EPP eHealth

DELIVERABLE D3.4

JOINT STATEMENT OF UNMET NEEDS

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DISEMINATION LEVEL	
X	**PU** = Public
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1 INTRODUCTION

This document has been prepared as part of the EU Horizon2020 funded EPP-eHealth project. Its objective is to invite ambitious European Healthcare institutions that are seeking for unmet needs to join us in communicating collective messages to the market. Several 'Joint Statement of Unmet needs' have been identified by the EPP-eHealth consortium and the final versions will include the names of those healthcare institutions that express interest. The remainder of the document provides the context and logic for the proposed joint communication.

The main aim of the EPP-eHealth project is to mobilise the procurement power of healthcare institutions and major companies to help accelerate progress towards deployment and market uptake of eHealth solutions. One approach to mobilise such procurement power is to develop Joint Statements of Unmet Needs that demonstrate a common need for new solutions. These can then be communicated to potential solution providers (through a process known as 'market sounding') with the aim of creating a dialogue that will result in new solutions becoming available to city authorities and their suppliers. This is known as innovation procurement.

Each of the four healthcare institutions involved in the EPP-eHealth project has identified several specific unmet needs related to eHealth unmet challenges.

This document is aimed at encouraging other healthcare institutions that are interested in the same eHealth unmet needs to lend their support to the broad communication of Joint Statements of unmet need.

Joint Statements of Unmet needs offer an aggregated means of communicating common unmet needs to the market in a way that demonstrates scale and replicability. They are not about joint procurement but are aimed at convincing innovative businesses that there is substantial customer demand for new solutions to address these unmet needs.

This document includes six priority areas unmet needs for solutions that have been highlighted by healthcare institutions that are participating in the EPP-eHealth project, namely:

- **Priority Area # 1- Patient empowerment through telemedicine and individual tailored apps.** The specific identified unmet needs under this priority area are:
  1. **Empowering patients through telemedicine, Teleconsultation, and Telediagnosis**
  2. **Increased patient use of individual tailored health care apps**
  3. **Telemedicine platform**
- **Priority Area # 2 – Management of Diseases**
  The specific identified unmet needs under this priority area are:
  1. **Platform for the management of chronic diseases**
  2. **Integral system to support patient safety: prescription, dispensing and consumption of medical drugs**
  3. **Mirror therapy programme for face neurological rehabilitation**
- **Priority Area # 3- Electronic health record: extraction of data and exploitation.** The specific identified unmet needs under this priority area are:
  1. **Process management applied to the Electronic Health Record**
  2. **Decision support systems based on Electronic Health Record**
  3. **Big data: bioinformatics, integration of omics data, biomarkers, use and interpretation of data from EHR and other information systems**
  4. **Personalised medicine/ precision medicine. Integrate biological/clinical data with other data**
  5. **Reduction of risk for patients' security in the Electronic Health Record design, implementation and use**
  6. **Implantable pacemakers and defibrillators remote monitoring integrated system**
  7. **Maternal-fetal integrated monitoring system used during labour**
  8. **A solution to improve the timeframe for diagnosis**
- **Priority Area # 4 – Real Time Tracking Solutions**
  The specific identified unmet needs under this priority area are:
  1. **Mobile assets and medical devices**
  2. **Surgical tools (sponges, towels, scalpels, needles, etc)**
  3. **Tracking patients**
- **Priority Area # 5- Advanced clinical imaging solutions**
  The specific identified unmet needs under this priority area are:
  1. **Cardiac imaging**
  2. **Retina imaging**
- **Priority area # 6- Improving health social innovation**

The specific identified unmet needs under this priority area are:

1. **Equal healthcare for everybody**
2. **From treatment-provider to mediator of knowledge – facilitating the transformation**

In each case, healthcare institutions (by operating in a cooperative manner) have the collective power to create a lead market for new solutions through their procurement functions and these can subsequently be adopted by others in the wider healthcare arena. Of course, in order to be sustainable and replicable, solutions also need to be economically viable and aimed at improving the quality and/or efficiency of the healthcare services.

We believe these unmet needs are common to many other healthcare institutions across Europe and we therefore invite other healthcare institutions to join this EPP-eHealth initiative by confirming your interest in supporting the joint communication of unmet needs for eHealth solutions. A list of healthcare institutions that express interest will be included in the final version of the document that is communicated to the market and may lead to a future collaborative action under Horizon 2020.

"We invite other healthcare institutions to join this EPP-eHealth initiative by confirming your interest in supporting the joint communication of unmet needs"

To express interest in this Joint Statement of Unmet need please send an email to: **l.sanchez@bravosolution.es** indicating which of the Priority Unmet Need you wish to support. Each also has a coordinator who can provide more information on their specific interest.

A shorter version of the document has been uploaded to the project website. This will facilitate the engagement with other healthcare institutions that share the same needs. The consortium will disseminate this Joint Statement of unmet needs widely through their dissemination channels to approach the wide audience of EU hospitals. A final version of this document will be published in the project website with the list of hospitals from outside the consortium that decide to join the EPP-eHealth project statement.

This document contains three annexes:

- Annex I: Synthesis of Unmet Needs Report
- Annex II: Priority Unmet Needs Report
- Annex III: Joint Statement of Unmet Needs (template distributed to procurers

2 THE POWER OF COLLECTIVE ACTION

Healthcare systems across Europe face considerable challenges including rising costs of providing care, increased budget pressures and disparity between the service on offer and healthcare needs. However, the rate of adoption of eHealth solutions appears to be slow and the benefits remain unrealised in the sector. Yet, eHealth has the potential to make a valuable contribution.

To realise this value a shift in approach is necessary. At present there is no shortage of eHealth ideas and solutions, but there is disparity between what is available and what is needed; technology push versus market demand. Currently, suppliers are developing technology solutions that they believe will be useful and beneficial to the sector, but there is no dialogue to confirm the need with healthcare stakeholders.

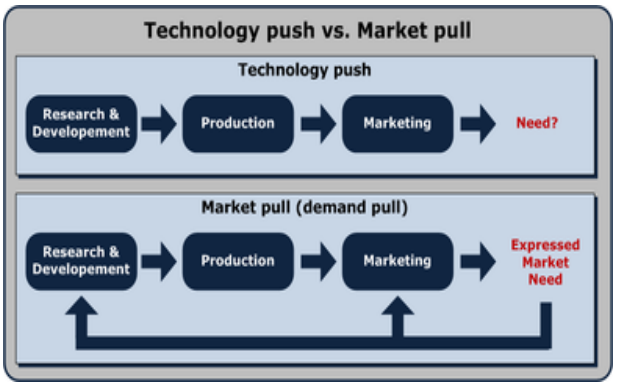

Figure 1: Technology Push vs Market Pull

Rather, this situation should be reversed; procurers should express their need to the market and the supply chain should conduct the necessary research and development to develop a solution to meet the communicated need.

Across Europe efforts are being made to recognise unmet needs and this report aims to presents these needs and translate them into messages that can be taken to the market; thus market pull (demand) rather than technology push.

3 THE METHODOLOGY

The methodology to identify unmet needs included:

1. Desk Research

This included a review of existing literature in the area and examining European Commission projects in the areas of healthcare, social care and eHealth. This enabled us to gain an understanding of what evidence already exists and what unmet needs have been identified by others which may also resonate with EPP eHealth consortium partners.

Additionally, we utilised experience gained in previous innovation procurement projects including EcoQUIP. EcoQUIP has an established ICT Thematic Group which seeks to understand new/improved ICT solutions that will increase the efficiency, quality and environmental sustainability of healthcare. This includes both ICT for 'healthcare operations' and ICT for 'healthcare delivery', which were ranked 1st and 2nd respectively in the 2013 EcoQUIP pre-workshop survey of priority areas for collaborative innovation procurement actions.

2. Qualitative Research Analysis

This involved a programme of structured interviews with suppliers, buyers and experts in Denmark, Poland and Spain. A summary of the interviews is included in the 'eHealth Solutions in Denmark, Poland and Spain; qualitative research report'. The interviews included the following sample:

Buyers	12
Suppliers	11
Experts	10
TOTAL	**33**

3. Consortium Activities

Consortium partners participated in PPI Training in February 2015 which introduced the key principles of innovation procurement, including the process of identifying unmet needs. Subsequently partners returned to their hospitals with the knowledge to be able to identify unmet needs in their own organisations. This was followed by one-to-one calls with each hospital to obtain an update on their unmet needs identification progress.

4. Peer Learning & Synthesis Workshop

The Peer Learning & Synthesis Workshop held in Rotterdam, January 2016 was an opportunity to follow up on the one-to-one calls, present initial desk research and qualitative findings to the consortium and to engage in discussion on the identified unmet needs of the consortium.

5. PPI Training Workshop Report

The Stakeholder Workshop brought together key actors and those engaged in health (and social) care PPI and PCP projects, buyers and supply chain representatives and EC officers. It reviewed current state of the art, consider barriers and opportunities, and propose future calls to enable the wider adoption of innovation procurement as a mechanism to drive markets for healthcare innovation. The Information and Peer Learning (PPI Training) Workshop was a practical and case study based workshop for stakeholders interested in finding out more about innovation procurement in practice, collaborative procurement initiatives and future funding opportunities in H2020 for PPI and PCP projects.

6. Co-creation workshops at Hospital level

Co-creation workshops were run by the four healthcare procurers in this consortium. As part of these workshops, EPP-eHealth procurers brought together key stakeholders from their organisations in order to jointly produce a mutually valued outcome: the organisation list of eHealth unmet needs.

7. Stakeholder workshop report.

The workshop focused on bringing together buyers (hospital project partners - procurers) and suppliers to discuss the unmet needs identified during the co-creation workshops and innovation procurement barriers and enablers. The workshop was specifically designed to bring together buyers (procurers) and suppliers with the intention of discussing the unmet needs identified within the EPP-eHealth project and considering the barriers and enablers of eHealth solutions in healthcare.

8. Development of the "Joint Statement of Unmet Needs."

A specific session was dedicated in Córdoba during the final project meeting to the prioritisation of the procurer´s unmet needs. The outcomes of this session are presented in this paper.

4 PRIORITY AREA #1 - PATIENT EMPOWERMENT THROUGH TELEMEDICINE AND INDIVIDUAL TAILORED APPS. (COORDINATOR: ZEALCO)

CONTEXT - Healthcare is under pressure in the EU and patient empowerment through e.g. Telemedicine and healthcare apps have the potential to shift the current paradigm of health care and will be one of the biggest cost savings potential in the future. The rising number of patients with multiple long-term illnesses further increases the need for innovative solutions in this area.

The procurement requirement is for solutions, which enables patients to access electronic medical records, information about next appointment, video, animations, and communication with health care providers. The solutions should be tailored around the patient's needs and make it possible for the patient to engage in decision making in the patient journey whilst integrating with legacy systems and also the health regulatory framework.

Also, responsibilities and roles in the system and during treatment must be clear to the patient. The procurement requirement is also for solutions, which strengthen the clinical personnel education tools to support patient empowerment, for example 'joint decision making' and 'good communication'. Innovative solutions to support further patient empowerment underpins the development of a health care system, with focus on quality and patient safety through targeted and individualised involvement of the patient and relatives.

There is a need to establish an integrated common platform of telemedicine that could resolve technological challenges of telemedicine projects on one hand, and that ensures interoperability, scalability, safety and long-term viability of the telemedicine solutions on the other hand. It should be aligned with the ICT strategy of the healthcare system, ensuring integration with corporate systems.

STATE OF THE ART - Sophisticated healthcare apps are already being testes, e.g. by Zealand Region in Denmark and tele solutions exist in different versions. There is however, still a need to make the widespread of such technologies happen and to explore further how to motivate different groups of patients to use and embrace eHealth solutions. This calls for

further research, technology development, knowledge sharing, and educational development studies.

BENEFITS / IMPACTS - Solutions within telemedicine and healthcare apps provide clinicians and patients with tools that move parts of the treatment from the hospital to the patients' own home, thus creating both a huge cost savings potential, empowerment and increased patient satisfaction.

One of the great advantages with e.g. healthcare apps are the inexpensive cost level of development. Moreover, functionalities and possibilities for smart devices and healthcare have no limit, only a pathway of unique possibilities.

SPECIFIC NEED #1 - EMPOWERING PATIENTS THROUGH TELEMEDICINE, TELECONSULTATIONS, AND TELEDIAGNOSIS

CONTEXT - Telemedicine, Teleconsultation, and Telediagnosis have the potential to create a shift in the current paradigm of health care. At the moment physicians spend too much time writing regular prescriptions for patients in continuous treatment. In addition, patients lose a lot of time for appointments that result only in receiving a prescription. Given the fact that a patient´s examination by the doctor is mandatory by law in some countries, the Teleconsultation / Telediagnosis would be a compromise solution.

Also, there is a need to have more efficient control and time management over the terms of patient's visits to medical specialists. In connection with the above solutions, there is a need to secure and support patient safety and to check compliance with law and regulations of the specific national health care systems.

STATE OF THE ART - There are currently solutions on the market, which partially could meet the identified needs of the participants in this project. But dynamics of knowledge and available technology could lead to more effective solutions. There is a need to establish an integrated common platform of tele-medicine that could resolve technological challenges of tele-medicine projects on one hand, and that ensures interoperability, scalability, patient safety and long-term viability of the tele-medicine solutions on the other hand. It should be aligned with the ICT strategy of the healthcare system, ensuring integration with corporate systems. It is necessary that telemedicine makes a leap from fragmentation to integration.

BENEFITS /IMPACTS - The impact of innovative solutions for the management of diseases and patient empowerment via tele solutions will include a reduction in the pressure on the health care system, and an improvement in health care delivery and patient outcomes and well-being.

Tele solutions will allow including telemedicine services widely within the existent healthcare management processes, thus helping save time for both patients and healthcare professionals, and would significantly improve the use of resources in the health care system. There is an enormous cost reduction potential within tele solutions and since the technology is quite mature it should be possible in the short-term perspective to develop good business cases for further use of tele solutions.

SPECIFIC NEED #2 - INCREASED PATIENT USE OF INDIVIDUAL TAILORED HEALTH CARE APPS

CONTEXT - Sophisticated healthcare apps are currently able to provide solutions that encourage and increase patient use of ICT. These apps provide information about next appointment, knowledge about the patient journey, and enables communication between hospital, municipality, and the patient. Patients can include family and relatives in the loop of information. The patient can send video, pictures, and tests, and can answer questionnaires. The app is tailored around the individually patient's needs. Clinical personnel in cooperation with the patient can choose from 25 different modules (blood pressure, temperature, weight etc.) to provide quality in the patient journey.

Still the widespread use of such apps is very limited. One reason is limited knowledge of the existence of such apps among clinical personal. Another reason could be inexperience amongst patients and patients unmotivated for using apps. These groups of patients are unlikely to utilize eHealth solutions although they might have access to it. Therefore, there is a need for solutions that traces this group of people and increases their use of ICT.

STATE OF THE ART - A sophisticated healthcare app like the above mentioned is currently being tested in Zealand Region. There is however, still a need to make the widespread use of such apps happen. This should be done by further exploring the possibilities and benefits of eHealth apps and through extended knowledge sharing within clinical personal. Also, there is a need to explore further how to motivate different groups of patients to use and embrace eHealth solution. This calls for further research and educational development studies.

IMPACT / BENEFITS - One of the great advantages with healthcare apps are the inexpensive cost level of development. Devices like iPhone and software like Android are continuously updated with new features. Features the healthcare sector and the industry can use to create be better treatment, higher quality, and real time data set. The platform is given, and new possibilities arise every time Apple, Samsung or Google update software or smart

devices. There is an enormous cost reduction potential within eHealth apps and the user possibilities are next to endless. The technology is quite mature and it should be possible in the short-term perspective to develop good business cases for further use of eHealth apps.

SPECIFIC NEED #3 – TELEMEDICINE PLATFORM

CONTEXT - There is a need to establish an integrated common platform of tele-medicine that could resolve technological challenges of tele-medicine projects on one hand, and that ensures interoperability, scalability, safety and long-term viability of the tele-medicine solutions on the other hand.
It should be aligned with the ICT strategy of the healthcare system, ensuring integration with corporate systems.

STATE OF THE ART - It is necessary that tele-medicine makes a leap from fragmentation to integration. This qualitative change is only possible through a sustainable approach for tele-medicine, in contrast with the launching of short-life projects or projects that are extended arbitrarily.

5 PRIORITY AREA #2 – MANAGEMENT OF DISEASES (COORDINATOR: SAS)

CONTEXT - Building on the development of a fully digitalised information and management integrated system, health services in Europe will need to open their current service portfolio to innovative solutions that allow better management of diseases, and that ensure patient empowerment when possible. This is of special interest to the EU for the management of chronic diseases and multimorbidity, as described in the CE eHealth Action Plan 2012-2020 (http://ec.europa.eu/health/sites/health/files/ehealth/docs/com_2012_736_en.pdf).

BENEFITS / IMPACT-

- Reduction in the pressure on the health care system, and an improvement in health care delivery and patient outcomes and well-being.
- Increase the self-management of diseases that could bring a significant reduction in the number of patient visits as well as a reduction in the number of healthcare professionals and an increase on the implementation of the e-prescription across Europe.
- Increasing the efficiency of treatments and rehabilitation times was well as the cost of each treatment.
- Reduction of errors in the administration of drugs while improving the real stock management and monitoring the adherence of treatments.
- Improvement in knowledge management and data exploitation allowing citizens to take active part in healthcare, and provide resources to healthcare professionals for personalised treatments that prevent unjustified variability in clinical practice.

Three specific needs have been detected in the area of disease management:

SPECIFIC NEED #1 - PLATFORM FOR THE MANAGEMENT OF CHRONIC DISEASES

CONTEXT - Primary healthcare is the key pillar that consolidates the sustainability of healthcare systems. It is the main doorway for patients and for data that feeds clinical data bases. It is necessary to provide new tools that allow primary healthcare to better play its role. Among these tools is the “healthcare biography”, or life story of health information, as a tool that links the EHR with the preventive actions of proven efficacy to improve health. Likewise, tools to support decision, communication tools for different levels within the healthcare system and users, tools for managing the knowledge generated within the healthcare biography and specific tools for the management of chronic patients are needed to ensure healthcare continuity and remote management of patients. All these tools should be part of a unique platform allowing the management of multiple chronic diseases.

STATE OF THE ART - The development of health care Apps and medical devices at EU level is profuse, although it seems that the market uptake is mainly local or regional. A preliminary contact with suppliers has brought forward a variety of developments already in the market. The main barrier for the uptake of an App is that the strategy of the purchasing organisation is not taken into account. It is also necessary to engage key staff at decision-making level in order to ensure a commitment from the health service. It is necessary a bigger effort from health systems to communicate their needs to suppliers. There are no solutions in the market that cover this need.

SPECIFIC NEED #2 - INTEGRAL SYSTEM TO SUPPORT PATIENT SAFETY: PRESCRIPTION, DISPENSING AND CONSUMPTION OF MEDICAL DRUGS (

CONTEXT - There is a need of an integral system for medicine traceability that allows eliminating completely human error in the process of dispensing drugs. The system should be able to communicate wirelessly with any ICT device, sensing events and trigger visual and sound alarms to interact with the pharmacy and clinical staff involved.

STATE OF THE ART - There are no solutions in the market that cover this need.

SPECIFIC NEED #3 - MIRROR THERAPY PROGRAMME FOR FACE NEUROLOGICAL REHABILITATION

CONTEXT – Mirror therapy is a relatively new therapeutic intervention which is simple, personalised and quite inexpensive that focuses on moving the unimpaired part of the body. Even if the mirror therapy is promising, an individualised therapy approach is necessary for an effective rehabilitation regime focused on the face. The solution should:

- Provide a rehabilitation programme which can be personalised for each patient and disease.
- Provide different training modules, including a specific training module to prepare the patient at home for the whole rehabilitation process.
- Allow the treatment to be administered as a home-based training programme.
- Support the interconnection and interoperability of different devices that can be used during the rehabilitation process at both, hospital and home.
- Allow hospital staff to monitor the rehabilitation process, even when the patients are at home.

STATE OF THE ART - A preliminary market research has shown that there are some available solutions that are focused in other body´s parts but not in the face.

6 PRIORITY AREA #3- ELECTRONIC HEALTH RECORD: EXTRACTION OF DATA AND EXPLOITATION. (COORDINATOR: SAS)

CONTEXT - Most European countries are currently in the process of implementing personal Electronic Health Records. Some regions have already developed, implemented and deployed a Health Care Information and Management Integrated System, based on EHR (like Andalusia). This is a step of great importance in order to achieve *access to safe and high-quality cross-border healthcare in the Union and to ensure patient mobility* (Directive 2011/24/EU).

Once the information and management system is in place, there is a need to use and integrate the wealth of data available, in order to transform the information available into knowledge. This knowledge is basic for clinical and research applications. The access and ability to use this knowledge will enable a number of other applications that need to feed from these data and information, including the management of diseases, patient empowerment and improved diagnostic solutions, among other.

BENEFITS / IMPACTS –

- Improvement of eHealth solutions and of professionals' skills which lead to accurate diagnostics and treatment and to the identification of new hazards, and therefore in the reduction of response times and of related adverse events
- Obtaining better eHealth solutions regarding patient safety while stimulating research on patient safety in relation to Health Information Technologies (HIT)
- Increase of the availability of data for biomedical research, which would lead to improvements in current clinical practice and better patient outcomes.
- Improvement in patient safety thanks to the use of a quality assurance system for health care systems and medical software.
- Improvement of the use of resources that would shorten the healing process and decrease the costs of provided healthcare due to better precision of the clinical practice and the collaboration at different levels.
- Advancement in the availability of electronic administration services for citizens which will lead to an increase of patient empowerment, potentially improving health care delivery and reducing pressure on health care systems.
- Improvement of interoperability of health care data at European level while improving health care delivery for EU citizens. The connection of data, even big data set will change the way we look at treatment today.
- Reducing the variability of the healthcare systems while optimising the use of resources by the system.

A total of eight specific needs related to the use of information from the EHR and extraction and interpretation of data have been detected:

SPECIFIC NEED #1- PROCESS MANAGEMENT APPLIED TO THE ELECTRONIC HEALTH RECORD

CONTEXT - Process management includes a series of interrelated and chronologically ordered healthcare actions and tasks, which are performed to users with known health conditions in order to obtain foreseeable and acceptable results. From an organisational point of view, it entails a shift of the classic healthcare paradigm structured in levels and services, to a horizontal and integrative model of health and care services.

The innovative solution expected seeks to adequate this well-defined processes in order to be understood by IT systems: inclusion criteria, work flow, tasks, competences and involvement of relevant actors, and foreseeable results. The resulting module will be the EHR process manager, integrating the existing information to offer healthcare professionals an effective guide of the tasks and processes necessary for healthcare. It will allow monitoring of the activities by both the healthcare professionals and the health service.

STATE OF THE ART - There are no solutions in the market that cover this need.

SPECFIC NEED #2 - DECISION SUPPORT SYSTEMS BASED ON ELECTRONIC HEALTH RECORD

CONTEXT – The medical decision-making processes are in transition from decisions based on evidence to decisions based on real time data. At the same time, there is a need for better prediction of patient diseases.

An intelligent system based on the integration of healthcare processes in the EHR is needed. It should contain a layer of information in the EHR that includes processes and healthcare protocols into the clinical information system, as a tool that supports decision and that shows the optimal path for the patient within the healthcare system, depending on the clinical data introduced. It should automatize clinical knowledge and best practices through the design of intelligent algorithms integrated in the information system. This should allow the system to suggest specific tests or referral to specialists according to patient record and the data included in the current process. It should be able to signal autonomously specific risks for health. The system should also be able to learn from alternatives presented by healthcare professionals in order to include them as current evidence.

STATE OF THE ART - There are some examples already in use of decision support systems at for specific uses, like in the field of liver transplantation. However, there are no generic systems with these capabilities based on EHR, due to the variability in clinical practice.

SPECIFIC NEED #3 - BIG DATA: BIOINFORMATICS, INTEGRATION OF OMICS DATA, BIOMARKERS, USE AND INTERPRETATION OF DATA FROM EHR AND OTHER INFORMATION SYSTEMS

CONTEXT - The solution needed in the field of Big Data would cover both clinical practice and management of the health systems. Once EHR is implemented homogenously in the Health Service, it generates a vast amount of data that are not being exploited. It would be possible to obtain a wealth of information that is suitable to be transformed into knowledge. The applications of Big Data in health are varied, including:

- Personalised/precision medicine, in order to improve diagnostic and treatment for patients, improving healthcare outcomes and decreasing costs.
- Effectiveness of drug therapy: combining an e-prescription system with the information in the EHR would make possible to analyse effectiveness of treatment for patients. This would allow to adapt prescriptions for specific pathologies to more effective treatments and discard other that are not being effective. This will allow a shift to a model of payment to pharmaceutical companies based on treatment effectiveness, in opposition to the current payment per dosage.
- The implementation of healthcare processes is becoming common in the clinical practice. The information contained in the EHR could help to improve these processes, allowing their modification in order to obtain better results in health outcomes or in the effectiveness of the processes.
- Patient safety: combining data from different sources would allow to know how the quality of a diagnostic or a treatment affects patient safety. This will help to offer all possible safety guarantees in healthcare delivery, avoiding as much adverse events as possible.

There is a need of innovative tools that allow data exploitation and analysis, integrating data from different sources, and from different healthcare levels (primary care, hospitals, pharmacy, finance, etc.).

STATE OF THE ART - There are no solutions in the market that cover this need.

SPECIFIC NEED #4 - PERSONALISED MEDICINE/ PRECISION MEDICINE. INTEGRATE BIOLOGICAL/CLINICAL DATA WITH OTHER DATA

CONTEXT - Personalised medicine addresses some challenges faced by health care systems, like low effectiveness of many common medicines, the presence of adverse reactions to drugs, and the increasing costs of chronic diseases management as the population ages (http://ec.europa.eu/research/health/index.cfm?pg=policy&policyname=personalised). The advancement of personalised /precision medicine involves providing health care systems with bioinformatics tools that allow the adaptation of current clinical protocols to the specific needs of each patient. In order to optimise healthcare management of some

diseases, it will be necessary to take into account not only clinical, pathology, medical image, prognostic and predictive variables, but also other type of data that are alien to the healthcare system, like lifestyle, adherence to treatment, and other public information about users.

The innovative solution needed will improve diagnosis and treatment of patients with chronic, onco-haematology, rare, and degenerative diseases through the application of personalised medicine and the use and application of Big Data tools in the health care system. It should integrate data from diverse sources and facilitate its analysis and exploitation, allowing the identification of common patterns of disease progression, therapeutic response, etc.

STATE OF THE ART - Although some technologies are already in the market, there are no integrated solutions that could solve this specific need.

SPECIFIC NEED #5- REDUCTION OF RISK FOR PATIENTS' SECURITY IN THE ELECTRONIC HEALTH RECORD DESIGN, IMPLEMENTATION AND USE

CONTEXT - All technological advances carry with them new challenges that need to be tackled, especially in relation to patient safety. The management of adverse events related directly to the use of eHealth solutions at all levels, including the empowered patient, must be taken into consideration at all times when designing and implementing technology solutions.

STATE OF THE ART - There is a need of a quality assurance system for IT solutions-software-for healthcare (non-existent at the moment). It is necessary to develop policies, guidelines, standards, frameworks and organizational structures aimed at ensuring patient safety in the use and implementation of eHealth solutions.

SPECIFIC NEED #6 - IMPLANTABLE PACEMAKERS AND DEFIBRILLATORS REMOTE MONITORING INTEGRATED SYSTEM

CONTEXT - The need for human oversight in the interpretation of cardiac monitoring data is still very important and cannot be avoided or reduced with the current market solutions. Furthermore each company has developed its own platform and software that are not compatible with other company`s products.
The solutions should:

- Monitor patients with a pacemaker or defibrillator remotely, safely and effectively irrespectively of device brand

- Provide an active computerized analysis for cardiac monitoring of patients with a pacemaker or defibrillator implanted that allows professionals immediate data review and determine when it is appropriate to react.
- Allow to personalize the parameters and to reduce, as much as possible, the number of false alarms that need to be evaluated by healthcare professionals while reducing the overtreatment of patients.
- Allow to react in time and to prevent potential cardiovascular events at an early stage.
- Be compatible with different available products in the market in order to avoid several trainings and tasks overlapping as well as to reduce time analysis.
- Provide a friendly user interface that does not demand specific training and that can be available to patients.
- Integrate the data from the remote monitoring to the electronic patient record as well as take into account data security and storage requirements.

STATE OF THE ART - A preliminary market research has shown only one potential solution under development: IHE IDCO, hospital development.

SPECIFIC NEED #7 – MATERNAL-FETAL INTEGRATED MONITORING SYSTEM USED DURING LABOUR

CONTEXT - One of the biggest problems with the labour process is that even with all the available devices, most of them sensors, doctors still need some time to differentiate the mom's medical data from the baby's, which also implies moving the sensors around and listening. Moreover, to have a single monitoring system that integrates all data is a real challenge. The solution should:

- Acquire, storage and process the maternal-fetal related medical data in an integrated way.
- Support the interconnection and interoperability of the different devices used during the delivery process.
- Be able to use wireless devices and reduce the number and size of them.
- Display continuously all values on the monitor's front panel paying special attention to warnings.
- Allow hospital staff to monitor the labour process in a more effective way and receive warnings in other devices, such as mobile phones.
- Allow the woman in labour and her family to get some basic information about the delivery process on their mobile phones.

STATE OF THE ART - A preliminary analysis of the market has allowed us to identify some solutions which only cover some of the aforementioned features but we could have not identified an integrated solution.

SPECIFIC NEED #8- SOLUTIONS TO IMPROVE THE TIMEFRAME FOR DIAGNOSIS

CONTEXT - Long lasting diagnosis of difficult medical cases, where patients are often directed by one medical specialist to another specialist. There is a need of easy exchange of experiences in the field of atypical symptoms in order to speed up diagnosis of the patient. The best solution would be a platform that would suggest next steps for doctors who have detected certain symptoms. This solution could have following functions: as a source of information on the patient's history of diseases (searching for patient's data in different IT-systems of the hospital or outside of the hospital); a tool for on-line consultation between the doctor and the doctors of other specialisations; a platform of knowledge serving an educational function on a postgraduate level - vocational training for doctors, who work in clinical teaching hospitals. This tool could not only suggest a possible diagnosis, but also suggest the additional diagnostic tests for the patient, maybe even with a suggestion, where such additional diagnostics could take place. This could be a list of diagnostic institutions, where such diagnostics are being performed with the number of diagnostic services provided. This would give the information for the patient on the experience of such institution in performing such diagnostics.

STATE OF THE ART - After extended market research, we are aware, that there are solutions on the market, which could partially meet this need. But dynamics of knowledge (especially in the field of artificial intelligence) and available technology could lead to most effective one. An optimal solution could be designed in a R&D process in cooperation between business and a hospital. Clinical Hospital would cooperate in a R&D process with business to identify the optimal solution.

7 PRIORITY AREA #4 – REAL TIME TRACKING SOLUTIONS (COORDINATOR: SU)

CONTEXT - At hospital level there is a common need of improving tracking management and of optimizing the use of equipments, tools and resources as well as developing new technologies for tracking different medical elements and improving patient safety and the quality of care. The main elements that can be tracked in a hospital are mobile assets, mobile medical devices, surgical tools and patients. These elements are gathered in three specific needs which are explained in separate sections.

Mobility of people and assets is a requirement for delivery of high-quality patient care. However, tracking mobile assets, surgical tools and patients and therefore improving the quality of the service poses challenges for healthcare organizations. The current practice related to tracking requires manual checking, searching and supervision which imply a waste of precious time, cost and it is liable to human errors. Helping locate people and assets in an automated way can save health care professionals a great deal of time and improve the efficiency of such tasks.

BENEFITS / IMPACT - The solutions should:

- Be affordable, reliable, safe and replicable in a wide range of environments.
- Allow to develop tracking management technologies with the specific needs of each element and hospital service.
- Allow to obtain real-time information about the availability, location and status of all the mobile assets, medical devices, surgical tools and patients.
- Allow to book the mobile assets and medical devices in advance while assuring full utilization.
- Detect usage trends to reduce over procurement and improve future procurement
- Be user friendly and integrated with current hospital systems allowing the use of current workstations.
- Include all the necessary software for server and storage administration and maintenance.

Some of the **impacts** of the potential solutions are listed below:

- Reducing cost and time consumption of the checking and searching of mobile assets, medical devices and surgical tools
- Reducing the number of medical errors and therefore ensuring patients safety and improving surgery performance
- Reducing patient time in the hospital while reducing treatment cost
- Reducing costs from lost, damaged or stolen inventory
- New developments regarding server and storage capacity, administration and maintenance

- Opening of a new market sector for tracking equipment, supplies and services while reinforcing the European healthcare value chain and improving the competitiveness of the European companies.

Below the three specific needs identified within this priority area:

SPECIFIC NEED #1- MOBILE ASSET AND MEDICAL DEVICES

CONTEXT - This unmet need is related to tracking and managing different mobile assets and medical devices at the hospital environment such as wheelchairs, mobile X-ray units, respiratory machines, patient monitors, mammography units, defibrillators, scales, pyjamas, etc.

Healthcare professionals spend valuable time searching for mobile equipment each day at hospitals and clinics. Optimizing workflow, by being able to locate resources and coordinate this information with staff members will enable healthcare professionals to optimize their workflow.

An e-health solution should gather the information from the own-reports of the equipment or from the internal information systems of the hospital and analyse the real time of the use of a piece of equipment. This kind of analytical tool should provide information for the administration of the Hospital, whether the equipment is being used efficiently and to what extent. An e-Health solution to monitor and analyse the real usage of the equipment would help the administration of the hospital to optimise its effectiveness, to properly allocate the equipment and the personnel, who is operating the equipment, which in the scale of the hospital would give significant savings or additional sources of income (commercial activity) and reduce the waiting time for the treatment. It would be also useful for purchase planning.

STATE OF THE ART - A preliminary analysis of the market reveals that there are some expensive solutions available in the market which covers some of these features. These solutions do not provide such comprehensive and multifunctional information as it is needed. Moreover, there would be a need for compatibility of data exchange between new ITC solutions, ICT systems already functioning in the hospitals and data generated by the equipment itself.

SPECIFIC NEED #2- SURGICAL TOOLS (sponges, towels, scalpels, needles, etc)

CONTEXT - Hospitals need to improve the tracking of surgical tools such as sponges, towels, scalpels, needles, etc before, during and after surgery, as well as identify when some of them require maintenance or replacement. Some of these surgical processes also imply patient safety due to the human error that can happen while accounting for all of the

required surgical tools before, during and after a surgical procedure. To prevent these types of errors, all surgical items are recounted and inventoried after a procedure and those missing must be located before procedure can be completed. This manual tracking process is also very high time-consuming.

STATE OF THE ART - A preliminary contact with suppliers reveals that there are some expensive solutions available in the market which are also very time and staff demanding

SPECIFIC NEED #3- TRACKING PATIENTS

CONTEXT -Providing efficient, high-quality patient care requires that health care professional have real time information about patients' locations and conditions. When procedures must be done in a sequential and time-sensitive order, it is critical to be able to immediately locate the patient and to have access to patient's vital signs.
Furthermore, being able to track people that want to go out of bed or out of the room or those with dementia is another challenge that will become increasingly more prevalent as the population ages. Newborns could also be tracked to avoid tragic incidents.

STATE OF THE ART - Having health care professionals assigned to each patient or to a group of patients consumes a lot of valuable resources but the solutions that are available in the market are also quite time and staff demanding.

8 PRIORITY AREA #5 - ADVANCED CLINICAL IMAGING SOLUTIONS (COORDINATOR: SERMAS)

CONTEXT - At hospital level there is a common need to:
- Improve clinical imaging strategies
- Optimize the use of imaging resources and data.
- Develop new approaches for obtaining and processing images and data.

These needs are common to several pathologies but two of them are more relevant because they represent real challenges related to clinical imaging: cardiac imaging and retina imaging. More information about these two specific needs can be found in the following sections.

The current practice of clinical image analysis, screening and processing is based on examination by human experts. It requires trained clinicians to examine images, searching for lesions, in order to provide an accurate diagnosis.

Screening and automatisation programs are costly and time consuming due to the prevalence of some diseases and the shortage of specialists. This burdens clinicians and increases time to diagnosis and waiting lists, and may compromise health care quality.

Taking all this into account, there are four common topics in the clinical imaging field that still represent a real challenge:

- **Image acquisition**: the acquisition of some types of clinical images, such as kinetic cardiac images and retinal vessels, is still very challenging. Improvements in this field can allow a more efficient and cost-sensitive workflow.
- **Image processing and automation**: The processing and screening of clinical images is performed by clinicians and therefore it's time and resource consuming. The automation, integration and interoperation of these processes is still very low and unreliable.
- **Image analysis and diagnosis:** this implies the extraction of meaningful information from images in order to provide an accurate diagnosis. This information is transferred into knowledge, leading to vast quantities of data. Image analysis can be performed both by humans and by computational techniques in an automated way. As mentioned before this last process is still poorly developed and unreliable.
- **Image data storage**: as more images are obtained, more storage capacity is needed. Storage capacity and file management, including data safety, is a big and real challenge that requires new and cheaper solutions. Solutions that improve current

practices (hardware-miniaturization, etc) will have a positive impact and reduce costs on ICT systems.

BENEFITS / IMPACT - The solutions should:

- Be affordable, reliable, safe and replicable in a wide range of pathologies and environments.
- Enable obtaining static and kinetic clinical images that can be processed and interpreted without human intervention, leading to an accurate diagnosis.
- Allow 3D replication of organs and body parts in order to use them in surgical procedure simulations and in the creation of prostheses.
- Allow access to the latest developments of each patient from any workstation.
- Share and have access to this information from different locations, ensuring data protection.
- Be integrated with current hospital advanced processing solutions allowing the use of current workstations.
- Include all the necessary software for server and storage administration and maintenance.
- Use an identical work environment for research and clinical tasks.

Some of the potential impacts of the potential solutions are listed below:

- The development of a novel imaging approach, which allows to obtain kinetic images and to process this images without human intervention..
- Imaging technologies facilitating the provision of more accurate diagnosis and new therapies for patients;
- Reducing cost and time on the screening and processing of clinical images, while improving accuracy of diagnosis and treatment, and reducing pressure on health care systems.
- New developments regarding server and storage capacity, administration and maintenance.

Opening of new markets for clinical imaging equipment, supplies and services, while reinforcing the European healthcare value chain and improving the competitiveness of the European healthcare sector

SPECIFIC NEED #1: CARDIAC IMAGING

CONTEXT - This unmet need is related to the acquisition of kinetic images as well as to the rest of crossed challenges that are present in the clinical imaging field such as: processing, automation and storage.

Congenital heart malformations are very complex, with many combinations of defects. Some of these defects are related to cardiac movements. and their treatment is invasive and needs

to be tailored to each individual patient. Therefore, the main goal is the acquisition and segmentation of kinetic cardiac images that allow 3D printing and an accurate diagnosis and a tailored treatment, which will improve patients' safety.

STATE OF THE ART - A preliminary analysis of the market reveals that there is not a product like this in the market. Some solutions that are being developed have been identified but they are not in a market phase.

SPECIFIC NEED #2: RETINA IMAGING

CONTEXT - The acquisition of high-resolution retinal images is technologically challenging and expensive. Smartphone cameras may enable imaging the retina in a simple, low-cost and non-invasive way. Thus the main goal is the efficient, semi-automatic segmentation of retinal vessels, the quantification of their properties and the availability of these technologies at an affordable price.

STATE OF THE ART - The preliminary contact with suppliers has identified at least one solution under development for specific use on images of the retina.

9 PRIORITY AREA #6- IMPROVING HEALTH SOCIAL INNOVATION (COORDINATOR: ZEALCO)

CONTEXT - Many recent studies show a significant inequality in health and healthcare delivery depending on factors like geographic location, education and income and is often closely related to other areas in life like low work ability and low social competences. Inequality is often enhanced in peripheral areas, where the presence of the right number of health care personal combined with the right clinical skills is often problematic.

The procurement requirement is for innovative solutions, which secure easy and equal access to the health care system. The development of eHealth solutions is to some extend capable of meeting this need by expanding the opportunities to offer medical advice and treatment via e-mail and tele solutions.

Another aspect of improving health social innovation is to include the patient's own involvement and resources as much as possible. It should be ensured that patients receive the necessary knowledge and the necessary skills to act in health care. The medical staff should advise patients and relatives on how to strengthen the patient and where to find information. Several new healthcare apps pave the way for unique possibilities for the clinical personnel to connect traditional healthcare data with data sounding the patient in their life outside the hospital.

The connection between data from the apps and the doctor’s medical knowledge will be the future of healthcare, and will transform the role of the doctor from being a treatment-provider to a mediator of knowledge.

STATE OF THE ART - There is a need to explore further how to motivate different groups of patients to use and embrace eHealth solution. Often patients with low personal resources are more unlikely to embrace eHealth solutions. This calls for further research and educational development studies.

BENEFITS / IMPACTS - Benefits from improving health social innovation are most likely to be identified on a broad societal level. The health care system would be likely to receive fewer patients with multiple diagnoses and eHealth solutions would contribute to increased health and well-being for many patients. One of the great advances with eHealth care is that, compared to other infrastructure solutions, it is a relatively cheap method to provide equal health care to a larger population. The precondition for this though, is that the electronic infrastructure is in place.

SPECIFIC NEED #1 - EQUAL HEALTHCARE FOR EVERYBODY

CONTEXT - Many studies show a significant inequality in health and healthcare delivery depending on factors like geographic location, education and income. The emergence of eHealth solutions at some point transcend these inequalities and at some point, enhance them.

Patients with fewer personal resources e.g. on the psychiatric area, might have high competences using Smartphone and other eHealth solutions. Apps can help these patients in treatment and dialog with physicians. Similar for patients with low mobility resources. Here eHealth solutions can compensate for long distances to relevant healthcare providers.

On the other hand, some patient's e.g. elderly, poorly educated or low income patients might not have skills or motivation to use ICT-tools in their own treatment. These patients do not benefit from eHealth solutions to the same level as other patients and this increases health inequality.

Also, eHealth solutions presuppose that all citizens have equal access to the Internet and telecommunications connections. This is especially not the case in peripheral areas and hence increases an already existing health care inequality for these areas.

STATE OF THE ART - Providers are continuously working to develop more and more user-friendly eHealth solutions. Still there is a need to explore further how to motivate different groups of patients to use and embrace eHealth solution. This calls for further research and educational development studies. The lack of access to Internet and telecommunications are still a reality many places in Europe, even though it has very high and increasing political priority in many communities across Europe. This also needs to be addressed.

BENEFTIS / IMPACTS - Benefits from reducing inequality in the health care system are most likely to be identified on a broad societal level. The health care system would be likely to receive fewer patients with multiple diagnoses and eHealth solutions would contribute to increased health and well-being for many patients. One of the great advances with eHealth care is that, compared to other infrastructure solutions, it is a relatively cheap method to provide equal health care to a larger population. The precondition for this though, is that the electronic infrastructure is in place.

Inequality is already an existing and accelerating challenge for the healthcare system in Europe. Using eHealth solutions to reduce further inequality should be a top priority in a short-term perspective.

SPECIFIC NEED #2 - FROM TREATMENT-PROVIDER TO MEDIATOR OF KNOWLEDGE – FACILITATING THE TRANSFORMATION

CONTEXT - Over the last couple of years eHealth have matured and a new industry has emerged. The development of several new healthcare apps paves the way for unique possibilities of connecting traditional healthcare data with data sounding the patient in their life outside the hospital.

The connection of data, even big data set, will change the way we look at treatment today. The connection between the data from the Smartphone and the doctor's knowledge will be the future of healthcare. As a result, a transformation of roles in the healthcare sector is occurring. For example, the role of the doctor is transforming from being a treatment-provider to a mediator of knowledge. Hence, the need for solutions that support this development, and knowledge and research about eHealth as a facilitator for the transformation of the roles.

STATE OF THE ART - The transformation process is still in the making, and to our knowledge, the marked provide no current solution to the specific need. The development of a solution would require further knowledge and research regarding eHealth as a facilitator for the transformation of the roles.

BENEFITS / IMPACT - An innovative solution to facilitate the transformation of roles would make it possible for doctors to see the patient in a more holistic manner, considering health *and* societal data, making it more likely to provide the right diagnosis and or treatment, thus saving time and money in the healthcare system and at the same time radically improve patient experience.

Efficiency will continuously be one the core issues in the future healthcare sector. With expectedly more and more available data and healthcare apps on the marked, the need for facilitating the transformation and being able to integrate different data in the treatment will increase and the need for an innovative solution will become relevant in a medium-term perspective.

10 ANNEX I – SYNTHESIS OF UNMET NEEDS REPORT

1. Identified Unmet Need Themes

The available literature and qualitative analysis reveals a number of high level thematic areas of unmet need and these are summarised below.

1.1 Patient Empowerment

The World Health Organisation (WHO) defines empowerment as "a process through which people gain greater control over decisions and actions affecting their health ….should be seen as both an individual and a community process"[1]

Both desk research[2] and qualitative analysis revealed that patient empowerment remains an unmet need within the sector. Patient empowerment includes four components:

1. Understanding by the patient of his/her role;
2. Acquisition by patients of sufficient knowledge to be able to engage with their healthcare provider;
3. Patient skills; and
4. The presence of a facilitating environment

There is a high level of political commitment for patient empowerment. For example, the WHO Regional Office for Europe has recently embedded patient empowerment in a new European health policy, Health 2020, to be adopted later this year[3].

1.2 Self-Management

Self-management support can be viewed in two ways: as a portfolio of techniques and tools to help patients choose healthy behaviours; and as a fundamental transformation of the patient-care giver relationship into a collaborative partnership (de Silva 2011)[4].

The qualitative analysis demonstrates that self-management is a key unmet need within the sector. Self-management is about giving patients with long-term conditions the tools, skills

[1] http://www.ncbi.nlm.nih.gov/books/NBK144022/
[2] EcoQUIP Provocation Paper (2013) and Kings Fund (2015)
[3] http://www.euro.who.int/en/health-topics/health-policy/health-2020-the-european-policy-for-health-and-well-being
[4] http://www.kingsfund.org.uk/projects/gp-commissioning/ten-priorities-for-commissioners/self-management

and support they need to improve their own wellbeing and health. The rising number of patients with long-term illness increases the need for self-management solutions. The UK Department of Health[5] has indicated a potential cost saving of over £450 per person per year following an investment in self-management as a result of patients using health services more efficiently.

1.3 Chronic Disease Management

Chronic disease management includes the detection, screening and treatment of chronic diseases as well as palliative care. Such interventions are essential for achieving the global target of a 25% relative reduction in the risk of premature mortality from chronic diseases[6].

Chronic diseases, such as heart disease, stroke, cancer, chronic respiratory diseases and diabetes, are by far the leading cause of mortality in Europe, representing 77% of the total disease burden and 86% of all deaths. Caring for those with chronic conditions is not about a cure, but to enhance functional status, minimize distressing symptoms, prolong life and enhance the quality of life[7].

The WHO reports that service delivery in this area tends to be fragmented and there is "thus a need for new service delivery models that are characterized by collaboration and cooperation among professions and institutions that have traditionally worked separately". Therefore, the need for management solutions to tackle this increasingly common challenge is evident both in desk research[8] and the qualitative analysis.

1.4 Diagnosis Timeframe & Management

"The role of the general practitioners in diagnosis is one of problem recognition and decision making….the diagnostic process in general practice is as often a combination of shortcuts, loops and dead ends as it is a straight line going from presentation to diagnosis"[9].

[5] http://selfmanagementuk.org/why-self-management-works

[6] http://www.who.int/ncds/management/introduction/en/

[7] http://www.euro.who.int/__data/assets/pdf_file/0009/270729/Assessing-chronic-disease-management-in-European-health-systems.pdf

[8] http://alliancechronicdiseases.org/

[9] http://www.kingsfund.org.uk/sites/files/kf/Diagnosis%20and%20referral.pdf

The qualitative analysis revealed an unmet need in relation to diagnosis timeframes and management particularly in relation to cancer diagnoses, but the participants believed that timeframe solutions should be applied to other diagnoses. Recent work done as part of the National Awareness and Early Diagnosis Initiative (NAEDI) for cancer suggests some significant quality issues arising from delays in cancer diagnosis. This is being recognised at a policy level, for example the UK Government have set cancer waiting time targets and NICE have updated GP referral guidelines; however, these are not always being met. The need for a solution is further evidenced with the anticipated increase in the number of cancer patients from two to three million by the end of the next Government in 2020[10]. Similarly, the EcoQUIP project discovered that early diagnosis is also a key element in preventing the onset of serious conditions that then require acute care.

1.5 Patient Information

Patient information systems…"have the ability to track individual health problems and treatment over time, giving insight into optimal diagnosis and treatment of the individual as well as improving the delivery of services"[11].

Patient information needs identified during the study were two-fold. Firstly, sharing patient information between practitioners has proven to be an area of unmet need, as it has become apparent from the analysis that clinicians do not always have all the necessary patient information available. For example, if a general practitioner (GP) refers the patient to a specialist, it is expected that the specialist will communicate the outcomes with the GP; however, this is not always the case in practice. Therefore, there is a need to improve patient information sharing between healthcare professionals to improve the continuity of care. Secondly, providing patients with access to for example their health record, information on their condition and being able to liaise with peers all impact on the patient experience. The use of electronic health records should address much of these challenges; however, these clearly need to be fully integrated and accessible.

[10] http://www.macmillan.org.uk/Aboutus/News/Latest_News/MacmillanCancerSupportrespondstobreachofnationalcancerwaitingtimetargets.aspx

[11] http://apps.who.int/iris/bitstream/10665/76794/1/9789241504645_eng.pdf

1.6 Decision Making Process

Health care decision making involves the "convergence of issues from two major dimensions: 1) the 'patient centred' direction that considers a person's wishes, goals and current capacity for reviewing information; and 2) the 'provider centred' direction that considers a patient's condition and prognosis and the relevance of potential treatment options"[12].

The qualitative analysis discovered that medical decision making processes are an area of unmet need. There were three elements reported in this theme:

- Provision of information to make decision making more efficient e.g. app based information
- Decision making support system to help clinicians make decisions e.g. decision infrastructure
- Automated decision making e.g. algorithms for automatic decisions and alerts based on real time data

Decision making has become a complex paradigm with shifts in power; the traditional paternalistic view of doctors as a 'know-it-all' has gone, rather patients are becoming more active in the process. The Dean of education at the University College London's School of Medicine commented that "now doctors are seen as the experts on medical information and choices, but patients are seen as the experts on what those choices mean in their own lives.[13]" Much of the literature discusses 'shared decision making' which is also driving the need for a solution that addresses the shifts in power whilst improving the health and clinical care of individuals and assist health policy formation. Ultimately solutions must be identified to balance the power and overall process to improve patient outcomes and experience.

1.7 Ageing Workforce

12 http://www.ltcinfo.net/Health%20Care%20Decision%20Making%20Process_Maryland%20Medicine_2010.pdf

13 http://www.latimes.com/health/la-he-doctor-patient-20140607-story.html

The World Health Organisation states that the world will be short of 12.9 million healthcare workers by 2035[14].

It is recognised that Europe has an ageing population and the World Health Organisation states that this will have serious implications for the health of billions of people across all regions of the world. The proportion of people of working age in the EU-28 is shrinking whilst the relative number of those retiring is expanding. The Economist Intelligence Unit, on behalf of Towers Watson, surveyed 480 senior executives at companies across Europe. Almost three quarters (71%) of them expect the number of their employees aged 60+ to increase by 2020, including 22% who expect it to increase significantly.

Thus, as the workforce ages there are insufficient numbers of younger people entering the profession to replace those that are retiring. For example, in 2009 approximately 30% of all doctors in Europe were over 55 years old and by 2020 more than 3.2% of all European doctors are expected to retire annually[15].

The sector suffers from low retention levels, believed to be caused by relatively low pay in some healthcare profession, long working hours, stress and difficulty in maintaining a work life balance. Therefore, this is an issue which must be addressed as it is estimated that with the forecast shortages that 14% of demand for care will go unmet15.

1.8 Skills Shortage

The UK Commission for Employment and Skills recently reported that developments within the sector including demographic changes, social and political factors and technology and innovation are generating skills and performance challenges in all the key health and social care occupations[16].

Skills shortages were also evident in the qualitative analysis. Increasingly, healthcare professionals require a relatively high level of technical know-how in addition to clinical knowledge in order to operate new medical appliances and diagnostic techniques. They also need to utilise, to the fullest, emerging solutions such as eHealth, including electronic

[14] http://www.who.int/mediacentre/news/releases/2013/health-workforce-shortage/en/
[15] http://ec.europa.eu/health/workforce/docs/staff_working_doc_healthcare_workforce_en.pdf
[16] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/430164/Executive_Summary_Skills_and_performance_challenges_in_health_and_social_care.pdf

patient records and telemedicine. The level of the workforce skills and experience of training appears to be variable across healthcare occupations. In health and social care, new working practices and their consistent adoption are fundamental to effective delivery. Therefore, investment in skills is vital particularly as health professionals will need to develop new skills and competences required for new treatments and new delivery models, particularly associated with increasing numbers of elderly people with multiple chronic conditions.

1.9 Ageing Population

The European Commission notes that by 2025 more than 20% of Europeans will be 65 or over, with a particularly rapid increase in numbers of over-80s[17].

The ageing population of Europe is one of the greatest social and economic challenges of the twenty first century and it will affect all EU countries and a large number of policy areas including economy, social security, labour and healthcare systems. In particular, the impact on healthcare will be especially profound, as the ageing population will bring about a range of different healthcare requirements. Consequently, healthcare systems across Europe must be able to adapt in order to continue providing adequate levels of care whilst remaining financially sustainable.

1.10 Interoperability/Integration/Standards

The Healthcare Information and Management Systems Society define interoperability in healthcare as "the ability of different information technology systems and software applications to communicate, exchange data, and use the information that has been exchanged"[18].

Interoperability and true integration in healthcare has yet to be achieved due to a number of factors including:

1. Lack of universal standards-based Electronic Health Record systems (EHRs) adoption. Health information exchange cannot happen until EHRs are installed and operational across Europe.

[17] http://ec.europa.eu/health/ageing/policy/index_en.htm

[18] http://www.himss.org/library/interoperability-standards/what-is-interoperability

2. Disconnect between process and technology. Existing healthcare processes must be redesigned to incorporate new technologies. This is particularly noticeable in healthcare due to the lack of standardisation.
3. Complex privacy and security challenges associated with technologies are at the forefront of healthcare institutions.
4. Standards are a huge barrier to ICT adoption in healthcare. There is a need for synchronous collective action among multiple stakeholders; standards and rules for must be uniform to bridge existing and future networks.

These barriers were reinforced in the qualitative analysis and the need remains for ICT based standards to facilitate interoperability in healthcare.

2. Projects and Unmet Needs

There are a number of current eHealth projects exploring research and innovation in the field of ICT for health and wellbeing. These projects are also working to identify unmet needs and this section of the report summarises their efforts and unmet needs. The projects are classified as either Pre Commercial Procurement (PCP) or Public Procurement of Innovative Solutions (PPI).

The European Commission defines PCP "the procurement of research and development of new innovative solutions before they are commercially available"[19]. PCP projects in the eHealth arena based on the thematic areas identified previously include.

PPI "occurs when public authorities act as a launch customer for innovative goods or services. These are typically not yet available on a large-scale commercial basis and may include conformance testing"[20].

2.1 PCP Projects

SILVER (http://www.silverpcp.eu/) is a PCP based project searching for new technologies to assist elderly people in their everyday lives. This project links with two of the aforementioned thematic areas: patient empowerment and ageing population. In March 2013 an international PCP call for tender was opened to acquire the research and development of robotics based technologies that support independent living for the elderly. The Prior Information Notice (PIN) invited tenders to "tender for projects under the PCP Challenge to develop technology based solutions addressing robotic solutions for assisting elderly people with physical disabilities. The target group that this PCP Challenge looks to address is for those who require assistance by care staff in activities in daily life in order to continue living independently in their own homes, even when facing multiple physical and mental disabilities. These solutions should add to improved cost-effectiveness in the homecare sector"[21].

DECIPHERPCP (http://www.decipherpcp.eu/) aims to develop a mobile solution which enables secure cross-border access to existing patient healthcare portals. This project relates to the thematic areas of patient empowerment and patient information. In June 2014 a call to tender was launched inviting bidder to "tender under the pre-commercial

[19] https://ec.europa.eu/digital-agenda/en/pre-commercial-procurement

[20] http://www.innovation-procurement.org/about-ppi/

[21] http://ted.europa.eu/udl?uri=TED:NOTICE:296155-2012:TEXT:EN:HTML

procurement (PCP) procedure for the provision of research and development services to seek solutions for a "Distributed European Community Individual Patient Healthcare Electronic Record" (DECIPHER)"[22].

THALEA (http://www.thalea-pcp.eu/) aims to enable Intensive Care Units to improve the care for acutely live-threatened patients by telemedicine and telemonitoring. The consortium of hospitals will conduct a PCP focused on developing a highly interoperable telemedicine-platform that detects increased risk ICU-patients. This links directly with the interoperability theme. In 2014 a PIN was launched to create "a Telemedical control-centre software for tele-ICUs capable of capturing workflow-data, physiologic parameters, laboratory results and current medication in order to set up a robust real-time analysis tool enabling telemedical ICU-staff to monitor and oversee an entire ICU patient population. Our goal is to support identification of patients at risk of prolonged ICU stay, organ dysfunction, or death.
By means of this call and in order to provide a link between different PDMS of ICUs, a prototypical product will be developed. It should function comparable to a pilot's cockpit, which provides a condensed view of patient data present on the ICU. A special feature of this product will be an automatic detection of critical ill patients, by reviewing their data without any interruption. An automatic pre-alarm will notify professional care givers in case of emergencies"[23].

UNWIRED HEALTH (http://www.unwiredhealth.eu/) brings healthcare authorities and industry together to develop practical, convenient and innovative mHealth solutions for people with heart failure. These solutions will improve the lives of patients and change the delivery of care. This links to the patient empowerment theme. In 2014 a PIN was released which "aimed at generating a new mHealth system for Heart Failure (HF) management. Considering the needs of both clinicians and patients looking for the most convenient tools to improve the monitoring of HF patients. The system must be secure, interoperable and fully integrated with the technological systems of health care providers and with the care coordination platforms (either local, regional or national level)"24.

[22] http://ted.europa.eu/udl?uri=TED:NOTICE:217431-2014:TEXT:EN:HTML

[23] http://ted.europa.eu/udl?uri=TED:NOTICE:030789-2014:TEXT:EN:HTML

[24] http://ted.europa.eu/udl?uri=TED:NOTICE:382364-2014:TEXT:EN:HTML

NYMPHA (http://www.nympha-md-project.eu/) focuses on mobile eHealth services for supporting physicians and patients in the treatment of bipolar disorder through continuous patients monitoring in order to dynamically support illness management and potentially identify early deviations in mood and attitudes suggesting the onset of a crisis. This relates to the chronic disease management theme outlined previously. A call for tender was launched which related to the "search for mobile technological solutions to support health workers and patients with the care and management of bipolar disorder"[25].

There are also three new PCP projects:

MAGIC is a consortium of health care providers that aims to conduct a PCP to improve care delivery systems that empower patients in optimising their recovery from a stroke together with healthcare professionals. This relates to the theme of patient empowerment.

EMPATTICS is a consortium of health care providers that aims to conduct a PCP focusing on new ICT solutions that can empower chronic patients as decision makers in the treatment of their disease. This relates to both the patient empowerment and chronic disease management themes.

RELIEF is a consortium of healthcare procurers that aims to get new innovative solutions developed through a PCP for recovering life wellbeing through ICT based pain self-management techniques. This relates to the thematic area of self-management.

2.2 PPI Projects

STOPandGO (http://stopandgoproject.eu/). The Whole System Demonstrator (WSD) showed that incorporating telehealth and telecare technology into care and cure services can lead to reductions in the need for people to access services, as well as improving their ability to live better lives in their own homes (e.g., quality of life). The project seeks to overcome some of the issues issues identified in WSD and illustrate real improvements in Quality of Life, care and carer programmes, hospital in-patient stay, and other service outcome aspects felt to be essential.

THALEA (II) is a consortium of hospitals that aims to start a PPI after the THALEA PCP project (outlined above) to deploy highly interoperable telemedicine-platforms that detect increased risk ICU-patients.

[25] http://www.appalti.provincia.tn.it/bandiappalti/pagina11571.html

3. Procurement Requirements

The previous section of the report outlined the high level thematic areas of unmet needs, but to effectively take these messages to the market, these generic themes must be translated into specific unmet needs; goods/services that can be purchased. This distinction is critical because the supply chain has to be able to respond to a specific opportunity. This section of the report seeks to specify the procurement requirements.

3.1 Patient Empowerment

Problem	**Healthcare professionals interact with a patient for a limited period of time annually; the remainder of the time the patient takes care of themselves. As a result, many patients say that they don't feel as involve in their care as they would like. Patients would like to be involved in decision making and to have their voice heard.**
Solution	Effective use of ICT to improve patient access to their health record, condition information, peer groups and overall communication and decision making.
Procurement Requirement	The procurement requirement is for a solution which provides patients with access to their medical records and the ability to engage with health professionals and peers whilst integrating with legacy systems and the health framework. Thus, leading to the patient empowerment and improved patient experience.

3.2 Self-Management

Problem	**The rising number of patients with long-term illness increases the need for self-management solutions. The UK Department of Health[26] has indicated a potential cost saving of over £450 per person per year following an investment in self-management as a result of patients using health services more efficiently.**

[26] http://selfmanagementuk.org/why-self-management-works

Solution	Effective use of ICT to enable patients to choose healthy behaviours and to ensure a collaborative relationship can be forged between the patient and caregiver.
Procurement Requirement	The procurement requirement is for a solution which provides patients with tools, skills and support to facilitate self-management. Thus, leading to an improved patient experience.

3.3 Chronic Disease Management

Problem	**The number of citizens across Europe with chronic disease represents 77% of the total disease burden and 86% of all deaths. Therefore, the management of such diseases has a profound impact on both the patient and the healthcare system.**
Solution	Effective use of ICT to facilitate effective chronic disease management.
Procurement Requirement	The procurement requirement is for a solution which enhances functional status, minimize distressing symptoms, prolong life and enhance the quality of life whilst supporting the healthcare system to manage the disease and impact on the system.

3.4 Diagnosis Timeframe and Management

Problem	**There is a significant issue in the diagnosis timeframe and management of conditions, particularly cancer diagnoses which often results in quality issues**.
Solution	Effective use of ICT to improve the diagnosis timeframe and ensure efficient diagnosis management.
Procurement Requirement	The procurement requirement is for a solution which enables clinicians to improve the timeframe of diagnosis and the management of this diagnosis to ease the tension and impact on the patient. Thus improving the overall process leading to a better

	patient experience.

3.5 Patient Information

Problem	**The problem is two-fold: 1. Fragmented information sharing between clinicians and 2. Limited patient access to relevant information.**
Solution	Firstly, the effective use of ICT to ensure that clinicians can effectively share all necessary patient information to ensure they have the full account of the patient medical history. Secondly, the effective use of ICT to provide patients with access to their own medical records, the option to engage with fellow patients and information and guidance on medical conditions.
Procurement Requirement	The procurement requirement is two-fold: 1. For a solution which enables clinicians to share medical information across departments and/or institutions to ensure continuity of care. 2. For a solution that allows patients to view their own medical records, enables them to engage and interact with fellow patients and provides information and guidance on medical conditions.

3.6 Decision Making Process

Problem	**The medical decision making process is complex and is being compounded by a shift in power between clinician and patient**.
Solution	Effective use of ICT to support the decision making process for both patient and clinician.
Procurement Requirement	The procurement requirement is for a solution which simplifies the decision making process and supports both the professional expertise of the clinician whilst recognising the patients opinion on how the decision will impact their daily lives.

3.7 Ageing Workforce

Problem	**The European healthcare sector is facing the problem of an ageing workforce which is a direct consequence of changing demographics. This is fast becoming an issue as there are insufficient numbers of young people entering the profession to replace those reaching retirement age.**
Solution	Effective use of ICT to accommodate the declining numbers of healthcare professionals.
Procurement Requirement	The procurement requirement is for a solution that manages the forecasted staff shortages whilst ensuring health systems can continue to provide a high level of care for patients across Europe.

3.8 Skills Shortage

Problem	**Clinicians require a high level of technical know-how which is being further complicated by demographic changes, social and political factors and technology and innovation which are generating skills and performance challenges in all the key health and social care occupations.**
Solution	Effective use of ICT to ensure clinicians has access to ongoing training and skills development opportunities.
Procurement Requirement	The procurement requirement is for a solution that facilitates continued skills development for clinicians ensuring they have the necessary technical (medical) and ICT skills to provide healthcare in the twenty first century.

3.9 Ageing Population

Problem	**Europe is facing a substantial demographic challenge as it is forecasted that by 2025 more than 20% of Europeans will be 65 or over. This has serious implications for healthcare systems across**

	Europe as they have to cope with increasing care demands.
Solution	Effective use of ICT to handle the increasing care needs of an ageing population.
Procurement Requirement	The procurement requirement is for a solution that supports the management and delivery of care required by a growing number of elderly patients.

3.10 Interoperability/Integration/Standards

Problem	**There is no shortage of solutions from the supply chain and there are numerous pilots in the area of eHealth, but often these do not integrate with the wider health infrastructure. Additionally, there are no standards in place for the sector to ensure developments comply with regulations and specific guidelines.**
Solution	Effective use of ICT to ensure interoperability and integration can be achieved between systems across healthcare infrastructure(s).
Procurement Requirement	The procurement requirement is for a solution that ensures a standardised approach to eHealth solution development and that facilitates interoperability and integration with legacy systems across a healthcare infrastructure.

4. Summary

The report demonstrates that there are commonalities between the high level unmet needs identified in the EPP eHealth project, the wider literature and the work of other PCP/PPI projects. Often these unmet needs remain high level; this report however endeavours to translate the high level themes into specific procurement requirements that can be communicated to the supply chain and ultimately purchased. However, this is not as easy in practice; a key outcome of the Synthesis Workshop was that eHealth is difficult to procure and procurers just don't know how to effectively purchase eHealth solutions. However, innovation procurement and the process of outlining credible unmet needs and allowing suppliers to respond to problems in a way that integrates with existing healthcare infrastructures may ease the difficulty.

11 ANNEX II – CO-CREATION WORKSHOPS OUTCOMES

CO-CREATION WORKSHOP

Guidance and orientation; Outcomes

This document is created by BravoSolution to facilitate the project procurers in the identification of their eHealth unmet needs. It explains the main methodology, advices and protocols to carry out a co-creation workshop, with selected stakeholders from each organisation.

This is an internal document which is conceived to serve as a guide to the Public procurer's to conduct their co-creation workshop. The outcomes of this document will be used as complementary information to develop the *Deliverable D3.4 Joint Statement of Unmet needs.*

The document is structured in two parts: **Part 1 contains instructions and recommendations** about the methodology to perform the co-creation workshop; **Part 2 offers a space to indicate the outcomes of your workshop, general impressions and conclusions.**

PART 1: CO-CREATION WORKSHOP GUIDANCE

11.1

11.2 What is a Co-creation workshop?

A co-creation workshop is a management initiative that brings different parties together (for instance, representatives of different departments inside a company), in order to jointly produce a mutually valued outcome (e.g.: identify the organisation eHealth unmet needs).Successful co-creation workshop requires two key steps:

- **Contribution of ideas**: Participants must be convinced to share their views and ideas (i.e., to contribute). However, receiving contribution is actually quite hard because most professionals are quite busy and don´t have enough time to care about extra tasks. A co-creation workshop, if properly managed, is an ideal frame that favors the flow of ideas and communication within different groups that usually don´t have the opportunity to talk to each other.

- **Selecting and prioritizing ideas**: After exposing the different views and ideas, the group should work together to prioritize them (i.e.: reflections about ideas shared). A workshop leader will have to deal with the ideas in a very subtle way to avoid rejecting ideas in an offensive way.

If possible, the co-creation workshops should be run in inspiring spaces. A room with natural daylight and views could inspire creativity and led to a **relaxing atmosphere**, which enhances communication and avoids the impression of being at work.

11.3 Recommended number of participants

Number of participants: each Public Procurer must form a team of 5-10 to participate in the co-creation workshop. (See Methodology section below for participant´s profiles).

Recommended duration

Timing: approximate 2 hours. In longer workshops participants could lose their attention and/or digress. Since professionals tend to be quite busy it is important to keep to timings. At the start of the workshop it's important to stress to co-creators that in order to finish on time they need to follow the instructions of the workshop leader and to be very focused on the matter.

Methodology and instructions

A co-creation workshop is a methodology which is **suggested** to be implemented by each Public Procurer of the EPP-eHealth consortium: ZEALCO; SERMAS; SAS and SU.

In order to facilitate the performance of the co-creation workshop it is recommended to follow the next instructions:

- **Select the person/persons who will LEAD the co-creation workshop** from each public procurer: preferably a person familiar with the project.
- **Pre-identify the profiles of the participants**:

  Key profiles should be identified ad-hoc depending on the organisational chart of each procurer. It is important to select individuals motivated and aligned with the project aims. Ideally, the following areas should be represented in the co-creation workshop:

- Management (CEO, Directors, Medical Director Etc.)
- Medical Doctor (specify the specialisation: GP, specialist physician, etc.)
- Nurse
- IT Specialists
- Member of Procurement Department

- **Clearly inform about the purpose of the co-creation workshop**: "Get an understanding of the eHealth unmet needs from the procurer perspective, through the feedback obtained from selected relevant players inside each procurer organisation participating in EPP-eHealth". Indicate clearly that the information and views collected will be treated anonymously and solely for the purpose of the EPP-eHealth project. In addition, participants should be aware that this is an opportunity to influence in the future EC calls (programme 2018 – 2020) and possibly obtain financial support for their future acquisitions.
- **Do not lose sight of your own purpose**: to understand the motivations, needs and expectations of the different departments involved in the healthcare management, which are represented in the co-creation workshop.
- **Regarding the profile of the participants**, we would recommend at least one representative for the following areas: Management, Procurement, Clinical, Nursing and IT.
- **Language**: the co-creation workshop will be conducted in the language of the procurer. Outcomes of the workshop should be translated to English to integrate them into the *Deliverable D3.4 Joint Statement of Unmet needs.*
- The **information gathered** during the co-creation workshop should be sent to BravoSolution partner as responsible of the *Deliverable D3.4* by email.
- **Gather not only terse answers** but also your notes about conversations, impressions, etc.

Useful co-creation techniques

List of useful techniques and reference sites where to find the toolkits and methods to conduct the co-creation workshop is presented below. **We highly recommend reading the materials in following links:**

- **World Cafe Method**: http://www.theworldcafe.com/key-concepts-resources/world-cafe-method/
- **SCAMPER:** https://litemind.com/scamper/

- **Overview of main techniques** which are used as part of the design thinking and co-creation processes: http://www.servicedesigntools.org/

Advices to obtain good results

- **Inform about the purpose of the co-creation workshop**: "Get an understanding of the eHealth unmet needs from the procurer perspective, through the feedback obtained from selected relevant players inside each procurer organisation participating in EPP-eHealth". Indicate clearly that the information and views collected will be treated anonymously and solely for the purpose of the EPP-eHealth project. In addition, participants should be aware that this is an opportunity to influence in the future EC calls (programme 2018 – 2020) and obtain financial support for their future acquisitions.
- **Ask why? Whenever you can:** ask why the participants do or say something if possible. Answers could be interesting, try to maintain a conversation when possible.
- **Don't be afraid of silence**: If you allow the silence maybe the participants could reflect on what he/she has just said and reveal something deeper.
- **Don't suggest answers**: Even unintentionally, could make people respond in a way that confirm your expectations.
- **Make questions in a neutral manner.**
- **Be sure that you can document all information**: if this is not possible use a recorder to allow you to catch all relevant feedback.

Areas of intervention identified by EPP-eHealth project

The available literature and qualitative analysis carried out in the EPP-eHealth project revealed a number of high level thematic areas of unmet need which are summarised below[27]:

Patient Empowerment: *the World Health Organisation (WHO) defines empowerment as "a process through which people gain greater control over decisions and actions affecting their health ….should be seen as both an individual and a community process"*

Self-Management: *Self-management support can be viewed in two ways: as a portfolio of techniques and tools to help patients choose healthy behaviours; and as a fundamental transformation of the patient-care giver relationship into a collaborative partnership (de Silva 2011).*

Chronic Disease Management: *Chronic disease management includes the detection, screening and treatment of chronic diseases as well as palliative care. Such interventions are essential for achieving the global target of a 25% relative reduction in the risk of premature mortality from chronic diseases.*

Diagnosis Timeframe & Management: *"The role of the general practitioners in diagnosis is one of problem recognition and decision making….the diagnostic process in general practice is as often a combination of shortcuts, loops and dead ends as it is a straight line going from presentation to diagnosis".*

Patient Information: *Patient information systems…"have the ability to track individual health problems and treatment over time, giving insight into optimal diagnosis and treatment of the individual as well as improving the delivery of services".*

Decision Making Process *Health care decision making involves the "convergence of issues from two major dimensions: 1) the 'patient centred' direction that considers a person's wishes, goals and current capacity for reviewing information; and 2) the 'provider centred' direction that considers a patient's condition and prognosis and the relevance of potential treatment options"*

Ageing Workforce: *the World Health Organisation states that the world will be short of 12.9 million healthcare workers by 2035*

Skills Shortage: *the UK Commission for Employment and Skills recently reported that developments within the sector including demographic changes, social and political*

[27] Reference source: EPP-eHealth project "Synthesis of unmet needs report", February 2016. **Further information available there**

factors and technology and innovation are generating skills and performance challenges in all the key health and social care occupations.

Ageing Population *The European Commission notes that by 2025 more than 20% of Europeans will be 65 or over, with a particularly rapid increase in numbers of over-80sof over-80s.*

Interoperability/Integration/Standards: *The Healthcare Information and Management Systems Society define interoperability in healthcare as "the ability of different information technology systems and software applications to communicate, exchange data, and use the information that has been exchanged".*

PART 2: CO-CREATION WORKSHOP OUTCOMES

Please complete this section with the results of the co-creation session:

Materials and Methods used

Please, indicate if supportive material has been used to support the workshop development (e.g.: Organisation strategic plan, national plans, etc.). In addition, if the above mentioned co-creation techniques have been used to facilitate discussion (e.g.: SCAMPER, World Café Method etc.)

Procurer eHealth identified unmet needs

*Please list **the eHealth identified unmet needs** resulting from the co-creation workshop. Describe the **context (why),** the **need (what)** and expected **solution (how).***

General impressions

Please, describe your general impressions other than the list of needs (e.g.: general atmosphere, degree of cooperation, different interests between departments, motivations, and quickness in the identification of the unmet needs (where they so obvious?) etc.

Other information

Any other information which you consider relevant for the purpose...

Conclusions

Main conclusions to synthesise the session...

ZEALCO CO-CREATION WORKSHOP OUTCOMES

List of participants

The participants of the workshop were as follows:

- Two representatives from the Department of Procurement – procurers. The participants have knowledge of procurement procedures including public procurement rules.
- Two representatives from the Department of Quality and Development. These participants have experience with projects concerning developing it-solutions that supports and involves patients as partners in their own treatment. They could indeed contribute with identification of some unmet needs, since they are engaging with these issues every day in their own projects.
- A representative from the Department of IT. This participant is the head of the secretariat in the Department of IT. He could contribute with information about which it-solutions exists in the region and the region's IT-strategy in general. A representative from the Department of Production, Research and Innovation. This representative could not participate in the workshop. However, after the workshop was held, we prepared a summary, which was subsequently discussed with this participant. He contributed with knowledge of existing innovative eHealth solutions on the market.

It could have been relevant involving the clinicians as well in the co-creation workshop in order to get the point of view from the users of eHealth. However, we found the stated unmet needs in the report, "Synthesis of Evidence of Unmet Needs," too unfocused, why we could not ask the clinicians to devote time to the workshop.

Materials and Methods used

The workshop was held as an informal talk, as we were only five participants. We went through each section of unmet needs in the report "Synthesis of Evidence of Unmet Needs," and on the way, we discussed and identified unmet needs in Region Zealand.

Procurer eHealth identified unmet needs

Patient Empowerment

1. Health inequality

Why: eHealth solutions that supports patient empowerment are very widespread in Region Zealand. However, there are parts of the patients who have fewer personal

resources and poor eHealth literacy. They do not get the benefit of eHealth solutions to the same level, as the rest of the patients. This increases the existing health inequality.

What: In order to counter this issue, there is a need for solutions that take into account citizens with fewer personal resources and lower health literacy.

How: There should be a stronger focus on this group. There is a need for increased knowledge of eHealth literacy and the complexities therein as well to develop a solution.

Self-Management

1. Health inequality

Why: There are parts of the patients, who does not have skills or motivation to use ICT-tools in their own treatment. Due to this, they will not get the benefit of eHealth solutions at the same level as the rest of the patients. This increases the existing health inequality.

What: There is a need for solutions that take into account the differences of patients' skills and motivation in the use of eHealth.

2. Available information

Why: It should be easier for patients to catch up information that features in their own treatment regardless where the patients are and what need they have. For example, a patient who is abroad should could catch up his information easily.

What: There is a need for eHealth solutions that supports the individual care pathways.

How: The solution could be a platform that collects all information, pictures and videos, which the patient easily can access.

Chronic Disease Management

1. Earlier detection with men

Why: Men take longer time to see a doctor for a healthcare check than women take. Consequently, men are suffering from a late detection rate, which have a negative influence on men's diagnosis and treatment. The detection of men's diseases usually is happening to late. In existing eHealth regarding chronic diseases, there is a potential for an early detection of diseases.

What: There is a need for solutions that supports early detection with men.

2. Transversal cooperation

Why: Many treatments require involvement from different healthcare professions across different sections. There is a need for more inter-organizational collaboration and transversal cooperation across the healthcare professions in order to provide better results for the patient. Managing and handling the collaboration, though, can be a challenge.

What: There is a need for a solution that can support the multidisciplinary cooperation across professional and organisational boundaries.

Diagnosis Timeframe and Management

1. Patients with rare diseases

Why: Disease Management Programs and Clinical Pathways are designed to improve the health of patients with specific chronic conditions. Patients who cannot be placed into a Disease Management Program nor into a Clinical Pathway does not have the same opportunity for a streamlined treatment. This is usually patients with rare diseases.

What: There is a need for solutions that supports these patients' treatment procedures.

Decision Making Process

1. New decision making process

Why: The medical decision-making processes is in a transition from decisions based on evidence to decisions based on real time data. At the same time, there is a need for better prediction of patient diseases.

What: Due to this transition, there is a need for a better basis of data, including the development of algorithms to predict diseases.

Ageing workforce

Why: The workforce is ageing, while there is shortage in healthcare workers.

What: There is a need for solutions that can relieve and complement the healthcare workers.

How: A solution could be robotics, telemedicine and other timesaving eHealth solutions.

Skills Shortage

1. Transformation of roles

Why: There is a transformation of roles in the healthcare sector. For example, the role of the doctor is transforming from being a treatment-provider to a mediator of knowledge.

What: There is a need for solutions that supports this development. There is a need for knowledge and research about eHealth as a facilitator for the transformation of the roles.

2. Unmotivated patients

Why: There are groups of patients who does not utilize eHealth solutions although they have access to it.

How: Therefore, there is a need for solutions that traces this group of patients and increases their use of ICT.

General impressions

At the beginning of the workshop, there was a concern among the participants about whether they were able to identify the regions unmet needs thoroughly. The unmet needs stated in the report "Synthesis of Evidence of Unmet Needs" are very wide, and in spite of the short time and the few participants participating in the workshop, it seemed to be difficult to make a rightful picture of the regions unmet needs.

The participants anyway identified a number unmet needs based on their knowledge and experience. Despite the initially considered difficulties, the participants were very motivated to go into the discussion of identifying unmet needs.

The identification of the unmet needs was very quickly. It was obvious for the participants which needs were more relevant in Region Zealand than others were. The participants spoke out of the experiences they had with their own projects concerning eHealth. They presented the unmet needs supplemented with different examples.

Other information

In addition to the above-identified unmet-needs, the participants of the workshop have also stressed some barriers for implementation of eHealth solutions. One of barriers is the legislation about data-security. There is a profound need for better utilization of existing data. A better data utilisation is, however hampered by existing legislation. A better data utilisation also requires a change of culture among healthcare sector professionals in order to change attitudes toward exchanging data. Moreover, some of the participants found that there is a discrepancy between the innovation and the daily operation, as the innovative ideas rarely become implemented in the organization. Therefore, there is a need for more transversal cooperation and decision-making in the organization in order to implement innovative ideas.

Conclusions

In general, eHealth are very widespread in the Danish healthcare sector, and therefore we have eHealth solutions that support many of the unmet needs stated in the report "Synthesis of Evidence of Unmet Needs." However, some of the existing eHealth solutions generates new unmet needs e.g. the issue concerning health inequality, which should be taken into consideration in the further development of eHealth solutions and procurement of the very same. Finally, it should be mentioned that it is difficult to suggest an expecting eHealth solution to some of the identified unmet needs in Region Zealand. In order to do so, there is a need for increased knowledge and research on some of the issues.

SAS CO-CREATION WORKSHOP OUTCOMES

Participants

Name	Position
José María de la Higuera	Coordinator of the Strategy of Public Procurement of Innovation of the Andalusian Public Health Service
Manuel Jimber	Responsible of information safety at Reina Sofia University Hospital.
José Carlos Prieto	International Project manager at IMIBIC and Reina Sofia University Hospital
José Daniel Soto	Head of Information and Communication Technology Service at Regional Ministry of Health.
Javier López Narbona	Head of Innovation and Parity at the General Secretariat of Research Development and Innovation, Regional Ministry of Health
Ana Carriazo	Responsible for International Relationships, Regional Ministry of Health
Francisco Sánchez Laguna	Responsible for the Coordination of Information Systems Service at the Andalusian Health Service
José Ramón Román	Deputy Director of Procurement and Logistics, Andalusian Health Service
David de Mena	Adviser for the Deputy Director of Information and Communication Technologies, Andalusian Health Service

Materials and Methods used

The participants in the workshop work at the Andalusian Health Service and the Regional Ministry of Health. The majority of them have direct responsibilities or work at departments with direct responsibilities for the design and implementation of strategies in health, including eHealth. The original list of participants invited to the workshop and their job position is included in the first page. The final list of participants it attached at the end of this document. The language used in the meeting was Spanish.

The main sources of information have been their knowledge and experience regarding eHealth and the regional strategy for eHealth (in progress). Part of the information includes present needs identified for the development and implementation of PCP/PPI projects at regional and national level.

The original agenda included in page 2 was followed, although the identification of needs turned into a brainstorming session. All the ideas gathered have been later collated and sent to participants for revision before final approval of the document.

Procurer eHealth identified unmet needs

Immediate needs identified:

- Tools that allow a shift towards management by processes, based on the electronic health record. Making coding easier for professionals, in order to have better information. Clinical modelling and moving the EHR towards semantic tagging of the information in Standard format (SNODMED-CT). Create care pathways which can be integrated with the EHR in order to help professionals.
- Decision support systems based on Electronic Health Record.
- Big data: bioinformatics, integration of omics data, biomarkers, use and interpretation of data. Search for a cost-effective service that is possible to include in the portfolio of a public health service. Feed decision support systems for clinicians.
- Platform for the management of chronic diseases.
- Regional integrated service of digital anatomical pathology.
- Real time tracking systems for patients and equipment/goods. It has been detected a need to improve and rationalise health care delivery within hospitals. A system that allows tracking and geo-localise patients and equipment at all times will allow such improvement.

- Teleconsultation and Telediagnosis, allowing a shift in the current paradigm of health care.
- Personalised medicine/ precision medicine. Integrate biological/clinical data with other data: environmental, demographic, behavioural, etc.
- New technical solutions for diagnostics by image, allowing automatisation: ophthalmology (retinography), dermatology, otorhinolaryngology, etc. Integration of these images in the corporative PACS in order to make them accessible to every professional.
- Integral system to support patient safety: prescription, dispensing and consumption of medical drugs.
- Light intervention equipment for emergency services. There is a need to reduce the size and weight of portable equipment that is used by ambulance crews at emergency services. It has been detected that the current standard equipment weighs over 12 kg and is causing injuries to staff carrying it in a daily basis. This has consequences on the staff health, increase of days of sick leave, etc.

Other needs (already identified but not yet included in a regional strategy):

- Management systems operating beyond the electronic health record, which allow to model processes.
- Middleware that allows the use of the electronic health record for management of chronic patients, allowing patient empowerment.
- More integration of current IT systems at SAS to international standards for electronic health records and to ensure interoperability.
- Integration of current and future clinical guidelines for complex patients. Personalised/individualised care taking into consideration social aspects.
- Intra-hospital robotics: medicines, materials, etc.
- System for quality assurance of health information systems and software as a medical device in relation to patient safety. It could also be included as a general recommendation for the CE: Need of a quality assurance system (non-existent at the moment for IT solutions-software- for healthcare)

- Data storage. There is a problem of digital data storage (images, genetic information, health records, etc.). There is a need of innovative solutions: reduce space of hardware- miniaturisation, etc.

General impressions

The participants in the meeting were all willing to provide meaningful information. As most of the participants are involved in strategic planning and implementation of IT solutions for health in the Andalusian public health service, a good part of the contributions were related to future strategic needs, rather than to specific projects. Although the strategic plan for eHealth is under development, the staff responsible for its elaboration has long-term experience in the area and they already have a clear picture of which are the most important aspects to be considered.

Also, there is already a plan in place for innovative public procurement at regional level. Some of the needs already identified, including specific projects to be implemented during next year, have been included at the top of the ranking.

The needs seemed to be clear to everyone involved in the meeting, as there has already been some work done previously, for example a broader IT strategic plan is already in place, although it does not include a specific plan for eHealth.

Conclusions

The session was a success in terms participation and the number of ideas gathered. Apart from the specific ideas for projects based on immediate needs detected in some health services, there is a great potential for innovation in IT for health related to improvements of current systems and practices. Most of the strategic needs detected are directed towards personalised and precision medicine, the integration of information and its use in the optimisation of health care delivery and the improvement of health outcomes for patients.

The improvement of diagnostics and patient empowerment seem to be at the top of the list of priorities. All this technological advances carry with them new challenges that need to be tackled, especially in relation to patient safety. The management of adverse events related directly to the use of eHealth solutions at all levels, including the empowered

patient, must be taken into consideration at all times when designing and implementing technology solutions.

SERMAS CO-CREATION WORKSHOP OUTCOMES

The University Hospital of La Paz- HULP held and internal co-creation workshop on the 18th October in hospital premises. The workshop was organised by the HULP Innovation Platform with the collaboration of the Innovation Support Unit – UAI.

List of participants

The following participants attended the workshop, mainly hospital physicians and managers.

- Dra. Gloria Forés Moreno, HULP Deputy Medical Director
- Dr. Javier Cobas Gamallo, HULP Maternal and Children Hospital Managing Director
- Dr. José María Muñoz y Ramón, HULP Medical Director
- Dr. Javier de Castro Carpeño, HULP Oncology Service
- Dr. Mario Álvarez Gallego, HULP General and Digestive Surgery Service
- Dr. Ignacio Zapardiel Gutiérrez, HULP Obstetrics and Gynecology Unit
- Dr. Federico Gutiérrez Larraya, HULP Paediatric Cardiology Service
- Dr. Jose Tomás Castell, HULP General Surgery Service
- Dr. Esteban López de Sá y Areses, HULP Cardiology Service
- Dª Ana del Prado Catalina, HULP Directorate of Economic Management
- Dª Marisa Tejedor Botello, International Relations, IdiPAZ-FIBHULP
- Dª Adriana Varela Fernández, Innovation Support Unit, IdiPAZ-FIBHULP

Materials and Methods used

We organised the workshop as part of the HULP Innovation Platform activities. This platform was created in 2014 and its main goal is to promote, diffuse and enhance innovation throughout the HULP. Members of the platform are diverse and cover almost all the hospital services.

The HULP Innovation Platform is managed by the Innovation Support Unit- UAI from the Foundation for Biomedical Research of La Paz University Hospital -FIBHULP. The platform holds meetings regularly, normally every two or three months. An special meeting was called with the aim to identify potential unmet eHealth needs in the Hospital to be discussed within the meeting.

Procurer eHealth identified unmet needs

From all the unmet needs identified, more than 10, seven were selected and summarized in one page document each:

- Implantable pacemakers and defibrillators remote monitoring integrated system
- Smart probe to prevent esophageal damage during ablation of ventricular fibrillation.
- Hyperglycemia monitoring and treatment integrated system
- Mirror therapy programme for face neurological rehabilitation
- Smart and mobile transducer for brain evaluation and ultrasound treatment application
- Maternal-fetal integrated monitoring system used during labour.
- Clinical imaging advanced processing solution oriented to research and development.

General impressions

From the HULP our impressions are diverse:

- Even if we have received several unmet needs, some of them are already in the market so they don´t fit in a PPI process.
- For those that we have selected, we haven´t identified a solution that fits perfectly what the physicians are looking for, but we need to analyse this aspect in deep to be sure that potential solutions are not available and if so, if they are feasible

Other information

As part of the HULP Innovation Platform activities, we will keep working on identifying more unmet needs, not only related to eHealth that could be part of a CPI process. As part of the EPP e-Health project, we think that a matching exercise between potential procurers could be useful in order to identify common needs and define future steps. Another important point, could be to identify potential funding sources to launch a CPI process taking into account the common identified needs.

Conclusions

The internal workshop was very interesting and useful as part of the Innovation Platform and also as part of the EPP EHealth project activities but we need go on in working more on PPI awareness and on the methodology in order to be able to identify unmet needs that could fit in a PPI process.

SU CO-CREATION WORKSHOP OUTCOMES

Materials and Methods used

Since in Poland we do not have a valuable documents referring to innovative public procurement and eHealth solutions participants of the workshop were provided with condensed information about above topics based on documents that were already developed in a project. Also to facilitate the work participants received few examples and were asked to prepare their own ideas for the meeting that was a topic of discussion. The meeting took place at 5th October 2016.

Participants of the meeting:

- Krzysztof Mydel - Deputy Director Coordination and Development (Leader of Hospital Project EPP Team)
- Marcin Batko - Head of the Division of Public Procurement
- Paweł Kaczara - Head of Department of Information Technology and telecommunication engineering
- Katarzyna Kosik Gajewska – Head of the Department of legal service
- Elżbieta Lewicka – Head of Division of wages
- Łukasz Sendo – Division of Public Procurement
- Grzegorz Szklarczyk – Head of Division for Commercial Activity and New Projects
- Kazimierz Cięciak – Division for Commercial Activity and New Projects
- Katarzyna Wilk – Kwaskowska - Division for Commercial Activity and New Projects

Procurer eHealth identified unmet needs

1. PROBLEM: physicians spend too much time on writing out the regular prescriptions for patients in the continuous treatment. Also, patients lose a lot of time for appointments that result only in receiving a prescription. There is a need of solution that would enable patients to receive prescriptions/drugs without a need of making an appointment.
2. PROBLEM: Not efficient control and management over the terms of patients visits. Often, a visit to a medical specialist is determined in a distant time. There is a need to create a tool, that will enable patients to monitor the queue and that will inform them about released dates by other patients, which gives them a chance to speed their term. The best idea would be to prepare an application with easy access.
3. PROBLEM: Long lasting diagnosis of difficult medical cases where patients often are referred by a medical specialist to another specialist. There is a need of easy exchange of experiences in the field of atypical symptoms in order to speed up diagnosis of the patient. The best solution would be a platform that would suggest next steps for doctors who have detected certain symptoms.
4. POBLEM: Receptionists are overloaded with work; they must provide information to patients who feel lost. There is a need for a solution that will provide patients with current information (in the building of the hospital and remotely outside).

5. PROBLEM: Medical equipment is not used in an optimized way. There is a need of solution for optimization of equipment usage.

6. PROBLEM: patients visit different doctors who prescribe them drugs, sometimes without knowing what other drugs patient is taking already and that might lead to serious medical complications. Also it is difficult to obtain full information regarding the vaccinations that patient already had. There is a need of building a system that will allow to check what prescriptions patient have received, what drugs were bought in a pharmacy.
7. PROBLEM: It is difficult to obtain information about the current work experience and courses completed by medical personnel. Hospital often has to provide that information to different institutions. There is a need of creating a "platform" where all current information will be uploaded by doctors and hospitals with access for institutions that need such data.
8. PROBLEM: Hospital doesn't have a system of monitoring the level of the workload of medical staff, which would be helpful in the planning of employment.
9. PROBLEM: Hospital in order to obtain accreditation certificate of Quality Monitoring Centre must meet certain standards. All parameters are individually collected without the supporting tools that would make easier to supervise the quality to meet the requirements.
10. PROBLEM: No current knowledge of the opportunities to participate in training courses organized in the hospital and about the potential of delivering training on their own. Individual units train staff outside the hospital because they have no knowledge that such training could be done in the hospital.
11. PROBLEM: Difficulties in organizing a transport inside the hospital, patients sometimes have to wait very long time for transport while in a different place in hospital a wheelchair or transport is waiting. There is a need of tool that will optimize the transport services inside the hospital.
12. PROBLEM: In order to receive an information on what stage is the implementation of an order employees have to make a phone call and find person who is taking care of that order and that is time-consuming. The same situation is with agreements/contracts - lack of access to information on what stage the order / agreement is. There is a need of creating a solution that will enable to monitor stages of implementing orders/agreements.

General impressions
We were very pleased with the level of involvement of EPP team members, each brought ideas that became the subject of discussion. Because Hospital's EPP team represents different areas we have managed to gain a wide cross-section of unmet needs of the hospital. Organizing a meeting brought also results in better understanding a concept of innovative procurement by representatives of different hospital areas. It had also a disseminating aspect.

Conclusions Naming the needs and the opportunity to talk about it will bring us closer to solving problems by using innovative procurement.

12 ANNEX III – PRIORITY UNMET NEEDS REPORT

EPP eHealth, ZEALCO- Priority unmet needs document

Procurement policy:
Region Zealand will use the opportunities in the legislation, particularly the procurement law that offers opportunities for procuring innovative solutions. The region's innovative driving force and openness of suppliers' potential will constitute the basis for the region's future innovative procurement.

Adjustment and development of new solutions requires an evolved collaboration between Region Zealand and suppliers, who wants to contribute to innovation.
The suppliers are specialized in developing subject specific solutions, and it is crucial for Region Zealand to meet the suppliers and their competences on an even playing field. The regions' innovative driving force and openness toward the industries' potential, should serve as framework for the region's future innovative procurements.
Innovation is a high priority on the agenda in Region Zealand, as it is a mean to obtain better quality and higher efficiency. Innovation is reinforcing by external inspiration and knowledge. The access to the suppliers' competences, experiences and knowledge about how to support the region with innovative solutions, is through dialog with the market.

The region's vision is to ensure a professional and smooth handling of a procurement before, under and after contract award

NEED	A solution that supports earlier detection with men.
CONTEXT/BACKGROUND	Men take longer time to see a doctor for a healthcare check than women take. Consequently, men are suffering from a late detection rate, which have a negative influence on men's diagnosis and treatment. The detection of men's diseases usually are happening too late. In existing eHealth regarding chronic diseases, there is a potential for an early detection of diseases. There is a need for solutions that supports early detection with men.
STATE OF THE ART / MARKET PRELIMINARY ANALYSIS	1. *Solution: Better data in the region that supports the detection.* The market offers a

	collection of data, and an integration of multiple data systems, so it is possible to exchange information between hospitals and doctors for instance. An innovative solution is needed because Region Zealand, for now, do not have data for early detection. 2. A solution can be based on existing hospital data. They would look at these data, match them with similar profiles, and then go to see them. Matches based on huge data can predict healthcare work. In order to motivate the men to go to see a doctor, the supplier have teams of psychologists who advise people (potential patients), and then the people afterwards motivates each other. It works like an internal campaign among different groups of people. An innovative solution is needed because Region Zealand, for now, do not have a strategy of how to make men aware of their own health.
BENEFITS/IMPACTS	In the long term, the solutions will provide economically benefits, as it will be possible to prevent diseases and thus keep the men out of hospitals.
PRIORITY	This is a priority because in the long term the solutions provide economically benefits.

NEED	A solution that takes into account citizens with fewer personal resources, lower health literacy and lack of motivation of the use of eHealth.
CONTEXT/BACKGROUN	There are parts of the patients who does not have skills or motivation to use ICT-tools in their own treatment. Due to this, they will not get the benefit of eHealth solutions at the same level as the rest of the

	patients. This increases the existing health inequality, and therefore there is a need for solutions that take into account the differences of patients' skills and motivation in the use of eHealth.
STATE OF THE ART / MARKET PRELIMINARY ANALYSIS	1. Solution that supports users' motivation to use telecare devices. The solution regards a clinical group, who is being able to provide motivation for those who will not use the telecare. This clinical group could also involve the patient's family in order to increase the motivation. 2. To handle long-term conditions there exists a solution that is concerned with collecting all eHealth tools in one platform, so it is easier for people to use and have an overview over their opportunities. This platform would support people online. 3. Onteca can provide some solutions regarding motivation, where they make games to get people to engage. They can offer education through games to the unmotivated patients. 4. Over the last couple of years, eHealth has matured and a new industry has emerged with a number of implemented apps. Patients with fewer personal resources e.g. on the psychiatric area have high competences using smartphones, and apps can help them in treatment and dialog with physicians. Today it is possible to include

	motivation factors, as gamification elements, and even serious game elements. Communities, patient groups for rehabilitation and team training are essential ways to use healthcare apps, and is an area where disease management can maximize outcome and results. An innovative solution is needed because many of the patients cannot or will not use eHealth devices. It is more or less a complex need, why there is a need for more solutions.
BENEFITS/IMPACTS	- Social benefits, as it will prevent the increasing health inequality. Health inequality is not just a social issue but a political issue as well. - Economically benefits: The great advances with healthcare apps are the inexpensive cost level of development. Devices like iPhone, Samsung Galaxy, and software IOS and Android are continuously updated to be faster, better and more Sophisticated with new features. Features the healthcare sector and the industry can use to create better treatment, higher quality, and real time data set. The platform is given, and new possibilities arise every time Apple, Samsung or Google update
PRIORITY	There is a political awareness about this issue.

NEEDS	A solution that supports the decision making process based on real time data.

CONTEXT/BACKGROUN	The medical decision-making processes are in transition from decisions based on evidence to decisions based on real time data. At the same time, there is a need for better prediction of patient diseases. Due to this transition, there is a need for a better basis of data, including the development of algorithms to predict diseases.
STATE OF THE ART / MARKET PRELIMINARY ANALYSIS	Sophisticated healthcare apps can integrate with electronic patient records, provide patients with real-time data on tests results, and compare real-time data with earlier data set. With sophisticated healthcare apps patients can register an array of different self-management values, give access to healthcare provider, family members and friends. Healthcare providers can see the data, and follow up with instructions, training programs and motivation talks.
BENEFITS/IMPACTS	The benefits with healthcare apps are the unique possibilities of connecting traditional healthcare data with data sounding the patient in their life outside the hospital. The connection of data, even big data set will change the way we look at treatment today. The connection between the data from the smartphone and the doctors' knowledge will be the future of healthcare.
PRIORITY	Apps have potential to solve several needs.

EPP eHealth, SAS - Priority unmet needs document

INTRODUCTION

The Servicio Andaluz de Salud (SAS) has put in place a plan for Public Procurement of Innovation, including ICT and eHealth solutions, with prioritised specific projects. A number of these projects have been included in this document, together with other needs identified during the implementation of EPPeHealth, and as part of the process of definition of the SAS strategy for eHealth.

Apart from the specific ideas for projects based on immediate needs detected in some health services, there is a great potential for innovation in IT for health related to improvements of current systems and practices. Most of the strategic needs detected are directed towards personalised and precision medicine, the integration of information and its use in the optimisation of health care delivery and the improvement of health outcomes for patients.

The improvement of diagnostics and patient empowerment are at the top of the list of priorities. All these technological advances carry with them new challenges that need to be tackled, especially in relation to patient safety. The management of adverse events related directly to the use of eHealth solutions at all levels, including the empowered patient, must be taken into consideration at all times when designing and implementing technology solutions. In line with this general need to ensure patient safety, it could be advisable to develop at EU level a System for quality assurance of health information systems and software as a medical device, as it does not currently exist at the moment for IT solutions/software for healthcare.

PRIORITY NEED - ELECTRONIC HEALTH RECORDS

Context

The Andalusian Health Service has been the first regional service in Spain, and one of the firsts in Europe, to fully develop, implement and deploy a Health Care Information and Management Integrated System
(DIRAYA - https://ec.europa.eu/eip/ageing/repository/andalusian-ehealth-strategy systemdiraya_en).

The system has been fully operative for the whole population of Andalusia for the last three years. It is centred on the personal Electronic Health Records and ensures the integration of all information for each user, facilitates access to all services and structures the information. The system includes a series of related modules including the Electronic Health Record, e-Prescription, e- Appointments, analytical tests, Radiology Information System, among others. Once the information and management system is in place, the main needs detected at SAS are related to the use and further integration of the wealth of data available. Some of the needs related to EHR are:

- Management by processes, moving the EHR towards semantic tagging of the information in Standard format.
- Decision support systems based on Electronic Health Record.
- Big data: bioinformatics, integration of omics data, biomarkers, use and interpretation of data.
- Personalised medicine/ precision medicine. Integrate biological/clinical data with other data.
- Management systems operating beyond the electronic health record, which allow to model processes.
- Middleware that allows the use of the electronic health record for management of chronic
- tients, allowing patient empowerment.
- More integration of current IT systems at SAS to international standards for electronic health records and to ensure interoperability. - Integration of current and future clinical guidelines for complex patients.
- Personalised/individualised care taking into consideration social aspects.
- Reduction of risk for patients security in the electronic health record use

State of the Art

It is necessary to consider that the system currently in place at SAS is custom-build and it might need a research & development approach. A preliminary contact with suppliers has identified some related initiatives at other health services working on the use of data from electronic health records, including information from free-text data through machine learning.

This unmet need is very complex and it will necessarily involve the development of several individual projects. Each project could be addressed in different ways depending on its nature: through research, in-house development, public procurement, etc.

Impact

The impact of innovative solutions for the EHR could be various:

- Improvement of health care delivery and outcomes for patients
- Improvement of health care system management, with reduced costs.
- Advancement in the availability of electronic administration services for citizens.
- Increase the availability of data for biomedical research, which would lead to improvements in current clinical practice and better patient outcomes.
- Increase patient empowerment, potentially improving health care delivery and reducing pressure on health care systems.
- Improve interoperability of health care data at European level, improving health care delivery for EU citizens.

Priority

This is a priority for SAS as a next step after full digitalisation of health care data and services. It will allow advancement towards personalised care and precision medicine, patient empowerment and sustainability and resilience of the public health care system in Andalusia.

SAS will be ready to implement pre-commercial procurement processes in the short term for the majority of the needs described for the use of data from the EHR, as they require further development.

PRIORITY NEED – MANAGEMENT OF DISEASES, PATIENT EMPOWERMENT

Context

Building on the development of a fully digitalised information and management integrated system, SAS is interested in opening its current service portfolio to innovative solutions that allow better management of diseases, and that ensure patient empowerment when possible. The main needs detected at SAS include:

- Platform for the management of chronic diseases.
- Teleconsultation and tele-diagnostics, allowing a shift in the current paradigm of health care.
- Integral system to support patient safety: prescription, dispensing and consumption of medical drugs.

State of the Art

The development of health care Apps and medical devices at EU level is profuse, although it seems that the market uptake is mainly local or regional. A preliminary contact with suppliers has brought forward a variety of developments already in the market.

Impact

The impact for SAS of innovative solutions for the management of diseases and patient empowerment will include a reduction in the pressure on the health care system, and an improvement in health care delivery and patient outcomes and well-being.

The number of possible solutions makes very difficult to quantify this impact. Although, the implementation of innovative solutions that increase self-management of diseases could bring a significant reduction in the number of patient visits, as previous experiences have already shown, for example with the implementation of the e-prescription.

Priority

In the mid-term, some of the developments detected for specific conditions or illnesses could be of interest for purchase at SAS, depending on the previous study of its cost-effectiveness and on their interoperability with the current system in place.
In the short-term, it could be of interest for SAS the development of innovative solutions for the management of chronic diseases through a single platform, and that allows patient empowerment. This could be potentially of interest for a pre-commercial procurement action.

PRIORITY NEED – IMAGING: DIAGNOSTICS AND DATA STORAGE

Context

SAS has developed a Picture Archiving and Communication System (PACS) module fully integrated in its health care information and management service. X-ray and nuclear medicine images from patients are readily accessible for clinicians in all SAS medical settings. Building on this development, a number of needs have been identified:

- Regional integrated service of digital anatomical pathology.
- New technical solutions for diagnostics by image allowing automatization, for example mobile solutions for the analysis of images of retina.

- Need of innovative solutions for data storage (images, genetic information, health records, etc.) reduce space of hardware- miniaturisation, etc.

State of the Art

The preliminary contact with suppliers has identified at least one solution under development for specific use on images of the retina. This could be a good start for a specific PCP action to expand its application to multiple conditions. No other solutions have been detected during preliminary contacts with suppliers for data storage, so new contacts with the market are advisable.

Impact

The development of innovative solutions for the advancement on the automatization of diagnostic processes will have a positive impact on health care delivery, as it will reduce the time-to-treatment and improve patient outcomes and well-being. It will as well have an impact on the reduction of pressure on health care systems and reduce costs. Data storage is already a pressing problem for health care systems, and solutions that improve current practices will have a positive impact and reduce costs on ICT systems.

Priority

A pre-commercial procurement process would be possible at SAS in the short-term for the development of innovative solutions for diagnostic through automated image analysis.

OTHER NEEDS IDENTIFIED

Context

A number of other needs have been identified at SAS in relation to improvement of current organisational practices:

- Real time tracking systems for patients and equipment/goods.
- Intra-hospital robotics: medicines, materials, etc.
- System for quality assurance of health information systems and software as a medical device in relation to patient safety.

State of the Art

The preliminary contact with suppliers has identified some previous projects tackling the implementation of tracking systems in hospitals. This could be a good start for a specific PCP

action as it will need specific developments to adapt the systems to the characteristics of different medical settings: hospitals, outpatient clinics, different wards within hospitals, etc.

No other solutions have been detected during preliminary contacts with suppliers for robotics or quality assurance systems, so new contacts with the market are advisable.

Impact

The deployment of innovative solutions for tracking persons and or equipment/goods within health care settings will have a positive impact on health care management. On one hand it can potentially improve health care delivery. On the other hand, it could improve management at administrative and operational level, as it will provide real-time information of the work-force and equipment/goods allowing optimisation of the use of resources.

The adoption of robotics solutions for storage purposes will increase the efficiency of general storage services and pharmacies within hospitals, reducing costs and delivery errors.

The use of a quality assurance system for health care systems and medical software will improve patient safety.

Priority

SAS will be ready to purchase or start a pre-commercial procurement process, depending on the degree of development of the solution, in the short-term for innovative solutions for tracking purposes within hospitals. Robotic solutions for storage will be of interest for SAS in the long-term.

EPP eHealth SERMAS - Priority unmet needs document

Need - Implantable pacemakers and defibrillators remote monitoring integrated system

Context/Background

The need for human oversight in the interpretation of cardiac monitoring data is still very important and cannot be avoided or reduced with the current market solutions. Furthermore each company has developed its own platform and software that are not compatible with other company`s products.

The solutions should:

Monitor patients with a pacemaker or defibrillator remotely, safely and effectively irrespectively of device brand

Provide an active computerized analysis for cardiac monitoring of patients with a pacemaker or defibrillator implanted that allows professionals immediate data review and determine when it is appropriate to react.

Allow to personalized the parameters and to reduce, as much as possible, the number of false alarms that need to be evaluated by healthcare professionals while reducing the overtreatment of patients.

Allow to react in time and to prevent potential cardiovascular events at an early stage.

Be compatible with different available products in the market in order to avoid several trainings and tasks overlapping as well as to reduce time analysis.

Provide a friendly user interface that does not demand specific training and that can be available to patients.

Integrate the data from the remote monitoring to the electronic patient record as well as take into account data security and storage requirements.

State of the art/ market preliminary analysis

A preliminary market research has shown only one available potential solution:

IHE IDCO, hospital development

Benefits/ Impacts

Reducing the number of professionals, monitors and devices used for monitoring pacemakers

Reducing the false alarms, response times and medical errors of the healthcare professionals

Reducing the cost of monitoring pacemakers

Improving diagnostic options

Need - Smart probe to prevent esophageal damage during ablation of ventricular fibrillation

Context/Background

Catheter ablation is a technique of cardiac electrophysiology that can cause injury due to the warming produced by the radiofrequency application. The most severe injury is the thermal esophagus injury, since the esophagus is in direct contact with the posterior left atrial wall and pulmonary veins.

The solution should:

Include temperature sensors and ultrasound transponders attached that allow monitor the temperature of the affected area and its environment.

Be directly connected to a monitoring system that sends alarms and allows professionals constantly data review.

Be able to deliver a cold fluid to the affected tissue area.

Allow professionals to react in time in order to prevent potential esophageal damage.

State of the art/ market preliminary analysis

A preliminary market research has shown that there are several publications related to this need but no available solution in the market has been identified yet.

Benefits/ Impacts

Reducing the number of medical errors and therefore esophageal damage

Improving surgery performance

Reducing patient time in the hospital while reducing treatment cost

Need - Mobile medical equipment tracking.

Context/Background

Hospital staff spends a lot of time looking for mobile medical equipment and, furthermore, there is an over procurement of assets to ensure equipment availability.

The solution should:

Track equipment across hospital, such as scales, respiratory machines, patient monitors, mammography units, mobile x-ray units, etc

Inform about availability and allow booking while assuring full utilization.

Be user friendly for clinical staff.

Inform about low inventory levels and maintenance dates.

State of the art/ market preliminary analysis

A preliminary market research has shown the following available solutions:

Visibility™ Asset Tracking, Versus

AllTraq system. ABGI

Medical Equipment Tracking Software, gigatrack

Benefits/ Impacts

Decreasing the number of search for equipment and therefore the time spent on it.

Detecting usage trends to improve future procurement.

Reducing the over procurement of equipment and therefore costs.

Reducing costs from lost, damaged or stolen inventory

Need - Mirror therapy programme for face neurological rehabilitation

Context/Background

Even if the mirror therapy is promising, an individualised therapy approach is necessary for an effective rehabilitation regime.

The solutions should:

Provide a rehabilitation programme which can be personalised for each patient and disease.

Provide different training modules, including a specific training module to prepare the patient at home for the whole rehabilitation process.

Allow the treatment to be administered as a home-based training programme.

Support the interconnection and interoperability of different devices that can be used during the rehabilitation process at both, hospital and home.

Allow hospital staff to monitor the rehabilitation process, even when the patients are at home.

State of the art/ market preliminary analysis

A preliminary market research has shown that there are some available solutions that are focused in other body´s parts and not in the face.

Benefits/ Impacts

Reducing the number of professionals participating in neurological rehabilitation

Reducing the time of the rehabilitation and the cost of each treatment

Increasing the efficiency of the rehabilitation treatment

Being applied to other neurological pathologies

Need - Smart and mobile transducer for brain evaluation and ultrasound treatment application

Context/Background

Some neurological diseases, such as a stroke, require the availability of accessible, agile and less invasive brain imaging diagnostic techniques, for both the parenchyma and blood ves. These devices should be small, light and mobile in order to be available at ambulances.

The solutions should:

Be mobile and user-friendly in order to be available in ambulances and at patients`homes.

Provide an image of the brain structures and automatically identify the best bone-window.

Acquire, storage and process brain related medical data in an integrated way.

Display continuously all values on a screen paying special attention to warnings.

Allow the interconnection and interoperability of different devices used during evaluation and treatment, such as computers, mobile phones, etc.

Support the delivery of drugs with the help of a ultrasound to the concrete affected brain area.

State of the art/ market preliminary analysis

A preliminary market research has not allowed us to identify any similar solution in development or in the market.

Benefits/ Impacts

Conducting an accurate diagnosis and treatment before arriving at hospital

Reducing the number of professionals and devices used for brain evaluation and ultrasound treatment application

Reducing the response times and medical errors of the health care team.

Reducing the overtreatment of each patient as well as its cost

Priority

This solution is a priority because it can help to reduce time , cost as well as medical errors.

Furthermore, the idea of reducing sizes and making equipment mobile can be applied to other medical equipment and pathologies.

Need - Maternal-fetal integrated monitoring system used during labour

Context/Background

One of the biggest problems with the labour process is that even with all the available devices, most of them sensors, doctors still need some time to differentiate the mom's

medical data from the baby's, which also implies moving the sensors around and listening. Moreover, to have a single monitoring system that integrates all data is a real challenge.

The solution should:

Acquire, storage and process the maternal-fetal related medical data in an integrated way.

Support the interconnection and interoperability of the different devices used during the delivery process.

Be able to use wireless devices and reduce the number and size of them.

Display continuously all values on the monitor's front panel paying special attention to warnings.

Allow hospital staff to monitor the labour process in a more effective way and receive warnings in other devices, such as mobile phones.

Allow the woman in labour and her family to get some basic information about the delivery process on their mobile phones.

State of the art/ market preliminary analysis

A preliminary analysis of the market has allowed us to identify the following similar or complementary solutions:

- Sense4Baby monitor, Airstrip
- Corometrics 250cx Series Manternal/Fetal Monitor, GE Healthcare
- Avalon fetal monitoring, Philips

Benefits/ Impacts

Reducing the number of professionals, monitors and devices used for monitoring delivery.

Reducing the response times and medical errors of the health care team.

Reducing the cost of each baby delivery.

Need - Clinical imaging advanced processing solution oriented to research and development.

Context/Background

Congenital heart malformations are very complex, with many combinations of defects and some of them are related to kinetic movements. Its invasive treatment needs to be personalized and is very delicate. Segmentation techniques and 3D printing can allow personalization and therefore facilitate patient safety improvement.

The solution should:

Allow developing in line clinical image management prototypes with the specific needs of each healthcare professional.

Allow to obtain images that enable automatic processing of static structures and kinetic movements for diagnosis and treatment.

Allow 3D replication of organs and body parts in order to use them in surgical procedure simulations and in the creation of prostheses.

Allow access to the latest developments of each clinic area from any workstation.

Send data from any workstation in order to evaluate them in the development environment and to achieve results.

Be integrated with current hospital advanced processing solutions allowing the use of current workstations.

Include all the necessary software for server and storage administration and maintenance.

Use an identical work environment for both, research and clinical tasks.

State of the art/ market preliminary analysis

The real challenge is the obtaining of images of kinetic movements and the automation of image processing. A preliminary analysis of the market reveals that there is not a product like this in the market, some solutions under development have been identified but they are not in the market already.

Benefits/ Impacts

Conducting a more accurate diagnosis

Applying personalised and more effective treatments

Reducing the number of tests and surgical interventions

Reducing the number of technicians

Need - Surgical sponges track

Context/Background

Surgical sponges left behind inside a patient`s body represent a real risk and a costly problem. These foreign objects can cause pain or infection.

The solutions should:

Scan the patient`s body and detect different types of sponges and other items.
Register and count every sponge utilized during surgical procedure.
Provide a graphical interface with information about all the items utilized.

State of the art/ market preliminary analysis

A preliminary market research has shown the following available solutions:
Visi-Sponge, TSG
SmartSponge System, ClearCount
ORLocate,
There are other solutions under development.

Benefits/ Impacts

Reducing the number of medical errors and therefore ensuring patients safety.

Improving surgery performance

Reducing patient time in the hospital while reducing treatment cost

EPP eHealth, Region SU - Priority unmet needs document

The University Hospital in Krakow has identified 11 unmet needs, which have been presented and discussed with various potential suppliers, who joined the EPP-project Workshop in Liverpool. Generally, the implementation of the presented innovative products in Polish Hospital would require the adaptation of these solutions to fit into the standards of Polish health care system.

Procurer eHealth identified unmet needs:

NEED 1	**A solution to enable patients to receive prescriptions without the need to make an appointment.**
CONTEXT / BACKGROUND	Physicians spend too much time on writing out the regular prescriptions for patients in the continuous treatment. Also, patients lose a lot of time for appointments that result only in receiving a prescription. There is a need of solution that would enable patients in continuous treatment to receive prescriptions/drugs without a need of making an appointment.
STATE OF THE ART / MARKET PRELIMINARY ANALYSYSIS	Not available in Poland. From Liverpool's workshop we know, that there are foreign companies (damibu , Aimes), which could develop such solutions, which would meet the needs of the UHK.
BENEFITS / IMPACTS	Solution could help save time (patients, healthcare professionals), would improve the use of resources in hospital. There is a need to check the compliance of such solution with the law / regulations of the Polish health care system.
PRIORITY	We would buy solution immediately, if it could be financed from external sources (lots of needs/limited resources – New Hospital is being build). Priority depends on the cost of the solution.

NEED 2	**A solution to enable patients to monitor the queue and inform them about waiting times.**
CONTEXT /	Not efficient control and management over the terms of patients

BACKGROUND	visits. Often, a visit to a medical specialist is determined in a distant time. There is a need to create a tool that will enable patients to monitor the queue, that will inform them about released dates by other patients, which gives them a chance to speed their term of visit.
STATE OF THE ART / MARKET PRELIMINARY ANALYSYSIS	After extended market research, we are aware, that there are solutions on the market, which partially could meet this need. But dynamics of knowledge and available technology could lead to most effective one. Moreover there is a need to develop a solution, that would be compatible with the other ITC software solutions, which are already functioning in the Hospital and up to date with the needs of patients – mobile communication.
BENEFITS / IMPACTS	Solution could help save time (patients, healthcare professionals), would improve the use of resources in hospital.
PRIORITY	We would buy it immediately, if could be financed from external sources (lots of needs/limited resources – New Hospital). Priority depends of cost of the solution.

NEED 3	**A solution to improve the timeframe of diagnosis.**
CONTEXT / BACKGROUND	Long lasting diagnosis of difficult medical cases, where patients are often directed by one medical specialist to another specialist. There is a need of easy exchange of experiences in the field of atypical symptoms in order to speed up diagnosis of the patient. The best solution would be a platform that would suggest next steps for doctors who have detected certain symptoms.
STATE OF THE ART / MARKET PRELIMINARY ANALYSYSIS	After extended market research, we are aware, that there are solutions on the market, which could meet this need. But dynamics of knowledge (especially in the field of artificial intelligence) and available technology could lead to most effective one.
BENEFITS / IMPACTS	Solution would significantly improve the use of resources, would shorten the healing process and decrease the costs of provided healthcare. Also many unnecessary tests would be avoided.
PRIORITY	Solution important according to forthcoming workforce ageing and skills shortages. At present, assuming necessity of financing from

	own recourses not included in near term investment plan. We would buy it immediately, if could be financed from external sources (lot of needs/limited resources – New Hospital). Priority depends of cost of the solution.

NEED 4	**A solution to improve patient information both internally (within the hospital building) and externally (out with the hospital)**
CONTEXT / BACKGROUND	Description of the problem / need from various perspectives: quantitative and qualitative (depending on the need), e.g. functional, social, economical, etc. A significant number of patients' complaints which are addressed to the Hospital concerns the matter of insufficient or lacking information for the patient, so that they feel lost or misinformed in Hospital. They complain about losing time, getting insufficient information about the requirements before the planned visit or hospitalization, problems with registration for the visit and hospitalization. The system of internal and external communication with patient is very important and needed in both: old premises of the UHK – because it is a multibuilding Hospital with far distanced locations and also in the New premises, which will be new and unknown for personnel and patients. Receptionists are overloaded with work, they must provide information to patients who feel lost. There is a need for a solution that will provide patients with current information (In the building of the hospital and remotely outside)
STATE OF THE ART / MARKET PRELIMINARY ANALYSYSIS	Solutions available in the market. Explain why an innovative solution is needed. Supplier's perspective gathered in Liverpool's workshop The suppliers - Aimes and Tiani Spirit - have already products, which enable the electronic communication between patient and hospital, but the technological part of its solutions is designed to meet the British legal and IT standards. Tiani Spirit has already products, such

	as “Electronic Health Record Solutions” or “Tiani Health Records” which enable the internal exchange of medical information but the technological part of its solutions is designed to meet the British or Austrian standards. Aimes and Tiani Spirit seem to be companies, which could develop such solutions, which would meet the needs of the UHK.
BENEFITS / IMPACTS	How the innovative solution is expected to improve the state of the art from various perspectives (quantitative and qualitative); economical, functional, social, Main expected benefits An e-Health Solution to improve a mutual communication between patient and doctor in Hospital would significantly improve the use of resources, would shorten the waiting times for the patients’ visits, would improve the healing and treatment process, increase the level of satisfaction for patient and doctor, decrease the costs of provided healthcare. We are searching for a comprehensive solution, which would cover all the communication needs – external communication between Hospital and patient before the visit in Hospital and the internal communication starting from the e-registration and information about how to move in Hospital, finishing with the tools to monitor the wellbeing of patient after leaving the Hospital.
PRIORITY	Why is this priority for you? Would you buy this solution? Improving the mutual communication between medical personnel and patients is one of top priorities for the old and new Hospital. We would buy it immediately, if we could afford it or if it could be financed from external sources (lot of needs/limited resources – New Hospital). Priority depends of cost of the solution.

NEED 5	**A solution to optimise the use of equipment within the hospital**
CONTEXT / BACKGROUND	Description of the problem / need from various perspectives: quantitative and qualitative (depending on the need), e.g. functional, social, economical, etc. One of the most urgent problems of the administration of the Hospital is to monitor and optimise the use of equipment in the Hospital, due to the following reasons: - Economical (cost-effectiveness), using the equipment for commercial activity. - Functional – optimisation of allocation of the equipment in the clinics or assigning personnel to the wards to use the equipment more efficiently Social – optimisation of the use of equipment would shorten the waiting time for patient's treatment.
STATE OF THE ART / MARKET PRELIMINARY ANALYSYSIS	Solutions available in the market. Explain why an innovative solution is needed. Supplier's perspective gathered in Liverpool's workshop **None of the suppliers addressed this unmet need of UHK**
BENEFITS / IMPACTS	How the innovative solution is expected to improve the state of the art from various perspectives (quantitative and qualitative); economical, functional, social, Main expected benefits An e-health solution should gather the information from the own-reports of the equipment or from the internal information systems of the hospital and analyse the real time of the use of a piece of equipment. This kind of analytical tool should provide information for the administration of the Hospital, whether the equipment is being used efficiently and to what extent. An e-Health solution to monitor and analyse the real usage of the equipment would help the administration of the hospital to optimise its effectiveness, to properly allocate the equipment and the personnel, who is operating the equipment, which in the scale

	of the hospital would give significant savings or additional sources of income (commercial activity) and reduce the waiting time for the treatment. It would be also useful for purchase planning.
PRIORITY	Why is this priority for you? Would you buy this solution? Increasing the effectiveness of the use of the equipment in Hospital is one of top priorities for the old and new Hospital. We would buy it immediately, if we could afford it or if it could be financed from external sources (lot of needs/limited resources – New Hospital). Priority depends of cost of the solution.

NEED 6	**A solution to enable full prescription tracking**
CONTEXT / BACKGROUND	Description of the problem / need from various perspectives: quantitative and qualitative (depending on the need), e.g. functional, social, economical, etc. Medical doctors who examine the patient do not have full knowledge of what medicines the patients has already been taken. There is a risk, that the doctor prescribes a medicine, which has a negative interaction with other medicine, which the patient is taking. There is a need for a solution, that would enable the doctor during the patient's visit to check, what other medicines has been prescribed for this patient, what has this patient bought in the pharmacy to prevent the problem of negative interaction of medicines. That might lead to serious medical complications. Also it is difficult to obtain full information regarding the vaccinations that patient already had. There is a need of building a system that will allow to check what prescriptions patient have received what drugs were bought in a pharmacy.
STATE OF THE ART /	Solutions available in the market. Explain why an innovative

MARKET PRELIMINARY ANALYSYSIS	solution is needed. Supplier's perspective gathered in Liverpool's workshop **None of the suppliers addressed this unmet need of UHK**
BENEFITS / IMPACTS	How the innovative solution is expected to improve the state of the art from various perspectives (quantitative and qualitative); economical, functional, social, Main expected benefits This e-health solution (probably an independent platform) would improve the work of medical doctors in the Hospital, but it has to be compatible with many various ICT-systems used by other Healthcare providers.
PRIORITY	Why is this priority for you? Would you buy this solution? We would buy it immediately, if we could afford it or if it could be financed from external sources (lot of needs/limited resources – New Hospital). Priority depends of cost of the solution.

NEED 7	**A solution to record the qualifications, training and continuous professional development of medical professionals and disseminate training opportunities (skills development)**
CONTEXT / BACKGROUND	Description of the problem / need from various perspectives: quantitative and qualitative (depending on the need), e.g. functional, social, economical, etc. It is difficult to obtain information about the current work

	experience and courses completed by medical personnel. Hospital often has to provide that information to different institutions. There is a need of creating a "platform" where all current information will be uploaded by doctors and hospitals with access for a institutions that need such data. The "platform" should also obtain the information of any additional skills (such as language skills), which would be helpful for administration of the Hospital to allocate the personnel with proper qualifications, where it is really needed. This solution would be also helpful to enable proper development of career paths.
STATE OF THE ART / MARKET PRELIMINARY ANALYSYSIS	Solutions available in the market. Explain why an innovative solution is needed. Supplier's perspective gathered in Liverpool's workshop **None of the suppliers addressed this unmet need of UHK**
BENEFITS / IMPACTS	How the innovative solution is expected to improve the state of the art from various perspectives (quantitative and qualitative); economical, functional, social, Main expected benefits This e-health solution (probably an independent platform) would improve the work of administrative personnel and medical doctors in the Hospital, but it has to be compatible with many various ICT-systems used by other Healthcare providers.

PRIORITY	Why is this priority for you? Would you buy this solution? We would buy it, if we could afford it or if it could be financed from external sources (lot of needs/limited resources – New Hospital). Priority depends of cost of the solution.

NEED 8	**A solution to manage and plan the workload of medical staff and available resources**
CONTEXT / BACKGROUND	Description of the problem / need from various perspectives: quantitative and qualitative (depending on the need), e.g. functional, social, economical, etc. Hospital doesn't have a system of monitoring the level of the workload of medical staff, which would be helpful in the planning of employment.
STATE OF THE ART / MARKET PRELIMINARY ANALYSYSIS	Solutions available in the market. Explain why an innovative solution is needed. Supplier's perspective gathered in Liverpool's workshop **None of the suppliers addressed this unmet need of UHK**
BENEFITS / IMPACTS	How the innovative solution is expected to improve the state of the art from various perspectives (quantitative and qualitative); economical, functional, social, Main expected benefits There is a need of creating an ICT solution to check the appropriate level of the workload of medical staff, to improve the allocation of human resources in the Hospital, to plan the recruitment and outplacement of personnel.
PRIORITY	Why is this priority for you? Would you buy this solution? We would buy it, if we could afford it or if it could be financed

	from external sources (lot of needs/limited resources – New Hospital). Priority depends of cost of the solution.

NEED 9	**A solution to ensure quality and compliance to enable Quality Monitoring Centre accreditation**
CONTEXT / BACKGROUND	Description of the problem / need from various perspectives: quantitative and qualitative (depending on the need), e.g. functional, social, economical, etc. Hospital in order to obtain accreditation certificate of Quality Monitoring Centre must meet certain standards. All parameters are individually collected without the supporting tools that would make easier to supervise the quality to meet the requirements. Each organizational unit has to monitor manually its own quality monitoring indicators and send them to a QM unit, which manually makes analysis of fulfilling the indicators. There is a need for a ICT solution, which would automatically gather and develop analyses of various indicators coming from every single organizational unit of the UHK. This tool could also inform the QM team in advance about the risk of not meeting the requirements and allow to take steps in advance to avoid problems.
STATE OF THE ART / MARKET PRELIMINARY ANALYSYSIS	Solutions available in the market. Explain why an innovative solution is needed. Supplier's perspective gathered in Liverpool's workshop **None of the suppliers addressed this unmet need of UHK**
BENEFITS / IMPACTS	How the innovative solution is expected to improve the state of the art from various perspectives (quantitative and qualitative); economical, functional, social, Main expected benefits

	Quality Monitoring is a priority need for both – the old and the new UHK. An ICT solution would help gather and develop QM data, which would primary facilitate the job of the QM unit, but secondary, all organisational units of the Hospital would benefit from the use of such solution, because it should be automatic, free from manual mistakes, less time-consuming. The solution should help generating optimal reports which will lead to implementing of high quality procedures for administration and patients.
PRIORITY	Why is this priority for you? Would you buy this solution? We would buy it, if we could afford it or if it could be financed from external sources (lot of needs/limited resources – New Hospital). Priority depends of cost of the solution.

NEED 10	**A solution to optimise transport services within the hospital**
CONTEXT / BACKGROUND	Description of the problem / need from various perspectives: quantitative and qualitative (depending on the need), e.g. functional, social, economical, etc. One of the problems of the administration of the Hospital is to monitor and optimise the use of means of transport in the Hospital and between the hospital buildings, due to the following reasons: - Economical (cost-and time effectiveness), using the optimised means for transporting medical materials, other goods (administrative supply chain), but also facilitate the transport of patients between the wards or clinics (by wheelchair, ambulance or other means). - Functional – optimisation of allocation of the means of transport in the clinics and in the administrative sections - Social – optimisation of the means of transport would shorten the waiting time for patient's treatment. Difficulties

	in organizing a transport inside the hospital, patients sometimes have to wait very long while in a different place in hospital wheelchair or transport is waiting.
STATE OF THE ART / MARKET PRELIMINARY ANALYSYSIS	Solutions available in the market. Explain why an innovative solution is needed. Supplier's perspective gathered in Liverpool's workshop **None of the suppliers addressed this unmet need of UHK**
BENEFITS / IMPACTS	How the innovative solution is expected to improve the state of the art from various perspectives (quantitative and qualitative); economical, functional, social, Main expected benefits The implementation of such ICT solution would improve the time and cost – effectiveness of the Hospital's means of transport, which would have positive impact on both – Hospitals logistics and the comfort of patient.
PRIORITY	Why is this priority for you? Would you buy this solution? Increasing the effectiveness of the use of the means of transport in Hospital is one of top priorities for the old and new Hospital. We would buy it immediately, if we could afford it or if it could be financed from external sources (lot of needs/limited resources – New Hospital). Priority depends of cost of the solution.

NEED 11	**A solution to monitor orders and contracts**
CONTEXT / BACKGROUND	Description of the problem / need from various perspectives: quantitative and qualitative (depending on the need), e.g. functional, social, economical, etc. The Administration of the Hospital is functioning with respect to the Law on public procurement, which means that the each

	organisational unit of the hospital is preparing the purchasing plan for the procurement department which is overloaded with work and cannot give back proper information to the organisational unit at which stage the order is being proceeded. There is a need of an ICT-solution to enable on-line 2 way internal communication between the units of the Hospital and the public procurement department, which would inform each side of the actual status of an order and would enable optimisation and prioritising of each procurement procedure.
STATE OF THE ART / MARKET PRELIMINARY ANALYSYSIS	Solutions available in the market. Explain why an innovative solution is needed. Supplier's perspective gathered in Liverpool's workshop **None of the suppliers addressed this unmet need of UHK**
BENEFITS / IMPACTS	How the innovative solution is expected to improve the state of the art from various perspectives (quantitative and qualitative); economical, functional, social, Main expected benefits An ICT-solution should improve the mutual communication between the organisational units of the Hospital and the Public Procurement Department, which would optimise the flow of procurement procedures. This should lead to a shortening of time needed for finalising a procedure and let prioritise the procedures.
PRIORITY	Why is this priority for you? Would you buy this solution? Increasing the effectiveness of the public procurement procedures in the scale of our Hospital is one of top priorities for the old and new Hospital. We would buy such solution, if we could afford it or if it could be financed from external sources (lot of needs/limited resources – New Hospital). Priority depends of cost of the solution.

13 ANNEX III – JOINT STATEMET OF UNMET NEEDS (TEMPLATE DISTRIBUTED TO PROCURERS).

JOINT STATATEMET OF UNMET NEED No 1

PRIORITY AREA No 1

Priority Area No 1	Title E.g.: Patient Empowerment *Remember to rename the titles of the needs so as to make them sounder/ attractive*
CONTEXT/BACKGROUND	Description of the problem/need from various perspectives: functional, social, economical, etc. • Why is this a concern? • What is the dimension of the problem? *Give numbers, references based on reliable sources (academic studies, EU reports, etc).*
STATE OF THE ART / MARKET PRELIMINARY ANALYSIS	What is the current market status and why current available solutions do not fit your needs. Explain why **innovative** solutions are needed. *Give numbers, references based on reliable sources (academic studies, EU reports, etc).*
BENEFITS/IMPACTS	Potential economical, social, functional, etc. benefits. *Give numbers, references based on reliable sources (academic studies, EU reports, etc).*

SPECIFIC NEEDS UNDER PRIORITY AREA No 1

SPECIFIC NEED #1	Title E.g.: Telemedicine, Teleconsultation; Telediagnosis *Remember to rename the titles of the needs so as to make them sounder/ attractive*
CONTEXT/BACKGROUND	Description of the problem/need from various perspectives: quantitative and qualitative (depending on the need). E.g.: functional, social, economical, etc. *Give numbers, references based on reliable sources (academic studies, EU reports, etc).*
STATE OF THE ART / MARKET PRELIMINARY ANALYSIS	Solutions available in the market. Explain why an innovative solution is needed. Supplier's

	perspective gathered in Liverpool´s Workshop. *Give numbers, references based on reliable sources (academic studies, EU reports, etc)*
BENEFITS/IMPACTS	How the innovative solution is expected to improve the state of the art from various perspectives (quantitative and qualitative); economical, social, functional, etc. Main expected benefits *Give numbers, references based on reliable sources (academic studies, EU reports, etc).*
PRIORITY	Why is this priority for you? Would you buy that solution? Would you buy such solution in the short-term; medium-term; long-term *Give numbers, references based on reliable sources (academic studies, EU reports, etc).*

SPECIF NEED #2	Title E.g.: Increase patient use of IT *Remember to rename the titles of the needs so as to make them sounder/ attractive*
CONTEXT/BACKGROUND	Description of the problem/need from various perspectives: quantitative and qualitative (depending on the need). E.g.: functional, social, economical, etc. *Give numbers, references based on reliable sources (academic studies, EU reports, etc).*
STATE OF THE ART / MARKET PRELIMINARY ANALYSIS	Solutions available in the market. Explain why an innovative solution is needed. Supplier's perspective gathered in Liverpool´s Workshop. *Give numbers, references based on reliable sources (academic studies, EU reports, etc).*
BENEFITS/IMPACTS	How the innovative solution is expected to improve the state of the art from various perspectives (quantitative and qualitative); economical, social, functional, etc. Main expected benefits *Give numbers, references based on reliable sources (academic studies, EU reports, etc).*
PRIORITY	Why is this priority for you? Would you buy that solution? Would you buy such solution in the

	short-term; medium-term; long-term *Give numbers, references based on reliable sources (academic studies, EU reports, etc).*

NOTE: For the additional 5 unmet needs repeat the same structure.

Recommendations

- Be **concise** and at the same time present a **robust and solid reasoning** and description of the unmet need.
- Remember to **rename the titles of the needs** so as to make them sounder and **more attractive to the EC!**
- **Give evidences**; data, numbers, population affected, etc to justify the problem /need. You will see more examples in the template document. We need to show that the problem has enough dimensions so as to be included in our Joint Statement Document of Unmet Needs (replicability).
- Underscore that **innovation is required to meet the unmet need**. Explain why innovation is needed: breakthrough with respect of the state of the art; "current solutions in the market do not meet your need".
- Since this will be one of the two main outcomes of a two year project, **ensure proper quality in content and format.**

SUMMARY OF UNMET NEEDS AND RESPONSIBLE PARTERS

#	JOINT STATEMENT UNMET NEEDS (PROPOSER)		RESPONSIBLE
1	Priority Area	**Patient empowerment solutions** (SAS)	ZEALCO
	Specific Needs	Telemedicine, Teleconsultation, Telediagnosis (SU)	
		Increase Patient Use of IT (ZEALCO)	
2	Priority Area	**Management of diseases** (SAS)	SAS
	Specific Needs	Platform for chronics (SAS)	
		Mirror therapy programme for face neurological rehabilitation (SERMAS)	
3	Priority Area	**Extract and exploit data within the Electronic Health Records (Integration; Big data)** (SAS)	SAS
	Specific Needs	Implantable pacemakers and defibrillators remote monitoring integrated system (SERMAS)	
		Improve timeframe for diagnosis (SU)	
		A solution that supports decision making process based on real time data (ZEALCO)	
		Maternal-fetal integrated monitoring system used during labour (SERMAS)	
4	Priority Area	**Real time tracking and exploitation for optimisation of resources and processes (patients, equipment,...)** (SERMAS / SU)	SU
	Specific Needs	Surgical Sponges tracking (SERMAS)	
5	Priority Area	**Clinical imaging advanced processing solution oriented to research and development (SERMAS)**	SERMAS
	Specific Needs	Smart and mobile transducer for brain evaluation and ultrasound application (SERMAS)	
		Imaging diagnosis and data storage (SAS)	
6	Priority Area	**Improve Health Social innovation** (ZEALCO)	ZEALCO
	Specific Needs	Reduce inequalities in healthcare delivery (ZEALCO)	
		Transformation of medical professionals from treatment providers to mediators of knowledge (ZEALCO)	

14 REFERENCES

[1] EPP-eHealth "Synthesis of Unmet Needs Report", OPTIMAT, March 2016.

[2] EPP-eHealth "Co-creation workshops outcome report", EPP-eHealth consortium, November 2016.

[3] EPP-eHealth "Priority Unmet Needs report", EPP-eHealth consortium, November 2016.