

MYAIRCOACH NEWSLETTER

Issue No. 2

Welcome to the second annual issue of the MyAirCoach Newsletter.

MyAirCoach newsletter will serve as a fully accessible communication tool for the dissemination of important project news and the description of future steps.

Please [subscribe](#) to our mailing list in order to receive notifications for the project news



**MY AIR
COACH**
PREDICTIVE
SELF-MANAGEMENT
OF ASTHMA



Horizon 2020
European Union Funding
for Research & Innovation

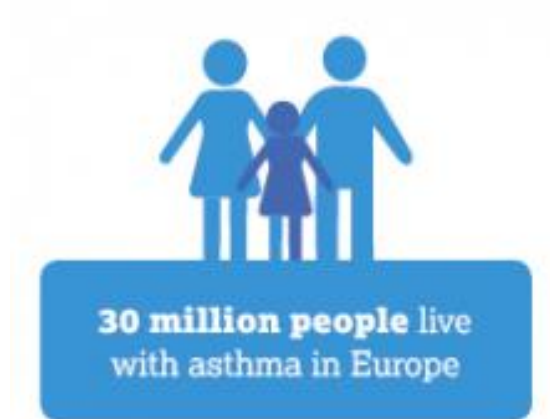
myaircoach.eu

Project Summary

The MyAirCoach project aims to improve the quality of life of asthma patients and their families and to increase the efficiency of asthma healthcare as a whole.

MyAirCoach will do this through the use of miniaturized sensing devices and novel decision support methodologies. The system will be based on a wide spectrum of measurements which will include physiological, environmental and lifestyle parameters.

This will in turn allow the accurate assessment of the patients' condition: help ensure proper use of medication, and the avoidance of possible future risk factors.



It is also envisaged that the innovative components developed as part of this project will stimulate research in the field of asthma management and support the creation of synergies, both across and within, the disciplines of technology development and medical research.

Modern approaches of modelling and prediction of asthma will be used for the optimization of the diagnosis and treatment process:

Multi-parametric monitoring

- Asthma related parameters, activity, lifestyle, and environment

Inhaler prototype

- Sensing capabilities and connectivity with smart devices

Personalized monitoring and guidance platform

- Automated assessment and guidance, interactive interfaces
- Supervision and communication with healthcare personnel

Patient-specific computational models

- Physiological and environment-aware computational models

Test campaigns

- Optimization and validation of the computational models

Predictive value of new physiological markers

- Propose new metrics to analyze and evaluate medical treatments

Validation of the myAirCoach project

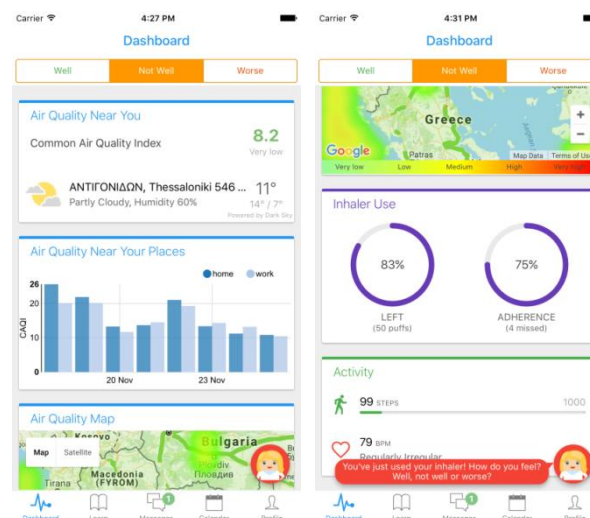
Project Update

The myAirCoach project is entering its third and final year of implementation. A lot of progress has been made in past 12 months and now it's time to integrate the intermediate results, plan next actions and make the last efforts towards the development of our mHealth system for asthma self-management. All of these factors were discussed during the last partner meeting held in Manchester on November 29th and 30th.

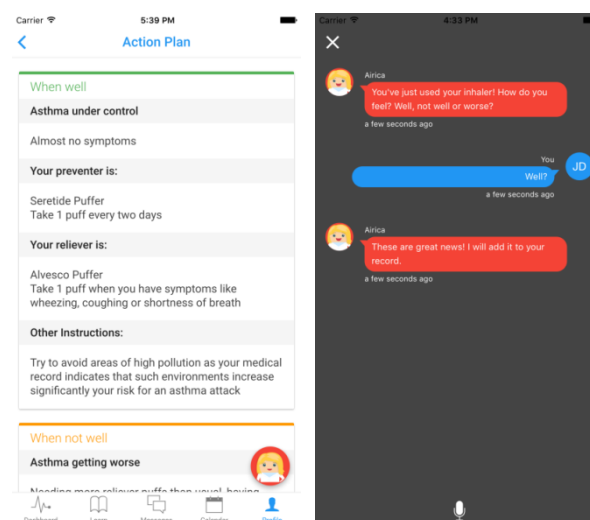


During the meeting, relevant advancements on the software interfaces were reported: CERTH, project coordinator, presented a first version of both the online platform and of the mobile application that will be used by patients and healthcare professionals. At the moment, the mobile application includes educational components that can help patients better understand their condition, as well as training elements to support the proper use of their inhaler and avoid mistakes that reduce the effectiveness

of the medication. Furthermore, the myAirCoach application currently supports different communication channels and can help users easily find their doctor's contact details.



Dashboard screen including summaries environmental conditions and pollution map as well as activity and adherence indicators



Mobile app implementation of action plan and virtual guidance agent capabilities

Finally, some visual indicators of physiology, medication, activity and environment have been implemented which also present daily summaries and enable the engagement of patients and carers in a virtual community.

The current version of the mobile app has been reviewed by the members of the Advisory Patients Forum and will be further integrated with features currently under development in other work-packages. In particular, the interface will include a Patient Modelling Framework that is a computational model of the lung that allows predictions of clinical states that can be used for alerting the patient to upcoming potentially dangerous events.

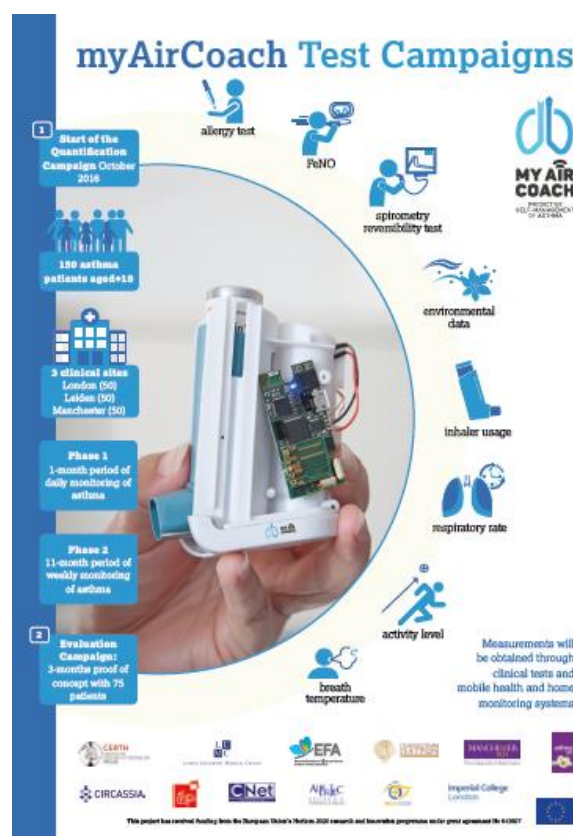
Moreover, the clinical partners presented the state of the art of the test campaigns that recently started in London, Manchester and Leiden (see article below) and discussed the plan for the evaluation campaign, which will represent the final testing of the myAirCoach integrated system.

Finally, the project partner IHP presented the first prototypes of the smart inhaler, which reached the finals of the Innovation Radar contest (see article below), and of the sensor system for measuring environmental factors such as particulate matters

Test Campaigns

The myAirCoach project aims to create a novel mHealth system to assist patients with the self-management of their asthma. Our ambition is to provide patients with an advanced warning of any changes to their asthma control or,

more importantly, to the potential of an exacerbation of their asthma. However to date, the factors needed to predict asthma control or the occurrence of asthma exacerbations are largely unknown.



In the test phase we aim to collect a wide range of physiological, behavioral and environmental data using current mHealth and home-monitoring systems, environmental databases and patient characteristics, to determine to what extent asthma control and the occurrence of asthma exacerbations can be predicted. Patients will be monitored throughout this one year study from three angles; i) physiologically: their lung function, heart rate and respiratory rate will be monitored using commercially available

devices; ii) behaviorally: participant's activity levels and adherence to their asthma medication; and iii) environmentally, we will monitor environmental data from participants' home and work locations.

Recruitment for this study is ongoing and the first wave of participants have been enthusiastic about using the new equipment and are very supportive of the myAirCoach initiative. "We envisage that data from this study will be used to develop personalised predictive models, within the myAirCoach decision support software, to assist patients with the self-management of their asthma in the future" says Andrew Simpson, Clinical Research Fellow at the University of Manchester, where 5 patients have been recruited so far.

Lung Modelling Results

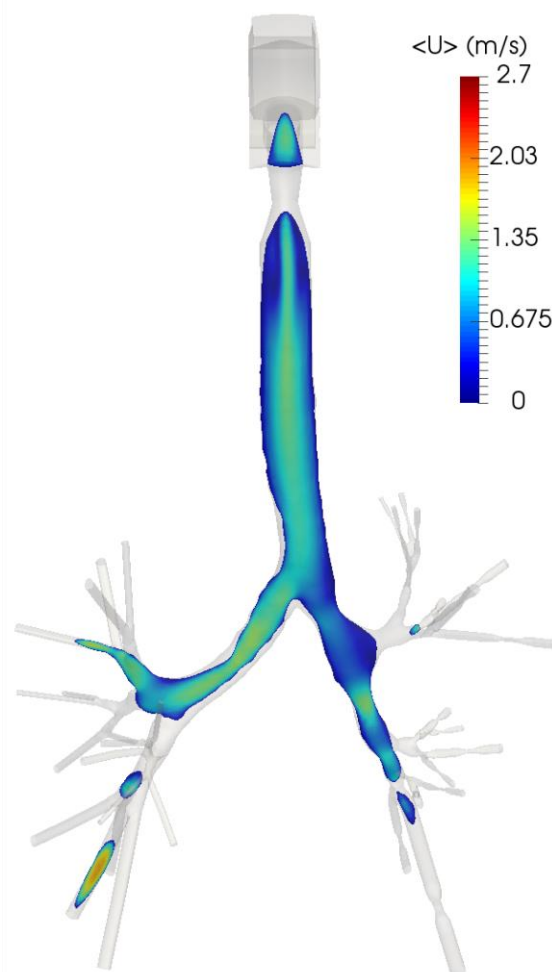
One of the main objectives of the project is the understanding of the breathing process of patients during and asthma attack and the deposition of particles such as pollution and other allergens on the airway walls.

In this direction efforts have been made for the creation of detailed lung models with narrowing in different points and useful results were reached using CFD approaches. The following figures outline some interesting results in regards to the velocity of air in the lungs

of a patient with narrowing in the left lung and the density of deposited particles throughout the patients airways.



**Particles deposition throughout the lung airways
(obstructions occur in both lungs)**



**Air velocity (m/s) into the airways (obstructions
occur in right lung only)**

CHRONIC DISEASES

GLOBAL STATUS AND ROADMAP

What are chronic diseases ?

Chronic Diseases,

are not passed from person to person (Noncommunicable) and they are of long duration and generally slow progression.



65% of all deaths worldwide are due to chronic diseases.
(Estimated number of 38 million per year)

3 out of 4 deaths from chronic diseases occur in low and middle income countries.

42% of the victims of chronic diseases are under 70 years old, whereas for low income countries this percentage raises to **82%**

4 main groups of diseases account for the majority of the world wide mortality burden by chronic diseases:



Mental Disorders

Mental disorders are another highly important group of chronic diseases since they are strongly linked with all others,

not only with respect to their **causes and consequences**, but also in terms of their **prevention and management**.

Common Misunderstandings

Several misunderstandings have contributed to this neglect of chronic diseases

1 Chronic diseases cannot be prevented <small>The major causes of chronic diseases are known and if these risk factors are eliminated some major difficulties of chronic diseases will be addressed</small>	2 Chronic diseases are the result of unhealthy lifestyle <small>Individual responsibility can be considered only when individuals have access to healthy life and are supported to make healthy choices</small>	3 Chronic disease prevention and control is too expensive <small>A full range of chronic diseases interventions are very cost effective, whereas many of the available solutions are inexpensive</small>
4 Chronic diseases mainly affect high income countries <small>75% of chronic disease deaths are in low and middle income countries</small>	5 Low and middle income countries should control infectious diseases before chronic diseases <small>Low and middle income countries are at the center of a variety of health challenges. While the solution of the problem of infectious diseases still remains of fundamental importance, in many cases there has been incidents of rapid response in chronic disease risk factors and deaths. These risk levels forestall a devastating future of chronic diseases.</small>	
6 Chronic diseases affect primarily men <small>Chronic diseases, including heart diseases, affect women and men almost equally</small>	7 Chronic diseases affect primarily old people <small>Almost half of chronic disease deaths occur prematurely in people under 70 years old</small>	8 Chronic diseases mainly affect rich people <small>In all but the least developed countries of the world, poor people are as much likely than the wealthy to develop chronic diseases. Everywhere in the world poor people are more likely to die as a result of a chronic disease.</small>

Global Objectives

Six Main Global Objectives have been identified by the World Health Organization for the prevention and control of chronic diseases

- 1 Make the **prevention and control** a priority
- 2 Strengthen **national** capacities and leadership
- 3 Reduce **modifiable** risk factors
- 5 Strengthen **health systems**
- 4 Promote **high-quality** research
- 6 Monitor **trends** of disease

Global Targets for 2015

- 25% reduction in deaths of people under 70 years old from cardiovascular diseases, cancer, respiratory diseases and diabetes
- 10% reduction in the harmful use of alcohol
- 10% reduction in prevalence of insufficient physical exercise
- 30% relative reduction in salt intake
- 30% reduction of the current tobacco use
- 25% reduction in prevalence of high blood pressure
- Halt the rise of diabetes and obesity
- Ensure that 50% of people receive preventive therapy for heart attacks and strokes
- Establish 80% availability of affordable technology and medicine to treat Chronic Diseases

SOURCES:
[1] "Preventing Chronic Diseases. A Vital Investment." WHO Global Report". Geneva: World Health Organization, 2015. ISBN 9241206301. Available at: <http://www.who.int/chp/chronic-diseases-report>

[2] "Non-Communicable Diseases: Fact sheet". World Health Organization. Updated January 2015. Available at: <http://www.who.int/mediacentre/factsheets/fs104/en/>

[3] "Reducing the burden of mental disorders in health care systems". Geneva: World Health Organization, 2014. ISBN 9789241206793. Available at: http://www.who.int/mediacentre/publications/mental_health/mental_disorders/en/

[4] "Global action plan for the prevention and control of NCDs 2013-2020". Geneva: World Health Organization, 2013. ISBN 9789241206262. Available at: <http://www.who.int/nmh/publications/2013/global-action-plan>

• Workshop on Mobile Healthcare for the Self-Management of Chronic Diseases and the Empowerment of Patients in conjunction with MobileHC 2016, Florence, Italy
myAirCoach.eu/mobilehc2016/

The current workshop is supported by EU funded project MyAirCoach (Grant Agreement no. 643607)



myAirCoach Workshop at MobileHCI

Last September, researchers in the field of ICT, engineers, healthcare professionals and patient representatives gathered in the charming Palazzo dei Congressi in Florence for MobileHCI 2016 - the 18th International conference on human-computer interaction with mobile devices and services. In the context of this vital conference, myAirCoach organized a workshop on the 6th of September entitled 'Mobile Healthcare for the Self-Management of Chronic Diseases and the Empowerment of Patients'. During the conference, fresh mHealth approaches to empower chronic patients were presented and discussed, as well as opportunities and challenges in the design of mobile applications in the modern technological environment.

The workshop was divided into three sessions: the first one focused on "Mental disorders in the Modern mHealth environment", the second was dedicated to "Mobile applications for the management of chronic conditions", and the last was on "User centered design and personalization of mHealth solutions targeting chronic conditions".

The workshop ended with an overview of the myAirCoach project, presented by Konstantinos Votis from the Centre For Research & Technology Hellas, and

with a final round table addressing current challenges in mHealth (eg Clinical Significance, Regulatory Framework, Standardization, Usability, Engagement and Adherence, Gamification, Social Networks, Security, Privacy and Ethics).

The workshop received extremely positive feedback and was the most attended session at MobileHCI. We hope that this has served as an opportunity for establishing synergies and profitable collaborations aimed at providing better and more effective mHealth solutions!

Please visit the workshop website for more details and material ([Link](#)).

EC competition Innovation Radar

The MyAirCoach project has reached the Final Round of the [Innovation Radar Prize 2016](#) - a European Commission initiative to identify high potential innovations and innovators in EU-funded research and innovation ICT projects. The smart inhaler, that will support asthma patients to self-manage their own disease, was selected by the European Commission after competing with another 39 European top innovators. Participants were grouped into four categories, namely ICT for Society, Excellent Science, Industrial & Enabling Technologies, Horizon 2020 ICT innovator.

The Commission was particularly impressed by the intelligent adapter for standard asthma inhalers developed by 'IHP' – Innovations for High Performance Microelectronics in collaboration with all other MyAirCoach partners. The adapter monitors whether the patient adheres to the therapy and medication plan, determines the correct medication, and measures the time and place where the inhaler is used. In addition, local environmental conditions, including temperature, pressure, and particle concentration are determined. The results are then transferred wirelessly through a mobile phone to an online system for further processing. A first prototype has already been tested in a laboratory environment.

After on-line voting, the MyAirCoach device was qualified for the finals under the category Horizon 2020 ICT innovator. The finals were held in Bratislava on September 26th during the ICT Proposers' Day, where IHP - supported by Jaakko Salminen, an experienced coach and member of the Finnish Business Angels Network - was invited for a pitch presentation in front of a jury. In total, 16 participants reached the finals, four per category. "We are convinced that our innovative approach holds the key to a better treatment of asthma patients in the future", affirmed IHP project leader Dr. Steffen Ortmann. "The results of the online voting make us feel confident for the final round in Bratislava", he suggested. Unfortunately

MyAirCoach did not receive the final prize, but its participation in the finals was in itself a great achievement. It indicates that the project has great potential and is moving in the right direction for improving the quality of life of asthma patients.

The winner of Horizon 2020 ICT Innovator category was Realeyes, an Estonian research-oriented SME measuring people's emotional response to video content using webcams. The overall Innovation Radar Prize was awarded to Intrinsic-ID, developed within the EU-funded project [PUFFIN](#), an authentication technology based on the electronic fingerprint of devices.

Patient involvement

As the project evolves, the input of patient representatives is becoming more and more used - it's shaping the myAirCoach solution so that it reflects the people who suffer from asthma, their needs and priorities.

Members of the Advisory Patient Forum (APF) met remotely three times this year, and participated in several phone calls and periodic work-package meetings with project partners, including in the partner meeting in Manchester.

Their contribution focused on the development of the myAirCoach virtual community and on the design of the

future myAirCoach user interface and mobile app. Our patient representatives had the opportunity to go through the demo versions and to provide comments and feedback directly to the developers on the usability and on the functionalities included. All aspects were analyzed, such as the login screen, main menu and patient profile, as well as environmental data and the way they were visualized. Relevant input was also provided on health data - which data to visualize, interpretation of data and how and what kind of recommendation the system should provide.

Also, the patient perspective was strongly reflected in the dissemination of the project results. APF members started to develop patient-friendly versions of the scientific papers arising from the project. You can read the first lay summary, titled 'The Digital Asthma Patient', through this [link](#). In a video [interview](#) published by MedTech, Dominique Hamerlijnck has expressed her views about the life of asthma patients and the solutions she is looking forward to, including myAirCoach. At the same time, Daniel Russell, the Chair of the APF, wrote an [open letter](#) regarding his expectations about the benefits that technologies like myAirCoach can bring to young people. Finally, Courtney Coleman from Asthma UK discussed at the [first Conference of the European Association of System Medicine](#), how patients are involved in the design of the myAirCoach mHealth system for asthma

self-management especially in the early stage of our project which focuses on the right input for the focus groups.



Events and scientific publications

The research community has demonstrated a great interest in myAirCoach at all important events where the project has been presented or promoted throughout the course of 2016. These events included the [World Congress of Asthma](#) (12-15 March, Madrid), the [eHealth Week](#) (8-10 June, Amsterdam), the [Indian Academy of Allergy annual congress](#) (22-24 July, Kolkata), the [Malaysian Thoracic Society Congress](#) (28-31 July, Penang), the [6th World Nursing and Healthcare Conference](#) (15-17 August, London), the [ISAM 2016](#) (26-29 October, Montreal) and recently the [Drug Delivery to the Lungs Conference](#) (7-9 December, Edinburgh).

myAirCoach also had great visibility at the [ERS Congress](#) (3-7 September, London), the biggest event worldwide in the respiratory field, thanks to two Poster presentations and the project brochures available at the booth of project partner EFA.



The enthusiastic feedback from all stakeholders on the intermediate results of the project provide strong support for the mHealth solution for asthma self-management, under development within MyAirCoach. You can find all information on our events at the myAirCoach website, where you can also read all available [scientific publications](#) and the public project [deliverables](#). We also invite you to follow us on [researchgate](#) to stay up to date on our latest research developments.

Interested in finding out more?

Find out more about the project at myAirCoach.eu

[Sign up](#) for the myAirCoach newsletter

Connect with us on social media:



This project has received funding from the European Union's Horizon 2020 Framework Programme for Research and Innovation under grant agreement no 643607.

