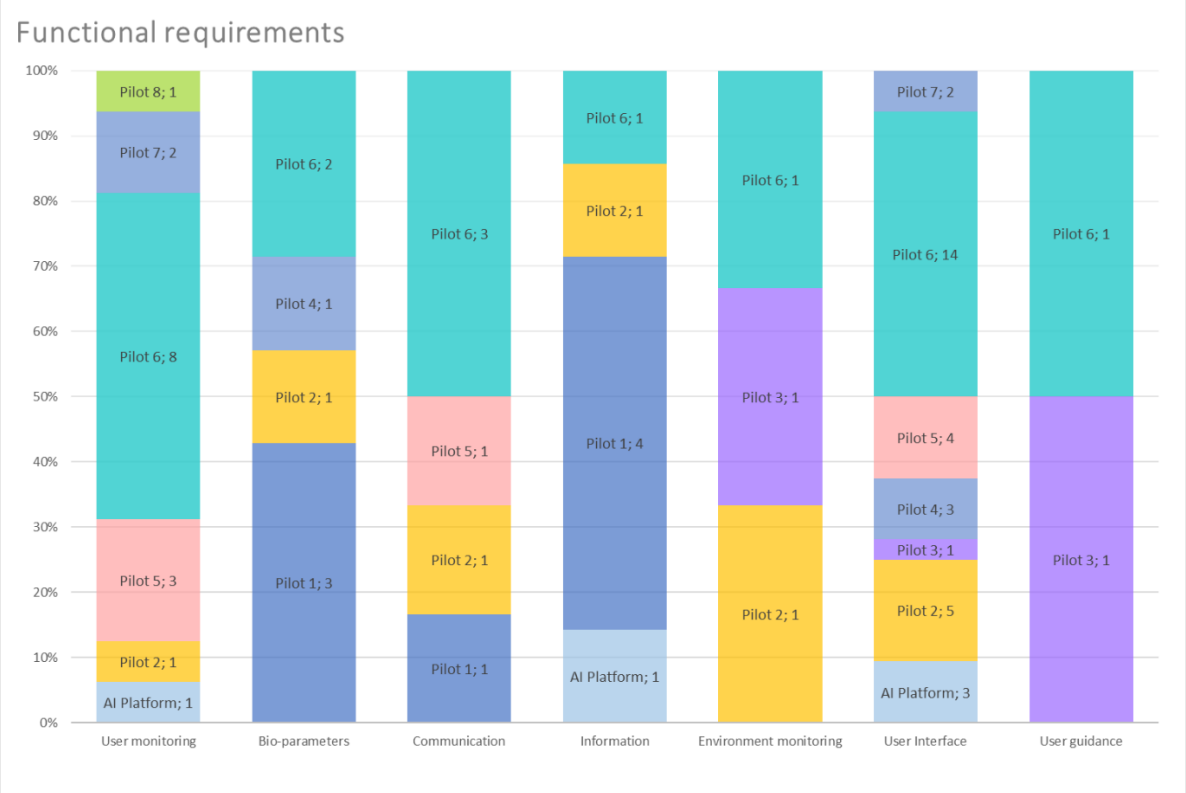


Figure 12: First version of the functional requirements - diagram

6.2 Non-functional requirements

The different non-functional requirements identified have been grouped according to the eight-group ISO 25010 classification, with an addition of the first as follows:

- **(QoS) Quality of Service:** what can the system provide to ensure that the service has high quality. It includes any component, use case requirement that aims at delivering a better overall service.
- **(F) Functional suitability:** This characteristic represents the degree to which a product or system provides functions that meet stated and implied needs when used under specified conditions.
- **(E) Performance efficiency:** This characteristic represents the performance relative to the amount of resources used under stated conditions.
- **(C) Compatibility:** Degree to which a product, system or component can exchange information with other products, systems or components, and/or perform its required functions, while sharing the same hardware or software environment.
- **(U) Usability:** Degree to which a product or system can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use.
- **(R) Reliability:** Degree to which a system, product or component performs specified functions under specified conditions for a specified period of time.
- **(S) Security:** Degree to which a product or system protects information and data so that persons or other products or systems have the degree of data access appropriate to their types and levels of authorization.
- **(M) Maintainability:** This characteristic represents the degree of effectiveness and efficiency with which a product or system can be modified to improve it, correct it or adapt it to changes in the environment, and in requirements.
- **(P) Portability:** Degree of effectiveness and efficiency with which a system, product or component can be transferred from one hardware, software or other operational or usage environment to another.

Table 11: First version of the non-functional requirements - table

	Non-functional requirements								
Pilot	Security	Performance efficiency	Maintainability	Functional suitability	Usability	Reliability	Portability	Quality of Service	Compatibility
AI Platform	1	1	0	1	0	0	1	1	0
Pilot 1	0	3	0	0	1	2	0	0	1
Pilot 2	1	6	2	1	3	1	1	8	1
Pilot 3	0	1	0	0	0	0	0	5	0
Pilot 4	0	2	1	0	1	0	0	0	0
Pilot 5	3	3	0	2	2	3	0	0	0
Pilot 6	2	3	1	2	2	0	0	1	0
Pilot 7	0	0	0	0	0	0	0	0	0
Pilot 8	2	0	0	1	1	0	0	0	0
	9	19	4	7	10	6	2	15	2

Note: The non-functional requirements scores in Table 8 and Table 11 do not match because there are functional requirements that require non-functional requirements, see D.3.

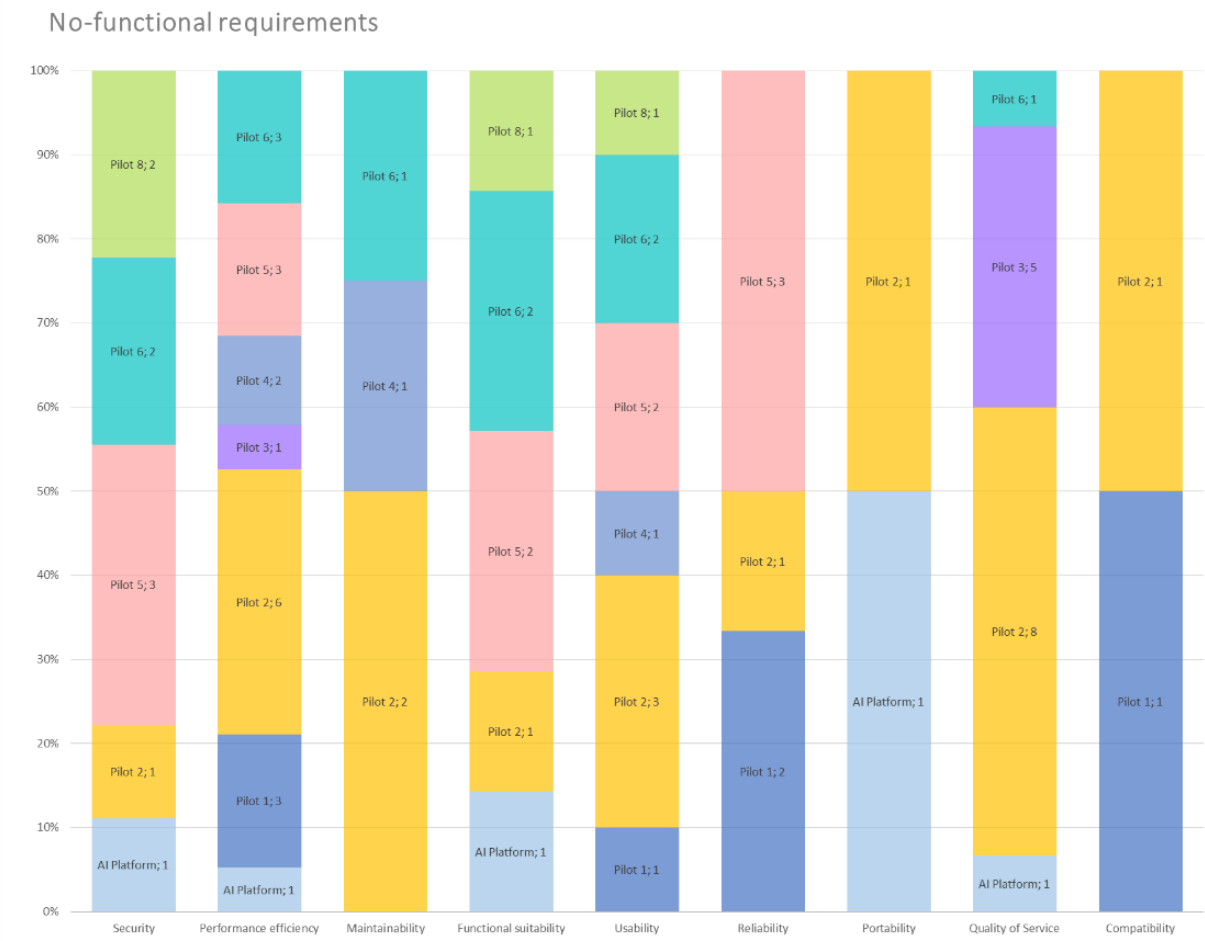


Figure 13: First version of the non-functional requirements - diagram

7 Conclusion

The present document – Stakeholders' requirements and analysis report – aimed to explain the HosmartAI participatory methodology and to give an introduction to the systematic approach for user requirements elicitation and analysis, presenting the first version of the user requirements.

For this purpose, this deliverable presented the agile methodology and gave an overview of the sprint approach and the steps carried out, and planned to be carried out in the future, to obtain the user requirements and how to optimize it, the identification and how to best engage the stakeholders, the general plan for implementing the sprints, and the user stories and the first version of the user requirements for each pilot and the HosmartAI Platform.

The participatory design of HosmartAI is a hybrid approach leveraging on a concept from Design Thinking, Lean Startup approach, and SCRUM agile framework. With this methodology, the consortium can explore and work on the optimized solution to achieve a solution that is accepted and needed by end users. The agile methodology will be applied during this task and several sprints.

The planned sprints for the project's lifetime are from 3 to 4 sprints, according to the needs. The first two sprints will not have a MVP, and are focus on understanding the problem, limitation and how to address these, whilst the 3rd and the 4th sprints will focus on testing the available MVPs with patients and healthcare professionals.

User stories were created for each of the 8 large-scale pilots and the HosmartAI platform in order to optimize the HosmartAI solutions provided by empathizing with the final beneficiaries of the same.

The first version of the user requirements presented a total of 129, within the 8 lighthouse pilots and the HosmartAI's platform. In order to initiate the prioritization of the user requirements, the value and implementation risk of each requirement were provided. The categorisation of the requirements type was also carried out, resulting in a balanced number between the functional and non-functional user requirements.

This first version represents a solid ground for the user requirements of the HosmartAI project. Following the submission of this deliverable, the consortium will continue to work to implement the sprints to agile the process and continuously adapt these user requirements aiming for an optimization and acceptance of the solutions developed within the project. These developments and modifications will be contemplated on the next T1.2 deliverables, being the next one to submit at M11, within D1.3 "Stakeholders' Requirements and Analysis Report - Second version".

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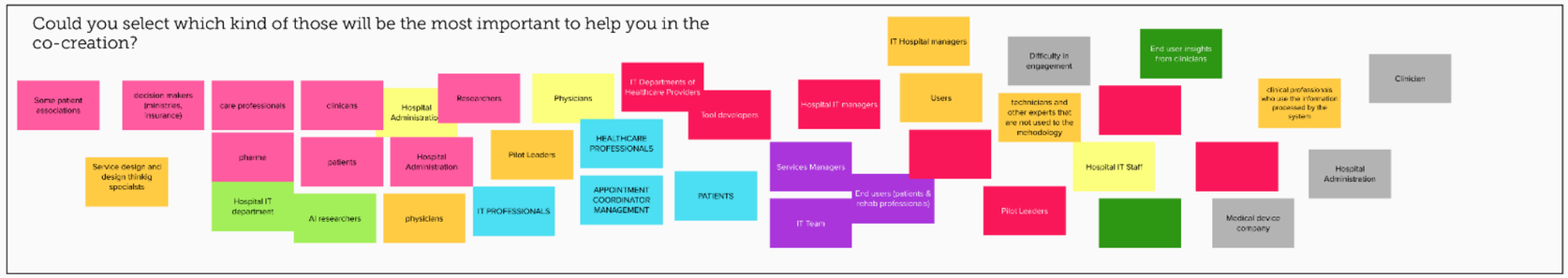
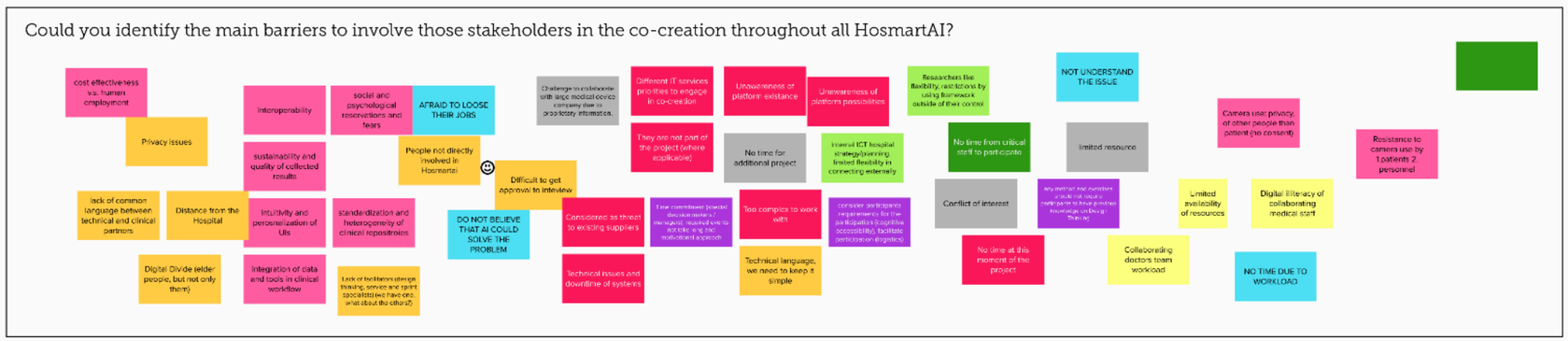
Appendix A MURAL (workshop during the consortium meeting on 30th June 2021)

Co-creation, as user-centred design culture, will be at the heart of the involvement of stakeholders at pilot level. Co-creation in healthcare has a built-in provision to sort immanent conflicts of interests and opinions up front. It does so by having the participants in the process learn each other's perspectives in the course of the development of innovation.

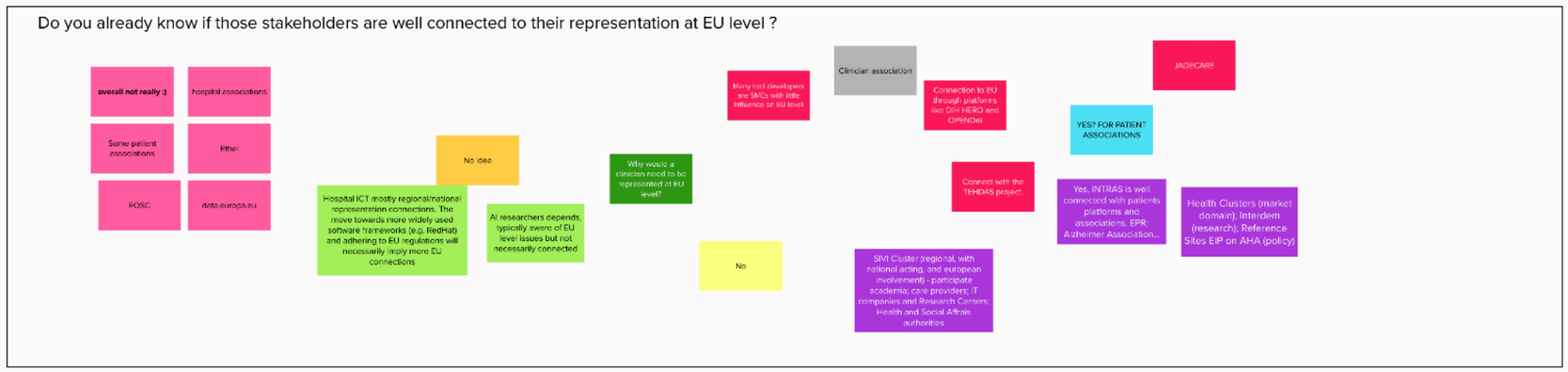
Q1



Q2



Q3



Platform
Pilot 1
Pilot 2
Pilot 3
Pilot 4
Pilot 5
Pilot 6
Pilot 7
Pilot 8

Appendix B Initial feedback questionnaire

20210818_Questionnaire T1.2_initial feedback_complete answers

Type of partner

Please identify your entity.

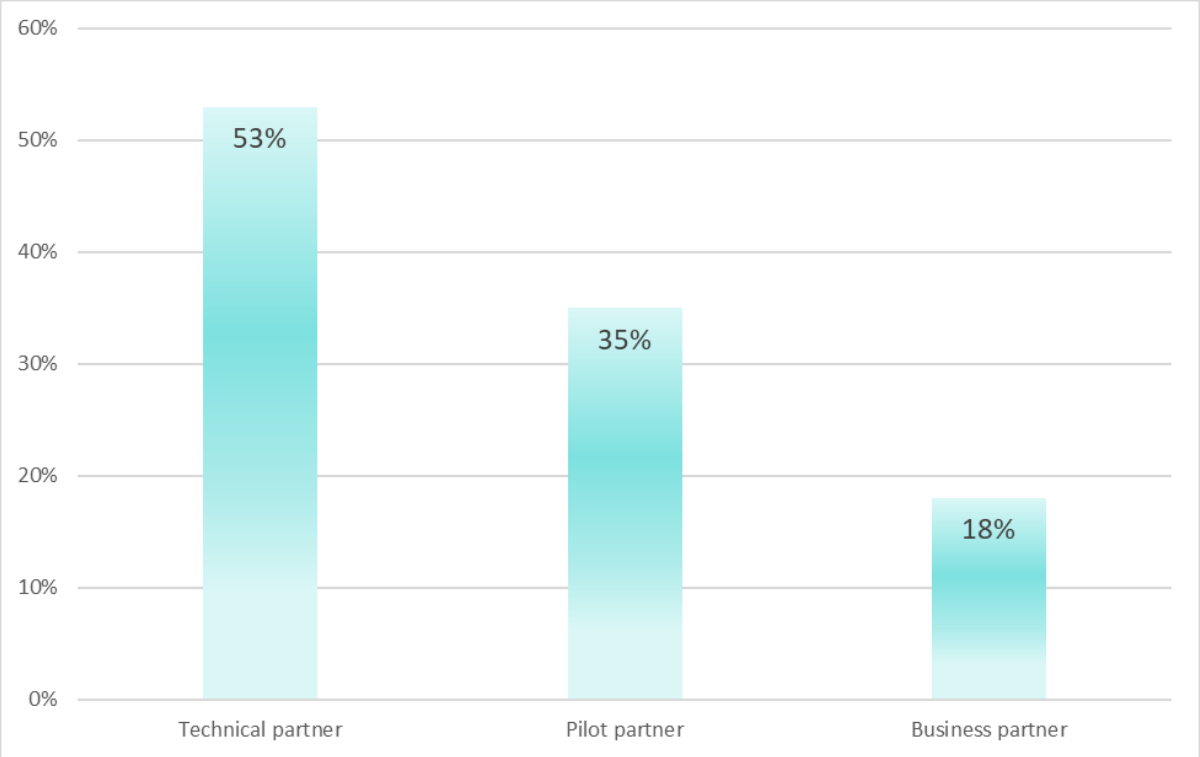
Number of respondents 17

Value	%	Total
Green Communications	5.9%	1
European Federation for Medical Informatics	5.9%	1
ETH Zurich	5.9%	1
INTRAS	5.9%	1
San Camillo IRCCS	5.9%	1
University of Maribor, University Clinical Center Maribor	5.9%	1
AUTH	5.9%	1
Leontios Hadjileontiadis - AUTH	5.9%	1
EXYS	5.9%	1
Liège University Hospital	5.9%	1
VUB	5.9%	1
VIMAR	5.9%	1
AUTH + AHEPA	5.9%	1
INTRA	5.9%	1
Vimar (perspective: Innovation Manager - therefore, while a technical questionnaire has been filled in, we would also like to give the business perspective)	5.9%	1
TeraGlobus Latvia, JSC	5.9%	1
ETHZ	5.9%	1
	Number of respondents	17

Type of partner

Please select which partner type you are within the T1.2. of the HosmartAI project:

Number of respondents 17



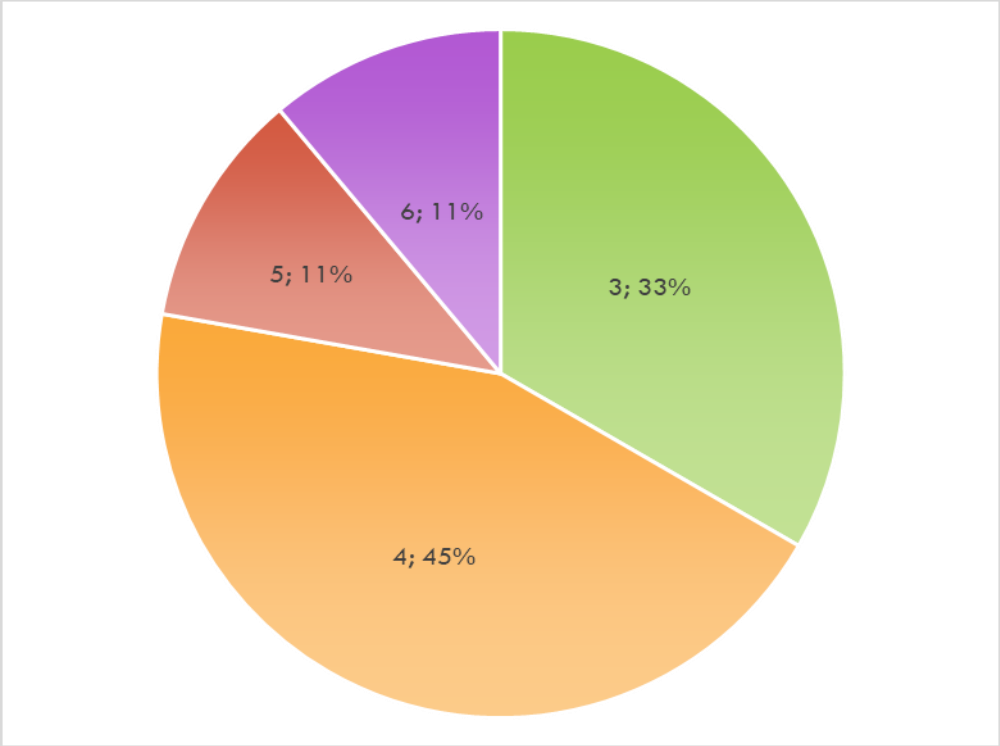
Please select which partner type you are within the T1.2. of the HosmartAI project:

Value	%	Total
Technical partner	53%	9
Pilot partner	35%	6
Business partner	18%	3
	Number of respondents	17

To be answered by technical partners

How many sprints do you believe are necessary and realistic (consider a good balance among iterations foreseen, time, efforts) from M7/8 to M31?

Number of respondents 9



Value	%	Total
3	33%	3
4	44%	4
5	11%	1
6	11%	1
	Number of respondents	9

To be answered by technical partners

2. Identify the most important stakeholders you need to collect insights from, for the design and development in which you are involved

Number of respondents 9

a-Stakeholders Profile (e.g. IT, clinicians, nurses, patients, technology providers, policymakers).

Value	%	Total
IT	22%	2
Technology providers	11%	1
Clinicans	11%	1
Policy Makers	11%	1
Pilot Leader	11%	1
Electrophysiologist	11%	1
Clinicians	11%	1
Healthcare Professional	11%	1
	Number of respondents	9

a-Minimum expected nº participants in sprints.

Value	%	Total
5	22%	2
3	11%	2
10	11%	1
4	11%	1
1	11%	1
5-8	11%	1
8	11%	1
	Number of respondents	9

b-Stakeholders Profile (e.g. IT, clinicians, nurses, patients, technology providers, policymakers).

Value	%	Total
IT	17%	1
Healthcare Managers	17%	1
WP2 partners	17%	1
Clinicians	17%	1
Nurses	17%	1
Clinicians	17%	1
	Number of respondents	6

b-Minimum expected nº participants in sprints.

Value	%	Total
3	17%	1
2	17%	1
6	17%	1
4	17%	1
5-10	17%	1
5	17%	1
	Number of respondents	6

c-Stakeholders Profile (e.g. IT, clinicians, nurses, patients, technology providers, policymakers)

Value	%	Total
Hospital IT Staff	17%	1
Technology experts	17%	1
Technology providers	17%	1
Policy Makers	17%	1
End users	17%	1
WP3 partners	17%	1
	Number of respondents	6

c- Minimum expected nº participants in sprints.

Value	%	Total
4	33%	2
2	33%	2
10	17%	1
5	17%	1
	Number of respondents	

d-Stakeholders Profile (e.g. IT, clinicians, nurses, patients, technology providers, policymakers).

Value	%	Total
Policy Makers	67%	2
Patients	33%	1
	Number of respondents	3

d- Minimum expected nº participants in sprints.

Value	%	Total
3	33%	1
50-100	33%	1
2	33%	1
	Number of respondents	3

e-Stakeholders Profile (e.g. IT, clinicians, nurses, patients, technology providers, policymakers)

Value	%	Total
Policy Makers	100%	1
	Number of respondents	1

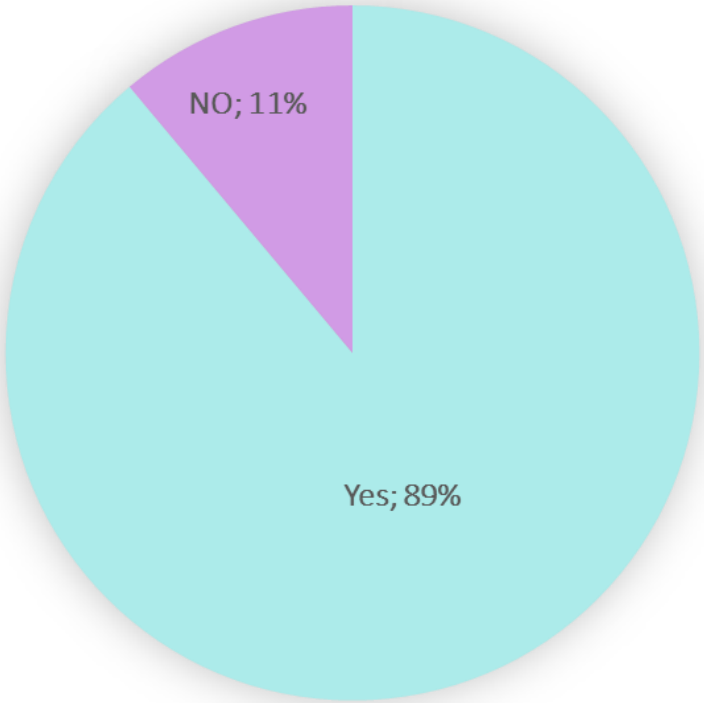
e- Minimum expected nº participants in sprints.

Value	%	Total
1	100%	1
Number of respondents		1

To be answered by technical partners

3. Are you keen to reach some stakeholders in the process?

Number of respondents 9



Value	%	Total
Yes	89%	8
NO	11%	1
	Number of respondents	9

To be answered by technical partners

Please indicate which stakeholders' profiles.

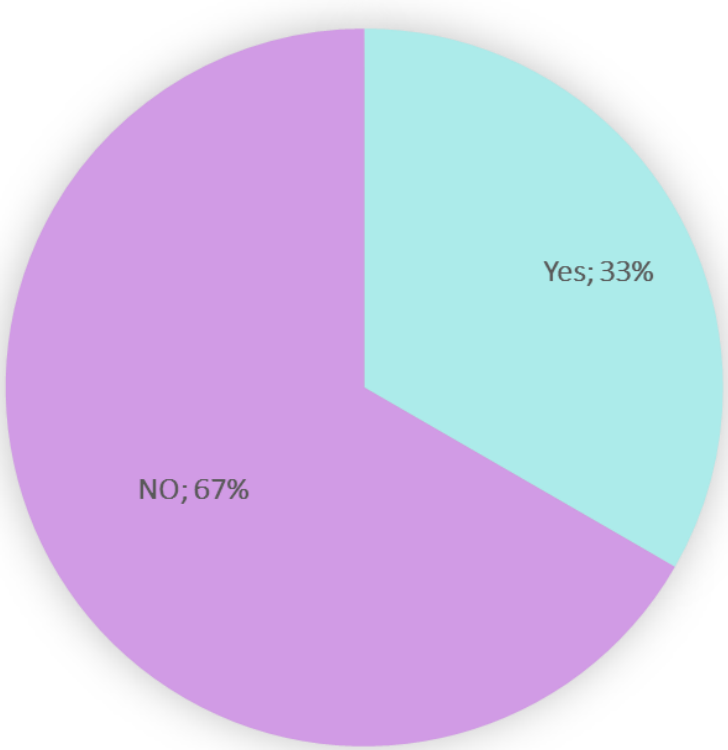
Number of respondents 8

Value	%	Total
IT, Clinicians	12,50%	1
All of the aforementioned, as the respective entities are members of the Hosmartai consortium.	12,50%	1
All above, expect limited access to policy makers	12,50%	1
Policy Makers	12,50%	1
WP2-3 partners and Pilot leaders	12,50%	1
Clinicians, Policy Makers	12,50%	1
Electrophysiologist with experience in cardiac ablation	12,50%	1
Cardiac electrophysiologist	12,50%	1
	Number of respondents	8

To be answered by technical partners

4. Do you envisage major constraints that should be discussed?

Number of respondents 9



Value	%	Total
Yes	33%	3
NO	67%	6
	Number of respondents	9

To be answered by technical partners

Please indicate these major constraints.

Number of respondents 3

Value	%	Total
use cases definition; resources (material, PM) needed for deployment;	33,33%	1
Backgroud constraints	33,33%	1
For patients, specific activities must be foreseen during ethical approval. Also, detailed interviews do not have repetitive patients that could be involved in the study multiple times.	33,33%	1
	Number of respondents	3

To be answered by technical partners

5. Indicate processes and methods for user requirements elicitation, system design and implementation with which you are familiarized (to understand partners' background experience).

Number of respondents 9

Value	%	Total
Observation, Brainstorming, interview, Requirements Workshops, Focus groups, web-based questionnaire, prototyping testing	11,11%	1
Not use to	11,11%	1
INTRA is a large software Company involved in several projects is familiar with the most established methods and processes	11,11%	1
Lean Startup	11,11%	1
Design thinking, personas, focus group, ideation, interview, people shadowing, experience map	11,11%	1
Interview with user and shareholder, literature review	11,11%	1
User Requirements Questionnaires and Surveys, Solution Analysis and Software Requirements	11,11%	1
Interview with clinicians	11,11%	1
LEAN development	11,11%	1
	Number of respondents	9

To be answered by technical partners

6. How do you plan to consider ethics design?

Number of respondents 9

Value	%	Total
Following GDPR	11.1%	1
We consider ethics and privacy by design two main concerns!	11.1%	1
Not relevant for our control algorithm and robotic system (no patient data store).	11.1%	1
Letter of Consent, Ethical approval and DTA between hospital and entities that will be granted access to personal data. Use of closed-loop systems and storage of extracted patient information on the hospital IT platform. Use of statistical cohorts and fully de-identified features for dissemination and AI training.	11.1%	1
ETHZ will not have access to patient data as the testing will be in-vivo only.	11.1%	1
Data is processed at source and will not travel over the Internet	11.1%	1
By implementing according to the GDPR principles.	11.1%	1
We will first gather the requirements from SELP and privacy tasks. Then work with the relevant experts on the technical implementation. Finally, consider how to integrate it with the HosmartAI platform.	11.1%	1
We plan it along the specification phase	11.1%	1
Number of respondents		9

To be answered by pilot partners

1. Indicate your pilot, and your pilot primary and secondary users.

Number of respondents 6

a-Pilot#1 – Primary Users

Value	%	Total
Healthcare Professional	100%	1
	Number of respondents	1

a-Pilot#1 – Secondary Users

Value	%	Total
Healthcare Managers	100%	1
	Number of respondents	1

b-Pilot#2 – Primary Users

Value	%	Total
Radiotherapy Units	100%	1
	Number of respondents	1

b-Pilot#2 – Secondary Users

Value	%	Total
Hospital Units	100%	1
	Number of respondents	1

c-Pilot#3 – Primary Users

Value	%	Total
Patients with neurological diseases	100%	1
	Number of respondents	1

c-Pilot#3 – Secondary Users

Value	%	Total
Healthcare professional expert un neurorehabilitation	100%	1
	Number of respondents	1

e-Pilot#5 – Primary Users

Value	%	Total
Patients and Clinicians	100%	1
	Number of respondents	1

e-Pilot#5 – Secondary Users

Value	%	Total
Nurses	100%	1
	Number of respondents	1

f-Pilot#6 – Primary Users

Value	%	Total
Older adults / Patients of the neuro-psychological rehabilitation services	100%	1
	Number of respondents	1

f-Pilot#6 – Secondary Users

Value	%	Total
Psychologists , neuropsychologists	100%	1
	Number of respondents	1

h-Pilot#8 – Primary Users

Value	%	Total
Researchers	100%	1
	Number of respondents	1

h-Pilot#8 – Secondary Users

Value	%	Total
Medical doctors, in relation to cancer	100%	1
	Number of respondents	1

To be answered by pilot partners

2. Describe your initial plan for recruiting participants for the stakeholders' interactions (through the sprints approach).

Number of respondents 6

Value	%	Total
Access to final users on the field, by direct involvement of patients, clinicians and government institutions.	16,7%	1
Identify the right mission staff at the radiotherapy unit Increasing awareness of hospital management so that they can intervene at the level of health policy decision-making bodies Tailoring and personalizing communications Organize and manage mission teams Improve patient perception and acceptance of the pilot Invite Elekta (Mosaiq software) to participate in the AI software of the pilot #2	16,7%	1
cross-sectional survey for experts and patients, online questionnaires targeting tech. users, specific questionnaires during pilot execution to improve between the deployments	16,7%	1
Inviting sessions explaining the project and participants' expected contribution. Mainly patients from the neuro-psychological rehabilitation services in INTRAS Clinic, therapists, caregivers, and other stakeholders as care providers, representatives of government services (welfare, health), academy, IT developers in the domain (mainly entities and representatives involved in the regional Cluster - innovative solutions for the independent living)	16,7%	1
We already have an ongoing project (TumorScope) where we connect to many stakeholders within the UZ Brussels hospital setting.	16,7%	1
Healthcare professionals from the 2 university clinics will be invited to participate in development cycles.	16,7%	1
Number of respondents		6

To be answered by pilot partners

3. What practices of community building and stakeholder's engagement you would like to adopt? (e.g. motivations, incentives, indications for recruitment guidelines…). Indicate opportunities and limitations foreseen

Number of respondents 6

Value	%	Total
The key problem is to connect the ICT requirements (security, protection of data, ...) with research requirements (some flexibility) that allow innovation for investigating new AI-based approaches using medical data, so enabling medical doctors to help interpret the increasingly complex data for cancer patients. We are building bridges between all these stakeholders, primarily by trying to position people 'in between' the different communities to increase inter-community communication and understanding, so leading to constructive solutions that will benefit everyone.	16,7%	1
Indications for recruitment guidelines and users' needs. Opportunity: to develop final products applicable to real cases. Limitations: potential lack of transferability.	16,7%	1
social media posts? do not completely understand.	16,7%	1
Incentives such as participation in scientific publication and research activities.	16,7%	1
Awareness, motivations, enrollment. Partnering with different stakeholders for identifying new potential participants. Opportunities: Leveraging the radiotherapy community ties Increase research activities by engaging different stakeholders Limitations: little support of some staff	16,7%	1
INTRINSIC & EXTRINSIC MOTIVATIONS/INCENTIVES for participation: - Role of contributors to the development of products or services that help preserve the autonomy of people with cognitive impairment, with a focus on understanding needs and experience of older adults when they use such planned technologies - Rewards from their participation: opportunity for socializing, share knowledge and experiences, planning joyful activities FACILITATING: - consult availability and necessary support to attend - adapt sessions to participants requirements, time and preferences as possible - organize in a low requirements for participation format (as possible, especially when involving patients) - plan well the questions and activities to propose for the defined purposes in each sprint session with stakeholders - for a sense of community we might develop a Hosmartai newsletter for the local group of stakeholders.	16,7%	1
	Number of respondents	6

To be answered by pilot partners

4. Which is the essential information to be included into de informative for stakeholders participating in the sprints?

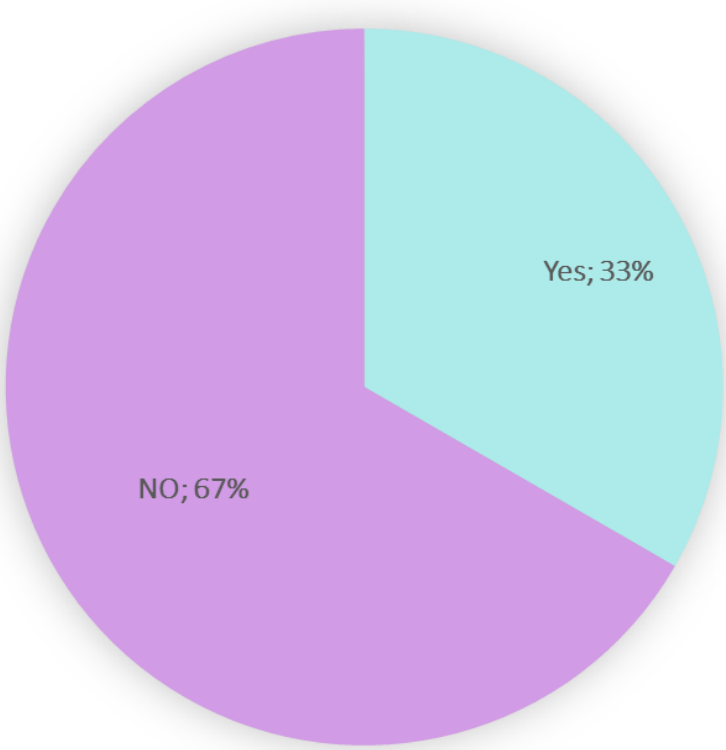
Number of respondents 6

Value	%	Total
The question is unclear.	16,7%	1
Informative material about the activities in which participants are asked to be enrolled, with obligations and rights of leaving. Brief explanation of the project and pilot solution planned. Participants informed consent to participate.	16,7%	1
related to usability, user experience and ease of use	16,7%	1
Different requirements for different stakeholders within the above-described problem setting	16,7%	1
The pilot's summary with particular attention to the objective and the benefits for all stakeholders.	16,7%	1
Clinical advantages, economic sustainability, safety.	16,7%	1
Number of respondents		6

To be answered by pilot partners

5. According to the normal procedures implemented in your entity, do you expect that the stakeholders' participants (including real users) need to re-consent before each sprint interaction?

Number of respondents 6



Value	%	Total
Yes	33%	3
NO	67%	6
	Number of respondents	9

To be answered by pilot partners

Please, identify why it is required or not required.

Number of respondents 6

Value	%	Total
It is not mandatory, however, is the organization's practice when working with patients, to explain in every session that has a different purpose or activities to inform and ask for reconsent. (re-consent per sprint)	16,7%	1
Depending on needs to collect personal data	16,7%	1
If it is not in the study protocol it cannot be implemented and related to patients we do not have continuous involvement of a patient in the pilot from its start to its end.	16,7%	1
Patients need to sign informed consent only once at recruitment.	16,7%	1
The stakeholders are healthcare professionals working in the university clinics.	16,7%	1
The security and data protection is already in place, but we need to develop systems that enable research on these data. At one point additional consent/approval will be required (e.g. for accessing (pseudo-) anonymized data), but current procedures are sufficient at this moment.	16,7%	1
Number of respondents		6

To be answered by pilot partners

6. How much time in advance you need to plan (fix the day/s) co-creation/testing sessions?

Number of respondents 5

Value	%	Total
30 days	20,0%	1
if it is required in the protocol then before submitting the protocol. Else at least two months.	20,0%	1
Not sure, need to discuss this - you give a lot of information at the beginning of the survey but it is difficult to assess what this entails practically (i.e. what is important in the first stage, ...)	20,0%	1
At least one month to fix dates with clinicians.	20,0%	1
2 to 3 weeks	20,0%	1
Number of respondents		5

To be answered by pilot partners

7.1. Co-creation sessions:

Number of respondents 5

Value	%	Total
See above, procedures currently in place should suffice initially	20,0%	1
- internal ethical committee review and agreement	20,0%	1
To inform on expected results	20,0%	1
GDPR	20,0%	1
clinical protocol, ethical approval, anonymity and GDPR, balance of gender	20,0%	1
	Number of respondents	5

To be answered by pilot partners

7.2. Co-creation involving experimentation/testing:

Number of respondents 6

Value	%	Total
None	16,7%	1
/	16,7%	1
GDPR	16,7%	1
Ethics committee approval	16,7%	1
To inform on expected results and data needed to achieve	16,7%	1
- internal ethical committee review and agreement - in some cases, if necessary to collect personal data, it might be necessary approval by the regional ethical committee	16,7%	1
	Number of respondents	6

To be answered by pilot partners

8. Indicate the background of the local stakeholder's group manager and/or professional facilitators who will be conducting the interactions with the stakeholders' group.

Number of respondents 6

Value	%	Total
Clinical and academic background	16,7%	1
Scientists used to managing projects with several stakeholders	16,7%	1
Hans de Canck, Dieter De Court, both are innovation-oriented people working within AI at the VUB (Hans) and for innovation within the UZ Brussels (Dieter)	16,7%	1
Psychologist Neuropsychologist Gerontologist	16,7%	1
Experienced (more than 4 years of experience) in co-creation and living lab methodology.	16,7%	1
???	16,7%	1
Number of respondents		6

To be answered by pilot partners

9. Indicate the co-creation methodologies with which you are familiarized (to understand background experience).

Number of respondents 6

Value	%	Total
None really beyond practical experience in interdisciplinary projects, and the principles that I got from your information at the beginning.	16,7%	1
Design thinking 5 steps; co-creation workshops; interviews; focus groups; showcasing; co-creation with testing or simulations; …	16,7%	1
Case-study and qualitative	16,7%	1
Focus group, interview, role-playing	16,7%	1
World cafe, mapping (e.g. empathy, stakeholders, value), observations, blueprint creation, prototype testing.	16,7%	1
user questionnaires and likert subjective experiments. As mentioned in the meetings options would be preferred…	16,7%	1
Number of respondents		6

To be answered by pilot partners

10. Indicate user-requirements elicitation methodologies with which you are familiarized (to understand background experience)

Number of respondents 5

Value	%	Total
None	20,0%	1
Design thinking, personas, focus group, ideation, interviews, people shadowing, experience map	20,0%	1
user questionnaires	20,0%	1
Interviews, brainstorming, focus group, surveys, questionnaires,	20,0%	1
collecting user requirements from literature, interviews, questionnaires, user observation, workshops, brainstorming, use cases, role-playing and prototyping	20,0%	1
Number of respondents		5

To be answered by pilot partners

11. Indicate specific aspects for scheduling of the mentioned activities that should be considered (e.g. periods of personnel vacations, holidays, overlap with other activities, periods in which is more difficult to bring together the stakeholder group)

Number of respondents 6

Value	%	Total
holidays, other activities (research, clinical)	16,7%	1
vacations, holidays, December is almost impossible, also july - mid sept. Are not good months, COVID	16,7%	1
All the cited above	16,7%	1
Will be difficult from half July to half August.	16,7%	1
The Orthodox Easter holidays, holidays in August, possible restrictions due to COVID-19.	16,7%	1
Limit access to participants (patients, therapists, and other stakeholders: August and Christmas period. Other stakeholders rather than the primary and secondary users normally show less availability for participating (important to consider this aspect in the length of the proposed activities). There might be times were activities with other projects overlap generating internal workload. For reducing such risk, we need to have planned the dates for the sprints events in which as pilot partner we participate, and expected dates for the interactions with the stakeholders in advance (2 months before if possible)	16,7%	1
Number of respondents		6

To be answered by Business partners

1. Indicate the group(s) of stakeholders that should be engaged in T1.2 for collecting the business perspective you plan to reach

Number of respondents 2

a-Stakeholders

Value	%	Total
Healthcare system: healthcare professionals	50%	1
medical technology end users	50%	1
	Number of respondents	2

a-Purpose

Value	%	Total
Validate technical value of the solutions	50%	1
to collect feedback on primary and secondary users' needs with a patient-centered care delivery perspective	50%	1
	Number of respondents	2

a-Expected moment in the project (MX)

Value	%	Total
During Pilots (WP5) + Business Modelling phase (WP7)	50%	1
tbd	50%	1
	Number of respondents	2

b-Stakeholders

Value	%	Total
Healthcare system: management (directors, financial & procurement managers)	100%	1
	Number of respondents	1

b-Purpose

Value	%	Total
Understand and validate the value of the solutions (and understand buying approaches)	100%	1
	Number of respondents	1

b-Expected moment in the project (MX)

Value	%	Total
During Pilots (WP5) + Business Modelling Phase (WP7)	100%	1
	Number of respondents	1

c-Stakeholders

Value	%	Total

Regional Healthcare policymakers	100%	1
	Number of respondents	1

c-Purpose

Value	%	Total
Understand added value of solutions and differences from available ones	100%	1
	Number of respondents	1

c-Expected moment in the project (MX)

Value	%	Total
During Pilots (WP5) + Business Modelling Phase (Wp7)	100%	1
	Number of respondents	1

d-Stakeholders

Value	%	Total
Solution Providers	100%	1
	Number of respondents	1

d-Purpose

Value	%	Total
Understand integration potential	100%	1
	Number of respondents	1

d-Expected moment in the project (MX)

Value	%	Total
During Pilots (WP5) + Business Modelling Phase (Wp7)Open Calls (WP6)	100%	1
	Number of respondents	1

e-Stakeholders

Value	%	Total
ServiceProviders	100%	1
	Number of respondents	1

e-Purpose

Value	%	Total
Understand the role of data generated by and from the Hosmartai Platform	100%	1
	Number of respondents	1

e-Expected moment in the project (MX)

Value	%	Total

During Pilots (WP5) + Business Modelling Phase (Wp7)	100%	1
	Number of respondents	**1**

f-Stakeholders

Value	%	Total
Regional facilitators (DIHs)	100%	1
	Number of respondents	**1**

f-Purpose

Value	%	Total
Understand exploitation potential and business models relevant to regional solution & technology providers and end users	100%	1
	Number of respondents	**1**

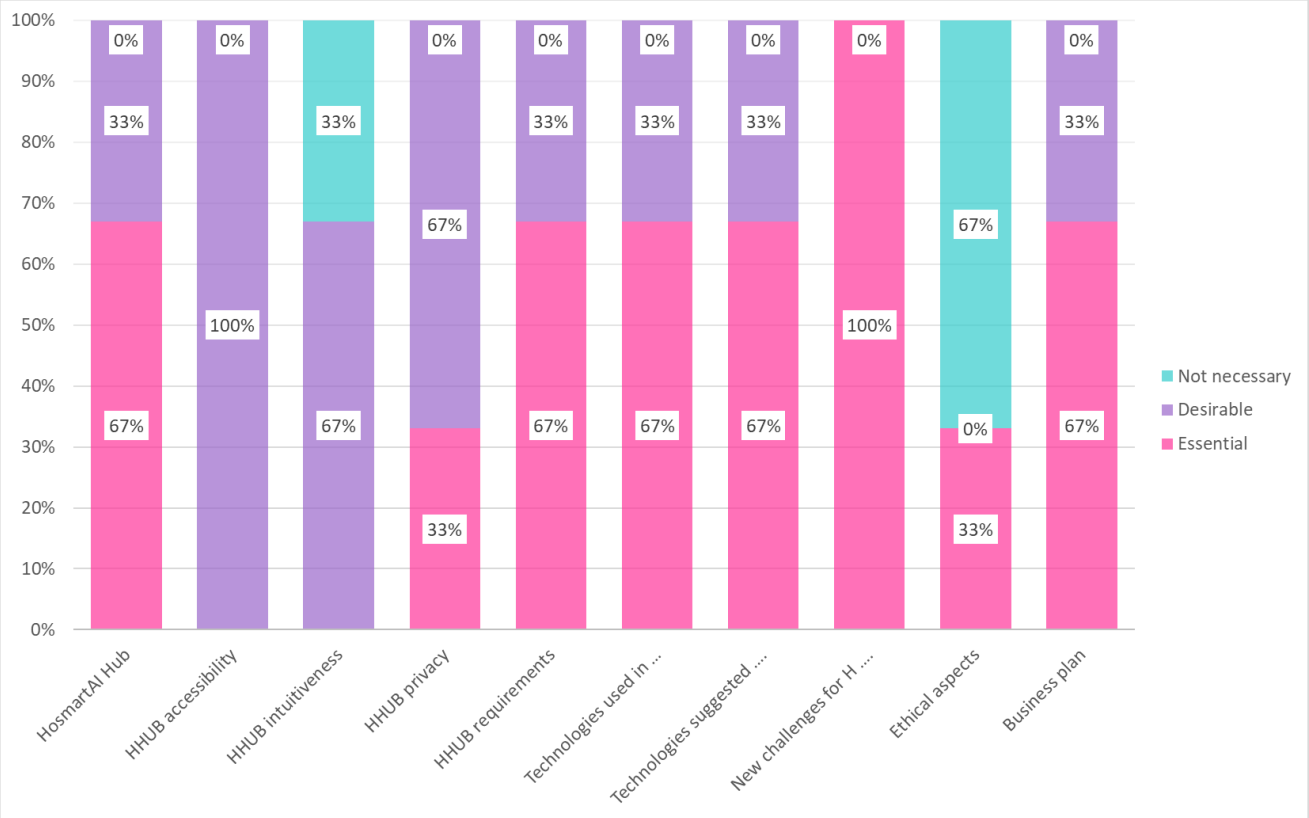
f-Expected moment in the project (MX)

Value	%	Total
During Pilots (WP5), Open Calls (WP6) and WP7	100%	1
	Number of respondents	**1**

To be answered by Business partners

a. Please indicate in the following table the priority you attribute to the suggested topics.

Number of respondents 3



Fila	Essential	Desirable	Not necessary
HosmartAI Hub	67%	33%	0%
HHUB accessibility (HHUB accessibility)	0%	100%	0%
HHUB intuitiveness (HHUB intuitiveness)	0%	67%	33%
HHUB privacy (HHUB privacy)	33%	67%	0%
HHUB requirements (HHUB requirements)	67%	33%	0%
Technologies used in the pilots (Technologies used in the pilots)	67%	33%	0%
Technologies suggested in the open calls' application (Technologies suggested in the open calls' application)	67%	33%	0%
New challenges for HosmartAI (to understand the necessity of new usability) (New challenges for HosmartAI (to understand the necessity of new usability))	100%	0%	0%
Ethical aspects (Ethical aspects)	33%	0%	67%
Business plan	67%	33%	0%

To be answered by Business partners

2.2. Please indicate any other topic(s) that you consider relevant

Number of respondents 2

a-Other suggestions

Value	%	Total
Pricing Models	50%	1
Data topology	50%	1
	Number of respondents	2

a-Essential

Value	%	Total
X	50%	1
X	50%	1
	Number of respondents	2

b-Other suggestions

Value	%	Total
Maintenance policies	100%	1
	Number of respondents	1

b-Essential

Value	%	Total
X	100%	1
	Number of respondents	1

c-Other suggestions

Value	%	Total
End user awareness	100%	1
	Number of respondents	1

c-Essential

Value	%	Total
X	100%	1
	Number of respondents	1

To be answered by Business partners

3. Advance a list of concrete questions you would like to see consulted with the stakeholders.

Number of respondents 2

Valor	%	Total
What is the balance between innovation and experience (estimated, %)?	50%	1
1) Maintenance policies: who should be responsible for the maintenance and quality of available applications/data/resources available on the Hosmartai Platform (including the selection of new apps)? 1.a) Maintenance policies (to technology and service providers): would you be willing to pay to be included in the HosmartAI marketplace? 2) Pricing model: Who should pay for the "Content" of the Hosmartai Platform? 3) Which could be the most effective ways to make end users fully aware of the potential of the Hosmartai Platform? (i.e.: available demo versions, engage dIHs, other) 4) Which constraints (technical, economic, administrative/bureaucratic) do you see in proposing the Hosmartai platform to a) healthcare professionals/management; b) healthcare authorities AND what would you suggest to overcome them? 5) Are you aware of similar platforms/initiatives/services? 6) How would you rate the transferability of the technologies used in the pilots to your context? 7) Do you have other challenges to suggest that the HOsmartAI platform should focus on?	50%	1
Number of respondents		2

To be answered by Business partners

4. Indicate the methods you plan/consider for business assumptions exploration and validation (e.g. queries, interviews and surveys, Delphi, …).

Number of respondents 3

Value	%	Total
Run short interviews with an ideal online follow-up survey. Interviewee should ideally be provided with a clear concept/description of the HHUB and its potential benefits + description of the pilots (and the role of the HUB for the pilots)	33,3%	1
surveys, Analytical Hierarchy Process (AHP), Delphi	33,3%	1
queries, surveys	33,3%	1
	Number of respondents	3

Campos de usuario

Number of respondents 0

Show average	Numbers of respondents

No results found

Parámetros

Number of respondents 17

Value	%	Total

No results found

	Number of respondents	17

Appendix C User stories

C.1 Template provided for user stories

Workshop session (recommended):

You can perform a workshop of one hour to brainstorm the characteristics of personas with real users (for example, professionals from your entities, or with patients once no personal data will be collected, just a group discussion). You can use this brainstorm format to initiate the discussion of the topic (e.g., Assistive Care in Care Centre: Virtual Assistant) that you want to develop.

Main Objective: Participants can either support the construction of 'personas' and then discuss how technology could be built to best support them in their "patient journey" or "working journey" according to the case you are working in.

You can take this opportunity to understand better the opportunities for local recruitment in this workshop or in a different consultation. An example of questions is given:

- Would you be willing to become a member of an expert by experience group/stakeholders panel to be part of discussions and access prototype technologies for… (describe your case)
- Would you be flexible to participate in morning/afternoon/evening meetings?
- Is there a time of the year that would be difficult for you to participate?
- Would you prefer to participate in a group, or alone?
- What is the best incentive for you to participate? (e.g. pleasant meetings that guarantee a sense of belonging, usefulness and creation of routines of co-participation, group cohesion)
- How can this group be organized so that each one feels comfortable, safe, satisfied and eager to continue participating? (e.g. How often would you like to be invited?; How long would you like to participate each time; What would you like your interaction to be each time, etc.)
- How often would you be happy/motivated to participate in short sessions, interacting with some technology and providing feedback (your vision of how it fits into your life or others who can benefit from it) so that you can give your opinion and thus help to better respond to the real needs of people?
- What can make you stay encouraged to participate?
- What is the biggest barrier to your participation?

If you proceed with this questioning, please, report the main results.

Pilot Partner:
Number of stakeholders per profile involved in the consultation:

Please provide the overall feedback from all the participants (aggregated), highlighting more the common findings.

- ***Willingness to participate in the group***
- ***Incentive for participation***
- ***Benefits of the participation***
- ***Major concerns***
- ***Participation in a group or individually***
- ***How long should interactions (sessions, interviews or questionnaires) last***
- ***Role in the HosmartAI stakeholder community***
- ***What they expect from such a project***

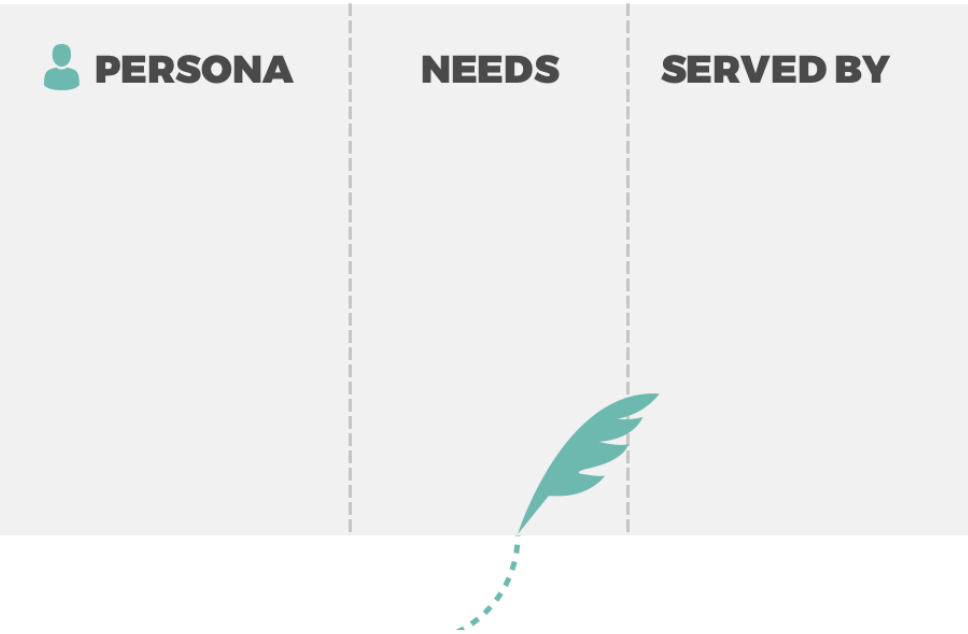
Guidelines for the session: Using Design Thinking and participatory research principles, participants can be organized in the most suitable manner considering COVID-free protocols.

Personas are a tool to characterise the target users to make better product decisions. The process of creating personas helps to develop empathy with the people with who you intend to use your product, and a workshop is a great way to encourage your stakeholders to think about user needs effectively instead of thinking about solutions first.

- You can do a face to face workshop or an online workshop (you can use easy facilitating online tools such as https://ideaboardz.com/ we can support you setting the "Persona Canvas")

1. **CREATE THE CANVAS**

To run the workshop, the first thing you need to do is draw the canvas for each persona you have. You can draw it on a whiteboard, using brown craft paper, poster-sized post-its, or whatever large sheets of paper you have.



Once you have the canvas ready, you will do the whole exercise for one of the personas and then, after you finish with that persona continue and do the exercise with the next one. And so on for each persona.

2. DEFINE THE "PERSONA"

Once you have the canvas ready, you will do the whole exercise for one of the personas and then, after you finish with that persona continue and do the exercise with the next one. And so on for each persona.

Start the workshop by spending some time trying to understand and empathise with the persona by completing a bio. We'll start with high level data and drill down to more specifics to complete a picture of that persona. The basic data to start with is:

- Name
- Age
- Occupation
- Location

You can also include other data if you feel it would be relevant for your project, like technology use, social media use, socioeconomic level, budget, time available, etc.

Then, start talking about this persona's bio as a team. This is important, so take your time. The more specific you go here, the better. Talk about the parts of her bio related to your project, but try to go a bit further.

Is your persona married? Do they have a pet? What are her hobbies? How about her personality? Favourite sport, films, food, book, colour…? Of course you´re inventing all of this,

but it helps to create an emotional link with your imaginary persona. You don't need to write down everything, just make sure everyone feels like they have really met the persona before you continue on with the workshop.

Once you feel the persona has taken form in the mind of all the participants of the workshop, write down the behaviours of your persona. This time include the behaviours that relate to your project only, so try to be as specific as you can. Nothing too complicated, a simple list is more than enough.

Note: if you will need any extra facilitation you should organize it in advance in case you work with participants that have cognitive accessibility requirements. For example, you can create supportive cards with characteristics that persona can have to facilitate participation.

3. DEFINE USER NEEDS

Time to move to the next area of the canvas, defining the needs.

Give post-its to the participants and ask them to think about the needs of the persona. Spend some time brainstorming them, asking your team to write down one need in each post-it and to share it with the rest of the team. Once you have a good amount of post-its covering the wall, give 3 dot stickers to each participant and ask them to vote the most important needs of that user.

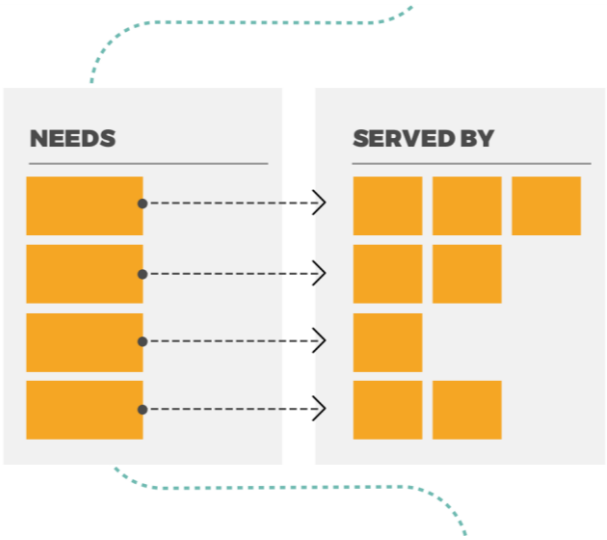
Once the voting is done, keep the needs with votes and discard the rest for the next part of the workshop.

4. SERVED BY

Now we're up to the last part of the persona canvas.

For each of the selected needs, spend some time brainstorming how you can serve it with your project. Again, use post-its to do this, one idea per post-it.

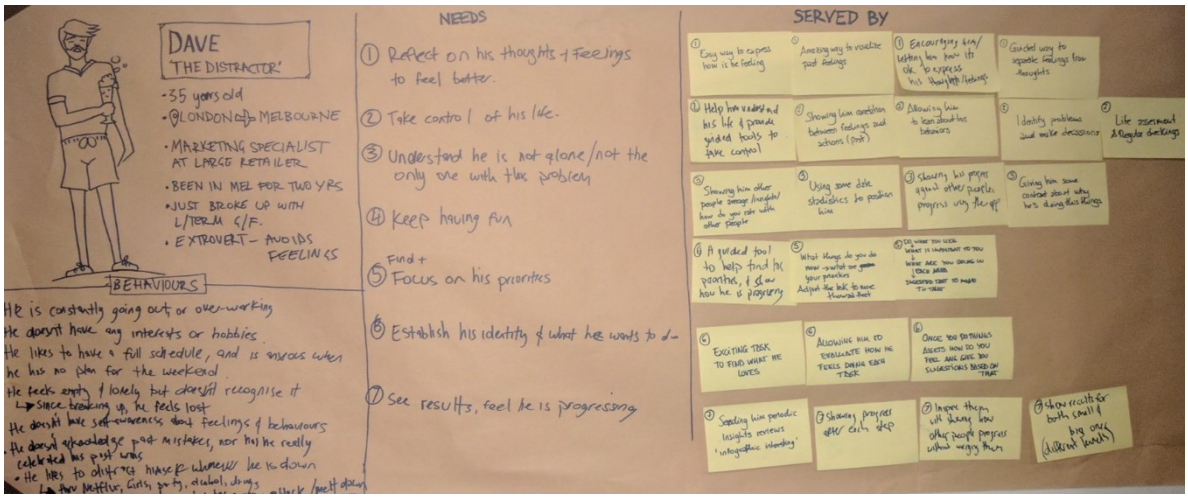
After spending some time ideating in one need, order the ideas from most relevant to least. Use the voting stickers if you need to, but it should be easy to decide just by having a little chat. Discard the least relevant ones. Repeat this ideation process for each of the needs.



5. YOUR PERSONAS ARE READY!

And you´re done! At the end, you'll have a great understanding of the persona, what needs she has and how you can serve her needs with your project. If you repeat it with all your key personas, at the end you'll have a good list of functionalities or ideas for your project.

You can see below how can be a final example of personas



Extracted exercise from @unmade.design best practice

After the session, you should report the "personas" in the templates provided (template can be adjusted according to your cases).

Template to fill "Personas"

The user story includes a Persona description (commonly shared characteristics of the targets users that the HosmartAI want to address).

This Persona will be a representation of the typical user. Like this, you can address their needs and develop the best, simplest and more efficient solution. Try to define the information presented in the following table in order to best describe the participant of your pilot. Keep in mind that this is a representation of a real person, so try not to exaggerate. A common mistake is to overwhelm a Persona with a lot of problems that need care.

You can have a look at the existing personas of EIPonAHA and use them as a starting point or even completely the same if they fit your users.

https://ec.europa.eu/eip/ageing/news/12-personas-have-been-developed-enable-eip-aha-envision-realistic-health-and-care-needs-certain_en.html

Some suggestions:

When creating these, we ask you to consider each *Persona* while describing each one of your target users (?) (empathise). In other words, **describe in *Personas* the users of the solution you are deploying.** Put yourself in the end user's "shoes", explore what this *Persona* may need, its concerns, etc**. to understand how you can help the end user in the most efficient way**.

User Personas are key tools in design processes and marketing plans, ideally resulting in useful and successful products.

Do not be afraid to **be specific** in your persona development. **You can always edit and modify your user personas later on**.

The components of user personas vary depending on customer base, company needs, and market research but often include the following:

- Demographic information such as name, age, gender, income, education, and location.
- Personal information such as name, job title, company, job description, marital status, and number of children.
- A short biography. Use this section to bring out personality traits
- Goals & motivators. Make sure that those listed always connect back to your product or service.
- Pain points. Think about your ideal customer's annoyances, problems, and even fears. This information will help you market a truly useful product that responds to demand

Persona ID:	Socio-demographics:		Digital literacy: (from 1 low to 5 high)	
Picture:	Age:		Internet usage	
			Mobile devices skills	
			Affinity to new tech	
			Digital Health Literacy	

			Technology usage	
Name:			General attitude toward technology	
About the person				
What is important to him/her	Care Concerns / Health concerns		Daily Living	
Events, issues & personal concerns	Treatment		Own Resources, Assets/Support	
Care professional concerns				
Unmet Needs				

Table from real to ideal

From Real to Ideal: You can progress with this simple exercise to support you defining the next step of user stories.

Persona ID	*Issue / topic*	*What happens nowadays?*	*What is the ideal scenario?*

Table of epics that compound the user stories

User stories can be created at varying levels of detail. We can start by creating a user story to cover large amounts of functionality. These large user stories are generally known as Epics. An Epic is a less detailed User Story.

When creating these Epics, we ask you to consider each *Persona* that you have created in the previous step. In other words, **describe in *Personas* the users of the solution you are deploying.** Put yourself in the end user's "shoes", explore what this *Persona* may need, its concerns, etc**. to understand how you can help the end user in the most efficient way**.

- We ask you to consider the type of user that you are empathizing with (e.g. primary user? Or secondary user?; who is the type of user that we are addressing?)
- Define aspects of what your end users want or expect the system to do (what actions they allow and how they expect it to work)

Please try to think about the technologies that are already described and that will be used in your pilot. What needs are these technologies addressing? Also, try to envisage how these technologies can be improved/changed to meet better your users' needs or propose features for unmet needs. Do not be afraid to be creative, it is not mandatory to implement everything at the end. This is a first planning phase.

When fulfilling the following table, you advise you to do so thinking about completing the sentences:

As a < type of user >, I want < main goal > so that < main purpose >. For this, I <proposed the solution>.

Persona ID	*As a < type of user >*	*I want < main goal >*	*so that < main purpose >.*	*For this, I <proposed the solution>*

C.2 User stories

C.2.1 Pilot 1

Template to fill "personas"

Persona ID: 1	Socio-demographics:		Digital literacy: (from 1 low to 5 high)	
Picture: (no data)	Country:	Greece	Internet usage	5
	Job title:	Cardiologist	Mobile devices skills	5
			Affinity to new tech	5
			Digital Health Literacy	5
			Technology usage	5
Name: John			General attitude toward technology	5

About the person
– John is a cardiologist at the 1st Cardiology Clinic at AHEPA hospital in Thessaloniki, Greece. – He works there for five (5) years. – He is interested in medical research and participates in various studies as a researcher. – He also maintains a private practice

What is important to him/her	Care Concerns / Health concerns	Daily Living
– To provide the best possible medical services to patients. – To save each patient from unnecessary examinations that may have adverse effects. – To reduce patient's stay in the health unit.	(Not relevant data)	He works at the 1st Cardiology Clinic at AHEPA hospital from 10:00 to 17:00 and then he continues to provide medical services in his private office from 18:00 to 22:00.
Events, issues & personal concerns	**Treatment**	**Own Resources, Assets/Support**
(Not relevant data)	(Not relevant data)	(Not relevant data)
Care professional concerns		
Due to workload and work pressure, John worries that he may not interpret examinations results correctly and either submit the patient to further unnecessary and potentially harmful medical examinations, or release him while he should be examined further.		
Unmet Needs		
– To reduce the examination time to what is absolutely necessary. – To use smart systems and interventions that will help him make better decisions based on patients' objective medical data.		

Persona ID: 2	*Socio-demographics:*		*Digital literacy: (from 1 low to 5 high)*	
Picture: (no data)	Country:	Greece	Internet usage	5
	Job title:	Gynecologist Obstetrician	Mobile devices skills	5
			Affinity to new tech	5
			Digital Health Literacy	5
			Technology usage	5
Name: Peter			General attitude toward technology	5

About the person

- Peter is a gynecologist at the Gynaecology and Obstetrics unit in a secondary hospital in Central Macedonia, Greece.
- He works there for three (3) years.
- He is interested in medical research and participates in various studies as a researcher.

What is important to him/her	Care Concerns / Health concerns	Daily Living
– To provide the best possible medical services to pregnant women.	(Not relevant data)	He works at the hospital's Gynecology and Obstetrics clinic from 10:00 to 17:00.
Events, issues & personal concerns	**Treatment**	**Own Resources, Assets/Support**
(Not relevant data)	(Not relevant data)	(Not relevant data)
Care professional concerns		

Due to the clinic's lack of resources (typical for secondary/local hospital) Peter worries that:

- He may pointlessly refer pregnant women with symptoms of preterm labor to the region's referral center.
- He cannot effectively monitor cases complicated by fetal growth restriction (FGR).

Unmet Needs

- To use smart systems and interventions that will help him make better decisions.
- To organize and monitor needed data in the most efficient way.
- To have an efficient digital way to communicate with referral centres.

Table from real to ideal

Persona ID	*Issue / topic*	*What happens nowadays?*	*What is the ideal scenario?*
1	Need for AI support tools	– Patients' coronary CT angiography (CCTA) results in evaluation is based on the physician's experience. – No smart support tools are available. – Patients might receive further, more extensive, but possibly unnecessary examinations. – Further examinations might have adverse effects and also can last up longer, freeing up hospital resources.	– CCTA objective results and insights in combination with lab results, medical history, etc. are entered into an AI system that indicates whether or not each patient needs to undergo further examinations. – The system's output will be the presence of obstructive coronary artery disease (CAD), defined as the detection of ≥ 50% diameter stenosis.

Persona ID	*Issue / topic*	*What happens nowadays?*	*What is the ideal scenario?*
2	Need for AI support tools	– Pregnant women with symptoms of preterm labor undergo for a computerized cardiotocography (cCTG). Based on cCTG analysis the treating physician decides if women need to be referred to the region's referral center, in case neonatal intensive care unit is needed. – Smart tools are available only for cCTG analysis. – The transfer of neededmedical information is performed by telephone between the two health units.	– Objective results from the cCTG analysis in combination with demographics and other obstetrical data are entered into an AI system that indicates whether or not each pregnant needs to be referred to the region's referral centre. – If needs to be referred, her medical information is automatically and digitally transferred to the referral center.
3	Need for monitoring tools	– Milder FGR cases are monitored as outpatients and have regular ultrasound and cCTG examinations, together with clinical assessment for preeclampsia. – Severe FGR cases are managed as inpatients, receiving more intense antenatal care with ultrasound and cCTG examinations and assessment for signs of preeclampsia. – In both cases no smart support tools are available, nor a system for monitoring medical data and course of the incident.	– The existence of a digital system for managing the necessary data of pregnant women and in addition a smart tool for data analysis and support of medical decisions.

Table of epics that compound the user stories

Persona ID	*As a < type of user >*	*I want < main goal >*	*so that < main purpose >.*	*For this, I <proposed the solution>*
1	As a cardiologist/health care professional,	I want to provide the best possible medical services to each patient	so that the patient doesn't need to repeat examinations and avoid possible adverse effects.	For this, I propose to use a smart AI system that indicates whether or not the patient needs to undergo further examinations.
1	As a radiologist/healthc are professional,	I want to optimize patients' examination time	so that more patients are examined on each shift.	For this, I propose to use a smart AI system that indicates which patients truly need to undergo further examinations and use resources of the health unit.

Persona ID	*As a < type of user >*	*I want < main goal >*	*so that < main purpose >.*	*For this, I <proposed the solution>*
2	As a gynecologist/obste trician/healthcare professional,	I want to provide the best possible medical services	so that pregnant women with symptoms of preterm labour are not unnecessarily referred to referral centers.	For this, I propose to use a smart AI system that indicates whether each pregnant woman needs to be referred to a referral centre.
2	As a gynecologist/obste trician/healthcare professional,	I want to provide the best possible medical services	so that pregnancies complicated by FGR (mild and severe) are effectively monitored until labour.	For this, I propose to use an electronic system for managing pregnant women's data.
2	As a gynecologist/obste trician/healthcare professional,	I want to provide the best possible medical services	so that pregnancies complicated by FGR (mild and severe) are effectively monitored until labour.	For this, I propose to use a smart tool for data analysis and support of medical decisions.

C.2.2 Pilot 2

Template to fill "personas"

Persona ID:	Socio-demographics:		Digital literacy: (from 1 low to 5 high)	
Picture: 	Age	75	Internet usage	2
	Civil Status	Married	Mobile devices skills	2
	Country	Belgum	Affinity to new tech	1
	Living situation	Lives in a house outside Liège City	Digital Health Literacy	2
	Profession	Retired (she used to be an employee)	Technology usage	2
	Economic Stauts	Middle class	General attitude toward technology	1
Name:	Marie			

About the person
Marie is married and has a daughter and 2 grandchildren. Marie does not drive and her husband, who had an accident a few years ago, cannot drive either. Marie needs to undergo a radiotherapy treatment for breast cancer during 3 weeks. Marie's daughter has a work schedule from 8:30 to 16:30 being only possible for her to drive her mother to the hospital at 17:00.

What is important to him/her	Care Concerns / Health concerns	Daily Living
– To enjoy life with their families. – To be as autonomous as possible in order to avoid to bother family members continuously and to be placed in a nursing home – To be able to go back to work as soon as possible – To have a social life	– To be able to attend to all their radiotherapy treatments. – To be able to attend to all their follow-up. – To have co-morbidities related to the radiotherapy and cancer treatment. – To have a cancer gene that might be transmitted to their offspring. – Not to worry about economic issues related to their health – Not to have access to a psychological support	– To be able to help their relatives who are older than them or in worst shape need quite some support. – To be able to have a daily walk or any physical or recreational activity (gardening, etc...) – To be able to shop on their own and prepare their own meals
Events, issues & personal concerns	**Treatment**	**Own Resources, Assets/Support**
– To forget his life and work memories. – To be forced to live in a nursing home – Economic issues	– Radiotherapy and several medications related to the cancer follow-up	– Resources: Comprehensive Cancer Center – Tangible support: family members and spouse. – Emotional support: family members, spouse and friends
Care professional concerns		

To be able to deliver a radiotherapy treatment at the right moment with the right machine.
Unmet Needs
Not to be able to take in account all the parameters influencing the patient flow at the radiotherapy unit.

Persona ID:	Socio-demographics:		Digital literacy: (from 1 low to 5 high)	
Picture: 	Age	50	Internet usage	4
	Civil Status	Married	Mobile devices skills	4
	Country	Belgium	Affinity to new tech	5
	Living situation	Lives in a house outside Liège City	Digital Health Literacy	4
	Profession	Radio-oncologist	Technology usage	4
	Economic Status	Higher class	General attitude toward technology	5
Name:	Jean			

About the person

Jean is a Radiation Oncologist who has been working in radiotherapy for 20 years. The CHU de Liège is its second employer. He previously worked in a very large hospital in the Brussels region.

Jean is married with two children. He is a very willing professional and works until very late every day to be able to treat all his patients according to the protocols described for each tumor.

He is very strict with the schedule coordinators because he wants all his patients to have their radiotherapy sessions at the time they want and in the appropriate radiotherapy machine.

What is important to him/her	Care Concerns / Health concerns	Daily Living
– To save his/her patients – To enjoy life with their families.	– Treat patients as best as possible. – The planning of appointments must consider a precise time between the simulation and the first radiotherapy treatment – Damage as little as possible the healthy tissues around the tumor. – Expects the delivered dose to be correctly calculated by the physicist	– He wants all his/her explanations to be well understood by the patient – Being able to work in harmony with other colleagues – He/She wishes his orders be followed by the schedule coordinator – He/She wishes be listened by the head of department and by the hospital management
Events, issues & personal concerns	**Treatment**	**Own Resources, Assets/Support**
– Be able to return home at convenient times to have a decent family/personal life	–	– Resources: Comprehensive Cancer Center
Care professional concerns		

To be able to deliver a radiotherapy treatment following protocols at the right moment with the right machine.
Unmet Needs
Not to be able to take in account all the parameters influencing the patient flow at the radiotherapy unit.

Persona ID:	*Socio-demographics:*		*Digital literacy: (from 1 low to 5 high)*	
Patient Picture 	Age:	30	Internet usage	4
	Civil Status	Married	Mobile devices skills	4
	Country	Belgium	Affinity to new tech	5
	Living situation	Lives in a department in the Liège city	Digital Health Literacy	4
	Profession	Nurse at the Radiotherapy department	Technology usage	3
	Economic Status	Middle class	General attitude toward technology	4
Name:	Julie			

About the person

Julie is not married, but she lives with her partner for 5 years and plans to become a mother pretty soon.

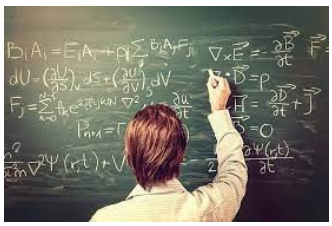
She received special training in radiotherapy to acquire the knowledge required to work in the department.

She greatly appreciates her work in the radiotherapy department as she has very good contact with patients and colleagues.

She tries not to work overtime but unfortunately, this is not always possible.

What is important to him/her	Care Concerns / Health concerns	Daily Living
– To contribute to treat as best as possible the patients – To enjoy life with her partner and/or family. – To have a balanced life – To continue to evolve in her career	– Treat patients as best as possible. – To have enough time to listen to each patient requests and concerns – To have time to be involved in patient empowerment (Health literacy)	– Work as a team with colleagues to respond in an integrated manner
Events, issues & personal concerns	**Treatment**	**Own Resources, Assets/Support**
– To have a balanced life – To avoid burnout – To avoid physical problems by lifting patients and working quickly	–	– Resources: Comprehensive Cancer Center – Emotional support: when needed support of the psychologist at CHU de Liège

		– Free physiotherapy sessions for the staff of the CHU de Liège
Care professional concerns		
To be able to deliver a radiotherapy treatment at the right moment with the right machine.		
Unmet Needs		
Insufficient time to listen to each patient's requests and concerns Overtime working hours due to insufficient staff. This situation worsens during vacation		

Persona ID:	*Socio-demographics:*		*Digital literacy: (from 1 low to 5 high)*	
Physicist Picture 	Age:	50	Internet usage	5
	Civil Status	Married	Mobile devices skills	5
	Country	Belgium	Affinity to new tech	5
	Living situation	Lives in a house near the hospital	Digital Health Literacy	5
	Profession	Physicist at CHU Liège	Technology usage	5
	Economic Status	Higher class	General attitude toward technology	5
Name:	Marc			

About the person

Marc is a radiophysicist at CHU de Liège. He is married and has two children who come home on weekends and during the holidays only because both study in a university 100 km from Liège.

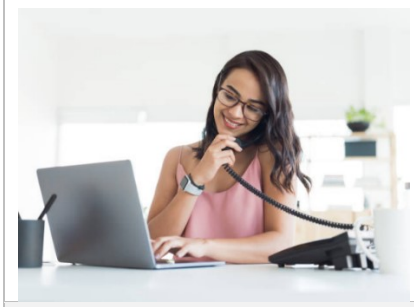
He works an average of 8 hours a day but he is on-call at least once a month and has to work overtime when necessary.

His main mission is to ensure that machines emitting radiation are in perfect condition. He must also calculate the doses that must be delivered to each patient.

Marc is also involved in decisions concerning the purchase of new irradiation machines, new software and computer tools.

What is important to him/her	Care Concerns / Health concerns	Daily Living
– Ensure that each machine is checked on time and therefore stop its use at specific times of the month – Not to work too many extra hours in order to enjoy the few moments his children are at home. – Be able to work as a team with physicians to ensure that the time between simulation and first	– Treat patients as best as possible. – To ensure that each patient gets the right radiation dose	– Work as a team with colleagues to respond in an integrated manner

treatment follows the protocol.		
Events, issues & personal concerns	**Treatment**	**Own Resources, Assets/Support**
– To have a balanced life – To avoid burnout	– -	– Resources: Comprehensive Cancer Center
Care professional concerns		
To be able to have enough time to calculate radiation parameters between the simulation and the first radiation treatment.		
Unmet Needs		
Enough time for calculations		

Persona ID:	*Socio-demographics:*		*Digital literacy: (from 1 low to 5 high)*	
Coordinator of radiotherapy plan Picture 	Age:	30	Internet usage	4
	Civil Status	Married	Mobile devices skills	5
	Country	Belgium	Affinity to new tech	5
	Living situation	Lives in a house near the hospital	Digital Health Literacy	4
	Profession	Coordinator	Technology usage	4
	Economic Stauts	Middle class	General attitude toward technology	5
Name:	Simone			
About the person				
Simone holds a medical secretary diploma. She is specialized in flow planning thanks to a training given by the regional government. Since the flow of patients is very specific, she underwent training inside the hospital before being able to work on her own. She often works under time pressure and doctors who all want their patients to be treated as quickly as possible in the best conditions. She is married and has two small children. Her husband works full time				
What is important to him/her	**Care Concerns / Health concerns**		**Daily Living**	
– Have enough time to establish the radiation patient flow in order to ensure the best possible treatment – Fulfill as much as possible all the medical doctors' requirements	– To ensure that each patient gets the best possible radiation flow – To ensure that the established flow integrates as many parameters as possible		– Work as a team with colleagues inside and outside the radiotherapy unit to respond in an integrated manner	

– Establish a radiation flow as close as possible to the internal guidelines – Integrate into the patient flow as many medical parameters and personal wishes of the patient – Do not work too many hours of overtime in order to enjoy personal and family life. – Do not feel stressed		– She is under quite some stress because she does not always manage to fulfill the requirements of each doctor at the same time.
Events, issues & personal concerns	Treatment	Own Resources, Assets/Support
– To have a balanced life – To avoid burnout	– -	– Resources: Comprehensive Cancer Center
Care professional concerns		
To be able to have enough time to establish each radiation flow To be able to incorporate as many patient parameters as possible in the flow		
Unmet Needs		
Enough time.		

Table from real to ideal

Persona ID	*Issue / topic*	*What happens nowadays?*	*What is the ideal scenario?*
Marie	She underwent a tumorectomy for breast cancer, needs a radiotherapy but has to be driven by car to reach the radiotherapy Unit of her hospital.	She cannot be appointed for a radiotherapy treatment before 16:30	To be able to assign her several radiotherapy sessions one after the other after 16:30

Table of epics that compound the user stories

Persona ID	*As a < type of user >*	*I want < main goal >*	*so that < main purpose >*	*For this, I <proposed the solution>*
Doctor	As a healthcare professional.	I want to provide the most efficient scheduler for my patients.	So that, I can assure my patients of the best treatment outcome.	For this, I propose to have a scheduler for optimization time, machine, etc...

Nurse	As a healthcare professional	I want to provide the most efficient scheduler for my patients	– So that, I have more time to have an empathic attitude towards my patients while increasing the efficiency of my work (time and precision). – So that, I can avoid working overtime leading to a burnout	For this; I propose to have a scheduler for optimization time, machine, etc.
Patient	As a cancer patient treated with radiotherapy	I want to have the best patient journey.	So that, my radiotherapy plan is scheduled as the doctor explained to me and in addition does not conflict with my other cancer treatments.	For this, I propose a tool to have a scheduler for optimization time.
		I want to be informed quickly about changes in my radiotherapy planning. I want to have answers to some questions I might have during my treatment	So that, I can avoid unnecessary travels and adapt my personal life according to the new scheduling. To increase my patient empowerment while decreasing my anxiety	For this, I propose to have a tool: – Informing me as soon as possible the new schedule and be able to choose which appointment suits me better. – answering in real-time my questions related to my treatment, follow-up and expected outcomes
Coordinator of radiotherapy plan	As a staff of the radiotherapy department	I want to be assisted by an AI solution during my daily duties	So that, I can increase efficiency when creating a treatment plan (reduce time and increase precision)	For this, I propose to have a tool which, by being able to weigh various factors, will help me choose the best option for each patient situation.
Physicist	As a staff of the radiotherapy department	I want to be assisted by an AI solution during my daily job	So that, I can improve the maintenance planning of the machines and ensure that their use (time and capacity) is drastically improved.	For this, I propose to have a tool which allows to concentrate identical/similar treatments on the same day and avoid unused timeslots of the radiotherapy romos (unused capacity)

C.2.3 Pilot 3

Template to fill "personas"

Persona ID: *The physiotherapist*	*Socio-demographics:*		*Digital literacy: (from 1 low to 5 high)*	
Picture: 	Age:	27	Internet usage	5
	Birthplace:	Taormina, Sicily	Mobile devices skills	5
	Current living in:	Lido di Venezia, not far from the hospital where she works	Affinity to new tech	4
	Status:	Single	Digital Health Literacy	4
			Technology usage	5
			General attitude toward technology	4
Name:	Elisa			

About the person

– When she was a child she wanted to become a pilot in the Air Force
– Usually she trusts people
– Sometimes she plays following her rules
– She loves music and she plays guitar and sings, but only by herself
– She loves to travel and discover new things around the world
– She always practiced sports, it makes her feel free!
– She's learning to row, venetian style!

What is important to him/her	Care Concerns / Health Concerns	Daily Living
– To always feel – passionate in his work	– Don't waste her precious – time! She needs to be well organized to take care of her patients	– When not working, she likes – to improvise fun activities with friends
Events, issues & personal concerns	**Treatment**	**Own Resources, Assets/ Support**
– Almost none, she's optimistic and positive	– As a physiotherapist, she appreciates that part of the regular care is provided by technology-based therapy, so that she can spend more time with the patient and provide him better attentions	– She's a good listener

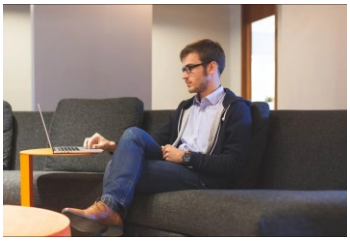
Care professional concerns

She needs to follow the patient after hospital discharge in order to improve the rehabilitation
Collaboration with patients and caregivers is very important.

Unmet Needs

She'd like to improve the tele-exercise pack with fine movements exercises

She'd like to add the measurement of life-parameter to the telerehabilitation service in order to find out if the service empowers the patients to be more active in the 24 hours

Persona ID: *The caregiver*	*Socio-demographics:*		*Digital literacy: (from 1 low to 5 high)*	
Picture: 	Age:	40	Internet usage	5
	Birthplace:	Mestre, Venezia	Mobile devices skills	5
	Current living in:	Mirano, Venezia	Affinity to new tech	4
	Status:	Married, he has two daughters	Digital Health Literacy	3
	As a caregiver he takes care of:	His father suffered a stroke 8 months ago	Technology usage	4
			General attitude toward technology	4
Name:	Antonio			

About the person

– He is a young successful entrepreneur in the field of clothing.
– He is a little touchy
– Before the stroke, his father worked 12 hours a day. 10 years ago he started to work in the family business, after 2 months he quit to find his way.
– He has excellent digital skills as he works with online selling.

What is important to him/her	Care Concerns / Health Concerns	Daily Living
– He loves his two daughters very much. They are his strength. – He thinks that in pain and illness the human touch is one of the most important – things	– He fears what he can't – control and not having the possibility of choosing – When his father had a stroke he felt very angry – He hopes that his father can recover at his best so that he could spend some – good times with him	– He works so much! He doesn't sleep much and sometimes he works at night to have time during the day for his family – He spends his free time with his family
Events, issues & personal concerns	**Treatment**	**Own Resources, Assets/ Support**
– His father had a stroke 8 months ago, he is 68. Antonio and her mother help him with every activity he can't do alone anymore. – His father was hospitalized during the pandemic: they've seen each other through the window and he felt deeply moved	– He helps his father with daily activities, visits, transports and in every way he can. – When his father was hospitalized a part of the regular care was provided by technology-based therapy, so that the care professionals could spend more time with the patient and provide him better attentions.	– He loves his two daughters very much. They are his strength. – He works with his wife: she's well organized and focused, he's more creative and has good problem-solving skills.

Care professional concerns	
He always looks for best-rated hospital He thinks that in pain and illness the human touch is one of the most important things. He wants for his father care professional that are empathic.	
Unmet Needs	
Sometimes he needs some time alone for himself He would love his father to enjoy his life. The telerehabilitation service was perfect for his father as it helped him to recover while staying close to his family. He would like to continue	

Persona ID: *The patient*	*Socio-demographics:*		*Digital literacy: (from 1 low* *to 5 high)*	
Picture: 	Age:	45	Internet usage	5
	Birthplace:	Treviso	Mobile devices skills	5
	Current living in:	Treviso	Affinity to new tech	4
	Status:	Married, she has a 12 years old daughter	Digital Health Literacy	3
	Diagnosis:	Multiple sclerosis since she was 25	Technology usage	4
			General attitude toward technology	4
Name:	Ilaria			

About the person		
– She loves animals. She has a cat, fishes, birds, a rabbit – She has a lot of friends		
What is important to him/her	Care Concerns / Health Concerns	Daily Living
– Her daughter is the most important thing in her life. She doesn't like to stay away from her for too long. – She feels good when she can be of help to other people she – loves	– She can work from home – 4 hours a day, after that she gets tired and needs to rest – Her illness starts to be disabling: her daughter helps to iron, to set the table, to carry heavy things and so on.	– When she wakes up she – does 30 min. of gymnastic to check how her body feels that day – She works from home as an employee. – She does housework and cooks for her daughter. – She spends her free time with her daughter.
Events, issues & personal concerns	Treatment	Own Resources, Assets/ Support

– She was diagnosed with multiple sclerosis when she was 25. After the diagnosis, her whole life changed. – When she knew about her illness from the doctor she jumped in her car and started to cry. – When she read on the internet about her illness she cried even more – His husband supported her after the diagnosis, but now they are separating, that's painful for her	– She stayed one month at the hospital and she received all the care she needed. She was very happy about the progress she made. – When she was hospitalized a part of the regular care was provided by technology-based therapy, so that the care professionals could spend more time with her and provide her better attentions. – After hospitalization, the telerehabilitation service was the best for her: she could stay close to her daughter and make signs of progress at the same time! – The gamification of the rehabilitation services and the good mood of the personnel helped her. She also liked to progress by reaching new goals. – Physiotherapists and healthcare personnel were able to establish a trust-based relation with her	– She thought her daughter to be independent: i.e. she goes to school alone and she cooks meals. – She doesn't like to ask for help and she wants to feel independent as much as she can. She has a strong character.
Care professional concerns		
– She needs a care professional with a human touch to follow her. Empathy is the key. – She wants to do as much rehabilitation as possible. – She misses the telerehabilitation service.		
Unmet Needs		
– She hopes to get back to walk without using medical aids – Sometimes rehabilitation centers are fully booked – She would like the telerehabilitation service to be continuous. The telerehabilitation service was the best for her: she could stay close to her daughter and make signs of progress at the same time!		

Table from real to ideal

Persona ID	*Issue / topic*	*What happens nowadays?*	*What is the ideal scenario?*
Physiotherapist	Continuity of care	She can keep on following the patient via telerehabilitation	Keep on improving the actual model that already works well
Caregiver	Taking care of his family and of his father after he suffered a stroke	He sleeps only 4 hours and work at night in order to be supportive during the day	To have more time to enjoy his family and to support his father

Patient	Getting back to walk without assistive devices	She uses a cane, but keep on working on her rehabilitation	She would love to do her rehabilitation from home, where she can stay close to her daughter

Table of epics that compound the user stories

Persona ID	*As a < type of user >*	*I want < main goal >*	*so that < main purpose >*	*For this, I <proposed the solution>*
Physiotherapist	Physiotherapist	I don't want patients to be abandoned after discharge from hospitalization	So that I can keep helping them in rehabilitation	For this, we set up a telerehabilitation service
Caregiver	Caregiver of a patient with stroke	I want him (my father) to recover at his best	So that I could enjoy some time with him	For this, I'm always looking for the best rehabilitation services for him
Patient	Patient with multiple sclerosis	I want to get back to walk without a cane	I could take long walks with my daughter	For this, I want to exercise every day. Better from home, but followed online by an emphatic physiotherapist.

C.2.4 Pilot 4

Template to fill "Personas"

User

The user profiles summarize the mental, physical and demographic traits of the intended user population, as well as any special characteristics that can have a bearing on design decisions, such as occupational skills and job requirements.

The following is a broad classification of users for the robotic platform:

Category	*User*
Primary User	Electrophysiologists/Cardiologists
Secondary User	Catheter Lab Nurse or Trained Assistant Physician
Third User	Patient
Fourth User	Service Personnel
Fifth User	Cleaning Personnel

In HosmartAI we will focus on the primary user as the AI algorithm developed will only be used by the primary user. Impact on the other users is expected to be a reduction of the procedure time.

Primary User

User Profile Data	*Definition for Operational user*	*Definition for Usability tester*
Age	20 > user's age < 80	35 > user's age < 60
Sex	Both genders (female and male)	Male or Female
Physical peculiarity	Mild reading vision impairment or vision corrected – One-hand system capable of guiding and holding device (joystick use) – Average degree of aging-related short-term memory impairment. – Max. Impaired by 40% resulting in 60% of normal hearing at 500 Hz to 2 kHz	See Physical Peculiarity
Education	– Medical degree – Min. 4 years of specialist training in the area of Cardiology	Educated as – Cardiologist and/or – Electrophysiologist
Experience	– Sufficient knowledge in the field of cardiology/electrophysiology (see Education)	Working experience as – Cardiologist and/or – Electrophysiologist.
Language ability	– Communicate in and understand English	– Advanced English level
Technical proficiency	– General understanding of using a computer	– Technical proficiency in using a computer

Device use	Navigation of a magnetic catheter inside the heart by – Changing magnetic field orientation remotely – Controlling the catheter slack remotely	– See Device Use
Product knowledge	– New Product: Product Training required! Defined in User Training Specification	– Product Training will be provided before usability test. Defined in User Training Specification.

User requirements

For the robotic platform we have identified a list of more than 50 user requirements by interviewing the different users.

In HosmartAI, we will add the following requirements:

HosmartAI new requirement	The User shall be able to active semi-automatic navigation to a target location.
HosmartAI new requirement	The User shall be able to active semi-automatic navigation along an ablation trajectory.
HosmartAI new requirement	The user shall be able to view an AI improved 3D electrophysiological map of cardiac structures and electrical signals.

Table from real to ideal

Persona ID	*Issue / topic*	*What happens nowadays?*	*What is the ideal scenario?*
	Atrial fibrillation (AF) is the most common sustained cardiac arrhythmia in adults and one of the 3 cardiovascular pandemics of the XXI century according to the World Health Organization (WHO).	Performed by manual operation of catheters which require a significant amount of dexterity and experience. This results in substantial heterogeneity of clinical practice and is an important barrier to offer this therapy to many patients.	Robotic systems aimed to reduce the learning curve required to perform AF ablation procedures, reduce complications and make the procedure less operator dependent and more automatized.

Table of epics that compound the user stories

Persona ID	*As a < type of user >*	*I want < main goal >*	*so that < main purpose >*	*For this, I <proposed the solution>*
	Cardiac electrophysiologist	to reduce the learning curve required to perform AF ablation procedures and to reduce complications.	more patients can be treated safely by an increased number of trained operators.	A new robotic system for cardiac catheter navigation based on electromagnetic fields which could be rapidly changed in order to allow fast and automatic catheter steering with powerful tissue contact

				force for catheter ablation of AF.
	Cardiac electrophysiologist	to get recommendations on the appropriate targets for AF ablation.	to better select the most appropriated targets for AF ablation.	A new mapping approach was developed with the help of artificial intelligence and big data techniques.
	Cardiac electrophysiologist	more automatization.	the procedure is less operator-dependent.	An interface to integrate the new mapping approach and the robotic system with commercially available mapping systems.
	Patient	to be treated without a long waiting time.	I can be treated soon	Having more trained electrophysiologists.
	Patient	have no recurrence of the arrythmias.	I do not require a second procedure.	Better tool to identify the source of the arrythmias

C.2.5 Pilot 5

Template to fill "Personas"

Persona ID: 1	*Socio-demographics:*		*Digital literacy: (from 1 low to 5 high)*	
Picture: (no data)	Country:	Slovenia	Internet usage	5
	Job title:	Vascular surgeon	Mobile devices skills	4
	Age:	47	Affinity to new tech	4
			Digital Health Literacy	5
			Technology usage	4
			General attitude toward technology	4
Name:	Tine			
About the person				
Vascular surgeon at a University Medical Centre Maribor, with multi-year experience in vascular surgery in most difficult conditions. Active in the research field. He performs emergency vascular surgery, abdominal aorta procedures, constructions of arterio-venus fistula, limb salvage surgery, carotid artery procedures, ultrasound guides vascular operations and patient diagnostics and operation preparation with post-operative follow-up.				
What is important to him/her	Care Concerns / Health concerns		Daily Living	

To give the best surgery or intervention for the patient. To provide accurate and efficient diagnostic services.	Stress	Following the surgery program and patients examination in the morning. Writing articles and research work in the afternoon
Events, issues & personal concerns	Treatment	Own Resources, Assets/Support
(Not relevant data	(Not relevant data)	(Not relevant data)
Care professional concerns		
Tine is putting his patients in the first place and is providing the best treatment conditions. He feels stress and time pressure due to a deficiency of doctors.		
Unmet Needs		
Lack of staff and time for patients.		

Persona ID: 2	*Socio-demographics:*		*Digital literacy: (from 1 low to 5 high)*	
Picture:*(no data)*	Country:	Slovenia	Internet usage	4
	Job title:	thoracic surgeon	Mobile devices skills	4
	Age:	52	Affinity to new tech	3
			Digital Health Literacy	5
			Technology usage	4
			General attitude toward technology	5
Name:	Martin			
About the person				
Martin is a skillful thoracic surgeon in the thoracic surgery department in University Medical Centre Maribor. Also, assistant professor in Medical Faculty. He performs VATS lobectomies, thyroidectomies, esophageal resections, corrections of chest deformities and implantation of pacemakers. She is included in diagnostics and post-operative follow-up.				
What is important to him/her	Care Concerns / Health concerns		Daily Living	
Accurate and prompt diagnostics. To give the patient the best possible operative treatment, with good results.	Artrerialhypertension Stress		He is meditating to relieve stress from work in hospital and Faculty. Surgery program, consultant work through the work day.	
Events, issues & personal concerns	Treatment		Own Resources, Assets/Support	
(Not relevant data)	(Not relevant data)		(Not relevant data)	
Care professional concerns				
Martin is worried about quality of care. He is scared, that the daily stress will cause a burn out syndrome.				
Unmet Needs				
Not enough staff. Not enough time for patients, who can feel left out.				

Persona ID: 3	*Socio-demographics:*		*Digital literacy: (from 1 low to 5 high)*	
Picture:(no data)	Country:	Slovenia	Internet usage	3
	Job title:	Vascular nurse	Mobile devices skills	4
	Age:	45	Affinity to new tech	3
			Digital Health Literacy	3
			Technology usage	4
			General attitude toward technology	4
Name:	Mateja			
About the person				
Mateja is a health worker who takes care of the coordination of nursing care at the ward.				
What is important to him/her		Care Concerns / Health concerns	Daily Living	
To provide the best service for patients, good work conditions.		(Not relevant data)	Stressful, unhealthy eating. Coordination of bureaucracy and patients.	
Events, issues & personal concerns		Treatment	Own Resources, Assets/Support	
(Not relevant data)		(Not relevant data)	Gardening.	
Care professional concerns				
Mateja is worried that he will not be able to physically maintain this pace for long.				
Unmet Needs				
Understaffed and older employees.				

Persona ID: 4	*Socio-demographics:*		*Digital literacy: (from 1 low to 5 high)*	
Picture: (no data)	Country:	Slovenia	Internet usage	4
	Job title:	Thoracic nurse	Mobile devices skills	4
	Age:	30	Affinity to new tech	3
			Digital Health Literacy	5
			Technology usage	4
			General attitude toward technology	5
Name:	Ina			
About the person				

Ina is a nurse, used to long and hard shifts. She is a chief nurse, who oversees other nurses and is in command of their schedule and their professional development. She enjoys working with people and is aspiring to be a faculty teacher someday.		
What is important to him/her	Care Concerns / Health concerns	Daily Living
To stay focused and on time with all her tasks.	(Not relevant data)	She often skips multiple meals due to the fast work pace.
Events, issues & personal concerns	Treatment	Own Resources, Assets/Support
(Not relevant data)	(Not relevant data)	Rest on days off.
Care professional concerns		
Burnout. Optimally prepared patients for the operation, so that all correct diagnostic procedures before that are undertaken. That each patient gets correct therapy each day on time.		
Unmet Needs		
More help on the ward, younger staff.		

Persona ID: 5	*Socio-demographics:*		*Digital literacy: (from 1 low to 5 high)*	
Picture: (no data)	*Country:*	Slovenia	Internet usage	2
	Job title:	Vascular patient	Mobile devices skills	3
	Age:	80	Affinity to new tech	
			Digital Health Literacy	
			Technology usage	2
Name:	Janez			
About the person				
Janez is living alone in a city apartment, after his wife died 5 years ago. He has two sons and three grandchildren who visit him occasionally. He plays chess in the local community club.				
What is important to him/her	Care Concerns / Health concerns		Daily Living	
To be as autonomous as possible in order to avoid bothering family members. To be able to go home and return to his normal life as soon as possible.	Not to lose his leg. To be able to spend some time in a physiotherapy facility.		He wakes up early. During the day he performs simple domestic tasks. Get his lunch delivered from local nursing home. In the afternoon he reads books, watches tv or plays chess	
Events, issues & personal concerns	Treatment		Own Resources, Assets/Support	
To be forced to live in a nursing home and not being able to care for himself	Major operation – aorto femoral bypass surgery, for limb salvation.		Loving but busy family members.	
Care professional concerns				

To be able to deliver more support for social and daily life reintegration.
Unmet Needs
Understaffed and older employees.

Persona ID: 6	*Socio-demographics:*		*Digital literacy: (from 1 low to 5 high)*	
Picture:*(no data)*	*Country:*	Slovenia	Internet usage	5
	Job title:	Vascular patient	Mobile devices skills	5
	Age:	38	Affinity to new tech	5
			Digital Health Literacy	5
			Technology usage	
			General attitude toward technology	
Name:	Jerneja			

About the person		
Jerneja is divorced, living in a small house outside the city with her six-year daughter. She is hard working busy single mother with three different part-time jobs.		
What is important to him/her	Care Concerns / Health concerns	Daily Living
To continue to work as soon as possible. To spend time with her daughter. To enjoy some alone time	Cosmetic effect of the vein surgery. Being overwhelmed with work, causes her anxiety.	She works at the advertising agency for 9h to 12h (with 1 to 4 hours addition when major projects events). She performs remaining administrative and accounting tasks when arriving at home. Afterward, she takes care of her daughter and other domestic tasks.
Events, issues & personal concerns	Treatment	Own Resources, Assets/Support
To be forced to live in a nursing home and not being able to care for himself.	Varicose vein surgery.	Her older parents and friends help her out around the house and with some daily tasks.
Care professional concerns		
To be able to perform an operation on schedule because of disruption of unplanned emergency outdoor patient admission.		
Unmet Needs		
Understaffed employees, too little information about post-operative care and rehabilitation.		

Persona ID: 7	*Socio-demographics:*		*Digital literacy: (from 1 low to 5 high)*	
Picture: *(no data)*	*Country:*	Slovenia	Internet usage	3
	Job title:	Vascular patient	Mobile devices skills	3
	Age:	73	Affinity to new tech	
			Digital Health Literacy	
			Technology usage	1
			General attitude toward technology	
Name:	Olga			

About the person		
Olga is living alone in a nursing home, after her husband died 7 years ago. She has one son who lives with his family in Germany and few times per year comes to visit.		
What is important to him/her	Care Concerns / Health concerns	Daily Living
To be as autonomous as possible and return to her normal life as soon as possible.	Mild vascular dementia with symptoms of memory loss. Diabetes.	Nursing home schedule.
Events, issues & personal concerns	Treatment	Own Resources, Assets/Support
Not being able to care for herself.	Carotid artery operation.	Nursing home care. Supportive but distant family members.
Care professional concerns		
To be able to deliver more support for social and daily life reintegration.		
Unmet Needs		
Understaffed employees. Olga needs cognitive training to maintain her present cognitive functioning.		

Persona ID: 8	*Socio-demographics:*		*Digital literacy: (from 1 low to 5 high)*	
Picture:*(no data)*	*Country:*	Slovenia	Internet usage	3
	Job title:	patient	Mobile devices skills	4
	Age:	65	Affinity to new tech	3
			Digital Health Literacy	5
			Technology usage	4
			General attitude toward Technology	4
Name:	Vlado			

About the person			
Vlado is a heavy smoker with a stressful job as a president of a small company			
What is important to him/her	*Care Concerns / Health concerns*	*Daily Living*	
Providing economic stability for wife and 2 children.	Rehabilitation after major surgery. He is expected to undergo additional chemotherapy	Working at least 10 hours a day, then working at the house for additional proposing projects at night.	
Events, issues & personal concerns	*Treatment*	*Own Resources, Assets/Support*	
Who will care for company and family		Lung carcinoma operation	Family support
Care professional concerns			
Major operation and chemotherapy. Patient is in the terminal stage of disease and needs more psychological support.			
Unmet Needs			
Socio-economic support.			

Table from real to ideal

Persona ID	*Issue / topic*	*What happens nowadays?*	*What is the ideal scenario?*
1	Not enough staff	We are planning to employ more registered nurses.	Better working conditions in 2-3 years.
1	Chaotic working environment	New reorganization or working process with separation of outpatient emergencies with elective indoor patients.	Two clear organizing paths.

Persona ID	*Issue / topic*	*What happens nowadays?*	*What is the ideal scenario?*
2	New intensive care department	Currently sharing with the central intensive care department.	Reorganization is planed within one year.

Persona ID	*Issue / topic*	*What happens nowadays?*	*What is the ideal scenario?*
3	Not enough staff	We are planning to employ more registered nurses.	Better working conditions in 2-3 years.

Persona ID	*Issue / topic*	*What happens nowadays?*	*What is the ideal scenario?*

4	Patients in terminal state of disease	Lack of psychological support for the nurses.	Robot diminishes the time that nurses spent with that type of a patient. But still patient gets the usual or more attention.

Persona ID	*Issue / topic*	*What happens nowadays?*	*What is the ideal scenario?*
5-7	Social interaction	Due to COVID, the patients are isolated from family and friend members.	Contact during the time spent in hospitals with the assistance of the robot.

Persona ID	*Issue / topic*	*What happens nowadays?*	*What is the ideal scenario?*
8	Support with the rehabilitation process	Side effect because of the chemotherapy.	Robot can help the patient with assisted breathing exercises.

Table of epics that compound the user stories

Persona ID	*As a < type of user >*	*I want < main goal >*	*so that < main purpose >*	*For this, I <proposed the solution>*
1	Vascular surgeon	To derive diagnostic measures in as little time as possible	Time to treatment is reduced	AI-assisted measurement transferred to robot. Overworked staff is warned by possible mistake – the robot has programmed the main diagnostic pathways and possible emergencies in the working department.
1	Vascular surgeon	To provide objective and accurate diagnostic measures	More effective treatment is enabled	AI-assisted measurement transferred to robot. Overworked staff is warned by possible mistake – the robot has programmed the main diagnostic pathways and possible emergencies in the working department.

Persona ID	*As a < type of user >*	*I want < main goal >*	*so that < main purpose >*	*For this, I <proposed the solution>*
2	thoracic surgeon	Lack of time for proper operation presentation	More patients can be examined daily. They can be more informed about their condition and treatment.	AI-assisted morning rounds with information about patient history and results from diagnostic exams. AI-assisted video for operation explanation and form fulfillment.
2	thoracic surgeon	To provide accurate diagnoses	More effective treatment is enabled	AI-assisted measurement transferred to robot.

				Overworked staff is warned by possible mistake – the robot has programmed the main diagnostic pathways and possible emergencies in the working department.

Persona ID	*As a < type of user >*	*I want < main goal >*	*so that < main purpose >.*	*For this, I <proposed the solution>*
3	Vascular nurse	Help with nursing	More patients are cared for regularly.	With Robot helping to fulfill the form, one nurse is free for actual nursing. If the Robot will measure the blood pressure, temperature and pulse and blood oxygenation additional nurse is free for wound dressing.

Persona ID	*As a < type of user >*	*I want < main goal >*	*so that < main purpose >.*	*For this, I <proposed the solution>*
4	Thoracic nurse	I want to provide the best care for each patient.	So their post-operative rehabilitation is optimal.	For this, I propose an AI-guided post-operative plan, individualised for each patient, to met their needs.
4	Thoracic nurse	I want to do a fair schedule for my co-workers.	So they each get the same amount of weekend work and overtime.	For this a propose an AI-guided scheduler, which can plan a fair work plan each month for each worker.

Persona ID	*As a < type of user >*	*I want < main goal >*	*so that < main purpose >.*	*For this, I <proposed the solution>*
5	Vascular patient	Keep the leg	Better quality of life	Help with operation and rehabilitation
6	Vascular patient	Go back to work	Economical security for the patient and her family	Help with operation and rehabilitation
7	Vascular patient	Stimulating cognitive interaction	Prevention of worsening the vascular dementia	Help with operation and rehabilitation

Persona ID	*As a < type of user >*	*I want < main goal >*	*so that < main purpose >.*	*For this, I <proposed the solution>*
8	Thoracic patient	Go back to work	Economical security for the patient and her family	Help with operation and rehabilitation

C.2.6 Pilot 6

Template to fill "Personas"

Persona ID:	*Socio-demographics:*		*Digital literacy: (from 1 low to 5 high)*	
Picture:	*Age:*	82	Internet usage	1
	Civilian Status:	Married	Mobile devices skills	1
	Country:	Spain	Affinity to new tech	2
	Living situation:	Lives in a city's apartment, with his wife	Digital Health Literacy	2
	Profession:	Retired (he used to be a chef)	Technology usage	2
			General attitude toward technology	2
Name:	Jose			

About the person		
José lives in the city with his wife. José wife has difficulties taking care of him (for her age). José has three children and 5 grandchildren. He is socially active. José goes every day (2h) to the memory clinic, where he is with other people and carries out cognitive training sessions.		
What is important to him/her	Care Concerns / Health concerns	Daily Living
To enjoy some alone time. To continue to cook for friends and family. To spend time with his wife and see his grandchildren grow.	Mild dementia (Alzheimer with symptoms of memory loss and disorientation). Diabetes.	Mornings: he goes to the memory clinic. He comes back home at lunchtime to spend time with his wife. He stays with his wife at home or goes for a walk with his family.
Events, issues & personal concerns	Treatment	Own Resources, Assets/Support
To forget his life and work memories. To not being able to carry out activities that he is passionate about (e.g.cooking).	Medication for diabetes.	Resources: memory clinic. Tangible support: His wife and Emotional support: His wife and family.
Care professional concerns		

The progress of the mental disease and his cognitive state.	That increases his level of dependency, which could lead to a greater burden to his wife.	
Unmet Needs		
José needs a better and more responsive support to detain the loss of cognitive functioning and increase his cognitive stimulation.		

Persona ID:	*Socio-demographics:*		*Digital literacy: (from 1 low to 5 high)*	
Picture:	*Age:*	63	Internet usage	3
	Civilian Status:	Widow	Mobile devices skills	4
	Country:	France	Affinity to new tech	4
	Living situation:	Rural area in the summer. City in the winter	Digital Health Literacy	1
	Profession:	Retired (used to be a French professor)	Technology usage	3
			General attitude toward technology	4
	Name:	Gabriela		

About the person		
Gabriela is independent, without major health concerns, only has some walking difficulties. Gabriela is passionate about dancing and music. She used to go dancing classes until the knee operation that unable her to dance. She is conscious that she does not have MCI, however, she wants to prevent it. Gabriela lives alone in the city (every Winter) and in the rural area (every Summer). She has a son, that lives in another country's town. She calls him regularly. They saw each other once every two weeks. On the day they are together, they spend the whole day together.		
What is important to her	Care Concerns / Health concerns	Daily Living
To stay in touch with friends as much as she can (they are not seeing each other as they did in the past). Once a month, she reunites with her book club to comment a different book. Spend time with her son. To keep up with her hobbies and music. To learn new things. Maintain her cognitive functioning.	She had an operation to her knee years ago. She has high cholesterol levels. She has myopia.	She wakes up early. In the morning: simple domestic tasks (e.g. cook). In the afternoon: goes to the public library to help (e.g. organise books); listens to music every afternoon. She goes to sleep early.
Events, issues & personal concerns	Treatment	Own Resources, Assets/Support

To be socially isolated and lonely. To lose cognitive functioning.	Medication for cholesterol. Uses glasses for myopia. She uses a crutch to help her walk.	Resources: car for occasional situations. Tangible support: One caregiver that comes twice a week (that helps her go to the doctor, shopping and some domestic tasks). Her son (with occasional tasks). Emotional support: Her son and friends.
Care professional concerns		
Since widow, she has left a lot of social activities.	She can walk, but cannot walk long distances.	Worried that with the diminished cognitive stimulus, her cognitive functioning might decrease.
Unmet Needs		
Gabriela needs cognitive training to maintain her present cognitive functioning. Gabriela needs some kind of company in her daily life.		

Persona ID:	*Socio-demographics:*		*Digital literacy: (from 1 low to 5 high)*	
Picture:	*Age:*	32	Internet usage	5
	Civilian Status:	Married	Mobile devices skills	5
	Country:	Spain	Affinity to new tech	5
	Living situation:	City	Digital Health Literacy	5
	Profession:	Neuropsychologist	Technology usage	5
	Clients/Patients profiles:	Older people with cognitive impairment	General attitude toward technology	5
Name:	Sara			
About the person				
Sara is a married woman with one child (3 years old). She is the only neuropsychologist at the memory clinic since she started working (5 years ago).				

What is important to her	Health Concerns	Daily Living
To be a good professional. To have an impact on her patients and to have recommendations. To have time for herself and her family.	She has too much work, without sufficient support, being overwhelmed with work, which causes her anxiety.	She works at the memory clinic between 8h to 17h (with 1h to eat). She performs remaining tasks (i.e. administrative tasks) when arriving at home. Afterward, she carries out domestic tasks.
Events, issues & personal concerns	Treatment	Own Resources, Assets/Support

She has more anxiety and worries that her situation will get worst with the workload. Her work occupies part of her personal life.	-	Resources at the clinic: ICT tools. She is waiting for approval for the clinic to hire more staff.
Professional concerns		
She has a big load of work, too many patients and she worries about not being able to attend to her patients in an efficient way.	She worries about her sessions' efficiency, because they are not updated and the clinic does not have innovative tools to carry out updated sessions.	She is worried that she does not reach enough patients with the lack of time.
Unmet Needs		
She needs to optimize her time in her professional time. She needs a solution to support her with this load of work, for example, by delegating some of her tasks to another person or tool. She needs to update and complement the interventions' therapies that are used at the memory clinic in a holistic approach. She wants to augment her patients' network. She wants to separate more clearly her work and her personal life. She wants to organize in the most efficient her patients' data.		

Table from real to ideal

Persona ID	*Issue / topic*	*What happens nowadays?*	*What is the ideal scenario?*
Gabriela	Social isolation and loneliness	She lives alone and is a widow. She does not have social activity as in the past. She has light mobility problems.	To be motivated to carry out social activities and cognitive stimulus to maintain her cognitive functioning and augment her neuroplasticity. This resource should be close to her home in order to not demand long distances of mobility.
José	Mild dementia (Memory loss and disorientation symptoms).	He does not have any type of cognitive training. He has diabetes. He is semi-dependent on his wife.	To have a cognitive and neuro rehabilitation intervention.
Sara	Healthcare professional	The workload is too high for one person. Intervention tools are outdated.	To have support in the clinic and divide her workload. To update the ICT tools to have more complete interventions and organized logistic data.

Table of epics that compound the user stories

Table of Epics that compound the user stories Persona ID	*As a < type of user >*	*I want < main goal >*	*so that < main purpose >.*	*For this, I <proposed the solution>*
Gabriela	As an older adult.	I want to have an active life.	So that I maintain my abilities.	For this, I propose a solution that stimulates my mental capacities in an interactive and complete way.
	As an older adult.	I want to be regularly informed about the present/news about society.	So that I know what is going on in society.	For this, I propose to have a tool that maintains me in contact and informed about my environment.
	As a person with diminished social life.	I want to augment my social activities.	So that I maintain my mental health.	For this, I propose to have a tool that knows my interests and information about me. Also, a tool that makes conversation and keeps me company when needed.
	As a person with diminished mental activity.	I want to augment my mental activity.	So that I can activate my mind.	For this, I propose to have a tool that knows my capacities and limits, and that helps me and encourages me to carry out exercises to get better.
José	As an older adult.	I want to have an active life.	So that I maintain my abilities.	For this, I propose a solution that stimulates my mental capacities in an interactive and complete way.
	As an older adult.	I want to be regularly informed about the present/news about society.	So that I know what is going on in society.	For this, I propose to have a tool that maintains me in contact and informed about my environment.
	As a semi-dependent person resulting from mild dementia.	I want to have help while I am carrying out my activities.	So that I do not depend on other professionals.	For this, I propose to have a tool that supports me, while accompanies me carrying out cognitive sessions.
	As a person with mild dementia.	I want to have more mental activity.	So that I prevent the worsening of my mental disease and not depend more on others.	For this, I propose to have a tool that proposes personalized activities and my progress.

Sara	As a healthcare professional.	I want to provide the most efficient intervention for my patients.	So that I can actualize my interventions.	For this, I propose to have an ICT tool that can create activities in a spontaneous way according to the user.
	As a professional with a high workload.	I want to have as much information as possible about my patients.	So that I can structure the most efficient intervention possible.	For this, I propose to have an ICT tool that can collect and save big data.
	As a professional.	I want to have a strong patients' network	So that I can increase my professional status and success.	For this, I propose to have an ICT tool that supports some of my sessions and workload.
	As a healthcare professional	I want to optimize my time	So I can dedicate more time to the patients.	For this, I propose to have an ICT tool that supports my sessions in a collective way.
	As a person with a great amount of work	I want to have more time for my personal life.	So that I can dedicate me out of work time to myself and my family.	For this, I propose to have an ICT tool that supports me with my administrative tasks.

C.2.7 Pilot 7

Template to fill "Personas"

Persona ID:	*Socio-demographics:*		*Digital literacy: (from 1 low to 5 high)*	
Picture:	*Age 48*	Volvo-manufacturing	Internet usage	4
	Male	Teamlead (2-shifts, no night shift)	Mobile devices skills	3
	Married		Affinity to new tech	3
	No children		Digital Health Literacy	3
	Gent (BE)		Technology usage	4
			General attitude toward technology	4
Name:	Geert Paling			
About the person				
Smart man, but no specific studies (critical thinker) Enjoys life with friends (restaurant/bar)				
What is important to him/her	Care Concerns / Health concerns		Daily Living	

Facts and figures Clarity Honesty What you see is what you get	At this moment he has problems with the physical work, but is getting short breading while walking. GP sent him to a Cardiologist. Waiting for a verdict and help.	Week 1: get up at 4 am, start working at 5, back home at 3 pm. Small rest and meet in the city with friends, read a book, some walking or relax biking. Week 2: get up at 9 am, easy breakfast, homework, go to work at 1 pm, back home at 10 pm, watch TV till midnight or go to a bar with friends till 'closing time'
Events, issues & personal concerns	**Treatment**	**Own Resources, Assets/Support**
Will they be able to help me? When? How long will it take to be back on track? How long will the intervention take? Do I need to stay overnight? What kind of intervention will they perform? Anesthetics?	Some stents will be needed	Social Security and limited personal hospitalisation insurance?
Unmet Needs		
Information about procedure and understanding of the intervention		

Persona ID:	*Socio-demographics:*		*Digital literacy: (from 1 low to 5 high)*	
Picture:	Age:	40	Internet usage	4
	Gender	Male	Mobile devices skills	4
	Income	High	Affinity to new tech	4
	Education	Academic	Digital Health Literacy	5
	Location	Brussel	Technology usage	4
			General attitude toward technology	4
Name:	Dr. Dre			
About the person				
Experienced cardiologist with a PhD in cardiology research Communicative				

What is important to him/her	Care Concerns / Health concerns	Daily Living
Health Good work-life balance	Well-being of the patient Appropriate diagnosis and treatment	Long days at the hospital Plays golf in his spare time
Events, issues & personal concerns	**Treatment**	**Care professional concerns**

Needs to work late in the hospital to complete reporting and administrative work	N/A	The well-being of the patient Complexity to make an appropriate diagnosis and perform treatment such that treatment outcome is optimal
Unmet Needs		
Intuitive guidance during PCI cases. Administrative assistance during post-interventional reporting		

Persona ID:	*Socio-demographics:*		*Digital literacy: (from 1 low to 5 high)*	
Picture:	Age:	50	Internet usage	4
	Gender	Male	Mobile devices skills	4
	Income	High	Affinity to new tech	4
	Education	Academic	Digital Health Literacy	5
	Location	Gent	Technology usage	3
			General attitude toward technology	3
Name:	Dr. Mike			
About the person				
Cathlab manager with a clinical background as a cardiologist.				
What is important to him/her	Care Concerns / Health concerns		Daily Living	
Health Good work-life balance	Cares about the efficient utilization of the medical equipment in his department		Long days at the hospital, many meetings with both the clinicians as well as the C-suite. Plays tennis in his spare time	
Events, issues & personal concerns	Treatment		Care professional concerns	
Is worried about the workload for his clinical staff members, due to their intense jobs in the cathlab and additional burden of reporting.	N/A		Well-being of the clinical staff Sub-optimal usage of scarce medical equipment in his department.	
Unmet Needs				
Intuitive guidance during PCI cases to relieve the burden of the cardiologists Administrative assistance during post-interventional reporting				

Table from real to ideal

Persona ID	*Issue / topic*	*What happens nowadays?*	*What is the ideal scenario?*
Cardiologist	Administrative burden	Administrative work is widely recognized as a major source of professional burnout in healthcare, and particularly for invasive cardiologists. After treating six to eight patients in one day, having to spend another two hours on reporting can easily wear you down	AI can automatically guide and track each step of a procedure, logging relevant events and actions, and then auto-populate reports with images and measurements acquired during the procedure
Cardiologist	Realtime clinical decision support	Many cardiologists today complain about the large amount of data and complexity of data they acquire every day, and the difficulty in deriving meaningful insights from it	During the clinical procedure an application assists the cardiologist in the interpretation of imaging data, makes quantitative analyses and suggests best treatment options
Manager	Operational data to maximise the use of the medical equipment	Only global data about the number of patients	More detailed data that offer the opportunity to improve the process, reduce down-time, …
Manager	Scarce resources	Much manual work is required to complete reporting	Less supporting staff needed, fewer materials, …
Geert Paling (patient)	Information/Understanding	Cardiologist explains and gives a brochure. The patient looks for some extra information by Dr. Google	Patient's problem is visualised and the intervention is shown (animated). This information gets to the patient on time, depending on the time-path

Table of epics that compound the user stories

Persona ID	*As a < type of user >*	*I want < main goal >*	*so that < main purpose >.*	*For this, I <proposed the solution>*
Dr. Dre	Cardiologist	To be able to dedicate my time to the treatment of patients	The treatment outcome will be optimal and I don't lose time on administrative work	Need a system that automatically captures essential steps and populates the post-procedural report
Dr. Dre	Cardiologist	To focus my attention on the treatment and	The patient will feel comfortable and the treatment outcome will be optimal	Need a system that assists me in the interpretation and analysis of complex medical imaging data

		wellbeing of the patient		
Geert Paling	Patient	To be informed	I understand what they will do with me (+consequences)	Would like to have personalised and easy to understand information
Mr. Mike	Cathlab manager	The clinical staff to be able to perform their clinical tasks as best as possible	Treatment outcome is optimal and the clinical staff is satisfied with their work.	Need applications that optimally support the clinical staff during the pre/intra/post-procedural activities.

C.2.8 Pilot 8

Template to fill "Personas"

Persona ID	*Socio-demographics:*		*Digital literacy: (from 1 low to 5 high)*	
Picture:	Age:	45	Internet usage	4
	Civilian Status:	Married	Mobile devices skills	3
	Country:	Belgium	Affinity to new tech	4
	Living situation:	Live's in a city's apartment, with her daughter	Digital Health Literacy	4
	Profession:	Hospital manager	Technology usage	3
	Economic status:	XX	General attitude toward technology	3
Name:	Dr. Mrs. Jones			
About the person				
Mrs. Jones is a Hospital Manager. She works with administrators to plan and coordinate the health services of the hospital. Her daily tasks include the supervision of all areas of the hospital, including physicians, health information technicians, nursing, medical records and more.				
What is important to him/her	Care Concerns / Health concerns		Daily Living	
Progress the digital transformation in her hospital. The transformation to be as seamless as possible Resources needed to train the hospital staff to use the new technologies	She has myopia. She has back problems.		She wakes up early. She starts to work at 7.00 am and finishes at 3.00 pm. Then, pick up her daughter from school at 4 pm, and do domestic tasks.	

Events, issues & personal concerns	Treatment	Own Resources, Assets/Support
She has a big load of work, and when she returns home, she has to take care of her daughter. She suffers from anxiety due to her husband working during the week in another city.	She uses glasses for the myopia, but waiting to have surgery Visits to a massage therapist once a week.	Resources: Own car for work and daily life. Emotional support: Her daughter and her husband (who works in another city).
Care professional concerns		
Technical innovation is not achieving the anticipated impact as hospital organization and policies do not adapt. Data security and privacy: ensuring the data is neither accessible nor disrupted by third parties. Measuring the economic balance of new technologies adoption.	Need of new technologies to create a system that can optimize data patient and help medical staff in their daily work tasks. Designing an IT system for assessing the staff in their daily tasks and that also ensures data security and privacy.	IT system from the hospital needs some refurbishing to the new envisaged requirements and needs. The IT support is always in compromise and the majority of the staff feel overwhelmed with the new developments in IT.
Unmet Needs		
Enough support to understand the new technologies and their implications and overhead costs. In her personal life, she needs to balance the work and the family life.		

Persona ID	*Socio-demographics:*		*Digital literacy: (from 1 low to 5 high)*	
Picture:	Age:	45	Internet usage	3
	Civilian Status:	Married	Mobile devices skills	4
	Country:	France	Affinity to new tech	3
	Living situation:	Lives in a city apartment with his wife and his two kids.	Digital Health Literacy	4
	Profession:	Doctor	Technology usage	4
	Economic status:	XX	General attitude toward technology	4
Name:	Dr. Smith			
About the person				
Doctor Smith is a Healthcare professional. HosmartAI has been deployed in the Hospital he works. He is married and has two kids (8 and 10 years).				

What is important to him/her	Care Concerns / Health concerns	Daily Living
Treating and monitoring his patients efficiently.	He usually has migraines. He suffers from stress.	He wakes up early Sometimes, he works in the morning and sometimes in the afternoon, so getting into a daily routine is not so easy.
Events, issues & personal concerns	**Treatment**	**Own Resources, Assets/Support**
His work occupies part of his personal life. He takes care of the kids, as his wife travels a lot because of her work.	Medication for migraines. He practices sport to reduce the stress.	Resources: Own car for work and daily life. Emotional support: His wife and his kids.
Care professional concerns		
Find the best treatment and monitoring tools. Trustworthiness of the suggested monitoring tools/treatments	He wants to optimize the time he works by the monitorization of his patients to find the best and the most correct treatment. Development of a tool for monitoring his patients and discover which is the best treatment for their health problems.	IT system from the hospital needs some refurbishing to the new envisaged requirements and needs. The IT support is always in compromise and the majority of the staff feel overwhelmed with the new developments in IT
Unmet Needs		
Difficulties in finding the appropriate treatment without proper feedback. Monitoring his patients without a proper hospital's HER. High risk of relapse		

Persona ID:	*Socio-demographics:*		*Digital literacy: (from 1 low to 5 high)*	
Picture:	Age:	45	Internet usage	4
	Civilian status:	Divorced	Mobile devices skills	5
	Country:	Italy	Affinity to new tech	5
	Living situation:	Live's in a big house in a village next to the city	Digital Health Literacy	5
	Profession:	CEO in a Tech company	Technology usage	5
	Economic status:	XX	General attitude toward technology	5
Name:	Mr Antonioni			
About the person				

Mr. Antonioni is the CEO of a healthcare tech company, which has developed a system that predicts the effectiveness of treatment. He is divorced, but has three kids that live with him during the weekends. During weekdays, he suffers from loneliness, so tries to meet friends and visit his mother that lives in an elderly's home.		
What is important to him/her	Care Concerns / Health concerns	Daily Living
Pursuing the dissemination and deployment of his products in hospitals.	He had lung cancer 12 years ago, and this was the main reason to found his company.	He doesn't have a routine. Sometimes he does online work and sometimes goes to the office. Finding the economical sources for the continuous improvement of the company product represents a burden.
Events, issues & personal concerns	Treatment	Own Resources, Assets/Support
He suffers from loneliness and a high load of work. He wants to improve the IT systems for helping medical staff in a better way of planification and optimization.	Medical revisions every year.	Resources: Own car. Emotional resources: Meeting friends and visit her mother (83 years old, lives in an elderly's home).
Care professional concerns		
The deployment of their system would require radical changes to the IT of the hospitals.	Enhancing and distributing his IT solution for optimization of the patients' scheduling and treatment.	The tool will be able to improve the calendar patients need to follow whenever they are taking part in a treatment.
Unmet Needs		
Find ways to integrate the system into hospitals with reduced cost and effort. Find new solutions that can be integrated into the system to make it better. Does not know what the users think of the system.		

Table of epics that compound the user stories

Persona ID	*As a < type of user >*	*I want < main goal >*	*so that < main purpose >.*	*For this, I <proposed the solution>*
HOSPITAL_MANAGER	Hospital Manager	to analyze the contextual factors that impact the successful introduction, use and sustainability of innovative solutions	I gain new knowledge on how to best invest the time and money, which resources to prioritize and who can provide those resources	decided to deploy HosmartAI to get useful information through the HosmartAI benchmarking tool for the reorganization of the workforce based on a logistic process that had already been

				implemented in other hospitals
DR_SMITH	Healthcare professional	to spend a lot less time every morning to check the report or potentially wrong values	I can spend more time taking care of tasks that represent a big benefit to the patient	looked in the Marketplace to find HosmartAI Applications that could be used in the daily practice and the results of the Benchmarking Tool (based on previous cases/or cases coming from another hospital) to select a specific Application that uses AI
CEO_TECH	CEO of Healthcare Company	to adapt a product that predicts the effectiveness of a treatment	the product can easily be used in a hospital with low cost and effort	invested some time to use HosmartAI Semantic Data Model and AI Platform Core-Components APIs to convert the AI application to a HosmartAI Application
CEO_TECH	CEO of Healthcare Company	to improve the product with new AI features	it remains competitive	checked the HosmartAI Co-creation space for challenges that would work towards the improvement of the product
CEO_TECH	CEO of Healthcare Company	to get feedback from end users	I adapt the product to their needs	used the Benchmarking Tool to get insights on the efficiency and effectiveness in real environments

Appendix D User requirements

D.1 Template provided for User requirements

User requirements identification process (M5-M6)

Focus on identifying, at an early stage, initial user needs and requirements. These requirements will become initial input for the participatory design and agile requirements elicitation process and will be later re-evaluated and changed based on end user input and consultation.

End users will be actively engaged throughout the HosmartAI project especially after M8, so the first version of user requirements will focus on existing knowledge that other European projects had mined beforehand.

Please, perform in the next two weeks (till 27th May) an open literature study to capture existing and validated knowledge (while giving it back to the research community through this public deliverable) for the first version of user requirement elicitation.

This information is considered as the starting point and it comes from discovering primary and secondary users' needs and the deployment of use cases in previous, successful ICT projects. **The literature study aimed at finding European ICT projects that have developed technologies for similar environments and related aims.**

The study of the literature will provide a set of requirements that are related to the HosmartAI solutions as well as can serve as input for the creation of user scenarios.

> For this, fulfill the following tables while doing a literature research.
> You will find one supportive example for each related table. Please fulfill accordingly.

Initial version of the requirements

> You will find below the orienting steps for the literature research. However, consider that you might prefer to proceed with a different order for developing the activity.

> This structure is related to the plan for presenting user requirements in D1.2 (M7).

> Pilot partners are indicated to initiate/coordinate the literature research, and the rest of the partners involved in the pilot cases should collaborate actively and pre-validate the results (e.g. avoiding to state user requirements that can be out of the scope justifiably)

HosmartAI User Groups and objectives

Fill in the following table. Indicate your pilot's main users and main objectives targeted by the 1st version of user requirements. Relate with D1.1. if possible.

Pilot	*Main users*	*Main objectives targeted by the 1st version of user requirements*

Literature study

2.2.1. Provide a brief description of the way you conducted the literature study for your pilot searching for inputs for the first set of requirements and the creation of user scenarios. – Use this to plan your literature study and at the end to report/describe the searching process

Please inform about: keywords, databases accessed, gray literature, search period, and screening method (more or less systematic).

2.2.2. EU PROJECTS

2.2.2.1 Indicate the EU projects pre-selected (defining set of requirements based on end user engagement)

Please provide a short description of the projects studied in order to present the relevance with the HosmartAI project and present the requirement elicitation mechanisms that were used.

- Be sure that all projects have included end users in the requirements elicitation process so they depict end users' needs and wants.
- Projects that delivered user requirements based only on the consortium's knowledge and experience should be excluded.
- Consider studies that have been analysed, had either public deliverables describing the user requirement analysis process followed or were part of previous or ongoing relevant projects that HosmartAI's partners are involved.
- Indicate for each project: project acronym, dates of execution, webpage, a brief description, resume of the requirement elicitation mechanisms implemented, and participants.
- An example to be deleted later is grayed out.

Projects	
i-PROGNOSIS 1/2/2016-31/1/2020 http://www.i-prognosis.eu/	Description The main objective of the i-PROGNOSIS project is to design an ICT-based approach for early detection of Parkinson's disease and the design of ICT-based interventions to maintain and enhance the quality of older adults' life-promoting active and healthy ageing.
	Requirement elicitation mechanisms Consortium face-to-face sessions, questionnaires, focus groups, interviews, web surveys
	Participants patients, carers, physicians, therapists, researchers, PD specialist nurses, neurologists, healthy older adults
	Description
	Requirement elicitation mechanisms
	Participants
	Description
	Requirement elicitation mechanisms
	Participants
	Description
	Requirement elicitation mechanisms
	Participants
	Description
	Requirement elicitation mechanisms
	Participants
	Description
	Requirement elicitation mechanisms
	Participants

2.2.2.2. Requirements extracted from EU projects

Fulfill the following table with initial user requirements for your pilot solution extracted from EU projects

> An example to be deleted later is grayed out.

Pilot X	
Title	*Description*
e.g. Facial Emotional Recognition	e.g. The system should be able to analyze the facial expressions of the users in real-time and provide information about the user's emotional state.

2.2.3. Bibliometric study

2.2.3.1. Indicate the research papers studied

> Analyse if there are gaps not extensively studied by the selected EU projects

> To bridge that gap, research papers can be analysed.

Research papers studied	*Search engine used*	*Keywords*
e.g. The COACH prompting system to assist older adults with dementia through handwashing: An efficacy study. (Mihailidis, Boger, Craig, & Hoey, 2008)	PubMed	eCoach Older adults

2.2.3.2. Requirements extracted from bibliometric study

Pilot X	
Title	*Description*
e.g. Facial Emotional Recognition	e.g. The system should be able to analyse the facial expressions of the users in real-time and provide information about the user's emotional state.

D.2 Template for the joint user requirements

Title	Description	Evidence (EU project, research)	User requirements uptaken method	Value	Implementation Risk	Requirement type	functional requirements	Non-functional requirements	Most important actor involved
E.G. Speech Emotional Recognition	E.G Implement techniques for recognizing the emotions contained in the speech	E.G. Miraculous life	extracted from European projects						

CATEGORIES			
FUNCTIONAL		**NON- FUNCTIONAL**	
FR.UM	User monitoring	NFR.S	Security
FR.B	Bio-parameters	NFR.E	Performance efficiency
FR.C	Communication	NFR.M	Maintainability
FR.I	Information	NFR.F	Functional suitability
FR.EM	Environment monitoring	NFR.U	Usability
FR.UI	User Interface	NFR.R	Reliability
FR.UG	User guidance	NFR.P	Portability
		NFR.QoS	Quality of Service
		NFR.C	Compatibility
Options to select (Up uptake methods)			
extracted from User Stories			
extracted from D1.1			
extracted from a European project			
extracted from other research			
extracted from other real consultation			
Value: How valuable will be for the user in case the requirement is implemented.			
High (3)			
Medium (2)			
Low (1)			

D.3 User requirements detailed results

Title	Description	Value	Implementation Risk	Requirement type	functional requirements	Non-functional requirements	Most important actor involved
AI Platform	The requirements listed below refer to the AI Platform.						
Benchmarking	Analyze the contextual factors that impact the successful introduction, use and sustainability of innovative solutions	High (3)	Medium (2)	Non-functional		Functional suitability	Researchers
AI Tools for hospitals	Provide AI Applications that facilitate tasks in a hospital and can be used in daily practice to save time for other tasks that represent a big benefit to the patient	High (3)	High (3)	Functional	User monitoring	Quality of Service	Healthcare professionals
Catalog of AI Applications	Select AI Applications based on the description and benchmarking results	Medium (2)	Low (1)	Functional	User Interface		Healthcare professionals
Existing application conversion	Adapt an existing app to HosmartAI Semantic data Model and AI Platform Core Component APIs	High (3)	High (3)	Functional	User Interface	Portability	Researchers
Improvement of HosmartAI App	Add new AI features to an app	High (3)	Medium (2)	Non-functional		Performance efficiency	Healthcare professionals
End user feedback	Receive feedback from end users through the Benchmarking tool	High (3)	Low (1)	Functional	User Interface		Healthcare professionals
Data traceability	Patients and healthcare professionals need transparent, secure and trustworthy storage and use of personal and healthcare data. A need that is answered through the use of edge computing techniques for processing and storing data at source rather than in distant cloud and by third parties. A layer of traceability can be added using blockchain to trace data usage (What data? when? where? by who? and what for?).	High (3)	Medium (2)	Functional	Information	Security	Patients
Title	Description	Value	Implementation Risk	Requirement type	functional requirements	Non-functional requirements	Most important actor involved
AI-Assisted Echocardiography Interpretation	The requirements listed below refer to the AI-Assisted Echocardiography medical scenario of Pilot #1.						
Automatic, fast estimation of the Left Ventricular Ejection Fraction (LVEF)	The solution should, automatically and in a short amount of time, estimate the Left Ventricular Ejection Fraction (LVEF) from acquired echocardiographic video recordings.	High (3)	Low (1)	Functional	Bio-parameters		Healthcare professionals

Elimination of the interobserver variability in LVEF estimation	Human subjectivity introduces significant interobserver variability in the estimation of the LVEF. Irregularity in the heart cycles also impacts the estimation accuracy. To counter this, current guidelines recommend averaging the measures over multiple heart cycles. In practice, the recommendation is often not followed due to time constraints. The solution should eliminate interobserver variability.	High (3)	Medium (2)	Non-functional		Reliability	Healthcare professionals
Explainable LVEF estimation	Limited explainability impedes clinical acceptance of AI technologies. The solution should therefore be as transparent as possible, in order for the medical specialists to use it confidently.	Medium (2)	Low (1)	Functional	Communication		Healthcare professionals
Image quality monitoring	Image quality significantly affects the accuracy of measurements. The solution should provide the functionality to facilitate the acquisition of properly aligned cardiac views.	Low (1)	Medium (2)	Functional	Information		Healthcare professionals
User-friendly interface	The user interface should be clean and intuitive, enabling effective communication of information to the specialist.	High (3)	Low (1)	Non-functional		Usability	Healthcare professionals
Efficient placement and integration of the software in the clinical setting.	The solution should be straightforwardly integrated into the established clinical practice, introducing no obstacles.	High (3)	High (3)	Non-functional		Compatibility	Healthcare professionals
Evidence (EU project, research)							User requirements uptaken method
	[REF-05] /[REF-06] / [REF-07]						extracted from other research
	[REF-08] / [REF-09] / [REF-10] /[REF-11]						extracted from other research
	[REF-12] / [REF-13]/ [REF-14]						extracted from other research

	This is a fundamental requirement applicable to all medical scenarios.						extracted from other real consultation
AI-Assisted Capsule Endoscopy Interpretation	The requirements listed below refer to the AI-Assisted Capsule Endoscopy medical scenario of Pilot #1.						
Automatic, fast detection of suspicious lesions/abnormalities in capsule endoscopy videos	There is a great need to improve the time-intensive nature of reviewing examinations which in usual care last from 30 to 120 minutes. This long-lasting, tedious procedure does not only add delays on gastroenterology department operations, but it also fatigues the physician.	High (3)	Medium (2)	Functional	Bio-parameters		Healthcare professionals
High diagnostic yield for multiclass case	Although there are computer-based techniques for the successful detection of some of the possible classes of lesions/abnormalities, an accurate multiclass detector is what is needed in clinical practice.	High (3)	High (3)	Functional	Bio-parameters		Healthcare professionals
Trustworthy AI-based inference	Unilateral development of AI systems ignores the needs of stakeholders. Computer-aided diagnosis systems need to fulfill certain preconditions for this technology to be embraced by society. Beyond the efficiency of AI in detecting and characterizing lesions/abnormalities in capsule endoscopy, the opaque decision-making (also known as "AI blackbox") must become more interpretable using explainable AI (xAI) techniques.	Medium (2)	Medium (2)	Non-functional		Reliability	Healthcare professionals
Evidence (EU project, research)							User requirements uptaken method
							extracted from other research
	[REF-15] / [REF-16] / [REF-17]						extracted from other research
	This is a standard requirement from gastroenterologists due to the nature of the examination.						extracted from D1.1

AI-Assisted coronary CT angiography interpretation	The requirements listed below refer to the CCTA medical scenario of Pilot #1.						
Patient classification based on the extend of obstructive CAD.	The system must contain an AI-based model that will be able to classify patients based on the presence and extend of obstructive CAD. The platform to be developed aims to support cardiologists to choose individual-tailored therapy/prevention methods, by predicting patients likely to have coronary heart disease (CHD). To this end, clinical and genetic risk factors, lab exams results, coronary artery geometric features, the coronary artery calcium score (CACS), etc. will be analyzed and machine learning methods will be used to train an AI-based model that will be able to classify patients based on the presence and extend of obstructive CAD. Coronary CT angiography (CCTA) datasets will be analyzed using dedicated software for vessel analysis with tools for semi-automatic quantification of plaque volume. The outcome of the present study will be the presence of obstructive coronary artery disease (CAD) on CCTA, defined as the detection of ≥ 50% diameter stenosis in any of the four major epicardial coronary arteries.	High (3)	High (3)	Functional	Information	Performance efficiency	Healthcare professionals
Evidence (EU project, research)							User requirements uptaken method
	Extracted from interviews with the collaborating physicians' team.						extracted from User Stories
AI-Assisted computerized cardiotocography interpretation	The requirements listed below refer to the obstetrics medical scenario of Pilot #1.						

Predicting next actions and steps for cases with symptoms of preterm labor.	The system must contain an AI-based model that indicates whether each pregnant woman needs to be referred to a referral center for cases with symptoms of preterm labor. The platform to be developed aims to support gynecologists/obstetricians to identify whether pregnant women with symptoms of preterm labor need to be referred to the region's referral center, in case neonatal intensive care unit is needed. To this end, computerized cardiotocography (cCTG) analysis results, demographic details and other obstetrical data will be analyzed and machine learning methods will be used to train an AI-based model that will be able to classify pregnant women based on the need to be referred.	High (3)	High (3)	Functional	Information	Performance efficiency	Healthcare professionals
Predicting next actions and steps for cases complicated by fetal growth restriction.	The system must contain an AI-based tool for data analysis and support of medical decisions for cases complicated by fetal growth restriction. Besides preterm labor cases, the platform will also support and effectively monitor cases complicated by fetal growth restriction (FGR) (both milder and severe cases). For this, a smart tool for data analysis and support of medical decisions will be developed.	High (3)	High (3)	Functional	Information	Performance efficiency	Healthcare professionals
Evidence (EU project, research)							User requirements uptaken method
Extracted from interviews with the collaborating physicians' team.							extracted from User Stories
Title	**Description**	**Value**	**Implementation Risk**	**Requirement type**	**functional requirements**	**Non-functional requirements**	**Most important actor involved**
Development of a clinician-friendly, interpretable computer-aided diagnosis system (ICADx) to support and optimise clinical decision	The requirements listed below refer to the scenario of Pilot #2. (Patients perspective)						

making in multi-specialty healthcare environment							
Building conversational chatbots faster using NLP and machine learning	The system should be used to train and improve human-machine understanding – being the most accurate technology- in this new era of people and machines communication	High (3)	Medium (2)	Functional	User monitoring	Security	Patients
Chabot	Patient-centred treatment experience with a coaching system at its core. EPIONE™ features unobtrusive monitoring of treatment effects, a visual analytics platform, a chatbot-enabled assistant for patients, an online peer support community portal, and an intelligent videoconferencing system to enable discussions between experts and patients.	High (3)	High (3)	Functional	Bio-parameters	Performance efficiency	Patients
Patients contact	Apps and mental treatments onto an innovative mental health ecosystem platform that can be accessed via a smartphone and can respond to individual needs	High (3)	Medium (2)	Functional	Communication	Maintainability	Patients
Patient empowerment	InteropEHRate aims to empower the citizens regarding their health data and unlock health data from local silos, using a bottom-up approach for EHR interoperability	High (3)	Medium (2)	Functional	Information	Functional suitability	Patients
Chatbot and Patient empowerment	The main objectives of PERSIST is to increase self-efficacy and satisfaction with care as well as to reduce psychological stress for a better management of the consequences of the cancer treatment and the disease, resulting in an improvement in health and wellbeing and a faster integration into the labour market, where applicable, compared to usual care; increased effectiveness in cancer treatment and follow-up by providing prediction models from Big Data that will support decision-making and contribute to optimal treatment decisions with positive consequences in the QoL and the health status of survivors.	High (3)	High (3)	Functional	Environment monitoring	Usability	Patients

Patient experience	To investigate the subjective experience of adult cancer patients undergoing external radiotherapy and provide evidence for better practices in radiotherapy services.	High (3)	Medium (2)	Non-functional		Reliability	Researchers
Patient experience	Relationship between cancer patients' perceptions of the person-centeredness of their treatment experience and their anxiety levels during treatment.	Medium (2)	Low (1)	Non-functional	User Interface	Portability	Researchers
Patient experience	Understand and describe the experience of radiotherapy on the perspective of a woman with oral cancer.	Medium (2)	Low (1)	Non-functional		Quality of Service	Researchers
Patient experience and programs for patients and their family	Experience of patients receiving radiation treatment for cancer of the head and neck in five main themes: 1) making sense of the diagnosis, 2) distress from disrupted expectations, 3) heightened awareness of self, others and the health care system, 4) strategies to 'get through' treatment, and 5) living with uncertainty. Contribution to the development of head and neck cancer-specific patient support and education programs for patients and families.	Medium (2)	Medium (2)	Non-functional		Compatibility	Researchers
Patient experience	Involvement of patients in choosing daily appointment times, providing good information during the RT process to make the patients feel safe, experience and attitude of the staff and respect for the patient's autonomy are highly ranked values for patients. An implementation of person-centred care may help relieve many of these problems.	High (3)	Low (1)	Non-functional		Quality of Service	Researchers
Patient experience and literacy	Findings from this study indicate that collectively across three groups and over time, there were low levels of anxiety, depression, and distress from bowel preparation. Amount, timing, quality, and approach to educational information are important factors to ensure patients feel prepared for their radiation therapy treatments	High (3)	Low (1)	Non-functional		Quality of Service	Researchers

Patient experience	Patients who had undergone stereotactic radiotherapy did not demonstrate higher values for anxiety, depression or PTS symptoms than patients treated with conventional radiotherapy. All in all, it is the type of underlying disorder (malignant/benign), which affects the extent of psychological stress experienced by patients following radiotherapy	Medium (2)	Low (1)	Non-functional		Quality of Service	Researchers
Patient and individuals perception of radiotherapy	Ascertain broad public perceptions of radiation and the more in-depth cancer patient perceptions of RT	Medium (2)	Low (1)	Non-functional		Quality of Service	Researchers
Patients experience	Understanding the patients' experience with oncologic radiotherapy through an anthropological interpretative approach and ethnographic method	Medium (2)	Medium (2)	Non-functional		Quality of Service	Researchers
Patient experience and health literacy	Provide adequate information and support to optimise patient preparation for medical interventions, including cancer treatments. This qualitative study explored patients' experiences of and preferences for preparation for radiotherapy.	Medium (2)	Medium (2)	Non-functional		Quality of Service	Researchers
Evidence (EU project, research)							User requirements uptaken method
BITEXT/ RELIEF/ HYGGii / InterhopERAte/ PERSIST/ OR4.0							extracted from European project
– Exploring the cancer patients' experiences during external radiotherapy: A systematic review and thematic synthesis of qualitative and quantitative evidence – The influence of a department's psychosocial climate and treatment environment on cancer patients' anxiety during radiotherapy – Experience of radiotherapy in head and neck – Patients' experience of receiving radiation treatment for head and neck cancer: Before, during and after treatment – What matters to you? – Free-text comments in a questionnaire from patients undergoing radiotherapy – Assessing the Psychological Impact of Daily Bowel Preparation on Prostate Patients Who Receive Radiation Therapy – Emotional State of Patients in Radiotherapy and How They Deal with Their Disorder – Fears and Misperceptions of Radiation Therapy: Sources and Impact on Decision-Making and Anxiety – The oncologic radiotherapy experience for patients: a poison-drug – Patients' Experiences of Preparation for Radiation Therapy: A Qualitative Study							extracted from other research

Optimizing the use of radiotherapy	The requirements listed below refer to the scenario of Pilot #2. (Health and IT professionals perspective)						
AI platform for automate patient flow	An intelligent platform can manage and automate patient flows, events and tasks, moving hospitals from a reactive to a proactive healthcare system.	High (3)	High (3)	Functional	User Interface	Performance efficiency	Healthcare managers
Algorithms for the radiotherapy flow	Developing and evaluating models and algorithms used to automatically create radiotherapy treatment schedules	High (3)	Medium (2)	Functional	User Interface	Performance efficiency	Hospital units
Radiotherapy Plan Model	Modelling and formulating radiotherapy plan into a shop scheduling problem.	Medium (2)	Medium (2)	Functional	User Interface	Usability	Hospital units
Management of effective resources of health professionals	More support for nursing resource-Managing resources effectively is crucial for any organisation's success. In hospitals, this involves nursing quality as well as volume.	High (3)	Medium (2)	Non-functional		Usability	Healthcare managers
Optimizing Radiotherapy	Optimizing lung cancer radiation treatment worldwide in Covid-19 outbreak	High (3)	Medium (2)	Non-functional		Performance efficiency	Clinicians
Optimizing Radiotherapy	Optimization methods to aid oncology clinics in three-dimensional treatment plans.	High (3)	Medium (2)	Non-functional		Performance efficiency	Clinicians
Optimization treatment	Multivariable models for the treatment for Head and Neck Radiotherapy	Medium (2)	Medium (2)	Non-functional		Performance efficiency	Hospital units
Cost and service Optimization	Analytical approach to achieve an appropriate balance between operational costs and service quality.	Medium (2)	Low (1)	Non-functional		Maintainability	Healthcare managers
Improve scheduling	Solution for booking, scheduling and solve workload issues	Medium (2)	Medium (2)	Functional	User Interface		Healthcare managers
Random elements and optimization	Optimizing the pharmaceuticals supply chain in a hospital setting by taking into account random elements related to demand, costs and the lead times of medicines.	High (3)	Medium (2)	Non-functional		Quality of Service	Healthcare managers
Healthcare needs for supportive care	Radiation therapists (RTs) plan and deliver radiotherapy treatment for patients diagnosed with cancer. They need to communicate regularly with their patients and may have a role to play in reducing patient anxiety and distress. The objectives were to	High (3)	Medium (2)	Non-functional			Researchers

	explore how the environment of radiotherapy departments supports or inhibits communication generally and information giving and supportive care provision in particular. Time, space and a technology-driven culture were found to negatively affect the quality of interaction that occurred between RTs and their patients.						
Evidence (EU project, research)							User requirements uptaken method
	OR4.0						extracted from a European project
	– Novel approaches to radiotherapy treatment scheduling – A review of scheduling problems in radiotherapy – A review of scheduling problems in radiotherapy – Optimizing lung cancer radiation treatment worldwide in Covid-19 outbreak – Optimization methods for radiation therapy plans – Multivariable normal tissue complication probability model-based treatment plan optimization. – Bi-objective optimization for a queueing model with two-phase heterogeneous service – Operations Research Methods Improve Chemotherapy Patient Appointment Scheduling: – Optimization under uncertainty of the pharmaceutical supply chain in hospitals – Time, space and technology in radiotherapy departments: how do these factors impact on patients' experiences of radiotherapy?						extracted from other research
Title	**Description**	**Value**	**Implementation Risk**	**Requirement type**	**functional requirements**	**Non-functional requirements**	**Most important actor involved**
Treatment Improvement with the use of innovative technologies and robotics in rehabilitation process	The requirements listed below refer to the scenario of Pilot #3. (Patients and caregivers perspective)						

User-friendly interface and telerehabilitation kit	Patients need a clean and intuitive user interface, and an easy-to-use telerehabilitation kit. During hospitalization patients are supported by a physiotherapist, while they might need caregivers' support to manage the telerehabilitation service from home, especially the elder ones and the those with limited autonomy.	High (3)	Medium (2)	Functional	User Interface		Patients
Patients need to feel empathy-based care	Patients need care professionals with a human touch to follow them. During hospitalization a part of the regular care is provided by technology-based therapy so that the care professionals can spend more time with patients and provide better attention. After hospitalization the physiotherapist-patient relationship continues while rehabilitation is provided by the telerehabilitation service.	High (3)	Medium (2)	Non-functional		Quality of Service	Patients
Gamification of rehabilitation services	Patients reported that when they have fun exercises are easier and better.	High (3)	Medium (2)	Non-functional		Quality of Service	Patients
Familiar environment	Patients need to stay close to their family and beloved ones. Tele-rehabilitation services provide the care that patients need while they can stay at home.	High (3)	Medium (2)	Non-functional		Quality of Service	Patients
Continuity of care	Patients want to recover at their best, so they keep on looking for rehabilitation centres after hospitalization. The telerehabilitation service provided after hospitalization guarantees continuity of care and they feel satisfied of the progress they have made with this approach.	High (3)	High (3)	Non-functional		Quality of Service	Patients
Importance of caregivers	Most of the patients are not autonomous in their activities. The role of caregivers is crucial and this should always be taken into account.	High (3)	Medium (2)	Non-functional		Quality of Service	Patients
Evidence (EU project, research)							User requirements uptaken method

	– Usability is a general requirement applicable to all medical scenarios.						Extracted from other real consultation
	– Semi-structured interview with patients and caregivers.						Extracted from User Stories
Treatment Improvement with the use of innovative technologies and robotics in rehabilitation process	The requirements listed below refer to the scenario of Pilot #3. (Care professionals perspective)						
Environment monitoring	The capability of receiving an alert on patients' risky behaviours and information on activities run at hospital and home	High (3)	Medium (2)	Functional	Environment monitoring		Healthcare professionals
Performance efficiency	Information on services delivered to patients, both in presence of healthcare professionals and run autonomously by the patients themselves	High (3)	Medium (2)	Non-functional		Performance efficiency	Healthcare managers
Collaboration with caregivers	If the patient is not autonomous, physiotherapists need to reach a caregiver for every need. (i.e. reschedule appointments, technical problems, adjust wearable devices...)	Medium (2)	Medium (2)	Functional	User guidance		Clinicians
Continuity of care	After hospitalization patients are often left to themselves and they could feel abandoned. The telerehabilitation service allows physiotherapists to follow the patient after hospital discharge in order to improve the rehabilitation and guarantee continuity of care. Physiotherapists are satisfied with the service and they wish to keep improving it to provide better care.	Medium (2)	Medium (2)	Non-functional		Quality of Service	Clinicians
Evidence (EU project, research)							User requirements uptaken method
	– Semi-structured interview with physioterapists						Extracted from User Stories
Title	**Description**	**Value**	**Implementation Risk**	**Requirement type**	**functional requirements**	**Non-functional requirements**	**Most important actor involved**

Robotic Systems for minimally Invasive Operation	The requirements listed below refer to the scenario of Pilot #4.						
Automatic navigation to target location	The User shall be able to active semi-automatic navigation to a target location.	High (3)	High (3)	Functional	User Interface	Performance efficiency	Healthcare professionals
Automatic navigation along a trajectory	The User shall be able to active semi-automatic navigation along an ablation trajectory.	High (3)	High (3)	Functional	User Interface	Performance efficiency	Healthcare professionals
Improved EP map	The user shall be able to view an AI improved 3D electrophysiological map of cardiac structures and electrical signals.	High (3)	High (3)	Functional	Bio-parameters	Maintainability	Healthcare professionals
User interface to defined target location	The user shall be able to select a target location.	High (3)	Low (1)	Functional	User Interface	Usability	Healthcare professionals
Evidence (EU project, research)							User requirements uptaken method
– Interviews with multiple electrophysiologists during the last 8 years.							extracted from other real consultation
Title	**Description**	**Value**	**Implementation Risk**	**Requirement type**	**functional requirements**	**Non-functional requirements**	**Most important actor involved**
Assistive Care in Hospital: Robotic Nurse	The requirements listed below refer to the scenario of Pilot #5.						
Multi-modal Sensing and Symmetric Interaction	The system should be able to cover the different types of data sources for getting a holistic approach for patients.	High (3)	Low (1)	Functional	User Interface		Patients
Reconfiguration of robot	The system should be able to reconfigure the PEPPER robot according to the requirements of the working environment and project targets.	Medium (2)	Low (1)	Non-functional	User Interface	Functional suitability	Healthcare professionals
Development of autonomous navigation	Algorithms for real-time autonomous navigation and SLAM should be appropriate for the clinic environment and based only on Pepper's HW resources.	High (3)	Low (1)	Non-functional		Reliability	Hospital units
Obstacle avoidance and objects' recognition	The robot should recognize objects on its pathway to properly avoid them, move aside or stop in critical situations in human environments.	High (3)	Low (1)	Non-functional		Security	Healthcare professionals

Kinematic (inverse) models	Is the robot capable of substituting and executing nursing tasks in a human-like manner? What are the major differences or adjustments to achieve that. Besides indoor autonomous navigation through hallways and rooms, can a robot execute simple/complex nursing tasks.	Medium (2)	High (3)	Functional	Communication		Patients
Safety aspects	We need to set up a safe common workspace and actively share it with robots, patients and clinical staff. The robot should be adapted to the human environment and not vice versa.	High (3)	Low (1)	Non-functional		Security	Hospital units
Patient adherence, quality of self-reports and long term sustainability	Familiarity, perceived complexity, and trustworthiness represent the main drivers of patient adherence and have an impact on the quality of self-reports (PROs). The systems must be designed in a way to reflects trustworthiness and help users to easily get familiar with them (i.e. use the natural way of communicating).	High (3)	Low (1)	Functional	User monitoring		Patients
Patient acceptance and stigmatization	Ethical considerations related to decreased social contact, as patients' stigmatization and fear of the dehumanization of society. Robots may be perceived as a local threat to their independence due to unfamiliarity and technical inexperience.	High (3)	Medium (2)	Non-functional		Usability	Patients
Safety and autonomy	Although the AI-driven systems exhibit robust, autonomous capabilities and initial concerns regarding physical safety around people have been partially addressing the problem of dynamic highly unpredictable environment in hospital wards remains.	High (3)	Low (1)	Non-functional		Security	Healthcare professionals
Acceptance from healthcare professionals	Although healthcare professionals are clearly facing high workloads and tend to recognize the potential value of care robots as an aid in "measuring/monitoring", "mobility/activity" and "safety of care", they are in fact challenged in understanding and prioritizing of the robotics units into fundamental aspects of care.	High (3)	Medium (2)	Functional	User Interface		Healthcare professionals

Development of AI for nursing	When we consider the development coupled with the precondition of nurse engagement, it is crucial for a nursing AI to have a successful implementation and long-term sustainability. Nonetheless, if it is necessary to evaluate the "strength" of the delineations, then collaboration would be most important as a precondition, since it is important, to begin with, a nurse-centric AI.	High (3)	Low (1)	Non-functional		Performance efficiency	Patients
Technology Literacy	All people who will be in contact with the robot should have a basic technology information.	High (3)	Medium (2)	Non-functional		Functional suitability	Healthcare professionals
Datasets for feature extraction from multimodal sensing	Facial, speech and text feature extraction datasets should be searched and downloaded for further investigation of feature fusion. Example datasets: • Facial: The Japanese Female Facial Expression (JAFFE) Dataset, EmotioNet database • Speech: Berlin Emotional • Text: EmoBank, DailyDialog: A Manually Labelled Multi-turn Dialogue Dataset Multi-modal: Ryerson Audio-Visual Database of Emotional Speech and Song (RAVDESS), CMU Multimodal Opinion Sentiment and Emotion Intensity (CMU-MOSEI)	High (3)	Low (1)	Functional	User monitoring		Researchers
Libraries for feature extraction from multimodal sensing	Facial, speech and text feature extraction libraries should be searched and downloaded for further investigation of feature fusion. Example libraries: • Facial: OpenFace, AUNets • Speech: openSMILE, LibRosa • Text: NLTK, Reldi, Spacy, Stanza • Multi-modal: end2you	High (3)	Low (1)	Functional	User monitoring		Researchers

Decision of HW sensors to be used for SLAM algorithm	We need to decide which sensors (laser, sonar, 3D camera, etc), will be appropriate for SLAM algorithm development on Pepper, for indoor use with staff and patients. Or maybe will depend on combined partial SLAM algorithms (ICP, Visual, EKF SLAM) Libraries in ROS, OpenSLAM, GitHub can be useful. The position and orientation of the robot must be known in real-time.	High (3)	Medium (2)	Non-functional		Reliability	Researchers
Real-time autonomous navigation and remote control.	We need to check if already developed ROS libraries are sufficient or try to compare them with other open-source libraries. Finally, we can improve the code by specific needs in the project (clean environment, hospital, etc.) in python or C++ code. Navigation remote /autonomous should be smooth and safe between staff and patients.	Medium (2)	Low (1)	Non-functional		Performance efficiency	Researchers
Motion Control and Trajectory Planning for Obstacle Avoidance	Optimal trajectory planning is important to safely navigate the robot, however in case of obstacles (human, hospital bed, chair, etc.) a robot must find its way around the obstacle. Methods for optimal trajectory and its optimisation will need to be addressed here.	High (3)	Low (1)	Functional		Reliability	Researchers
Visual recognition and obstacle categorization, human motion prediction	In order to avoid indoor dangerous scenarios on a robot pathway or workspace, additional algorithms can be addressed to increase safety (collision avoidance). Meaning algorithms for human motion prediction (such as a moving arm or body towards the robot) can decrease accidents and contact with the robot. Also, categorization of obstacles (equipment, humans) and their properties such as dimension and shape estimation can be used for smooth collision avoidance, etc.	Medium (2)	Low (1)	Functional		Performance efficiency	Researchers
Patients contact	Apps and mental treatments onto an innovative mental health ecosystem platform that can be accessed via a smartphone and can respond to individual needs	High (3)	Low (1)	Functional	User Interface		Patients

Patient empowerment	InteropEHRate aims to empower the citizens regarding their health data and unlock health data from local silos, using a bottom-up approach for HER interoperability	Medium (2)	Medium (2)	Non-functional		Usability	Patients
Evidence (EU project, research)							User requirements uptaken method
[REF-18] / [REF-19]							extracted from other research
[REF-20]							extracted from other research
[REF-21] / [REF-22] / [REF-23] / [REF-24]							extracted from other research
[REF-25] / [REF-26] / [REF-27]							extracted from other research
[REF-28] / [REF-29]							extracted from other research
[REF-30] / [REF-31]							extracted from other research
[REF-32] / [REF-33]							extracted from other research
[REF-34] / [REF-35] / [REF-36]							extracted from other research
[REF-37] / [REF-38] / [REF-39]							extracted from other research
[REF-40] / [REF-41]							extracted from other research
[REF-42] / [REF-43]							extracted from other research
ECROBOT, PERSIST, NEVERMIND, CogIMon, SARAFun, An.Dy, ENRICHME, CARESSES, SmokeBot, AEROARMS, COMANOID, HYGGii, InterhopERAte							extracted from European projects
Title	**Description**	**Value**	**Implementation Risk**	**Requirement type**	**functional requirements**	**Non-functional requirements**	**Most important actor involved**

Assistive Care in Care Centre: Virtual Assistant	The requirements listed below refer to the scenario of Pilot #6.						
An AI and Big Data diagnosis support system	Big Data platform system for efficient medical assistance, diagnosis.	High (3)	Low (1)	Non-functional		Performance efficiency	Healthcare professionals
Only installation	During the installation of the detection/interventions/games application and the detection/interventions smartwatch applications, all background services must be installed as well, without requiring any further interaction by the user.	Medium (2)	Medium (2)	Functional	User Interface		Patients
Background services and local data must be completely removed	The uninstall process must remove the main detection/interventions/games application or detection/interventions smartwatch application, any locally stored data and the background services, thus leaving the mobile device in a state similar prior to installing the applications.	Medium (2)	Low (1)	Functional	User Interface		Patients
Data contribution	Through an appropriate and easily understandable feedback element in the home screen of the detection application, the user must be able to view the absolute amount of data collected and a relative (percentage) breakdown of data contribution per data source. The feedback element will be refreshed on a regular basis, e.g., each time the syncing service uploads data to the Cloud server.	Medium (2)	Low (1)	Functional	User Interface		Patients
Notifications and interaction I	The user must be able to receive notifications by the detection/interventions application. The actor should be notified and be able to interact with the notification per standard guidelines of the OS. The actor must further be able to view the content of the notification within the detection/interventions application, by selecting it from the OS notifications tray. Finally, the actor must have access to a list of notifications received within the detection/interventions application, via the notifications tab.	Medium (2)	Low (1)	Functional	User Interface		Patients

Notifications and interaction II	The notification must include an epitomized breakdown of the indicators leading to the result in a language that is comprehensive and informative. This information should also be propagated to the expert clinician via the user in order to assist her/him during her/his diagnosis.	Medium (2)	Low (1)	Functional	User Interface		Clinicians
Human-computer interaction: Provide Feedback	The solution must include feedback elements on key monitoring data and serious games activity and performance metrics on a dedicated section (dashboard tab). Feedback elements and data-to-feedback service must be refreshed based on new monitoring data on a scheduled basis. Thus, the data-to-feedback service should perform its operations on a scheduled basis. This feedback should be provided in a way that is user-friendly and comprehensive.	High (3)	Low (1)	Functional	User Interface		Patients
Request help	The user shall be able to request technical support regarding the usage of the detection/interventions application and the background services in a way that is user-friendly and comprehensive via the detection/interventions application.	Medium (2)	Medium (2)	Functional	User guidance		Patients
Collection of data - Record data	The background service of each assistive intervention must record statistics on its usage, i.e., the number of intervention activations by the user, their duration of usage and the number of events detected (e.g., sleep disturbances per night), where applicable. The latter data will be stored by the respective background services and made available to the syncing service of the application of the interventions in order to be uploaded on the Cloud server.	High (3)	Low (1)	Functional	User Interface		Healthcare professionals
Collection of data – voice	The recorded voice data must be collected and processed by the voice service in an unobtrusive way and without requiring any interaction.	Medium (2)	Medium (2)	Functional	Bio-parameters		Healthcare professionals

Collection of data – Integrated care	Electronic Health Record to share all relevant digital information about the patient between healthcare providers in a real-time framework. Also included are digital images, clinical tests, etc.	Medium (2)	Medium (2)	Functional	Information		Clinicians
Typing pattern service	The keystrokes must be collected and processed by the typing pattern service in an unobtrusive way and without requiring any interaction, when the user's the custom keyboard to type.	High (3)	High (3)	Functional	User monitoring		Healthcare professionals
Location service	The location data must be collected, de-identified and processed by the location service in an unobtrusive way and without requiring any interaction.	High (3)	Medium (2)	Functional	Environment monitoring		Researchers
Sensor data capturing service	The sensor data capturing service must collect the correct data depending on the activity	High (3)	Medium (2)	Functional	Bio-parameters		Healthcare professionals
Syncing service	The data stored from the background services of the detection/interventions application must be stored and communicated with the Cloud server by the syncing service in an unobtrusive way and without requiring any interaction.	High (3)	Medium (2)	Functional	Communication		N/A
Decision sub-system based on the detection behavioural model	The decision sub-system based on the detection behavioural model must infer the potential changes in the user's behaviour in an unobtrusive way and without requiring any interaction.	High (3)	Medium (2)	Functional	User monitoring		Healthcare professionals
Contact clinician	The user must be able to easily access the contact information (name, address, telephone number, e-mail address) of her/his clinician through the help & feedback tab of the application of the interventions.	High (3)	Low (1)	Functional	Communication		Patients
User profiles I	The solution can operate with different user profiles (including guest profile) guest user profile, and be able to recognise and adapt the selected profile.	High (3)	Low (1)	Functional	User Interface		N/A

Intervention platform – clinician	The clinician must be able to access the intervention platform in an unobtrusive way, by creating and modifying an existing account profile (not the username and the password) of a user, and modify the intervention programmed by the intervention platform. This information provided should be easy to understand and have useful information.	Medium (2)	Low (1)	Functional	User monitoring		Clinicians
User account Log in/Log out	Upon logging into the interventions platform, the interventions user could stay logged-in even after a session has been terminated. The interventions platform must include an option for the user or expert clinician to log-out from the interventions platform. The process will not affect the interventions user's or clinician log-in status on other mobile devices or the Web-based interventions platform. After logging out, the user or expert clinician must be presented with the log-in screen of the interventions platform.	Medium (2)	Low (1)	Functional	User Interface		N/A
Accessibility I	The interventions platform must be accessible through a dedicated URL from a browser, provided that the user's, clinician's mobile device (smartphone or tablet) or PC is connected to the internet.	Medium (2)	Low (1)	Functional	User Interface		Healthcare professionals
Accessibility II	The interventions application must allow the user to access via dedicated tabs (VEI and TNI tabs) and use the assistive interventions.	Medium (2)	Low (1)	Functional	User Interface		Healthcare professionals
Assistive intervention I	The dedicated UI of each assistive intervention, either in the applications of the smartphone or smartwatch, must include all the parameters that the interventions user can change in order to affect the functionality of the intervention, as well as the option to activate/deactivate it - including the respective background service.	Medium (2)	Medium (2)	Functional	User Interface		Healthcare professionals
Assistive intervention II	When an user deactivates an assistive intervention, the respective services on the smartphone or smartwatch	Medium (2)	Low (1)	Functional	User Interface		Healthcare professionals

	are also terminated, i.e., no data recording, processing or uploading takes place.						
Serious games I	Each serious game should have instructions at the beginning and a countdown for the user to prepare to play, and also, the option to pause the activity.	Medium (2)	Medium (2)	Functional	User Interface		Patients
Performance metrics	Based on the user's performance metrics regarding a particular game scenario, the personalisation service must adapt certain parameters of the game scenario (e.g. difficulty) for the next time the interventions user plays the particular game scenario. The personalisation service can perform its operations immediately after the game scenario is terminated.	Medium (2)	Medium (2)	Functional	User monitoring		Patients
GDPR	the system must be designed and operate in a way that conforms to the country's laws. In the European Union, the system must be compliant with the General Data Protection Regulation7 (GDPR).	High (3)	Medium (2)	Non-functional		Security	N/A
Cloud Service	The networking system must be able to cope with the generated traffic and computational load.	High (3)	Medium (2)	Non-functional		Performance efficiency	N/A
Cost of additional devices	The cost of additional devices required for capturing monitoring data and for use in PGS and assistive interventions must be as low as possible, so as for the expert clinician to provide them to the user without creating significant financial burdens. Nevertheless, the cost of the devices must be second to the accuracy and safety of the devices, which are top priority.	High (3)	Medium (2)	Non-functional		Quality of Service	N/A
Translation	The text of the detection/interventions/games application and the detection/interventions smartwatch application must be translated into different languages. Based on the system language of the user's mobile device (smartphone/tablet/smartwatch), the detection/interventions/games application and the detection/interventions smartwatch application will be presented in the respective language.	High (3)	Medium (2)	Non-functional		Functional suitability	N/A

Log in process	The time interval between the user or expert clinician or caregiver entering her/his account credentials until the validation or not of her/his log-in by the intervention platform or interventions/games application must be as small as possible.	Medium (2)	Medium (2)	Non-functional		Performance efficiency	N/A
Feedback elements	The design of and the statistics presented via the feedback elements must provide the user with easy-to-understand and useful information that will require minimal additional knowledge from the user to assimilate it.	High (3)	Low (1)	Non-functional		Functional suitability	N/A
UI Interventions platform	The UI elements of the interventions platform, including sliders, buttons, text, menus, text fields, must be designed so as to be easily accessible by the user or expert clinician or caregiver (high contrast, large enough fonts, distinctive colours). Icons or accompanying text of icons must clearly state the functionality they correspond to.	Medium (2)	Low (1)	Non-functional		Usability	N/A
Robot - Virtual assistant	The system should be able to ask for help in case of emergency or falls and of danger in general and to know one's own interests/hobbies/activities	High (3)	Medium (2)	Functional	User monitoring		Patients
Robot - Monitoring	The system should be able to ask for help in case of emergency or falls and of danger in general, to be able to daily check and stimulate mood disorder and to experience of loss and loneliness: between awareness and coping (with fears and anxiety, for example).	High (3)	Medium (2)	Functional	User monitoring		Patients
Recommendation system	The system should be able to make recommendations for activities based on stored information (always updating) about previously enjoyed activities and stated interests in a persuasive way.	High (3)	High (3)	Functional	Communication		Patients
Privacy	All collected information should be unobstructed and users should be able to withdraw themselves and their data at any time from the system for any reason.	High (3)	Medium (2)	Non-functional		Security	Patients

System will be easy to learn	The cost of learning the system features and functioning should be minimum. Short-term memory decline with age should be taken into account both at the app design and at the training phase.	High (3)	Medium (2)	Non-functional		Maintainability	N/A
Robot - navigation and scanning	The robot should have the ability to navigate, scan the room, automatically locate the person to talk to and keep them in focus.	High (3)	Medium (2)	Functional	User monitoring		Patients
Robot - Social abilities	The robot should be able to cooperate, express empathy, show assertivity, exhibit self-control, show responsibility, gain trust and show competence.	High (3)	High (3)	Non-functional		Usability	Patients
Robot - Behavioural features	The robot should be able to: • listening attentively, for example by looking at the participant and nodding • being nice and pleasant to interact with, for example by smiling • remembering little personal details about people, for example by using their names • being expressive, for example by using facial expressions • admitting mistakes	High (3)	High (3)	Functional	User monitoring		Patients
Evidence (EU project, research)							User requirements uptaken method
							extracted from other research
	[REF-44]						extracted from other research
	i-PROGNOSIS, BIONIC, Carewell, HEARTMAN, MOVECARE, ACANTO, ALFRED, iToilet, TERESA						extracted from a European projects

	Consultation with real users						extracted from other real consultation
Title	**Description**	**Value**	**Implementation Risk**	**Requirement type**	**functional requirements**	**Non-functional requirements**	**Most important actor involved**
Smart Cathlab Assistant	The requirements listed below refer to the scenario of Pilot #7.						
Automatic reporting	The clinical user shall be able to dedicate his/her time to the treatment of the patient, such that the treatment outcome will be optimal and I don't lose time on administrative work	High (3)	High (3)	Functional	User monitoring		Clinicians
Clinical decision support	The clinical user shall be able to focus his/her attention on the wellbeing of the patient, such that the patient will feel comfortable and treatment outcome is optimal	High (3)	High (3)	Functional	User Interface		Clinicians
Image interpretation	The clinical application should support an automatic interpretation of clinical image data and present the results in an interpretable way to the user	High (3)	High (3)	Functional	User Interface		Clinicians
Data acquisition	For each step of the procedure, assistance will be provided by the smart cathlab application in order to systematize and standardize the data acquisition	High (3)	High (3)	Functional	User monitoring		Healthcare managers
Evidence (EU project, research)							User requirements uptaken method
	User studies and interviews with clinical key opinion leaders						extracted from other real consultation
Title	**Description**	**Value**	**Implementation Risk**	**Requirement type**	**functional requirements**	**Non-functional requirements**	**Most important actor involved**
Prognosis of cancer patients and their response to treatment combining multi-omics data	The requirements listed below refer to the scenario of Pilot #8.						
Better access to clinical data for research	System should enable research within legal parameters to help advance healthcare (see also below)	High (3)	Medium (2)	Non-functional		Usability	Researchers

Environments that ensure data security	Protect patient information, recognizing full de-identification is difficult	High (3)	High (3)	Non-functional		Security	Healthcare managers
Access to different data types	EMR, medical imaging, genomics, and physiological monitoring data	High (3)	High (3)	Functional	User monitoring		Healthcare professionals
Secure computing environment	Built for data science to enable discovery, within the hospital setting	High (3)	Medium (2)	Non-functional		Security	Healthcare managers
Bring new discoveries into clinical care	Clinical researchers should be able to use advances in diagnosis and treatment, when validated	High (3)	Medium (2)	Non-functional		Functional suitability	Researchers

Appendix E Consent form

Informative sheet

What is the purpose of this research and development project?

HosmartAI – "Hospital Smart development based on AI", aims to promote an effective and efficient healthcare system transformation, by the use of AI technological developments and robotics. In order to achieve this transformation, HosmartAI will create a common open integration platform with the necessary tools to facilitate and measure the benefits of integrating digital technologies (robotics and AI) for healthcare professionals, patients, information system managers and health organisation administrations.

Expert groups will be held within the settings services to discuss needs and share ideas to generate better solutions in a collaborative way, among other actions.

Who is organising the activities with the participants?

This project has the participation of 24 European entities from different structures.

In (**ENTITY NAME**) the responsible are _____ (**Responsible name) (profession), (email, phone number**); _____ **(Responsible name), (profession), (email, phone number**).

What will be asked to do in this study?

Your participation is entirely voluntary. We will ask you to participate in expert sessions in which all that is required is that you tell us about your experience and views, and co-creative activities can be generated.

We would like you to share your experience and impressions of what we are going to present, to help us develop solutions that can help _____ **(explain the main objective of your pilot/platform)**. The sessions will take place in small groups (around 8 people) and will be organised in 4 sessions.

Your involvement is of great value as a partner in the development of technological solutions that improve healthcare delivery and outcomes.

This discussion group will last less than two hours. If these workshops/discussion groups can be held face-to-face, the respect for the barrier and sanitary measures against COVID-19 is guaranteed. If face-to-face is not possible, we will organise online sessions.

What if I change my mind about participating?

You are free to withdraw from this study at any time, without giving a reason. In this case, your data will be deleted.

What will happen to the information I will give if I participate in this study?

What is discussed in the expert group will remain confidential and will not be shared with anyone else. With your permission, we may record the discussion so that we can consider the main ideas and contributions and transcribe them onto paper. In any case, we will change your name and other details so that it is not possible to identify you. The recording will then be destroyed at the end of the project (May 2024).

To be able to contact you, we will ask for your contact information. But don't worry, your answers will not be associated with your name. We will delete your contact information at the end of the project (May 2024).

Our research team will write a summary of the main points addressed. This summary will be shared with the project partners and the research funding organisation, and will be published, but don't worry because no information that can identify you will be presented.

No individual information will be disclosed, but if you would like to have a general summary of the results, please indicate this to the expert session leader.

You may exercise your rights regarding any personal information you may provide, i.e. your right of access, rectification, deletion, opposition, portability and limitation. To exercise your rights, please contact the relevant study managers or data protection officers (contact details above). In the event of failure to respect these rights, you may refer the matter to a supervisory authority _____ **(indicate National authority)**.

If you agree to participate in the expert sessions, please complete the consent form and keep this information sheet. You may withdraw your consent at any time. This will not invalidate the past processing of your data.

Informed Consent

for User and Practitioner Consultation sessions

Mark with an X all the points with which you agree:

	I understand that I will participate in expert sessions on a voluntary basis, where I will be able to assess aspects and ideas presented by my accumulated life experience.
	The reason for these expert sessions has been explained to me and I have had the opportunity to read the fact sheet and ask questions.
	I give my contact information to be contacted for this project.
	I understand that my answers are confidential and made anonymous. No information that identifies me or any family member will be used.
	I will be able to request the results of this consultation when they become available.
	I consent to the recording of the discussion that will be generated in the group for further study. The information provided may be used in further research in an anonymous manner.
	I authorise the taking of photos of the activity and the recording of the session and I authorise the MOAI LABS project to distribute images of me, limiting their use to MOAI LABS project activities.
	I understand that I have the right to withdraw from the sitting at any time without giving reasons.

I give my consent to participate in this consultation session:

Participant's name: Signature:	Researcher's name: Signature:

Informed Consent

for User and Practitioner Consultation sessions

Mark with an X all the points with which you agree:

	I understand that I will participate in expert sessions on a voluntary basis, where I will be able to assess aspects and ideas presented by my accumulated life experience.
	The reason for these expert sessions has been explained to me and I have had the opportunity to read the fact sheet and ask questions.

	I give my contact information to be contacted for this project.
	I understand that my answers are confidential and made anonymous. No information that identifies me or any family member will be used.
	I will be able to request the results of this consultation when they become available.
	I consent to the recording of the discussion that will be generated in the group for further study. The information provided may be used in further research in an anonymous manner.
	I authorise the taking of photos of the activity and the recording of the session and I authorise the MOAI LABS project to distribute images of me, limiting their use to MOAI LABS project activities.
	I understand that I have the right to withdraw from the sitting at any time without giving reasons.

I give my consent to participate in this consultation

Participant's name: Signature:	Researcher's name: Signature:

Appendix F Evaluation from Stakeholder's Community - Happiness

Sprint: .....

1. How likely is it that you would recommend these meetings to a friend or colleague to attend?

0	1	2	3	4	5	6	7	8	9	10

Not at all likely Extremely likely

2. How do you feel about this session/meeting?

RATING SCORE	1	2	3	4	5
USER MOOD	Very unsatisfied	Unsatisfied	Netural	Satisfied	Very Satisfied

3. Were you with us in our previous meeting? YES ☐ NO ☐
4. If YES, in a scale from 0 to 10 how many of the discussed features we have delivered?

0	1	2	3	4	5	6	7	8	9	10

None Half All

5. Is there anything you want to propose as a possible improvement?

.....
.....
.....
.....
.....
.....

Appendix G Evaluation from Stakeholder's Community - Participation

1. I am proud of the quality of work I produced for HOSMARTAI at this Sprint

	1	2	3	4	5	6	7	8	9	10	
Not at all	○	○	○	○	○	○	○	○	○	○	Very

1. As HOSMARTAI team we get stuff done quickly and efficiently

	1	2	3	4	5	6	7	8	9	10	
Not at all	○	○	○	○	○	○	○	○	○	○	Very

2. I had a clear and inspiring mission for this Sprint

	1	2	3	4	5	6	7	8	9	10	
Not at all	○	○	○	○	○	○	○	○	○	○	Very

3. I enjoyed the work done in this Sprint

	1	2	3	4	5	6	7	8	9	10	
Not at all	○	○	○	○	○	○	○	○	○	○	Very

4. I have learnt new things from my engagement with HOSMARTAI Sprint

	1	2	3	4	5	6	7	8	9	10	
Not at all	○	○	○	○	○	○	○	○	○	○	Very

5. I get the support I need from the team

	1	2	3	4	5	6	7	8	9	10	
Not at all	○	○	○	○	○	○	○	○	○	○	Very

6. I contribute to what will be developed and how

	1	2	3	4	5	6	7	8	9	10	
Not at all	○	○	○	○	○	○	○	○	○	○	Very

7. As HOSMARTAI team we have good communication and collaboration

	1	2	3	4	5	6	7	8	9	10	
Not at all	○	○	○	○	○	○	○	○	○	○	Very