A Demonstration of 4D Digital Avatar Infrastructure for Access of Complete Patient Information

Project acronym: MyHealthAvatar

Deliverable No. 2.2
Scenario Based User Needs and Requirements

Grant agreement no: 600929

Dissemination Level		
PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
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ABSTRACT:
This deliverable has the initial purpose to describe and to underline the specific user needs and requirements of the MyHealthAvatar (MHA) platform by being focused on comprehensive and detailed MHA Scenarios / Use Cases. This purpose has by been successfully accomplished and it has been extended to cover as well the general public and patient's views and expectations for MHA platform.

KEYWORD LIST:
User needs, user requirements, scenarios, use cases, survey

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[1] **R**=Report, **P**=Prototype, **D**=Demonstrator, **O**=Other

[2] **PU**=Public, **PP**=Restricted to other programme participants (including the Commission Services), **RE**=Restricted to a group specified by the consortium (including the Commission Services), **CO**=Confidential, only for members of the consortium (including the Commission Services)

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1 Executive Summary

The main topic that has been in details investigated and described in this document is the scenario based end-user's needs and requirements applicable for:

- citizens to accept the 'Avatar' from MyHealthAvatar (MHA) platform
- clinicians to show the benefits of such an Avatar in routine clinical practice
- IT people to develop the 4D Avatar and the legal and ethical environment
- basic researchers to strengthen VPH research

The techniques used during the end-user's needs and requirements elicitation phase of the project included small and large scale **Surveys**, questionnaires, meetings, interviews, stakeholder focus groups, previous experience, and the results from other research projects. Of special focus and interest were the elaboration of the detailed and comprehensive **Scenarios / Use Cases**, the related activities here have been implemented in a robust linkage of the end users with developers. The complexity of the domain, which is addressed by the project required that a spiral process of requirements analysis, elicitation, documentation and validation to be adopted. Specific techniques have also been selected for the elicitation, negotiation and agreement of requirements as well as their validation. These techniques are Scenarios combined with Use Cases and prototyping (prototyping activities are expected for latter stages). As result, and in order to summarise, this document defines and presents in details MHA Scenarios / Use Cases (**Table 1**), close to an in depth description of end-user's needs and requirements necessary to guide the activities expected in the frames of further MHA project's work packages and deliverables.

ID	Scenario / Use Case Name
UC-1	Enter, import, store and export personal medical data
UC-2	Informed Consent and Privacy
UC-3	Interactive 3D Model of the Human Body (Patient Education & Serious Game)
UC-4	Collecting, saving and sharing data from third party social networks
UC-5	Remote Monitoring
UC-6	Mobile Driven 3D Virtual Lung
UC-7	Mobile Lifestyle and Social media
UC-8	Compile and perform a simulation using a biological model
UC-9	Manage the content of the Model Repository and the Clinical Data Repository
UC-10	Tools for browsing medical images in avatar
UC-11	Tools for the analysis of medical images in avatar
UC-12	Utilization of personal genomic information for the individualization of MHA platform
UC-13	Anti-platelet therapy in pre-operating period
UC-14	Multi-scale visualization of biomedical data
UC-15	Bidirectional Linkage to ObTiMA
UC-16	Consultation Scenario: Interaction between the patient and physician
UC-17	Patient Diary
UC-18	Patient Devices SDK
UC-19	Search for Similar Patients
UC-20	Knowledge Discovery
UC-21	Building patient community among users
UC-22	Avatar Data Browse

UC-23	Avatar Data Collection	
UC-24	Knowledge Avatar	
UC-25	Web Login	
UC-26	Brain Trauma	
UC-27	Personalised CHF Risk Analysis	

Table 1. MHA Scenarios / Use Cases

An additional topic termed in this document is the general description of the accepted and followed scenario based design with the related definitions and in special the 'Scenario / Use Case Approach'.

The initial purpose of this document was to describe and to underline the specific user needs of the MHA platform by being focused on comprehensive and detailed MHA Scenarios / Use Cases. This purpose has been successfully extended to cover as well the general public and patient's views and their expectations for MHA platform. The achieved results are presented in the chapter entitled **MHA Survey (General Public / Patients)**, it comprises the survey design and the presentation of the collected and analysed data.

Introduction and Project Background

Owing to the highly fragmented health systems in European countries, gaining access to a consistent record of individual citizens that involves cross-border activities is very difficult. MyHealthAvatar is an attempt at a proof of concept for the digital representation of patient health status. It is designed as a lifetime companion for individual citizens that will facilitate the collection of, and access to, long-term health-status information. This will be extremely valuable for clinical decisions and offer a promising approach to acquire population data to support clinical research, leading to strengthened multidisciplinary research excellence in supporting innovative medical care.

MyHealthAvatar will be built on the latest ICT technology with an aim of engaging public interest to achieve its targeted outcomes. In addition to data access, it is also an interface to access integrative models and analysis tools, utilizing resources already created by the VPH community. Overall, it will contribute to individualized disease prediction and prevention and support healthy lifestyles and independent living. It is expected to exert a major influence on the reshaping of future healthcare in the handling of increased life expectancy and the ageing population in Europe. This complies with the priority and strategy of FP7 ICT for healthcare, and constitutes a preparatory action aiming at the grand challenge on a "Digital Patient", which is currently the subject of a roadmap in the VPH community.[3]

1.1   Project Background

The MyHealthAvatar project will focus on research and demonstration actions, through which the achievability of an innovative representation of the health status of citizens, named 4D MyHealthAvatar, will be explored. The 4D Avatar is anticipated as an interface that will allow data access, collection, sharing and analysis by utilizing modern ICT technology. It is expected to become the citizen's lifelong companion, providing long-term and consistent health status information of the individual citizen along a timeline representing the citizen's life, starting from birth. Data sharing will be encouraged, which will potentially provide to an extensive collection of population data to offer extremely valuable support to clinical research. The avatar will be equipped with a toolbox to facilitate clinical data analysis and knowledge discovery.

MyHealthAvatar can be described as a personal bag carried by individual citizens throughout their lifetime. It is a companion that will continually follow the citizen and will empower them to look after their own health records. This fits very well into the recent trend of developing patient-centred healthcare systems.

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[3] MyHealthAvatar project, Description of Work (DoW) document.

2 Scenario Based Design

2.1 Scenario Definition

In general terms a scenario is a narrative description of the imaginable interactions between the end user's actions and the technical system, which usually includes computer hardware and software. Scenarios are frequently used as part of the software development process. They are typically produced in linkage with end users and developers. Scenarios are written in plain language, with minimal technical details, so that stakeholders without any IT knowledge can have a clear understanding and can share their contribution. Scenarios help to focus design efforts on the end user's requirements, which are distinct from technical or business requirements.

Scenarios are replacing or supplementing the traditional functional requirements. Close to it, scenarios are very appropriate to describe a system interaction from the end user's perspective.

Scenarios may be related to Use Cases, which describe interactions at a technical level. Unlike use cases, however, scenarios can be understood by people who do not have any technical background. They are therefore suitable for use during participatory design activities.

2.2 Use Case Definition

In software development a Use Case usually is defined as a list of steps, typically defining interactions between an "actor" and a system, to achieve a goal. The actor can be a human or an external system. Usually the Use Case defines a goal-oriented set of interactions between external users and the system under consideration or development. Use Cases have become a widespread practice for capturing functional requirements in software design.

A Use Case scenario is a description that illustrates, step by step, how the user is using the system, essentially capturing the system behaviour from the user's point of view. A use case scenario can include stories, examples, and drawings. Use cases are extremely useful for describing the problem domain in unambiguous terms and for communicating with the potential users of a system.

2.3 Scenario / Use Case Approach

By assuming that Scenarios may be related to Use Cases, our approach is to integrate as much as possible the described Scenarios in the frames of the related Use Cases. We designed a complex template which has a section dedicated to Scenario description, named 'Basic Flow'. As result, we will use from now the term 'Scenario / Use Case', it allows us to describe from the very beginning the MHA Scenarios with minimum technical information in linkage to more complex and rich in technical requirements Use Cases. Despite the complexity of this approach it has been accepted by all project partners and it would serve as a powerful guideline for further MHA platform development activities. Additionally, this approach allows us, close to end-user needs and requirements, to underline as well the ICT requirements.

2.4 Scenario / Use Case Template

The template for Scenarios / Use Cases is presented below. It has been discussed with all project partners and one of its main purposes was to allow the detailed and advanced description of project's Scenarios / Use Cases. Close to the description topic, we managed to include the 'Preconditions', 'Basic' and 'Alternative' flows, 'Dependencies', 'Required external resources' and 'Assumptions' topics. The version information ('Date created', 'Updated' and 'Revision' fields) and the 'Questions' topics are also of particular importance.

The template has been accepted and successfully used by all project partners, close to it; it allowed us to present in the chapters bellow all elaborated and collected Scenarios / Use Cases.

Use Case ID:	UC-1		
Use Case Name:	Use case name		
Use Case Owner:		Last Updated By:	
Technical Collaborators:		Clinical Collaborator:	It might be internal or external to the project
Date Created:		Last Revision Date:	
Description:	Use case description. Ensure that you use an active voice.		
Actors:	Who will be taking part in this process? If you want to write descriptions, it makes the use case even more valuable.		
Trigger:	What is making the use case begin. For instance, User presses a button.		
Preconditions:	What needs to be true before the use case can begin (i.e. execution of other use cases prior to this use-case).		
Successful End condition:			
Fail End condition:			
Basic Flow:	What are the basic steps		
Alternate Flows:	Are there any deviations to the basic steps?		
Postconditions:	What is the next step? Consider this use case as the precondition for the next.		
Dependencies:	This use case extends to the following use cases: Is this part of a bigger use case? This use case includes the following use cases: Does this include other use cases?		
Required External Resources:	[ ] Data, please specify:	What type of data do we need to collect? Please be as specific as possible at this point of time. Who owns those data/where they will come from? What type of analysis we need to support?	
	[ ] Tools, please specify:	What type of tools? Who owns those tools? How they can be used in the MHA?	
	[ ] Services, please specify:	What type of Services? Who owns those Services? How they can be used in the MHA?	
	[ ] Models, please specify:	What type of Models? Who owns those Models? How they can be used in the MHA?	
	[ ] Other, please specify:		

How this use-case is going to be validated?	Include how the aforementioned use-case will be integrated possibly with clinicians workflow
Frequency of Use:	How often will this be executed?
Who are the users?	The main end-user categories are: Clinicians and Patients but feel free to add other end-use categories If necessary.
Special Requirements:	Please detail any specific requirements demanded by the use case (e.g. performance, usability, interaction, storage requirements)
Assumptions:	Any other detail that you feel relevant.
Questions:	Please detail all issues and questions that need to be answered prior to the completion of the use-case description.

2.5 Software Development Methodology

The main goals of the software process models are to identify the order of the software development's stages and to establish the transition steps between stages (from one stage to the next). Project partners are advised to avoid the outdated 'code-and-fix model' which has in general two basic steps: write some code; fix the problems in the code.

According to MHA project Description of Work (DoW) [2] document the complexity of the domain, which is addressed by the project necessitated that a spiral (**Figure 1**) process of requirements analysis, elicitation, documentation and validation is adopted. Specific techniques have also been selected for the elicitation, negotiation and agreement of requirements as well as their validation. These techniques are scenarios (concept of requirements) and prototyping.
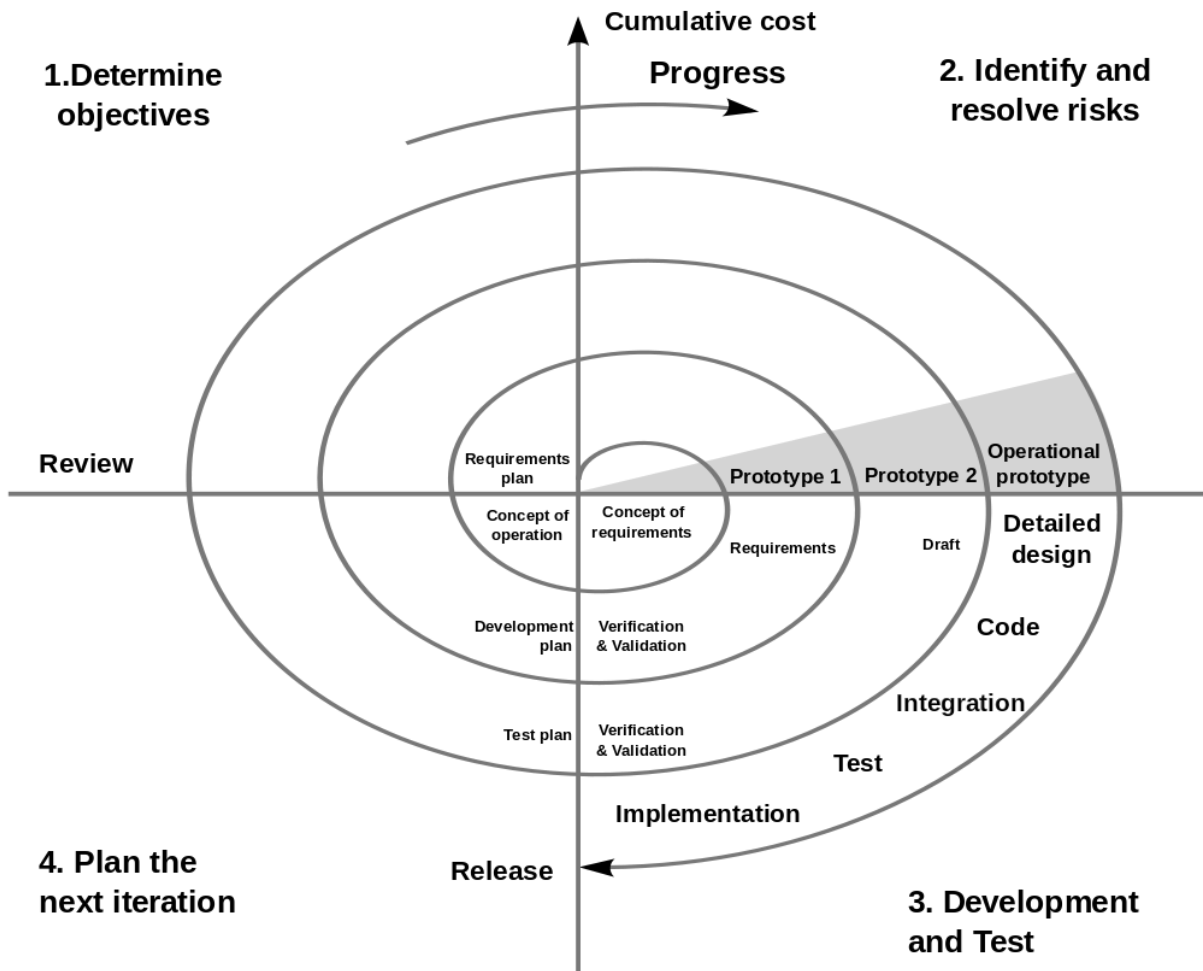
Figure 1. Spiral model (Boehm, 1988) [1]

3 An Initial set of MHA Scenarios / Use Cases

The project has carried out analysis of detailed end-user requirements and needs by collecting an initial set of Scenarios / Use Cases. These cases were collected by consortium members through interaction with stakeholders of MyHealthAvatar system, including citizens/patients, clinical doctors and clinical and IT researchers. The template of the use cases allows us to describe in details the Scenarios / Use Cases proposed for implementation. Each of these cases addresses a use scenario from a particular user perspective, either as a patient, or as a doctor, or as a clinical or IT researcher.

This chapter presents all the collected cases. The use case collection has been an extremely useful exercise in order to allow us to develop concrete understanding of user requirements for the MyHealthAvatar system. Since these cases were collected from the perspectives of individual stakeholders, we are fully aware that there are repetition and inconsistency between them. One of key tasks of the project in the next stage is to reach a final set of refined use cases based on these initial collections. The team of MHA project is continuously working on this. This approach is in line with the project description and the accepted spiral software development process. Close to the fact that elaborated Scenarios / Use Cases are in continuous development a special attention is paid on elaborating new ones

The final set of refined use cases will fit into the next project's task Nr 7.1, named "Scenarios and use cases for MyHealthAvatar: PM10=>PM18 (Task Leader: USAAR)". This task will describe in details the new Scenarios / Use Cases that are relevant for MHA platform. As scenarios are based on the results of Work Package 2 (WP2), this task starts at month 10 after the finalization of WP2. Additionally, all Scenarios / Use Cases will be prioritised and aligned to different stakeholders (citizens, clinicians, basic researchers and IT people).

Due to the complexity of the elaborated Scenarios / Use Cases and for usability reasons all sub-chapters in the Chapter 4 (MHA Scenarios / Use Cases) are entitled according the name of the related Scenario / Use Case and the Scenario / Use Case description begins from a new page. It will allow us to manage with easy the elaborated/described Scenarios / Use Cases and to elaborate with easy updated and revised versions.

3.1 Enter, import, store and export personal medical data

Use Case ID:	UC-1
Use Case Name:	Enter, import, store and export personal medical data (e.g. Electronic Health Records)

Use Case Owner:	USAAR	**Last Updated By:**	Haridimos Kondylakis
Technical Collaborators:	TBD	**Clinical Collaborator:**	USAAR
Date Created:	02.05.2013	**Last Revision Date:**	01.07.2013

Description:	End User has the GUIs, functionalities and tools in the frames of MyHealthAvatar platform to enter, import, store and export personal medical data.
Actors:	End User & MyHealthAvatar platform
Trigger:	User accesses the section "Personal Medical Data"
Preconditions:	User has to Log-in or to create a New Account (New Avatar)
Successful End condition:	
Fail End condition:	
Basic Flow:	The basic steps are: 1. Successful Log-In (or New account creation) by using Username or Email and Password 2. Select your Avatar 3. Click Enter/Import personal medical data for your Avatar 4. The list of available HIS (by location) is presented, if not applicable, skip to the next step 5. Import personal medical data from PHR system (Microsoft HealthVault, IndivoX, etc.), if not applicable, skip to the next step 6. Enter Personal medical data (Conditions, Treatment, Symptoms)
Alternate Flows:	Two alternative flows are in place: • Import personal medical data (HIS and/or PHR) • Enter personal medical data
Postconditions:	The next step is to store the entered/imported medical data on your Avatar ("Save" button). After successful data save, the option "Export data" is activated and/or available.
Dependencies:	This use case extends to the following use cases: 1. Successful Log In (TBD) 2. Creation of New (account) Avatar, plus the acceptance of MyHealthAvatar platform's Privacy, Terms and conditions (TBD) 3. New Avatar creation functionality (TBD) 4. Other Use Cases (TBD)

Required External Resources:	[x] Data, please specify:	Access to HIS and/or PHR
	[x] Tools, please specify:	Access to ObTiMA
	[x] Services, please specify:	PHR export/import functionality
	[ ] Models, please specify:	
	[ ] Other, please specify:	

Frequency of Use:	Frequent use is expected due to the general and basic character of this Use Case
Who are the users?	
Special Requirements:	The interface and tools to assure the access to HIS should be described and implemented. Access to ObTiMA tool should be described as a separate use case.

	The minimum medical dataset should be defined and described (compatible and/or similar to Continuity of Care Record (CCR) and the Continuity of Care Document (CCD) formats/standards)
Assumptions:	UC-1 would play the central role in MyHealthAvatar platform. MyHealthAvatar should support the Continuity of Care Record (CCR) and the Continuity of Care Document (CCD) formats/standards.
Questions:	Who will be responsible for this Use Case development/implementation?

3.2 Informed Consent and Privacy

Use Case ID:	UC-2		
Use Case Name:	Informed Consent and Privacy		
Use Case Owner:	USAAR	**Last Updated By:**	
Technical Collaborators:	TBD	**Clinical Collaborator:**	USAAR
Date Created:	03.05.2013	**Last Revision Date:**	
Description:	MyHealthAvatar could be treated as a platform for End-Users who want to share their health information to create collective knowledge about disease, health, and treatments. In order to achieve this goal advanced Informed Consent and Privacy Policy Scenario / Use Case should be implemented. End User has the GUIs, functionalities and tools in the frames of MyHealthAvatar platform to accept, reject, print or revise at any time the Privacy and Informed Consent settings.		
Actors:	End User & MyHealthAvatar platform		
Trigger:	User accesses the section "Privacy and Informed Consent"		
Preconditions:	User has to Log-in or to create a New Account (New Avatar)		
Successful End condition:			
Fail End condition:			
Basic Flow:	The basic steps are: 1. Successful Log-In (or New account creation) by using Username or Email and Password 2. Select your Avatar 3. Click Accept/Revise link named "Privacy and Informed Consent" of your Avatar 4. The Privacy and Informed Consent description with checkboxes is shown. 5. End User has the option to select any checkbox according his/her preferences 6. End User has the option to "Edit", "Save" and "Print" the Accepted "Privacy and Informed Consent" preferences.		
Alternate Flows:	The alternative flows are possible by allowing the End Users to access the "Privacy and Informed Consent" section from any location of the MyHealthAvatar platform.		
Postconditions:	The important post condition is the ability to "Print" the accepted "Privacy and Informed Consent" preferences. It would be great to have in place the "Track Changes" frames, the kind of history of changes with dates.		
Dependencies:	Guidance messages should be in place (i.e. if the End User selects to not share any anonymous Avatar data he/she will not have access to any other anonymous Avatar data)		
Required External Resources:	[ ] Data, please specify:		
	[ ] Tools, please specify:		
	[ ] Services, please specify:		
	[ ] Models, please specify:		
	[x] Other, please specify:	Linkage to the results of CONTRACT Project[4]	
Frequency of Use:	Frequent use is expected due to linkage with existing functionalities. The		

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	access to some functionalities of MyHealthAvatar will be restricted as soon as the End User didn't accept the related "Privacy and Informed Consent" conditions.
Who are the users?	
Special Requirements:	Privacy and Informed Consent should be in details explained. Examples of shared data that End Users may submit at the MyHealthAvatar platform, including through their Avatar, may include[5]: • Biographical information, e.g. photograph, biography, gender, age, location (city, state and country), general notes; • Condition/disease information, e.g. diagnosis date, first symptom, family history; • Treatment information, e.g. type of treatment/ medication, treatment start dates, stop dates, dosages, side effects, treatment evaluations; • Symptom information, e.g. severity, duration; • Primary and secondary outcome scores over time, e.g. ALSFRS-R, MSRS, PDRS, FVC, PFRS, Mood Map, Quality of Life, weight, InstantMe; • Laboratory results, e.g. CD-4 count, viral load, creatinine; • Genetic information, e.g. information on individual genes and/or entire genetic scans; • Individual and aggregated survey responses; • Information shared via free text fields, e.g. the forum, treatment evaluations, surveys, annotations, journals, feeds, adverse event reports; and • Connections to other Avatars. In the course of using the MyHealthAvatar platform, End Users should be aware that other End Users may share information that could be used to reasonably identify them ("Personal Information"), including name, medical images, and email address. When a Member chooses to share Personal Information via a free text field (e.g. forum, treatment evaluations, annotations, journals, feeds and adverse event reports) and photos or images, the information shall be treated as Shared Data.
Assumptions:	UC-2 would require continuous revisions in close collaboration with MyHealthAvatar project partners.
Questions:	Could we implement the Privacy, Informed Consent related frames in line with the bellow guidelines? Final Guidelines for Informed Consent and Data Security, Deliverable 4.2, CONTRACT Project, http://www.contract-fp7.eu/site/images/Documents/D4.2._Final%20guidelines.pdf

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[5] http://www.patientslikeme.com/about/privacy (June 2013)

3.3 Interactive 3D Model of the Human Body (Patient Education & Serious Game)

Use Case ID:	UC-3		
Use Case Name:	Interactive 3D Model of the Human Body (Patient Education & Serious Game)		
Use Case Owner:	USAAR	Last Updated By:	
Technical Collaborators:	TBD	Clinical Collaborator:	USAAR
Date Created:	03.05.2013	Last Revision Date:	
Description:	MyHealthAvatar platform would propose an avatar - a 3D representation of the human body - to allow End Users (e.g. patients, doctors) to visualize patient medical records in a new way. Similar to IBM's Anatomic and Symbolic Mapper Engine (ASME), this visualization method would allow the End User to click with the computer mouse on a particular part of the avatar "body" to trigger a search of medical records to retrieve relevant information. "The ASME system will allow doctors to "click" on different parts of the 3-D avatar of the human body - for example, the spine - and instantly see all the available medical history and information related to that patient's spine, including text entries, lab results and medical images such as radiographs or MRIs. Or the doctor might be interested only in information related to a particular part of the spine; in this case, the practitioner can zoom in, narrowing the search parameters by time or other factors."[6]		
Actors:	End User & MyHealthAvatar platform		
Trigger:	User accesses the Avatar		
Preconditions:	User has to Log-in or to create a New Account (New Avatar)		
Successful End condition:			
Fail End condition:			
Basic Flow:	The basic steps are: 1. Successful Log-In (or New account creation) by using Username or Email and Password 2. Select your Avatar 3. Click on different parts of the 3-D Avatar of the human body (e.g. kidney) 4. See all the available medical history and information related to that patient's parts of the human body (e.g. text entries, EHR, lab results and/or medical images). 5. Browse the available information with ability to Add, Edit, Save,		

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[6] http://www-03.ibm.com/press/us/en/pressrelease/22375.wss (June 2013)

	Change the Privacy Settings, or Delete the existing entries. 6. End messages (e.g. "Success", "Error") in case of any of the above performed actions. 7. Log-Out option with related message.
Alternate Flows:	The alternative flows are possible by allowing the End Users to access his/her Avatar from any location of the MyHealthAvatar platform.
Postconditions:	The important post conditions are the end messages in case of any performed actions (e.g. Add, Edit, Save, Change the Privacy Settings, Delete, etc.)
Dependencies:	Dependencies are related to UC 1 and UC 2

Required External Resources:	[x] Data, please specify:	EHR, PHR
	[x] Tools, please specify:	Semantic Core Ontology
	[ ] Services, please specify:	
	[x] Models, please specify:	3-D models of the human body
	[ ] Other, please specify:	

Frequency of Use:	Frequent use!
Who are the users?	
Special Requirements:	The key technologic challenge is the integration of heterogeneous data sources and complex text-based information (unstructured data) and linking that data to the anatomical model in a meaningful and easy-to-navigate way. Strong linkage to: • WP 3 (Architecture and integration) • WP 4 (Semantic interoperability) • WP 8 (Avatar centred visual analytics)
Assumptions:	UC-3 would require a close collaboration and contribution from all MyHealthAvatar project partners.
Questions:	Who is elaborating the mockups?

3.4 Collecting, saving and sharing data from third party social networks

Use Case ID:	UC-4		
Use Case Name:	Collecting, saving and sharing data from third party social networks (Facebook, Twitter)		
Use Case Owner:	USAAR	Last Updated By:	
Technical Collaborators:	TBD	Clinical Collaborator:	USAAR
Date Created:	13.05.2013	Last Revision Date:	
Description:	This Use Case is in strong relationship with project's tasks bellow: • T3.4 Methodologies to support link with external data sources: PM2=>PM33(Task Leader: FORTH) • T6.1 Data collection utilities PM2=>PM12 (Task Leader: BED) • Task 11. 3. Understanding the Legal and IPR regime in MyHealthAvatars PM25=>PM30 (Task Leader: LUH) End User has the related tools in the frames of MyHealthAvatar platform to collect, save and share data from third party social networks (Facebook, Twitter, etc.). The interface allows the End Users to attach to his/her own Avatar his/her own Facebook and/or Twitter account. The End-User's Avatar will have the frames to show the last updates, status messages or short texts from the related Facebook and/or Twitter accounts. The Avatar (End-User) has as well the possibility to subscribe to Twitter and/or Facebook channels of interest. The Avatar (End-User) has the option to share data to the added (only own!) Twitter and/or Facebook channels.		
Actors:	End-User, MyHealthAvatar platform		
Trigger:	End-User accesses the section "My Social Networks" with options: • Add "Social Network Account" • Edit "Social Network Account" • Delete "Social Network Account" • Follow "Social Network Account" • Share your data (data has to be defined) to "Social Network Account"		
Preconditions:	User has to Log-in or to create a New Account (New Avatar). Is important to mention that End-Users could have the option to create a New Account (New Avatar) with or without the linkage to the third party social networks.		
Successful End condition:			
Fail End condition:			
Basic Flow:	The basic flow is: 1. Create a New Avatar (select the option with or without the third party social networks) 2. The flow ends here if the End-User selects the option "without the third party social networks" 3. The flow continues if the End-User selects the option "with the third party social networks" 4. End-User has the option to Add his social network account (Facebook and/or Twitter) 5. The account information (User Name and Password) is requested and provided		

	6. The last status messages from the added social network account are shown in a separate Avatar's frame/section
Alternate Flows:	Alternative flows are related to the available options like: • Edit "Social Network Account" • Delete "Social Network Account" • Follow "Social Network Account" • Share your data (data has to be defined) to "Social Network Account"
Postconditions:	The postcondition is to make visible (or hide) the status messages from the added social network account to other Avatars.
Dependencies:	The only dependence is the option presented above, and in special, to create a New Avatar with or without the third party social networks.
Required External Resources:	[ ] Data, please specify:	
	[ ] Tools, please specify:	
	[x] Services, please specify:	Twitter and Facebook APIs
	[ ] Models, please specify:	
	[ ] Other, please specify:	
Frequency of Use:	Frequency of use could be high
Who are the users?	
Special Requirements:	The special requirement is an advanced integration of Twitter and Facebook APIs into MyHealthAvatar platform
Assumptions:	This Use Case could serve as an advanced dissemination tool in special by End Users active in third party social networks.
Questions:	We have to identify who has the experience and skills to integrating/use Twitter and Facebook APIs.

3.5 Remote Monitoring

Use Case ID:	UC-5		
Use Case Name:	Remote Monitoring (Diabetes, blood sugar level)		
Use Case Owner:	USAAR	Last Updated By:	
Technical Collaborators:	TBD	Clinical Collaborator:	USAAR
Date Created:	13.05.2013	Last Revision Date:	
Description:

Image source: Continua Health Alliance, http://www.continuaalliance.org

The Remote Monitoring tool/frame collects and processes patient care information from supported healthcare devices that conform to standards (preferably selected by the Continua Health Alliance).

End User uses a glucose meter and MyHealthAvatar platform to monitor his/her blood sugar levels. The MyHealthAvatar platform reminds to check the blood sugar regularly during the day, and the glucose meter should be able seamlessly to transmit the measurements to the Avatar after each use. The data is saved that maintains the Avatar's long-term history and looks for possible abnormal events. If the saved data is unusual, or the End-User skips a test, the MyHealthAvatar platform automatically generates an alert message. | | |
Actors:	End-User, MyHealthAvatar platform, Glucose Meter (Bluetooth or USB enabled)		
Trigger:	End-User accesses the section "My Remote Monitoring Devices" and allow the access of the Glucose Meter by using Bluetooth or USB connection (computer or other mobile device should be equipped with a Bluetooth wireless adapter or USB)		
Preconditions:	User has to Log-in or to create a New Account (New Avatar). End-Users could have the option to create a New Account (New Avatar) with		

	or without the linkage to the remote monitoring devices.
Successful End condition:	
Fail End condition:	
Basic Flow:	The basic flow is: 1. Create a New Avatar (select the option with or without the remote monitoring devices) 2. The flow ends here if the End-User selects the option "without the remote monitoring devices" 3. The flow continues if the End-User selects the option "with the remote monitoring devices" 4. End-User has the option to "Add" the monitoring device, at the initial stage only a glucose meter could be added 5. The monitoring devices parameters (Bluetooth or USB) are settled. 6. The glucose meter starts sending data. 7. End user has the option to visualize the collected data 8. (to be discussed) Collected data could change the appearance of the Avatar and/or alert messages are sent if the End-User skipped a test
Alternate Flows:	Alternative flows are related to the available options like: • Visualize collected data (blood sugar levels) • Share collected data (blood sugar levels) • Archive collected data (blood sugar levels) • Send/Remove Reminders and/or Alerts messages
Postconditions:	The postcondition is to make visible (or hide) the collected data (blood sugar levels)
Dependencies:	The only dependence is the option presented above, and in special, to create a New Avatar with or without the linkage to the remote monitoring devices.

Required External Resources:	[ ] Data, please specify:	
	[x] Tools, please specify:	Glucose Meter with Bluetooth or USB connection
	[ ] Services, please specify:	
	[ ] Models, please specify:	
	[x] Other, please specify:	Continua Health Alliance standards

Frequency of Use:	Frequency of use could be high
Who are the users?	
Special Requirements:	The special requirement is an advanced integration and interoperability of Glucose Meter (Bluetooth or USB connection) with MyHealthAvatar platform
Assumptions:	This Use Case would serve as an example of the advanced integration of the remote monitoring devices. The open access to MyHealthAvatar API would allow the developers to add more devices and solutions.
Questions:	Who has the experience and the skills to implement Continua Health Alliance standards?

3.6 Mobile Driven 3D Virtual Lung

Use Case ID:	UC-6		
Use Case Name:	Mobile Driven 3D Virtual Lung		
Use Case Owner:	FORTH	**Last Updated By:**	
Technical Collaborators:	TBD	**Clinical Collaborator:**	USAAR
Date Created:	20.06.2013	**Last Revision Date:**	
Description:	**This use case has strong relationship with the following project's tasks:** T5.1 Development of the models repository T5.2 A data repository for models T4.5: Semantic Reasoning for Decision Support T6.1 Data collection utilities T6.2 Data collection from online patient diary T6.3 Data repository for health information T7.1: Scenarios and use cases for MyHealthAvatar Task 8.2 Key techniques of visual analysis Task 8.3 A visual data analysis suite **Moreover it is related to the following project objectives:** • ICT utilities that support data collection, including web information extraction and mobile apps • Visual representation of the avatars in multi-layer geometries and colors to support a body (anatomy) centered visualization of health status data • Visual analytics within the ICT toolbox that offers valuable information blending and analysis from heterogeneous data sources **Details:** In this use case we will capture breathing movements from lung from patients through the acoustic signal of respiration using a mobile smart phone. Using personalized information, additional to the acoustic breathing signal, like the age, gender, height, and possible diseases (i.e. cancer) we will use the MyHealthAvatar model to represent a 3D visualization avatar of the lungs' function. This will be used in order to allow for the visual comparison of the normal function or the goals of the patient. The envisaged application's aim is to create a 3D virtual therapy environment, using MyHealthAvatar platform, customized for the patients which will encourage them to regulate their breath.		
Actors:	End User & MyHealthAvatar platform		
Trigger:	End User		
Preconditions:	This use case will use a smart-phone application that will interface a breathing classification component, a lung capacity estimation component and a 3D visualization component. All the components will be integrated in order to produce appropriate output including the 3-D animations component of the human lung moving according to the corresponding breathing movements of a specific person. Data from MHA and external data source should be mapped to this component.		
Successful End condition:			
Fail End condition:			
Basic Flow:	1. Acoustic signal recording (using mobile phone) 2. Analysis (segmentation) of the acquired signal 3. Lang capacity computation (FVC)		

	4. Classification to identify breathing movements 5. Visualization	
Alternate Flows:		
Postconditions:		
Dependencies:		
Required External Resources:	[x] Data, please specify:	If MHA wants to retrieve external information, the relevant data sources should be available and accessible
	[x] Tools, please specify:	Android/iOS development tools Mobile phone 3d visualization
	[ ] Services, please specify:	
	[ ] Models, please specify:	
	[ ] Other, please specify:	
Frequency of Use:	Frequently	
Who are the users?		
Special Requirements:	A proper interface should be available for searching and visualizing results.	
Assumptions:		
Questions:		

3.7 Mobile Lifestyle and Social media

Use Case ID:	UC-7		
Use Case Name:	Mobile Lifestyle and Social media		
Use Case Owner:	FORTH	Last Updated By:	
Technical Collaborators:	TBD	Clinical Collaborator:	USAAR
Date Created:	20.06.2013	Last Revision Date:	
Description:	**This use case has strong relationship with the following project's tasks:** T6.1 Data collection utilities T6.2 Data collection from online patient diary T6.3 Data repository for health information Task 8.2 Key techniques of visual analysis Task 8.3 A visual data analysis suite **Moreover it is related to the following project objectives:** • ICT utilities that support data collection, including web information extraction and mobile apps • Visual representation of the avatars in multi-layer geometries and colors to support a body (anatomy) centered visualization of health status data **Details:** In this use case we aim to create a symbiotic relationship of available technology today for mobile applications and MyHealthAvatar platform. The goal is to respond to the fast growing demand for developing new technologies and services for mobile/health applications supporting wellness, fitness and prevention of the most common chronic diseases (i.e. cardio-vascular and stroke, diabetes, rheumatic problems, respiratory problems and COPD, etc.). Mobile applications will monitor user's "health-status", "lifestyle" and "wellness" and upload data to the MyHealthAvatar system for close monitoring of health conditions and prevention of many diseases. The system then will be able to analyse user's lifestyle and medical data. Special "alerts" will be applied to support end users with feedback supporting and assisting their daily activities and well-being. A social media service will be used to allow the interconnection of end users. This social media service, accessible by smart phones, will be used in a dual mode allowing the users to insert information about themselves (like they do in common social media technologies) but also will be a mean of supporting personalized services to them from the system in the form of alerts and guidance (i.e. post therapy monitoring of user's behaviours after orthopaedics operation, cancer patients reaction to treatment, etc.). The user will be able to take advantage of mobile digital technology using 3D visualization models the project will deploy.		
Actors:	End User & MyHealthAvatar platform		
Trigger:	End User		
Preconditions:	This use case will use a smart-phone application that will interface with the social media service that will be deployed but also other MyHealthAvatar enabled social media services available today.		
Successful End condition:			
Fail End condition:			
Basic Flow:			
Alternate Flows:			

Postconditions:		
Dependencies:		
Required External Resources:	[x] Data, please specify:	If MHA wants to retrieve external information, the relevant data sources should be available and accessible
	[x] Tools, please specify:	Android/iOS development tools Mobile phone 3d visualization
	[ ] Services, please specify:	
	[ ] Models, please specify:	
	[ ] Other, please specify:	
Frequency of Use:	Frequently	
Who are the users?		
Special Requirements:	A proper interface should be available for searching and visualizing results.	
Assumptions:		
Questions:		

3.8 Compile and perform a simulation using a biological model

Use Case ID:	UC-8		
Use Case Name:	Compile and perform a simulation using a biological model		
Use Case Owner:	ICCS	Last Updated By:	
Technical Collaborators:	TBD	Clinical Collaborator:	USAAR
Date Created:	19.06.2013	Last Revision Date:	
Description:	End-User has the GUIs, functionalities and tools in the frames of MyHealthAvatar platform to create and execute a biological simulation scenario. End-User selects one of the biological simulation models available in the Model Repository and one of the sets of clinical data available in the Clinical Data Repository (or uploads a set from his computer). Afterwards he/she executes a biological simulation. Finally he/she retrieves the results of the simulation and proceeds to their evaluation. This use case has strong relationship with the following project task: T.3.5 Investigation of local cloud T.3.7 Platform integration T.5.1 Development of the model repository T.5.2 Development of the data repository for models T5.3 Integration with the security framework		
Actors:	End User & MyHealthAvatar platform		
Trigger:	• User accesses the section "Simulation Interface". • User "clicks" on a specific area of the 3-D avatar of the human body, for example the kidney, is directly or indirectly (by a menu) redirected to the "Simulation Interface" and is guided to the proper biological simulation model/-s (for example the kidney simulation model/-s).		
Preconditions:	• The User has to Log-in or to create a New Account (New Avatar). • The option to "perform simulations using biological models" must be enabled in the user's profile. • The user must have the proper access rights in order to use a biological simulation model from the Model Repository. • The biological simulation model must be already imported to the Model Repository. • The user must have the proper access rights in order to use a set of clinical data from the Clinical Data Repository. • The clinical data that the biological simulation model needs in order to run must be already imported into the Clinical Data Repository or it must be provided (uploaded) by the user just before the start of the simulation. • The clinical data must be compatible, in terms of format and content, with the selected biological simulation model. • The user must have the proper access rights to a computational platform. • The computational platform must have enough available resources in order for the simulation to be performed successfully.		
Successful End condition:			
Fail End condition:			
Basic Flow:	The basic steps are:		

	1. Successful Log-In (or New account creation) by using Username or Email and Password.
	2. Select the Avatar.
	3. The flow ends here if the End-User doesn't have the option "Perform simulations using biological models" enabled.
	4. The flow continues if the End-User has the option "Perform simulations using biological models" enabled.
	5. End-User creates a biological simulation scenario, by selecting a simulation model from the Model Repository and a set of data from the Clinical Data Repository.
	6. End-User starts the simulation process.
	7. When the simulation is completed, the proper ending code is displayed, either a success message or an erroneous message.
	8. End-User user has the possibility to download the results of the simulation to his computer, either the simulation ended successful or with errors.
Alternate Flows:	The alternative flows are: 1. In step 5 of the basic flow, the selection of the simulation model can be guided by narrowing the available simulation models to only the ones related to a specific part of the human body, by clicking on the 3-D representation of human body. 2. In step 6 of basic flow, End-User can upload a set of data from his computer instead of using a set of data provided by the Clinical Data Repository.
Postconditions:	
Dependencies:	• The option to perform simulations using biological models must be enabled in the user's profile. • The user must have the proper access rights to the Model Repository. • The user must have the proper access rights to the Clinical data repository. • The user must have the proper access rights to a Computational Platform.

Required External Resources:	[x] Data, please specify:	Clinical data (already preprocessed), ready to be used by the simulation models
	[x] Tools, please specify:	• Model Repository • Clinical Data Repository (related to simulation models)
	[x] Services, please specify:	• Query the Model Repository for available models. • Query the Clinical Data Repository (related to biological simulation models). • Copy a selected model to the computational platform. • Copy a set of selected preprocessed data to the computational platform. • Execute the simulation scenario (by sending a computational job to the

		computational platform). • Retrieve the result of the execution of a simulation model.
	[x] Models, please specify:	Simulation Models
	[x] Other, please specify:	Computational Platform: Can be either a personal computer, a cloud virtual machine, a High Performance Computer (HPC) or any other system able to perform computational simulations.
Frequency of Use:	Medium frequency.	
Who are the users?		
Special Requirements:		
Assumptions:	• The biological simulation model is already imported in the model repository. • A set of clinical data compatible with the aforementioned biological simulation model is already imported in the clinical data repository. • Appropriate computational resources are available for running the simulation. • The security framework is responsible for controlling the access to the model repository, the clinical data repository and the computational platform.	
Questions:	Although the biological simulation model (nephroblastoma) planned to be used in the MyHealthAvatar demonstrator doesn't use proprietary software, what if a model uses proprietary software, like a model developed in Matlab (licensing issues)?	

3.9 Manage the content of the Model Repository and the Clinical Data Repository

Use Case ID:	UC-9
Use Case Name:	Manage the content of the Model Repository and the Clinical Data Repository (related to simulation models)

Use Case Owner:	ICCS	**Last Updated By:**	
Technical Collaborators:	TBD	**Clinical Collaborator:**	USAAR
Date Created:	29.06.2013	**Last Revision Date:**	

Description:	End-User has the GUIs, functionalities to manage the content of the Model Repository and the Clinical Data Repository (related to simulation models). This use case has strong relationship with the following project task: T.3.7 Platform integration T.5.1 Development of the model repository T.5.2 Development of the data repository for models T5.3 Integration with the security framework Due to the commonness of this use case, a detailed description is redundant.
Actors:	End User & MyHealthAvatar platform
Trigger:	• User "clicks" on links available in the main MyHealthAvatar web interface. • User accesses the Model Repository URL or the Clinical Data Repository URL.
Preconditions:	The following precondition applies to both Model Repository and the Clinical Data Repository: • The User has to Log-in to the interface of the Repository
Successful End condition:	
Fail End condition:	
Basic Flow:	The following basic flow applies to both Model Repositories and Clinical Data Repository. The basic steps are: 1. Successful Log-In (or New account creation) by using Username or Email and Password. 2. Manage (add, edit, upload, delete) the content of the Repository.
Alternate Flows:	The alternative flow is: 1. In case the user has administrative rights he/she can have access to the user management interface and perform the corresponding actions.
Postconditions:	
Dependencies:	

Required External Resources:	[ ] Data, please specify:	
	[ ] Tools, please specify:	
	[ ] Services, please specify:	
	[ ] Models, please specify:	
	[ ] Other, please specify:	

Frequency of Use:	Medium frequency.
Who are the users?	
Special Requirements:	
Assumptions:	
Questions:	

3.10 Tools for browsing medical images in avatar

Use Case ID:	UC-10		
Use Case Name:	Tools for browsing medical images in avatar		
Use Case Owner:	LIN	Last Updated By:	
Technical Collaborators:	TBD	Clinical Collaborator:	USAAR
Date Created:	04.07.2013	Last Revision Date:	
Description:	Tools which will help the user to analyze medical image		
Actors:	End User & MyHealthAvatar platform		
Trigger:	User accesses the section "Tools"		
Preconditions:	User has to Log-in or to create a New Account (New Avatar)		
Successful End condition:			
Fail End condition:			
Basic Flow:	The basic steps are: 1. Successful Log-In (or New account creation) by using Username or Email and Password 2. Select your Avatar 3. Click Enter on the 'Tools' section and manipulate the 3D Body		
Alternate Flows:	The 'Tools' section must be accessible from any location of the MyHealthAvatar platform.		
Postconditions:			
Dependencies:	The platform must provide library consisted by information regarding several anatomy objects with 3D navigation		
Required External Resources:	[ ] Data, please specify:		
	[ ] Tools, please specify:		
	[ ] Services, please specify:		
	[ ] Models, please specify:		
	[ ] Other, please specify:		
Frequency of Use:	Frequent use is expected		
Who are the users?			
Special Requirements:	Tools • Select a set of medical images within the avatar • Load and Browse the selected images • Allow zoom in/out at particular areas of the images • Indicate the images at corresponding part of the avatar body		
Assumptions:	To be accessible in all browsers.		
Questions:			

3.11 Tools for the analysis of medical images in avatar

Use Case ID:	UC-11
Use Case Name:	Tools for the analysis of medical images in avatar

Use Case Owner:	LIN	**Last Updated By:**	
Technical Collaborators:	TBD	**Clinical Collaborator:**	USAAR
Date Created:	04.07.2013	**Last Revision Date:**	

Description:	Tools which will help the user to analyze medical images
Actors:	End User & MyHealthAvatar platform
Trigger:	User accesses the section "Tools"
Preconditions:	User has to Log-in or to create a New Account (New Avatar)
Successful End condition:	
Fail End condition:	
Basic Flow:	The basic steps are: 1. Successful Log-In (or New account creation) by using Username or Email and Password 2. Select your Avatar 3. Click Enter on the 'Tools' section and manipulate the 3D Body
Alternate Flows:	The 'Tools' section must be accessible from any location of the MyHealthAvatar platform.
Postconditions:	
Dependencies:	The platform must provide library consisted by information regarding several anatomy objects with 3D navigation

Required External Resources:	[ ] Data, please specify:	
	[ ] Tools, please specify:	
	[ ] Services, please specify:	
	[ ] Models, please specify:	
	[ ] Other, please specify:	

Frequency of Use:	Frequent use is expected
Who are the users?	
Special Requirements:	Tools • Perform basic image processing, such as Image filtering, and enhancement, etc. • Perform segmentation of region of interests (lesions or anatomies) on selected images
Assumptions:	To be accessible in all browsers.
Questions:	

3.12 Utilization of personal genomic information for the individualization of MHA platform

Use Case ID:	UC-12		
Use Case Name:	Utilization of personal genomic information for the individualization of MHA platform		
Use Case Owner:	FORTH	Last Updated By:	
Technical Collaborators:	TBD	Clinical Collaborator:	USAAR
Date Created:	21.07.2013	Last Revision Date:	
Description:	Our health status and all our personal traits are the outcome of the continuous interaction between our genomic background and the various environmental parameters. The present use case aims at the **development of MHA technology as an individualized medicine platform by the utilization, interpretation and integration of personal genomic information into health medical history record**. This technically high-level and complex use case involves a number of health and lifestyle related processes, tools and services which translate genomic data to genetic predisposition evaluation and health risk estimation, pharmacogenomic predictions, histology and pathway visualizations etc. in order to support and facilitate advanced individualized medical decision making (integrative individual patient case view, specification of simulation models, therapy selection etc.) and provide with guidelines for preventive medicine. This use case relates to the following tasks of the project: T.3.7 Platform integration T4.5: Semantic Reasoning for Decision Support T.5.2 Development of the data repository for models T6.1 Data collection utilities T6.3 Data repository for health information Task 8.2 Key techniques of visual analysis Task 8.3 A visual data analysis suite		
Actors:	User, MyHealthAvatar platform, eHR, Genome Information		
Trigger:	User uploads file with genome information to MHA platform.		
Preconditions:	Inform consent should have been obtained for comprehensive genome analysis and genetic counseling should be available. Further evaluation of the volunteer(s) could be considered (according to **Personal Genome Project** criteria). Personal Genome (or Exome) information at high coverage (>75%) should have be obtained by Next Generation Sequencing Platforms (available to MHA consortium) and at an adequate depth. Personal genome data, but with limited health related information, can be downloaded from public data sources (**1000 genomes**) and or Personal Genomics initiatives (**genomes unzipped**).		
Successful End condition:			
Fail End condition:			
Basic Flow:	The basic (high-level) steps from the Genome information upload to the creation of an individualized HealthAvatar platform are: 1. **Sequence comparison and alignment** algorithms using the input genome data and the **Human Genome Reference** identify gene alleles, haplotypes, mutations and polymorphisms on the individual's genome. Other special algorithms and quantitative measurements identify chromosomal aberrations. Genome browser tools can also be included as an option for the expert user.		

	2. Identified genome variations are compared to reported Disease related and Pharmacogenomic databases. Extensive **lists of annotated variations** are generated.
	3. Health related genotype evaluations are performed:
	a) Burden or risk from mutations related to **monogenic disorders** is identified (more than 10,000 diseases are known to be monogenic ie. Thalassaemia, Cystic Fibrosis, Huntington's).
	b) Sets of gene alleles or SNPs are co-evaluated for **genetic predisposition to multigenic diseases** (T2 diabetes, Obesity, Dyslipidemia, Hypertension etc.) or protective alleles (in PCSK9 and Coronary disease).
	c) **Pharmacogenomic variations** are identified in Phase I, II, transporters and other drug metabolism related genes.
	4. Personalized **Risk Graphs** are generated presenting the current risks, according to individual's epidemiological data and genotype. Re-evaluation by comparison of the genetic predisposition and the actual health status.
	5. Individual is classified according to pharmacogenomics background to Poor/Intermediate/Extensive/Ultra-rapid metabolizer for **various drugs** and active compounds.
	6. Evaluating the risks and possibly considering the pharmacogenomics background, specific, individualized, **preventive medicine and lifestyle counseling** can be provided by experts (i.e. prescription of Prasugrel instead of Plavix for CVD in poor CYP2C19 metabolizer, changes in fat diet and nutraceuticals i.e. plant sterols) according to general guidelines.
	7. **Visualization** of this information into the MHA platform in disease and/or tissue specific manner.
	Note: Certain steps (ie. 1 & 2) can also be implemented "off-line" using a specialized genome analysis platform (Partek genomics suite, Ingenuity Systems, CLC genomics workbench etc.) and then introduced into the MHA platform.
Alternate Flows:	Alternatively and targeting the interested individual or "patient", the MHA platform could provide special tools and services such as:
	1. Mobile expert information, guidelines and suggestions about lifestyle habits (exercise, diet, food supplements) on an individualized basis.
	2. Genetic counseling services and awareness reports about certain "actionable" genetic characteristics and possible risks. Participation to social networks and involvement in patient groups (as in UC-9: Mobile Lifestyle and Social media).
	3. Capture everyday lifestyle information such as diet (fats, calorie content, sweeteners etc.), health related habits (smoking etc.), work environment (hazard agents etc.), exercise (distance walked etc.), mood and physical condition, vital signals (blood pressure, sugar levels etc.) and record all this information together with the medical Health Record and the Personal Genomic Information in order to create the most comprehensive health related information collection for further evaluation of genomic and environmental determinants in health and disease.
	4. Deviating from health applications, ethnic heritage information based on mitochondrial DNA (matrilineal) and Y chromosome (patrilineal) haplogroup information could be provided.
Postconditions:	Further directions for the utilization of personal genomic information can be

	the use of MHA platform as an advanced visualization and/or simulation tool for pharmacodynamics and pharmacokinetics. In this case use co-visualization and/or *in silico* models can be developed for: i) drug distribution to various tissues (according to pharmacokinetic measurements), ii) drag target expression and iii) individual's mutant and variant protein expression maps for those related to drug response (according to available data sources i.e. Human Protein Atlas), and iv) molecular pathways related to the particular tissues, drug target and therapy related proteins. Tissue, organ visualization tools (UC-3: Interactive 3D Model of the Human Body and UC-7: 3D Avatar Visualization and manipulation) and simulation tools (UC-10: Compile and perform a simulation using a biological model) described in other Use Cases could be utilized and further specialized in support of these further advancements of the MHA platform.	
Dependencies:	The present use case is presented as a high technical level scenario assuming that various procedures and tools are in place and operational (i.e. genome annotation). Specific technical developments (i.e. generation of predisposition gene lists) can be further elaborated as lower level use cases. Other existing dependencies, such as the availability of medical data, are covered in related use cases. (UC-1: Enter, import, store and export personal medical data e.g. Electronic Health Records). It should also be noted that targeted genomic information could also be utilized in order to individualize specific use cases such as UC-5: Remote monitoring (Diabetes, blood sugar level).	
Required External Resources:	[x] Data, please specify:	Pharmacogenomics profile (DMET chip) and/or comprehensive genome or exome information (from Ion Proton HTP Sequencing platforms available at IMBB-FORTH) and health records of 2-4 volunteers. Personal genome information with limited health data annotation from public sources (1000genomes etc.)
	[x] Tools, please specify:	Genome browser and annotation: VEGA, Argo, Artemis, genome browsers Genomes unzipped, or Golden Helix Genome Browse, or Integrative Genomics Viewer Ingenuity (variant analysis) Genome Space tools (GeneOntology, KEGG etc.) DNAnexus Bioconductor (Variants)
	[x] Services, please specify:	Query databases: Annovar (biobase) The Human Gene Mutation Database Cosmic Database (human cancers) GWAS central The Cancer Genome Atlas MutaBase Human Protein Atlas
	[x] Models, please specify:	Pharmacodynamics and pharmacokinetics model for specific (demonstration) purposes. PharmGkb simCYP
	[x] Other, please specify:	Disease-Tissue MHA Visualization tools

Frequency of Use:	In principle personal genomic information should be the basis of every "patient" case and its MHA instantiation. In that sense, all platform tools should eventually become "individualized" utilizing and presenting genomic and genetic information
Who are the users?	
Special Requirements:	Specialized Databases for providing specific disease and/or risk and/or lifestyle guidelines (step 6 and alternative step 2) Pharmacodynamics and pharmacokinetics data (step 5) A user friendly interface for introducing/recording everyday health and lifestyle information and for monitoring "biosignals" via a number of portable, mobile, wearable devices (alternative step 3)
Assumptions:	The present use case utilizes most of the available knowledge but for accurate risk calculations, health evaluations and therapy predictions detailed patho-physiological data and correlation information are needed. Although these are intensively gathered in a wide variety of studies, extensive detailed information is not yet available.
Questions:	The technical development of such a complex and high-level use case scenario into an individualized MHA platform is obviously demanding more than the available time and resources. Can the consortium identify a specific application (ie. blood sugar monitoring, specific drug and therapy modeling or monitoring etc.) in which there is available interest and expertise?

3.13 Anti-platelet therapy in pre-operating period

Use Case ID:	UC-13
Use Case Name:	Anti-platelet therapy in pre-operating period (The example of decision making tool regarding emergency situations in clinical practice)

Use Case Owner:	FORTH	**Last Updated By:**	
Technical Collaborators:	TBD	**Clinical Collaborator:**	USAAR
Date Created:	28/06/2013	**Last Revision Date:**	23/07/2013

Description:	Hemostasis disorders can develop due to a deficiency or defect in an individual's platelets or clotting factors. Dysfunctions can lead either in bleeding disorders (hemophilia) or in over-clotting disorders such as thrombosis. Dysfunctions that lead in thrombus formation can be related with morbidities such as cardiovascular disorders (coronary disease, heart attack, angina, congestive heart failure and valve disease), pulmonary embolism, stroke and transient ischemic attacks, deep vein thrombosis, peripheral vascular disease (PVD), phlebitis and in some cases obesity. Patients that are diagnosed with over-clotting deficiencies are treated with anticoagulant or anti-platelet therapies as a preventive care. Several single nucleotide polymorpshisms (SNPs) are known regarding drug-targets or metabolizing enzymes (mainly of Cytochrome P450 family) of anti-platelet and anticoagulant therapies. Some well-known examples are the Vitamin K epoxide reductase complex subunit 1 (VKORC1) where specific gene mutations have been related with deficiencies in Vitamin-K-depedent clotting factors and the response to anticoagulant therapies of warfarin and acenocoumarol. Also regarding metabolizing enzymes of P450 family, CYP2C19 is the main metabolic enzyme for the activation of the anti-platelet agent clopidogrel. Clopidogrel is a pro-drug activated in the liver by cytochrome P450 enzymes, mainly CYP2C19. Genetic polymorphism (CYP2C19*2, CYP2C19*3 and CYP2C19*17) exists for CYP2C19 expression, with approximately 5% of Caucasian and 20% of Asian populations being poor metabolizers with no CYP2C19 function. Due to the above, Anti-platelet and anticoagulant agents that are administered in clinical practice appear to have a large inter-subject variability in their pharmacokinetics and thus in pharmacodynamics. Antiplatelet and anticoagulation therapies are typical examples where therapeutic drug monitoring is applied for every patient as well as pharmacogenomics information are taken into account and several algorithms have been created in order to integrate data and improve pharmacotherapy. Moreover, there are emergency cases such as pre-operative periods where an adjustment in dose should be applied for patients following anti-coagulation and anti-platelet therapies in order to avoid bleeding problems during surgery or in the stage of recovery. A typical use-case scenario: "A male 55 years old that follows anti-platelet therapy, needs to go on surgery. The doctor has to re-adjust the administration of the anti-platelet therapy for the up-coming surgery and wants to perform the operation as soon as possible. General information are known for pre-operative care but how can the doctor avoid any guesswork and apply a personalized approach for this case and possible for future patients?"
Actors:	Avatar1(Doctor),Avatar2 (patient), (Avatar3) Research staff for in silico clinical trials platforms, genome information platform/tool, MyHealthAvatar platform

Trigger:	Upload of diagnosis in patient's electronic health record or during creation of patient's Avatar in MHA platform. Alternative the use case can be triggered after the medical examination and the decision that patient should go on surgery.
Preconditions:	The facts that are true in this case are: 1. Anti-platelet therapy may lead in the appearance of bleeding in the postoperative period. 2. Anti-platelet and anti-thrombotic agents that are administered in clinical practice appear to have a large inter-subject variability in their pharmacokinetics and thus in pharmacodynamics due to genetic and epigenetic factors. 3. Anti-platelet therapy is a clinical case that personalized medicine tools are essential. Therapeutic drug monitoring is usually followed for the proper adjustment of the treatment administered. 4. There are not many data available regarding the time that the treatment will stop be active after the discontinuation. 5. Clinical trials regarding the above situation cannot be performed.
Successful End condition:	
Fail End condition:	

Basic Flow:	Basic steps:
	1. Gathering all the necessary data required from patients health record. This step can be during the therapeutic drug monitoring and dose adjustment prior to the emergency situation. Also this step can be during utilization of personal genomics (Use-case 14)
	2. Creating of MyHealthAvatar profile for this patient
	3. Development of a workspace in a platform for in silico clinical trials
	The basic things that are needed:
	    I. Drug data regarding the pharmacokinetic and/or pharmacodynamic parameters as well as for toxicity
	    II. Population data regarding demographic, genetic, biochemical and physiological parameters
	      − Patient's genetic data of drug-metabolizing enzymes which can influence drug concentrations in the body should be considered.
	      − Data for (I) and (II) could be available from literature and can be in the default parameters of the platform or can be enriched from patient's data
	      − Data for (II) can be created from clustering of MyHealthAvatar profiles of patients with same or similar disease profile
	    III. Clinical trial protocol and design. In this case the clinical trial will need to estimate the drug concentrations in the body for a period of time after the last administration (i.e. 48 hours after the last administration)
	4. Simulation of virtual clinical trials in the specific "virtual population"
	5. Embed results in an appropriate worksheet or in a different platform
	6. Matching and identification of the Avatar from MHA with the "virtual patient" from the "virtual population" of the simulated clinical trial
	7. Identification of the time that anti-platelet's drug concentration is below the minimum effective concentration
	8. Evaluation for the time needed after the sub-therapeutic concentrations of the drug in order the clotting activity to start

	returning to the default values.
	9. Evaluation of the obtained results and decision of the time that the patient will be ready for surgery
	10. Surgery performing and re-introduction of the anti-thrombotic treatment
	Note: This basic flow can be created during therapeutic drug monitoring of patient's status after the diagnosis of clotting-deficiency
Alternate Flows:	Alternative flows will be followed if the patient is receiving treatments for other co-existing diseases for the possible evaluation of any interactions and/or any modulations regarding the basic flow.
	Alternative flows can be considered taking into account the adding therapies applied after or during surgery for this patient (e.g. antibiotics, analgesics, sedatives, antacids, anticoagulants administered subcutaneous or intravenous such as heparin etc.)
Postconditions:	Monitoring of patients status after surgery. Evaluating results and update data in MHA and in clinical trial simulator platform. Re-adjust the therapy on the recovery stage
Dependencies:	This case refers in the administration of drugs in emerging situations in clinical level such as pre-operative period and for patients in intensive care units. It represents a typical example of how data can be created through in silico clinical trials approaches especially in clinical cases where clinical trials cannot be performed. It also tries to represent how personalized information regarding drugs, diseases and health status information can be introduced and exploited through MHA in order to create decision making tools and approaches.
	Dependencies of this case can be related with Use Cases 1, 2, 3 and 5. This case follows and it is related with the Use Case 14 and utilization of personal genomic information for the individualization of MHA platform

Required External Resources:	[x] Data, please specify:	• Drug data
		   o Pharmacokinetic properties
		   o Pharmacodynamic properties
		• Population data
		   o Demographic
		   o Genetic
		   o Physiology
		   o Pathology
		• Clinical trials protocols and parameters (as they are described in regulatory organizations FDA and EMA)

	[x] Tools, please specify:	PCs with related software installed regarding in silico clinical trials MHA platform Genomic platforms/tools Bioinformatic tools
	[x] Services, please specify:	Links with databases: Genomic databases (see use-case 14) Drug databases (PharmKGB, Pubmed, DrugBank)
	[x] Models, please specify:	Physiologically-Based Pharmacokinetic/Pharmacodynamic models
	[x] Other, please specify:	Normal values of hemostatic factors

		in general and/or specific population
Frequency of Use:	The in silico application of virtual clinical trials can be used in every emergency case where a following treatment may influence the post-operating recovery of a patient after surgery. The development of databases and generation of data prior to the emergency situation could be more helpful regarding the faster fitting of the patient with Avatar.	
Who are the users?		
Special Requirements:	Familiarity of doctors and generally of the medical staff with MHA technologies Linking of MHA data between research and medical organizations and personnel applying MHA technologies	
Assumptions:	Some basic assumptions are: - Necessary drug data for the generation of the in silico clinical trials are available in the literature and easily accessed - Full and detailed patient's health history record - Platforms used for in silico clinical trials have been evaluated with clinical results from other studies (Validity of the platform) - Continuous development and simulation of clinical trials from in silico platforms in order to create databases for patient's avatar fitting	
Questions:	The new era in health care towards the "stratified medicine" and personalization of treatment demands the development of approaches and tools such as MHA platform. The question that rises is how an education program could be introduced for medical society (especially staff that work in the point of service such as hospitals etc.) in order to get familiar with user-friendly platforms and tools and also stay up to date with these approaches?	

3.14 Multi-scale visualization of biomedical data

Use Case ID:	UC-14		
Use Case Name:	Multi-scale visualization of biomedical data		
Use Case Owner:	FORTH	Last Updated By:	
Technical Collaborators:	TBD	Clinical Collaborator:	USAAR
Date Created:	25.07.2013	Last Revision Date:	
Description:	One of the key challenges for MyHealthAvatar is the interactive visualization of multi-scale biomedical data. The typical data will be a 3D+time dataset of which multiple instances at different scales will have to be displayed together. Information will be on very different spatial and temporal scales going from the molecule up to body level, in different forms (medical images, computer models, signals etc.) and of heterogeneous dimensionality (2D, 3D, 3D+t). This use case relates to the following tasks of the project: T8.1 Avatar modeling and rendering suite T8.2 Key techniques of visual analysis T8.3 A visual data analysis suite Moreover it is related to the following project objectives: "Visual representation of the avatars in multi-layer geometries and colours to support a body (anatomy) centred visualization of health status data". This use case will be presented in the context of the clinical case of Alzheimer disease. Alzheimer is a chronic, progressive neurodegenerative disease. The following tools are used for the diagnosis, monitoring and treatment: 1. **Patient history** helps the doctor assess an individual's past and current health situation. It also helps the doctor evaluate any medical problems, develop a plan of treatment, and monitor the patient's health over time. This may include information about age, sex, history of current illness, past medical history, memory loss events etc. 2. **Physical examination** enables the doctor to assess the overall physical condition of the patient. The physical exam includes an examination of vital signs (temperature, blood pressure, pulse), height and weight, skin, head, eyes, ears, nose, throat/neck, chest, including lungs and heart, breasts, abdomen, bones and muscles, nerves. 3. **Laboratory tests**, including blood tests and urinalysis. Blood tests are used to look for the presence of a specific gene that has been identified as a risk factor for Alzheimer's disease. Urinalysis tests detects abnormalities, such as improper levels of sugar or protein. 4. **Lumbar puncture/spinal tap** is a procedure in which the fluid surrounding the spinal cord is withdrawn through a needle and examined in a laboratory. This test can help your doctor diagnose disorders of the central nervous system. 5. **Computed tomography (CT)** scan creates a series of cross-sectional "slices" of the body. CT scans often can reveal certain changes that are characteristic of Alzheimer's disease in its later stages. 6. **Magnetic resonance imaging (MRI)** is very helpful for imaging "soft tissues," such as organs. MRI is beneficial in ruling out other causes		

of dementia, such as tumors or strokes. It also might help to show the physical and functional changes in the brain that are associated with Alzheimer's disease.

7. **Electroencephalography (EEG)** measures brain function by analyzing the electrical activity generated by the brain. This activity is measured through special electrodes applied to the scalp. It is most helpful in identifying disorders that can mimic Alzheimer's disease.

8. **Electrocardiogram (ECG or EKG)** is a recording of the heart's electrical activity, showing the heart's rate and rhythm.

In addition, the following tests also might be done to help diagnose and monitor the progression of Alzheimer's disease: Neuropsychological testing, Positron emission tomography (PET) scan, Single photon emission computed tomography (SPECT) scan and Magnetic resonance spectroscopy imaging (MRSI).

Considering that Alzheimer is a chronic disease, the above multi-level medical data will exhibit a strong dynamic and temporal nature. Interactive multi-scale visualization is necessary for supporting data reasoning and search. This will offer a useful input to doctors and will help them to carry out personalized healthcare. A first step target multi-scale visualization is the use of different markers on the avatar, presenting the existence and the location of available datasets on different levels, from molecule to body level.

Actors:	End User & MyHealthAvatar platform
Trigger:	User accesses the Avatar
Preconditions:	1. User has to Log-in 2. Biomedical data have been imported to the platform for the specific avatar.
Successful End condition:	
Fail End condition:	
Basic Flow:	1. Select the avatar. 2. The visual markers are presented on the avatar, indicating the available datasets on different locations of the body. 3. Mouse over a marker, a popup window with basic information for the specific dataset is presented. 4. Click on a desired marker and a navigation window is opened. The navigation window presents the complete description of the dataset and a list of all available children datasets. 5. Navigate on different levels (from body to molecule level and reverse) by clicking on the corresponding datasets icons on the navigation window.
Alternate Flows:	1. For temporal multi-scale data, the representation is obtained by "animating" the visualization over the time. Each frame displays the value of each parameter at a given time point (e.g. predictive models). 2. For spatial multi-scale data, user can configure multiple views of the same dataset. The user can move from one scale to other by clicking on the visual markers, which show the presence of lower scale data.
Postconditions:	-
Dependencies:	Dependencies are related to UC 1, UC 3, UC 5, UC 7
Required External Resources:	[x] Data, please specify:	Medical Data
	[ ] Tools, please specify:	

	[ ] Services, please specify:	
	[x] Models, please specify:	3D Models of the human body
	[ ] Other, please specify:	
Frequency of Use:	Frequently	
Who are the users?		
Special Requirements:		
Assumptions:	User friendly interface, accessible by all browsers	
Questions:		

3.15 Bidirectional linkage to ObTiMA

Use Case ID:	UC-15		
Use Case Name:	Bidirectional linkage to ObTiMA		
Use Case Owner:	USAAR	Last Updated By:	
Technical Collaborators:	TBD	Clinical Collaborator:	USAAR
Date Created:	02.08.2013	Last Revision Date:	
Description:	ObTiMA, an ontology-based clinical trial management system, has been developed as a proof-of-concept application to highlight the possibilities of ontology based creation and managing of clinical trials within the ACGT (Advancing Clinico-Genomic Trials on Cancer) project. ObTiMA has a modular architecture with a core basic module for data management of clinical trials. Different other modules are under development in the frames of p-medicine project. The data stored in ObTiMA are relevant for the Health Avatar to enhance the system with relevant clinical trial data. On the other hand the info stored in MHA might be of relevance for a clinical trial. As result, the bidirectional data upload from MHA to ObTiMA is needed. This Scenario / Use Case describes the bilateral linkage between ObTiMA and MHA by being focused on the Operational Data Model (ODM).		
Actors:	Patients and healthcare professionals enrolled in clinical trials		
Trigger:	Two trigger interfaces are required, one for patients with an account in ObTiMa and MHA. The second trigger interface is required for healthcare professionals with accounts in MHA and ObTiMA platforms.		
Preconditions:	The major precondition is the presence of the confirmed accounts in two platforms (MHA and ObTiMA)		
Successful End condition:	Successful data exchange		
Fail End condition:	Failed data exchange		
Basic Flow:	The basic steps are: • Access the data export/import interface • Specify data export/import from ObTiMA • Specify data export/import from MHA • Confirmation message of data/export		
Alternate Flows:			
Postconditions:	Data export/import confirmation		
Dependencies:	Presence of data export/import frameworks in two platforms (MHA and ObtiMA)		
Required External Resources:	[x] Data, please specify:		eCRF with filed in data from ObTiMA Health Avatar with clinical trial related data (i.e. laboratory results, pre-operative state, etc.)
	[x] Tools, please specify:		ObTiMA platform
	[ ] Services, please specify:		
	[x] Models, please specify:		The Operational Data Model (ODM) is designed to facilitate the archive and interchange of the metadata and data for clinical research, its power being fully unleashed when data are collected from multiple sources.

	[ ] Other, please specify:	
How this use-case is going to be validated?	Successful implementation of data/export functionalities with the related end user frames.	
Frequency of Use:	Frequent in case of enrolment in clinical trials	
Who are the users?	Healthcare professionals and Patients enrolled in clinical trials.	
Special Requirements:	Export import interfaces in both platform according CDISC ODM standards	
Assumptions:		
Questions:		

3.16 Consultation Scenario: Interaction between the patient and physician

Use Case ID:	UC-16		
Use Case Name:	Consultation Scenario: Interaction between the patient and physician		
Use Case Owner:	USAAR	Last Updated By:	
Technical Collaborators:	TBD	Clinical Collaborator:	USAAR
Date Created:	02.08.2013	Last Revision Date:	
Description:	The MyHealthAvatar system can be used for direct interaction between the patient and the physician. Such an interaction might provide the following functionalities: 1. Making appointments with the physician 2. Asking questions to the physician 3. Giving advice to the patient by the physician		
Actors:	Patients and healthcare professionals		
Trigger:	The patient is accessing the MHA consultation interface and selects his/her physician from the list of MHA platform registered healthcare professionals		
Preconditions:	The patient and healthcare professionals should be with confirmed registrations in the frames of MHA platform.		
Successful End condition:	The patient is able to find and to select his/her physician from the consultation interface		
Fail End condition:	The patient is not able to find and to select his/her physician from the consultation interface		
Basic Flow:	The basic flow is: • patient finds and selects his physician from consultation interface • the option to write a message and/or invite to view his/her Avatar is given • patient specify his request with possibility to attach (or provide the access) to his/her avatar • the notification message is sent to the selected physician • the selected physician is receiving a related notification with ability to access all additional provided information (patient avatar) or with possibility to request more information • a feedback message is sent back to the patient • all sent/received messages are stored with possibility to access or delete them		
Alternate Flows:	Alternative flows could be available in case if patient is requesting any information from his/her physician by visualizing the 3D avatar. Vice-versa flow as well should be possible (healthcare professional is asking questions to his patient or is requesting the access to his avatar)		
Postconditions:	What is the next step? Consider this use case as the precondition for the next.		
Dependencies:	Many dependences are in place, end users should be able to: • create accounts to visualize the avatar; • access the avatar with related healthcare data; • share their data and/or avatar.		
Required External Resources:	[x] Data, please specify:	Avatar with healthcare related data	
	[] Tools, please specify:		
	[ ] Services, please specify:		
	[ ] Models, please specify:		
	[ ] Other, please specify:		

How this use-case is going to be validated?	Include how the aforementioned use-case will be integrated possibly with clinicians workflow
Frequency of Use:	Frequent
Who are the users?	Healthcare professionals and patients
Special Requirements:	Advanced end-users usability frames should be implemented
Assumptions:	
Questions:	

3.17 Patient Diary

Use Case ID:	UC-17		
Use Case Name:	Patient Diary		
Use Case Owner:	USAAR	Last Updated By:	
Technical Collaborators:	TBD	Clinical Collaborator:	USAAR
Date Created:	02.08.2013	Last Revision Date:	
Description:	An interface for patients writing a diary is very helpful to collect patient specific data related to their disease. This can be partly structured: e.g. body weight, heart rate, blood pressure, temperature, medicine taken, etc. It can also include structured data of scoring systems, e.g. physical and/or psychological and/or emotional status. In addition free text entry needs to be allowed.		
Actors:	MHA platform end-users (patients)		
Trigger:	What is making the use case begin. For instance, User presses a button.		
Preconditions:	Confirmed registration and the access to the Diary interface		
Successful End condition:	Access Diary interface		
Fail End condition:	No access to Diary interface		
Basic Flow:	The basic steps are: 1. Successful Log-In (or New account creation) by using Username or Email and Password 2. Select your Avatar 3. Click Diary section from your Avatar 4. The Diary interface is shown with ability to enter and or visualize data by date, week, month, year. 5. End User has the option to select any date or any diary entry with possibility to update it (in case of updates the update date is shown) 6. Some diary entries could be in linkage with avatar appearance. 7. End User has the option to "Edit", "Save", "Print" or "Share" the Diary info.		
Alternate Flows:	Alternatively flows are possible, important is to have the Diary interface accessible from any page of MHA platform.		
Postconditions:			
Dependencies:	Diary structured data or minimum data set should be specified		
Required External Resources:	[x] Data, please specify:	Diary structured data or minimum data set	
	[x] Tools, please specify:	Import tools from other patients diary systems could be required	
	[ ] Services, please specify:		
	[ ] Models, please specify:		
	[ ] Other, please specify:		
How this use-case is going to be validated?	By project partners and end-users		
Frequency of Use:	Frequently in special case of patients with chronic conditions		
Who are the users?	Patients as end-users of MHA platform		
Special Requirements:			
Assumptions:			
Questions:			

3.18 Patient Devices SDK

Use Case ID:	UC-18		
Use Case Name:	Patient Devices SDKs		
Use Case Owner:	USAAR	Last Updated By:	
Technical Collaborators:	TBD	Clinical Collaborator:	USAAR
Date Created:	02.08.2013	Last Revision Date:	
Description:	Today many different devices are available that collect data, e.g. blood pressure, heart rate, blood glucose levels, etc. The approach for direct storage of these data in MHA is possible by implementing an advanced Patient Devices Software Development Kit (SDK or "devkit"). A SDK will represent a set of software development tools that will allow healthcare it professionals the creation of applications for MHA able to access and strore data from any patient monitoring device. Patient Devices SDK may be something as simple as an application programming interface (API) in the form of some files to interface to a particular programming language or include sophisticated hardware to communicate with MHA platform. SDK may also include sample code and supporting technical notes or other supporting documentation to help clarify points from the primary reference material.		
Actors:	IT professionals		
Trigger:	IT professionals may request the access to MHA API interface		
Preconditions:	IT professionals should register and provide some basic registration information.		
Successful End condition:	IT professionals have the access to MHA API		
Fail End condition:	IT professionals do not have the access to MHA API		
Basic Flow:	No flow is available, important is to develop from the very beginning the MHA platform with related API frames/functionalities		
Alternate Flows:			
Postconditions:	With access to MHA API software developers will be able to elaborate any services and software able to connect to avatars and store patient data from any device.		
Dependencies:	The MHA platform is proposed for implementation as a web-based API layer. It could include a web application that provides an explorer type UI for the MHA platform as well as being the key middleman web based authentication. This environment (API framework) will enable all interested software developers to create a comprehensive suite of functionalities that will leverage MHA core capabilities.		
Required External Resources:	[] Data, please specify:		
	[ ] Tools, please specify:		
	[ ] Services, please specify:		
	[ ] Models, please specify:		
	[x] Other, please specify:	Java Programming Language Application Programming Interfaces (APIs)	
How this use-case is going to be validated?	By project partners (IT professionals)		
Frequency of Use:	Frequently in case of API presence		

Who are the users?	IT professionals and (indirectly) all MHA end-users
Special Requirements:	
Assumptions:	
Questions:	

3.19 Search for Similar Patients

Use Case ID:	UC-19		
Use Case Name:	Search for Similar Patients		
Use Case Owner:	USAAR	Last Updated By:	
Technical Collaborators:	TBD	Clinical Collaborator:	USAAR
Date Created:	02.08.2013	Last Revision Date:	
Description:	This Scenario / Use Case describes the search framework from end-users' perspective and it is focused on listing all MHA registered end-users with ability to apply advanced search filters: • Age • Gender • Votes (Likes) • Treatment • Symptom • Interests • Country • City • etc. It is important to mention that every end-user should confirm the possibility to visualize his/her profile publically or privately. Only public profiles should be visible in search results. Additionally, the search function is suggested to be accessible only for end-users with public profiles. For an example of advanced search filters, please visit http://www.patientslikeme.com/patients		
Actors:	Patients and other end-users of MHA platform		
Trigger:	User search for patients (other end users).		
Preconditions:	Confirmed MHA end-user profile should be in place (preferably) with confirmation to visualize his/her profile publically. The minimum suggested search filters are: • Age • Gender • Votes (Likes) • Treatment • Symptom • Interests • Country • City		
Successful End condition:			
Fail End condition:			
Basic Flow:	What are the basic steps		
Alternate Flows:	Are there any deviations to the basic steps?		
Postconditions:	What is the next step? Consider this use case as the precondition for the next.		
Dependencies:	UC-2		
Required External Resources:	[x] Data, please specify:		End user generated data.

	[x] Tools, please specify:	Advanced semantic search interfaces.
	[ ] Services, please specify:	
	[ ] Models, please specify:	
	[ ] Other, please specify:	
How this use-case is going to be validated?	Include how the aforementioned use-case will be integrated possibly with clinicians workflow	
Frequency of Use:	Frequently	
Who are the users?	All MHA platform end-users	
Special Requirements:	Presence of end-user generated data.	
Assumptions:		
Questions:		

3.20 Knowledge Discovery

Use Case ID:	UC-20		
Use Case Name:	Knowledge Discovery		
Use Case Owner:	USAAR	Last Updated By:	
Technical Collaborators:	TBD	Clinical Collaborator:	USAAR
Date Created:	02.08.2013	Last Revision Date:	
Description:	Patients are interested in the most recent and personalized information about their disease, treatment and prognosis. MHA platform could contain a ontology-based Knowledge Discovery (KD) module able to connects highly heterogeneous data and textual information. The semantic framework could be based on gene, tissue, disease and compound ontologies (important for drugs and clinical research frames). This framework could contain information from different organisms, platforms, data types and research areas that is integrated into and correlated within a single searchable environment using search algorithms. It could provide a unified interface for all MHA users to formulate, explore and identify new information (according to specific preferences and needs) across vast collections of available experimental and research data. KD module could combine classical keyword-based search with text-mining and ontologies to navigate large results sets (internal & external) and facilitate information and/or knowledge discovery. End users could be provided with an advanced ontology based (Gene Ontology (GO) and Medical Subject Headings (MeSH)) 'Table of Contents' in order to access, explore, structure (quickly) the millions of available resources (PubMed abstracts, news, clinical trials info) according to the predefined topics of interest (Allergy, Cancer, etc.). Some related examples are presented below: • GoPubMed, http://www.gopubmed.com • NextBio, http://www.nextbio.com • ResearchGate, http://www.researchgate.net		
Actors:	All MHA platform's end users		
Trigger:	Click on search button and/or ontology based (taxonomy) 'Table of Content'		
Preconditions:	End user has to have a confirmed MHA profile MHA platform has to have the access to external and/or local databases with publically available data (PubMed, Clinical Trials, News, etc.)		
Successful End condition:	Personalized search results are displayed with possibility to refine them according available taxonomies.		
Fail End condition:	No search results or no available info		
Basic Flow:	The basic steps are related to end user interactions with search button, search text fields and search results.		
Alternate Flows:	Alternative flows could be available in case of clicks to 3D Avatar body and the presentation of the available search results.		
Postconditions:	Search results could be saved		
Dependencies:	This use case extends all ontology related Scenarios / Use Cases		
Required External Resources:	[x] Data, please specify:		PubMed Repository, Clinical Trials information, news articles, etc.
	[x] Tools, please specify:		Text mining tools; Apache Lucene(TM) is a high-performance,

		full-featured text search engine; GATE - a full-lifecycle open source solution for text processing
	[x] Services, please specify:	OpenCalais Web Service will allow to automatically annotate the content with rich semantic metadata
	[x] Models, please specify:	Semantic data model
	[x] Other, please specify:	Advanced ontologies and taxonomies (i.e. Gene Ontology (GO), Medical Subject Headings (MeSH))
How this use-case is going to be validated?	Test of the Implemented search interfaces (KD module)	
Frequency of Use:	Frequent	
Who are the users?	All MHA platform's end users	
Special Requirements:	Needs for proprietary search algorithms and the contribution of high skilled and experienced semantic and/or data mining experts would be required.	
Assumptions:	Term extraction experience from external data (PubMed abstracts, Clinical Trial, News articles) and semantic benchmarking with GO and MeSH would be required.	
Questions:		

3.21 Building patient community among users

Use Case ID:	UC-21		
Use Case Name:	Building patient community among users		
Use Case Owner:	BED	Last Updated By:	
Technical Collaborators:	FORTH, ICCS, LIN, ANS	Clinical Collaborator:	USAAR
Date Created:	14.08.2013	Last Revision Date:	
Description:	The avatar system offers an ideal platform for interaction and communications among patients. They will be able to: • Find patients with similar condition, symptom and treatments • Find out symptoms and treatment for their conditions by looking at other fellow patients • Find out possible conditions for their symptoms by looking at other fellow patients • Find out possible treatments for their conditions by looking at other fellow patients		
Actors:	Patients		
Trigger:			
Preconditions:	Users need to have their avatar accounts		
Successful End condition			
Fail End condition			
Basic Flow:	Upon successful Log-In (or New account creation) by using Username and Password, users will be able to carry out search among all the users of the avatar system for the following purposes: • Search for patients with specific conditions, symptoms and treatments • Find out symptoms and treatments for specific conditions • Find out conditions from specific symptoms. • Search for treatments for specific conditions		
Alternate Flows:			
Postconditions:			
Dependencies:	Users need to have their user account in the avatar system		
Required External Resources:	[ ] Data, please specify:		
	[x] Tools, please specify:	Web service tools (in Java)	
	[x] Services, please specify:	Citizens who will use the avatar system for communication with other fellow patients.	
	[ ] Models, please specify:		
	[ ] Other, please specify:		
How this use-case is going to be validated?	Usability test from users		
Frequency of Use:	Frequently		
Who are the users?	Citizens		
Special Requirements:			
Assumptions:			
Questions:			

3.22 Avatar Data Browse

Use Case ID:	UC-22		
Use Case Name:	Avatar Data Browse		
Use Case Owner:	BED	Last Updated By:	
Technical Collaborators:	FORTH, ICCS, LIN, ANS	Clinical Collaborator:	USAAR
Date Created:	14.08.2013	Last Revision Date:	
Description:	Upon log in to their own account, users will be able to browse their own data, including all the personal health status data collected through the avatar system, plus medical records and clinical data from the hospitals		
	The avatar system will need to offer tools that support effective data query and search, such as filtering.		
	The 4D avatar will play an important role in presenting the data. Users will be able to select individual parts of the avatar body to view the data associated to the selected parts.		
	Different colours or textures will be assigned to individual parts of the 4D avatar to represent their health status. For example, if the heart has a serious problem it will be highlighted using a unique colour or texture		
Actors:	Citizens		
Trigger:			
Preconditions:	Users will need to sign up to the system, accept all the legal terms, and log onto the system		
Successful End condition	A smooth browse of all data		
Fail End condition	Users fail to retrieve data they need		
Basic Flow:	The basic steps are: 1. Successful Log-In (or New account creation) by using Username and Password 2. Use user interface (menus, dialog boxes etc). to see data 3. Allow to use filters for data filtering 4. View health status through the colours/textures of the 4D avatar 5. Click on individual parts of the avatar to view relevant data		
Alternate Flows:			
Postconditions:	Browsing data is a fundamental step that allows users to perform operations that require data information		
Dependencies:	Browsing data is a fundamental step that allows users to perform operations that require data information		
Required External Resources:	[x] Data, please specify:	Synthetic data and other publicly available data from the web	
	[x] Tools, please specify:	Web service tools (Java)	
	[ ] Services, please specify:		
	[ ] Models, please specify:		
	[ ] Other, please specify:		
How this use-case is going to be validated?	The feedback from the public (citizens)		
Frequency of Use:	Frequently		
Who are the users?	Citizens		
Special Requirements:			
Assumptions:			
Questions:			

3.23 Avatar Data Collection

Use Case ID:	UC-23		
Use Case Name:	Avatar Data Collection		
Use Case Owner:	BED	Last Updated By:	
Technical Collaborators:	FORTH, ICCS, LIN, ANS	Clinical Collaborator:	USAAR
Date Created:	14.08.2013	Last Revision Date:	
Description:	This case explores various ways for the data collection in the avatar to monitor users' health-status, lifestyle and wellness. These include: • Web interface for data entry • Sensors (e.g. blood pressure, heart rate, locations) • Mobile apps • Eletronic cards from daily life (e.g. shopping cards, gym cards, credit cards) • Computer social network (e.g. Twitter, facebook, Internet forums) For example, users uses a glucose meter and MyHealthAvatar platform to monitor his/her blood sugar levels. The data is saved that maintains the Avatar's long-term history and looks for possible abnormal events. If the saved data is unusual, or the End-User skips a test, the MyHealthAvatar platform automatically generates an alert message Mobile apps will be used to monitor the health status of the users (e.g. mood, feeling). We will also explore the possibility to extract health related information from electronic cards (e.g. purchase of food and drink, daily exercises in gyms), as well as from social network.		
Actors:	Citizens		
Trigger:			
Preconditions:	Users need to have their avatar accounts		
Successful End condition:	Data collection without much effort from users		
Fail End condition:	Data collection that needs a lot effort from users		
Basic Flow:	The basic steps are: For manual data entry: • Successful Log-In (or New account creation) by using Username and Password • Enter data from the text boxes For automatic data collection • The users will need to register their avatar accounts with their mobiles, social network account, electronic cards. • Users should be able to switch on/off the automatic data collection • The data will go into the avatar automatically		
Alternate Flows:			
Postconditions:	The data will be key to all the activities in the avatar system		
Dependencies:	Users need to have their user account in the avatar system		
Required External Resources:	[ ] Data, please specify:		
	[x] Tools, please specify:	Information extraction toolkits (Apache, Gate, etc.), mobile apps (Android), Twitter and Facebook APIs	
	[x] Services, please specify:	Citizens will use these data collection tools to automatically collect data in their avatars.	
	[ ] Models, please specify:		

	[ ] Other, please specify:	
How this use-case is going to be validated?	These will be validated from the users of the avatar system	
Frequency of Use:	Frequently	
Who are the users?	Citizens	
Special Requirements:		
Assumptions:		
Questions:		

3.24 Knowledge Avatar

Use Case ID:	UC-24		
Use Case Name:	Knowledge Avatar		
Use Case Owner:	BED	Last Updated By:	
Technical Collaborators:	FORTH, ICCS, LIN, ANS	Clinical Collaborator:	USAAR
Date Created:	14.08.2013	Last Revision Date:	
Description:	The avatar will be used as a means for presenting general medical knowledge to the citizen users. Users will be able to select individual parts and see related medical information such as anatomy. The information may also include medicine and food.		
Actors:	Citizens		
Trigger:			
Preconditions:	Users will need to sign up to the system, accept all the legal terms, and log onto the system		
Successful End condition	Users get information they need		
Fail End condition	Users fail to get information they need		
Basic Flow:	The basic steps are: 1. Successful Log-In (or New account creation) by using Username and Password 2. Click on individual parts of the avatar to view associated medical information, including anatomical functions, relevant medicine/food.		
Alternate Flows:			
Postconditions:			
Dependencies:	Users need to have their user account		
Required External Resources:	[x] Data, please specify:	Medical and health knowledge available from the Web.	
	[x] Tools, please specify:	Web service tools (in Java)	
	[x] Services, please specify:	For citizens to get general health and medical knowledge	
	[ ] Models, please specify:		
	[ ] Other, please specify:		
How this use-case is going to be validated?	The feedback from the public (citizens)		
Frequency of Use:	Frequently		
Who are the users?	Citizens		
Special Requirements:			
Assumptions:			
Questions:			

3.25 Web Login

Use Case ID:	UC-25		
Use Case Name:	Web Login		
Use Case Owner:	BED	Last Updated By:	
Technical Collaborators:	FORTH, ICCS, LIN, ANS	Clinical Collaborator:	USAAR
Date Created:	14.08.2013	Last Revision Date:	
Description:	Users (citizens) will be able to log onto the system using their username and password. New users will be able to sign up to the system by creating basic personal information including security questions. Informed consent and privacy: Users will need to accept the privacy policy and the "terms and conditions" of using the MyHealthAvatar platform. Upon log into the system, users will be able to enter, browse their data, explore medical information, communicate with other fellow patients. Users will be able to view and interact with an avatar - a 3D representation of the human body. It will allow the End User to click with the computer mouse on a particular part of the avatar "body" to trigger a search of medical records to retrieve relevant information.		
Actors:	Citizens and patients		
Trigger:			
Preconditions:			
Successful End condition	Successful log in		
Fail End condition	Fail to log in or register		
Basic Flow:	The basic steps are: 1. After press a sign up button, new users will provide basic information (user name, age, gender etc.) and some security questions. They will also have to accept the accept the privacy policy and the "terms and conditions" of using the MyHealthAvatar platform. 2. Upon log in, users will be able to see the system menu, a visual avatar (presented in 4D form). 3. Users will be able to perform operations described in all the other use cases.		
Alternate Flows:			
Postconditions:	Users will be able to perform all the operations described in all the other use cases		
Dependencies:	This will be the basic step for all the operations described in all the other use cases		
Required External Resources:	[ ] Data, please specify:		
	[x] Tools, please specify:	Web service tools (in Java)	
	[ ] Services, please specify:		
	[ ] Models, please specify:		
	[ ] Other, please specify:		
How this use-case is going to be validated?	The feedback from the public (citizens)		
Frequency of Use:	Frequently		
Who are the users?	Citizens		
Special Requirements:			

Assumptions:	
Questions:	

3.26 Brain Trauma

Use Case ID:	UC-26		
Use Case Name:	Brain Trauma		
Use Case Owner:	BED	Last Updated By:	
Technical Collaborators:	LIN	Clinical Collaborator:	BED
Date Created:	20.08.2013	Last Revision Date:	
Description:	A pre-injury clinical profile of patient is a critical aide that can help the clinicians by providing a better insight and possibly improve the clinical outcomes. Individualized treatment and targeted therapies based on patients' data are imperative both from the patients' perspective and also from the clinicians point of view and can ensure more promising outcomes and better disease prediction and prevention. A clinical phenotype of the patient has to be developed based on pre-injury characteristics. The clinical and neurological findings can be combined with image features from CT scans to develop a prognostic model for traumatic brain injuries (TBI).Related studies show that prognosis after TBI is strongly correlated to the medical history of the patient and characteristics like age, alcoholism, drugs, cardiac problems, liver dysfunction, diabetes and renal impairment can affect the treatment regimen and morbidity and mortality. The data repository available within MyHealthAvatar can allow researchers develop mathematical and computational models based on gender, race, ethnicity categories, age, lifestyle, education and medical data and this can significantly contribute to innovative healthcare practices.		
Actors:	Doctors and patients .		
Trigger:	Prognosis is needed for head injury patients		
Preconditions:	The availability of demographic data, clinical phenotypes and image phenotypes		
Successful End condition:			
Fail End condition:			

Basic Flow:	The basic steps include:
	  1. The patient share their avatar data with the doctors
	  2. The doctor accesses the demographical data of the patient
	  3. The doctor accesses the clinical and image data of the patient from the hospital system (e.g. PACS)
	  4. The doctor assesses the patient using a prognosis model		

Alternate Flows:			
Postconditions:	A treatment plan is drawn		
Dependencies:	The patients are registered to the avatar system and their medical history and other characteristics data are available in their avatars.		
Required External Resources:	[x] Data, please specify:	Related studies on patient cohorts, such as CRASH	
	[x] Tools, please specify:	Prognosis models and data mining tools	
	[x] Services, please specify:	Provide prognosis for head injury patients	
	[ ] Models, please specify: Prognosis models		
	[ ] Other, please specify:		

How this use-case is going to be validated?	By experts with clinical background in BED
Frequency of Use:	When a prognosis is needed for head injury patients
Who are the users?	Doctors and patients
Special Requirements:	
Assumptions:	
Questions:	

3.27 Personalised CHF Risk Analysis

Use Case ID:	UC-27		
Use Case Name:	Building personalized CHF related risk profiles and "real-time monitoring" services		
Use Case Owner:	FORTH	Last Updated By:	Vangelis Sakkalis
Technical Collaborators:	TBD	Clinical Collaborator:	USAAR
Date Created:	28/06/2013	Last Revision Date:	31/07/2013
Description:	A major challenge related to caring for patients with chronic conditions is the early detection of exacerbations of the disease that may be of great significance. The dedicated clinical personnel should be contacted immediately and possibly intervene in time before an acute state is reached, by changing medication, or any other interventions, in order to ensure patient safety. There is a need to support real-time remote monitoring of patients diagnosed with congestive heart failure and MHA, enhanced with semantic technologies, may host personalized, accurate and up-to-date clinical information. In order to tailor the proposed system to the patient's profile and assist physicians in selecting people who are predisposed by coronary disease, hypertension, or valvular heart disease; we build a CHF related risk profile based on a risk appraisal function that is based on the Framingham Heart Study (486 heart failure cases during 38 years of follow-up). The predictors used are based on Age, Coronary heart disease and Valve disease status provided by the patient Electronic Health Record (EHR), as well as on HR, on blood pressure and on Body Mass Index (BMI) provided by the pulse oximeter, the blood pressure monitor and the weight scale respectively. The calculated risk probability may be used to alter the default threshold values (higher risk probability adds more constraint on the physiological patterns.		
Actors:	Avatar1(Doctor),Avatar2 (patient)		
Trigger:	Upload of patient's physiological and imaging data and past diagnosis in patient's electronic health record or during creation of patient's Avatar in MHA platform. Alternative the use case can be triggered after the condition is diagnosed by patient physical examination and confirmed with echocardiography.		
Preconditions:	Heart failure is caused by any condition, which reduces the efficiency of the myocardium, or heart muscle, through damage or overloading. As such, it can be caused by a diverse array of conditions, including myocardial infarction (in which the heart muscle is starved of oxygen and dies), hypertension (which increases the force of contraction needed to pump blood) and amyloidosis (in which protein is deposited in the heart muscle, causing it to stiffen).		
Successful End condition:			
Fail End condition:			
Basic Flow:	Basic steps: 1. Gathering all the necessary patient data (as described in Dependencies. 2. Creating of MyHealthAvatar profile for this patient 3. Real-time patient data updates (if possible) and processing to detect possible deviations from normal values (Figure 1). 4. Alarm Doctor for possible intervention		
Alternate Flows:	Alternative flows will be followed if patient data are not provided in full.		
Postconditions:	Remote monitoring of patient health status after diagnosis. Risk assesment and update data in MHA.		

Dependencies:	To achieve such functionality the following device and technologies should be available:	
	• Wireless or wearable medical devices and sensors acquiring patient's vital signs. In our reference implementation the supported measurements are: Blood Pressure5 (BP), SpO2 , Heart Rate (HR), body weight and 12-lead ECG monitoring. • Monitoring application recording the aforementioned bio signals and hosting risk assessment algorithms to enable the alerting process. A full description of this application as applied in a clinical environment is described in [5]. • Ontology-driven application intelligence capable of reasoning on the patient data.	
Required External Resources:	[x] Data, please specify:	Patient Electronic Health Record (EHR) • Age • Coronary heart disease • Valve disease status Pulse oximeter • HR Blood pressure monitor • Blood pressure Weight scale • Body Mass Index (BMI)
	[x] Tools, please specify:	Server PC hosting the risk assessment algorithm. Smartphone if remote monitoring is to be used. MHA platform
	[x] Services, please specify:	Links with EHR and PACS
	[x] Models, please specify:	Risk Assessment model
	[x] Other, please specify:	Normal values are provided in general and/or specific population
How this use-case is going to be validated?		
Frequency of Use:	The proposed application can be used even in real time or selected time intervals, depending on the patient's initial diagnosis.	
Who are the users?		
Special Requirements:	Familiarity of doctors and generally of the medical staff with MHA technologies Linking of MHA data between research and medical organizations and personnel applying MHA technologies	
Assumptions:	Some basic assumptions are: • Necessary physiological and clinical data to run the model. • Full and detailed patient's health history record. • Monitoring Devices/ Sensors, if available.	
Questions:		

4 MHA Survey (General Public / Patients)

4.1 Survey Design

The aim of this survey was to enhance our current understanding of patient and public views about the MHA platform. First, we investigated the background (sociodemographic characteristics) of our respondents, their understating of the basic terms like EHR and PHR. Second, we addressed complex questions about the expected and proposed for implementation MHA functionalities and of special interest were the questions about the security and privacy concerns the end users might have.

In general terms the survey allowed us to examine individuals' specific hopes and concerns about MHA platform and we were able to gain a deeper understanding of patient and public views about MHA platform's functionalities.

The survey (**Figure 2**) has been elaborated by using a web-based, open source, survey management system[7] and all questions with related answers have been in details discussed with all project partners. The received suggestions related to survey structure improvements have been implemented. As result, a survey with minimum questions but with a very wide coverage has been elaborated and widely distributed to the available news channels and audiences.

Figure 2. Screenshot of the MHA Survey main (Start) page

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[7] LimeSurvey - the free & open source survey software tool, http://www.limesurvey.org (May 2013)

MHA Survey has been designed with the requirements to keep the questions and answers as much as possible understandable for general public, simple to follow and with minimum possible amount of items (questions). As a performance check all survey respondents have been allowed to share their feedback on the survey (results are presented below). Additionally, we allowed all survey respondents to provide us with their contact e-mail in case of interest to receive the final survey report.

The final version of MHA Survey (English version) has been translated in two additional languages (German and Hungarian) as result of the support received from our project partners.

4.2 Survey Data Analysis

The format for the collected survey's responses/data analysis includes:

- 'Analysis/Comment' text

- Visual 'Charts' with data percentage presentation

- Table with answers 'Count / Percentage' data

Survey data analysis, presented in the chapters bellow, allowed us to define properly or to refresh MHA Use Cases / Scenarios. The collected data invigorate our knowledge and understanding about the end-users' expectations, needs and requirements. We would suggest all project partners to use the collected data as a 'guide' for their further activities related to MHA platform's design, functionalities and interfaces.

The survey has collected in total 270 responses (with 161 full responses and 109 incomplete responses).

4.2.1 General Questions

General section with its related questions has been elaborated in order to underline the background of the survey respondents. Survey started with simple sex and age related questions, and, afterwards, more complex information have been requested (i.e. health status, computer skills, social networks awareness, healthcare job).

All received, collected and stored data/information are presented below. Please note that the chapter names bellow are equivalent to the survey's questions' titles.

'General Questions' section had the questions:

- Please select your gender

- Please select your age range

- What is your highest level of education?

- Have you ever worked in a job related to healthcare?
    - (if 'Yes')Please specify

- Do you have any long term health conditions?
    - (if 'Other')Please specify

- How would you rate yourself computer skills?

- Are you a member of any of the following online social networking services?

o   (if 'Other')Please specify

- Have you ever participated in a health research study (e.g. clinical research)?

Important findings or comments related to the collected survey responses are presented in the related questions/chapters.
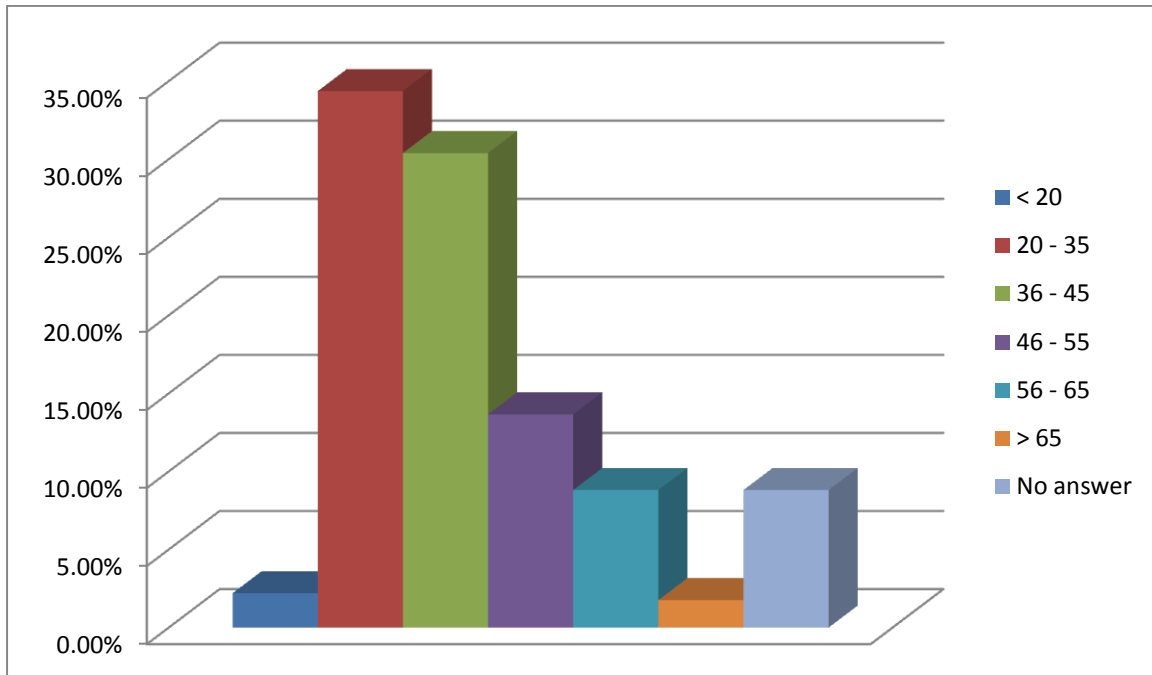
4.2.1.1   Please select your gender

Analysis/Comment: Self-explanatory
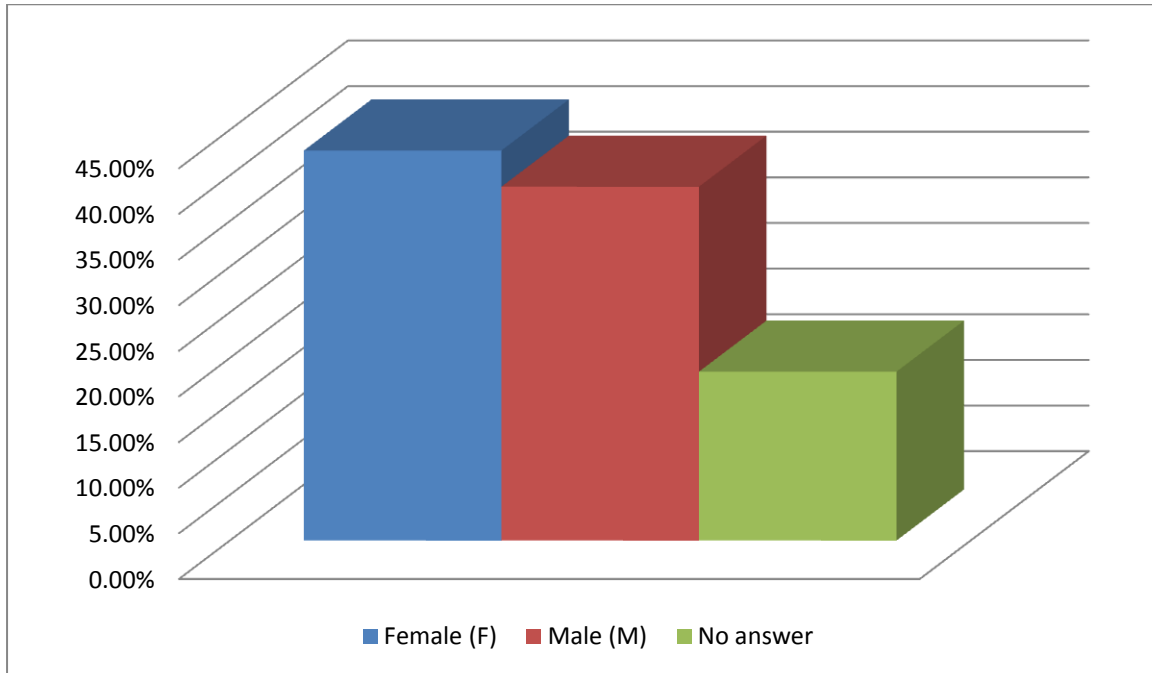
Answer	Count	Percentage
Female (F)	97	42,73%
Male (M)	88	38,77%
No answer	42	18,50%

### 4.2.1.2   Please select your age range

Analysis/Comment: The most selected age ranges from all responses are 20-35 and 36-45. The results offer the insights about the further and most active MHA platform's end-users.

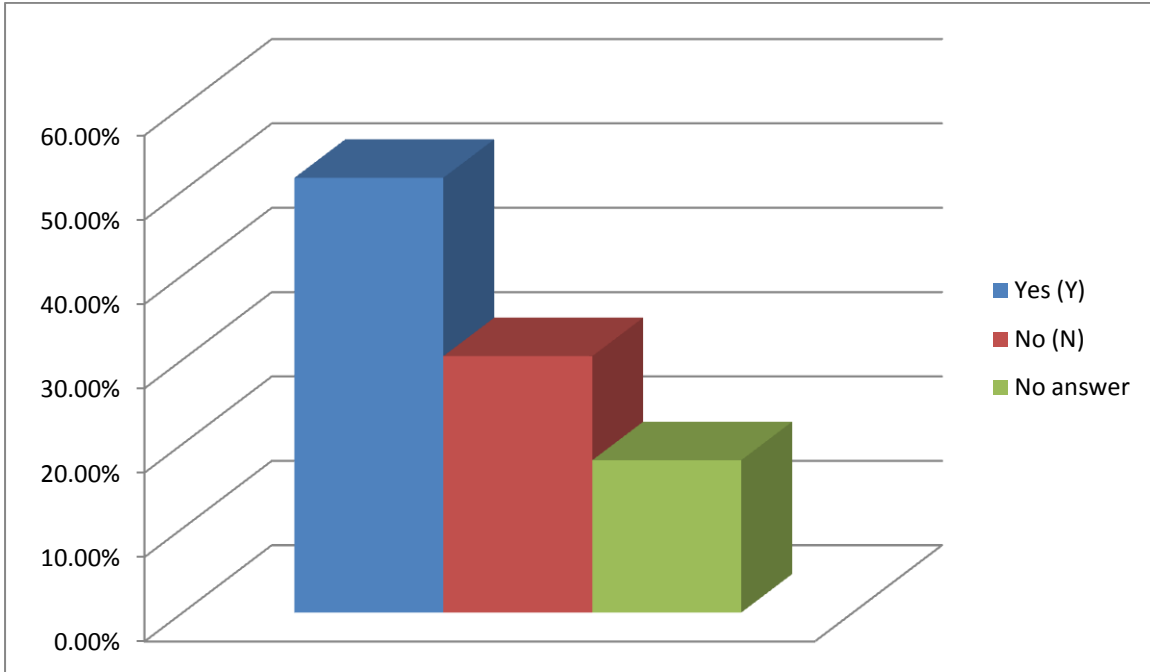| Answer	Count	Percentage
< 20	5	2,20%
20 - 35	78	34,36%
36 - 45	69	30,40%
46 - 55	31	13,66%
56 - 65	20	8,81%
> 65	4	1,76%
No answer	20	8,81%

4.2.1.3   What is your highest level of education?

Analysis/Comment: 68,72% of survey respondents reported 'Higher Degree' as the highest level of education.
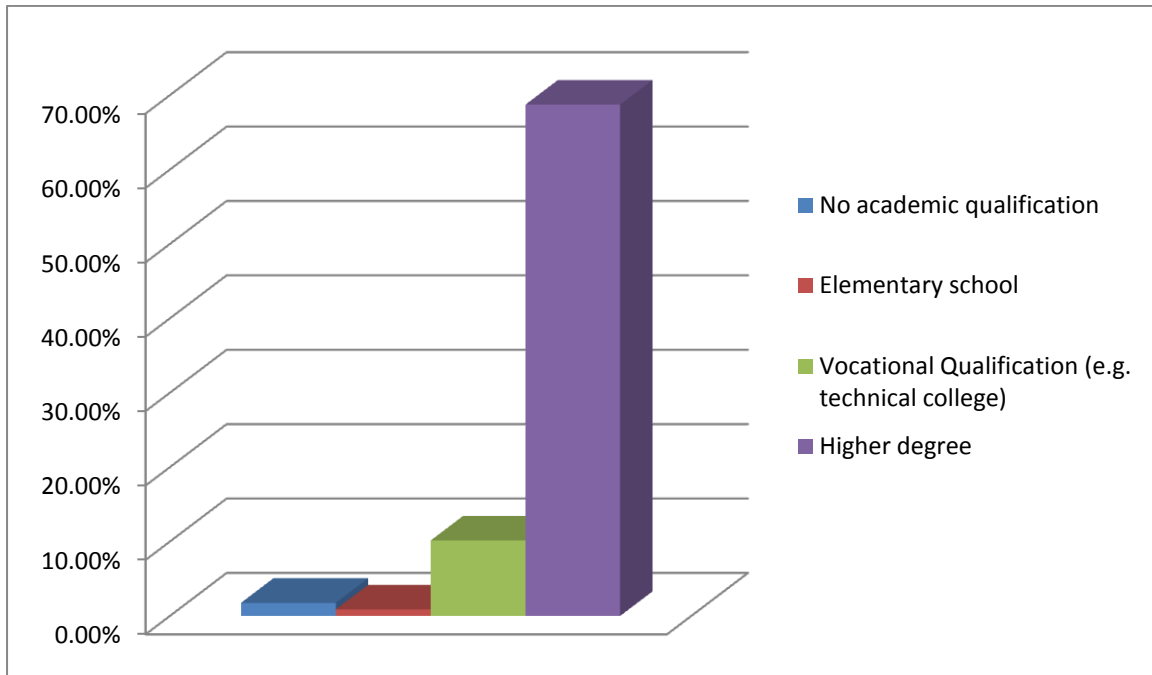
Answer	Count	Percentage
No academic qualification	4	1,76%
Elementary school	2	0,88%
Vocational Qualification (e.g. technical college)	23	10,13%
Higher degree	156	68,72%
No answer	42	18,50%

4.2.1.4 Have you ever worked in a job related to healthcare?

Analysis/Comment: 51,54% of survey respondents reported a job related to healthcare. It is an important finding due to our additional task to explore the views, requirements and opinions of healthcare professional stakeholders.
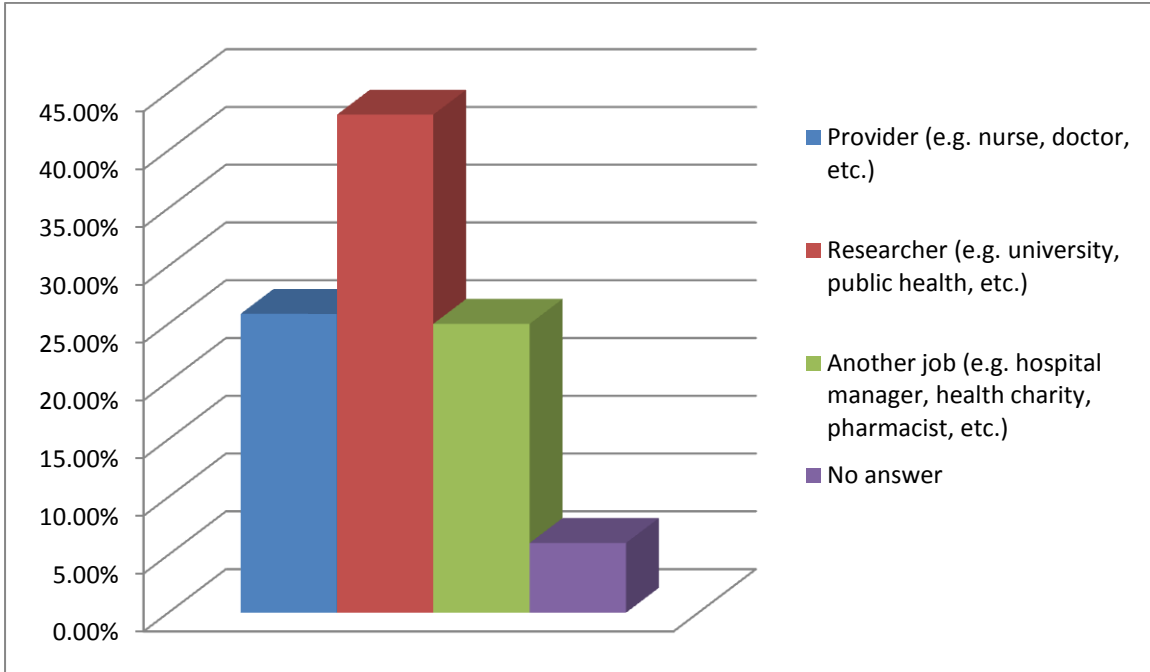
Answer	Count	Percentage
Yes (Y)	117	51,54%
No (N)	69	30,40%
No answer	41	18,06%

4.2.1.4.1 Please specify

Analysis/Comment: This option was visible only in case of "Yes" answer from "Have you ever worked in a job related to healthcare?" question. It allowed the survey respondents to provide more information about their healthcare related job. It is important to mention that healthcare providers (25,86%) and researchers (43,10%) are expected as further active end-users of MHA platform.
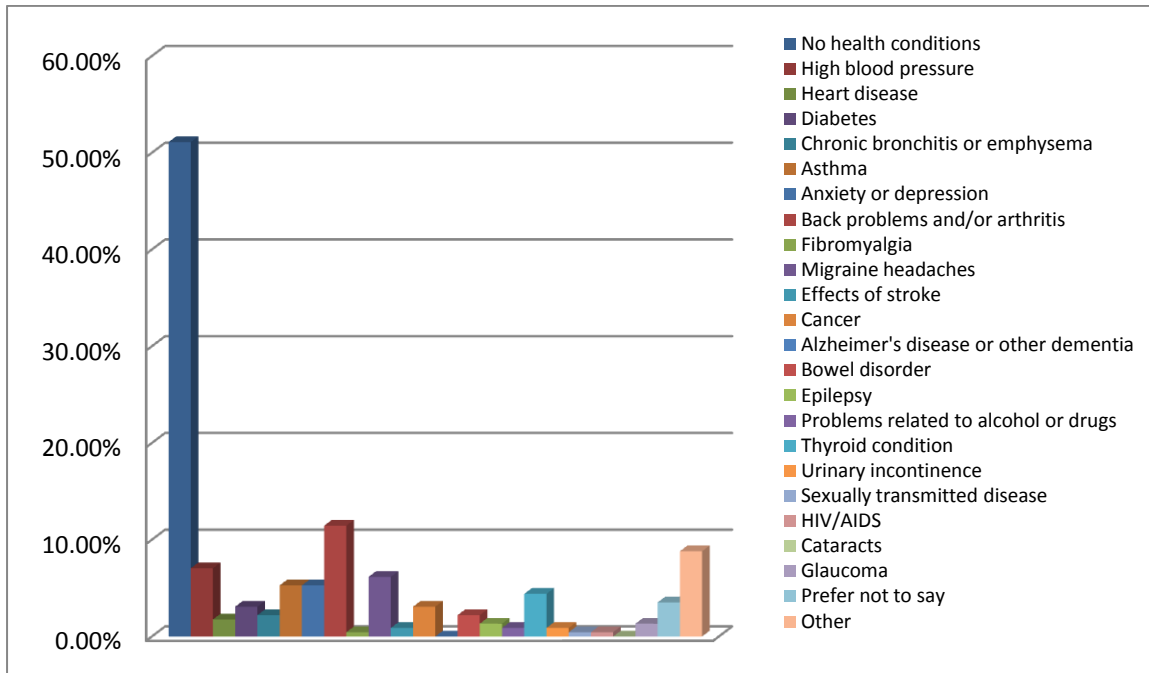
Answer	Count	Percentage
Provider (e.g. nurse, doctor, etc.)	30	25,86%
Researcher (e.g. university, public health, etc.)	50	43,10%
Another job (e.g. hospital manager, health charity, pharmacist, etc.)	29	25,00%
No answer	7	6,03%

4.2.1.5 Do you have any long term health conditions?

Analysis/Comment: 51,10% of respondents reported no long term health condition and only 3,52% preferred not to say. The top reported health conditions would be proposed for consideration for further MHA platform's Use Cases / Scenarios.

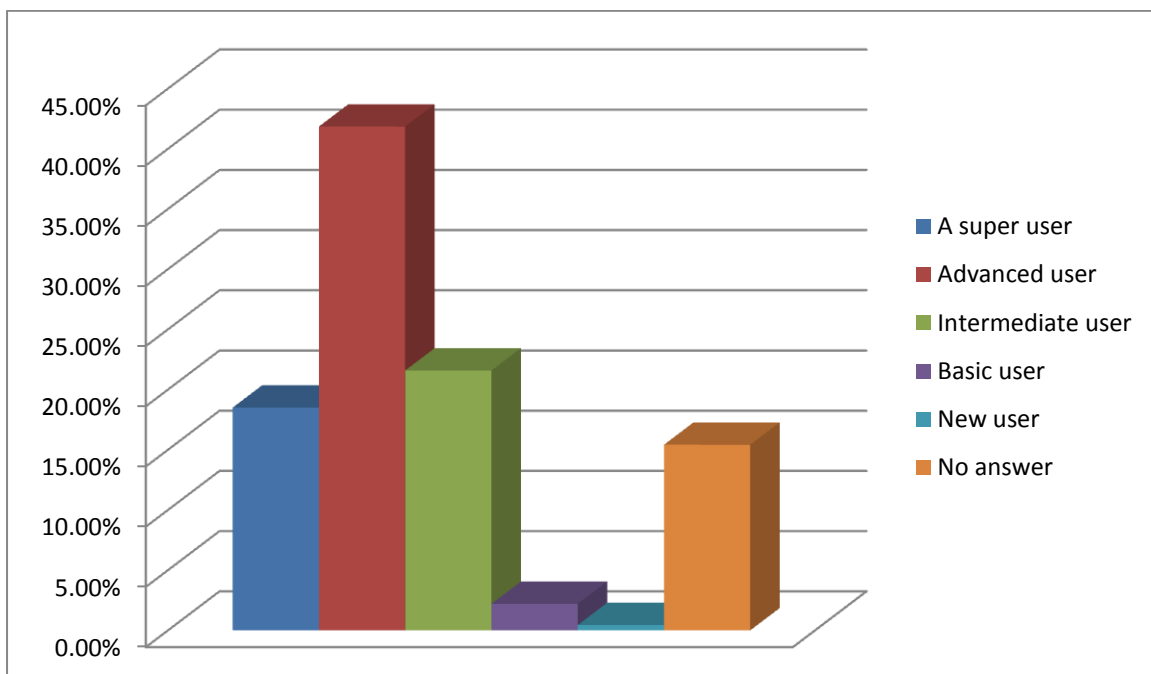| Answer	Count	Percentage
No health conditions	116	51,10%
High blood pressure	16	7,05%
Heart disease	4	1,76%
Diabetes	7	3,08%
Chronic bronchitis or emphysema	5	2,20%
Asthma	12	5,29%
Anxiety or depression	12	5,29%
Back problems and/or arthritis	26	11,45%
Fibromyalgia	1	0,44%
Migraine headaches	14	6,17%
Effects of stroke	2	0,88%
Cancer	7	3,08%
Alzheimer's disease or other dementia	0	0,00%
Bowel disorder	5	2,20%
Epilepsy	3	1,32%
Problems related to alcohol or drugs	2	0,88%
Thyroid condition	10	4,41%
Urinary incontinence	2	0,88%
Sexually transmitted disease	1	0,44%
HIV/AIDS	1	0,44%
Cataracts	0	0,00%
Glaucoma	3	1,32%
Prefer not to say	8	3,52%
Other	20	8,81%

4.2.1.5.1 Please specify

Analysis/Comment: This question was visible only in case of "Other" selection from "Do you have any long term health conditions?" question. It allowed the survey respondents to provide more information about their other long term health conditions.

17 responses have been received and analysed. Most of them are related to allergy.

4.2.1.6 How would you rate yourself computer skills?

Analysis/Comment: Most of the survey respondents have advanced (41,85%) and intermediate(21,59%) computer skills.

The survey was web based, one of the arguments could be that the new or basic users were not be able to find and to take the survey.
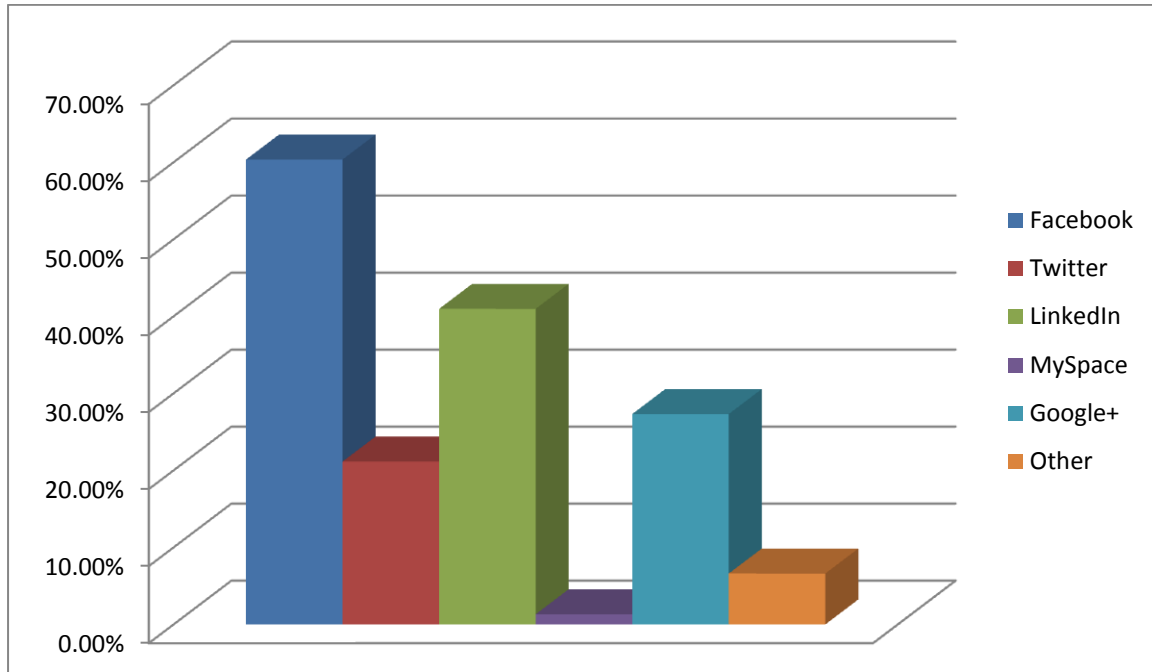

Answer	Count	Percentage
A super user	42	18,50%
Advanced user	95	41,85%
Intermediate user	49	21,59%
Basic user	5	2,20%
New user	1	0,44%
No answer	35	15,42%

4.2.1.7 Are you a member of any of the following online social networking services?

Analysis/Comment: The promising results have been collected; all survey respondents appear to be aware about the social networking tools. Despite our initial project focus on Facebook (60,35%) and Twitter (21,15%), the additional reported social networking tools are LinkedIn (useful for enrolment

of healthcare provider and research stakeholders) with 40,97% and Google+ (for general public) with 27,31%.

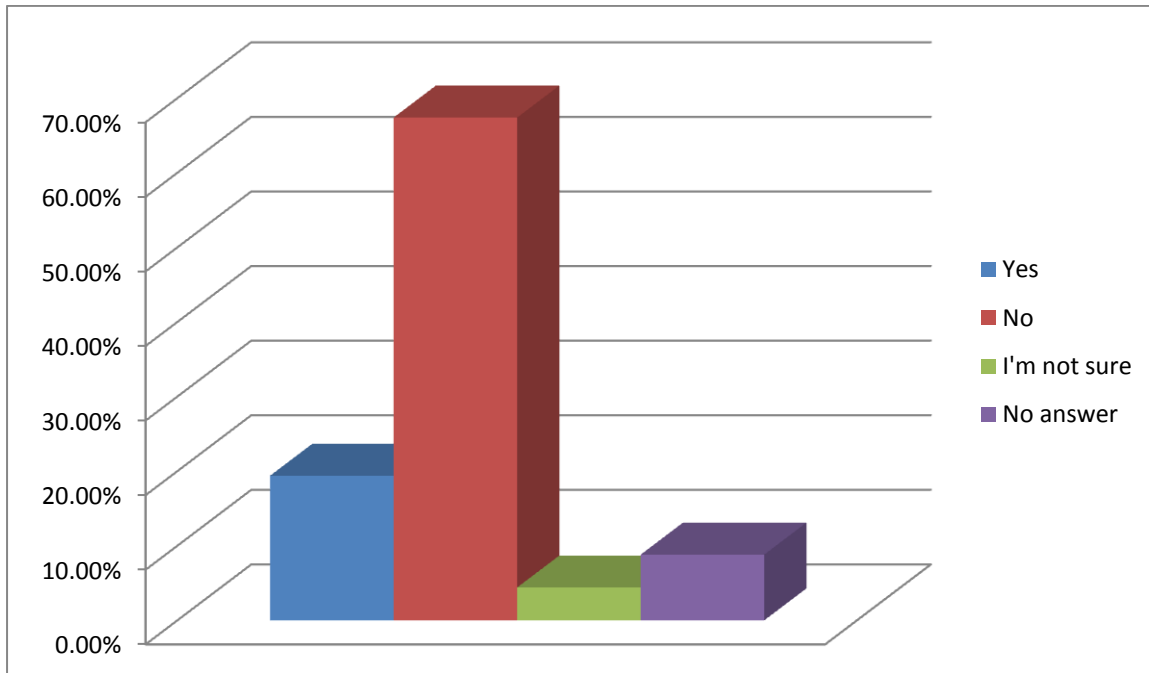| Answer	Count	Percentage
Facebook	137	60,35%
Twitter	48	21,15%
LinkedIn	93	40,97%
MySpace	3	1,32%
Google+	62	27,31%
Other	15	6,61%

4.2.1.7.1 Please specify

Analysis/Comment: This question was visible only in case of "Other" selection from "Are you a member of any of the following online social networking services?" question.

12 responses have been received and analysed. XING is the top reported social networking service.

4.2.1.8 Have you ever participated in a health research study (e.g. clinical research)?

Analysis/Comment: 67,40% of respondents opted for no participation in any health research study, 19,38% of respondents selected the participation in health research studies.

Clinical trials or any other health research studies should be presented and described (in the frames of MHA platform) by taking into account that end-users could have no related experience and/or knowledge about the clinical research.

Answer	Count	Percentage
Yes	44	19,38%
No	153	67,40%
I'm not sure	10	4,41%
No answer	20	8,81%

4.2.2 Medical / Health Records

Medical / Health Records section with its related questions had the main goal to underline the knowledge and the experience of the survey respondents with EHR / PHR systems. Despite only two visible questions on this section, a number of additional questions had the interactive status (i.e. If 'Yes' answer, 'Please specify' question has been addressed).

The last interactive question was of special significance by being focused on identifying the interest of the survey respondents in a new, PHR system. The 'Medical / Health Records' section had the minimum number of question, and in special:
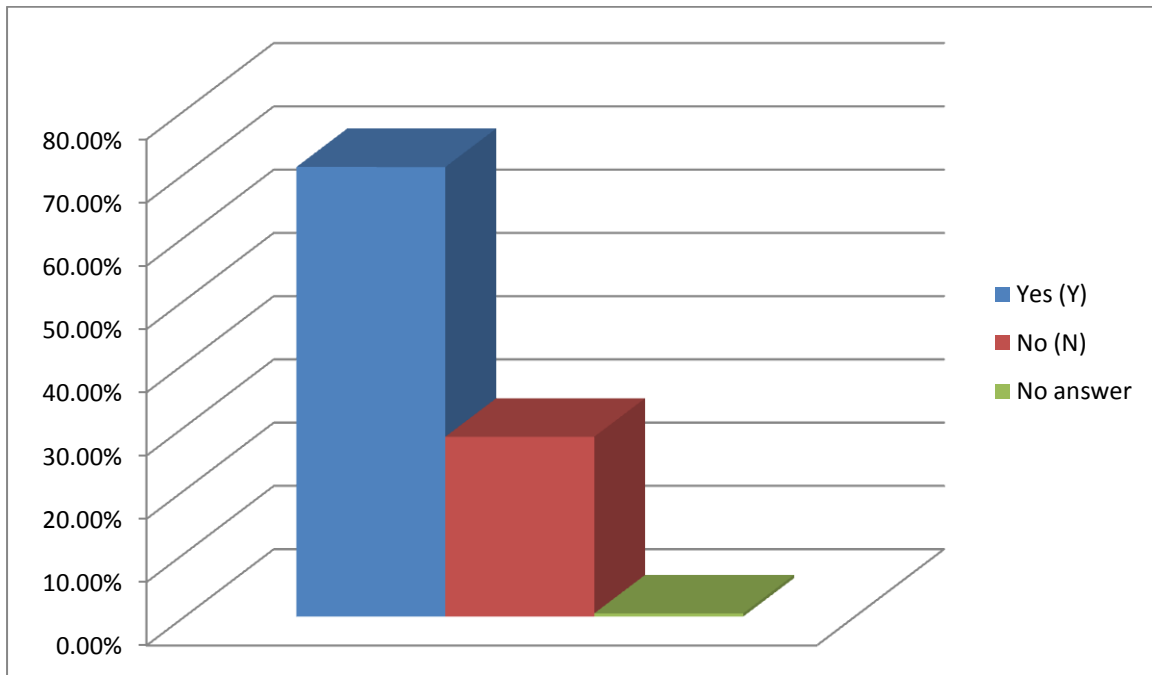
- Have you ever heard anything about Electronic Health Records (EHR)?
    - (if 'Yes')Where have you heard about Electronic Health Records (EHR) before?
        - (if 'Another source')Please specify
    - (if 'No')Would you be interested in finding out more about Electronic Health Records (EHRs) in the frames of MyHealthAvatar project's web page?
- Do you use the electronic Personal Health Records (PHRs)?
    - (if 'Yes')Please specify
    - (if 'Yes')Did you enter, import, store or export personal medical data?
        - (if 'Yes')Please specify

o (if 'No')Would you be interested in a new, secure, advanced and personal health platform that lets you gather, store, analyse and visualise your health information online?

▪ (if 'Comments'), please specify

### 4.2.2.1 Have you ever heard anything about Electronic Health Records (EHR)?

Analysis/Comment: 71,07% of survey respondents are aware about EHR.

Answer	Count	Percentage
Yes (Y)	140	71,07%
No (N)	56	28,43%
No answer	1	0,51%

4.2.2.1.1 Where have you heard about Electronic Health Records (EHR) before?

Analysis/Comment: This question was visible only in case of "Yes" selection from "Have you ever heard anything about Electronic Health Records (EHR)?" question. The goal of this question was to identify the top sources of the respondents' awareness.
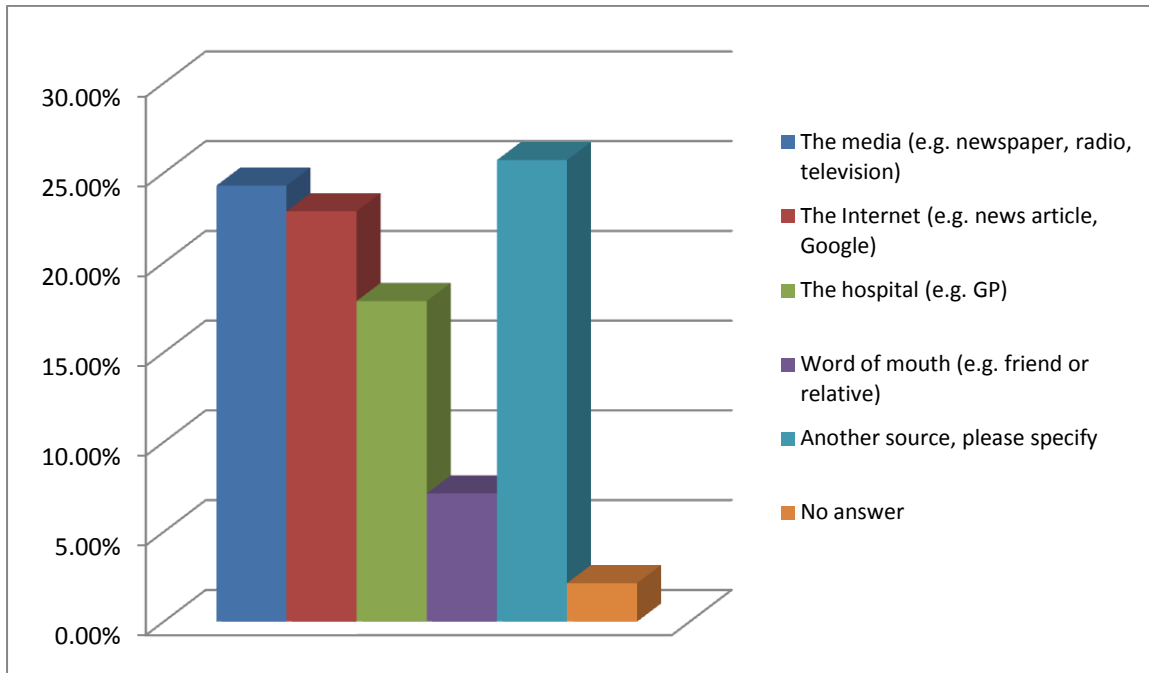
Answer	Count	Percentage
The media (e.g. newspaper, radio, television)	34	24,29%
The Internet (e.g. news article, Google)	32	22,86%
The hospital (e.g. GP)	25	17,86%
Word of mouth (e.g. friend or relative)	10	7,14%
Another source, please specify	36	25,71%
No answer	3	2,14%

4.2.2.1.2   Another source, please specify

Analysis/Comment: The answers for this question were possible in case of "Another source, please specify" selection from "Where have you heard about Electronic Health Records (EHR) before?" question.

36 responses have been received and analysed. Most respondents are aware about EHR due to their daily work activities.

4.2.2.1.3   Would you be interested in finding out more about Electronic Health Records (EHRs) in the frames of MyHealthAvatar project's web page?

Analysis/Comment: This question was visible only in case of "No" selection from "Have you ever heard anything about Electronic Health Records (EHR)?" question.

58,93% of survey respondents (with no information about EHR) would be interested in finding more information about EHR in the frames of MHA project's web page.
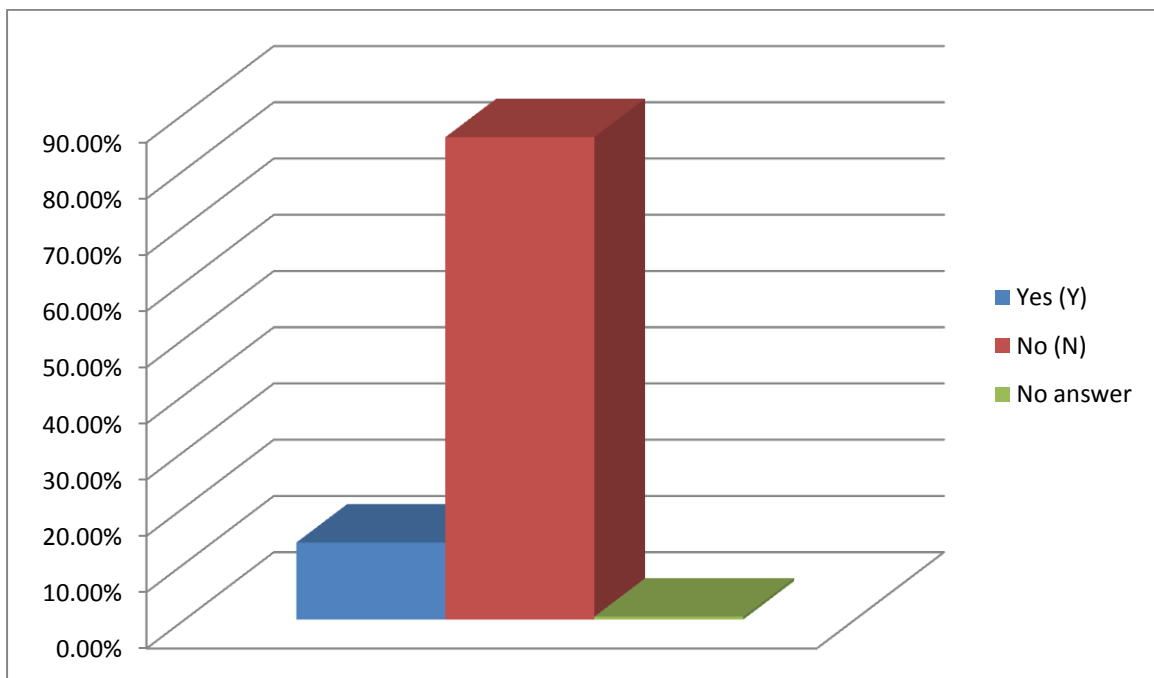
A section in the frames of MHA project's web page with the basic and general description of EHR and PHR terms would be proposed for implementation.
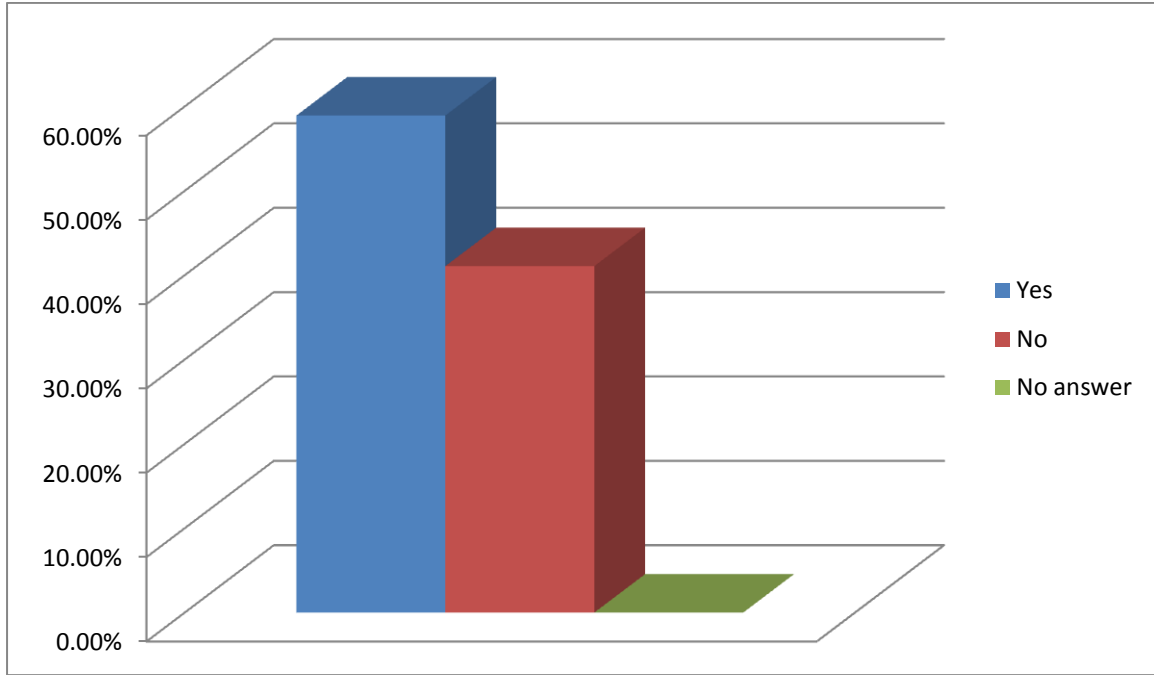
Answer	Count	Percentage
Yes	33	58,93%
No	23	41,07%
Comments	0	0,00%
No answer	0	0,00%

4.2.2.2 Do you use the electronic Personal Health Records (PHRs)?

Analysis/Comment: 85,79% of survey respondents are not using PHR.

Answer	Count	Percentage
Yes (Y)	27	13,71%
No (N)	169	85,79%
No answer	1	0,51%

4.2.2.2.1 Please specify

Analysis/Comment: This question was visible only in case of "Yes" selection from "Do you use the electronic Personal Health Records (PHRs)?" question.

27 responses have been received and analysed. The top reported PHR is MyHealthVault platform.

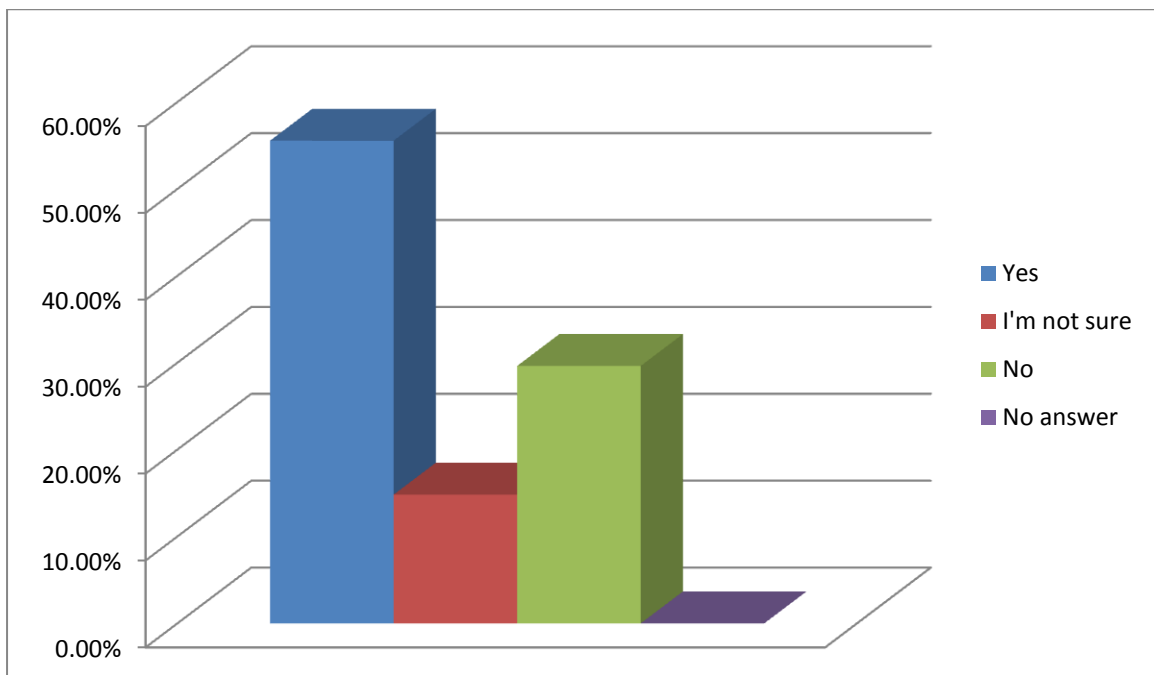### 4.2.2.2.2 Did you enter, import, store or export personal medical data?

Analysis/Comment: This question was visible only in case of "Yes" selection from "Do you use the electronic Personal Health Records (PHRs)?" question.

The goal was to underline if survey respondents have been using the enter/store/export/import of personal medical data functionalities from their PHR systems. A related Use Case / Scenario has been elaborated. 55,56% of respondents with a PHR did use the "enter, import, store or export" of personal medical data.
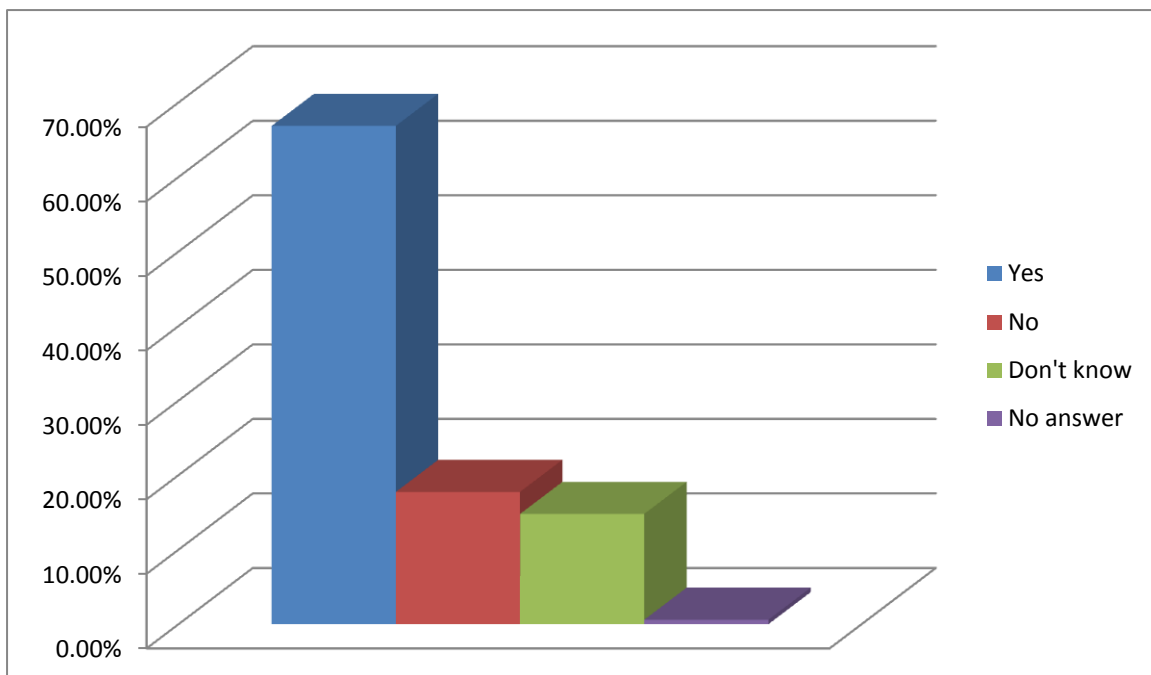

Answer	Count	Percentage
Yes	15	55,56%
I'm not sure	4	14,81%
No	8	29,63%
No answer	0	0,00%

4.2.2.2.3   Would you be interested in a new, secure, advanced and personal health platform that lets you gather, store, analyse and visualise your health information online?

Analysis/Comment: This question was visible only in case of "No" selection from "Do you use the electronic Personal Health Records (PHRs)?" question. It was of special interest (straightforward question) and it is related to the interest of the survey respondents in a new PHR system in case if they are not using any.

66,86% of respondents reported their interest in a new, secure, advanced and personal health platform that lets gather, store, analyse and visualise health information online.

Answer	Count	Percentage
Yes	113	66,86%
No	30	17,75%
Don't know	25	14,79%
No answer	1	0,59%

4.2.2.2.4   Comments, please specify

Analysis/Comment:

"Comments" text box has been available for "Would you be interested in a new, secure, advanced and personal health platform that lets you gather, store, analyse and visualise your health information online?" question.

13 responses have been received and analysed.

4.2.3 MHA functionalities

MHA functionalities section has been elaborated to underline the most expected functionalities from MHA platform. Additionally it allowed us to refresh the elaborated Scenarios / Use Cases and

to prioritise MHA functionalities in line with end-users expectations and views. All survey questions from this section and the related responses are self- explanatory and all project partners are suggested to relay on the collected results in their current and further MHA platform development activities.

'MHA functionalities' section had the questions bellow:

- MyHealthAvatar will provide a variety of functionalities. How interested would you be in the following functions?
  - Enter, import, store and export personal medical data (e.g. Electronic Health Records)
  - Schedule and coordinate medical appointments
  - Find personalised information about the diseases, drugs, vitamins, food, etc.
  - Provide/Share your data/information (Avatar) to other Avatar(s)
  - Provide/Share your personal Avatar to your doctor (e.g. GP)
  - Ability to manage your personal Avatar participation in health research (e.g. Clinical Trials)
  - Enter, import, store and export your Avatar personal medication list
  - Enter, import, store and export your Avatar personal laboratory results
  - Ability to manage who has access to your information (Avatar)
  - Track who has accessed your data/information (Avatar)
  - Ability to access and manage your Avatar by using a mobile application (App)
  - Enter, import, store and export your personal medical images (e.g. DICOM files)
- Do you have suggestions for new functions we could add?
- If there was MyHealthAvatar platform, would you want your Avatar to be part of it for health research (e.g. clinical trial)?
  - ('Comments' text box), please specify

The chapters bellow presents the collected data/responses.

4.2.3.1 MyHealthAvatar will provide a variety of functionalities. How interested would you be in the following functions?

This question was a most complex one. Survey respondents were requested to rate a list of further MHA platform functionalities / functions by using a simple rating grade:

- Very interested
- Somewhat interested
- Unsure
- Somewhat uninterested
- Very uninterested
- No answer (this option was applicable in case if respondents left the survey)

**4.2.3.1.1   Enter, import, store and export personal medical data (e.g. Electronic Health Records)**

Analysis/Comment: 52,78% of respondents are '**Very**' interested and 25,56% are '**Somewhat**' interested in this function/functionality.
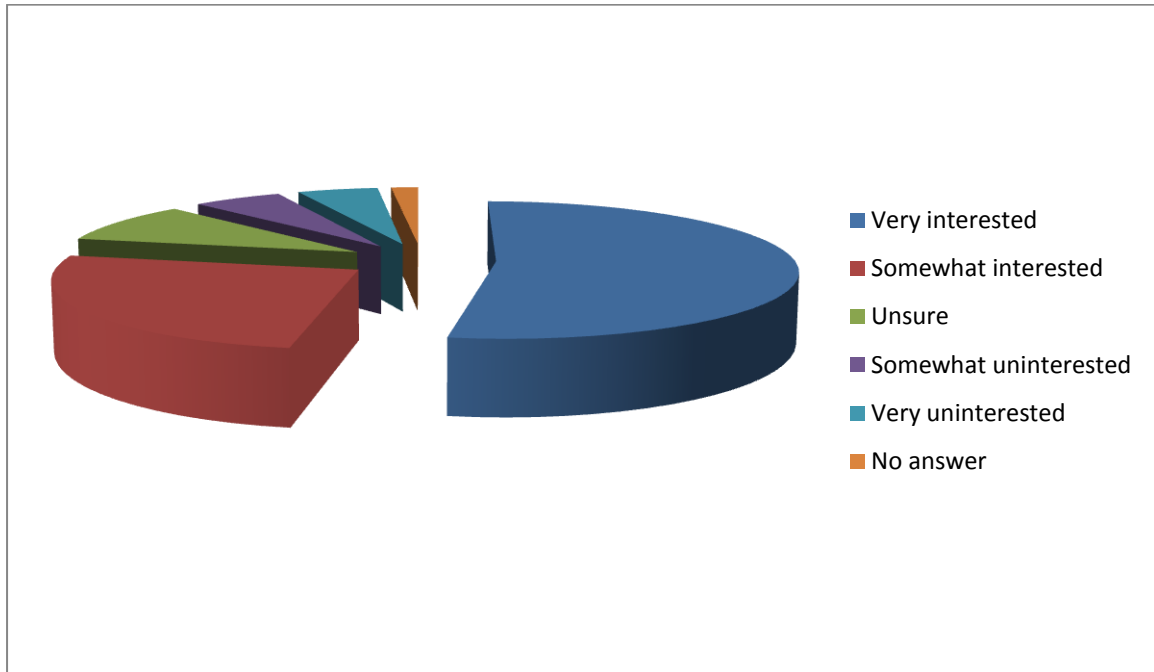
Answer	Count	Percentage
Very interested	95	52,78%
Somewhat interested	46	25,56%
Unsure	17	9,44%
Somewhat uninterested	10	5,56%
Very uninterested	9	5,00%
No answer	3	1,67%

**4.2.3.1.2   Schedule and coordinate medical appointments**

Analysis/Comment: 43,89% of respondents are '**Very**' interested and 31,67% are '**Somewhat**' interested in this function/functionality.
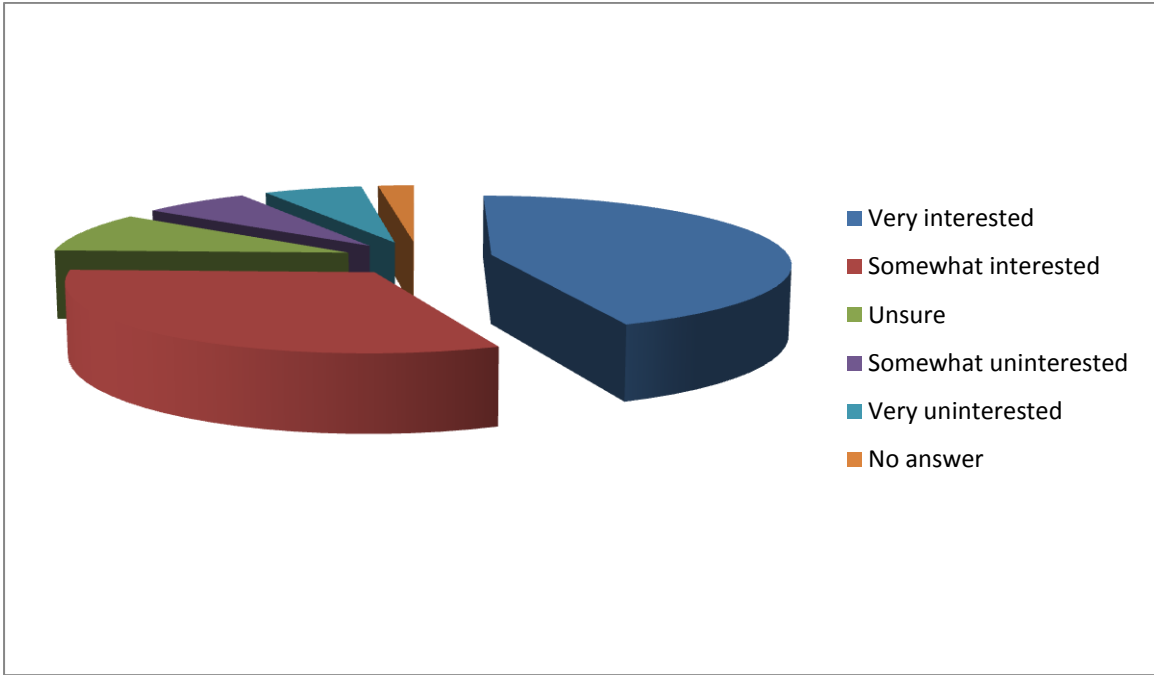
Answer	Count	Percentage
Very interested	79	43,89%
Somewhat interested	57	31,67%
Unsure	17	9,44%
Somewhat uninterested	12	6,67%
Very uninterested	11	6,11%
No answer	4	2,22%

4.2.3.1.3 Find personalised information about the diseases, drugs, vitamins, food, etc.
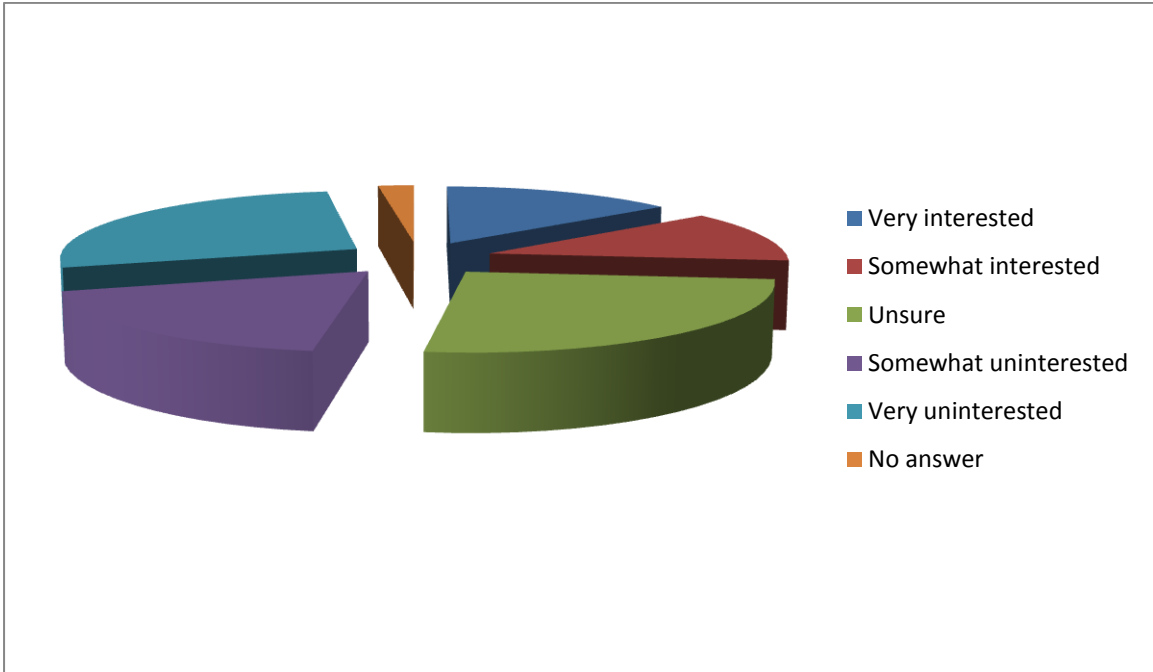
Analysis/Comment: 50,56% of respondents are '**Very**' interested and 30,00% are '**Somewhat**' interested in this function/functionality.
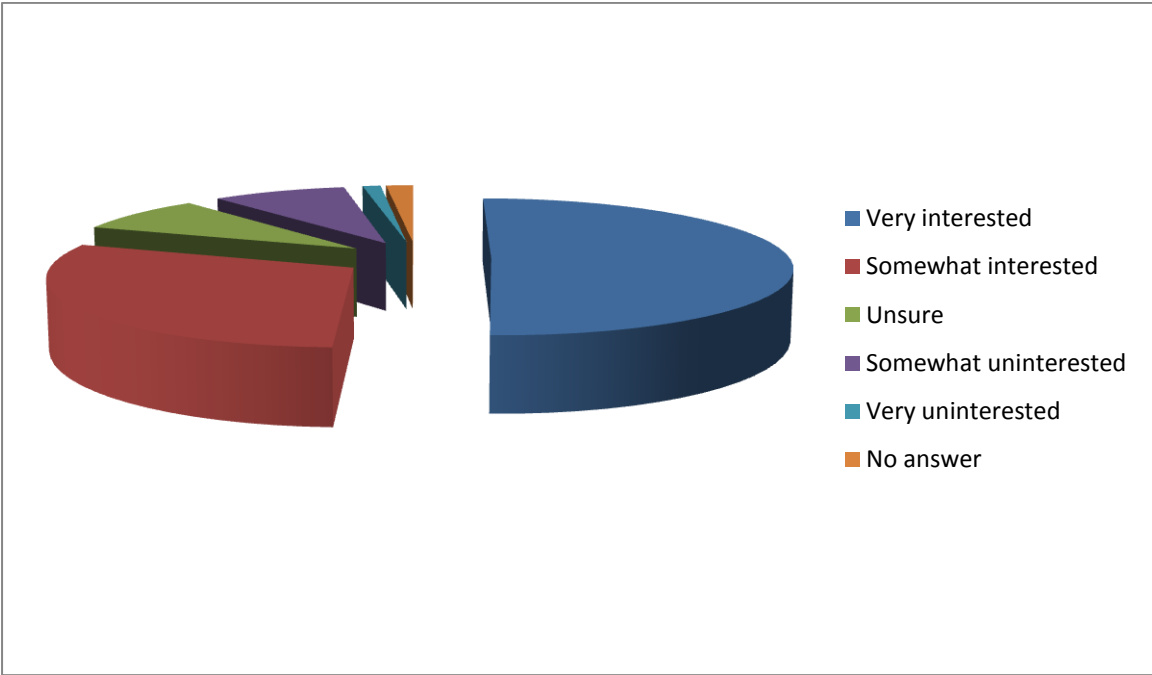
Answer	Count	Percentage
Very interested	91	50,56%
Somewhat interested	54	30,00%
Unsure	15	8,33%
Somewhat uninterested	15	8,33%
Very uninterested	2	1,11%
No answer	3	1,67%

4.2.3.1.4   Provide/Share your data/information (Avatar) to other Avatar(s)
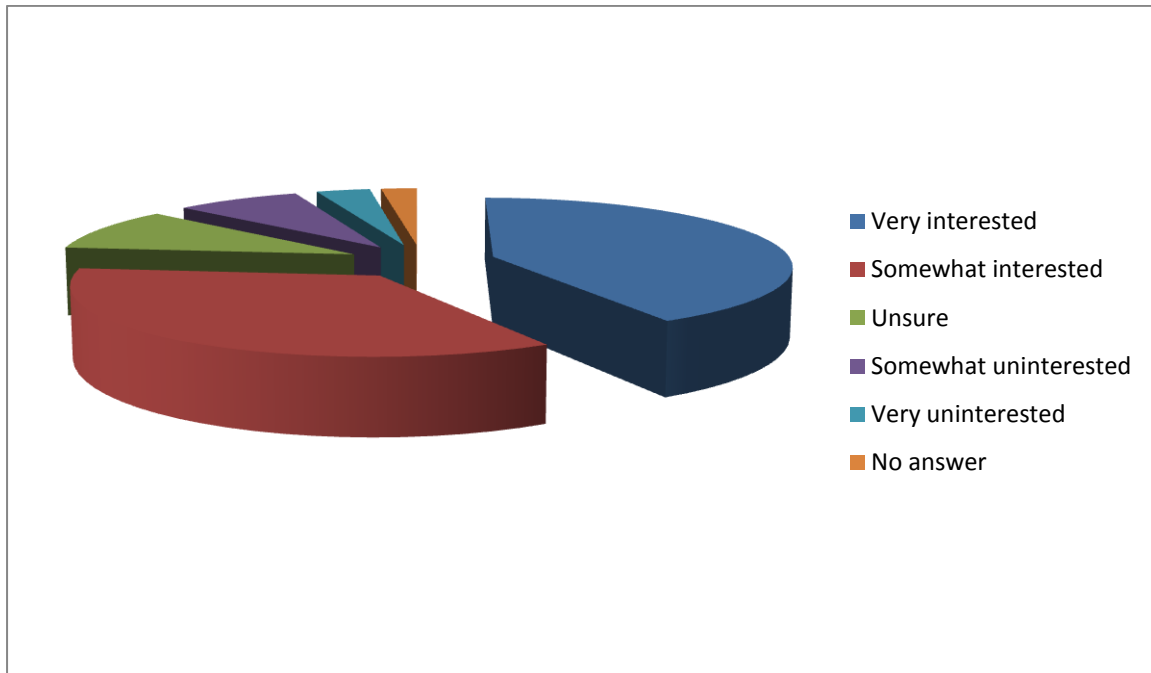
Analysis/Comment: Most of the respondents (27,22%) are '**Very uninterested**' and 25,56% are '**Unsure**' about this function/functionality.

Answer	Count	Percentage
Very interested	26	14,44%
Somewhat interested	22	12,22%
Unsure	46	25,56%
Somewhat uninterested	33	18,33%
Very uninterested	49	27,22%
No answer	4	2,22%

4.2.3.1.5   Provide/Share your personal Avatar to your doctor (e.g. GP)

Analysis/Comment: 41,67% of respondents are '**Very**' interested and 35,00% are '**Somewhat**' interested in this function/functionality.
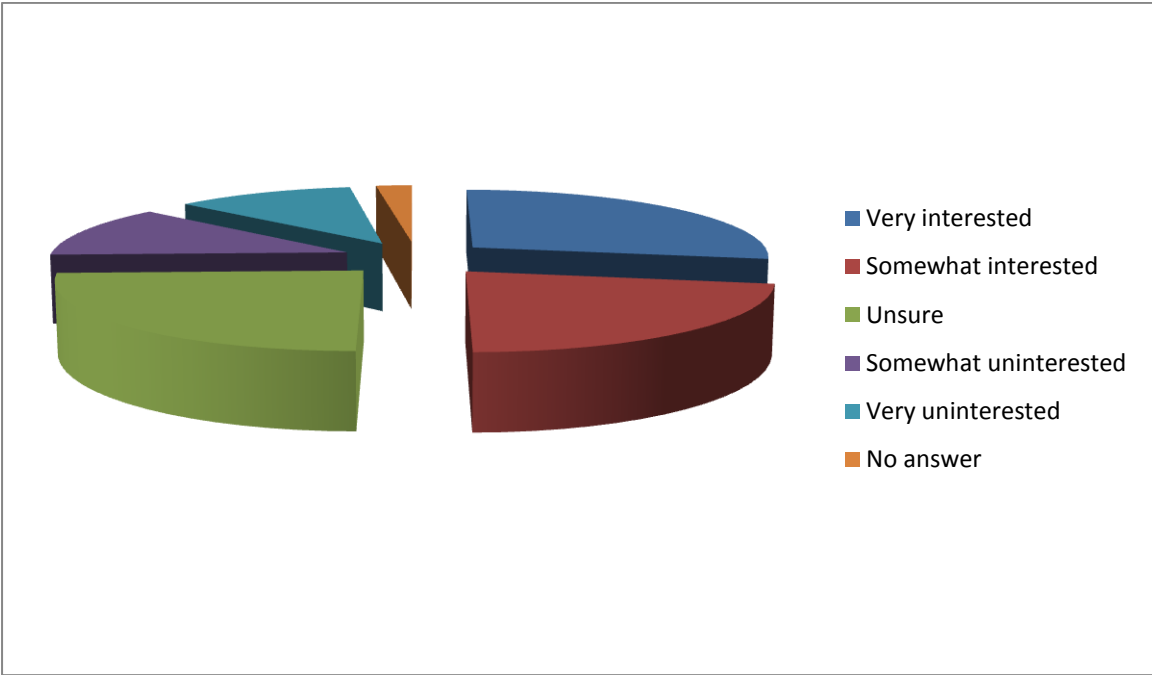
Answer	Count	Percentage
Very interested	75	41,67%
Somewhat interested	63	35,00%
Unsure	18	10,00%
Somewhat uninterested	14	7,78%
Very uninterested	6	3,33%
No answer	4	2,22%

4.2.3.1.6   Ability to manage your personal Avatar participation in health research (e.g. Clinical Trials)

Analysis/Comment: 27,78% of respondents are '**Very**' interested and 24,44% are '**Unsure**' about this function/functionality.

Answer	Count	Percentage
Very interested	50	27,78%
Somewhat interested	40	22,22%
Unsure	44	24,44%
Somewhat uninterested	22	12,22%
Very uninterested	20	11,11%
No answer	4	2,22%

4.2.3.1.7 Enter, import, store and export your Avatar personal medication list

Analysis/Comment: 42,78% of respondents are '**Very**' interested and 29,44% are '**Somewhat**' interested in this function/functionality.
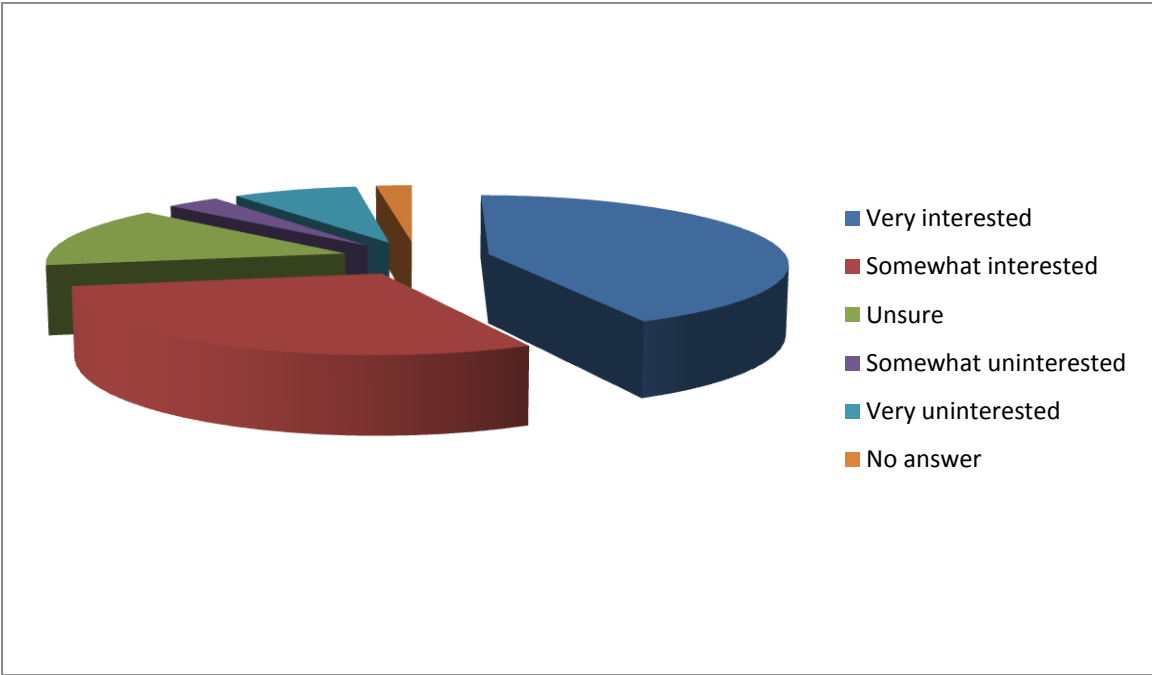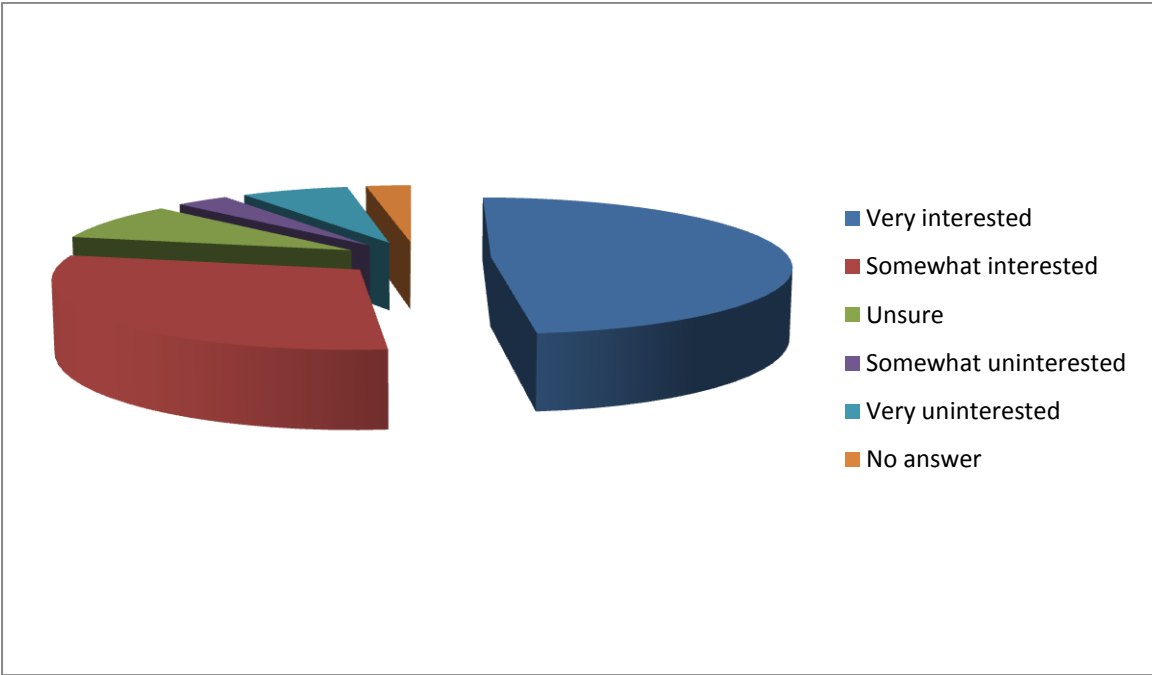
Answer	Count	Percentage
Very interested	77	42,78%
Somewhat interested	53	29,44%
Unsure	26	14,44%
Somewhat uninterested	6	3,33%
Very uninterested	14	7,78%
No answer	4	2,22%

4.2.3.1.8   Enter, import, store and export your Avatar personal laboratory results
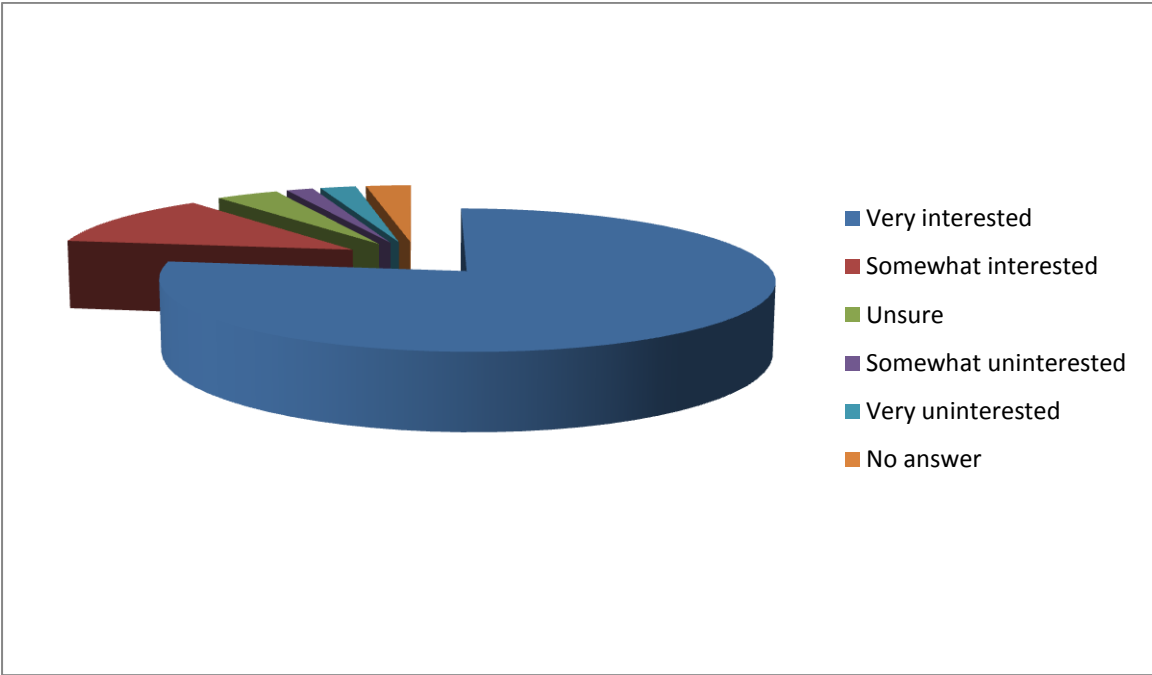
Analysis/Comment: 48,33% of respondents are '**Very**' interested and 30,00% are '**Somewhat**' interested in this function/functionality.

Answer	Count	Percentage
Very interested	87	48,33%
Somewhat interested	54	30,00%
Unsure	16	8,89%
Somewhat uninterested	6	3,33%
Very uninterested	12	6,67%
No answer	5	2,78%

4.2.3.1.9   Ability to manage who has access to your information (Avatar)

Analysis/Comment: 77,22% of respondents are '**Very**' interested and 12,22% are '**Somewhat**' interested in this function/functionality.

Answer	Count	Percentage
Very interested	139	77,22%
Somewhat interested	22	12,22%
Unsure	7	3,89%
Somewhat uninterested	3	1,67%
Very uninterested	4	2,22%
No answer	5	2,78%

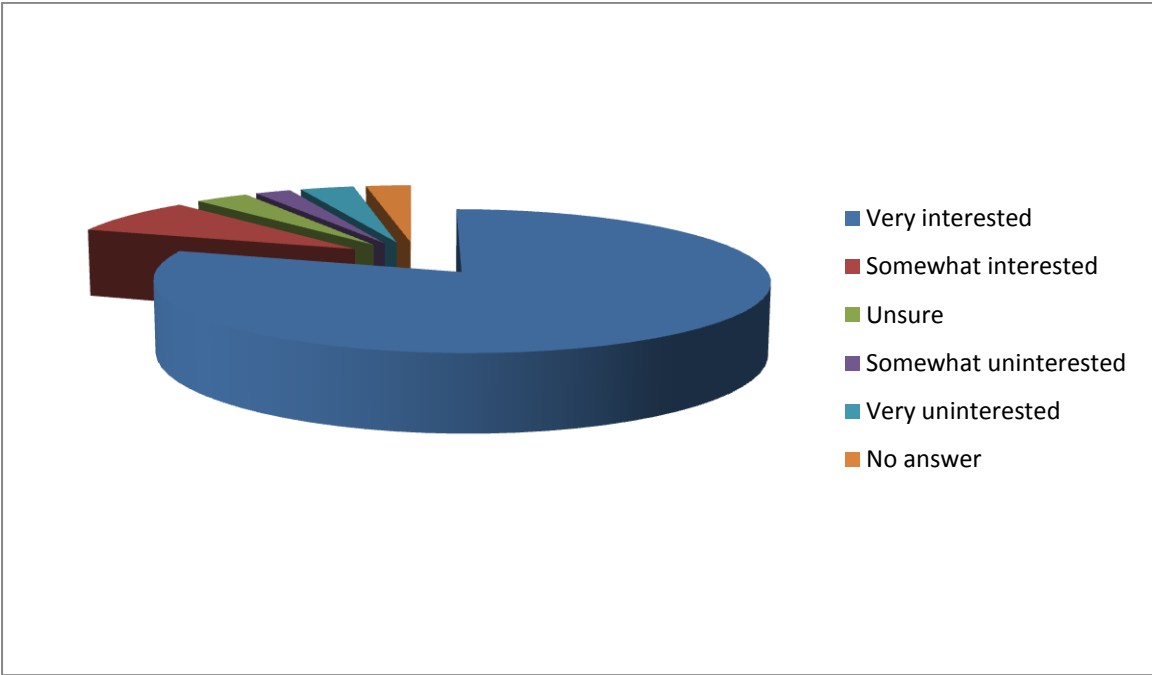### 4.2.3.1.10 Track who has accessed your data/information (Avatar)

Analysis/Comment: 80,00% of respondents are '**Very**' interested and 8,33% are '**Somewhat**' interested in this function/functionality.

Answer	Count	Percentage
Very interested	144	80,00%
Somewhat interested	15	8,33%
Unsure	6	3,33%
Somewhat uninterested	4	2,22%
Very uninterested	6	3,33%
No answer	5	2,78%

4.2.3.1.11 Ability to access and manage your Avatar by using a mobile application (App)
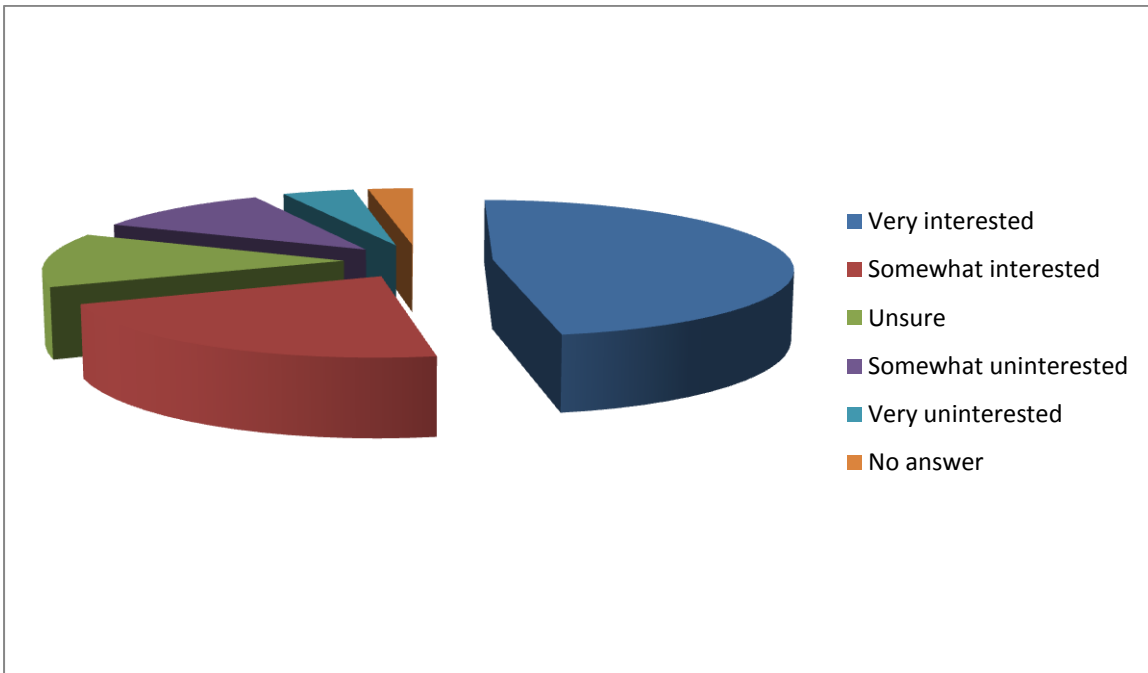
Analysis/Comment: 47,22% of respondents are '**Very**' interested and 21,67% are '**Somewhat**' interested in this function/functionality.

Answer	Count	Percentage
Very interested	85	47,22%
Somewhat interested	39	21,67%
Unsure	23	12,78%
Somewhat uninterested	20	11,11%
Very uninterested	8	4,44%
No answer	5	2,78%

4.2.3.1.12 Enter, import, store and export your personal medical images (e.g. DICOM files)
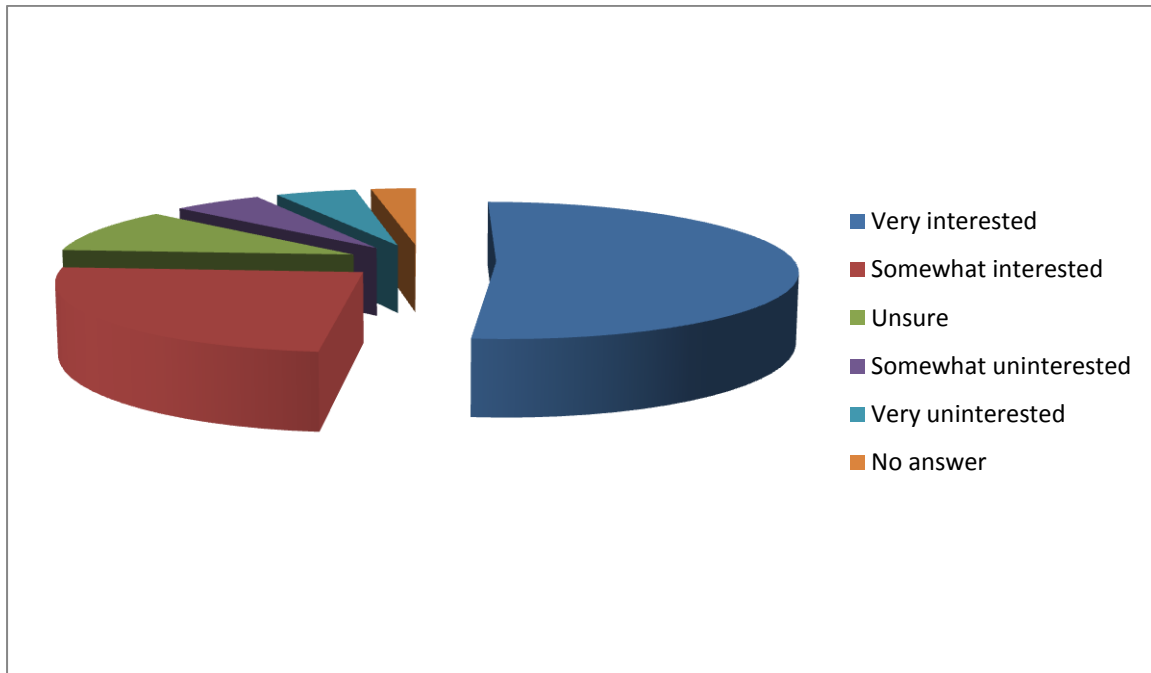
Analysis/Comment: 51,67% of respondents are '**Very**' interested and 24,44% are '**Somewhat**' interested in this function/functionality.

Answer	Count	Percentage
Very interested	93	51,67%
Somewhat interested	44	24,44%
Unsure	19	10,56%
Somewhat uninterested	10	5,56%
Very uninterested	9	5,00%
No answer	5	2,78%

4.2.3.2   Do you have suggestions for new functions we could add?

Analysis/Comment: This question was an additional option to specify functions/functionalities of MHA platform not mentioned before.

41 responses have been received (no spell or grammar check, no translation of answers into English):

Survey ID	Response
53	Address book of physicians, nurses, etc with whom I meet
54	RFID
62	As we get older there is a higher chance of using social servcies so would like to suggest this aspect of care is included. Also need to be able to put information in from private providers e.g. dentist, nrsing home care records.
70	access to homopathic medicine procedures and products Also medical research imformation
71	Family medical history Genetic testing
73	make access worldwide available
74	Clinical Genomics (like 23andme.com)
78	please see RWJ Project Health Design and Patti Brennan's view of PERSONAL health record. She points out that we need the ability to add

|	variables that are meaningful to the individual. I teach on this topic and give the example: A grandmother has medications that need monthly renewals. Her grandchildren are coming to visit during the week when she usually gets renewals. System should allow putting in unusual events (travel, surgery, etc.) that might affect medication renewals. System should coach on how to get early renewals for busy times or travel AND that such a need is coming up.
85	Health risks alarm
96	Enter personnal diary information
98	laboratory evaluation and short notifications if there are parameters out of normal range, reminders to check these, to do list
105	You already mentioned the sharing of information with other Avatar - maybe the focus here could be on family trees (to identify and monitor health issues related to the family history)
113	You should stop using the "avatar" word. These records are not virtual they are collected from real persons.
114	Finnish language and connection to national systems.
119	No, this seems very theoretical, based on what ICT industry wants, not what patients need
132	aaa
134	links to social care records too? especially to coordinate appointments
148	for someone testing blood glucose regularly this could help. or for mom's wanting to track their child's progress/immunizations
154	Enter, import, store and export consultations with all types of clinical and social care staff, not just doctors, including any telehealth, telemedicine and telecare sessions.
158	A way to interact with other avatars - peer support.
159	Taking all steps in ensuring the privacy and security of all information
170	Apart from representation, I am more interested in monitoring and assisting my personal health, such as provide advises and health plan according to my health data .
171	nem tudom , legutóbbi PSA leletem " nem került elő"
172	Nem tudom.
173	Még nem tudom,de ha lesz jelzem
197	Im Fall eines Notfalls Kontaktdaten von den nächsten Angehörigen speichern.
202	Informationen jenseits der Schulmedizin (was für alternative Behandlungsmöglichkeiten gibt es z.B. bei Fibromyalgie - mache gerade sehr gute Erfahrung mit Bioresonanz!!!)
208	Möglichkeit zur Familienchronik z.B. bei Krebs etc
222	Health insurance companies can exploit any loopholes. Hackers can get any information from the net. It will be difficult to get an honest health insurance cover. Many such heath related companies might also use this data for market research etc.
229	The ability to ensure my data is not used by or sold to any third parties without my consent and the absolute acceptance that I and I alone own my health data.
235	analysis tools for lab data, imaging, etc...
236	I am interested with the posibility to interac with my doctor with segurety missatges
244	No privacy at all. I think I'll never do it.
256	rendelés adattár. A szakterületek elérhetősége, helye.
264	my Avatar should look like I feel and represent my level of health in its look and feel, kinda like the idea behind RealAge

267	Nemtudom sajnálom
281	Warnung vor Medikamentenwechselwirkungen
293	Nem tudom!
297	Therapievorschläge und Informationen auch aus dem Bereich der alternativen Heilmethoden.
300	Überprüfung der Verträglichkeit von Medikamenten, die von verschiedenen Ärzten verordnet wurden.
320	Vollkommen ausreichend !

4.2.3.3 If there was MyHealthAvatar platform, would you want your Avatar to be part of it for health research (e.g. clinical trial)?

Analysis/Comment: We are very interested in identifying the willingness of the end-users to share their avatar data for health research (e.g. clinical trials). The received responses are encouraging, 21,67% of respondents selected '**Yes, complete record**', and 31,11% selection '**Yes, partial record**'. 30,00% of respondents were not sure.
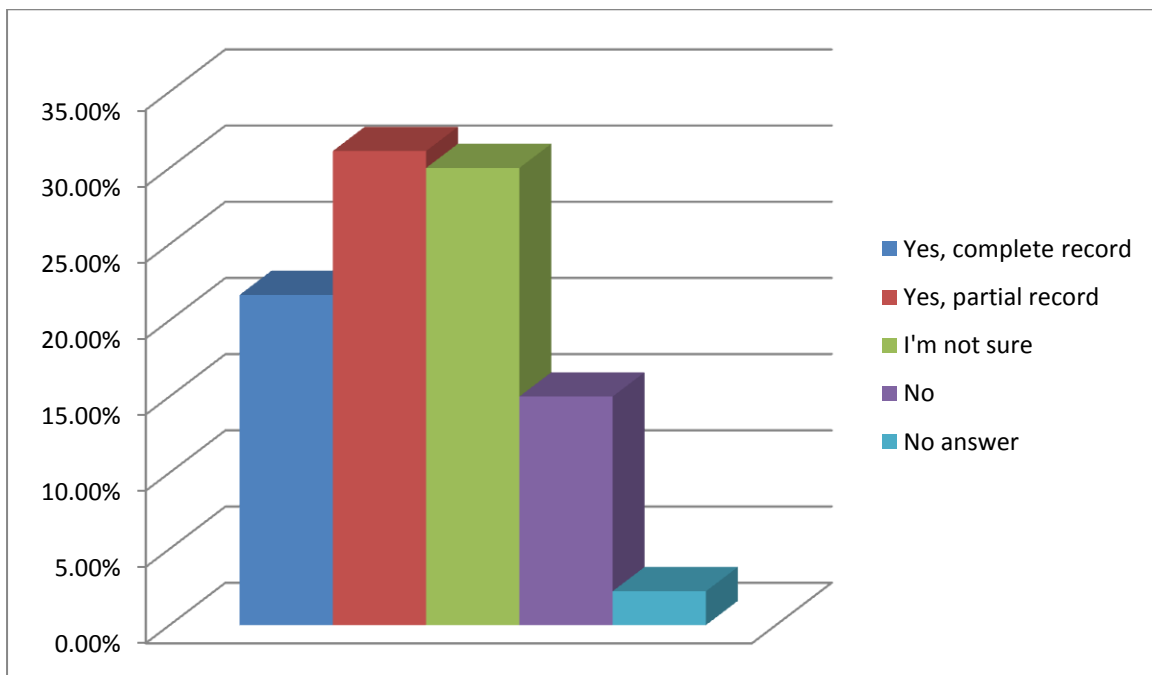
Answer	Count	Percentage
Yes, complete record	39	21,67%
Yes, partial record	56	31,11%
I'm not sure	54	30,00%
No	27	15,00%
No answer	4	2,22%

4.2.3.3.1 Comments, please specify

Analysis/Comment: "Comments" text box has been available for "If there was MyHealthAvatar platform, would you want your Avatar to be part of it for health research (e.g. clinical trial)?" question.

19 responses have been received and analysed. Most of them are related to access control and privacy issues.

4.2.4 Security and Privacy

The questions from 'Security and Privacy' section are in line with MHA project' Work Package 11. Our main goal was to identify the end-users' perspectives, views and concerns on security and privacy of the proposed for implementation MHA platform.

The questions of 'Security and Privacy' section were:

- MyHealthAvatar will provide a variety of functionalities. How interested would you be in the following functions?
  - Do you have any security concerns about MyHealthAvatar platform?
    - ('Comments' text box), please specify
  - Overall, what do you think about the level of possible risks to the security of MyHealthAvatar platform?
    - ('Comments' text box), please specify
  - Do you have any privacy concerns about MyHealthAvatar platform?
    - ('Comments' text box), please specify
  - Overall, what do you think about the level of possible risks to the privacy of MyHealthAvatar platform?
    - ('Comments' text box), please specify
  - If there was a MyHealthAvatar platform, would you expect to be asked before your records (Avatar) were accessed for any reason?
    - ('Comments' text box), please specify
  - Should these groups have access to your Avatar with your name and address present, removed or not at all?
    - Your doctor(s) (e.g. GP)
    - Healthcare researcher(s)
    - Other Avatar(s) from MyHealthAvatar platform
    - Family member(s)
    - Friend(s)

4.2.4.1 Do you have any security concerns about MyHealthAvatar platform?

Analysis/Comment: 67,46% of respondents have security concerns.
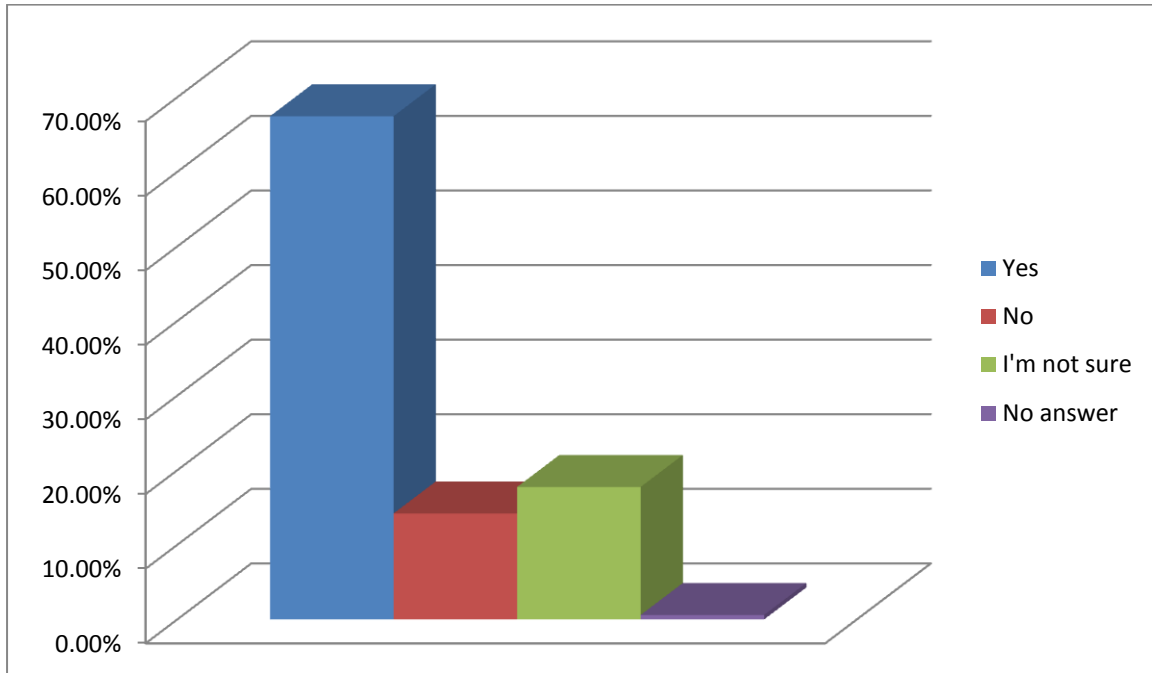
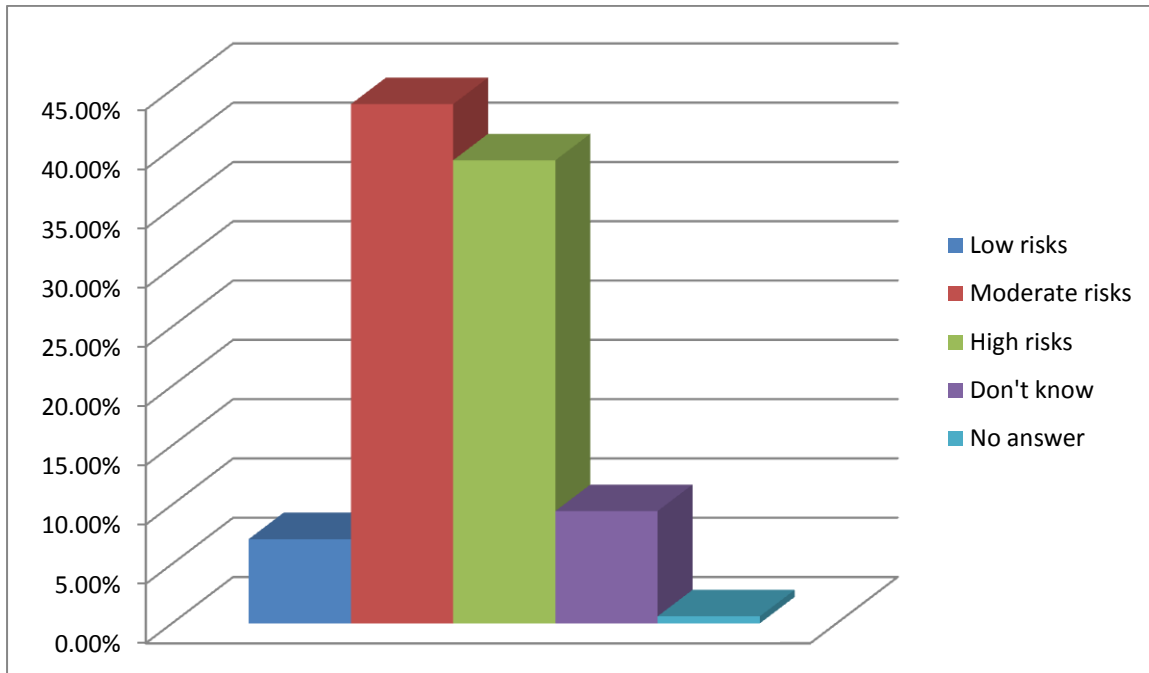| Answer	Count	Percentage
Yes	114	67,46%
No	24	14,20%
I'm not sure	30	17,75%
No answer	1	0,59%

4.2.4.1.1 Comments, please specify

Analysis/Comment: "Comments" text box has been available for "Do you have any security concerns about MyHealthAvatar platform?" question.

23 responses have been received and analysed.

4.2.4.2 Overall, what do you think about the level of possible risks to the security of MyHealthAvatar platform?

Analysis/Comment: This question has the goal to assess the level of the security risks (end-users' perspective). 39,05% of respondents selected the '**High risks**' option, and 43,79% opted for '**Moderate risks**'.

Answer	Count	Percentage
Low risks	12	7,10%
Moderate risks	74	43,79%
High risks	66	39,05%
Don't know	16	9,47%
No answer	1	0,59%

4.2.4.2.1 Comments, please specify

Analysis/Comment: "Comments" text box has been available for "Overall, what do you think about the level of possible risks to the security of MyHealthAvatar platform?" question.

15 responses have been received and analysed.

4.2.4.3 Do you have any privacy concerns about MyHealthAvatar platform?

Analysis/Comment: 68,05% of respondents have privacy concerns.

Answer	Count	Percentage
Yes	115	68,05%
No	26	15,38%
I'm not sure	27	15,98%
No answer	1	0,59%

4.2.4.3.1   Comments, please specify

Analysis/Comment: "Comments" text box has been available for "Do you have any privacy concerns about MyHealthAvatar platform?" question.

17 responses have been received and analysed.

4.2.4.4   Overall, what do you think about the level of possible risks to the privacy of MyHealthAvatar platform?

Analysis/Comment: This question has the goal to assess the level of the privacy risks (end-users' perspective). 40,24% of respondents selected the '**High risks**' option, and 42,01% opted for '**Moderate risks**'.

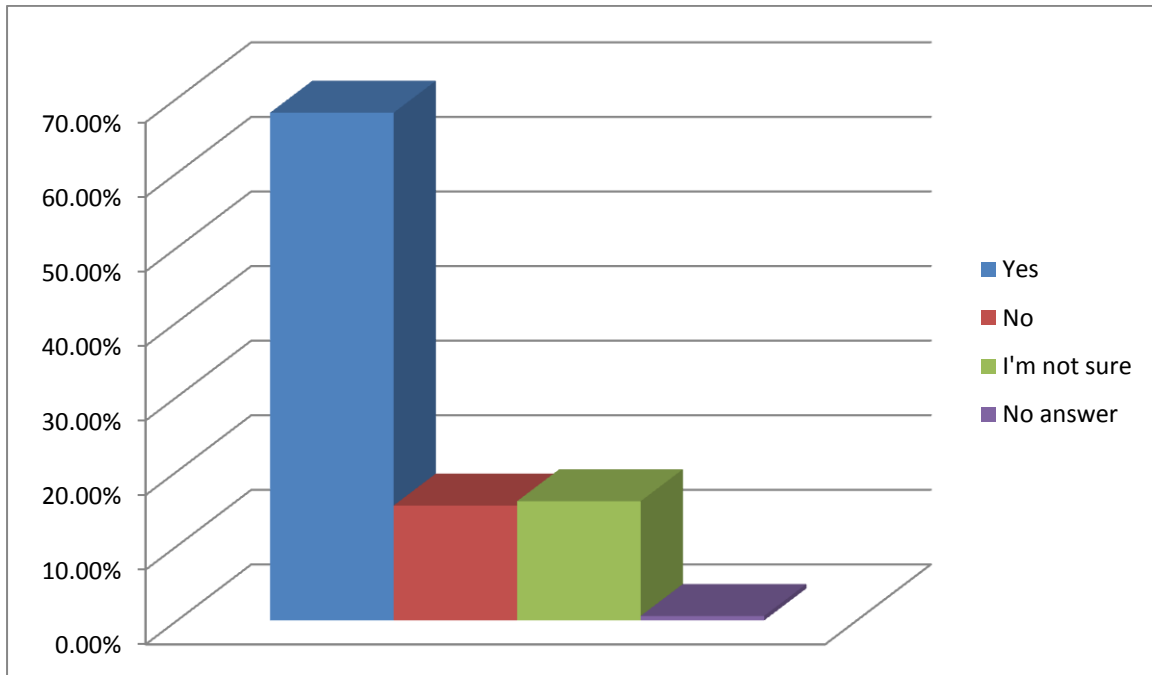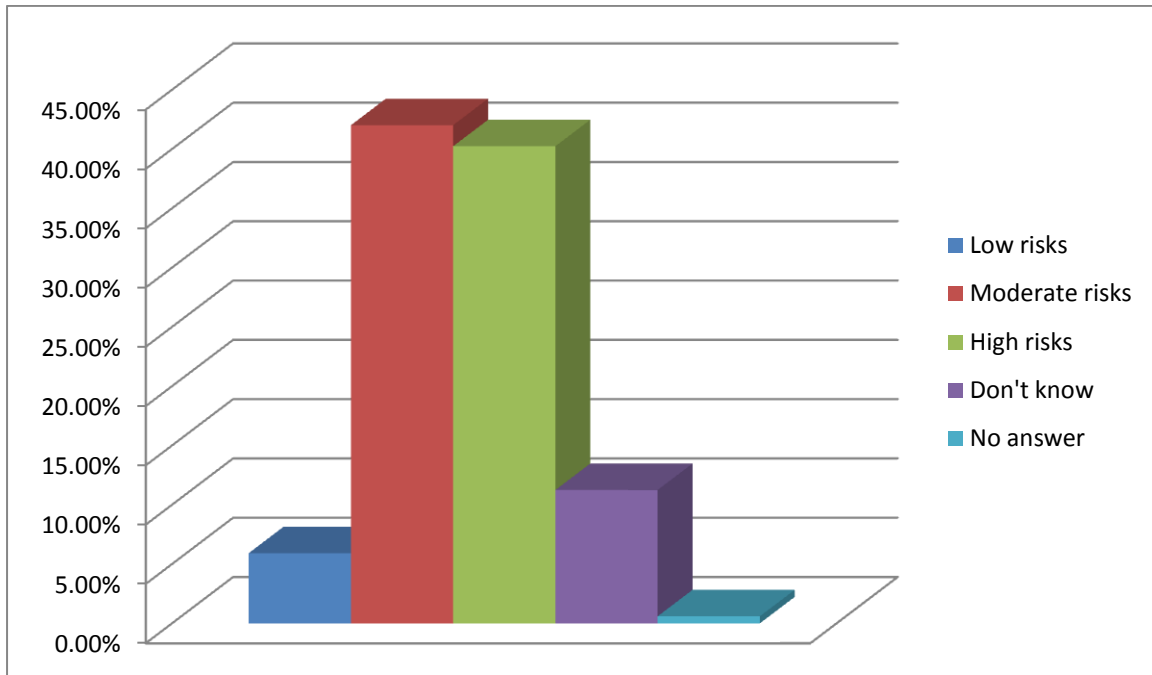| Answer	Count	Percentage
Low risks	10	5,92%
Moderate risks	71	42,01%
High risks	68	40,24%
Don't know	19	11,24%
No answer	1	0,59%

4.2.4.4.1   Comments, please specify

Analysis/Comment: "Comments" text box has been available for "Overall, what do you think about the level of possible risks to the privacy of MyHealthAvatar platform?" question.

8 responses have been received and analysed.

4.2.4.5   If there was a MyHealthAvatar platform, would you expect to be asked before your records (Avatar) were accessed for any reason?

Analysis/Comment: 88,76% of respondents are expecting to be asked before their records (Avatar) are accessed for any reason.
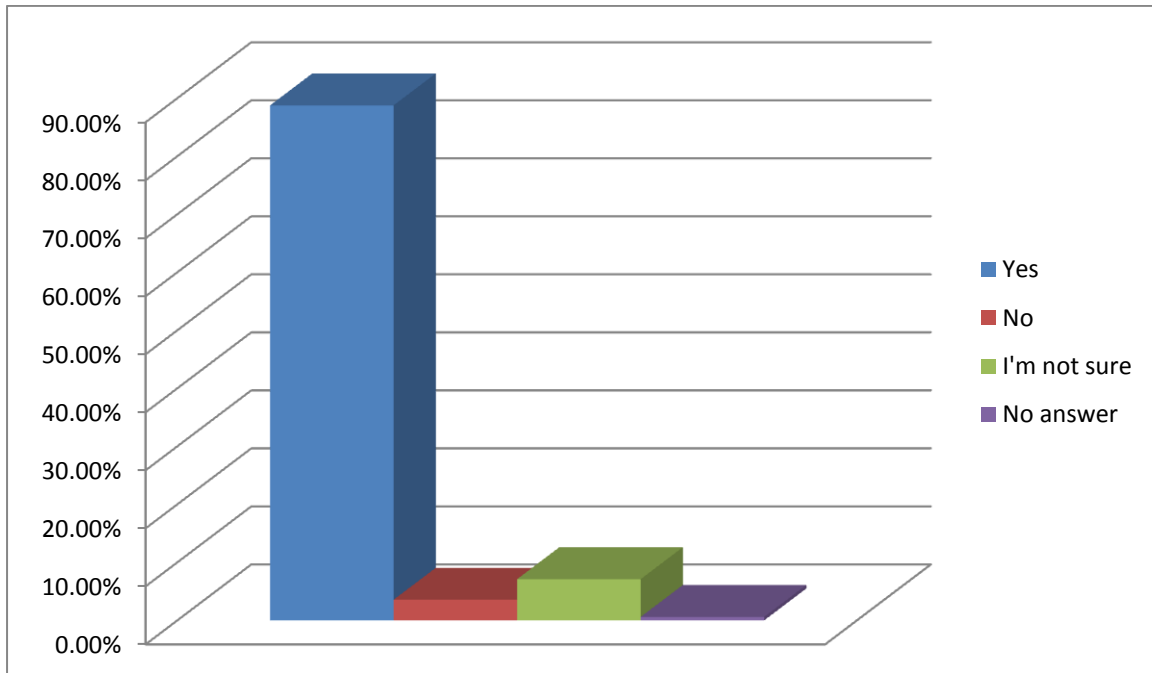
Answer	Count	Percentage
Yes	150	88,76%
No	6	3,55%
I'm not sure	12	7,10%
No answer	1	0,59%

4.2.4.5.1 Comments, please specify

Analysis/Comment: "Comments" text box has been available for "If there was a MyHealthAvatar platform, would you expect to be asked before your records (Avatar) were accessed for any reason?" question.

12 responses have been received and analysed.

4.2.4.6 Should these groups have access to your Avatar with your name and address present, removed or not at all?

Analysis/Comment: This question has been a complex one and it allowed the end-users to choose who could access their Avatar with name and address present, removed or not at all.

4.2.4.6.1 Your doctor(s) (e.g. GP)

Analysis/Comment: 71,01% of respondents reported that their doctor could have access to their Avatar with '**Name and address present**'.
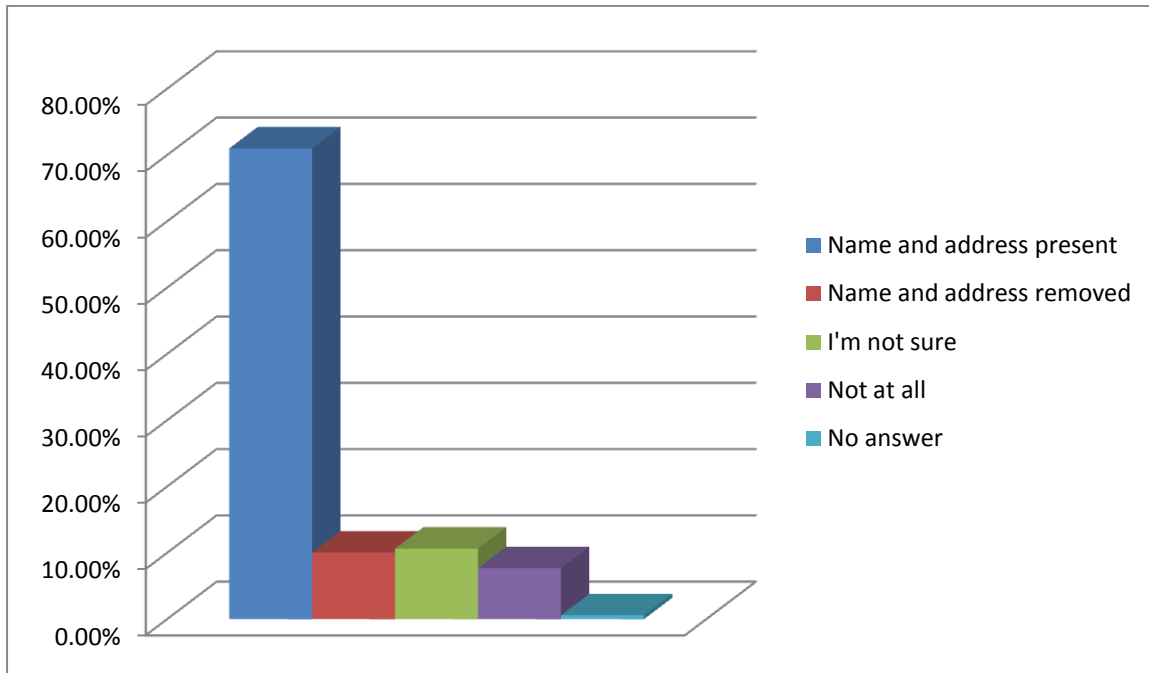
Answer	Count	Percentage
Name and address present	120	71,01%
Name and address removed	17	10,06%
I'm not sure	18	10,65%
Not at all	13	7,69%
No answer	1	0,59%

4.2.4.6.2 Healthcare researcher(s)

Analysis/Comment: 54,44% of respondents reported that researcher(s) could have access to their Avatar with '**Name and address removed'**.
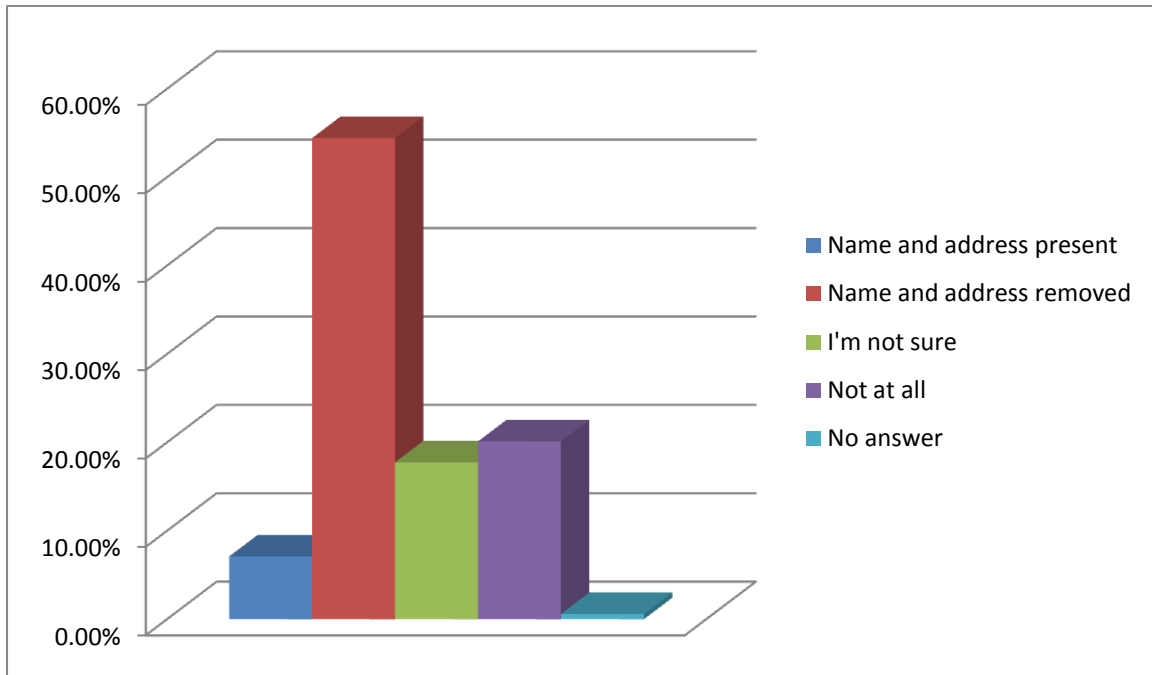
Answer	Count	Percentage
Name and address present	12	7,10%
Name and address removed	92	54,44%
I'm not sure	30	17,75%
Not at all	34	20,12%
No answer	1	0,59%

4.2.4.6.3 Other Avatar(s) from MyHealthAvatar platform

Analysis/Comment: 49,70% of respondents reported that other Avatar from MHA platform couldn't have access at all to their Avatar.
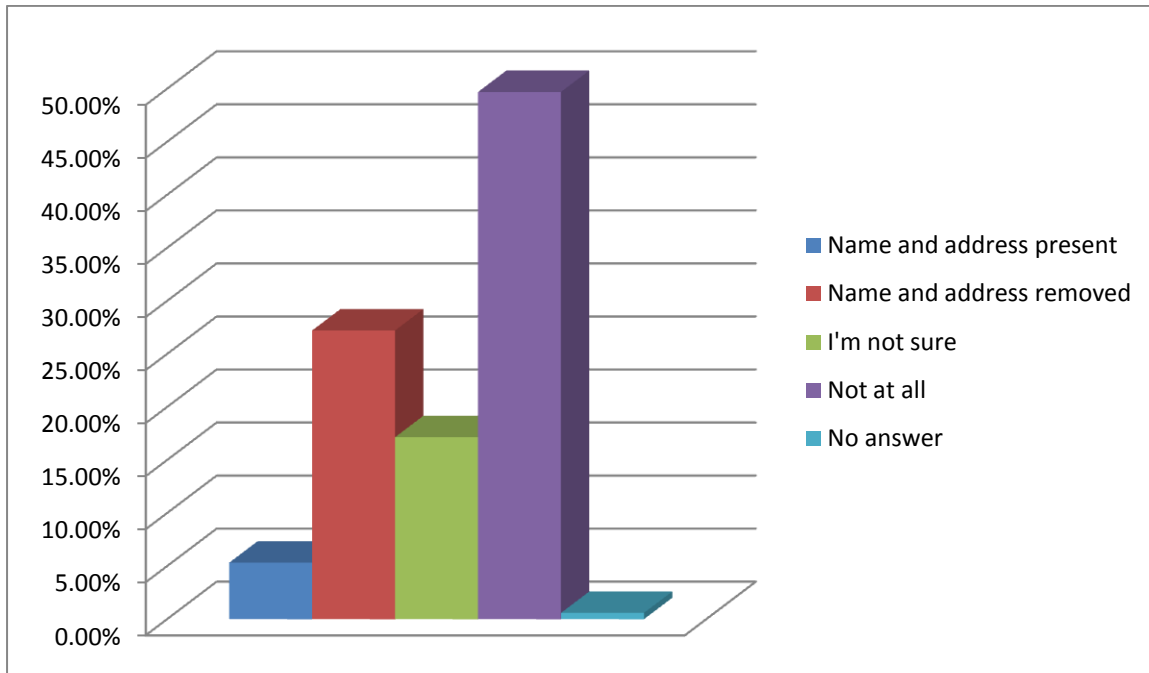
Answer	Count	Percentage
Name and address present	9	5,33%
Name and address removed	46	27,22%
I'm not sure	29	17,16%
Not at all	84	49,70%
No answer	1	0,59%

4.2.4.6.4   Family member(s)

Analysis/Comment: 34,32% of respondents reported that family member(s) couldn't have at all the access to their Avatar and 31,95% of respondents opted for access with '**Name and address present**'.
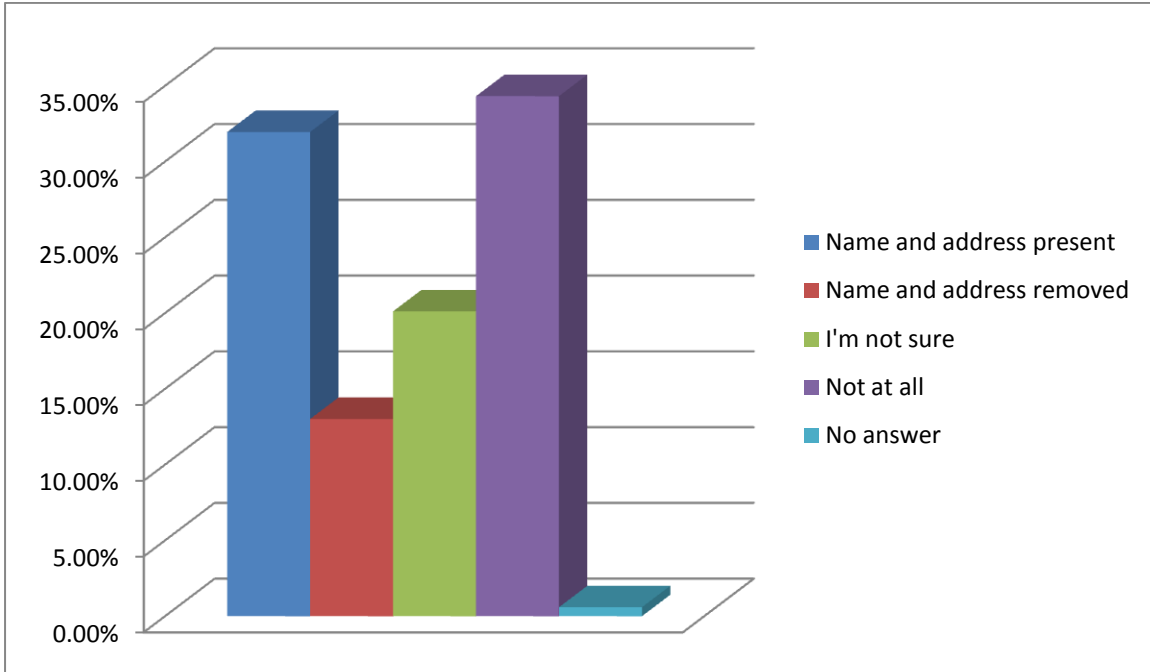
Answer	Count	Percentage
Name and address present	54	31,95%
Name and address removed	22	13,02%
I'm not sure	34	20,12%
Not at all	58	34,32%
No answer	1	0,59%

4.2.4.6.5   Friend(s)

Analysis/Comment: 61,54% of respondents reported that friend(s) couldn't have access at all to their Avatar.
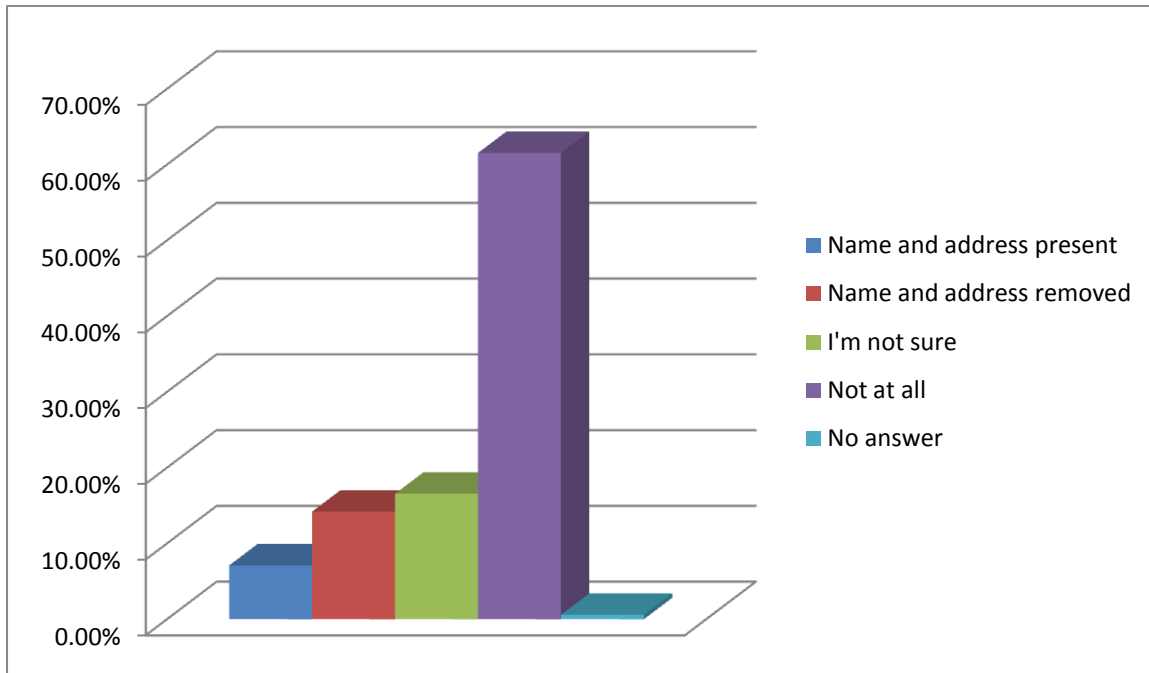
Answer	Count	Percentage
Name and address present	12	7,10%
Name and address removed	24	14,20%
I'm not sure	28	16,57%
Not at all	104	61,54%
No answer	1	0,59%

4.2.5 Feedback

Feedback section has only two last questions, the first question has been elaborated in order to allow all survey respondents to share any feedback on our survey and the second one has been elaborated in order to allow all interested respondents to receive by e-mail the final survey report.

4.2.5.1   Please provide any feedback on this survey

42 responses have been received and analysed. We are very proud to conclude that almost all received comments were positive and related to good wishes in our further project activities.

4.2.5.2   Please leave your e-mail if you would like us to send you the survey results

75 e-mail addresses have been provided. All interested respondents will be provided with public version of this deliverable and in special with a copy of the chapter related to MHA survey.

4.3   Survey Conclusions

One of the top conclusions is related to the high interest of all survey respondents in further MHA platform. We are very proud about the collected responses and the received positive feedback.

MHA survey has been on-line for only two months (June 2013 and July 3013), nevertheless, we managed to collect in total 270 responses (with 161 full responses and 109 incomplete responses).

The received responses allowed us to refresh the existing Scenarios / Use Cases. Additionally, new Scenarios / Use Cases will be elaborated by taking into account the collected survey results.

Of special interest is the advanced profile of our further, potential MHA end-users. Here we would like to mention that according to the collected responses:

- 42,73% of survey respondents are 'Female' and 38,77% are 'Male';
- The top selected age ranges are **20-35 Years** and **36-45 Years;**
- 68,72% of survey respondents reported 'Higher Degree' as the highest level of education;
- 51,54% of survey respondents reported a job related to healthcare;
- Most of the survey respondents have advanced (41,85%) and intermediate(21,59%) computer skills.

In the terms of knowledge and information about Medical / Health Records we would like to underline that according to the collected survey responses:

- 71,07% of survey respondents are aware about EHR;
- 58,93% of survey respondents (with no awareness about EHR) would be interested in finding more information about EHR in the frames of MHA project's web page;
- 85,79% of survey respondents are not using PHR.
- 66,86% of respondents (which are not using any PHR) reported their interest in a new, secure, advanced and personal health platform that lets gather, store, analyse and visualise health information online.

MHA functionalities section from MHA survey allowed us to highlight the most expected functionalities from further MHA platform. Additionally, it allowed us to refresh the elaborated Scenarios / Use Cases and to prioritise MHA functionalities in line with end-users expectations and views. All project partners are suggested to relay on the collected results in their current and further MHA platform development activities. Of special interest are:

- 52,78% of respondents are 'Very' interested and 25,56% are 'Somewhat' interested in 'Enter, import, store and export personal medical data (e.g. Electronic Health Records)'
- 43,89% of respondents are 'Very' interested and 31,67% are 'Somewhat' interested in 'Schedule and coordinate medical appointments'
- 50,56% of respondents are 'Very' interested and 30,00% are 'Somewhat' interested in 'Find personalised information about the diseases, drugs, vitamins, food, etc.'
- Most of the respondents (27,22%) are 'Very uninterested' and 25,56% are 'Unsure' about the function/functionality to 'Provide/Share your data/information (Avatar) to other Avatar(s)'
- 41,67% of respondents are 'Very' interested and 35,00% are 'Somewhat' interested in 'Provide/Share your personal Avatar to your doctor (e.g. GP)'
- 27,78% of respondents are 'Very' interested and 24,44% are 'Unsure' about the 'Ability to manage your personal Avatar participation in health research (e.g. Clinical Trials)'

- 42,78% of respondents are 'Very' interested and 29,44% are 'Somewhat' interested in 'Enter, import, store and export your Avatar personal medication list'

- 48,33% of respondents are 'Very' interested and 30,00% are 'Somewhat' interested in 'Enter, import, store and export your Avatar personal laboratory results'

- 77,22% of respondents are 'Very' interested and 12,22% are 'Somewhat' interested in 'Ability to manage who has access to your information (Avatar)'

- 80,00% of respondents are 'Very' interested and 8,33% are 'Somewhat' interested in 'Track who has accessed your data/information (Avatar)'

- 47,22% of respondents are 'Very' interested and 21,67% are 'Somewhat' interested in 'Ability to access and manage your Avatar by using a mobile application (App)'

- 51,67% of respondents are 'Very' interested and 24,44% are 'Somewhat' interested in 'Enter, import, store and export your personal medical images (e.g. DICOM files)'

In the frames of the Security and Privacy section of MHA Survey our main goal was to identify the end-users' perspectives, views and concerns on security and privacy of the proposed for implementation MHA platform, the top collected results are:

- 67,46% of respondents have security concerns and 39,05% of respondents selected the 'High risks' option, and 43,79% opted for 'Moderate risks' of the level of possible risks to the security of MHA platform

- 68,05% of respondents have privacy concerns and 40,24% of respondents selected the 'High risks' option, and 42,01% opted for 'Moderate risks' of the level of possible risks to the privacy of MHA platform

5 Conclusions

5.1 Introduction

This deliverable has the initial purpose to describe and to underline the specific user needs and requirements of the MyHealthAvatar (MHA) platform by being focused on comprehensive and detailed MHA Scenarios / Use Cases. The initial purpose of this document has by been successfully accomplished and it has been effectively extended (despite limited resources) by conducting a specialised survey (please see 'MHA Survey' chapter with its related conclusions section). We are proud to conclude that this achievement has been possible only as result of the support and the assistance received from all project partners.

The active enrolment of all project partners is one of the major achievements of this deliverable, all submitted Scenarios / Use Cases have been published in the frames of this document and all of them represent a valuable background for further project activities.

5.2 Concluding Scenarios / Use Cases

The table below (**Table 2.**) are presenting an initial collection of all Scenarios / Use Cases of this document. Project partners demonstrate a strong commitment and an active enrolment. These initial collections suggest that there are great potentials of demands for public acceptance of the MyHealthAvatar by citizens/patients and the envisaged system should:

- enable effective data browse using UI and visualization
- support clinical knowledge discovery for citizens and for researchers.
- allow smart data collection from citizens through constant self-monitoring using sensors
- provide assessment and prediction of the health status of patients by statistical analysis and simulation
- support build patient communities among patients with similar conditions
- link to external data sources, particularly to the hospital systems where the patient records and data are stored.
- provide a comprehensive and longitudinal collection of data regarding the patient health status that is relevant to a variety of clinical cases.

The next activities will be focused on refining these initial cases to define a set of finalised use cases according to the agreed DoW document and in special in line with activities from WP7 which has the major task named 'T7.1: Scenarios and use cases for MyHealthAvatar: PM10=>PM18 (Task Leader: USAAR)'. This task will describe finalised scenarios and use cases that are relevant for MHA. As scenarios are based on the results of WP2, this task starts at month 10 after the finalization of WP2. According to the different stakeholders (citizens, clinicians, basic researchers and IT people) scenarios and use cases will be provided for each of them. All existing and new Scenarios / Use Cases will be developed in an interactive process between all beneficiaries of the project and described in an advanced standardized way. Interoperability issues will be taken into account to allow a seamless interaction between different scenarios and to guarantee data sharing. Tools that need to be developed in those scenarios will be prioritized according to the user needs and requirements under

a clinical perspective. Criteria for prioritization will be developed at the beginning of this task. This task will also define the timeframe for realization of selected scenarios.

ID	Scenario / Use Case Name	Owner	End-Users
UC-1	Enter, import, store and export personal medical data	USAAR	General public, patients, researchers, healthcare and IT professionals
UC-2	Informed Consent and Privacy	USAAR	General public, patients, researchers, healthcare and IT professionals
UC-3	Interactive 3D Model of the Human Body (Patient Education & Serious Game)	USAAR	General public, patients, researchers, healthcare and IT professionals
UC-4	Collecting, saving and sharing data from third party social networks	USAAR	General public, patients, researchers, healthcare and IT professionals
UC-5	Remote Monitoring	USAAR	General public, patients, researchers, healthcare and IT professionals
UC-6	Mobile Driven 3D Virtual Lung	FORTH	General public, patients, researchers, healthcare and IT professionals
UC-7	Mobile Lifestyle and Social media	FORTH	General public, patients, researchers, healthcare and IT professionals
UC-8	Compile and perform a simulation using a biological model	ICCS	General public, patients, researchers, healthcare and IT professionals
UC-9	Manage the content of the Model Repository and the Clinical Data Repository (related to simulation models)	ICCS	General public, patients, researchers, healthcare and IT professionals
UC-10	Tools for browsing medical images in avatar	LIN	General public, patients, researchers, healthcare and IT professionals
UC-11	Tools for the analysis of medical images in avatar	LIN	General public, patients, researchers, healthcare and IT professionals
UC-12	Utilization of personal genomic information for the individualization of MHA platform	FORTH	General public, patients, researchers, healthcare and IT professionals
UC-13	Anti-platelet therapy in pre-operating period	FORTH	General public, patients, researchers, healthcare and IT professionals
UC-14	Multi-scale visualization of biomedical data	FORTH	General public, patients, researchers, healthcare and IT professionals
UC-15	Bidirectional linkage to ObTiMA	USAAR	General public, patients, researchers, healthcare and IT professionals
UC-16	Consultation Scenario: Interaction between the patient and physician	USAAR	General public, patients, healthcare professionals
UC-17	Patient Diary	USAAR	General public, patients
UC-18	Patient devices SDK	USAAR	IT professionals

UC-19	Search for Similar Patients	USAAR	General public, patients, researchers, healthcare and IT professionals
UC-20	Knowledge Discovery	USAAR	General public, patients, researchers, healthcare and IT professionals
UC-21	Building patient community among users	BED	General public
UC-22	Avatar Data Browse	BED	General public
UC-23	Avatar Data Collection	BED	General public
UC-24	Knowledge Avatar	BED	General public, patients, researchers, healthcare and IT professionals
UC-25	Web Login	BED	General public, patients
UC-26	Brain Trauma	BED	Patients, healthcare professionals
UC-27	Personalised CHF risk analysis	FORTH	Clinicians, patients

Table 2. An initial collection of all Scenarios / Use Cases

5.3 Demonstrating MHA Value, Safety and Privacy

MHA platform will be contributing to the research and industry biomedical domains by making fundamental changes. The proposed for implementation project rises new opportunities and contributes in an innovative way to patient awareness about health/disease status, clinical research, medication, lifestyle and how to manage illnesses and the available treatments.

Successful implementation of MHA platform will help to build an advanced and a unique networked model of communication among patients, their health care providers and other stakeholders.

We would conclude that the key of success is to demonstrate the value of MHA platform with its advanced safety and security frames. The first step, by describing the initial versions of MHA Scenarios / Use Cases and by presenting in addition the survey results has been successfully accomplished with support from all project partners.

6 References

[1]   A Spiral Model of Software Development and Enhancement Computer, Vol. 21 (May 1988), pp. 61-72 by Barry W. Boehm

[2]   MyHealthAvatar project Description of Work (DoW)

Appendix 1 – Abbreviations and acronyms

DoW   Description of Work

EHR   Electronic Health Record

ICT   Information and Communications Technology

MHA   MyHealthAvatar

PHR   Personal Health Record

TBD   To Be Decided