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## **PARTICIPATORY URBAN PLANNING IN NORDIC CITIES**

REPORT 1- DESIGN AND RESULTS OF WORKSHOPS 1 AND 2 WITH MUNICIPALITIES.  
NordicPATH – Nordic participatory, healthy, and people-centred cities  
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*Publication date:*  
2023

*Document Version*  
Publisher's PDF, also known as Version of record

[Link to publication from Aalborg University](#)

*Citation for published version (APA):*

Lissandrello, E. (2023). PARTICIPATORY URBAN PLANNING IN NORDIC CITIES: REPORT 1- DESIGN AND RESULTS OF WORKSHOPS 1 AND 2 WITH MUNICIPALITIES. NordicPATH – Nordic participatory, healthy, and people-centred cities. Department of Planning, Aalborg University.

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AALBORG UNIVERSITET

# PARTICIPATORY URBAN PLANNING IN NORDIC CITIES

*REPORT 1*

## DESIGN AND RESULTS OF WORKSHOPS 1 AND 2 WITH MUNICIPALITIES

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NordicPATH – Nordic participatory, healthy, and people-centred cities

May 2023



Title: Participatory Urban Planning in Nordic Cities

Subtitle: Report 1 - Design and Results of Workshop 1 and Workshop 2 with Municipalities  
NordicPATH: Nordic Participatory, Healthy, and People-Centered Cities

Year of publication: May 2023

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ISBN: 978-87-94480-01-7

Research funded by: NordForsk Programme on Sustainable Urban Development and Smart Cities (2020-2023)

Publisher: Institut for Planlægning, Aalborg Universitet. Rendsburggade 14, 9000 Aalborg

Citation for published version (APA):

Lissandrello, E. (2023). Participatory Urban Planning in Nordic Cities (s. 1-26).

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## PREMISE

This working report represents the first phase of participatory urban planning led by Aalborg University, Department of Planning in the context of the research project NordicPATH - Nordic Participatory, Healthy, and People-centered Cities, funded by the NordForsk Programme on Sustainable Urban Development and Smart Cities (2020-2023). The project consortium is constituted by Aalborg University, Denmark; Gothenburg University, the Swedish Environmental Research Institute (IVL), Sweden; and Mapita Oy, Finland, coordinated by the Norwegian Institute for Air Research (NILU), Norway.

The report consists of the action research performed by the project team in the design of the collaborative workshop series to establish participatory and collaborative interdisciplinary work across scientific disciplines and transdisciplinary with and across Nordic countries and municipalities. This report also discusses the preliminary results that have shaped the NordicPATH project's foundation. The method is explored with the municipalities of Aalborg (DK), Goteborg (SE), Kristiansand (NO), and Lappeenranta (FI)

The workshop series aims to share knowledge across disciplines involved in air quality research, citizen science, urban planning, and public participation with municipalities in Nordic cities. The NordicPATH project challenges current public participation in urban planning. The method is based on data collection strategies to address urban environmental issues such as air quality monitoring and interprets the data's relevance for urban planning strategies and actions.

The report articulates in two sections. The first section illustrates the overall strategy of the workshop series and the diverse stages. The second part describes the design and results of the first and second workshops.

The workshop series addresses air quality and climate change issues through citizens' participation and collaborative planning. Nordic countries play a role model for developing citizens-oriented methods, progressing radical change to cope with risks while enhancing democracy in practice, and inspiring other countries worldwide to achieve healthy and people-centred cities.

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# BUILDING THE NEXUS: PUBLIC PARTICIPATION, AIR QUALITY, AND URBAN PLANNING

The NordicPATH project is funded by the NordForsk Call on [Sustainable Urban Development and Smart Cities \(2020-2023\)](#). The overall objective of NordicPATH is to establish a new model for citizens' participation and collaborative planning in the Nordic countries with a point of departure on the urban air quality. Urban air quality is an important issue but still needs to be integrated into urban planning strategies and practice. The current goals of municipalities in the world and Nordic cities are to reach more sustainable ways of planning urban areas, considering the urgency to reduce CO2 emissions and to contrast climate change, and to guarantee a liveable, just, and healthy way of living for urban inhabitants. The air quality is a detector and tempers the reach of these goals.

Urban air quality is critical for municipalities to face now as it reflects some of the essential tensions related to the livability and social health conditions for citizens living, working, and inhabiting cities. Urban planning and transformation are not just related to the city's materiality but also the quality of the urban environment. In addition, the everyday life of the citizens impacts the air quality and the quality of the urban environment, for example, mobility behaviours and energy consumption practices such as wood burning.

The air is also an invisible element that spreads, crosses, and passes through different governance competencies and territorial scales. Therefore, the air quality is only partially controllable by a specific local and regional government policy. Air quality is only sometimes perceived as a problem by citizens or policymakers as it becomes the highest level of hazardous. Information about air quality is still often challenging and inaccessible for most people. Data on air quality is generally collected by official monitoring stations and modelled by experts. However, these models more often are not accessible to the public.

Moreover, people often have diverse perceptions of the risks of air pollution (e.g. wood burning, transport, industries, cruise ships). Therefore, a crucial issue is knowledge about air quality, information, and communication and the possibility of planning strategies and actions deliberated together with citizens. Participation means engaging citizens in co-producing knowledge for a fundamental issue such as air quality.

Participatory urban planning in NordicPATH means learning about (air) monitoring with citizens, policy actors, and researchers. Data gathered with air quality low-cost sensors accessible to everyone are interpreted and co-analysed to become useful for urban planning strategies and actions. That knowledge, produced in a plural and active manner, can improve urban areas' liveability and inform just and equitable choices on urban planning strategies for the urban environment. NordicPATH's overall objective is to establish a new model for citizens' participation and collaborative planning in the Nordic countries to create healthy and people-centred cities. This model is the central scope of participatory urban planning research.

This workshop series intends to create a platform among NordicPATH's researchers to develop interdisciplinary approaches across multiple disciplines involved in air quality studies, urban planning and transdisciplinary approaches with municipal actors. The main idea is to experiment with air quality as a trigger or an enabler of more integrated and participatory methods for enhancing future sustainable urban development and smart cities. In addition, the research aims to establish a learning ecosystem among researchers and municipal actors to identify a

collaborative pathway that connects the monitoring of the urban environment with citizen science and urban planning.

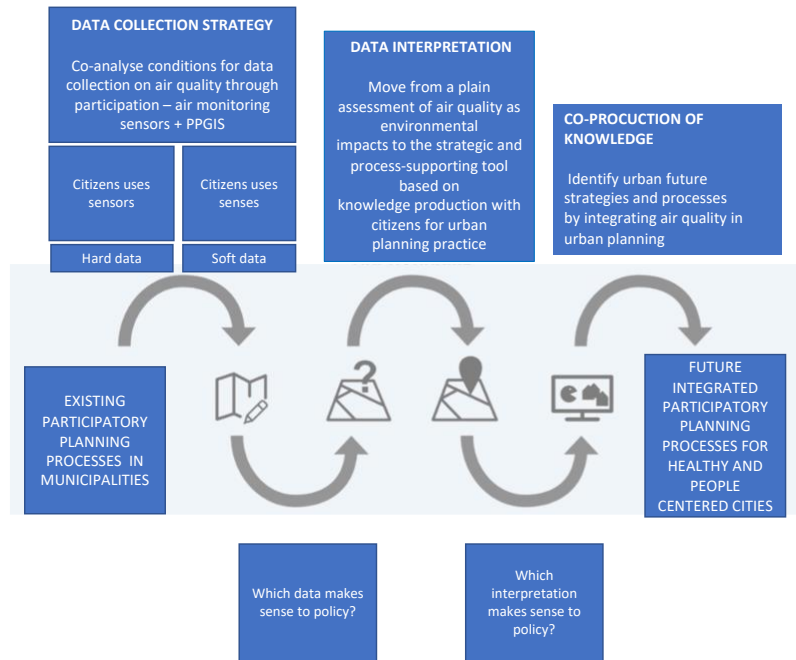


Figure 1 – The NordicPATH pathway– Nordic Participatory, Healthy, and People-Centered Cities

## THE WORKSHOP SERIES

The workshop series intends to build the nexus among the three main themes characterising the NordicPATH project: public participation, air quality monitoring, and urban planning. These themes are traditionally divided into silos of knowledge (disciplines) and policy sectors (departments). However, these themes become connected when decisions on urban transformations expose inhabitants to various risks, such as sources of pollution that affect the air quality, the liveability of the urban environment, and worsening climate change conditions. Therefore, NordicPATH intends to combine the three themes of public participation, air quality monitoring, and urban planning in a system-like and holistic manner and integrate them to identify three main questions (Figure 2) that lead the main workshop series. Each workshop focuses on a specific question:

- What are the (existing) challenges of participation in urban planning in Nordic cities? (Workshop 1)
- Which participation challenges can drive data collection strategies on urban air quality? (Workshop 2)
- How can data on urban air quality be collaboratively analysed and interpreted and potentially integrated into urban planning? (Workshop 3)

Participation methods and existing experiences with the municipalities involved in NordicPATH (Kristiansand, Goteborg, Lappeenranta, and Aalborg) are the starting point for discussion. The



main idea is that citizens and stakeholders monitor urban air quality through low-cost sensors and participatory GIS surveys. The involvement of citizens and stakeholders means that they are directly involved in co-producing knowledge about air quality through data collection (via sensors, PPGIS) in their urban contexts.

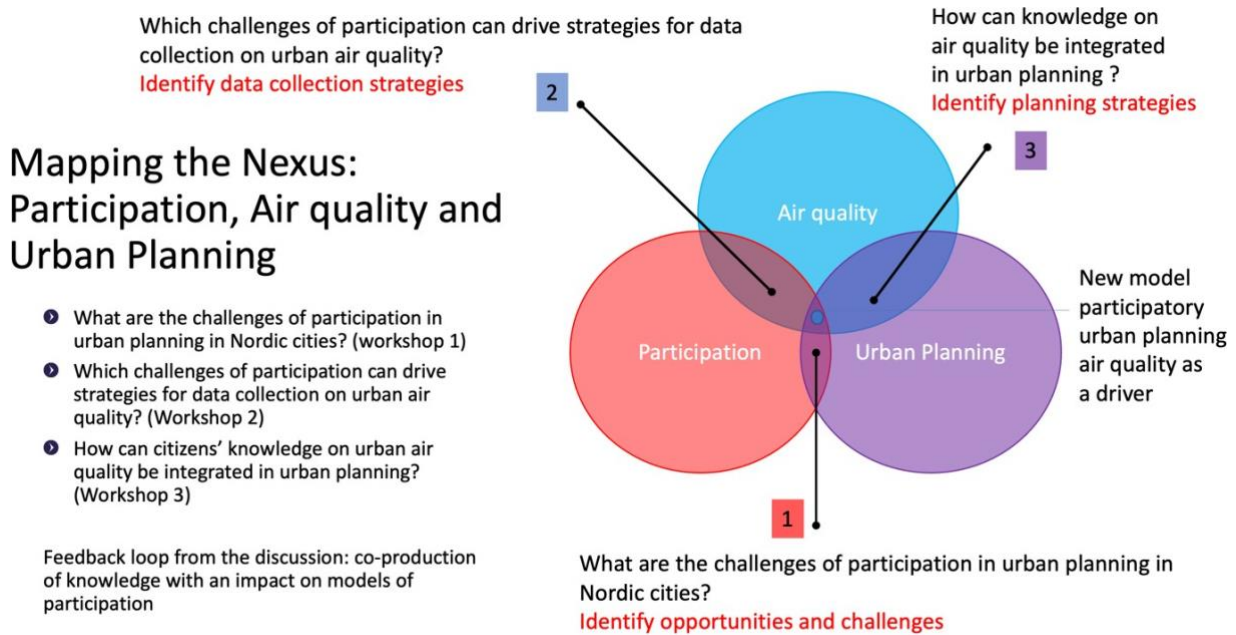


Figure 2 – NordicPATH Mapping the Nexus: Participation, Air Quality, Urban Planning for the Design of the Workshop Series

The workshop series has been designed as a roadmap to unroll specific questions. The starting point is to understand and share the existing participatory planning processes in municipalities (workshop 1), establish a data collection strategy (workshop 2), and co-analyse the meanings and relevance of those data for sustainable urban planning strategies and actions (workshop 3). The workshop series started in a full COVID-19 time, with a priority for a fully online or hybrid mode.

## WORKSHOP 1: WHAT ARE THE OPPORTUNITIES AND CHALLENGES OF PARTICIPATION IN URBAN PLANNING IN NORDIC CITIES?

Nordic cities offer the democratic condition to understand citizens' participation as a critical element for shaping sustainable urban futures. However, Nordic cities also follow diverse local cultures and have diverse local and recent urban planning experiences. The first workshop (11/03/2021) intended to understand the opportunities and the challenges of existing experiences on public participation. The aim was to find a common red line along Nordic cities

and develop a model to address the NordicPATH project. The workshop has been online only. All the participants (about 20 people) were connected to a Zoom platform.

The workshop articulated in three different parts:

- A general introduction and summary of current theories of public participation
- What is a Participatory GIS (Maptionnaire)? What are the possibilities?
- Experiences from the municipalities with public participation? We asked municipalities to give each a presentation of practical examples of good and bad experiences.

The goal of the NordicPATH project is to develop smart and sustainable cities. Nordic cities and countries have a comparatively advanced approach to public participation, reflecting a Welfare state system. Urban air quality is rare in current planning efforts. The topic holds the potential to impact participatory planning as a fundamental asset to human health and survival.

Air quality necessitates deliberation, information-sharing, and co-creation. Recent studies on urban air quality focus on the following:

- Identifying the causes of air pollution in urban contexts
- Identifying categories and groups vulnerable to air quality
- Identifying remedies and solutions (removing traffic, more green areas, awareness of woodburning behaviours)

Nordic Path is not just about creating remedies and solutions; the main goal is to co-produce knowledge and learn with citizens and stakeholders. The goal is to set up a planning method for engaging citizens and making choices to strategically integrate air quality in urban planning and policy-widening public participation.

## **PUBLIC PARTICIPATION IN NORDIC COUNTRIES: WHAT DO WE KNOW?**

The Welfare state in Nordic countries has placed citizens at the centre of the political agenda and the regulations to set up rules for the environmental quality of urban areas. The transition in the last decade, in many Nordic cities, has been to convert industrial areas of cities into liveable areas. This transition has radically changed the identity of cities from industrial hubs to more attractive centres of culture and knowledge. Planning for people has become a good motto for many Nordic cities. However, this motto also means that municipal planners aim to continue providing excellent public service for people in building attractive cities rather than fully engaging in planning with people. Even if the idea of public participation is high in the urban planning agenda in Nordic countries, it still suffers from kinds of "tokenism", as specified by Sherry Arnstein's ladder of participation. The idea that citizens can become active actors of knowledge, as citizen science claims, still need to be integrated into how Nordic planning operates. The rise of public participation, as maintained by collaborative planning schools since the 1980s, still needs to be achieved. Our complex society requires planning theory and practice no longer performing through a 'helicopter view' or a 'comprehensive knowledge' of problems but situated ways to inquiry inherently 'wicked' problems.

Engaging citizens is a way to reach situated and meaningful knowledge in planning means adequately addressing complex problems - as the citizens transform cities into everyday life practices. Public participation has been primarily institutionalised in the Nordic countries, at

least in terms of legal frameworks as required in planning processes (usually public hearings). However, the practice of public participation in planning differs among countries and municipalities, even in Nordic countries. As claimed by Innes and Booher (2004)<sup>1</sup>, the five primary purposes of public participation represent diverse angles and perspectives. Nordic cities also reflect fast digitalisation processes, with increasing public services now available online. However, digital tools still need to be fully integrated into public participation, and the potential remains largely unexplored, even if smart and sustainable cities are essential goals in the sustainable urban agenda. In terms of public participation, the main challenges are:

- How can citizens have a tangible impact on planning and public policy?
- Can citizens' inputs make any difference in planning processes and outcomes?
- Is smart participation (with data) generating more trustful relationships?
- Do we need to maintain or change the status quo of urban planning more democratically?
- Which ideas and practices of urban democracy will meet issues of public concerns such as air quality?

NordicPATH will address some of these challenges by selecting the most pressing issues linking public participation, air quality, and urban planning. It is not simply 'giving new tools' to citizens to collect data that we might establish new models of public participation. Participation is not just about citizens and policy interaction but is a complex issue about accountability, legitimacy, and issues of representation. Municipalities' size also matters, as widening participation on crucial topics via digital means can increase the accessibility of some groups or reproduce the same dynamics of face-to-face participation with 'usual suspects' (recurring participants, sometimes part of the population with more free time or pressing interests). Planners need to navigate a highly complex field and balance 'vested interests' –expressed by individuals or specific groups – against the general 'public interest'.

### **PARTICIPATORY GIS: WHAT/WHY/HOW?**

Digital systems, or PPGIS (Public Participation Geographic Information System), combine map data and surveys. The system allows people to answer questions by adding points to a map (such as, where in the city do you experience the worst air quality?) or drawing routes (for example, which routes do you use when walking around the city?). Participatory GIS was born from observing the everyday problems of public hearings, such as recurring participants, vocal minorities, low diversity, and general problems reaching the public. Additionally, collaborative meetings and workshops with citizens as workshops often overload planners with information, and planners often need help to navigate the priorities and decide whose voice and which information matters. One of the driving forces behind Participatory GIS is, therefore, the need to help public participation processes directly by offering a digital solution to the information – in the hope of reaching more people with more diverse backgrounds and that the digital ordering of data would make it easier for planners and researchers to make sense of those data.

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<sup>1</sup> Innes, J. E., & D. E. Booher (2004). "Reframing public participation: strategies for the 21st century." *Planning Theory & Practice* 5(4): 419–436. The five principles: 1) to get knowledge about the public interests, 2) to improve decisions by using the local knowledge of citizens, 3) to promote and achieve fairness and justice, 4) to secure legitimacy for decisions, 5) to meet the legal requirements in a process.

Generally, PPGIS (and, by extension, Maptionnaire) produces high-quality, versatile, and usable knowledge and can help improve efficiency in participatory processes.

Experiences using Maptionnaire have also shown that Participatory GIS can be more prone to positive feedback. An explanation could be that the format of a public hearing usually means that most people who show up are opposed to the plan, whereas people who have nothing to say tend to stay home. The digital nature of collecting data also means that it can be easily translated instead of the analogue nature of, e.g., post-it. Maptionnaire (and digital solutions in general) also stand out as being far more individual than their traditional counterparts: public hearings and co-creation processes are usually conducted with numerous people present, whereas digital participation only needs people to have access to the required technology (smartphone/computer and internet). An example is using the Maptionnaire by a transportation planner who has identified opportunities and challenges in a specific situation (Table 1).

Opportunities	Challenges
Supported the analysis and data-gathering process in making plans	The wording of the survey and the limited number of situations presented may influence respondents' answers.
Easier to validate and defend decisions with the gathered data	Digital divide, both in skills (map drawing) and in access. Risk of excluding some people
Made it easier to engage large numbers of people	Communications and marketing need to be on board to get the word out
Especially the statistical information gathered was beneficial.	Analysing large data sets can be difficult and time-consuming, and open questions are complex.
Surveys were easy to create	Cost, learning speed, actors involved, previous knowledge

Table 1 – Challenges and Opportunities in Using PPGIS

Participatory GIS (and, by extension, Maptionnaire) combined with other participatory methods (e.g., face-to-face) can accelerate participatory processes and meaningful results.

## EXISTING PARTICIPATORY EXPERIENCES FROM THE NORDIC MUNICIPALITIES

In preparation for the workshop, the NordicPATH team has required to each representative/s of the municipalities involved in the project to prepare a 7 min presentation of one (or two) personal experiences with public participation in each city that the planners consider as good practice or can define as such because:

- It has involved many people and has been perceived as successful by the municipality's citizens, stakeholders, planners, or policymakers.
- It has given planners some good experience on how to work with public participation in a new way (that was not possible before that)
- It has given a good result/outcome that has helped to progress the policy/planning process ahead for the future in the municipality.

## KRISTIANSAND

In Kristiansand, there is an increasing political focus on citizen involvement and participation, especially after the new amalgamation of municipalities in 2020. A new Kristiansand Municipality formed by merging three former municipalities, and the political landscape is now in favour of experimenting with new public participation methods (such as moving to digital platforms). Participatory good experiences have been recently organising groups, e.g., children/youth, elderly, and citizens with different cultural backgrounds. The municipality has recently produced a guideline document about public participation (Hvorfor Medvirkning) to support planning processes and engage various groups in public participation. Public participation is essential when planning – the municipality demands active reflection/plan for participation. As the first part of developing a new strategic municipal plan, Kristiansand has engaged in 25 different public participation events with broad involvement and a variety of (pre-COVID-19) methods – "Gjestebud" was a unique method tried out, which involved citizens inviting their friends and family to join the discussion and give feedback on important topics. Public participation is also crucial within the municipality's climate and environmental protection strategy. Kristiansand has tried digital solutions, such as open questions on the municipal website and digital workshops. Kristiansand's participation in the NordicPATH project is also part of this strategy.

Along with a continuous public participation effort, Kristiansand municipality has reflected on the challenges. There is a need to use several methods in public participation, as each method has a different outreach. By diversifying, combining, and mixing methods, it is possible to engage people. There is also the need to reflect on who is essential to involve when choosing a method. Kristiansand has also presented a series of reflective questions that generally guides the work of the planner when doing public participation:

- Who represents whom during public participation?
- Are only engaged the "complaining" ones?
- Can we co-create solutions in our city? Or are we using public participation only to get other inputs (where do we fall on the ladder)?
- Should we co-create in all planning processes? When do we need participatory processes, and how do we need participation?

Public participation in Kristiansand is essential to transitioning to a low-carbon society. Cities represent what can be done together with citizens.

Kristiansand still needs to find how to mobilise and engage citizens in co-creation processes for more sustainable and climate goals, a transition that is not just about the physical space but requires societal change.

## GOTHENBURG

The urban planning department in Gothenburg launched a participation initiative in 2012 called "Min stad" (My City), where citizens are encouraged to share good experiences, ideas, and visions for the city through an online map. Citizens can add points to the map and describe their thoughts, e.g., locations, streets, and places. For example, citizens can mark places they like on the map and describe why this is an excellent places. The city planners in Gothenburg use the map and find exciting inputs from the citizens to plan forward. The description of "min stad" is as follows:

*Min Stad is a digital bulletin board where you can share your dreams, needs, and interests – a place where we welcome a lively and open debate. Min stad is a unique service from the City of Gothenburg –*

*an interactive map where you can create suggestions within various categories such as culture, recreation, cycling, socialising, etc. You can even share a story about your favourite places in town. We hope Min Stad will evoke creative discussion and debate regarding our civic potential. Everything submitted to Min Stad is used as an inspiration for city planning work by the municipality of Gothenburg. Help us build a green and sustainable metropolis! Anyone can suggest and submit it to Min Stad.*

This experience sounds interesting for planners, but the challenge for Gothenburg lies in the fact that this tool is only available for the urban planning department. When a planner sits in the environmental administration, or the park department (both politically encouraged to engage in more public participation) have little to no experience with tools such as Min Stad. For the city of Gothenburg, the challenge is the internal silos divisions within departments that do not allow to synergise diverse types of knowledge about participatory tools and methods for citizens' engagement.

## **AALBORG**

Aalborg has been transitioning from an industrial city into a city for people; this transition has been possible in the last decade because public participation has been integral to achieving this transition. Budolfi Square and Karolinelund Park are two examples of long-term urban transformation projects for around ten years. The projects have involved many people, and now they are perceived as successful by citizens, planners, and policymakers. Furthermore, participatory events connected to these projects (in the city centre) have become a part of the local history and partly influenced the contemporary local identity.

Karolinelund Park is a former amusement park that closed in the 2010s, and a debate arose about what to do with the area. As a result, the municipality decided to engage citizens and initiate a public debate – involving school children, open surveys and interviews, workshops about what should happen in the park and what it could become, and created an association of users with the purpose to lead activities in the park, deciding who could be where and when. The process resulted in a political decision to open the park to the public for three years before starting any planning process.

The planning process of Budolfi Square focused on public participation from the start – which resulted in a considerable debate around the future of the square—being the city centre, Budolfi Square has involved many activities concerning the type of urban development. An initial draft of the urban development project got much resistance from citizens and citizens' associations, leading to the project being dropped (as it was deemed unfeasible). The process turned towards more information-sharing and a more active engagement strategy based on guided walks and Facebook debates. The main lesson from Aalborg in these two experiences is that high-quality solutions can be reached just through solid leadership from the city planners to work respectfully with citizens and many other partners in co-creation.

## **LAPPEENRANTA**

One of the most successful stories in Lappeenranta was creating a gamified experience to engage local children from schools. Lappeenranta's representative describes it as follows: A general two-stage design competition called Sammontalo served early childhood education, a comprehensive school for primary education, a library, youth work, a counselling centre, and sports services. At the time, Sammontalo was designed to serve more than a thousand children and young people once it was built. The Sammontalo game provided young people reflect on the future of Sammontalo from their own experiences. The aim was for all participants to participate

as equally as possible and for all young people to have a comfortable atmosphere and experience of being heard. The seminar took place in the middle of the school day (and took about 3 hours) and reached about 60 children from Sammonlahti school and other smaller schools in the area.

The children were divided into teams and given a paper doll to win ‘cosmetics’ to make it more personal and meaningful (a similar approach to video games) by attending the different workshops around the school. The children generally gave positive feedback and described it as a fun experience. The planners learned a lot about the potential of public participation and that children have unique and valuable ways of thinking and seeing the present and the future – confirming notions that more diversity in public participation can be a net positive. The main challenge for the planners was engaging children in projects (for, more generally, a significantly longer time than the 3 hours they used for each workshop).

### SUMMARY: EXISTING CHALLENGES OF PARTICIPATION IN NORDIC CITIES

Public participation in municipalities in Nordic countries can count on positive experiences and has offered opportunities for improvements in urban transformation in the last decade and for planning processes. During the workshop, planners of municipalities in Nordic cities predominantly focused on tools or outcomes and the involvement of citizens beyond the formalities of public hearings. Coming to our question on what are the opportunities and challenges of participation in urban planning in Nordic cities? In the workshop, we learned that:

- Public participation means in Nordic cities to help citizens to have an impact on their environment and work with diversified groups (especially Lappeenranta's story);
- Public participation is meaningful when citizens feel their ownership attached to urban transformation and in the contemporary urban identity formation (especially Aalborg's story);
- New tools and technologies to reach citizens and widen participation exist, but institutional silos are impeding synergies to strategise participation (e.g., between urban development and urban environment) (especially Gothenburg's story);
- New institutional arrangements on public participation at the city level give opportunities to create new synergies and combine the diversity of methods that can reach diverse citizens and stakeholders in situated ways to collect experiences and produce knowledge across silos (e.g., the Department of Citizens engagement in Kristiansand).

These lessons about public participation are strategic in NordicPATH to address the challenges through data collection strategies through monitoring air quality data - and Participatory GIS combined with existing participatory methods in Nordic cities.

Opportunities	Challenges
Helping citizens to have an impact on their environment.	Who is essential to engage?
Citizens feel ownership of the planning process	Who is the most affected by the planning process?
Use tools to widen participation (e.g., digital)	Which tools can planners use to get valuable and fast data to process?
Create synergies across silos	Which knowledge for which action?

Table 2 – Challenges and Opportunities in Public Participation in Nordic Cities

## **WORKSHOP 2 – WHICH CHALLENGES OF PARTICIPATION CAN DRIVE STRATEGIES FOR DATA COLLECTION ON URBAN AIR QUALITY?**

While the first workshop has been a discussion among the NordicPATH researchers and municipalities, the design of the second workshop (21/10/2021) has been focused on the interaction among municipal planners to provide inputs to researchers to shape specific strategies for data collection.

In Workshop 1, the NordicPATH team aimed to identify the challenges of public participation in each of the municipalities. Instead, Workshop 2 was about how air quality could engage citizens and other stakeholders to set data collection strategies. Air quality is a sensitive topic for planning future (more) liveable and healthy cities, but there are no direct methods to link air quality to urban planning. To create the link is the specific angle of the NordicPATH project. Collecting air quality data also strategically enforces the participatory process through citizen science or means to engage citizens. Citizens can become data collectors and active agents of knowledge co-production for sustainable urban transformations.

The second workshop's final scope was formulating a data collection strategy starting with municipalities' needs, situations, and future aims and perspectives. The NordicPATH's municipalities have discussed peer-to-peer - without the direct mediation of researchers - three different topics and specific questions. The design of the second workshop was a hybrid, two municipality representatives were in the place (Aalborg and Gothenburg), and two were connected online (Lappeenranta and Kristiansand). The three specific topics/questions have been the following:

TOPIC 1: Identifying the challenges of public participation – what are the most pressing?

TOPIC 2: Exploring air quality as a trigger or an enabler (an engaging method/tool/topic) of participatory processes - opportunities and challenges on this idea/hypothesis?

TOPIC 3: Describing urban transformations (plans, projects, strategies) where adopting the air quality as a trigger or an enabler (engaging method/tool/topic) could be tried - are there any, and how could we try - and include (more) people?

Municipalities met in pairs in digital breaking rooms (9 min x3) facilitated by a digital board with central questions so they could make notes (some of those are reported below). The results have been discussed in the plenary. In the following part, the discussions between and among municipalities are briefly reported to conclude at the end with a summary of partial results.

### **TOPIC 1: IDENTIFYING THE CHALLENGES OF PUBLIC PARTICIPATION - WHAT ARE THE MOST PRESSING CHALLENGES?**

Topic 1 discussion was a peer-to-peer exchange between two municipalities in pairs connected digitally in break rooms. The NordicPATH team invited the municipalities to interact more punctually on some challenges of public participation and exchange experiences between them.



Group 1 and Group 2 have worked in parallel on the same topic. Group 1 has been Lappeenranta and Gothenburg, and Group 2 is Kristiansand and Aalborg.

**GROUP WORK 1: LAPPEENRANTA AND GOTHENBURG**

One of the challenges discussed was how to present plans to the citizens in an understandable and participatory way. Formal public hearings often need help to reach everyone and get the best from citizens' participation. The question remains if citizens can see their impact on how urban areas are planned. One of the main problems is the engagement methods and motivating citizens to comment. In NordicPATH, the method of working with low-cost sensors is interesting. In Lappeenranta, involving cyclists in getting PM sensors on their bikes was relatively easy. Cyclists are often interested in their environment and how polluted are their cycling routes. It may be more difficult with the questionnaire and the surveys. Using sensors, especially with cyclists, can work well as citizens can collect data and become aware of their impact on that data. For example, citizens collecting air quality data while cycling can also reflect on how improving cycling can improve people's lifestyles and significantly impact the urban environment.



Figure 3 – Exchange between Lappeenranta and Gothenburg on the challenges of public participation

**GROUP WORK 2: KRISTIANSAND AND AALBORG**

Working peer-to-peer, the municipalities of Kristiansand and Aalborg have discussed that participation is often the input received during public hearings. However, those inputs only sometimes match the stage and the content of urban planning processes. It is also important and needed in participatory planning to find methods to not just get inputs or more data from the citizens but render these inputs and data visible to the citizens themselves – to show how the municipality can and makes use of those inputs. In the experiences of Kristiansand and

Aalborg emerge, the municipalities need to clarify expectations when involving citizens. This issue means clarifying why and how municipalities need inputs from citizens and how municipalities intend to use those inputs in planning processes.



Figure 4 – Exchange between Kristiansand and Aalborg on the challenges of public participation

**TOPIC 2: EXPLORING AIR QUALITY AS A TRIGGER OR ENABLER (AN ENGAGING METHOD/TOOL/TOPIC) OF PARTICIPATORY PROCESSES - OPPORTUNITIES AND CHALLENGES ON THIS IDEA/HYPOTHESIS?**

Topic 2 discussion was a peer-to-peer exchange between two municipalities in pairs connected digitally in break rooms. Topic 2 was centred on urban air quality and how the municipalities can see this topic as triggering participatory processes. The NordicPATH team invited the municipalities to discuss some opportunities and challenges of considering this issue. Group 1 and Group 2 have worked in parallel on the same topic. Group 1 has been Lappeenranta and Aalborg, and Group 2 is Kristiansand and Gothenburg.

**GROUP WORK 1: LAPPEENRANTA AND KRISTIANSAND**

Lappeenranta and Kristiansand have discussed that both municipalities have monitored air quality with official air monitoring stations for a long time. Especially in Kristiansand, air quality data have been used and visualised in air pollution maps for planning processes. The low-cost sensors installed during the NordicPATH project now provide an improved overview of air

pollution in the city in particular parts. Citizens are generally interested in air quality monitoring, and the specific aspect that interests them linked to it is health. Groups of citizens concerned or suspecting pollution in the areas they reside or around schools are generally most interested in monitoring, detecting, and understanding air pollution challenges. The benefit of involving citizens in air monitoring is the open values of the data. An example is the data collected via sensor monitoring with cyclists.



Figure 5 – Exchange between Lappeenranta and Kristiansand on the air quality as a trigger of public participation

**GROUP 2: GOTHENBURG AND AALBORG**

Similar issues emerged in Group 2: Gothenburg and Aalborg. In Gothenburg (Figure 6), the focus area of NordicPATH has been a central park of the city, where both low-cost and IVL passive sensors are installed. IVL has led the monitoring and the data collection, and the scope is to render these data open and to make recommendations to Gothenburg municipality about planning in the park (e.g., location of the playground, mobility surrounding the park, more green trees). There have been specific initiatives in the park where researchers and public planners have joint efforts to learn about air quality monitoring and the air quality in the park. In Aalborg, AAU has started several initiatives, engaging university students and cycling organisations in air monitoring with low-cost sensors mounted on the bikes. It has also organised meetings with the local neighbourhood councils to discuss air quality in the diverse areas of Aalborg and recruited citizens in the diverse areas to 'own' a low-cost sensor in their homes. In urban planning, in Aalborg, air quality has been generally studied by diverse initiatives; there is awareness of the importance of air quality for the health of citizens. There are municipality initiatives already on the agenda to improve air quality in the city, for example, turning all the buses to electrical or setting environmental zones in the city. However, air quality is not a specific chapter in urban planning.

**TOPIC 3: DESCRIBING URBAN TRANSFORMATIONS (PLANS, PROJECTS, STRATEGIES) WHERE ADOPTING THE AIR QUALITY AS A TRIGGER OR AN ENABLER (ENGAGING METHOD/TOOL/TOPIC) COULD BE TRIED - ARE THERE ANY, AND HOW COULD WE TRY - AND INCLUDE (MORE) PEOPLE?**

Topic 3 discussion was a peer-to-peer exchange between two municipalities in pairs connected digitally in break rooms. The NordicPATH team invited the municipalities to interact on urban transformations (plans, projects, strategies) and the possible links with urban air quality. In other words, how the air quality can be seen as a trigger for those urban transformations. Also, for this topic, Group 1 and Group 2 have worked in parallel on the same topic. Group 1 has been Lappeenranta and Aalborg, and Group 2 has been Kristiansand and Gothenburg.

**GROUP 1: LAPPEENRANTA AND AALBORG**

One of the crucial topics related to air quality in urban planning is transport and mobility. In both Lappeenranta and Aalborg, there are several attempts to reduce urban traffic in city centres. As a result, citizens will also be more motivated to cycle, walk, and use public transport rather than the car, improving urban air quality and the liveability of city centres. In Aalborg, planning has now placed new attention on the environmental or air quality zones in which traffic will reduce.



Figure 6 – Exchange between Lappeenranta and Aalborg on the air quality as a trigger of progressive urban planning

In Lappeenranta, there is great attention to the planning of green areas that can be influential too in improving urban air quality – especially when turning parking places into green areas. There is also more to do in non-traditional planning to improve information for citizens. For example, producing some piece of 'environmental art' through lightning could be possible. Imagine an infrastructure such as a bridge or a building in the city centre (e.g., city hall) that illuminates with diverse light colours detecting the air quality (e.g., green when it is good, red when it is terrible). We need to be more creative in communicating results and evidence to mobilise air quality planning.

## GROUP WORK 2: KRISTIANSAND AND GOTHENBURG

Kristiansand and Gothenburg have discussed urban plans, projects, and strategies that could directly link with urban air quality, especially with urban traffic around the park in Gothenburg and woodburning in some areas in Kristiansand. In both cases, the discussion mainly was on the need for a method that combines and integrates diverse data sources about urban air quality to create more evidence-based data providing new insights into urban air quality. This evidence-based could create an excellent base to initiate dialogues for planning across diverse departments in the municipalities.

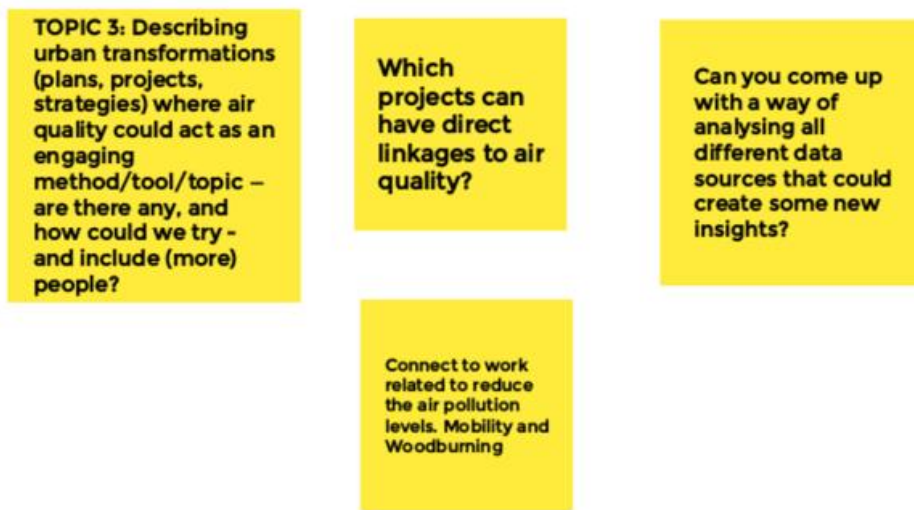


Figure 7 – Exchange between Kristiansand and Gothenburg on the air quality as a trigger of progressive urban planning

## PLENARY DISCUSSION

The final discussion (Figure 8) reproduces the final discussion with the three pillars that emerged from the previous peer-to-peer interactions on the specific topics. After the peer-to-peer discussions among municipalities, the NordicPATH team has proposed to wrap all the topics in three main pillars: how to improve data on air quality, how we can use those data, and how we can visualise those data.

### HOW TO IMPROVE DATA ON URBAN AIR QUALITY?

In Nordic cities, there is already a good knowledge of urban air quality through official monitoring stations that give generally good information about the situation. However, those data are often limited to exchange among experts or planners in specific sectors. Besides 'hard data' (quantitative) on air quality, there is a need to focus on the 'soft data' (qualitative) aspects of air quality. Communication, the talks with the citizens involving the policy actors, and discussing the situation in specific neighbourhoods and municipal levels still need to be included. Considerations about urban air quality should allow those talks. In Kristiansand, working with low-cost sensors has given more information about the effect of wood burning on urban air quality. Lappeenranta and Gotheburg underlined that official monitoring stations do not provide

precise information related to specific issues (the sources of pollution) or the urban areas most exposed in cities. Therefore, low-cost sensors and the citizens' engagement through air quality low-cost sensors can also be a way to collect data with limited resources. There is a need to create a more evidence-based combination of data and, as Aalborg underlines, to create new ways of communication to mobilise planning.

### **HOW CAN WE USE DATA?**

The discussion developed from questioning the citizens' expectations when collecting data about urban air quality. Several of the municipalities need to gain experience with citizen science, and it is rather challenging to figure out the possibilities and constraints of this method. Some other municipalities see the potential of citizen science to uncover aspects that otherwise would not be so evident to the public - for example, the effects of wood burning on air quality and transport problems. By understanding the effects of using the car instead of other means of transportation. In other words, the method of engaging citizens in measuring/monitoring issues as the air quality can be efficiently adopted when at stake there is a behavioural change at the societal level to be enhanced (e.g., stopping wood burning or stopping using cars). In this sense, using the sensors to engage citizens will create new possibilities for strategising public participation in a double way from citizens to policy and from policy to citizens. Research mediates this process through this method.

The issue remains the validity/reliability of those data. Data collected by citizens could be used for dialogue among experts (interdisciplinary research) first and then for dialogue among citizens and policymakers too (transdisciplinary research). In this sense, data can be used then in planning. For example, adopting changes in cycling paths or walking areas or making changes in the correspondence of schools to increase air quality and the livability of some areas, but also to balance air quality standards strategically in cities, for example, adopting low-or-zero emission zones in some urban areas, and protect vulnerable population living in polluted areas (often in the outskirts of cities).

### **HOW CAN WE VISUALISE DATA?**

Not just data collection is important, but also their visualisation. It is essential to pay attention to how to communicate data and to whom. Data must be informative for citizens and policymakers, and planners. Data must also be comparable to some situations that can be understood the most. Data from citizens 'owning a sensor' must be carefully analysed, confronted and validated, especially when showing peaks, but surveys are essential too. For example, the Participatory GIS and the questionnaires have inspired planning, but the answers must also be carefully analysed. It can be interesting to get opinions on how citizens perceive air quality in diverse areas, but deciding what to do with those data can be difficult. It is not immediate and directs the relevance of data and the perception of the air quality to the design of solutions to meet those perceptions. Maybe this can also be part of the research – the translation from data to possible solutions.

## STRATEGIES FOR DATA COLLECTION IN NORDIC CITIES

The municipalities involved in the NordicPATH have discussed potential data strategies –through citizen science, engaging citizens by collecting data via low-cost air quality monitoring sensors (hard data), and through participatory tools such as PPGIS questionnaires and surveys, workshops, and roundtables (soft data) in view to integrating into urban planning processes. Overall elements of discussion have been the citizens' engagement through sensors, the overall results from PPGIS surveys, the validation of low-cost sensors data, the information to extract from the data, and the communication of those data to planners, policymakers, and citizens in order of providing concrete planning strategies or solutions to municipalities and their inhabitants.

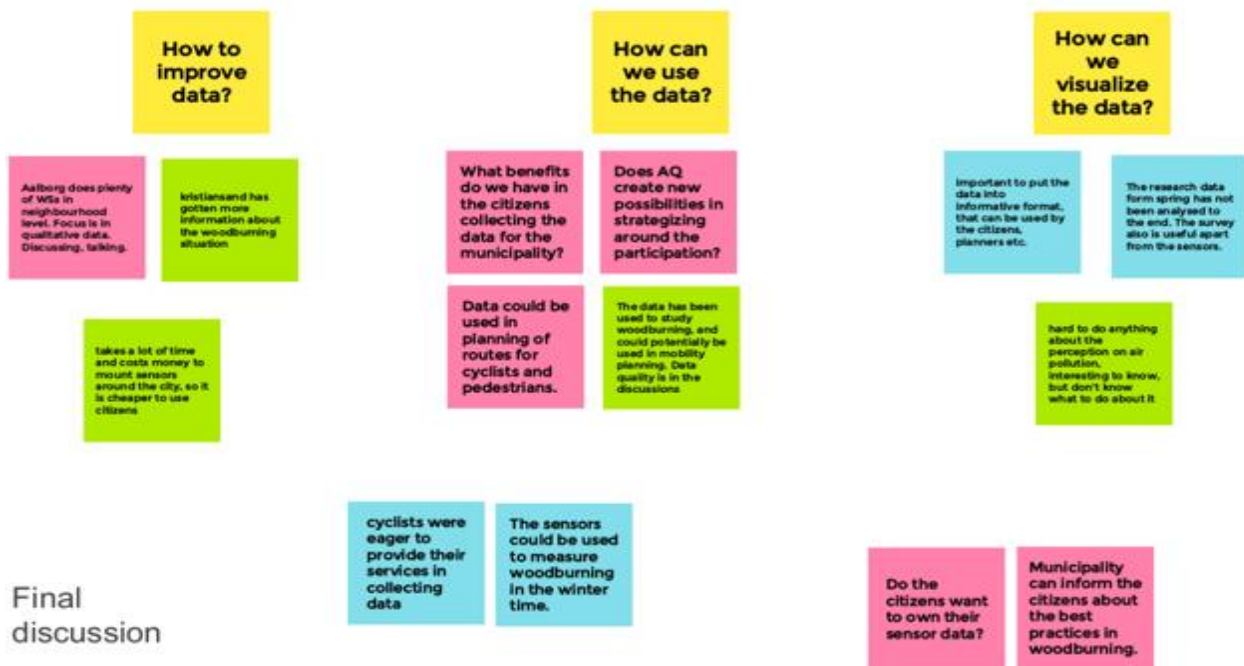


Figure 8 – The Three Pillars: Data on Air Quality, Use of Data, and Data Visualisation

### AALBORG

The municipality is classically more concerned with citizens' participation in the qualitative aspects of planning. The potential engagement of citizens with sensors can be considered for planning cycling or green mobility routes. Citizens generally provide the municipality with different levels of information when engaged in more classical public hearings or workshops. Often it is challenging to use citizens' inputs 1 to 1 directly in planning processes. The expectations that citizens have towards the municipality are a focus point. Sometimes citizens have high expectations about how they can influence planning processes. If there are no apparent thoughts about using the data when engaging citizens, the municipality cannot use those data. The municipality should be able to follow up on what it promises the citizens. In Aalborg, there has been a great effort in mobility plans that include public transport, cycling lanes, and pedestrian areas. There is a connection between the urban air quality and the traffic/mobility problems. Possible data collection on air quality can be interesting in monitoring the change in urban situations, such as reshaping public spaces in the city, replacing buses with electric vehicles, and the new upcoming +BUS. Data collection on air quality can also be

interesting to understand the seasonal impact, e.g., winter/summer, to adopt some measures for urban planning. It would also be interesting to integrate several existing data on air quality into a knowledge network of data. Integrating data is helpful when planning for cycling/walking routes.

### **KRISTIANSAND**

The municipality's concerns are that air quality data must be more qualitative. For example, the information about woodburning has been more accurate by involving the citizens through the NordicPATH project. Nevertheless, there is a need to be clear about using the sensors and the data represented. The municipality of Kristiansand is working on how air quality can be utilised with geo-referential data mapping to combine existing data based on modelling with air-quality data collected by the citizens through low-cost sensors. Kristiansand municipality would like to activate citizens and interest them in air quality. Working with a specific problem, such as wood burning in Kristiansand, is a good strategy for collecting data and engaging citizens through air monitoring sensors. Norway has a specific guide/regulation on how to work with air pollution. The sensors are ways to create evidence of air quality problems, but the public authorities should develop an action plan to address the problem and find solutions.

### **LAPPEENRANTA**

Lappeenranta municipality would be interested in low-cost mobile sensors to mount on bikes to collect data involving citizens. Even if the air quality data is not perfect with this type of sensor, it is likely successful in terms of engagement and enhancing dialogue on air quality in the city. In the first approaches attempted so far in Lappeenranta, cyclists are pleased to use the sensors on their bikes and to monitor the air quality on the cycling routes in the city. The municipality is interested in uncovering other potentials of the NordicPATH project beyond the data collection strategy on air quality alone. For example, the activation of citizens on air quality can be motivated as an essential indicator of urban liveability and sustainability. Understanding data is an important issue, more than collecting data. The main concerns are the meaning of the data and what actions can be taken with that information. Information about data is crucial and the focal point for the municipality, together with the engagement and activation of the citizens. A topic that connects well to air quality is cycling mobility and the improvements in air quality along the traffic arteria.

### **GOTHENBURG**

A focus point for Gothenburg is the green park area surrounded by traffic roads. Diverse types of sensors have been installed in the park, and the question is how monitoring sensors can be used to communicate to planners about air quality and how planners can use the data collected through the sensors. In Gothenburg, several types of air quality monitoring stations exist. The validation of those data and the communication of those data to planners is a focus point. The citizens are interested in the park because of several activities, including a playground and children's activities, so the data on air quality can orient further planning in the park, for example, where some activities will be placed and the vulnerable groups (such as children). Air quality data monitoring and modelling still need to be addressed and communicated to planners and policymakers. The communication and usability of that information are crucial points to develop.

## **SUMMARY: DATA COLLECTION STRATEGIES IN NORDIC CITIES**

The main question of the workshop was which participation challenges can drive data collection strategies on urban air quality. First, the workshop had three cycles of peer-to-peer discussions



between and among municipalities to focus on three topics: the challenges of public participation in urban planning in Nordic cities, the air quality as a potential trigger of public participation, and the link between air quality and urban planning. There is a need to move beyond the formal rules of public participation with limited possibilities to engage citizens comprehensively and deal with public expectations. Second, there is a need to expand the qualitative dimension of public participation and enhance methods that allow selection on specific issues and specific affected groups that there is a need to reach. Third, there is a need to match expectations between citizens and planners, and both sides can benefit from actual public participation. In Nordic cities, public participation experiences are positive and often innovative but must be placed 'in common' across municipal departments and often remain sectoral. This aspect is essential for planning just and sustainable cities and communities.

During the workshop, municipal planners in Nordic cities underlined the potential for air quality monitoring to engage citizens in knowledge co-production. The issue is about more than just the quantitative dimension of data but also the quality of those data. Existing monitoring stations on air quality are only sometimes attentive to the urban character of places and their inhabitants. Low-cost sensors can uncover more specific aspects of urban areas while engaging citizens. However, data need to show evidence to become meaningful. Therefore, the interpretation of data is essential at the same level as the collection of data. In addition, evidence can mobilise public attention through visualisation to make action strategies. The link between air quality and urban planning is not immediate but extremely important, especially concerning zero or low-emission zones in cities, short-term and long-term ambition to contrast and control the side effects of climate change. The air quality is a valuable indicator in this direction.

Data collection strategies in NordicPATH address air quality in two ways: through hard data (quantitative) combining official monitoring stations and low-cost sensors and soft data (qualitative) through Participatory GIS combined with existing participatory methods in Nordic cities. Hard and soft data need to be interpreted and co-assessed in relevance to become useful in urban planning strategies and actions.

Hard data	Soft data	Air quality data for urban planning: potential links to areas
Official monitoring stations + low-cost sensors with citizens (especially on bikes)	Workshops and round tables	Mobility
Official monitoring stations + low-cost sensors with citizens	Participatory GIS (PPGIS)	Wood burning
Official monitoring stations + low-cost sensors with citizens (especially on bikes)	Workshops and round tables, PPGIS, new ways to communicate and visualise data	Mobility and citizens participation
Official monitoring stations + low-cost sensors with planners	Workshops and round tables	Green areas and parks

Table 3 – Data Collection Strategies: Links Between Air Quality and Urban Planning in Nordic Cities

- Data collection strategies about air quality in Nordic cities via low-cost sensors can help municipalities gather more punctual quantitative data compared to official monitoring stations – specific data can serve to understand the source of air pollution and the critical areas in the city and consequently detect the affected inhabitants.
- Data collection strategies about air quality in Nordic cities can expand the ladder of citizens' participation via low-cost sensors for citizens and stakeholders, shifting from data modelling (segregated to experts and serving a few) to data monitoring (widened to many and serving everyone). Air quality is traditionally handled by experts analysing data and producing knowledge via modelling, often providing knowledge not easy to understand for everyone and providing knowledge to a few. Low-cost sensors can expand the knowledge range to many and allow decisions based on citizens' monitoring rather than expert modelling only.
- Monitoring air quality with citizens and stakeholders can reflexively engage them on their impact on the urban environment and uncover differences in groups and knowledge co-production.
- The knowledge produced by citizens and stakeholders mobilises attention on air quality to plan actions for urban transformations and in the contemporary urban identity formation (for example, related to measures to limit CO<sub>2</sub> emissions such as the establishment of zero or low-emission zones)
- Tools and technologies to reach citizens and widen participation should be placed 'in common' cross-institutional silos (e.g., between urban development and urban environment) to build from experience and strategise public participation for sustainable cities and communities.

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