Platform for Innovation of Procurement
and Procurement of Innovation

**Deliverable 5.1
A digital challenge identified –
building capabilities of the PIPPI CoP and
identifying digital challenges**
<span style="color:red">**Updated /Revised 2020-12-15**</span>

# PiPPi

**Horizon 2020GA project No 826157**



Platform for Innovation of Procurement
and Procurement of Innovation



European
Commission

Horizon 2020
European Union funding
for Research & Innovation

# Content

## Covid-19 impact on identification of digital challenges

The effects of the pandemic have impacted the work leading up to the selection of initial digital challenges in different ways. The pandemic has clearly shifted both short term as well as potential long-term focus, priorities and strategies of the PIPPI partners. This has had impact on the availability of clinical staff as well as technical, support and research staff to participate and fully engage in discussions and decision making with regards to identification and selection of digital challenges. As well as potentially effecting which challenges would be of most interest to pursue going forward. The work has led to the identification of three challenges which will be prioritized going forward, but with the awareness that further detailing of the challenges and possible future formal cross-border sign-off may depend on the defined unmet need to align to the overarching needs and strategies of the partners with respect to the current pandemic.

## List of Abbreviations

CoP – Community of practice

D – Deliverable

EUHA – European University Hospital Alliance

GA – Grant Agreement

H2020 – Horizon 2020

HCP – Healthcare provider

PCP- Pre-Commercial Procurement

PIPPI – Platform for Innovation of Procurement and Procurement of Innovation

PPI - Public Procurement of Innovation

PREM – Patient reported experience measures

PROM – Patient reported outcome measures

RFI – Request for information

T - Task

WP - Work Package

## Background – Objective of WP5 and D5.1

The main objective of WP5 is to perform a feasibility study and preparation of a cross-border PCP or PPI that will tackle digital challenges for clinical use. This will be based on the needs in ongoing projects and programs at the university hospitals in the consortium, EUHA and the outcome of parallel WPs, for example WP2, 3 and 4. The PIPPI consortium has the opportunity to follow the work, based

on ten university hospitals' experience and needs, as well as with input from industry and healthcare payers' representatives. The first two Tasks in this WP will build the knowledge necessary for the feasibility study and preparation performed in Task 5.3. Through this experience and programs PIPPI and partners will pilot the results of the project and base an eventual post-project PCP or PPI on real healthcare and patient needs and data. Specifically, the D5.1 will summarize the activities leading up to **'An identified digital challenge for a specific healthcare and patient need'**, which then will be further explored within the specific tasks within the WP5 and the within the Community of Practice (CoP).

In the PiPPi CoP our aim is to build the ability to continuously share, formulate and prepare challenges addressing common clinical unmet needs that could be addressed using digital healthcare solutions.
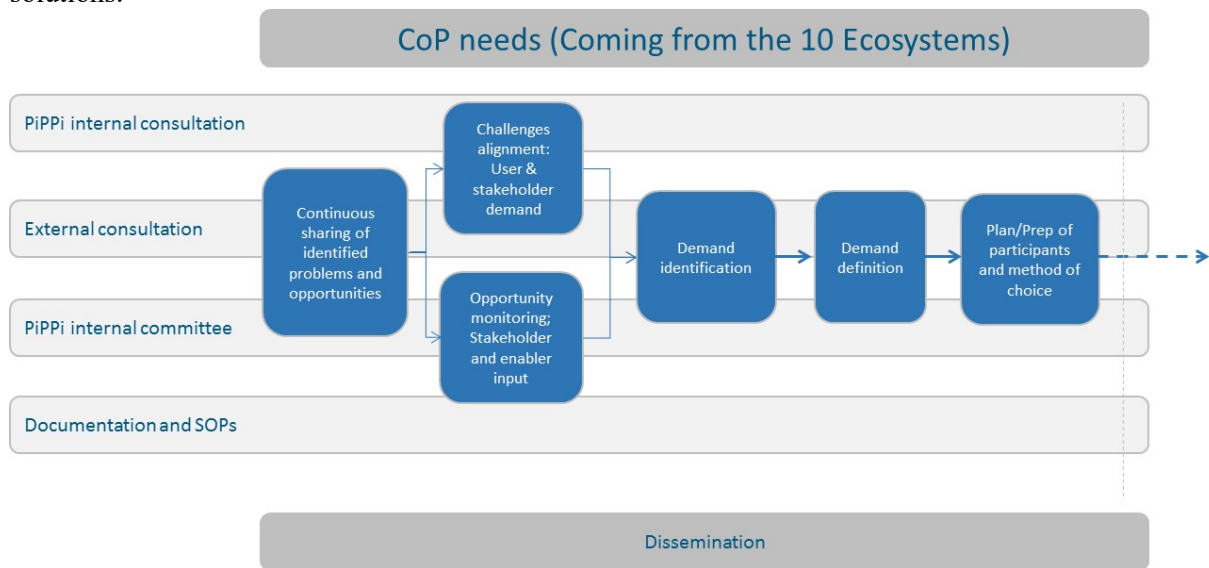


*Fig 2. Main PiPPi CoP process*

The work of the WP5 supports the overall building of the CoP at the same time iteratively testing the CoP by preparing a pilot in the form of a cross- border PCP/PPI. The first step is to identify a cross-border challenge based on unmet need.

To achieve this, there have been three main activities:

A. Identification and mapping of the **current processes for identification of unmet needs** at all partner sites today in order to harmonize understanding of terminology and process(es) in relation to our CoP.
B. **Identifying the current digital unmet needs** within the PiPPi partners, other hospitals of the European University Hospital Alliance (EUHA) that are not part of PIPPI and a sample of the ERNs.
C. **Leveraging digital challenge analysis** from other international bodies, to serve as input, verification and validation in the continuous work.

## Process mapping at each site

Each PIPPI partner has mapped their regular approach to identify current challenges and unmet needs in their respective organization. The following analyses and conclusions have been made on the local current processes and the direct and indirect impacts on the interaction with the coming CoP.

- Limited current methods and knowledge to distinguish unmet needs suitable for PCP/PPI
- Unmet needs are generally identified and captured by ad-hoc processes and driven by devoted champions
- Capture of problems and unmet needs (detailed into demand) is often intertangled – not a demand description with clear commonalities
- Local language – needs are formulated in local language, need of translation
- Local templates/tools – level and content of captured details and components vary significantly

Local settings in respective healthcare provider (HCP) organizations that have more of an indirect bearing on interaction with PiPPi CoP. These aspects will be continuously re-visited to gain further understanding in relation to the CoP and its functionalities:

- Organizational: hierarchal/decision making structure, flexibility/change management, accessibility to process/knowledge base/input, policies and politics
- Matching possibilities internally; might add unmet needs into CoP that are actually met elsewhere; within/outside of the org
- Capturing of problems/challenges in the organization are due to internal time constraints, structure and visibility, among other reasons
- Local/personal incentives and information of availability of suitable of solutions

From this work and analysis, it is clear that the work of the WP5 will be of great importance. To drive a common pilot all the way from identified cross-border challenges towards a possible post-PIPPI PCP/PPI, will effectively highlight hurdles and complexities as well as stimulate the building of *common* processes forming the CoP.

## Digital challenges – identification and common grounds

An initial list of about 20 digital challenges have been identified, some of which are described in detail and others more high-level (see appendix for the more detailed challenges). In most cases these challenges were identified by a non-formalized ad-hoc process within each PIPPI partner, as described in the section above. Most often specific internal stakeholder groups and specific clinical teams were approached where there was already on-going collaborations and networks both internal and cross-border were assessed.

From these identified challenges we have identified several common grounds. Some of the most significant to be identified being interoperability, aggregation of data and patient

empowerment. Interoperability as an example has been further detailed in sub-components; foundational, structural, semantic and organizational aspects.

| Digital Challenge | | Site | Interoperability | | | | | Data need | | | | Patient empowerment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Id | | | Overall interoperability | Foundational: how to communicate | Structural: defines the format, syntax, and organization of (meta)data | Semantic: coding vocabularies (SNOMED, LOINC) | Organizational: governance, policy, social, legal and organizational considerations | Overall data need | Collection (entry and gathering) | Sharing (for exsample local, national, international) | Using | |
| 1 | Providing a mobile-first digital check in (real- time clinic wait time info for patients) | King's | H | M | - | H | - | M | | | | |
| 2 | Digital software that provides 'real time availability' of recourses for outpatient scheduling of appointment | King's | H | H | - | - | - | M | | | | M |
| 3 | Creating an app that reduces need for face-to-face follow-up appointments | King's | H | M | H | M | M | M | | | | M |
| 4 | Adherence to medication in chronic and poli-medicated patients | VH | M | - | M | - | - | L | | | | H |
| 5 | Automatic registration of data | VH | M | | | | | M | | | | L |
| 6 | Digitalization and standardization of therapeutic patient education | VH | M | - | - | M | M | M | | | | H |
| 7 | Interoperability; Foundational, structural, Semantic and Organizational | Erasmus | H | | H | H | M | | | | | - |
| 8 | Aggregation of data to be able to increase the power and work on AI | Erasmus | | | | | | H | | | | - |
| 9 | Empowerment of patients | Erasmus | | | | | | | | | | H |
| 10 | Integration of PROMs into electronic data capture and clinical practice/pathways; accessibility of data for patient at anytime and anywhere | MUW | H | H | | | H | H | M | H | H | H |
| 11 | AKIM Revitalization, integration of routine care and research IT systems and integration of data of other healthcare providers that take over the treatment from MUW/AKH (including long-term follow up) | MUW | H | M | H | H | | H | H | H | | M |
| 12 | Patient recruitment for clinical studies and other types of clinical research; conceptualization and set up of a clinical studies registry and research data repository | MUW | H | H | M | M | H | H | H | H | M | M |
| 13 | LIVE INCITE – minimize the perioperative complications due to risk lifestyle behaviors. | K | | H | H | H | M | H | H | M | L | H |
| 14 | International Telemedicine consultation - to a need to be able cooperate with caregivers across borders around individual patients. This cooperation could be medical second opinion, multidisciplinary meetings, referral of patients to highly specialized care, preparation and follow up of referred patients, conferences or seminars around specific topics, training, research | K | H | H | M | H | H | H | L | H | H | L |
| 15 | PROM at K - improve the match between the individual patient and the treatment path there is a need to collect PROM and make the result available in the clinical care. There is also a difficulty to get patients to answer PROM due to the lack of direct incentive to do it as the PROMs are not used in the care. | K | H | H | L | H | H | L | M | | M | H |
| 16 | Minimizing complication & mortality in the surgical process. ….Need support for patients in the peri operative process to stop negative risk behaviors… within and outside of the hospital environment.. | HUS | | | | | | | | | | |
| 17 | Need for a (digital) tool that provides information for | HUS | | | | | | | | | | |
| | Ø number and acuteness of patients coming to elective | | | | | | | | | | | |
| | Ø capacity of acute care and bed places in the given | | | | | | | | | | | |
| 18 | Better flow of information between primary and secondary healthcare | HUS | | | | | | | | | | |
| 19 | Platform to collect PROMs & PREMs from patients | OSR | M | | M | H | H | M | | H | M | M |
| 20 | Ability to identify relevant patients and to be able to share patient data to enable multidisciplinary virtual advisory boards that can review patients diagnosis and treatment | ERN Rotterdam | H | H | H | H | H | H | L | H | H | L |

*Table 1. Identified challenges, with further detailing of the initial common grounds of interoperability, aggregation of data and patient empowerment. (see Appendix for more detailed descriptions for selected Challenges)*

As mentioned, the local processes, type and level of identification and language varies greatly. We have therefore developed a template to capture the challenges and potentially unmet needs. The sections in the template are meant to be re-viewed continuously during the

CoP main process and are therefore also expected to be more detailed as it progresses.

We have a first draft template to support the process of identifying common grounds and unmet needs; currently and on a continuous base. See first template draft below.
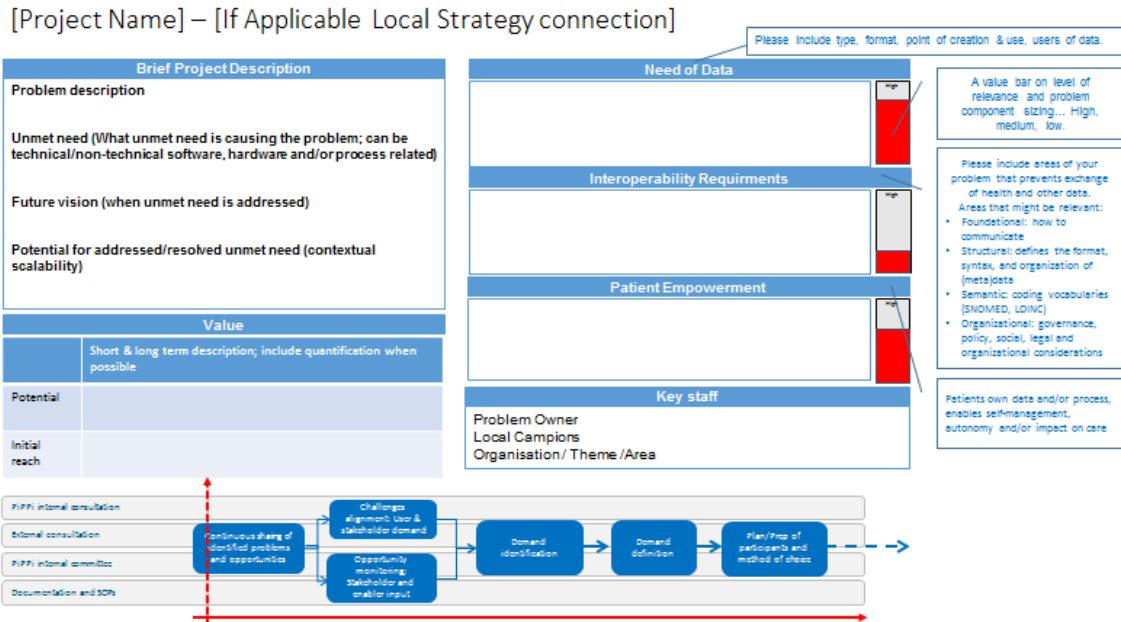


*Fig 2 First template draft of a one-page summary for unmet needs to be iterated and updated at each step in the PiPPi CoP process*

During the identification of common grounds, a growing realization of the need of identifying, formulating and defining how the value, or lack of value, is represented in all common grounds. This can also be closely related to value-based care components.  To be further detailed and developed, initially identified areas are:

1. Resource-related
   a. Time limitations; clinical staff's availability
   b. Knowledge limitations; limited training, expertise and/or understanding of processes
   c. Limited strategic planning; allocation of time, resources and monetary funds
   d. Ability to scale (process and resource utilization)
2. Patient focus
   a. Personalized/individualized care
   b. Empowerment (with/without autonomy)
   c. Home care
3. Data
   a. Aggregate data (as in current draft template: collection, sharing and using data)
   b. Data quality
   c. Unstructured data/Free text

    d. Federated versus centralized analyses
    e. Methods for visualizing data for clinicians?

This part of the analysis will also be further aligned with the work being done identifying outcome indicators as reported in D5.4.

## Initial clusters

During this first phase of identification of a cross-border unmet need a few clusters have been detected: outpatient/home care, patient communication, and cross-organization and -discipline interaction.

Several unmet needs at this point related to PROM & PREM – collection, sharing, using PROM & PREM input becoming an integrated part of and impacting the care process.

## Assessment and selection of initial challenges

During the next step the WP5 team considered how, in the most appropriate way, to be able to select the most relevant cross-border digital challenges to move forward in the process. The team decided on a set of fundamental questions to consider for each challenge, as a first filter and captured in a table, see below (these questions were also included in the updated on-pager, see below). Worth noting is that even if it would not be possible to give an absolute answer to the questions at this stage, and that the answers would come as part of later stages of the process, it would be valuable to considering from the beginning:

- Is the Challenge applicable to multiple partners (including cross-border)?
- Has market survey/interaction been carried out (formal request for information, RFI, other means)?
- The Challenge can be addressed by solutions already available on the market? ('direct buy')
- Is there no solution on the market and is there an interest to stimulate development and testing of new solutions? (PCP) (https://ec.europa.eu/digital-single-market/en/pre-commercial-procurement)
- Are developments relevant to the identified Challenge on-going but no solution is currently available on the market? (PPI) (https://ec.europa.eu/digital-single-market/en/public-procurement-innovative-solutions)

The initial assessment from this exercise was discussed with the PIPPI core team and summarized:

1. *Most of the Challenges describes 'local' rather than 'cross-border with some potential for scalability.*
2. *Understanding of the market is lacking in most cases (which is expected at this stage)*

3. *Most of the Challenges are initially considered to not have PCP potential*
4. *Most of the Challenges are initially considered to have potential for PPI or 'direct buy'*
5. *It is possible to cluster challenges (as initially done)*
6. *There is a strong general theme: Technical and data Interoperability (integration and standardization)*

| Id | DIGITAL CHALLENGE | Site | INITIAL ASSESSMENT | | | | |
|---|---|---|---|---|---|---|---|
| | | | Cross-border potential? | Market understanding? | Direct buy? | PCP? | PPI? |
| 1 | Providing a mobile-first digital check in (real- time clinic wait time info for patients) | King's | Common 'process' need? Generic functionalities-platform which can be tailored to multiple pippi-partners? | Karolinska / Stockholm coundty has developed an APP with similar functions for 'AlltidÖppet'. | Can most likely be developed by market if functional-requirements can be specified | Many market actors work on process-tools | Maybe if more complex generic/adaptable platform for multiple pippi-partners - 'co-develpment' needed |
| 2 | Digital software that provides 'real time availability' of recourses for outpatient scheduling of appointment (Process) | King's | Common 'process' need? Generic functionalities-platform which can be tailored to multiple pippi-partners? | Stockholm region has App for booking of primary care | Can most likely be developed by market if functional-requirements can be specified | Many market actors work on process-tools | Maybe if more complex generic/adaptable platform for multiple pippi-partners - 'co-develpment' needed |
| 3 | Creating an app that reduces need for face-to-face follow-up appointments (digital care for chronic / Long term conditions LTC)) | King's | Yes, international standards for LTC-PROM? Generic platform which can be tailored to specific PIPPI-partner context? | Fast development within digital care. Exist (at least partly) for example diabetes. | Can most likely be developed by market if functional-requirements can be specified | Many actors provide remote digital solutions? | Maybe if more complex generic/adaptable platform for multiple pippi-partners - 'co-develpment' needed |
| 4 | Adherence to medication in chronic and poli-medicated patients (digital care) | VH | Yes, specific integratins for each site or Generic platform which can be tailored to specific PIPPi-partner context? | LiveIncite, diabetes apps? | Potentially or PPI co-development | Developments most likely on-going. Pharma companies are working on this together with tech companies, tools already available | Maybe need for co-development engagement from HC to develop suitable solution |
| 5 | Automatic registration of data real-time (systems integration) | VH | Generic problem, specific to each location and its system-ecosystem, is it possible to envision a 'generic' systems-integration platform to be used for integration of any systems at any pippi-partner? | Systems-integration-platform which integrate data from multiple vendors, rather than a sole vendor providing the complete system? standards vs propritary solution | Not off the shelf, need close collaboration, se PPI potential | On-going developments, examples of solutions | Need close collaboration between company and HC, and all other vendors to make sure integration is allowed (with proprietary solutions?) and that processes are integrated in a relevant manner. |
| 6 | Digitalization and standardization of therapeutic patient education | VH | Generic problem, specific to each partner-HC system and language, is it possible to envision a 'generic' systems-integration platform to be used for integration of any systems at any pippi-partner? | Lots of patient information in paper-form available, Karolinska 'child-cancer -app' is a digital example, lots of apps available | Need customisation at each partner-site, generic platforms available which can be customiz at specific sites? | Ongoing projects that can be scaled. | Maybe, but mainly for iterating requirements |
| 7 | Interoperability; Foundational, structural, Semantic and Organizational | Erasmus | Needs to be driven across border to gain market acceptance | Probably needs to be lead by non profit organizations defining standards. Ongoing activities. Can PiPPi support in driving the area | Standards becoming better and mature enough for market to implement. | | |
| 8 | Aggregation of data to be able to increase the power and work on AI | Erasmus | Yes, aggregating and sharing data is a cross border activity | Needs to be driven by cargivers that own the data to avoid lock in to proppriatory solutions | Partly existing? | Question. Would a larger community preferably drive a PCP in order to drive the general acceptance? | I think it is good oppurtunity for PPI. However, what is the level of maturity? |
| 9 | Empowerment of patients | Erasmus | Generic problem, specific to each location. Cultural differences? | | | | |
| 10 | Integration of PROMs into electronic data capture and clinical practice/pathways; accessibility of data for patient at anytime and anywhere | MUW | Yes? specific integrations for each site or development of generic platform based on international standards which can be tailored to specific PiPPi-partner context? | Platforms available, generic application? | generic multi-sit/context platform need co-development activities ? | not suitable | Potential for PPI if generic mlti-site multi integration platform? |
| 11 | AKIM Revitalization, integration of routine care and research IT systems and integration of data of other healthcare providers that take over the treatment from MUW/AKH (including long-term follow up) | MUW | If not buying a completely new EHR, potential for generic systems integration platform? see #5. | | | | |
| 12 | Patient recruitment for clinical studies and other types of clinical research; conceptualization and set up of a clinical studies registry and research data repository | MUW | Yes, cross-border research data repository | Many on-going european projects in the field, and industry to provide solution | Global actors actors can provide infrastructure, acctoding to specified requirements. | not suitable | Maybe, but mainly for iterating requirements |
| 13 | LIVE INCITE – minimize the perioperative complications due to risk lifestyle behaviors. | K | Yes, same problem cross border but with local specifics due to different culture and healthcare organization/financing models. | Yes carried out as part of LiveIncite project | Solutions are available for private use but not for professional health care. | | |
| 14 | International Telemedicine consultation - to a need to be able cooperate with caregivers across borders around individual patients. This cooperation could be medical second opinion, multidisciplinary meetings, referral of patients to highly specialized care, preparation and follow up of referred patients, conferences or seminars around specific topics, training, research | K | Yes | On-going european projects for sharing patient-data, ex ERN, technology available, focus on integration and security? Lacking standards risks vendor lock in. | Needs engagement of all actors, not off the shelf? | not suitable | Need close collaboration between company and HC, and all other vendors to make sure integration is allowed (with proprietary solutions?) and that processes are integrated in a relevant manner. |
| 15 | PROM at K - improve the match between the individual patient and the treatment path there is a need to collect PROM and make the result available in the clinical care. There is also a difficulty to get patients to answer PROM due to the lack of direct incentive to do it as the PROMs are not used in the care. | K | Yes? specific integrations for each site or development of generic platform based on international standards which can be tailored to specific PIPPI-partner context? | Platforms available, generic application? | Generic multi-sit/context platform need co-development activities ? | not suitable | Potential for ppi if generic mlti-site multi integration platform? |
| 16 | Minimizing complication & mortality in the surgical process. ….Need support for patients in the peri operative process to stop negative risk behaviors… within and outside of the hospital environment.. | HUS | Yes, same problem cross border but with local specifics due to different culture and healthcare organization/financing models. | Yes carried out as part of LiveIncite project | Solutions are available for private use but not for professional health care. | | |
| 17.1 | Need for a (digital) tool that provides information for planning purposes on; number and acuteness of patients coming to elective (not urgent) surgery | HUS | Common 'process' need? To specific for cross-border? or potentially generic functionalities-platform which can be tailored to multiple pippi-partners? | Does any pippi partner have this installed already? | Can most likely be developed by market if functional-requirements can be specified | Many market actors work on process-tools | Maybe if more complex generic/adaptable platform for multiple pippi-partners - 'co-develpment' needed |
| 17.2 | Need for a (digital) tool that provides information for planning purposes on; capacity of acute care and bed places in the given moment and a few days ahead (for patient-flow planning purposes) | HUS | Common 'process' need? To specific for cross-border? or potentially generic functionalities-platform which can be tailored to multiple pippi-partners? | Does any pippi partner have this installed already? | Can most likely be developed by market if functional-requirements can be specified | Many market actors work on process-tools | Maybe if more complex generic/adaptable platform for multiple pippi-partners - 'co-develpment' needed |
| 18 | Better flow of information between primary and secondary healthcare (avoid that referrals are missing) | HUS | Dependent on contry-specific/region-specific HC system, in it possible to find generic common ground? Also a problem for international referrals that are expected to become morecommon in the future. | | | | |
| 19 | Platform to collect PROMs & PREMs from patients | OSR | Yes? specific integrations for each site or development of generic platform based on international standards which can be tailored to specific PiPPi-partner context? | Platforms are available, generic application? | Generic multi-sit/context platform need co-development activities ? | not suitable | Potential for PPI if generic mlti-site multi integration platform? |
| 20 | Ability to identify relevant patients and to be able to share patient data to enable multidisciplinary virtual advisory boards that can review patients diagnosis and treatment | ERN Rotterdam | Generic problem that requires specific locals solutions due to local systems used. | | | | |

*Table 2: Initial list of challenges and initial assessment.*

In addition to the above table a visual model description was created to support further understanding and discussions of the more fundamental general interactions/connections between the challenges and also to highlight external initiatives where PIPPI partners are engaged addressing overlapping challenges.
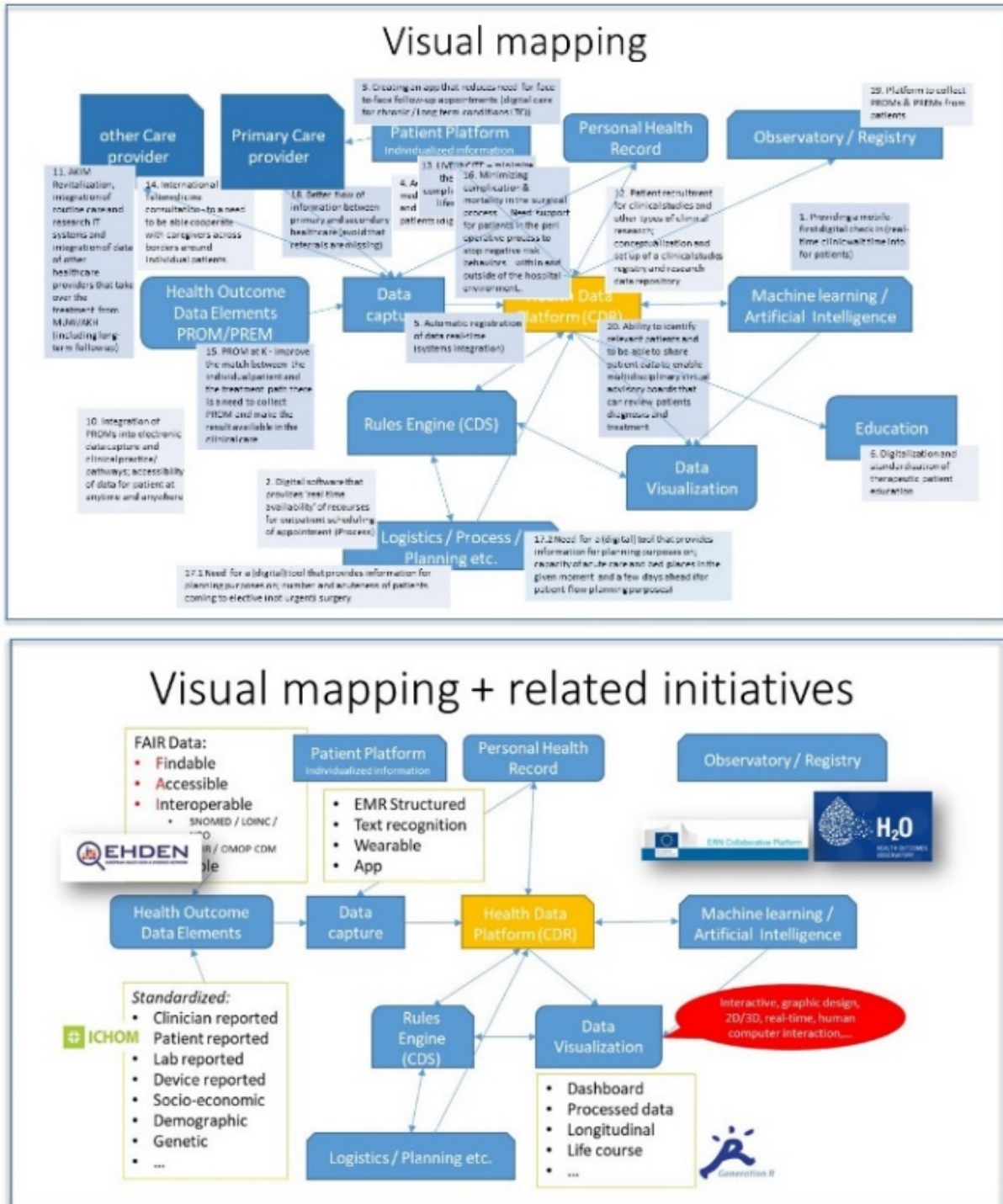


*Fig 3: Visual mapping of challenges including related initiatives.*

From these combined analyses of the individual challenges, their interactions/connections and related initiatives, three digital challenges were prioritized, which capture general high-level challenges relating to as described above *interoperability, integration and standardization, but also visualization* and remote *monitoring and detection* of clinical data. Important for the analysis was also to consider related initiatives which have been initiated between PIPPI partners to address some of these challenges, like the recently started IMI-project H2O (health outcomes observatories. https://www.imi.europa.eu/projects-results/project-factsheets/h2o) which focus on clinical data and PROM/PREM, as well as wearables. Data collection and standardization for patient care, drug monitoring and research. The IT-architecture (federated data) and data governance is very much in line with the recently issued European Data Governance Act. Next to H2O the EUHA hospitals collaborate on the development of a common IT architecture and data standardization (EHDEN project) in a digital network. The awareness that healthcare organizations need to be real data stewards and become more independent of commercial IT vendors becomes more and more prominent. To achieve this, this means that healthcare organizations need to be more pro-active and mature in their procurements of digital infrastructures. These Challenges were captured in the up-dated one pager, which give an initial high-level description of the Challenges:



## Challenge 1: Standardised Health Data Integration platform

| Standardised Health Data Integration platform | Brief Project Description | Initial assessment Cross border, PPI or PCP | Y/N/ Don't know |
|---|---|---|---|
| **Challenge (/un-met need) description:** Patient data is stored in a multitude of applications that each store data in a proprietary format creating data silos that make it difficult to aggregate data and fragmentizes the view of a patient. This also makes it difficult to develop new applications or use data in research as access to data is controlled by vendors. To break out of this vendor lock in it is necessary to have all diagnostic data stored in uniform and standardized format at one (near) real time open (FAIR) data platform (clinical data repository / data lake / ___ ) according to a globally accepted data model, most likely being OMOP Common Data Model. The data integration platform would be application agnostic and as such provide a basis for example generic EHR systems or specialized applications focused on a specific medical specialty/application. The specification of the platform should be standardized so that any vendor could potentially build and market such a platform creating a market with competing products that all can act as data platform for any clinical medical/health application. | | Is the Challenge applicable to multiple partners (cross-boarder)? | Y |
| | | Has market survey/interaction been carried out (RFI, other means)? | N |
| **Champion/Owner:** Contact at Erasmus: Jan Hazelzet | | The Challenge can be addressed by solutions already available on the market? (direct buy) | N |
| **Target stakeholder / beneficiary** Clinicians, Patients, HC and society | | Developments relevant to identified Challenge are on-going but no solution is currently available on the market? (PPI) https://ec.europa.eu/digital-single-market/en/public-procurement-innovative-solutions | Y |
| **On-going and network:** At Erasmus there is a project together with the Technical University Delft which is called 'Consultation Room in 2030'. Build on concrete and collaborated 'H2O', 'Patients' and 'EHDEN' projects and proposals. | | No solution on the market and there is an interest to stimulate development and testing of new solutions (PCP) https://ec.europa.eu/digital-single-market/en/pre-commercial-procurement | n/N? |

| | Estimated Values / Outcomes | Boundary conditions Analysis & Categorization | L/M /H |
|---|---|---|---|
| Estimated Values Baseline vs Future | Higher quality of care and more costs efficient care | Interoperability | H |
| Proposed outcome measurements | Use outcome list from Deliverable D5.4 | Data | H |
| | | Patient empowerment – lack of | L |
| | | Other? Industry? | |

## Challenge 2: Flexible visualization of aggregated diagnostic patient data
*(for Breast and Prostate Cancer and Transplantation? To be discussed)*

| Visualization of aggregated diagnostic patient data | **Brief Project Description** |
|---|---|
| **Challenge (un-met need) description:** At this moment in clinical practice, the amount of data present for a single patient is becoming more and more cognitively problematic to digest for clinicians. In order to visualize all this different data (clinical, PROMS, wearables, imaging, laboratory, pathology, genetic, social, environmental...) not only cross-sectional, but also longitudinal. We need to be able to display patient data in a flexible way that allows different views of a patients data dependent on in what context it is used. The contexts could vary from a 1:1 meeting with a patient to a multidisciplinary conference to information displayed during a surgical operation and depend on what information is available in that particular organization. It should be possible to choose what information is included in a view/dashboard by selecting different visualization modules. We need different expertise to develop such a visualization to be of use in daily clinical practice. Besides the input of clinicians, patients and IT, we need digital transformation, (service) design, human–screen interaction, and visualization experts from for example the gaming industry and aviation. | |
| **Champion/Owner of need:** *Contact at Erasmus: Jan Hazelzet* | |
| **Target stakeholder / beneficiary** *Clinicians, Patients, HC and society* **On-going and network:** *At Erasmus there is a project together with the Technical University Delft which is called 'Consultation Room in 2030'. Build on concrete and collaboration around 'H2O', 'EHDEN' 'Patients' 'PIONEER' (IMI) projects and proposals.* | |

| Cross Border PPI or PCP initial assessment | Y / N / Don't know |
|---|---|
| Is the Challenge applicable to multiple partners (cross-boarder)? | Y |
| Has market survey/interaction been carried out (RFI, other means)? | N |
| The Challenge can be addressed by solutions already available on the market? (direct buy) | N |
| Developments relevant to identified Challenge are on-going but no solution is currently available on the market? (PPI) https://ec.europa.eu/digital-single-market/en/public-procurement-innovative-solutions | Y |
| No solution on the market and there is an interest to stimulate development and testing of new solutions. (PCP) https://ec.europa.eu/digital-single-market/en/pre-commercial-procurement | Y/N? |

| | **Estimated Values / Outcomes** |
|---|---|
| Estimated Values Baseline vs Future | Higher quality of care and more costs efficient care |
| Proposed outcome measurements | Use outcome list from Deliverable D5.4 |

| Boundary conditions Analysis & Categorization | L / M / H |
|---|---|
| Interoperability | H |
| Data | H |
| Patient empowerment – lack of | L |
| Other? Industry? | |

## Challenge 3: Continuous monitoring and early detection of deterioration of patients along the care path – within as well as outside of the hospital

| [Project Name] | **Brief Project Description** |
|---|---|
| **Problem / Challenge / unmet need description** *Detection of early deterioration of patients with cardio-vascular/intensive care/infection/transplantation conditions is of great importance. There is a need for more advanced technical telemedicine solutions, including AI-decision support, for seamless and continuous monitoring and detection both along the whole care path – within as well as outside of the hospital.* | |
| *Health care at a distance and telemedicine is an area with a high potential; an area of high interest for Karolinska. Presently, we focus on remote monitoring, struggling with implementing basic solutions that work sufficiently enough today, but with a great potential for future improvements. One area for future improvements is decision support for earlier detection of deterioration, and one emerging technology of interest is AI or smart algorithms. Such improvements rely on a basic solution that can evolve over time with innovative solutions.* | |
| *Additional Challenges: Different health care systems, health care IT, reimbursement systems, regulations and legal issues; present remote monitoring system.* | |
| **Champion/Owner:** *Contact at Karolinska: Kristina Groth* *confirmed interest in the areas of intensive care and cardio vascular; and potentially of interest in the areas of infection/inflammation and transplantation* | |
| **Target stakeholder / beneficiary** *Patients, HC and society* **On-going and network:** *AI initiatives: EU project Nightingale, with an aim of additional funding for a multi-center study of the AI solution.* | |

| Cross Border PPI or PCP initial assessment | Y / N / Don't know |
|---|---|
| Is the Challenge applicable to multiple partners (cross-boarder)? | Y |
| Has market survey/interaction been carried out (RFI, other means)? | N |
| The Challenge can be addressed by solutions already available on the market? (direct buy) | N |
| Developments relevant to identified Challenge are on-going but no solution is currently available on the market? (PPI) https://ec.europa.eu/digital-single-market/en/public-procurement-innovative-solutions | Y |
| No solution on the market and there is an interest to stimulate development and testing of new solutions. (PCP) https://ec.europa.eu/digital-single-market/en/pre-commercial-procurement | Y/N? |

| | **Estimated Values / Outcomes** |
|---|---|
| Estimated Values Baseline vs Future | Higher quality of care and more costs efficient care |
| Proposed outcome measurements | See outcome list from Deliverable D5.4 – compare: HC cost, Patient outcome - mortality rate, complications, readmissions, less acute care, shorter hospital stay. |

| Boundary conditions Analysis & Categorization | L / M / H |
|---|---|
| Interoperability | H? |
| Data | H? |
| Patient empowerment – lack of | L? |
| Other? | ? |

*Fig 4: High level description of challenge 1-3.*

The PIPPI core-team discussed the challenges in a consensus meeting and agreed on their relevance. From the consensus meeting it was also emphasized that these challenges are complex, there are potential strong interdependencies between them and that at this stage, with the initial high-level description of the challenges, there would be a need to further detail the challenges in focused cross-border meetings. It was also evident that at this stage with this level of details it would be important to set the right expectations for the internal validation, and the level of commitment that could be expected from the partners. These considerations also would have strong bearing on the overall processes, addressed in the WP3, for bringing an identified challenge all the way through the CoP towards a detailed need ready for PPI/PCP. So, with all this taken into account the challenges were validated internally with

relevant stakeholders at respective PIPPI partner hospital. Validation thus meant answering three questions, to essentially express general interest in exploring the challenges in the context of the PIPPI CoP:

1. Is the challenge relevant to your organization?
   - Yes/No/Maybe?
   - Comments:
2. If Yes above: Would your organization be interesting in participate in a Webinar/Workshop in order to understand and develop this digital challenge?
3. Contact person(s) from your organization (name and role):

At the time of writing this report there were interest shown from relevant stakeholders within five of the PIPPI University Hospitals. This was a positive result especially since the timeline for responding collided with the second Covid-19 wave which made key stakeholder interaction and decision making more difficult for some partners. Most interest was shown for Challenge 3 (five interested) Challenge 2 (4-5 interested) and somewhat more uncertain interest for Challenge 1, with 2-3 hospitals showing interest. It was also stressed that there is especially an interdependency between Challenge 1 and 2 which may be considered going forward. In summary the project is satisfied with the outcome of this activity and feel that there is good potential to move these Challenges forward into the next stage of the project.

## Next steps

The WP5 will now continue with activities leading up to D5.2 and 5.3 in close interaction with the other WPs especially WP3, WP2, WP7. These activities will be focused on further detailing the challenges between the PIPPI partners, interactions with industry and payors as well as other stakeholder categories like academia and patient organizations. This input will also support the further understanding of weather these Challenges will encompass needs which are currently unmet as well as whether PCP or PPI would be the most relevant strategy to meet the need.

In addition, the project will also interact with the ICLEI Sustainable Procurement Platform Big Buyer initiative (https://sustainable-procurement.org/big-buyers/), which is a 'European Commission Initiative for promoting collaboration between big public buyers in implementing strategic public procurement for sustainable solutions.' which is establishing a new working groups to specifically focus on unmet needs in the healthcare sector. By engaging and introducing the identified challenges from the PIPPI project, there is potential to get further input on the selected challenges as well as potentially additional partners joining the possible future PPI/PCP.

# Appendix – One-pagers with digital challenges

**1** Providing a mobile-first digital check in experience and real-time clinic wait time information for patients (King's)

**Brief Project Description**

**Problem description**

King's sees 1.3 million outpatient attendances per year across five sites and outpatients is often the first point of contact with the hospital. Whilst patient feedback on the quality of clinical care is high, King's consistently scores poorly for the experience patients have while waiting to see a clinician – specifically, with regards to being informed of their wait times. Not knowing this information leaves patients in a heightened state of anxiety and leads to frustration about how to manage their expectations and time. King's has identified a need for focusing on quality improvements, relating to pre-clinician time in clinics, specifically around being informed of waiting times and improving the check in facility that we offer to our patients.

King's has identified the following unmet need:
- Check in kiosks and real-time waiting information displays to patients
- A check in facility that enables patients to 'arrive' themselves using their own smartphone and be able to receive real time updates on their mobile

**Unmet need (What unmet need is causing the problem; can be technical/non-technical software, hardware and/or process related)**
- Process: lack of standardization and compliance in clinic waiting areas. Patients should be notified of wait times on whiteboards or verbally by staff but audits determined this is not happening consistently and is difficult to enforce.
- Hardware/software: Lack of kiosks across areas for patients to check in and no screens to call them in and display wait times.
- Estates issues: growing demand on an already capacity-constrained estate is leading to more crowding in waiting areas. The mobile app will enable patients to wait anywhere, relieving pressure and not restricting patients to a confined area.

**Future vision (when unmet need is addressed)**
- Implementing one of the first mobile applications to outpatients offering virtual check in and the ability to update personal demographic information which will enhance both efficiency and patient experience
- Implementing a Call Forward system with real time wait information, notifying patients of when the clinician is ready to see them on their mobile phones and on screens in clinic so they are able to plan their visit and take comfort breaks without fear of missing the clinician calling them. This will address the considerable feedback from patients about lack of information on waiting times in clinic

**Potential for addressed/resolved unmet need (contextual scalability)**
Can be scaled to other sites and areas across King's College Hospital. Additional modules for the system could also be considered in the future (all subject to additional funding), such as those which automatically outcome and 'cash up' appointments.

| Value | |
|---|---|
| | **Short & long term description; include quantification when possible** |
| Potential | Improved patient experience; improved productivity (improves patient flow); improved decision making (greater insight to demand and capacity). |
| Initial reach | The initial scope will see expansion to 6 areas across three sites, reaching 26% of all outpatient attendances. |
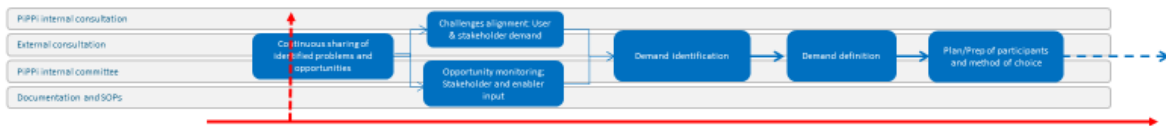


**2** Introducing a digital softward that provides 'real time availability' and transparency of resources for Outpatient scheduling of appointments.(King's)

**Brief Project Description**

**Problem description**
King's sees over 1.3 million outpatient attendances per year across five sites, and faces ongoing challenges regarding demand and capacity issues for its Outpatient services. There is growing pressure on the hospital being able to meet national standards for treating patients within the appropriate referral time for treatment.

This emphases the importance of finding ways to moderate demand and to make sure patients are treated quickly and efficiently once they are on our pathway.

King's has identified a need for improving ways that will help improve the scheduling of our Outpatient resources. At present King's lacks central control of managing clinic room availability for its Outpatient clinics, with no real transparency of how effective we are at managing our room utilization and resources.
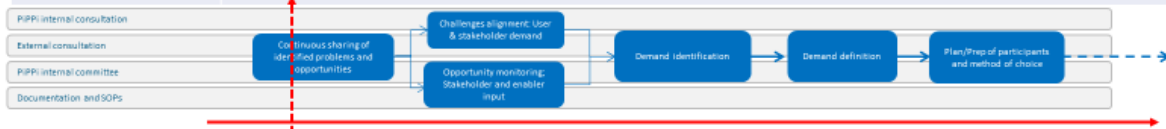
**Unmet need (What unmet need is causing the problem; can be technical/non-technical software, hardware and/or process related)**
No real time availability of clinic room resource across the hospital (e.g. clinic rooms).
No central process and control for managing outpatient clinic utilization across the hospital.

**Future vision (when unmet need is addressed)**
A digital software scheduling system that will allow users to easily visualize room resources and to manage the bookings of clinics and consultation rooms at a click of a button. This will allow King's to maximize the resource utilization centrally, and provide transparency across the hospital. The system will provide a streamlined process of how Outpatient departments are managed across the hospital.

**Potential for addressed/resolved unmet need (contextual scalability)**
The digital software is not limited to Outpatients scheduling, but can also be used to schedule other resources within the hospital, such as training and meeting room booking and enable real-time room booking across the hospital.

| Value | |
|---|---|
| | **Short & long term description; include quantification when possible** |
| Potential | The ability to manage other resources such as training and meeting room booking as well as clinician rota management. |
| Initial reach | All Outpatient areas across all King's sites. |

Platform for Innovation of Procurement and Procurement of Innovation

European Commission

Horizon 2020
European Union funding
for Research & Innovation

**3** Creating an app that reduces the need for face-to-face follow up appointments, in order to improve patient experience and utilize staff capacity better (King's)
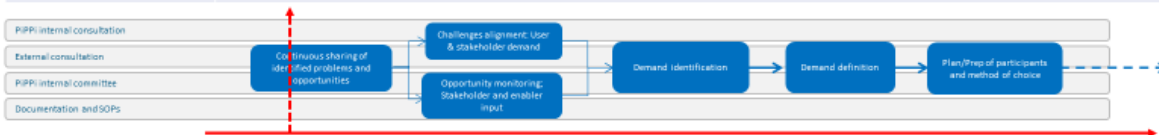
### Brief Project Description

**Problem description**

One of the biggest issues facing healthcare providers is that the number of people living with long-term conditions (LTCs) is rising, as is those with multiple LTCs. Inflammatory Bowel Disease (IBD) is an exemplar for long term conditions, requiring frequent routine appointments, an ongoing testing regimen and costly pharmacological intervention. Moreover, sufferers from Crohn's or Ulcerative Colitis are often young and can find that their condition leads to a significant reduction in quality of life.

King's has identified the following unmet need:
- Need to redesign the existing outpatient model as it creates *low or no-value add* routine face-to-face follow up appointments for IBD patients, scheduled on an arbitrary quarterly basis owing to an historic model of seeing outpatients
- Reducing the time newly referred ('New') patients wait for an IBD appointment
- Need to collect and collate patient-reported outcome measure (PROM) remotely and in real-time, allowing clinicians to monitor patient status and intervene as required
- Improve communication channels between patients and clinicians, which in their current state do not work well for patients or staff (e.g. difficulty for patients to get through, 'office hour' phone times that do not optimally use staff time and do not always suit patients, etc.)

**Unmet need (What unmet need is causing the problem; can be technical/non-technical software, hardware and/or process related)**
- Process re-structuring in order to increase value and reduce waiting time
- PROM collection that is used to inform clinical decision making
- Communication ability & accessibility between patients and clinicians (i.e. asynchronous messaging / email)

**Future vision (when unmet need is addressed)**
Implementing an app to IBD patients, offering patients a convenient digital touchpoint for their treatment, facilitating easy access to information (including their care plan, PROM/PREM collation, and self-management content); and digital contact with hospital staff.

**Potential for addressed/resolved unmet need (contextual scalability)**
Can be scaled to other long-term conditions at King's College Hospital, as well as to other hospitals (from a regional level, such as south London, to potential for international scaling).

### Value

| | Short & long term description; include quantification when possible |
|---|---|
| Potential | Reduce low/no-value add F2F appointments. Convert existing follow up slots to News, in order to reduce wait list. Estimates from initial modelling demonstrate that with just a 33% uptake rate of the app, 631 New appointments could be generated which would almost entirely address those patients breaching the 18 week 'referral to treatment' target. Improvements in patient experience would also follow, as well as wider system savings by using existing resources more effectively. |
| Initial reach | The problem is most evident in IBD patients, who typically have 4 face-to-face follow up appointments annually. There are 2,200 IBD patients at King's. |



**4** Adherence to medication in chronic and polimedicated patients (VdH)

### Brief Project Description

**Problem description**

Nowadays, chronic pathologies represent 80% of medical demands. Moreover, medication non-adherence is major problem, particularly in chronic diseases such as cardiovascular (CVD) or respiratory disease. Adherence or compliance is defined as the extent to which a patient acts in accordance with the prescribed interval and dose of a dosing regimen.
Non-adherent patients represent a multi-factorial challenge. 5 key factors are being analyzed regarding drug adherence: socioeconomic factors, healthcare system related factors, medical condition related factor, therapy related factor and patient-related factors
All this factors, allow us to realize the complexity of the challenge. However, it has been shown several aspects in which digital solutions can help. A better patient-physician relationship, early follow-up visits after discharge and physician continuity has been highly related to adherence to medications and had significant effect on outcomes (Vanboven et al. 2014). Furthermore, a better understanding by the patient of the disease, the risks and the effects of the treatment has also been linked to a better adherence. All these latter aspects, can be addressed by therapeutic patient education (see challenge 3). Finally, digital interventions has been shown to be helpful for patients living with chronic diseases, but further studies are needed to assess the outcomes of personalized mhealth interventions toward the optimal management of this diseases.

**Unmet need (What unmet need is causing the problem; can be technical/non-technical software, hardware and/or process related)**
There are several unmet needs. Firstly, the need to improve patient self-awareness and empowerment, which is related to a better relationship between patient and healthcare professionals and an improvement of management with chronic diseases

**Future vision (when unmet need is addressed)**
1) Better follow up and adherence of medication. 2) Increase patient empowerment and responsibility regarding their disease. 3) Reduction of decompensation and hospitalization of chronic patients. 4) Reduction of burden of disease in chronic pathologies

**Potential for addressed/resolved unmet need (contextual scalability)**
It is scalable to all chronic disease management in EU countries, which include multidrug intake and particularly important in aging diseases, i.e CVD, COPD...

### Value

| | Short & long term description; include quantification when possible |
|---|---|
| Potential | In numbers, medication non-adherence contributes every year to 125.000 preventable deaths in CVD (Ferdinand et al, 2017). Patients who do not adhere to prescribed courses of medication are at greater risk for poor outcomes, increased healthcare costs and productivity lost |
| Initial reach | It is a known and described in the bibliography by several authors and has been observed in the hospital patient follow up in chronic diseases. |

**5** **Automatic registration of data (VdH)**

| Brief Project Description |
|---|

**Problem description**
Recently it has been incorporated to daily work the usage of a multiparametric monitor that after measuring heart rate, blood pressure, oxygen saturation and temperature that directly includes all parameters into Gacela Care (nursery care) and medical record (SAP). Nowadays, the challenge that nursery face it is the automatization of their daily activity, the agenda that has been already defined by each patient. The agenda and the cure plan are linked. Therefore, every time that nurses follow their activity for example for weight control, edema valuation or cure a wound. At some point they need to stop and include all data into the program. Therefore, they include all data later in time, not in real time, including a risk that some tasks are not registered or when included the care plan has changed. Moreover, it leads to overload of work for the nursery team that they should register manually all their tasks in a not adapted to their needs way. Furthermore, in the hospital, different programs are being used to follow the patient (medical record, nursery care, drug administration, diet, critic patients...). At the end several programs (Gacela, silicon, centricity, SAP...) are used without any communication between them. Healthcare professionals are in charge of actualizing all programs, therefore, the challenge it is the automatic introduction of all data in a program (or programs) that can communicate and actualize information between them.
The challenges are:
- Introduction of all parameters automatically in to Gacela care (nursery care)
- Communication between the different interfaces of Gacela care (agenda and cure plan) to avoid the double introduction of data
- Introduction of all parameters and test into the medical record (SAP)
- Integration of the different systems used in the hospital to follow the patient or creation of a new tool that can be use for everything and all type of patients

**Unmet need (What unmet need is causing the problem; can be technical/non-technical software, hardware and/or process related)**
1) Interoperability and integration of the systems  2) Reduction of manual data introduction

**Future vision (when unmet need is addressed)**
Data accessibility and accuracy at all care points by the different healthcare professionals simultaneously and automatically results in error minimization and reduced administration workload

**Potential for addressed/resolved unmet need (contextual scalability)**
Reduction of the time spend in data introduction. Safety increase in care plan. Reduction on mistakes due to lack of information in the used program
The capability of minimizing double introduction of data can be use for in all clinics of the hospital and all type of patients

| Value | |
|---|---|
| | Short & long term description; include quantification when possible |
| Potential | Estimation of time spent on double entry of data: 15 mins/patient x 1000 patients/day x 12 month =180.000 min / year = 3.000 hours/year. |
| Initial reach | The problem has arisen at the Nursery care Unit, particularly in hospitalization. |



**10** *Integration of PROMs into electronic data capture and clinical practice/pathways; accessibility of data for patient at anytime and anywhere* (Medical University of Vienna / Vienna General Hospital)

| Brief Project Description |
|---|

**Problem description**
PROMs should be integrated into electronic data capture and into clinical practice. A local ePRO system is currently pilot tested. However, functionalities are missing, e.g. an offline solution, an efficient invitation system. Furthermore, PROMs should be integrated into clinical care. Short and long-term patient outcomes and satisfaction of patients should drive the definition of the best pathway. Benchmarking could be based on patient value. Patient data should be owned and accessible by patients anytime and anywhere.

**Unmet need (What unmet need is causing the problem; can be technical/non-technical software, hardware and/or process related)**
*Conceptualization of processes and interoperability of systems*: linking PROMs to the electronic health record (HER) system(s), including the research MUW IT system (RDA), the routine care IT system used at the Vienna General Hospital (AKIM), and the Austrian national electronic health record system (ELGA);
*Data sharing and access (HCP and patients)*: ensures most up-to-date medical data from any type of care provider in a patient's file; accessible by clinicians and patients from anywhere, at anytime
*Patient involvement and empowerment*: enables increased patient involvement in their care and ensures the most relevant outcomes and indicators for patients are collected and accessible

**Future vision (when unmet need is addressed)**
*Patients*: ownership of data; access to data anytime and anywhere, better clinical and patient-reported outcomes; 'activation' of patients; better patient experiences across the entire health care system through more integrated care; patient empowerment and involvement
*HCP*: better ability to diagnose and treat patients with access to more comprehensive data; increased job satisfaction from more streamlined electronic record systems
*Management*: cost savings in the form of more efficient, effective care; better value in the form of improved patient-reported outcomes; increased staff and "customer" satisfaction
*Researchers*: ability to access full scope of Austrian patient data (within ethical and data safety considerations) to identify national and local health trends and conduct epidemiological research; ability to identify and access data on rare diseases
*Payers and policy-makers*: potential to influence a national shift to prevention

**Potential for addressed/resolved unmet need (contextual scalability)**
*Interoperability of systems*: potential to scale up to include/incorporate international records and medical data from outside of Austria
*Data sharing and access*: potential to implement advanced query methods for clinicians and researchers to find rare disease cases, proactively track public health implications, better manage resource distribution, and more
*Patient involvement and empowerment*: potential to link with wearable devices or other patient involvement tools, as well as to include evidence-based medical and care resources; potential to implement patient empowerment tools, for example patient-centered care and/or shared-decision making tools like dashboards, personal patient histories, personalized goals, etc.

| Value | |
|---|---|
| | Short & long term description; include quantification when possible |
| Potential | Increased: treatment success, treatment adherence, patient activation, health-related quality of life. Could be used in any clinical or research context. |
| Initial reach | There is an ePROM pilot currently underway that will determine a core case. The potential is quantifiable through various outcomes measures and economic impact can be assessed using QALYs. |
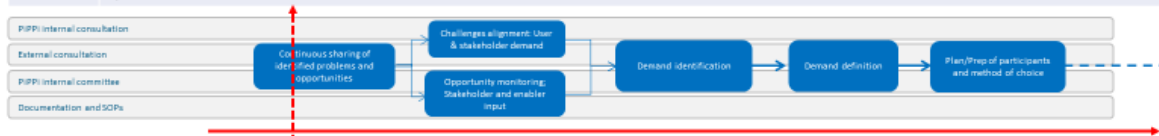
**11** AKIM Revitalization, integration of routine care and research IT systems and integration of data of other healthcare providers that take over the treatment from MUW/AKH (including long-term follow up) (Medical University of Vienna / Vienna General Hospital)

### Brief Project Description

**Problem description**
AKIM is the electronic health record system for routine care at the Vienna General Hospital. Similar to many electronic health record systems that have been in use for some years, the AKIM system was created and implemented under the technical constraints of that time. Some departments within the general hospital/medical university also use other disease-specific systems on the side. As a result, there are gaps especially in usability, interface design, and interoperability that cause user dissatisfaction and under-utilization. What is needed is a revitalization that takes into account user needs as well as technical flexibility and expansion. Speed and intuitive design are key considerations, as well as interoperability with other systems, and data integration. Any modifications or new implementations should be easily carried into the future as software and hardware continues to be updated in ways we do not yet anticipate. In addition, MUW operates a separate research IT system (RDA). Some interfaces exist between the routine care and the research IT systems. However, there is a need to define the processes of data acquisition and usage within these constraints (routine care and research).

**Unmet need (What unmet need is causing the problem; can be technical/non-technical software, hardware and/or process related)**
*Modernized records systems:* user-friendly design, speed of usage
*Interoperability of systems:* better interoperability between or integration of different systems used by/for different departments
*Data management:* holistic solution for the capturing, storing, and searching of data

**Future vision (when unmet need is addressed)**
*HCP:* increased job satisfaction from more streamlined electronic record systems; less time spent on workarounds for existing systems; less time spent using multiple different systems; more time spent with patients, providing care; easier time coordinating care between departments and with other care providers (external)
*Management:* cost savings in the form of more efficient, effective care; better value in the form of improved patient outcomes; increased staff satisfaction
*Patients:* more time with HCP leading to better patient experiences; improved clinical and patient-reported outcomes resulting from easier case management, especially for patients with multi-morbidities

**Potential for addressed/resolved unmet need (contextual scalability)**
*Modernized records systems:* easier, faster implementation of future developments in medical/care technologies
*Interoperability of systems:* potential to scale up to include/incorporate international records and medical data from outside of Austria
*Data management:* potential to implement advanced query methods for clinicians and researchers to find rare disease cases, proactively track public health implications, better manage resource distribution, and more

### Value

| | Short & long term description; include quantification when possible |
|---|---|
| Potential | Increased treatment success; better communication/coordination between clinicians re: records and patient management; increased patient satisfaction. Could be used in any clinical or research context as the core solution is interoperability and data integration. |
| Initial reach | ?? The potential is quantifiable through various outcomes measures and economic impact can be assessed using QALYs. |
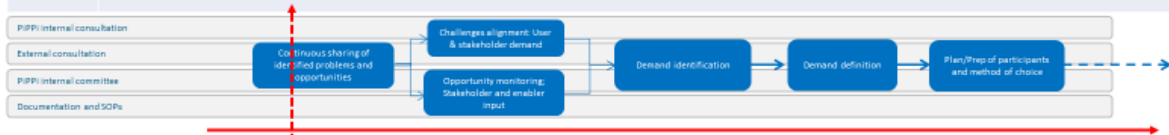


**12** Patient recruitment for clinical studies and other types of clinical research; conceptualization and set up of a clinical studies registry and research data repository (Medical University of Vienna / Vienna General Hospital)

### Brief Project Description

**Problem description**
The MUW is interested in procuring a new system/method for finding, recruiting and tracking patients for clinical and research studies. This should include internal patients (from the general hospital) as well as external patients (from other providers in Austria). Currently there are barriers to the identification of relevant patients and to successfully recruiting such patients. Moreover, the MUW and Vienna General Hospital aim to establish a common Monitoring System for Clinical Research. Furthermore, the MUW is currently exploring the requirements for a research data repository to improve internal, GDPR-compliant data management and for sharing data with external third parties.

**Unmet need (What unmet need is causing the problem; can be technical/non-technical software, hardware and/or process related)**
*Research:* improve the ability for researchers to find and recruit relevant patients for studies
*Patient involvement:* enables increased patient involvement in research; links interested patients with relevant studies; potentially provides trial procedures or medications in case of serious medical need
*Research data repository:* improve internal, GDPR-compliant data management and share data with external third parties.

**Future vision (when unmet need is addressed)**
*Researchers:* faster and smoother recruitment of patients, leading to faster completion of research; recruitment of the most relevant patients, especially in cases of rare diseases; potentially better communication with recruited patients; data sharing possibilities, open science, FAIR principles of data usage
*Patients:* increased patient involvement and empowerment through interaction with research activities; easier, smoother communication with researchers
*Industry:* a better drug development environment
*Medical University of Vienna:* overview on patients in studies; own repository allows to set the standards and the rules
*External researches:* will benefit from data sharing

**Potential for addressed/resolved unmet need (contextual scalability)**
*Communication with and management of patients:* there is the potential to apply the technique(s) and system for expanded communication with patients and care management beyond the research sphere.
*Repository could be linked to/used by other institutions.*

### Value

| | Short & long term description; include quantification when possible |
|---|---|
| Potential | The system could be scalable to other contexts since it is at the core a communication platform and data repository, however in this iteration the main focus is within the research sphere. |
| Initial reach | Interviews to gather requirements have been made and can be used to define a core case. It can be quantified through number of patients successfully recruited for clinical studies. |
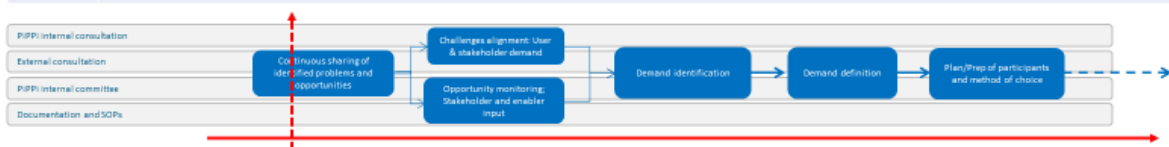
**14** International Telemedicine consultation – [If Applicable Local Strategy connection]

### Brief Project Description

**Problem description**
Increased specialization and a need to need to utilize costly resources better leads to a need to be able cooperate with caregivers across borders around individual patients. This cooperation could be medical second opinion, multidisciplinary meetings, referral of patients to highly specialized care, preparation and follow up of referred patients, conferences or seminars around specific topics, training, research, innovation projects or just sharing workloads during peaks.

**Unmet need (What unmet need is causing the problem; can be technical/non-technical software, hardware and/or process related)**
A way to share and view patient data across borders and organizations in a way that preserves the contextual and diagnostic qualities of the information

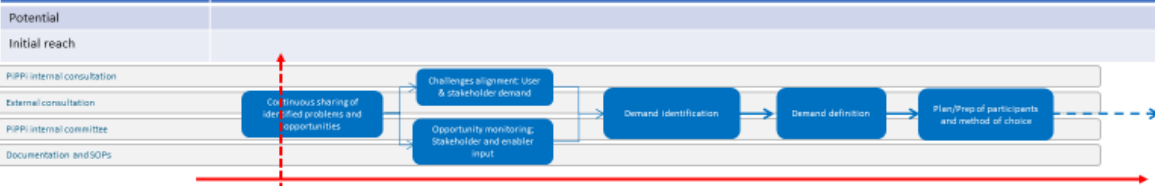Legal issues with sharing patient data across borders.

**Future vision (when unmet need is addressed)**
Patient data can be viewed across organizational and national borders in a way that enables cooperation of different caregivers around patients.

**Potential for addressed/resolved unmet need (contextual scalability)**

### Value
Short & long term description; include quantification when possible

| | |
|---|---|
| Potential | |
| Initial reach | |

PiPPi internal consultation
External consultation
PiPPi internal committee
Documentation and SOPs

Continuous sharing of identified problems and opportunities → Challenges alignment: User & stakeholder demand / Opportunity monitoring; Stakeholder and enabler input → Demand identification → Demand definition → Plan/Prep of participants and method of choice

**15** PROM at Karolinska– [If Applicable Local Strategy connection]

### Brief Project Description

**Problem description**
In order to facilitate value based care and improve the match between the individual patient and the treatment path there is a need to collect PROM and make the result available in the clinical care. There is also a difficulty to get patients to answer PROM due to the lack of direct incentive to do it as the PROMs are not used in the care.

**Unmet need (What unmet need is causing the problem; can be technical/non-technical software, hardware and/or process related)**
Collect PROMs in a for the patient convenient way with where patient can choose what for/channel is used to answer.

Make the PROMS available to the clinical staff when seeing the patient, connected to the EHR record as part of the aggregated patient data.

Provide incentive for the patient to answer PROM forms.

Automatic transfer of PROM to national quality registers.
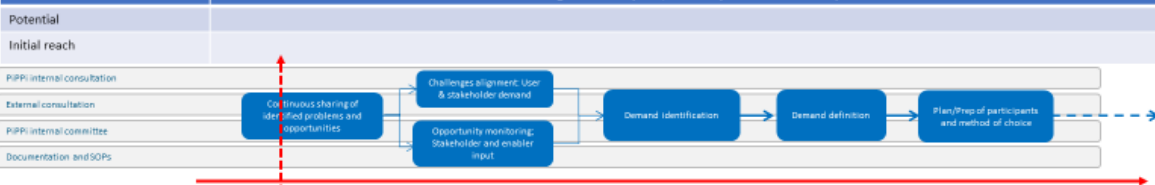
**Future vision (when unmet need is addressed)**
PROMS are available through different channels so patient can choose preferred option.
PROM data is available to treating clinical staff and can be used in discussing treatment options with the patient
PROM data is automatically shared with quality registers and for research purposes.

**Potential for addressed/resolved unmet need (contextual scalability)**
PROMs are used increasingly to evaluate care and personalize treatment, "treating the patient and not the condition". It is used across organizations and across Europe.

### Value
Short & long term description; include quantification when possible

| | |
|---|---|
| Potential | |
| Initial reach | |

PiPPi internal consultation
External consultation
PiPPi internal committee
Documentation and SOPs

Continuous sharing of identified problems and opportunities → Challenges alignment: User & stakeholder demand / Opportunity monitoring; Stakeholder and enabler input → Demand identification → Demand definition → Plan/Prep of participants and method of choice

Platform for Innovation of Procurement and Procurement of Innovation

Horizon 2020
European Union funding
for Research & Innovation
European Commission

## 19  Platform to collect PROMs & PREMs from patients (OSR)– [If Applicable Local Strategy connection]

**Brief Project Description**

**Problem description**

San Raffaele Hospital is looking for an iT platform / application to support the survey for PROM & PREM. This will be useful for collecting and analyzing data, integrating them with the clinical data produced by the structure and obtaining a reference point for transversal paths which fits well with the value-based perspective promoted by the Alliance EUHA.

Another significant motivation is to achieve interoperability of numerous clinical databases (or pathology registers), currently present in the hospital, for data collection during the patient journey and to be able to extract and transfer useful data for comparative analysis with other hospitals.

To overcome the difficulties linked to the multitude of data that are currently difficult to collect, use and share uniformly, San Raffaele Hospital intends to establish pathology registers with a first pilot at the Pancreas Surgery Unit.

As a result, acquisition of a solution to support the collection of PROMs and PREMS related to clinical diagnostic therapeutic pathways and solution for the management of Pathology Records for the San Raffaele Hospital is needed. For that, proposals from diverse supplier companies are being evaluated.

**Unmet need (What unmet need is causing the problem; can be technical/non-technical software, hardware and/or process related)**

Collection and tracking of pathologic data of patients, collection and tracking of experiences/satisfaction of patients, secure data sharing, patient involvement/empowerment, interoperability of system.

**Future vision (when unmet need is addressed)**

Applying value based healthcare will lead to improve patient outcomes, guarantee a better management and optimizing resources in accordance with the global logic of healthcare reorganization.

Achieve interoperability of numerous clinical databases (or pathology registers), currently present in the hospital, for data collection during the patient journey and to be able to extract and transfer useful data for comparative analysis with other hospitals.

A digital solution aimed at the effective and efficient collection of clinical outcomes and experiences of the patient enrolled on specific care pathways.

Guarantee the quality of the data collected throughout the patient journey and its connection with the clinical information for accurate synthesis of results and the continuous improvement of clinical journey

Lead management and reporting systems to monitor the progress of the activities and the degree of achievement to the objectives.

Guarantee the transfer of complete resources of OSR related to the clinical paths onto the application platform being acquired.

Register pathologies to improve the clinical research activity of the Hospital

**Potential for addressed/resolved unmet need (contextual scalability)**

Scalability to all medical contexts and to the new electronic patient record system will be implemented in 2020

| Value | |
|---|---|
| **Short & long term description; include quantification when possible** | |
| Potential | The tool will enable the Value-Based groups to collect PROMs & PREMs of all the patients involved and to include them in EPR and databases. The solution will be scalable to the whole hospital scope. |
| Initial reach | A first pilot at the Pancreas Surgery Unit will involve at least 300 patients undergo surgery each year. |