



MyHealthAvatar

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

**Project acronym: MyHealthAvatar**

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<b>RE</b>	Restricted to a group specified by the consortium (including the Commission Services)	
<b>CO</b>	Confidential, only for members of the consortium (including the Commission Services)	

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Institution:	University of Bedfordshire
E-Mail:	feng.dong@beds.ac.uk

**ABSTRACT:**

This deliverable describes the activities related to the dissemination and evaluation within the project.

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<sup>1</sup> R=Report, P=Prototype, D=Demonstrator, O=Other

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### **List of contributors**

- University of Bedfordshire Feng Dong
- Zsuzsanna Maros-Szabo, Larkbio
- Balint Domokos, Larkbio
- Zoltan Kovacs, Larkbio
- Norbert Graf, USAAR
- Ruslan David, USAAR
- Sarah Jensen, LUH
- Feng Dong, BED
- Haridimos Kondylakis, FORTH
- Manolis Spanakis, FORTH
- Nikolaos Christodoulou, ICCS
- Georgios Stamatakos, ICCS
- Xujiong Ye, LIN
- H Wei, ANS



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## 1 Executive Summary

This deliverable presents workshops and other relevant activities for demonstration and dissemination of the project outcomes within the final stage of the project. We fully recognise that the best way of convincing the public to adopt the technology is to provide them with an opportunity to try it and see what performance benefits and the adoption of the MyHealthAvatar outcomes can bring. The platform has been made available to different user groups through a number of stages. It is currently under a trial by the general public, who can have access to the platform and the app through e-consent.

By collaborating with other academic colleagues and contacts, MyHealthAvatar were involved in the organisation of three conferences/workshops, in which the project outcomes were disseminated, demonstrated and evaluated, including ICT 2015, MobileHealth 2015 and IoTBDH-2015.

In addition, the MyHealthAvatar consortium consists of a number of academic partners (namely universities), which include academic scientists from a wide range of scientific, social, medical and engineering background. This provides us with a perfect opportunity to disseminate and demonstrate the project outcomes to a wide range of fields and to look for further collaboration in research based on the outcome of MyHealthAvatar. To this end, a number of local workshops and meetings have been organised by each of the project partners.



## 2 Introduction

This deliverable presents workshops and other relevant activities for demonstration and dissemination of the project outcomes within the final stage of the project.

### 2.1 Access to the platform by the public

We fully recognise that the best way of convincing the public to adopt the technology is to provide them with an opportunity to try it and see what performance benefits and the adoption of the MyHealthAvatar outcomes can bring. The platform has been made available to different user groups through a number of stages:

- 1) From June 2014 to Sept 2014, by internal members within the consortium
- 2) From Sept 2014 to Dec 2015: by selected members external to the consortium, mainly through the collaborators and other linked projects
- 3) From Dec 2015 onwards: by the public, allowing them to access by e-consent

The platform is available at <https://myhealthavatar.org/mha/>. The MyHealthAvatar app is available from the Google Play Store for free download and unlimited trial. To reduce the effort in data entering, one of the three sensors/apps can be used to collect your self- monitoring data:

- Fitbit (One, Flex, Zip <https://www.fitbit.com/>) for step-count, calories burns, sleep.
- Withing Pulse O2 (<http://www.withings.com/uk/withings-pulse.html>) for step-count, pulse, oxygen level in blood, sleep.
- Moves (a free mobile app <https://www.moves-app.com/>) for locations, activities and steps-count. You need a smartphone in order to connect to the abovementioned sensors/apps.

### 2.2 Workshops, Dissemination and Demonstrations

The major dissemination activities that have taken place fall into two categories:

- Academic conferences and workshops – by collaborating with other academic colleagues and contacts, MyHealthAvatar were involved in the organisation of three conferences/workshops, in which the project outcomes were disseminated, demonstrated and evaluated – more details are reported in Section 3.
- Local workshops for the evaluation and disseminations run by the partners within the consortium

The MyHealthAvatar consortium consists of a number of academic partners (namely universities), which include academic scientists from a wide range of scientific, social, medical and engineering background. This provides us with a perfect opportunity to disseminate and demonstrate the project outcomes to a wide range of fields and to look for further collaboration in research based on the outcome of MyHealthAvatar. To this end, a number of local workshops and meetings have been organised by each of the project partners – more details are reported in Section 4.



## 3 Conferences and workshops

### 3.1 ICT 2015

#### 3.1.1 Introduction

ICT 2015 took place from 20 to 22 October in Lisbon, Portugal. It offered to more than 6000 visitors the possibility to "Innovate, Connect, Transform" our digital world.

- ICT 2015 event offered several parallel activities:
- A policy conference;
- An interactive exhibition;
- Many networking opportunities;
- Horizon 2020 Work Programme 2016-2017 thematic sessions;
- Startup Europe Forum.

ICT 2015 had 2 European Commissioners attending, 127 speakers in 4 plenary and 15 parallel sessions, 140 exhibition booths and 120 networking sessions. The event also had over 6000 participants, 23 videos, 23000 tweets with #ICT2015 and 5200 Twitter users that actively joined the online debate.

#### 3.1.2 Dissemination Activities

##### Exhibition

MyHealthAvatar was involved in the conference exhibition in ICT 2015, occupying a booth the team provided visitors with a chance to discuss and learn more about the MyHealthAvatar project. On display were the more tangible public interfaces to the platform, the web application and the mobile application. These assets were running on a small selection of hardware, visitors were encouraged to try the platform while conversing and learning more from the two demonstrators. During the course of the three days MyHealthAvatar was exhibiting, the team fielded numerous queries and requests for collaboration and an even larger amount of interest in accessing MyHealthAvatar's data.



MyHealthAvatar exhibition at ICT2015

## Evaluation

The evaluation forms were distributed among the participants to ask them to provide feedback to the different tools and interfaces of the MyHealthAvatar platform and mobile application. A user would be encouraged to use the tools by the demonstrators, then asked to provide feedback on the paper based evaluation form. Some visitors went even further by providing additional notes and suggestions regarding interface design and work flow. The overall quantity of responses was low however, with many visitors seemingly not willing to spend the required amount of time completing the form, rather they simply wanted some literature and a more detailed description before moving on to the next exhibit.

## 3.2 *IoTBDH-2015*

### 3.2.1 Introduction

IoTBDH-2015 was held on 26-28 October 2015 in Liverpool, UK. The goal of IoTBDH workshop is to bring together researchers and practitioners from both academia and industry into a forum, to present the state-of-the-art research and applications in utilizing IoT and big data technology for healthcare by presenting efficient scientific and engineering solutions, addressing the needs and challenges for integration with new technologies, and providing visions for future research and development. Dissemination activities. This year the workshop ran together with MyHealthAvatar.





MyHealthAvatar is designed as a lifetime companion for individual citizens to facilitate the collection of, and access to, long-term health-status information, which is extremely valuable for clinical decisions, leading to strengthened multidisciplinary research excellence in supporting innovative medical care. It is built on the latest ICT technology such as IoT for data collection with an aim of engaging public interest to achieve its targeted outcomes. The rapid advance of the Internet of Things (IoT) technology grants MyHealthAvatar opportunities to build health profiles of individuals with increased reliability and validity by monitoring their lifelogging data captured by a variety of IoT assets, including objects, sensors, mobile apps, web-objects, etc. One of the aims of MyHealthAvatar is to set to focus on the interoperability of the IoT assets, aiming at a common, interoperable and internet-based environment for long-term lifestyle information for individuals. It can keep users well informed about their daily activities, diet, sleep, mood, blood pressure, pulse rate, etc., enhancing self-awareness in health and encouraging positive attitudes towards lifestyles. Data sharing among different users is enabled to allow for experience exchange and to build healthcare social-networks among users.

### **3.3 MobileHealth 2015**

#### 3.1.1 Introduction

We organized an International Workshop on "Advances in Personalized Healthcare Services, Wearable Mobile Monitoring, and Social Media Pervasive Technologies" in conjunction with the 5th EAI International Conference on Wireless Mobile Communication and Healthcare - "Transforming healthcare through innovations in mobile and wireless technologies" held in OCTOBER 14–16, 2015 at LONDON, GREAT BRITAIN dedicated to The Digital Patient concept: Vision and Demonstrations.

The aims and the objectives were:

As an innovative concept, the impact of digital patient to personalised medicine is yet to be clear and hence requires a focused and concerted effort in addressing various questions regarding: Personalized healthcare emphasizes on the use of information about an individual/patient to select or optimize patient's preventative, therapeutic care and wellbeing. Modern healthcare solutions emphasize on the need to empower citizens to manage their own health and disease and include smart medical sensors, remote eHealth monitoring, smart-phone enabled data aggregation, medical awareness and analysis and context-aware assistive living technologies. Modern mobile healthcare systems, supported by information and communication technologies, provide solutions for improving illness prevention, facilitating chronic disease management, empowering patients, enable personalization of care improving the productivity of healthcare provisioning and improve utilization of healthcare enabling the management of diseases outside institutions as well as encouraging citizens to remain healthy. This workshop will build on experiences as well as technological and scientific developments stemming from some flagship projects funded by the EU under the FP7 framework programme aiming to bring together researches working in the fields of infrastructures and technologies for integrative biomedical research, ICT for predictive and translational medicine and the VPH at large.



In this context we invite researchers, physicians, computer scientists and engineers to present their experience and research work.

Topics covered (but not limited to):

- The power and limitations of modern technologies with respect to their applications to digital patients.
- Mobile and wireless technologies for healthcare delivery, enhanced monitoring and self-management of disease and health
- Clinical acceptability of digital patient in terms of supporting personalised medicine.
- User perspectives, use cases and future scenario realising the vision for the “digital patient”.
- Potential legal and ethical aspects of digital patients Wearable, outdoor and home based applications
- Wireless, mobile and wearable devices for pervasive healthcare
- Mobile applications for health, wellbeing disease management and disease prevention
- Patient monitoring in diverse environments (hospitals, nursing, assisted living)
- Healthcare telemetry and telemedicine, remote diagnosis and patient management
- Wireless access in ubiquitous systems for healthcare professionals
- Service-oriented middleware architecture for medical device connectivity in personal health monitoring applications
- Technologies for the management and support of chronic diseases and the ageing population
- innovative communication and mobile technologies to support data collection and access, sharing, search and reasoning
- Social media pervasive technologies for healthcare

The workshop organizers were: Dr. Emmanouil G. Spanakis (FORTH), Dr. Kostas Marias (FORTH) and Prof. Feng Dong (BED).

## **4 Institutional workshops**

### **4.1 BED**

During the course of the development of several key MHA components on site at the University of Bedfordshire, MHA developers and researchers were invited to demonstrate and discuss their work with current students from a varying range of courses and disciplines. Members of the MHA team conducted talks and workshops during lectures and practical sessions to engage the student body, and conducted written and digital evaluations in guided sessions using the extensive computing resources of the Universities’ computer science and technology department.



All evaluation methods provided students with a number of individual component evaluation forms, participants were given the option of completing the evaluation in any order and to complete any number of forms they had the time for.

#### **4.1.1 Evaluation class with students studying computer graphics**

During the month of November 2015 two classroom sessions were arranged with students studying computer science undergraduate courses related to computer graphics and game development. Time was set aside by the lecturers to allow MHA members to present an overview of the entire platform. This presentation helped provide some context for the students before they were given the opportunity to log into the web based platform using a demo account complete with examples of real data ported from actual MHA user accounts.

The first practical evaluation session ran with a small class students who had already been informed by their lecturer about the format of the session. Each student had access to a high spec PC and were logged in by the demonstrator into the demo account. They were given time for self-guided exploration and testing, questions were asked and the demonstrator explained each feature in depth accompanied by a practical demonstration. This class were provided paper based evaluation forms for each of the four web application components. With the paper based approach the students took the opportunity to not only mark down their responses, but to also start making detailed notes and suggestions on the forms. Much of their feedback related to aesthetic design choices and human computer interface (HCI) observations.

The second group of computer science students in November were asked to trial and evaluate both MHA components and Life Tracker in a joint demonstration and evaluation session, similar in format to the first smaller group of students but with the addition of computer based feedback in the form of a web based questionnaire. This larger group were given the same opportunity for self-motivated exploration of the platform and then were guided to the web based form, which they largely filled out while still actively using the platform.

Both groups provided plenty of feedback and suggestions about the user interface, as was to be expected by students studying software development but only a small amount of suggestions and feature requests for actual medical related output and functionality

#### **4.1.2 Evaluation class with students in sports sciences**

In December 2015 MHA members were invited to make a presentation to a large group of sports science students in Bedford. Due to only having a limited time during their lecture there was no time or facility to get the students to use the platform in any meaningful way. However such was the interest and engagement from the students that a significant portion of the class signed the legal disclaimer in order to try the platform for themselves. They were extremely interested in the prospect of monitoring sedentary behaviour and its impacts of health and diabetes.



### **4.1.3 Evaluation class with students in public health**

Later in December 2015 the opportunity arose to present and demonstrate the MHA platform to students studying a health care pathway who were not as computer literate as previous groups of students. This was an important test of how regular users would react to the platform.

The presentation occurred in a room with only one permanent computer, so the MHA team had to facilitate the acquisition and setup of a large number of laptops to ensure every participant would get the opportunity to try the platform for themselves. After the presentation a small team guided the class around the usage of the platform, making sure they had the opportunity to explore the tools. Being of a non-computing discipline most queries fielded by the participants were of a technical nature, concerned with more the how than the why of each feature.

This particular group seemed to approach the applications differently from computer science students, as was to be expected, they experimented with features in the mobile application in a way that wasn't testing its technical implementation but rather its ability to actually process data and events that occurred to these users specifically. An example of this method of testing and thinking was when they tested the food API's ability to cope with regional dishes, a reasonable line of inquiry but one that wasn't obvious to the computer scientists.

### **4.1.4 Evaluation class with students in mobile applications**

In February 2016 a MHA member was providing specialist cover for a unit tackling the topic of mobile applications development. This presented a good opportunity to gather specific evaluation feedback on the mobile application component of the MHA platform.

The platform was discussed in detail during the lecture as it was used as a case study to help guide the lecture through the entire development process. The mobile and web application were referred to many times and demonstrated through the use of a projector and visualizer. The students were informed that they would have the opportunity to try the platform in their practical session, either through an emulator or by downloading the mobile app to their own device.

The practical sessions ran on two separate days in two different campuses, both sessions were carried out in a well-equipped computing laboratories. Both groups had a common background in computing, but one group had a number of computer security specialists. The evaluation was presented as an optional activity to be undertaken alongside their scheduled practical activity. This resulted in a varying level of engagement, with some students simply focussing on their practical work during the session, but the ones that engaged were very thorough, completing a large number of the forms. Verbal feedback was unfortunately difficult to get as the class was quite busy and much of the demonstrators time was spent answering technical queries about the practical operation of the mobile and web app.

A full list of the demonstration and evaluation workshops and events organised by BED can be found in the ITable below



Event + Location	Date	Notes
Lisbon ICT	20-10-2015	<b>4</b> multi-part paper based evaluations, converted into David's digital version 11-12-2015
Daniel Paul Baily class Bedford Campus	01-12-2015	Multiple platform signups, no evaluations.
Computer Graphics class C009	17-11-2015	<b>4</b> multi-part paper based evaluations – high level of completeness, converted into David's digital version 11-12-2015
Computer Graphics class C012, LifeTracker demo also	25-11-2015	<b>10</b> digital submissions to a cut down version of the google form. Converted and added to David's version of the form on 11-12-2015
Postgraduate public health group in P303	09-12-2015	10 laptops, 20+ attendees. <b>11</b> valid digital submissions of unknown completeness.
Bedford hospital eye clinic	19-01-2016	Demo to Dr Saleh & Krisztina and iCare rep. No evaluations.
Teaching CIS022-2 MK026	09-02-2016	Platform demo in lecture
Teaching CIS022-2 A420	11-02-2016	Platform demo in lecture
Practical CIS022-2 MK010	16-02-2016	<b>5</b> digital evaluations (David's newest version)
C110 Evaluation drop in session	17-02-2016	<b>2</b> digital evaluations (David's newest version)
Practical CIS022-2 C110	18-02-2016	<b>6</b> digital evaluations (David's newest version)
C110 Evaluation drop in session	19-02-2016	<b>14</b> digital evaluations (David's newest version)

## 4.2 FORTH

We conducted an evaluation workshop within the premises of FORTH to demonstrate the MyHealthAvatar platform, its capabilities and features. We had a presentation trying to demonstrate how modern mobile healthcare systems, supported by information and communication technologies (like the ones proposed by MHA), can provide solutions able to improve wellness, promote illness prevention, facilitate chronic disease management, empower patients, enable personalization of care, improve the productivity of healthcare provisioning and improve utilization of healthcare enabling the management of diseases outside institutions as well as encouraging citizens to remain healthy. We then presented the participants with our evaluation survey forms and related multimedia material and asked them to complete the surveys.

## 4.3 USAAR

There was no physical workshop taking place at the University Hospital of the University of Saarland. Instead of a physical workshop we elaborated, implemented and updated the evaluation forms for the evaluation at all places. This was done with Google Forms and is described in D9.3 in



more detail. The evaluation forms can be found here: <http://www.ehealthserver.com/mha/>. The top MyHealthAvatar Evaluation survey is to be found here: <https://docs.google.com/forms/d/10cNa8inW9lwQyuLp8BbqieuO4epGRbgizn3OEAXlLtM/viewform?c=0&w=1>. In addition the online accessible MHA page (<https://myhealthavatar.org>) was elaborated and implemented together with the scenarios to be evaluated. Credentials for all evaluators were given (Username: demo1; Password: demo). After setting up of this infrastructure we invited people of our University and beyond via phone calls and emails to test and evaluate the corresponding MHA scenarios. This resulted in more people evaluating MHA than hosted during a single workshop. Results of this evaluation is reported in D9.3.

#### **4.4 LUH**

LUH invited students enrolled in the European Legal Informatics Study Programme to evaluate the MyHealthAvatar platform after having been introduced to the project and given guidance on how to use the platform.

In addition, both senior and junior research associates at the Institute for Legal Informatics evaluated the platform. Junior associates were introduced to the project and the MyHealthAvatar platform by the senior research associates working in the project. After their introduction to the platform, which included using the demo account provided to evaluators, the junior associates completed the surveys.

#### **4.5 ICCS**

##### **4.5.1 Evaluation workshop at ICCS - NTUA**

The In-Silico Oncology and In-Silico Medicine Group, organized a workshop within ICCS-NTUA premises. The entire work of the group in the context of MyHealthAvatar was presented to ICCS-NTUA members. IAPETUS, an application built by the group that includes two main modules; one that handles the execution of models, presents, stores and retrieves the results, and one that handles the Tool/Model repository built for WP5, was demonstrated. We explained the functions and the importance of VPH multiscale simulated models with respect to personalized medicine and the added value a digital “bag of data” such as MyHealthAvatar can bring to the modelling world by providing data for model adaptation/validation and the clinical world by utilizing validated models to offer more personalized health services to the citizens, by utilizing the data they offer to get additional information. The instructions to use IAPETUS and links to access it were provided, as well as the links for the surveys.

##### **4.5.2 Evaluation class with postgraduate students**

In the context of the post-graduate course “Multiscale Cancer Modelling and In-Silico Medicine” taught by partner ICCS team leader Georgios Stamatakos in *Institute of Communications and Computer Systems (ICCS)* at National Technical University of Athens (NTUA), there was a brief presentation and demonstration of IAPETUS. The instructions to use IAPETUS and links to access it were provided, as well as the links for the surveys.



## **4.6 LIN**

The MHA platform was demonstrated to our Computer Science third year students on image processing module, MSc students on advanced software engineering module, PhD/researchers in our school research groups. It was also demonstrated in a number of events including during the early diagnosis innovation workshop organized by CRUK in December, 2015; Medical image understanding and analysis (MIUA) conference organized by Lincoln in July 2015; meeting with Lincoln hospital in March, 2015. We have also recently presented our work in the 12th IASTED International Conference on Biomedical Engineering (BioMed), February, 2016 at Austria. All the participants are encouraged to use the MHA platform and we also provided the participant with the evaluation survey forms and related material and invited them to complete the surveys.

## **4.7 TEI-C**

We conducted an evaluation workshop within the premises of TEI-Crete to demonstrate MyHealthAvatar platform, its capabilities and features. The audience were undergraduate students from the departments of Nursing, Social care and Informatics Engineering and the postgraduate course in Informatics and Multimedia.

Prof. Tsiknakis delivered a presentation analysing recent developments on how the modern healthcare and social care systems, supported by information and communication technologies (like the ones proposed by MHA), can provide solutions able to improve wellness, promote illness prevention, facilitate chronic disease management, empower patients, and ultimately improve utilization of healthcare.

Following the presentation and discussion that followed, the workshop continued with a presentation to the participants about the MyHealthAvatar project, its technical approach and the services developed. Subsequently they were introduced to the evaluation methodology and the survey forms, together with the available multimedia material and were asked to complete the surveys.

## **4.8 Larkbio**

Larkbio employees working in the MHA project have had an account for the platform for over a year. Larkbio employees not directly involved in the project were asked to create an MHA account in December 2015. All employees were asked to use the platform, including adding personal and medical data, link tracking devices and applications (if available). After a few weeks of trial all employees completed the general evaluation forms. We have been discussing MHA results and capabilities with our partners and other business associates during the lifetime of the project. During the last phase of the project we have asked them to participate in the evaluation activities.

## **4.9 ANS**

The ANS staff working on the MHA project have been constantly involved in the using of the platform. Other members of the who are not working on the project have also been using the platform for the testing intensively. The Company has also been involved in the project MyLifeHub



(by offering in-kind contributions), which is a UK EPSRC project based on the outcome of MyHealthAvatar.

In addition, ANS is directly involved or has indirectly supported the following evaluation and demonstration activities:

Date: 15<sup>th</sup> Jan 2016, Location: Moorfields Eye Hospital, Audience: Eye doctors and nurses

Date: 19<sup>th</sup> Nov 2015, Location: Luton, Audience: Ice-Login Ltd (a UK based SME)

Date: 21/Nov 2014, Location: Luton, Audience: doctors from Moorfields Eye hospitals

Date: 6/Nov 2014, Location: Moorfields Eye Hospital, Audience: Eye doctors and nurses

Date: 17/Mar 2014, Location: Luton, Audience: staff from ICARE company