OPENAIR

Operational Network of
Air quality Impact Resources

Best Practice Guide

BP502 | Act on evidence

Engaging your organisation with air quality data

Introduction

This OPENAIR Best Practice Guide chapter is designed to support local governments in planning an internal engagement strategy around your air quality project and follow-on initiatives. This ensures that collected data supports evidence-based decision-making and innovation outcomes within your organisation. Internal planning and engagement frameworks are essential to the delivery of strong project outcomes. By engaging your organisation with air quality data, you will also help to build wider institutional capabilities.

Who is this resource for?

This resource aims to assist people involved in the design or delivery of air quality monitoring projects to engage colleagues within the same organisation on the topic of air quality data. It will explain how this data can be used to improve service delivery, and build capacity throughout the organisation.

This Best Practice Guide chapter may be helpful to:

- people leading new air quality monitoring projects
- local government executives
- strategic planners
- urban designers
- community engagement teams.

How to use this resource

This resource will help you to engage actively with colleagues in your organisation on the topic of air quality data. This kind of internal stakeholder engagement is essential to ensuring your pilot air quality program achieves impact in areas such as health and well-being.

Air quality sensor networks provide opportunities for local governments to generate improved air quality outcomes at the local level, while also building new institutional knowledge about the use of Internet of Things (IoT) sensors, and developing innovations based on insights from data.

1. Reasons to invest in an air quality monitoring project

Understanding local air quality

Low-cost air quality sensors provide local governments with new sources of data to improve their understanding of local air quality. Air quality monitoring projects generate knowledge about where, when, and why air pollution is occurring, and help to assess potential impacts on different community groups. This data can, in turn, be used to inform local government activities in areas such as health advocacy and community engagement. For more detail on planning relevant activities for impact, see the OPENAIR Best Practice Guide chapter *Activities for impact*.

Supporting evidence-based decision-making

Evidence-based decision-making (EBDM) in policy and management contexts is intended to ensure data is used effectively to support organisations at different stages of planning and decision-making. In the field of health policy, EBDM reflects a global move towards the implementation of science-led healthcare practices, commonly referred to as 'evidence-based practice'. In an air quality project, sources of evidence for decision-making include air quality data and evaluation data established as part of a pilot program, stakeholder engagement outcomes, citizen or community inputs, and other forms of feedback.

Evidence-based (or 'evidence-informed') decision-making is "a systematic and transparent approach that applies structured and replicable methods to identify, appraise, and make use of evidence across decision-making processes, including for implementation" (World Health Organisation (WHO), 2021, p. ix). Data and evidence need to be integrated at each stage of policy and program development, from design through to implementation. This requires a structured approach to using data and evidence to achieve behaviour change and impact.

To be effective, evidence-based decision-making requires a clear program logic so that different kinds of evidence can be used at different stages of a project. The OPENAIR Impact Planning Cycle supports local governments in delivering air quality sensing programs focused on key areas of impact (see the Best Practice Guide chapter *The Impact Planning Cycle overview*). A similar approach is recommended by the WHO Evidence Ecosystem for Impact framework (see Figure 2).

Deepening organisational experience in collecting, understanding, and using data

Building institutional capacity to use data effectively requires an organisation to learn from (and adapt to) data-driven decision-making tools and platforms associated with new technologies and digital partnerships. Limited institutional experience in using data to guide decision-making reduces the overall innovation capacity of local governments, including their capacity to deal with the complexities of data privacy, security, and transparency.

With the right internal stakeholder support, a local government air quality sensing project can thus contribute to expanding institutional capacity in the effective use of smart technology, and model how decision-making can be informed by reliable data.

2. Planning for engagement: steps in using data strategically at each stage of an air quality monitoring pilot program

Carry out strategic planning and alignment

Air quality data supports organisational strategic priorities in the domains of health, innovation, and community engagement. Use the OPENAIR Best Practice Guide chapter *Activities for impact* for your strategic planning, and to identify different types of data generated at each stage of your pilot program.

Engage internal stakeholders

Air quality data can be used to activate internal collaborations across your organisation. When planning a pilot program, identify the relevant internal stakeholders to ensure the project's goals can be defined and achieved.

Examples of internal stakeholder engagement actions include:

- encourage a motion from **local government representatives** demonstrating commitment to addressing a community air quality issue
- seek endorsement for the delivery and ownership of air quality sensor infrastructure and assets from **executives or leaders** in your organisation
- engage with relevant **community engagement program teams**, including those tasked with planning and development, as well as community services
- ensure **IT staff** can provide necessary support and have the required operational capabilities.

Ongoing internal consultation is fundamental to the success of any air quality sensing project, as is considering the capacity for internal stakeholders to champion key aspects of the project.

Clearly define project outcomes

It is important to clearly define desired outcomes for local government air quality initiatives. Outcomes should be measurable, so that they can be objectively assessed against local government strategic goals. The process of how to identify an output, outcome, and activity (and the data available at each stage) is discussed in the Best Practice Guide chapter *Activities for impact*.

Decide how data will be used to evaluate the success of your project

Although pilot projects may be too limited in scope to achieve organisational strategic objectives, it is still important to identify measurable success factors. Pilots are a low-risk way to assess the feasibility of your approach before committing more resources. Consider what data you need to answer questions relating to technical and organisational feasibility, and to evaluate the overall success of your pilot.

TIP: Consider **SMART** goals when mapping pilot outcomes. SMART goals are **Specific**, **Measurable**, **Achievable**, **Relevant**, and **Time-bound**.

Planning for internal stakeholder engagement
Internal engagement of stakeholders within your organisation needs to be informed by strategic priorities, and the measures used to report on those priorities over time. Strategic priorities may be specific to air quality outcomes (especially in areas such as health and planning), or may be linked to innovation capacity building, or developing data-driven capabilities within your organisation.

Use a program logic model to understand the role of data at each stage of the pilot process

One method for achieving effective use of data across different stages of a decision-making process is by using a 'program logic model.' Program logic models offer schematic representations that describe how a program is intended to work by linking activities with outputs, intermediate impacts, and longer-term outcomes. They are useful tools when planning internal stakeholder engagement because they are designed to link planned program outputs to a set of higher-order strategic outcomes – and to the relevant stakeholders (both internal and external to an organisation).

Ideally, program logic should be developed in the program planning stage. This supports engagement with stakeholders to articulate the desired program impacts, audiences, and outcomes, and to clarify how the intervention will achieve these. There are numerous program logic templates available to support organisations in planning for (and evaluating) programs (see the Additional resources section at the end of this chapter for examples).

One relevant example is the Air Quality Program Logic Map produced by the NSW Government. This demonstrates how higher-order organisational goals can be served by air quality monitoring, through a clear program of action that targets relevant stakeholders. A mix of short- and long-term reporting goals are informed by staged activities that span data collection and verification, impact evaluation, and policy advocacy. For the full program logic map, see the Additional resources.

Different kinds of data should be considered for the various focus areas of the program logic model. Table 1 outlines some examples relevant to an air quality monitoring project.

Table 1. Data relevant to focus areas of the program logic model

Program logic focus	Key questions	Relevant data
Strategic outcomes	How does air quality monitoring support the strategic priorities of local government? • Short term • Medium term • Long term	• Evaluation metrics, indicators, and reporting frameworks relevant to how local government reports strategic priorities (e.g. health outcomes)
Inputs	What are the resources needed for the program/pilot?	• Number of staff and contractors • Budget allocation • Materials and technologies
Outputs: activities	What are the activities of the pilot?	• Sensors installed • Digital assets produced • Campaigns produced
Outputs: data and technology	What are the sensor and data outputs?	• New air quality data • Data outputs: dashboards and data communication tools • New sensor knowledge (installation, calibration, operational procedures)
Outputs: audience/stakeholders	Who is the project audience and/or stakeholders?	• Number of participants • Demographics • Internal/external stakeholders

Table 2 provides examples of relevant local government activities, and how air quality data can be communicated to inform decision-making and actions by stakeholders.

Table 2. Examples of local government activities and communicating air quality data

Local government area	Data application	Focus measure or indicator	Example performance or success metric
Development and planning	Developers are required to demonstrate compliance with applicable legislation or guidelines around air quality. New real-time data can assist in fast and effective remediation if the parameters exceed safe levels.	Report using air quality ratings categories at development sites	• Reduced costs associated with remediation through real-time monitoring (rather than manual reviews) • Accuracy of new sensors tested against alternative/existing solutions • Number of new risks or incidents reported in response to novel data sources
Development and planning	Location of new facilities designed for vulnerable communities. New real-time data can inform decisions around where to locate new facilities for vulnerable communities (e.g. children, or elderly community members).	Report using air quality ratings categories at locations of planned facilities	• Consideration of air quality as factor in the location of new facilities for vulnerable people • Number of new risks reported in response to novel data sources
Community engagement	Residents can be informed about air quality issues in more localised areas of their communities.	Report using air quality ratings categories through community outreach channels	• Usage metrics for public platforms featuring novel air quality data • Number of new risks reported in response to novel data sources

3. Developing organisational capability in the use of data

Organisational capability in the use of data and technology can be understood through the lens of a 'maturity model' assessment. Smart city maturity models are designed to assess the level of 'maturity' (or readiness) for the implementation of smart city solutions (such as environmental sensing and monitoring). There are several smart city maturity assessment frameworks available.

Most smart city maturity models (SCMMs) identify the role of smart technology in supporting key city indicators across domains such as the economy, people, governance, mobility, and environment.

A summary of multiple maturity models (Aragão et al., 2023) categorises the different stages of maturity as follows:

Level 1—No smartness infrastructure working

Level 2—Smartness working but not meeting future needs

Level 3—Smartness meets current needs

Level 4—Smartness partially initiated for future needs

Level 5—Smartness continuously improving to meet future needs.

The Urban Tide smart cities maturity assessment model and self-assessment tool developed in 2015 support assessments of organisational capabilities in smart city implementation across a number of key categories.

Table 3 shows the domain categories for maturity assessment: **strategic intent**; **data**; **technology**; **governance**; **service delivery models**; and **citizen and business engagement**. Organisations operate at different levels within each of these domains, with Level 1 as the lowest and Level 5 as the highest level of integration. The tool provides a set of key characteristics associated with each domain level, allowing organisations to understand which steps or actions will lead to progress.

Table 3. Key domains from the Urban Tide smart city maturity model and self-assessment tool

Domain	Key characteristics
Strategic intent	• Successful smart cities have a strategy and roadmap setting out how investment in data and digital technologies enables service reform and partner collaboration • An effective strategy focuses on delivering improved outcomes aligned to the city's strategic priorities
Data and ICT	• Successful smart cities make effective use of their data assets to secure better outcomes • They invest in system-wide data capture, integration, and analytics capabilities • Open data underpins their commitment to transparency and innovation • Data sharing, data infrastructure, and governance are all fundamental considerations
Technology	• Organisations are continuously reviewing, adapting, and investing in ICT architecture to drive service transformation • A networked built environment across the city
Service delivery	• Successful smart cities adapt traditional organisational models of delivery to realise the opportunities of data and digital technologies • They invest in system-wide partnership models focused on shared outcomes
City-wide engagement	• Successful smart cities make best use of data and digital technologies to invest in enhanced openness and transparency • Citizen and business engagement, and stakeholder ownership of service reform, are central

Data use and reuse

The implementation of effective data governance, as well as data policies that inform how data can be used across different organisational units, is crucial to the ability of organisations to mature.

For organisations with low smart city maturity, data reuse and integration are often limited by the range of disparate systems in use for different operations. In these organisations, data is used primarily for the delivery of a particular service.

As smart city capability increases, data infrastructure and data sharing policies become more important. These are needed to enable the organisation to extend its data capture and analytics across different delivery areas, supporting improved decision-making and service design.

More advanced organisations must continuously review, adapt, and invest in their data infrastructure (and in the associated organisational structures and decision-making processes).

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Additional resources

NSW Department of Planning and Environment* | *Air quality program logic map

Figure 1 is an example 'air quality program logic map' used by the NSW Department of Planning and Environment.

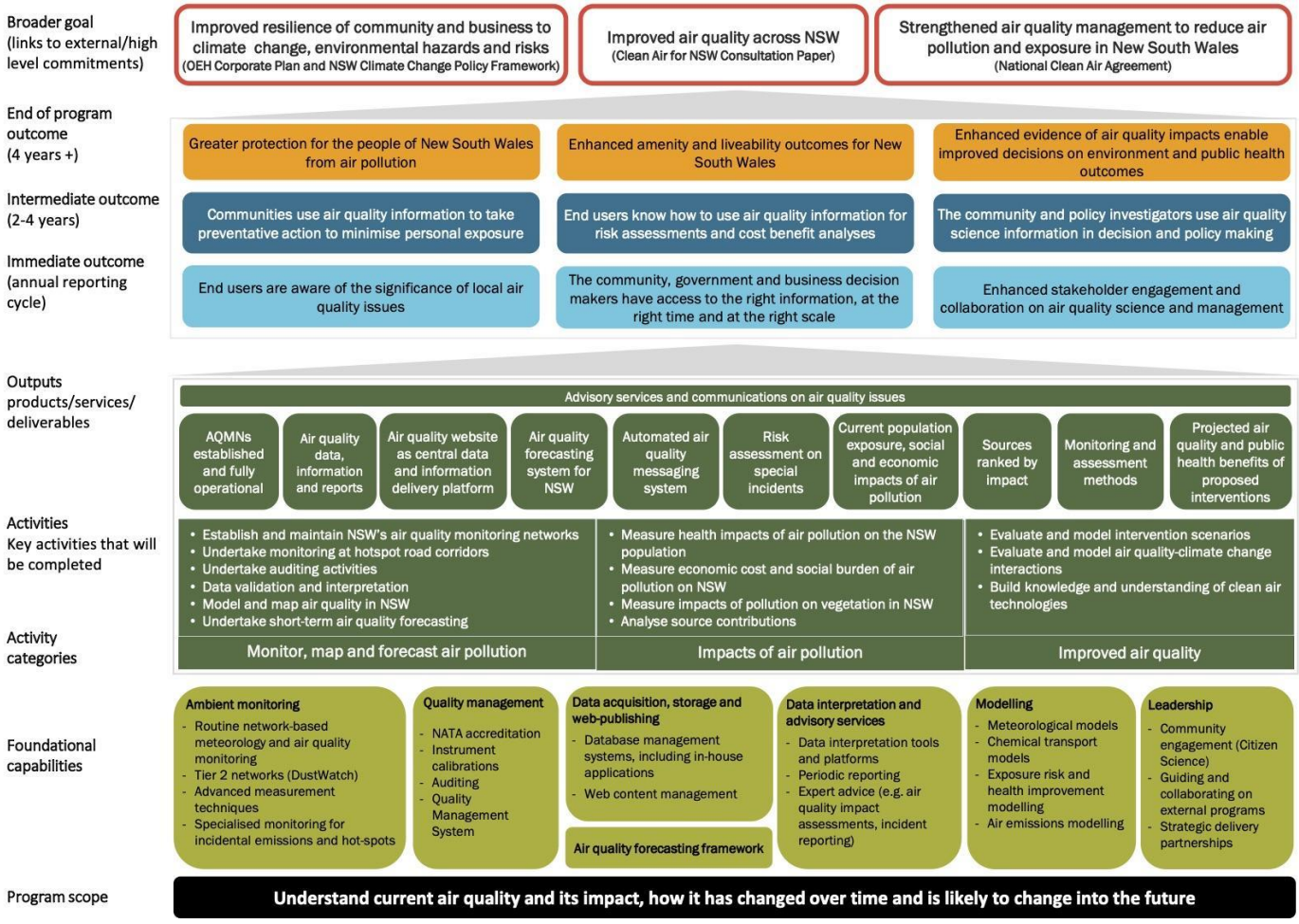

Figure 1. NSW DPE air quality program logic map. Figure source: (NSW Department of Planning & Environment, n.d.)

BusinessBasics* | *Evidence-based decision-making in ISO 9001

The ISO 9001 international standard for quality management systems (QMS) is based on seven quality management principles. One of those principles is evidence-based decision-making.

Urban Tide* | *Overview of the smart cities maturity model

This self-assessment tool and smart cities maturity model can help local governments to understand where they are on their journey towards 'smart'.

The World Health Organisation (WHO)| [Evidence, policy, Impact. WHO guide for evidence-informed decision-making]

On page 23 of this document is the WHO's 'Evidence Ecosystem for Impact' framework, addresses different inputs and stages of data and evidence in decision-making processes.

The WHO's 'Evidence Ecosystem for Impact' framework

Figure 2 presents the WHO's 'Evidence Ecosystem for Impact' framework, which addresses different inputs and stages of data and evidence in decision-making processes.

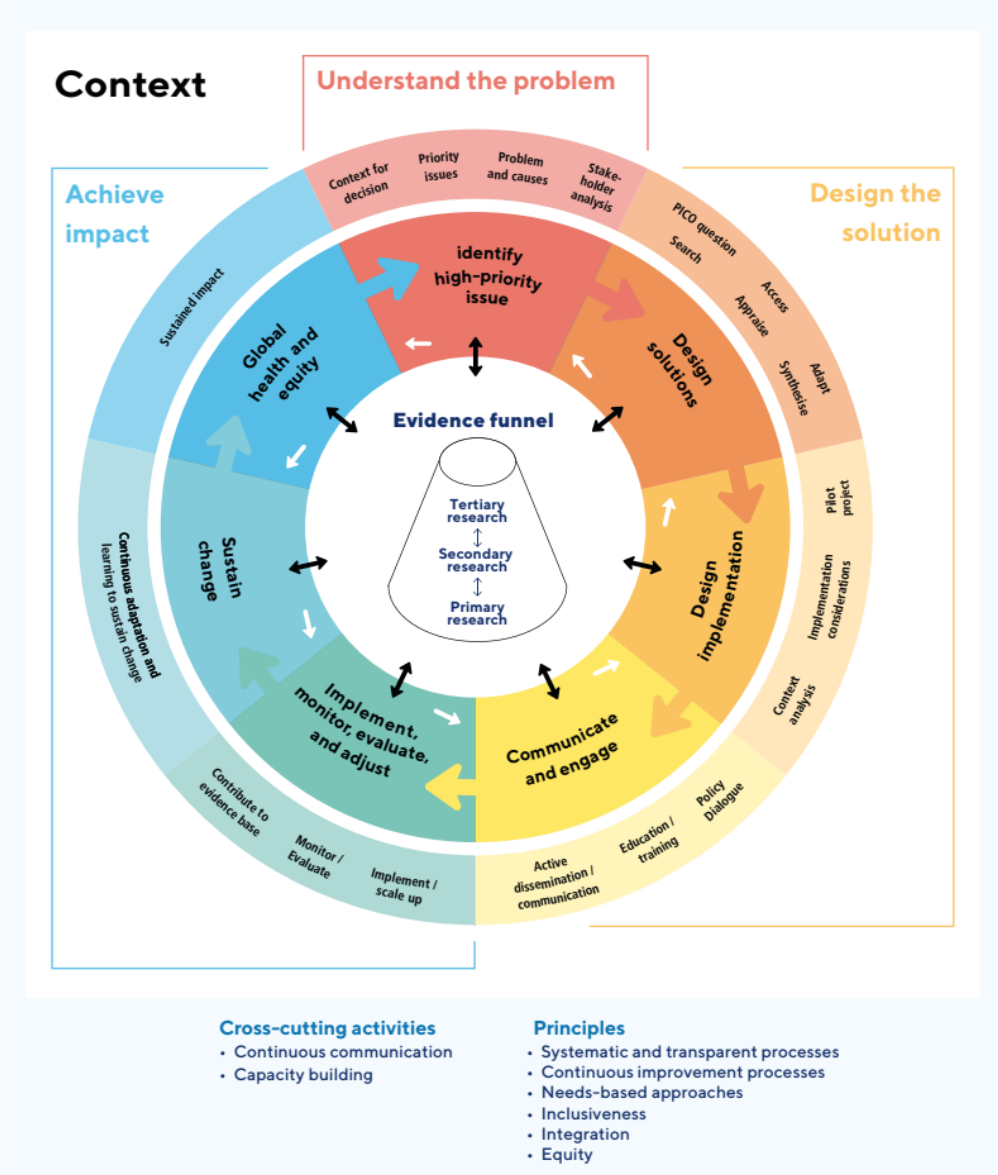

Figure 2. Evidence Ecosystem for Impact framework. Reproduced from WHO (2021), p 23.

Associated OPENAIR resources

Best Practice Guide chapters

The Impact Planning Cycle overview

This Best Practice Guide chapter introduces the OPENAIR Impact Planning Cycle, a simple practical framework designed to assist local governments with impact planning for a smart air quality monitoring project. The Impact Planning Cycle is a planning tool that can help to maximise the impact of a project and address the needs of an organisation and community.

Activities for impact

This Best Practice Guide chapter introduces a range of activities that can be undertaken by a local government to create impact relating to an air quality issue. Activities are categorised into four impact areas: transport; built environment; green infrastructure; and community engagement.

Further information

For more information about this project, please contact:

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This Best Practice Guide section is part of a suite of resources designed to support local government action on air quality through the use of smart low-cost sensing technologies. It is the first Australian project of its kind. Visit www.openair.org.au for more information.

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