AIR BREAK Journal Nr. 3

See on UIA website

With the project approaching its end in December 2023, this Journal Nr. 3 reflects on a number of core lessons learnt during the implementation of Air-Break Ferrara's innovative activities

Air-Break has been able to successfully complete all the foreseen activities under its main intervention axes. It planted more than 2000 new trees and shrubs in five areas of the city, within its reforestation programme. It deployed a new, granular, network of air-quality monitoring stations and implemented IT solutions to provide real-time data for policy-making and public fruition. It carried out analysis and behavioural change campaigns for sustainable mobility and developed innovative cycling infrastructure such as the Smart Bike Lane and the Smart Hubs. And, last but not least, it undertook a long-lasting process of citizens and stakeholders engagement and activation.

All of this, of course, did not come free of challenges. Challenges that, however, have been the opportunity for a continuous learn-and-adapt process, and now allow developing a number of reflections potentially relevant for many innovative projects across the EU.

LESSONS LEARNT

Measuring, elaborating, and communicating air-quality data is a sensitive matter

Air-Break initially aimed to democratize access to real-time air quality data through a public, openly accessible dashboard. This data was to be collected via innovative LSA-Units (see: Zoom-In Nr.1), intending to compute a city-wide air-quality index. However, this ambitious plan faced significant scrutiny at institutional level. In particular, ARPAE, the regional environmental protection agency of Emilia Romagna, highlighted three primary concerns.

Firstly, the measuring technology employed by the LSA-Units differed from that of the official AQ monitoring stations. This divergence in technologies raised questions about the reliability and accuracy of the data collected. Secondly, the calculation method for the air quality index did not align with international standards, casting doubts on its credibility and comparability. Thirdly, the potential mismatch between the air-quality data communicated by ARPAE and that collected by the project posed a risk. Given that regulatory measures, such as traffic limitations or heating regulations, rely on ARPAE's official data, any incongruence in the communicated data could disrupt and/or delegitimate these critical mitigation efforts.

The consequence of these challenges was a substantial delay in the release of the public dashboard, halting progress for nearly a year. In response, the project implemented a comprehensive solution framework to rectify these issues.

Primarily, the initiative installed two LSA-Units adjacent to the official ARPAE monitoring stations. This strategic placement facilitated the calibration and alignment of measurements, ensuring coherence between the differing technologies used for data collection. Secondly, the index calculation methodology underwent a significant overhaul, now adhering rigorously to the standards set forth by the European Environment Agency (EEA). This alignment not only bolstered the reliability of the index but also facilitated seamless comparison with broader European datasets. Moreover, Project Partners shifted from a singular city-wide air quality index to providing specific indices for each of the 14 designated areas where the LSA-Units were installed. This granular approach vastly improved the contextual relevance of the data, empowering local stakeholders and policymakers with area-specific insights.

Reflecting on these experiences yields critical lessons. Citizens display a profound interest in air-quality data due to its profound implications for public health and the direct impact of pollution-mitigation measures on their lives. This engagement underscores the necessity of reliable, publicly accessible real-time data for evidence-based discussions between citizens, stakeholders, and policymakers.

The introduction of LSA-Units stands as a potent tool in this endeavour. However, defining their precise role and function remains pivotal. These local sensors excel in monitoring pollution dynamics throughout the day and across different seasons in specific city areas. They facilitate a nuanced understanding of the primary causes of pollution by assessing various pollutant values. Consequently, they enable citizens, stakeholders, and policymakers to comprehend the impact of their actions and design more tailored, place-based measures.

This entire process highlights the intricate balance between citizen engagement, technological advancements, and policy formulation. Acknowledging these challenges and transforming them into opportunities has paved the way for improved air quality governance. Moving forward, a continued emphasis on data accuracy, standardization, and granularity will be pivotal in steering evidence-based policies that safeguard public health and foster sustainable urban environments.

Flexibility is key when deploying innovative investments

The initial vision for the Smart Bike Lane centred around deploying the patented mOOve™ modular system. This innovative technology aimed to embed various sensors and smart features into the pavement, elevating user experience while gathering crucial data for city management and policymaking (see: The construction of Ferrara's new Smart Bike Lane. Adapting to new conditions and challenges). However, the project encountered a significant challenge during the procurement phase, resulting in a major pivot from the original plan.

The energy crisis and subsequent inflation posed an unforeseen hurdle. After completing all administrative procedures and on the brink of finalizing the procurement contract, the selected supplier withdrew from the tender. Their inability to deliver the product at the predefined price due to market shifts brought the project to a standstill.

This abrupt withdrawal disrupted the project's momentum, halting investments and delaying progress for several months. The absence of an alternative supplier for the modular paving system necessitated a quick and innovative solution.

In response, project partners, particularly the Municipality of Ferrara and the University of Ferrara (UniFe), undertook the challenge of creating an alternative solution in-house. They reimagined the bike lane, substituting the in-ground sensors with advanced cameras and utilizing an alternative pavement. This adaptation ensured the project's continuity and led to the successful delivery of the bike lane, which opened to the public in early-October 2023.

The initial usage data revealed promising engagement, with over 850 cyclists utilizing the smart bike lane between October 30 and November 14, averaging approximately 56 users per day.

Figure 1 – The newly inaugurated Smart-Bike Lane. Source: the Author

This experience provided several lessons for future projects. Firstly, investing in innovative technology entails inherent risks, particularly when dealing with experimental products that lack economies of scale. External factors, such as market price fluctuations in essential resources like energy, can significantly impact small start-ups, emphasizing the vulnerability within strict public procurement regulations and fixed budgets.

Moreover, the experience highlighted the importance of open-mindedness and flexibility in overcoming otherwise insurmountable obstacles. The collaborative efforts between UniFe and the municipality's technical departments showcased the positive impact of close collaboration between research institutions and public administration in resolving high-level challenges efficiently.

Lastly, this experience serves as a compelling example of how good practices and innovative ideas can be adapted to different contexts. Embracing the "understand – adapt – reuse" principle, project partners successfully unpacked the core elements of the original smart bike lane design, adapted it to new circumstances, and delivered an infrastructure that optimally balanced efficiency and functionality.

The uptake of new services/infrastructure is not an automatic process

The installation of the Smart Hubs – designed as integrated docking/charging stations for electric light-mobility

vehicles – commenced in spring 2023 across four strategic locations within the city. Conceived by Project Partner Hera S.r.l., these hubs were envisioned to provide not only charging facilities for e-bikes and e-scooters but also additional customizable features like Wi-Fi, CCTV surveillance, pack-stations, and solar panels for self-sufficiency (see: Introducing Air-Break Ferrara's Smart Hubs). However, delays in the supply of optical fibre, essential for the hubs' operation, resulted in substantial delays in their delivery. It wasn't until early October that these hubs were inaugurated. During the initial operational period spanning from October 1 to November 13, 2023, the usage statistics painted a picture of minimal adoption and limited engagement with the service.

Figure 2 – Smart Hub Darsena. Source: the Author

Only 30 users registered for the Smart Hubs service during this period, with a stark disparity between registrations and actual usage. Excluding logins shorter than 10 minutes, only 6 users actively utilized the service. Among them, the frequency of usage varied, with a majority logging in for shorter durations. Only three users logged in for durations exceeding the 3.5-hour mark, crucial for a full charge of a completely depleted e-bike battery. Each Smart Hub location exhibited distinctive usage patterns: Smart Hub Central Station had 2 logins, Smart Hub Darsena 3, and Smart Hub Tecnopolo recorded 11 logins, while Smart Hub Corti di Medoro remained unused. The login durations varied, with one multi-day login, 3 logins lasting over 6 hours, 3 between 4-6 hours, 2 between 1-2 hours, and 7 lasting less than 1 hour. Most notably, the majority of logins occurred during daytime hours.

Notably, two of the hubs experienced vandalism, and tools provided for bike repairs were stolen, impacting their functionality.
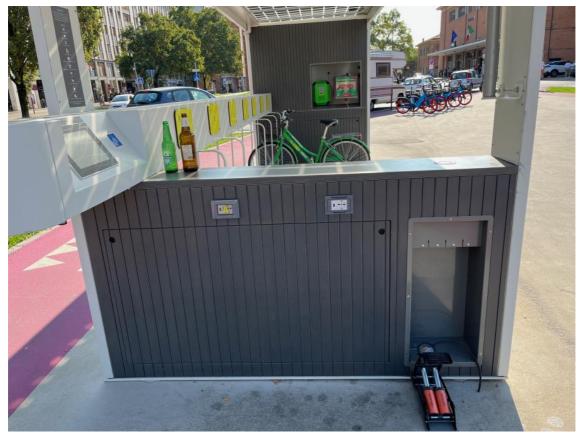
Figure 3 – Vandalised Smart Hub by the Central Station. Source: the Author

This tepid uptake raises crucial questions about the service's reception among the population, the demand for such facilities, and the appropriateness of the chosen hub locations. The challenges faced during this phase hampered the project's ability to effectively monitor its impact.

In response to these challenges, and in order to enhance their usage, the Smart Hubs will now integrate Amazon lockers through a significant economic agreement between Amazon and project partner HERA. This agreement will cover electrical energy costs, with ownership and the agreement transferring to the Municipality as of January 1, 2024. Furthermore, efforts are underway to explore the possibility of agreements with e-bike/e-scooter rental or sharing services to bolster the hubs' usage.

This experience offers several valuable lessons for future projects. The successful integration of innovative infrastructure such as the Smart Hubs doesn't simply unfold overnight; it necessitates a sturdy groundwork based on comprehensive use-cases and thorough market analyses. The process of selecting locations also gains paramount importance, best achieved through active participation. When juxtaposed with the enthusiastic reception of the new Smart Bike Lane—a direct response to the community's clamour for improved cycling connections—the modest uptake of the Smart Hubs underscores the pressing need for an extensive promotional and engagement drive. This concerted effort becomes pivotal in not just encouraging usage but also in averting the looming risk of underutilization. Forming partnerships with private entities that stand to gain from such infrastructure, be it e-mobility rental/sharing services or shipping companies seeking to charge their last-mile delivery e-vehicles, emerges as a strategic manoeuvre. These partnerships not only safeguard against underuse but may also amplify the overall effectiveness and utility of these hubs in the larger urban landscape.

Long-lasting changes towards sustainable mobility require solid public-private-people agreements

Following a comprehensive study analysing commuting behaviours in Ferrara (see:Analysing Commuting Patterns in Ferrara towards Better-Informed Policy Decisions) project partner SIPRO initiated a collaborative effort with local businesses and companies. The overarching goal aimed to cultivate an array of innovative solutions to nurture sustainable home-work commutes, ultimately weaning dependence on private vehicles. However, this trajectory was riddled with a labyrinth of challenges.

Initial engagements with companies, buoyed by expressions of interest and a sprinkling of responses, meandered through various stages but encountered roadblocks along the way. Dialogues with two firms fizzled due to tepid interest or the realization that post-Air-Break sustainability evaluations rendered the project untenable. Several proposed solutions, including a city-company shuttle funded during the project's tenure but intended for eventual company support, were perceived as unsustainable and abandoned. Another avenue explored involved SIPRO covering activation costs, procuring vehicles for subsequent handover to companies, yet the private sector's reluctance to shoulder post-project expenses curtailed progress. A ray of promise emerged with a contract forged with an electric car-sharing company, intriguing three companies. The project procured and allocated a set number of tickets for employees and suppliers. Currently, three car-sharing stations and cars have

been made available in the city, with the sustainability of this endeavour pivoting on companies' continued utilization post-ticket depletion.

The implications of these challenges reverberated through project implementation, forcing a downsizing of activities and subsequent underspending by SIPRO. To offset this setback, idle resources were repurposed, channelled predominantly into intensified reforestation initiatives. Despite earmarked resources available for mobility solutions, their utilization proved implausible due to the need to ensure sustainability beyond the project's lifespan. This compensatory reallocation aimed to offset the inability to execute transformative mobility actions with environmental compensation.

These hurdles provided a number of key lessons. Garnering proactive commitment from companies to invest in sustainable commuting options for employees proved a Herculean task. Be it due to cultural inertia or limited resources and investment capacity, implementing desired measures encountered formidable obstacles. This underscores the urgency for intensified campaigns to sensitize stakeholders on sustainable mobility. Additionally, forging agreements between private and public stakeholders to fund such initiatives emerges as a pivotal step forward. The potential asymmetry in negotiating power between these entities might significantly influence outcomes. Essential tools for cities to spearhead the transition towards sustainable mobility encompass cultural shifts, invigorating individual engagement, and a fortified regulatory framework. These components are pivotal in empowering cities to assume a central role in this transformative journey.

A platform for open exchange and innovation can ensure strong citizen and stakeholder engagement

As discussed above, the project encountered significant challenges in engaging and securing commitment from private companies for sustainable mobility measures. However, amidst these hurdles, Air-Break achieved substantial success in various citizen and stakeholder engagement endeavours over the past three years. Notably, the 'Air Fest' (see: The Air Fest: an Open Platform for Engaging Citizens and Stakeholders around Air Quality in Ferrara) emerged as a hallmark event, evolving from discussions solely centred on air quality to encompassing broader themes like ecological imaginations and collaborative governance. This event – organised and coordinated by Milan Polytechnic – transformed into a platform inviting stakeholders and partners to contribute ideas and proposals, reflecting the collaborative ethos of the initiative. Diverse activities, catering to varied interests, expertise levels, and contributions, included citizen science projects for students, policy debates involving stakeholders, and technical workshops.

Figure 4 – Working Groups at the Air Fest. Source: the Author

Emphasizing the integration of diverse perspectives, the Air Fest underscored the necessity of efficient interventions to combat air pollution and heat stress. The organizing team highlighted the role of scientific knowledge and emphasized collaboration between scientists and the public. Citizen science tools were lauded for their role in environmental comprehension and societal engagement towards sustainability. With an average participation of approximately 450 individuals, the Air Fest successfully fostered a robust community around the

project and broader Air-Break objectives.

The collaboration with the Emilia Romagna Environmental Agency (ARPAE), though not an official partner, significantly contributed to the project. Future endeavours aim to involve more private stakeholders. Noteworthy is the transformation of participants into proponents and implementers, treating the Air Fest as an experimentation and innovation platform.

Stressing the importance of continuous engagement and diverse stakeholder relationships, the significance of the Air Fest as a peak event was underscored. Other initiatives, such as workshops with high schools, also played crucial roles. Additionally, the event's visibility and networking opportunities facilitated new projects and interconnected various ecosystem actors.

Involving schools and civil society aimed to instil responsibility and awareness in future generations regarding air quality issues. Challenges in managing diverse stakeholders and balancing project aspects highlighted the need for adaptability and community empowerment. Managing stakeholder expectations and requests necessitated clear goals and a flexible approach.

Challenges emerged in maintaining a permanent forum for quality discussions, prompting consideration for a more decentralized approach as the project expands. The strategy of creating small, self-led groups focusing on specific topics was explored.

The key lessons underscore the significance of commitment and collaboration among stakeholders, highlighting the pivotal role of public authorities in facilitating these partnerships. Emphasizing diversity and openness within alliances, even among potential opponents, emerged as crucial elements. Importantly, fostering an open platform for exchange and innovation, where every voice holds equal weight, allowing for a cross-pollination of diverse experiences and knowledge, was a significant value addition. The cohesive and collaborative community cultivated around the project is poised to leave a lasting impact on Ferrara's policy-making landscape. Recognizing the value of participation and the requisite resources proved to be critical in these pursuits.

CHALLENGES FOR IMPLEMENTATION

Challenge	Observation
Leadership Challenge level 🟢	From Journal Nr. 2, the assessment of this challenge is unchanged. The MUA is strongly committed to the project both at political and technical level. On the one hand, Air-Break is a priority for the city's administration, and this ensures the full support and the direct, active involvement of political authorities in the project activities and public events. On the other hand, all senior managers from the different departments involved are engaged in- and stimulated towards the development and successful and timely implementation of project activities.
Public procurement Challenge level 🟠	The effects of recent years global contingencies (e.g., COVID-19 pandemic energy, peaking inflation) impacted the original timeline of Air-Break investments, causing major delays in the delivery of investments. Nonetheless, despite some adjustments to the original plans, the project has been able to finalise and open to public fruition all the foreseen investments.
Cross-department working Challenge level 🟢	From Journal Nr. 2, the assessment of this challenge is unchanged. The MUA established two bodies to ensure a smooth cross-department harmonisation: • A core Project Management Unit (PMU) composed by senior managers and senior staff from both the General Directorate / International Relations and the Environmental Quality Service, which is in charge for the overall coordination of the project. • The Operational Team (OT), composed by the managers of all departments involved in the project, which regularly meet and align their activities. Traditionally rooted silo-mentality within the administration is still a challenge, yet the regular meetings of the PMU and OT sensibly contribute mitigating this.

Participative approach

Challenge level 🔴

All Project Partners are strongly invested and engaged in the project and in the successful implementation of its activities. There is a very good degree of interaction among project partners, the civil society and some local stakeholders in the co-implementation of the different actions/activities related to the air-quality monitoring network. In particular, the larger group of stakeholders has been very active and engaged, with the prominent participation of local high-schools, the regional environmental agency - ARPAE, as well as of a number of national-level associations and interest groups (e.g., Legambiente, FIAB)

However, the project encountered major difficulties in actively engaging private-sector companies and securing their long term commitment to uptake sustainable mobility initiatives after the cease of project's funding.

Monitoring and evaluation

Challenge level 🔴

In the final stage of the project, monitoring and evaluation remains one of the most challenging aspects for Air-Break on two main levels. On the one hand the delays in the deployment of the Smart Hubs and Smart Bike Lane will allow only a few-months window to assess these investments. On the other hand, it appears rather complicated to disentangle the specific impact of project activities on the city's levels of air-pollution.

Communication

Challenge level 🟢

From Journal Nr. 2, the assessment of this challenge is unchanged. Air-Break has consolidated a strong outreach, visibility, and communication capacity, being able to disseminate effectively the main achievements accomplished both on traditional and social media. The yearly Air Fest constitutes a major event for the city, and a fundamental communication and engagement tool for the project.

Upscaling

Challenge level 🟡

As illustrated in my previous Journals, Air-Break has a manyfold upscaling potential:

- At the end of the project, and on the basis of the results achieved during implementation, the MUA intends to extend and mainstream Air-Break's experimental approach to the whole city's integrated sustainable urban planning policy.
- Thanks to the active involvement of ARPAE in the larger group of stakeholders, Air-Break's approach to AQ participatory monitoring has the potential to be scaled-up at the regional level.
- The products and technological solutions tested within Air-Break also have the potential to be adopted and replicated elsewhere
- MUA is taking stock of the findings and lessons learnt during implementation to inform the development of the new General Urban Plan (PUG, Piano Urbanistico Generale).
- The large network of stakeholders activated within Air-Break constitutes a major asset for the MUA and the project partnership for the development of new synergies, projects, and collaboration pathways, although the issue of long-term financial sustainability is central.

However, some concerns remain in respect to the actual uptake of the Smart Hubs

Air quality   Co2 reduction   Digital transition   Digitalisation   Europe closer to citizens   Greener Europe   Innovation and responsible public procurement   Mobility   Smarter Europe   Social innovation   Urban mobility

See on UIA website