D1.6: 1st Report of Advisory Board meetings

WP1 – Project management

Document Information

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Document History

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2.0	28/6/2017	Final	Internal review	Arne Fellermann (BUND)
3.0	30/6/2017	Final	Integration of the internal review comments	Christodoulos Keratidis (DRAXIS)

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1 Executive summary

The current deliverable is the first report on the activities of the hackAIR project's External Expert Advisory Board (EEAB). The members of the EEAB were contacted either through physical meetings or via internet. This deliverable summarizes the recommendations that these experts have provided to the project consortium from M1 (January 2016) until M18 (June 2017).

Regarding the structure of the current document, in Chapter 2 a short introduction on the term of EEAB is provided, while in Chapter 3 the role of the EEAB within the hackAIR project is presented. The selection process of the EEAB members is briefly provided in Chapter 4, and a short description of the members' qualifications is presented in Chapter 5. The activities carried out during this period between EEAB members and the hackAIR partners are presented in Chapter 6, and, finally, some of the most important recommendations of the experts to the hackAIR partners are summarized in Chapter 7 accompanied with the actions taken by the consortium to address these points.

2 Introduction

The use of external experts as advisors to EU funded projects is a common practice since their contribution can be crucial for the smooth implementation of the project. Within the context of a Horizon 2020 project, the External Expert Advisory Board (EEAB) has the role of an external counselling body comprised by high-level international experts from different areas of knowledge that meet regularly with the project consortium throughout the project and participate in project meetings and events.

The main tasks of the EEAB in a Horizon 2020 project, in general, are indicatively the following:

- to provide advice, guidance and recommendations for any project development ensuring high quality and excellence at all project stages and components
- to provide additional quality control and validation of the impact and outreach of the project
- to give technical and legal guidance
- to advise on links with relevant groups of interest outside the project consortium
- to propose and encourage the potential interactions of the project with other projects, initiatives and activities
- to provide advice on cooperation opportunities
- to serve as a link between the project and other national/regional activities in the EU
- to increase the visibility of project activities and support the dissemination of project results
- to stimulate the discussion between the relevant key players in the EU
- to extend the market potential of the project.

3 Role of the hackAIR External Expert Advisory Board (EEAB)

hackAIR is a research and innovation project responding to the topic ICT-10-2015: Collective Awareness Platforms for Sustainability and Social Innovation. The inclusion of an EEAB to the hackAIR project has been considered even from the proposal stage. The hackAIR EEAB will consist of experts with a world-wide reputation in the scientific and technical fields addressed by hackAIR such as ICT, environmental monitoring, air pollution management and citizen science.

For the strategic goal of coordination and integration of different disciplinary fields and expertise in the project, a fruitful communication and information exchange with external experts of relevant fields is crucial. This process involves both the project consortium and the EEAB. The EEAB serves as external advisor to the hackAIR consortium in order to reach the predefined targets and consolidate the project results as best as possible. The hackAIR partners are continuously providing the EEAB with the appropriate project information and support in the production of their advice and recommendations. The EEAB assists the hackAIR partners with independent strategic recommendations on the project objectives and long term developments.

All the activities carried out with the hackAIR EEAB fall under WP1-Project Management, which is led by DRAXIS, and will be documented in two deliverables. The first deliverable is the current document which summarizes the selection of the EEAB members and any feedback acquired from them from the beginning of the project until M18 (June 2017). The 2nd deliverable (D1.7: 2nd Report of Advisory Board meetings) will be submitted in M36 (December 2018) and will include all the EEAB activities that will take place in the 2nd half of the project's duration.

4 The EEAB members' selection

The identification of the hackAIR EEAB members has been an open and transparent process involving all the project partners. Initially, all partners were asked to identify experts of relevance to hackAIR, as well as from different types of stakeholders such as research centers, relevant H2020 projects, private companies and groups of potential hackAIR users. The hackAIR partners may have collaborated with these experts in their previous activities. An initial list of experts was established and all partners decided on those experts from whom hackAIR could benefit the most. Seven people were identified and were invited to join the hackAIR EEAB. The invitation was sent via a personal email (ANNEX A – Invitation Letter), and all the invited members accepted it and became official members of the hackAIR EEAB.

The EEAB list may be updated throughout the duration of the project in case a new need for consultation will emerge. At this point it should also be noted that, as the hackAIR EEAB members are people who are engaged with various activities in their fields of expertise, they may change position during the project.

5 Members of the EEAB

For the given period (January 2016 – June 2018), the hackAIR EEAB members are listed below.

Name	Organisation & expertise
Dr. (Ms.) Hester Volten	Air quality scientist at the National Institute of Public Health & the Environment in the Netherlands (RIVM)
Ms. Mel Woods	Art & Design expert at the Dundee University, Making Sense (CAPS) and GROW Observatory H2020 projects
Mr. Stavros Lounis	Gamification expert, Director of Gamifico Limited
Dr. (Mr.) Jorge Garcia Vidal	Professor at the Computer Architecture Department of the Technical University of Catalonia, coordinator of the CAPTOR (CAPS) project
Dr. (Mr.) Francesco Pilla	Lecturer in the Department of Planning & Environmental Policy in University College Dublin, coordinator of the iSCAPE H2020 project
Mr. Giuseppe De Carlo	Project manager at the European Federation of Allergy and Airways Diseases Patients' Associations (EFA)
Dr. (Mr.) Nils Jacob Berland	CTO at Sensar.io in Norway, expert in wireless sensors

A short description of their qualifications and position follows.

Dr. (Ms.) Hester Volten

Dr. Hester Volten has been working as an air quality scientist at the National Institute of Public Health and the Environment (RIVM) in the Netherlands since 2006. She holds a PhD in Astrophysics; her experimental results on light scattering properties of fine dust particles can be found in the Amsterdam-Granada Light Scattering Database. At the RIVM see has worked on LIDAR measurements of aerosols and NO_2 profiles and on the testing and developing of instruments to monitor air quality. After being involved in the iSPEX project, she became interested in citizen science. The iSPEX project is a highly successful citizen science project in which citizens use an iSPEX add-on to turn their smartphone into scientific instruments to measure aerosols (see also www.rivm.nl/ispex). She is currently involved in several citizen science projects and is particularly interested in how citizen science projects may be supported by and incorporated into official environmental monitoring programs. She is also a member of the Citizen Science Interest Group of the EEA (European Environmental Agency) and of ECSA (European Citizen Science Association.

Ms. Mel Woods

Ms. Mel Woods is expert in Art and Design at the Dundee University. Her research during the past 12 years has had an international focus, building the theme of 'creative intelligence' with a focus on people, future technologies and societal challenges. Her current work is applying this knowledge to grassroots citizen science activities following the successful H2020 Making Sense (CAPS) and H2020 GROW Observatory (Citizen Observatories). Both these projects are internationally configured working with partners across the EU, including WAAG Society, IAAC, JRC, Met Office, IIASA, Cultiv8, Storythings and FutureEverything amongst others.

Mr. Stavros Lounis

Mr. Stavros Lounis is the Director of Gamifico Limited, a Doctoral Candidate in the Department of Management Science and Technology of the Athens University of Economics and Business, and a Senior Researcher in the ELTRUN E-Business Research Center. He holds a B.Sc. in Applied Informatics in Management and Finance from the Faculty of Management and Economics and a MSc in Information and Communication Technology (ICT) Systems. Over the last years his research focuses on Gamification of Electronic Services, e-Commerce and Innovation in Consumer Service Design. His research has been published in peer-reviewed academic conferences.

Dr. (Mr.) Jorge Garcia Vidal

Dr. Jorge García Vidal is a Telecommunications Engineer. Since 2003, he is full professor at the Computer Architecture Department of the Technical University of Catalonia, where he is head of the Computer Networking Research Group. He is also responsible for the Smartcities activities of the Barcelona Supercomputing Center. He was a visiting scientist at the University of Arizona and at the University of California at Berkeley. Current research interests are on statistical techniques for data capture and data analysis for applications such as air quality monitoring, mobility patterns and text analysis. Currently, he is the coordinator of the project "CAPTOR-Collective awareness platform for tropospheric ozone pollution", and participates in the H2020 projects ASGARD and GROWSMARTER.

Dr. (Mr.) Francesco Pilla

Dr Francesco Pilla is lecturer in the Department of Planning and Environmental Policy in University College Dublin and the coordinator of the "iSCAPE-Improving the Smart Control of Air Pollution in Europe" project. His area of expertise is geospatial analysis and modelling of environmental dynamics, which involve the development of environmental pollution models (air, noise, water) and decision support tools using a GIS platform, in order to facilitate the interoperability of input data and research outcomes between the client/final user and the research team. His work focuses on understanding complex environmental phenomena in order to preempt the impacts resulting from interactions between the human population and the environment. His approach integrates models for environmental pollution with a GIS platform: this is used to assess and predict impacts from built-environment interventions which have the potential to provide population-wide effects. He uses a range of pervasive and community sensing applications as a means of calibration and validation of GIS models and decision support tools. He acquired considerable experience in networks of environmental sensors for urban environmental monitoring during his collaborations with two different research laboratories in MIT as part of a Fulbright/EPA TechImpact award (2015) and his PhD (2011) research work.

Mr. Giuseppe De Carlo

Mr. Giuseppe De Carlo is project manager at the European Federation of Allergy and Airways Diseases Patients' Associations – EFA and a member of the European Commission's Working Group on mHealth assessment guidelines. He also gained strong experience in the health impacts of air pollution through his involvement in various relevant projects: "myAirCoach– Analysis, modelling and sensing of both physiological and environmental factors for the customized and predictive self-management of Asthma", "ATOPICA – Atopic diseases in changing climate, land use & air quality".

Dr. (Mr.) Nils Jacob Berland

Dr. Nils Jacob Berland is CTO at Sensar.io in Norway. Sensar.io is a company science focusing on wireless sensors, mesh networking, data analysis and visualisation. He is also the founder of a community project in Bergen, Norway that monitor air quality based on many commodity particle sensors and analytical software. He holds a PhD in computer science from the University of Bergen.

6 EEAB activities

During these 18 months of the hackAIR project, the consortium has kept a continuous and fluent communication with the members of the EEAB. All partners agreed that a meeting with all the members of the EEAB will not be constructive to elicit valuable recommendations from them; thus they decided to hold individual meetings with them for any emerging issue, and also invite them to project activities when needed.

For the given period (January 2016-June 2017), the following activities took place so that the consortium could acquire feedback from the EEAB members:

- Christodoulos Keratidis (DRAXIS) had a call with *Francesco Pilla* on the 15th of May 2016 where he informed him about the project's work and invited him to participate in the hackAIR EEAB.
- On the 18th of May 2016, Christodoulos (DRAXIS) had a meeting with *Jorge Garcia Vidal* during the 1st CAPS community meeting and workshop in Berlin. There they introduced information on their CAPS projects' objectives and Christodoulos proposed to Jorge to join the hackAIR EEAB.
- Christodoulos (DRAXIS) had a meeting with *Mel Woods* during the 1st International ECSA Conference in Berlin on the 20th of May 2016. There he updated Mel on the project's progress.
- *Hester Volten, Mel Woods, Jorge Garcia Vidal*, and *Stavros Lounis* participated in the 1st hackAIR Air Sensing workshop on the 18th of November 2016. The "Air Sensing group" is a group organized by the hackAIR partners in August 2016 with the scope to maintain an exchange with interested stakeholders beyond external discussion forums (see D8.4-Network of Interest established). The 1st Air Sensing workshop was held both physically and remotely for some participants. Various issues relevant to participatory sensing of air pollution were discussed, while participants were also asked to provide their feedback on the hackAIR platform mock-ups.
- Christodoulos Keratidis (DRAXIS) had a conference call with *Mel Woods* on the 22nd of November 2016 to discuss potential barriers that may emerge in citizen science projects. Mel participates in the Making Sense project, a project aiming to explore how open source software and hardware, digital maker practices and open design can be effectively used by citizens to make sense of their environment, which is up and running from the beginning of 2015. Thus, she is the most appropriate EEAB member to inform us about important lessons learnt from her experience of setting up environmental citizen science projects.
- *Giuseppe De Carlo,* project manager of a group of people (EFA) who are potential users of the hackAIR solution, participated in the 1st day of the 3rd hackAIR project meeting in Brussels on the 24th of November 2016. Specifically, he briefly presented EFA's activities, gave feedback on the hackAIR solution from a users' perspective, pointed out the information that would be useful for people with asthma or airways diseases, and mentioned some tips on raising citizens awareness on air pollution.
- Panagiota Syropoulou (DRAXIS) and Ilias Stavrakas (TEI) had a remote discussion with *Nils Jacob Berland* on the 3rd of February 2017 on the potential implications of air quality sensors due to extreme meteorological conditions. Nils coordinates an air quality project in Bergen, Norway where they use the same sensors as in hackAIR. Thus, his feedback on the operation of these sensors will be valuable.
- Panagiota Syropoulou and Christodoulos Keratidis (DRAXIS) had a conference call with *Hester* on the 14th of February 2017 to discuss the potential usefulness of user-generated data for the improvement of models' outputs.
- As previously mentioned, the hackAIR partners are regularly updating the EEAB on the project's progress. After the initial information of the EEAB members on the projects' objectives, a hackAIR report was sent in March 2017 to the EEAB members to facilitate the exchange of information about the status of the project (ANNEX B – hackAIR EEAB update (March 2017)).

- Panagiota had a meeting with *Giuseppe* in Brussels on the 12th of April 2017 to update him on the project's progress and discuss on EFA's contribution on disseminating the hackAIR results. Giuseppe included this short hackAIR update in the next EFA's newsletter.
- In April 2017, *Stavros Lounis*, as a gamification expert, was contacted to give his feedback on the planned hackAIR gamification elements. As it will be in detail described in D5.2-1st version of integrated and tested hackAIR open platform (M20), Stavros was included on board to consult the consortium on the gamification strategy that will be integrated in the hackAIR platform. This strategy was shared with Stavros who gave us his valuable and thorough feedback.
- *Hester* participated in the 1st day of the 4th project meeting in Kjeller, Norway on the 18th of May 2017. There, she shared with the consortium her experience on integrating citizen science measurements in environmental monitoring in the Netherlands.

7 Feedback and actions

This Chapter focuses on the most important remarks pointed out during the activities described in Chapter 6.

1) Hester pointed that citizen science projects should focus on the usefulness of the information that users receive for their everyday life rather than on data accuracy. People want to know the meaning behind the numbers.

< hackAIR will not provide air quality information only in the form of individual pollutant's concentration but as an easy-to-understand aggregated air quality index. Additionally, the air quality will be represented by specific colours depending on the current air pollution levels, so that the information is even easier for the users to understand it. Finally, any registered user will receive health and activities recommendations customized to their needs in order to protect their wellbeing from the impacts of air pollution.>

2) As Hester has already run a citizen science project (iSPEX), she was asked by the hackAIR partners how we can ensure the validity of the user-generated data. Hester mentioned several ways of ensuring the validity of the data depending on the scope of the project. One way is to validate the data with official air quality measurements. In any case, the hackAIR partners should be flexible to change the validation procedure if necessary.

<The hackAIR partners apply several methods to ensure the validity of the user-generated data obtained both from the three proposed sensor systems (Arduino, PSoC, COTS) and the photo measurements. Extensive tests have been executed in laboratory and in real conditions where the hackAIR air quality measurements were compared to official ground-based and satellite data, and the results indicated that the hackAIR methodology is quite credible. In addition, it was agreed that predefined outliers will be implemented in the hackAIR solution so that extreme measurements will be omitted.>

3) Stavros noted that the gamification strategy should start by deciding which users' actions can be tracked by the system. Then, we should determine points to each action based not only on the required effort, but also on the importance that this action has for the project. Finally, in order not to discourage users, we should use leaderboards with 3-5 positions with the user always in the middle and not a leaderboard with e.g. 1.000 positions.

<In order to design the hackAIR gamification strategy, DRAXIS has consulted a gamification external expert, who prepared the proposed badges and assigned specific points on each mission according to required effort and significance for the project (e.g. in places where no official air quality measurements exist, the mission of taking sky photos through the hackAIR app will be very significant and it will be matched with a lot of points. Regarding the presentation of a leaderboard, this is out of the scope of the project as users do not want to be competitive with each other (D2.4: Report on co-creation of services).>

4) Mel proposed several methods on how to engage citizens in hackAIR. The first step is to co-create the solution with the potential users so that the developed platform corresponds to their needs. Then, within the pilot implementations, short-term and local event should be organized instead of big-scale pilot cases as citizens are more motivated to be engaged in initiatives for the improvement of their local environment. Each campaign can include a small group (e.g. 20 participants) in order to be focused, and regular meetups should be organized with the participants.

<The hackAIR platform will be developed based on the results of a co-creation process with potential users and different stakeholders that ware carried out in the first half of the project (M1-M18). More information is included in deliverable D2.4: Report on co-creation of services. Within the pilot implementations, in order to keep users engaged short campaigns are planned to be executed on neighborhood level and with the participation of a limited number of citizens. This plan will be reported in deliverable D7.1: Pilot plan (M20).>

5) Giuseppe pointed out that attention should be paid when recommendations are provided to people with health sensitivities. Moreover, he mentioned that people with respiratory sensitivities tend not to trust the official air quality data as they are not regularly updated and usually are not provided in user-friendly formats. Thus, he thinks that a tool like hackAIR would be very useful for them. However, they also need information about air quality forecasts and pollen.

<A similar comment to the one from Giuseppe regarding recommendations was extracted from the co-creation workshops (see D2.4: Report on co-creation of services). Thus, the proposed recommendations, which are presented in deliverable D4.2: Semantic integration and reasoning of environmental data, have an informative character and not a prohibited one. As for the provision of information about air quality forecasts and pollen in hackAIR, it is in the exploitation plans of the hackAIR consortium in case it will not be implemented within the duration of the project as this is not part of the project's objectives.>

6) According to Giuseppe, an efficient way to raise the awareness of healthy people on the health impacts of air pollution is the story sharing among healthy and ill people in order to create a sense of community inside the platform. On that point, Giuseppe recommended that he can bring us in contact with the Health and Environment Alliance (HEAL) for further visibility.

<The communication strategy of hackAIR will be based on story-telling techniques, while the hackAIR users will have the option to contact each other via the platform's forum to exchange experiences and ask for recommendations.>

7) Nils proposed that the pilot implementations can include schools as children can be more easily trained in building electronic devices and schools are a significant pool of potential young users.

<Having participated in citizen science projects, the hackAIR partners were familiar with the idea of including schools in the pilot implementations. This will be described in detailed in deliverable D7.1: Pilot plan (M20).

8) In order to avoid possible implications of the hackAIR system from extreme meteorological conditions, Nils proposed us to add temperature and humidity sensors to the system so that the PM measurements can be corrected.

<Users will have the option to include meteorological sensors in their devices, while this extra command has already been added in the code.>

9) Regarding the usefulness of user-generated data for the improvement of the models' outputs, Hester mentioned that this area is at a research stage for now, but there is the potential to serve a new business case.

<This case will be explored within Task 8.5: Sustainability & exploitation strategy (deliverable D8.8).>

10) Regarding the hackAIR gamification strategy, Stavros pointed out that hackAIR should include a distinct onboarding process and a process of re-engaging users in case of leaving the app.

<An onboarding process has already been integrated in the hackAIR app, while the hackAIR team will consider to include also re-engaging actions (e.g. push notifications).>

11) Regarding the hackAIR gamification tools, Stavros suggested that:

- Push notifications should be provided in a manner that does not annoy the user.

<Users will be able to set the frequency in which they want to receive push notifications, or deactivate them.>

- A fail-case scenario for the incomplete missions should be included.

<Fail-case scenarios will be include in the hackAIR app.>

- Different core game elements should be included.

<Different game elements, such as points, status, levels, badges etc., will be included. However, a leaderboard is out of the scope of the project as, according to the user needs, users do not want to be competitive with each other but contribute to the community.>

12) Stavros also suggested that the technical team should consult the following research papers that can help towards the optimization of the gamification architecture:

- A literature review of gamification design frameworks
- Integrated use of IoT , SMAC and Gamification for effective Pollution control
- Maximizing the Usefulness of Data Gathered Though Crowdsourcing Methods Using Gamification
- Points, stories, worlds, and diegesis: Comparing player experiences in two citizen science games

13) Hester mentioned that citizen science data does not need to be of high accuracy. However, for the pilots' credibility an idea is to involve the local government in order to provoke citizens' engagement and policy change.

<BUND and NILU will try to engage the local government in their pilot cases.>

14) Regarding the potential problems with the stability of low-cost sensors that may emerge, Hester recommended to add a temperature and humidity sensor to the system to correct the measurements.

<This solution is already included as an option for any user who wants to apply it.>

8 Conclusions

The hackAIR consortium is in close collaboration with the External Experts Advisory Board (EEAB) members who are individually contacted whenever a consultation for the project's progress is needed. The current document presents the activities that were organized with the hackAIR EEAB from June 2016 until June 2017, the feedback acquired from the experts, and the actions that the hackAIR consortium took (or plan to take) to address these recommendations. Until the end of the project (December 2018), the hackAIR EEAB members will continue to be updated on the project's progress, while individual meetings will be held with them and, if necessary, some of them will be invited in the project's meetings. All these actions will be reported on the 2nd Report of Advisory Board meetings (D1.7) in December 2018.

ANNEX A – Invitation Letter

Invitation to participate in the hackAIR project External Expert Advisory Board

Dear …,

We would like to invite you to become a distinguished member of the External Expert Advisory Board of the **hackAIR** project. hackAIR has received funding from the EC under the **Horizon 2020** Research and Innovation programme, which is the financial instrument of the EC that will offer funding to research projects for 7 years (2014 to 2020).

The project hackAIR (*Collective awareness platform for outdoor air pollution*) aims to **develop** and **pilot test an open platform** that will **enable communities** of citizens to easily **set up air quality monitoring networks** and **engage their members** in measuring and publishing outdoor air pollution levels. The hackAIR platform will enable the **collection of data** from measurements from **existing air quality stations** and **open data**, **user-generated sky-depicting images** (either publicly available geo-tagged and time-stamped images posted through social media platforms, or images captured by users), and **low-cost open hardware devices easily assembled by citizens**.

The role of the members of the hackAIR External Expert Advisory Board is to **participate in project's workshops**, in which they will review the project activities and outcomes, identify the strong/weak points with respect to the objectives of the project and the applications of the results, and provide recommendations. **All travel and accommodation costs will be covered by the project budget**.

The hackAIR External Expert Advisory Board will be convened some times throughout the duration of the project either in **meetings** or in **conference calls**. With your collaboration we will be able to issue recommendations that will ensure the fulfillment of the project's objectives.

We are looking forward to welcoming you on board of this unique group.

Do not hesitate to contact us for any further information or clarification

Best regards,

Christodoulos Keratidis
hackAIR Project Coordinator
DRAXIS Environmental S.A.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 688363.

ANNEX B – hackAIR EEAB update (March 2017)


hackAIR
COLLECTIVE AWARENESS FOR AIR QUALITY
Members of the hackAIR Advisory Board
1. Mel Woods (University of Dundee, Making Sense project)
2. Hester Volten (National Institute of Public Heath & Environment, iSPEX, Amsterdam Smart Citizens Lab)
3. Francesco Pilla (Trinity College Dublin, iSCAPE project)
4. Guiseppe De Carlo (European Federation of Allergy & Airways Diseases Patients' Associations)
5. Jorge García Vidal (Polytechnic University of Catalonia, CAPTOR project)
6. Nils Jacob Mohr Berland (Sensar.io)
7. Stavros Lounis (Director of Gamifico Limited)
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COLLECTIVE AWARENESS FOR AIR QUALITY

Where we are now and next steps

Until now

The **user needs** and the hackAIR **technical requirements** have been obtained, while **co-creation workshops** with users have been set up in the pilot areas to guarantee that the users' voice is being heard. The **privacy impact assessment** methodology that will guarantee that the hackAIR platform provides a secure environment has been defined. From a technical point of view, the **architecture & integration framework** of the hackAIR platform is ready, while the technical team is already developing the **1st version of the hackAIR mobile & web app**. The methodology for the **discovery, acquisition & processing** of environmental data from text- and image-based web sources has been reported. The **Look-Up-Table** for the automated estimation of air pollution from user-generated images is ready for the geographical area of Europe. In addition, the 1st version of **the design guidelines for the fabrication of the hackAIR open sensors** is available. We have also identified a 1st version of our **sustainability & exploitation strategy**. Finally, regarding the dissemination of the project activities, we have prepared a first **communication plan**, delivered the project website and other disseminations tools, and established the hackAIR **Network of Interest**.

Next steps

All the components of the hackAIR mobile and web platform will be developed and integrated by August 2017. The methodology that will facilitate the **search & profiling of environmental data** from the web will be finalized. The hackAIR **Look Up Table will be automatically used by the hackAIR system** to estimate air pollution from a large number of photos, while the validity of the method will be tested also **outside Europe**. **Final instructions** on how to assemble the hackAIR open sensor devices will be made available, while the **data fusion algorithm** for the use in the pilot study activities will be developed and tested. The hackAIR **personalized decision support services**, the **pilot plan** and the **engagement strategy** will be delivered by August 2017, so that the pilot activities will be launched in autumn 2017.

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hackAIR
COLLECTIVE AWARENESS FOR AIR QUALITY
Further insights
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COLLECTIVE AWARENESS FOR AIR QUALITY

User needs & technical requirements

For the acquisition of user requirements, some key concepts and components of the hackAIR platform were identified and a tech card for each technical component (15) was created by the technical partners. Based on the created tech cards and the discussion among the project partners, **two hypothetical scenarios** describing the possible interactions of different types of end-users with the hackAIR platform, along with **five personas** were created. These scenarios were discussed with all partners and with end users during **two co-creation workshops** that were organized in the pilot areas (Oslo, Berlin). The validation with the partners and with the end-users resulted in **a first set of functional and non-functional user requirements.**

Among others, it emerged that users should be able to **compare the air quality** in their city with other locations while they should also be able to see the **evolution of the air quality over time**. Receiving **feedback** is also very important for users, as they want information on how useful their measurements/ contributions are.

A detailed report on the co-creation activities of the hackAIR services will be published in June 2017.

The hackAIR tech cards

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COLLECTIVE AWARENESS FOR AIR QUALITY

Privacy Impact Assessment

The hackAIR partners have identified **privacy issues** that may arise during the project to guarantee that the hackAIR platform provides **a secure and safe environment** for collecting, sharing and consulting personal data. Focus is placed upon **the Directive 95/46/EC**, which is the main legal instrument on data protection, and the **General Data Protection Regulation** (GDPR) which is foreseen in May 2018, as most privacy and data protection topics relevant for hackAIR fall under these legislation instruments.

A first set of potential privacy and security risks that may arise along with associated solutions has been identified. Indicatively:

- **Cross-Site Scripting (XSS) attacks**, a type of injection in which malicious scripts are injected into otherwise benign web sites
- **SQL injection attacks** consists of inserting or 'injecting' of a SQL query via the input data from the client to the application
- **Returned error** cases might reveal sensitive information
- **Insecure Direct Object References** allow attackers to bypass authorization

The final results of the privacy impact assessment will be reported in February 2018.

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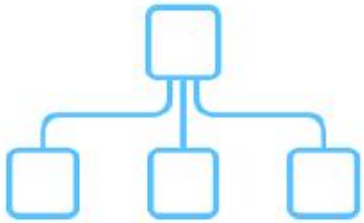
COLLECTIVE AWARENESS FOR AIR QUALITY

Architecture of the platform

The hackAIR development team has designed **the architecture of the hackAIR platform** and its subcomponents and defined the framework for their **integration** into the core platform. This architecture acts as reference for the technical partners during the development and the evaluation of the platform.

The 1st version of the platform will be delivered in **August 2017**.

For more information please visit the following link: D5.1-Architecture and Integration Framework Definition Specification



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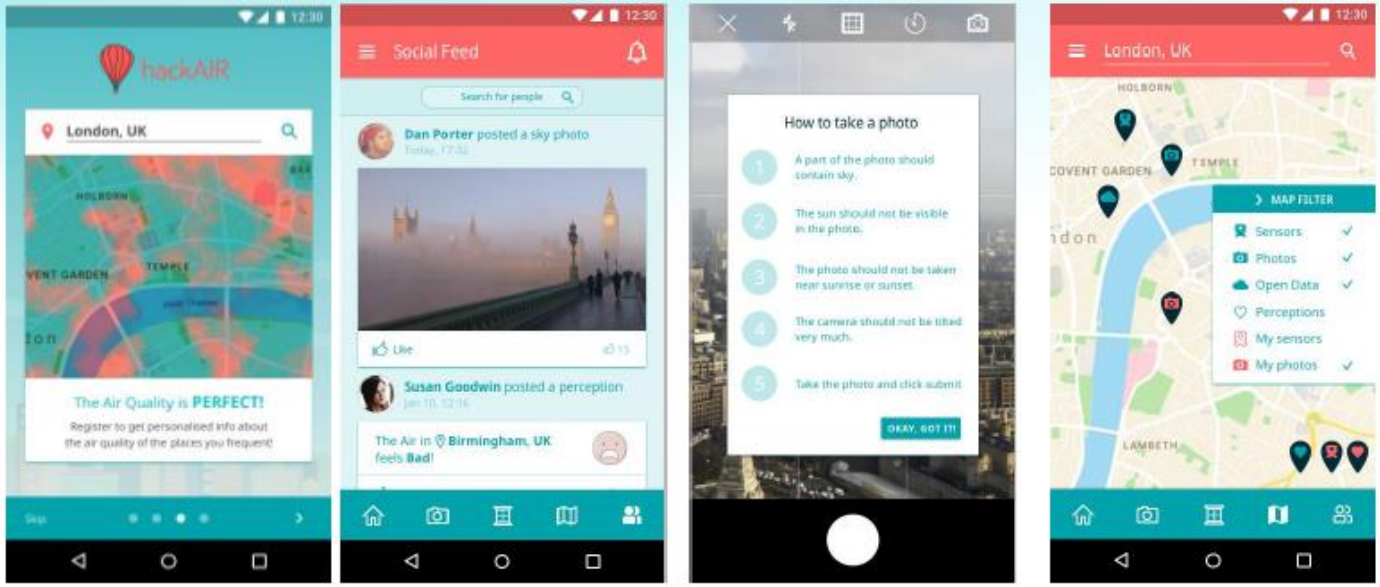
COLLECTIVE AWARENESS FOR AIR QUALITY

Mock-ups of the mobile app

Indicative mock ups based on which the technical team is developing the hackAIR mobile app



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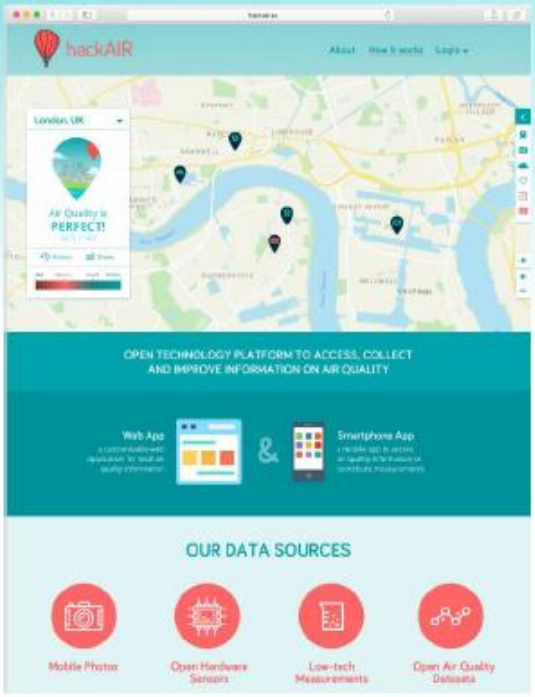
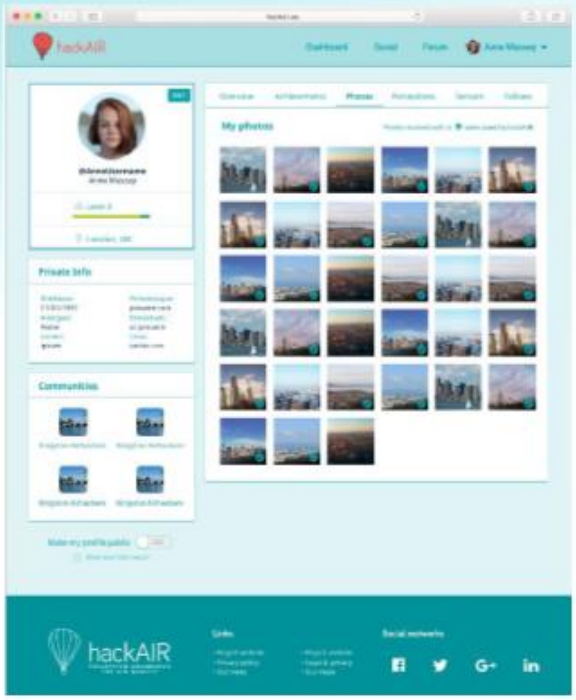
COLLECTIVE AWARENESS FOR AIR QUALITY

Mock-ups of the web app

Indicative mock ups based on which the technical team is developing the hackAIR web app





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COLLECTIVE AWARENESS FOR AIR QUALITY

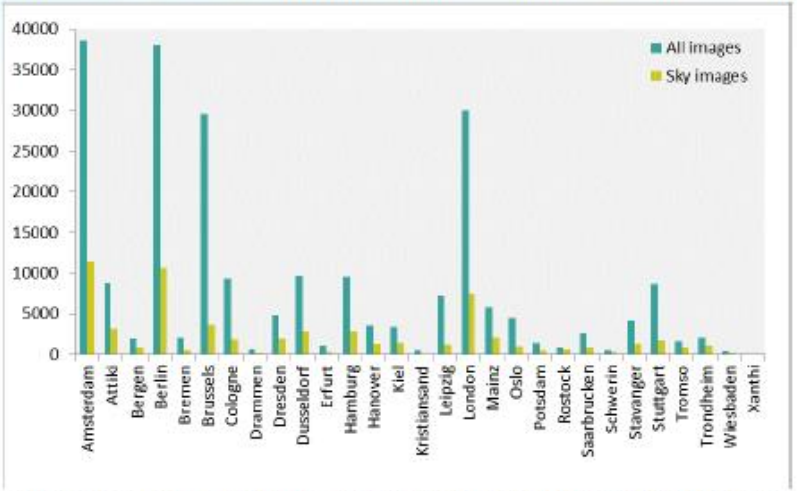
Discovery & indexing of environmental nodes

The hackAIR partners have reported on the methodology of discovery, acquisition, processing and indexing of air quality data acquired from the following sources:

- text-based **web official sources**,
- **image-based sources**, and specifically: a) **user-generated images** including publicly available images posted on **social media** platforms (e.g. Flickr), b) images captured by the users and **uploaded to the hackAIR mobile app**, and c) **images from webcams.**

Results from further investigation of the available webcam datasets and the methodology to extract accurate air quality estimations from webcam photos will be reported in **June 2017**.

For more information please visit the following link: D3.1-1st Environmental node discovery, indexing and data acquisition



Total number of images and images containing sky for Flickr during 1/1/2016-31/5/2016

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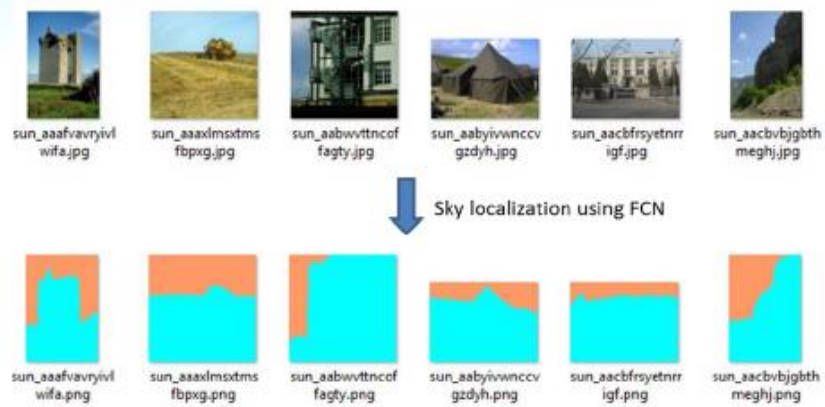
Air quality estimation from sky-depicted images

In order to estimate the **concentration of particulate matter in the atmosphere** from user-generated photos, a well-defined methodology was described and the respective Look-Up-Table was produced early in the project. The concept is that the particulate pollution is estimated from the ratios of the Red and Green band and the Green and Blue band of light identified from the **colour of the sky** depicted on the images.

The spatial representativeness of the estimated particulate matter ($PM_{2.5}$ and PM_{10}) concentrations is around 1-2km from the point where the photo is taken.

By June 2017, the above methodology will have been **validated** against observational data, while other **regions besides Europe** (e.g. China) will have been studied for the applicability of the method.



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Fabrication of the hackAIR open sensors

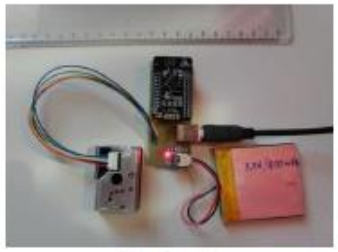
A first set of guidelines for the fabrication of the **hackAIR open sensors** that will be used for monitoring the air quality by the hackAIR users has been defined. Within hackAIR, there are three proposed hardware solutions:

1) An **Arduido**-based air quality monitoring node
2) A **Programmable System-on Chip** (PSoC) based air quality monitoring node
3) A **Commercial off-the-Shelf** air quality monitoring node that everyone can build with materials that can be easily found.

These instructions will be finalized in June 2017.

For more information please access our GitHub or visit the following link: D3.5-1st Design Guidelines for Open Sensor fabrication.

Arduino node



PSoC node

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Sustainability & exploitation strategy

The project partners have started to explore options to **bring the hackAIR solution to the market**. A preliminary list of the **assets** to be created during the project has been identified:

Technology applications	Technology infrastructure	Process skills
Environmental node discovery	Air quality data collected by hackAIR	Project management approach
Air quality estimation models	Backend infrastructure	Data management approach
Design guidelines for open sensors		Co-creation and requirements analysis approach
Data fusion algorithm		Engagement and behaviour change approach
Semantic integration and reasoning		Evaluation and impact assessment approach
Architecture and integration framework		Communications approach
Mobile app design		Exploitation approach
Web platform design		
Social media monitoring tool		

The delivered business & sustainability plan is only a suggestion and not a framework adopted by the consortium.

The final framework of this plan will be defined by November 2018.

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Dissemination

As regards the communication of the project and its results, we first designed an initial **communication plan** that will be executed during the project's implementation by all partners.

The **communication tools** that have been prepared so far are:

- the project's visual identity
- the project's website (www.hackair.eu)
- a first version of the project brochure
- postcards
- posters
- the first two issues of the project semi-annual newsletter
- social media accounts for the project.

For more information please visit the following link: D8.3-Dissemination Pack.

Finally, an initial contact list of the members of the hackAIR **Network of Interest** has been established and two webinars have already been organized with these members.

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Next Advisory Board meetings

Individual meetings (either physical or virtual) will be organized with all the Advisory Board members

Date: To be discussed

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Connect with us!

- Whenever you do *work* related to air quality and participatory sensing: Invite us!
- Whenever you *hear* about work related to air quality and participatory sensing: Let us know!
- And simply stay in touch: Follow us on Twitter or Facebook - and subscribe to our newsletter. We'll be happy to do the same!

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