The Urban Lab of Europe!

JOURNAL

PROJECT

DIAMS - Digital Alliance for Marseille Sustainability

Aix-Marseille Provence metropole, France

TOPIC

Air quality

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DIAMS Journal 2: get an update about Aix-Marseille project

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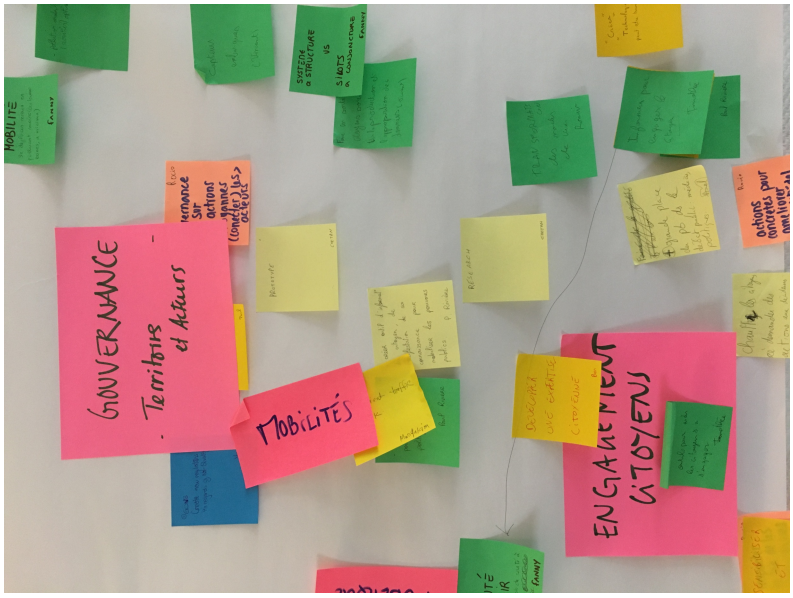

This second journal discusses the challenging times faced in this exceptional year, marked by the Covid-19 global pandemic, and how the DIAMS partners has been facing and overcoming them. Undoubtably, the Covid-19 pandemic had a great impact on the implementation of some of the activities as planned in the DIAMS project, especially those related to public engagement program. However, other parts of their engagement program, such as the design of the online service platform and the manufacture of the sensors with their telephone application, has been advanced and almost finalized.

The expansion of the Sars-Cov-2 virus at a global extent has led many countries to national lockdowns where most citizens and business stopped their daily activities and were called to remain at their domiciles. France established its first national lockdown on 17 March 2020. The reduction of economic activity led to a reduce of mobility in most urban centres. Mobility restrictions were smoothly lifted up on 10 May. As a consequence of the national lockdown, the concentrations of air pollutants related to traffic decreased in most cities, and this was the case for most of the urban centres in the Aix Marseille Métropole. Once lockdowns were lifted, more sustainable urban transport modes including the use of bikes and walking observed an increase on their usage. Most cities enlarged the areas dedicated to pedestrians and bicycles. However, in some cities, the usage of private vehicles has also increased in detriment of the use of public transport. A second French national lockdown started on 30 October 2020.

The national lockdown and the new social distancing rules have a clear impact on the development of the UIA DIAMS project, especially those activities related to public engagement. In January 2020 the citizen workshops started, as well as the activities with schools. However, there was a large period were those activities were put on halt due to the lockdown. After the summer school break, the activities with citizens have started slowly starting up again with a virtual participation option; but they have to put on halt again with the second national lockdown.

However, the team of the UIA DIAMS project worked hard to achieve their aims and progress has been done in other areas of the project. Those include the design of the telephone app that will be associated to the use of the small sensors to visualize the data for citizens and users to understand their measured levels; and the principles

and the technical basis for the online exchange platform; among others.

In terms of challenges, the big challenge for the UIA DIAMS project is the 'Participative approach for co-implementation´, especially with two of the biggest partners of the project. Moderate challenges for the project is the 'Monitoring, evaluation and measurement' but some steps forwards have put in place to remediate this. Overall, the UIA DIAMS project has most of the operational challenges in green and working hard on the implementation of the project despite the new public health recommendations.

1. Summary of the environmental legislation for air quality

Different legislation exists to regulate the levels of air quality and those are implemented at various administrative scales: from the European level to the very local one.

1.1 European legislation

In Europe, there are mainly two pieces of regulation that regulate air quality levels in their Member States. First, the EU Ambient Air Quality Directives 2004/107/EC and 2008/50/EC set a series of Limit and Target values to protect human health and the environment. Also, they establish the basis for the Member States to assess air quality in all their territories; to adopt and implement air quality plans to improve air quality in those places where standards are not met; and to maintain it where the air quality is good.

Second, in order to control the emissions of air pollutants to the atmosphere, the National Emission Ceilings (NEC) Directive (2016/2284/EU) sets emission limits for nitrogen oxides (NOX), non-methane volatile organic compounds (NMVOCs), sulphur dioxide (SO2), ammonia (NH3) and fine particulate matter (PM2.5) for Member States and the EU.

1.2 French legislation

At the national level, France regulates the air pollution levels and its emissions following the EU legislation complemented by three decrees:

- the decree of 7th April 2016 (DEVR1603792A) that establishes a suite of measures to be implemented during pollution episodes;
- the decree of 19th April 2017 (DEVR1710772A) that establishes the national plan of monitoring ambient air quality;
- and the decree PREPA of 10th May 2017 (DEVR1707177A) that establishes the national plan to reduce the atmospheric emissions of pollutants

1.3 Aix Marseille Métropole legistlation

The Métropole Aix Marseille Provence (AMP) developed its Environmental Strategy which the aim of improving air quality in the Métropole. The list of actions is grouped in nine thematic areas:

1. Routinely monitoring of air quality
2. Relief of dense urban areas
3. Cleaner transport
4. Promote the use of public transport
5. Reduce heavy duty vehicle freight
6. Reduce the impact of maritime and port activities
7. Promote building energy efficiency
8. Efficient management of green waste
9. Reduction of industrial emissions

2. The UIA DIAMS project in the air quality context

The UIA funded DIAMS project (Digital Alliance for Marseille Sustainability) aims to develop a platform to

exchange data on air quality and digital services (apps, on-line services) so all parts of the society (comprising decision-makers, experts, citizens and economic actors) commit to develop coordinated action plans at all territorial levels (individual, local, urban, regional, national and European-wide) to combat air pollution.

On itself, the online platform aims to:

- to promote a fluid transmission of territorial data and air quality data between urban, regional and national platforms; and ensure their consistency;
- to produce and deliver high-time and spatial-resolve air quality data in the area;
- to increase the awareness and the level of engagement of both citizens and policy makers through personalized and adaptable information;
- to promote behavioural change in citizens and private sector industries in order to find innovative solutions to improve air quality.

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3. Summary of the air quality levels in 2020

AtmoSud, the organization in charge of monitoring the levels of air pollution in the Region Sud Provence - Alpes - Côte d'Azur, of which the Aix Marseille Métropole belongs to, reported a decrease of the concentrations of nitrogen oxides (NOX = NO + NO2) during the spring French lockdown, with concentrations decreasing between 30 and 50% in the urban background areas and the traffic sites, respectively.

However, concentrations of the particulate matter increased associated with a greater use of wood combustion especially at the beginning of the lockdown, due to domestic wood burning and agricultural waste burning. Also, the smallest particles, named PM2.5 (i.e. particles with an aerodynamic diameter smaller than 2.5 µm) increased during the first weeks of the lockdown, associated with the usage of fertilizers in the agricultural fields that release ammonium in the atmosphere, the origin of widespread regional particle pollution episodes. This type of pollution episodes are quite frequent during springtime in many parts of Europe.

Once the lockdown was lifted, the levels of air pollutants related to traffic emissions increased but they were generally lower compared to previous years. However, once the number of sunlight hours increased as we advanced into the summer months, air quality levels deteriorated due to the increase of ozone levels.

The new normality and the restrictions in place to face the sanitary emergency would be changing some of the pollution patterns we were having in the past. Those should be analysed by the UIA DIAMS partners and maybe change the focus on some of their action plans.

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4. Overview of the operational challenges

4.1 Leadership

In terms of the leadership, we must distinguish two domains. First, the management team for the project at the Métropole, working in close collaboration with other departments within the local authority (EU department, Digital Strategy, Communication, Smart Tech and Smart City Unit), is efficient and engaged in the delivery of the project.

The second dimension of the leadership for the UIA DIAMS project comprises the political leadership at the Métropole. During the first year of implementation, this was a big challenge that the project faced. However, the former major of the AMP engaged with the UIA DIAMS project on the first term of 2020. Local elections were held in France in March 2020 (first round) and in May 2020 (second round) and resulted into a new local government at the Métropole but with the same president. As a result, there is a continuity in the politic held on the territory. It should be highlighted that Marseille, the biggest city of the Métropole, elected his mayor who is from the green party.

In this second year of implementation, the leadership challenge for the UIA DIAMS project is classified as low.

4.2 Public procurement

The procurement challenge is medium for DIAMS. During the implementation of the project, the Métropole has different procurement for different products and services : procurement for microscopes for animations on air

quality; animations in schools; logistic management of the sensors; financial monitoring of the DIAMS project; call for projects to mobilize citizens around air quality and DIAMS; research convention with a laboratory specialized in artificial intelligence and digital, etc.

The criteria used in the public procurement process in the AMP is negotiable according to the needs and justifications but generally tends to select the less expensive goods and services that sometimes means the less innovative ones. In order to overcome this potential problem, the DIAMS team at the AMP is trying to find means to engage innovation into public procurement processes by using other processes such as research convention, call for projects, etc. This appears to be a good approach that will ensure that the procurement process for the DIAMS project is based on innovation and not just on economic cost.

4.3 Cross-department working

The members of staff at the AMP involved in the DIAMS project comprise different departments at the local authority: EU Service, Digital Strategy Direction, Communication Direction, Smart City Service and the Environmental Strategy Direction. All these departments are geographically separated in the Métropole, in different cities. Despite, the different members of staff showed a good level of participation, involvement and engagement since the early stages of the implementation of the DIAMS project. There is a good level of cooperation with constant communication flow through phone calls and email exchanges; and bi-monthly meetings. In some strategic meetings all services and departments are also called. Some of the subjects and aspects of the project are led by a single department.

A new member of staff at the AMP started in October 2020 covering the role of Project Coordinator for the DIAMS project. She has been warmly welcomed by the team and started diligently working on the project.

Therefore, the cross-department working setting at the local authority level was well set since the beginning of the project and it continues to be in this second year of implementation, and it is not going to pose a challenge in the implementation of the DIAMS project.

4.4 Participative approach for co-implementation

The participative approach designed by the DIAMS project is well organized and have fortnightly scheduled meetings with the different actors and partners. A full work-package of the project is dedicated to this. It has been established three fortnightly meetings which involve different actors and partners:

- Steering Committee: This committee is composed by senior members of staff and the project management team at the AMP and other two partners of DIAMS (AtmoSud and Lab in the air). The aim of the Steering committee is to make strategic decisions and provide an oversight of the project. These meetings are held quarterly.

- Leaders Committee: This committee is composed by the DIAMS project management at the AMP, AtmoSud and Lab in the air. It decides on the general activities of the project and the general budget of the project and the meetings are held every two weeks. Depending on the topics discussed, appropriate directions are solicited to participate.

- Partners Committee: This committee is made up of the project managers of each partner and takes place once a month. Each partner gives an update about the progress of the project for those work-packages they are involved in, they communicate about the activities and the project results.

However, in this second year, this structure of regular meetings has slightly changed, partially due to conform with the new health guidelines.

The partners committee meetings have been stopped to be presential and the AMP keeps regular meetings with each individual partner using virtual platforms. Minutes and agreements are then circulated to the relevant partners. This meeting format has proved to be more efficient, with shorter and more concise meetings, putting an end to the long partners meetings This format is encouraged to keep in the longer term to ensure productive partners meetings, easier to mark milestones and objectives and reach agreements.

The leaders committee meetings have also stopped, and this is due to the continuous discrepancies between two of the leader partners. Since the very early stages of the project there has been continuous discrepancies with two leader partners, especially at the strategic level, with different visions on how to engage parts of the society such as the economic actors of the area and the procedures to follow; the online platform, etc. Each partner keeps working on the deliveries of their parts but without much exchange. The AMP, as coordinator of the DIAMS

project, should find a way to restart this leader committee meetings and ensure that they are kept along the implementation of the project.

This is proven to be the largest challenge that DIAMS faces.

4.5 Monitoring, evaluation and measurement

This challenge might be separated in two parts. First, monitoring, evaluating and measuring the deliverables of the project, as planned by the DIAMS proposal, within the expected time frame. This is constantly done at the AMP level and this is not posing a problem. Some delays on the delivery of the project are identified but these concern especially with the Covid-19 pandemic and the social distancing rules.

The second part, it is the evaluation and the impact that the project is creating at the community level: improvement of the air quality levels in the Métropole, change of behaviour from citizens, best practices adopted by the society, etc. This might pose a medium challenge for DIAMS as its quantification is complex. The innovative nature of the project makes it very difficult to quantify the results of the project as it evolves around the creation of the DIAMS community. The proposal of the project outlined the targets that the project is willing to achieve and as well the methodology how to quantify them. There are few metrics that might result appropriate to quantify the success of the project such as the compatibilization of the number of start-ups and services around the air quality domain. However, evaluate the level of awareness of the air quality problems in the local area among the population and quantify the effect of the DIAMS project may be challenging. Metrics such as the number of engaged contributors or the percentage of people in the target groups that have been reached might not be enough to capture the degree of engagement from the potential beneficiaries. In general, environmental projects face the big challenge of reaching the sceptical part of the society: for instance, those not willing to change from the use of private car to public modes of transport. It would be advisable to undertake some questionnaires to know the level of engagement in the general population about the topic of air quality and compare it with the ones who are participating and involve in the activities developed around DIAMS to be able to compare. Also, follow-up questionnaires for the people who is participating in the DIAMS activities and monitor any possible long-term change of behaviour might also help evaluating the level of impact and engagement of citizens and students in the long-term not just during the implementation of DIAMS.

Also, the project is aiming to reduce the population exposure to fine particulate matter. However, it is unclear how this goal is going to be evaluated and isolated from other possible policies taking place at the local, regional and European level, that might be also contributing to the reduction of ambient levels. The methodology how this is going to be quantified is still unclear at this level of implementation.

4.6 Communication with target beneficiaries

The engagement program of the UIA DIAMS is very vast and comprises different elements. It should be highlighted that the engagement program has been very impacted by the Covid-19 pandemic. In this section, the different elements of the engagement program are described, at which state they are and how they were affected by the lockdown and the new social distancing rules.

Engagement with young students (school projects).

Various education and science initiatives around the world have integrated children as agents of change. Those provide evidence that children have the potential to be catalysts for enhanced sustainability in their local environment (von Braun, 2016). These is expected to be achieved with the school project run within the UIA DIAMS project.

The project partner L'air et moi is in charge of the educational program that aims to engage students at the primary school level with the problem of urban air quality. On January 2020 sessions with school children started. Those consisted with a general introduction of air pollutants and how harmful they are to our health, followed by a walk in the surrounding area around the school measuring air pollutants with a small sensor. With the autumn lockdown, animations into schools can keep going but momentarily, external visitors are not allowed.

Citizen workshops

The new space A Lab in the air opened within the UIA DIAMS framework initialized a suite of ateliers or workshops opened for all citizens. Three types of workshops were designed as a first instance:

- Wearables: this suit of workshops aims to show the participants how to embroider a small sensor that will be

measuring the concentration that the user is exposed on their daily lives.

A tote bag with a small sensor embroidered on it. This is an example of the object that citizens may have once they attended the wearables workshop.

- Bee to bee: these workshops aim to promote the project "Interconnected hives". The project presents the role of bees in the natural ecosystems and also their role as biological indicator for certain types of pollution.

-Un café avec… («a coffee with… ») : monthly informal meetings for everyone presenting a professional working on the air quality field on all its domains: art, science, research, policy, entrepreneur, etc. These meetings aim to bring new ideas about air quality, governance, systems, etc.

Figure 2. Picture from the meeting with the artist Diego Ortiz and Hernan Zambrano on 16 September 2020 within the framework "A coffee with...", held on the space "A lab in the Air"

Future activities to engage citizen comprise an Escape game around the topic of air quality. It has been designed throughout 2020 and its inauguration was planned for December. Due to the current lockdown, the inauguration is postponed until 2021.

The first workshop took place in November 2019. However, due to the COVID-19 pandemic these were put in halt and they re-started on September 2020. A virtual participation is proposed following the new public health situation.

These citizen workshops are one of the main parts of the engagement program of the UIA DIAMS project. However, the voluntary basis of the participation on this type of activities and as well the fee that the citizen should pay to participate on them, limit the engagement program with those citizens who are interested on the topic and probably willing to make a change to improve air quality. It would be very relevant to the project to follow the participants throughout the DIAMS project through a suite of questionnaires to know their engagement level with the air quality topic before the participation on these activities, just after and few months later. That would also set the basis for the monitoring, evaluation and measurement the impact of the project on citizens and evaluate the possible long-term behavioural change induced by this type of innovative project.

Programme MATRICE. Air data

Matrice had a very ambitious program where young graduates, for a year period, where working on the development of a service around the topic of the air quality. For a month, students attended to a set of seminars, talks with people working on different dimensions of the air quality project. And following that, they started working on the design of their individual projects.

However, due to the lockdown, some students felt out of the program as the imposed remote working conditions impacted on their motivation as it happened at the moment when they were going into the implementation phase of their project and could not concretize it on the field. However, four projects came out and they were presented in November 2020.

Similarly to the school projects, this type of initiatives will help widening the problematic of poor urban air quality among the youngest part of the society, with the extra benefit of promoting to find innovative solutions to combat it and make it more visible.

Small sensors and phone application.

The use of portable sensors which measure air quality is a promising approach to improve public participation in

environmental projects and they are a useful tool to promote change towards a more environmental-friendly behaviours. Previous experiences in other cities suggest that the experience with the sensors, in comparison with those participants which were only provided with the traditional information, generates greater motivation among participants. The use of the sensor creates awareness of the problem of air pollution (Oltra et al., 2017).

The UIA DIAMS project will provide 2000 small sensors available for the community. During the second year of the implementation 50 sensors were available to test between the UIA DIAMS partners. The rest of sensors will be made and distributed in 2021. The manufacturer process of the small sensors was impacted by the Covid pandemic. Some of the parts were from China and their availability were limited at the beginning of the year with the closure of the Asiatic market due to the pandemic. Tera, the partner manufacturing the small sensors for DIAMS, found European alternatives for some of the parts but their distribution and acquisition were impacted by the spring lockdown across Europe. Currently, most of the parts used in the construction of the sensors are coming from Europe, reducing its environmental and carbon impact.

The new batch of small sensors for 2021 will have some of their features enhanced, such as a smaller size and easier clip-on systems.

Other developments around the sensors involved the deployment of them on electric cars and vans used by the postal service to map concentration of pollutants while driving and doing the courier delivery. Fixed monitoring stations, complementing the existing ones from the organization in charge of the monitoring of the air quality levels in the region (AtmoSud) will also be deployed soon.

The online DIAMS platform has been designed by the UIA partners during summer 2020, as well as the telephone app associated with the use of the sensors. The final details for both of them are being currently finalized and a first version is expected at the end of 2020.

Small sensor designed and built by TERA, partner of the UIA DIAMS project. Mobile app shows the latest particles concentrations as measured by the user. About 2000 sensors will be made available for the DIAMS community in 2021.

The availability of small sensors to measure personal levels of air quality will be extremely beneficial to create awareness about the problem of air quality. Data from them will provide the idea to be a personal problem; visible through the use of the telephone app; but also will give power to citizens to change, by making personal decisions about bringing down personal emissions and avoiding being exposed to high levels of pollutants, for instance by choosing low exposure routes.

Meetings with industrial partners. The UIA DIAMS approached different industrial partners in the Métropole to engage with the project. Several meetings with individual industries were held during the first and the second year of implementation but they were not fully satisfactory. DIAMS is going to try a new approach and the AMP is going to present the project to the Association of Industrial and Territorial Ecology 'PIICTO' in their general assembly in mid-November 2020. The members of this association comprise the AMP, other local authorities and industries which members are already engaged with the environmental sustainability (circular economy). A positive outcome is expected to be reached.

Overall, the communication with target beneficiaries challenge is is medium for the DIAMS project, especially given by the new public health guidelines following the Covid-19 pandemic making more difficult (or even putting into a halt) some of the activities with schools and citizens. However, the partners of the DIAMS project have been working hard and they made advances in some areas such as the visualization of the data through the development of the telephone app associated to the use of the sensor and set up the basis for the on-line platform.

5. Lessons Learnt

These are some lessons that the experience of the implementation of the UIA DIAMS project might help in the implementation of other innovative projects. The most relevant are:

1. Public procurement through research conventions and call for projects. This is proved to be a better approach to provide innovative projects with state-of-the art services and products needed for the implementation of the project that is not purely based on economic cost as most of the administrative procurements.
2. Good communication between the departments within the local authority since the early stages of the project. Setting up a collaborative environment between the different departments involved in the implementation of an innovative project is essential to assure leadership in the implementation of the project. Also, setting up a good collaboration between departments with enabled communication channels ensure smooth transitions if a new member of staff is starting in the project team.
3. Short and concise partners meeting. Long partners meetings, despite offering all partners involved in all decisions and advances of the project, might also lead to long and out-of-focus meetings where setting objectives and milestones are falling, and decisions and agreements are not made. Despite it is important to keep regular, short and informative updates to all partners about the implementation of the project, this type of partners meetings should be prioritized.
4. Development of an economic model to evaluate the long-term benefits of an innovative project. It is advisable to consider the long-term benefits of innovative projects in the region as it might set the basis to achieve long-term objectives and durable solutions. Also, this would also help upscaling the project. Developing an economic model for this might help setting this long-term planning.

6. Conclusions and challenge table

This second journal discusses the challenging times faced in this exceptional year, marked by the Covid-19 global pandemic, and how the DIAMS partners has been facing and overcoming them. Undoubtably, the Covid-19 pandemic had a great impact on the implementation of some of the activities as planned in the DIAMS project, especially those related to public engagement program. However, other parts of their engagement program, such as the design of the online service platform and the manufacture of the sensors with their telephone application, has been advanced and almost finalized.

The greatest challenge that UIA DIAMS project faces is the participative approach for implementation, with discrepancies between two leader partners. This has been ongoing since the first year of implementation of the project. The Métropole, as coordinator of the project, should try to mitigate this, especially to keep a consistent strategy across all partners.

The Métropole is working in the definition of certain qualitative and quantitative indicators to monitor, evaluate and measure the impact of DIAMS in the society, going beyond the achievements of the implementation of activities as designed by the DIAMS proposal.

Since early 2020, air quality is affirmed as a major issue of the Metropole's environmental strategy and the political leadership challenge that DIAMS faced during the first year of implementation is now low for DIAMS, with a full commitment from political leads.

Challenge	Observation
1. Leadership Challenge level	Operational and political leadership very active

2. Public procurement Challenge level	Low number of public procurements for the implementation of the project
3. Integrated cross-departmental working Challenge level	Good inter-department network
4. Participative approach Challenge level	Confrontational views and perspectives between leaders partners
5. Monitoring, evaluation and measurement Challenge level	In the process for the right definition of the quantitative and qualitive parameters
6. Communication with target beneficiaries Challenge level	Good communication plan and schedule, good implementation times, difficulties arise by the Covid-19 but partners remediating.
7. Upscaling Challenge level	Planned in the proposal, economical model to be used

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