

Best Practice Guide

BP107 | Identify

Smart places best practice



Introduction

Local governments exploring smart air quality measurement initiatives will encounter the concept of ‘smart places’ or ‘smart cities’. These terms refer to the ways in which digital technology, data, people, and place can be connected to address critical urban challenges and support sustainable, liveable, and inclusive communities.

It is important to be familiar with emerging smart places best practice if you are developing a smart air quality monitoring project. This OPENAIR Best Practice Guide chapter presents smart places best practice approaches that can inform the design of your air quality monitoring activities, explores a series of common challenges, and offers advice on how to overcome them.

How to use this resource

This chapter introduces best practice approaches for the design and delivery of smart places projects, with a specific focus on how these apply to smart low-cost air quality monitoring. The tips and advice provided within this chapter are best applied during the project design phase, ideally from as early as project inception and the development of a funding application.

Who is this resource for?

This chapter is intended to act as a guide for local governments tasked with designing and delivering a smart low-cost air quality monitoring project, and may be useful to staff in the following roles:

- people leading new air quality monitoring projects
- smart city professionals
- information and communication technology professionals
- local government leadership
- urban designers
- community engagement teams
- planners
- environmental officers.

“As a city, we cannot continue to let technology happen to us.”

– Ted Wheeler, Mayor of Portland, Oregon, USA (Smart City PDX, n.d.)

Smart places and air quality

A ‘smart place’ is the outcome of the strategic integration of digital technology and data with people and place, to address challenges of sustainability, and social and economic wellbeing. The concept expands on the idea of a ‘smart city’ including regional places, or anywhere that people live, work or play.

Early definitions and iterations of smart cities were technology centric. Many cities found themselves delivering projects that were tailored to the agendas of large corporate interests rather than in the interests of their own citizens. A shift towards a more human-centred way of designing smart places has occurred in recent years, initially underpinned by the United Nations Sustainable Development Goals (2015), and later formalised by the first international standard for smart cities¹, which took an explicitly human-centric stance. Many slightly different definitions of human-centred smart cities exist, but they all emphasise five core concepts (see Figure 1):

1. **Systems thinking** ensures that people, place, and good governance are given equal focus and consideration to technology and data.
2. **Accessibility, inclusivity, transparency, and accountability** are fundamental to the concept of ‘smartness’. Smartness is for the many, not the few, and should always strive to embody democratic principles.
3. **Impact design and process focus** should be designed into a project from day one. A project is as much about the process or journey as it is about the outcome. Participation and collaboration improve impact at every turn. Iterative and open-ended innovation are encouraged.
4. **Interoperability** enabled by open technology and data sharing are the foundation of collaboration, innovation, and sector maturity.
5. Smart places have a **triple bottom line**. Social and environmental impact are a core driving rationale and should be given equal weighting to economic benefit.



Figure 1. Five core concepts of human-centred smart places

¹(ISO, 2021)

Smart low-cost air quality monitoring projects are activities that require the use of smart places best practice, and should incorporate the following principles:

- **Be sensitive to place:** Air quality is a place-based concern that can vary on local scales, and strongly affects the well-being of people and communities. It can be explored and addressed with the help of smart technology and data, such as via the use of smart low-cost sensing devices.
- **Be people-centric:** Access to clean air is a matter of social equity and environmental justice and should be a core concern of any democracy.
- **Encourage participation:** Action on air quality requires widespread collaboration between organisations, and strong community participation.
- **Focus on process:** Engagement with air quality issues may require innovative thinking and approaches, and is often an ongoing, long-term process.
- **Ensure interoperability:** The interoperability of sensing technologies and data platforms (combined with the widespread sharing of data) directly supports positive outcomes for air quality projects.
- **Consider social, environmental, and economic benefits:** Addressing air quality delivers a wide range of benefits for human health and wellbeing, the environment, and local economies.

Best practice for smart places

The following section provides guidance on each of the five pillars of smart places best practice, with a focus on air quality initiatives. To achieve the largest possible impact, these concepts should guide the foundational thinking, strategy, and design of your air quality monitoring project.

Systems thinking

Air quality is a highly complex issue that touches on multiple intersecting processes and systems. It is decidedly place-based, arising from locally unique combinations of factors. Each place has its own community who have particular concerns and considerations. These complexities make air quality a challenge that requires systems thinking across multiple disciplines, departments, industries, and organisations. System-wide issues demand solutions that work for a wide variety of stakeholders, operate on a long-term basis, are unique to the situation, and are focused on change-making. In addressing these systems challenges, new technologies and data can be powerful tools that help you engage with others, gain insights, and leverage social capital for positive change.



TIP: Make your first project as focused as possible to avoid too much complexity. Start small, with modest goals. Understand that you may be at the start of a longer journey.

Accessibility, inclusivity, transparency, and accountability

The most vulnerable people in society are most negatively impacted by air pollution. Vulnerable populations are more likely to live and work in places with air pollution, and socioeconomic constraints can mean less options for avoiding exposure. Levels of social empowerment and agency, and awareness and understanding of air quality issues, tend to be lower in these populations.

To deliver a project that is accessible, inclusive, transparent, and accountable, it is critical to be aware of complexities in culture, social justice issues, and social advantage or disadvantage that specific groups in your community might experience. Any project run by local government to tackle air quality issues must consider these factors and take practical steps towards best practice to create genuine social impact (see Figure 2).

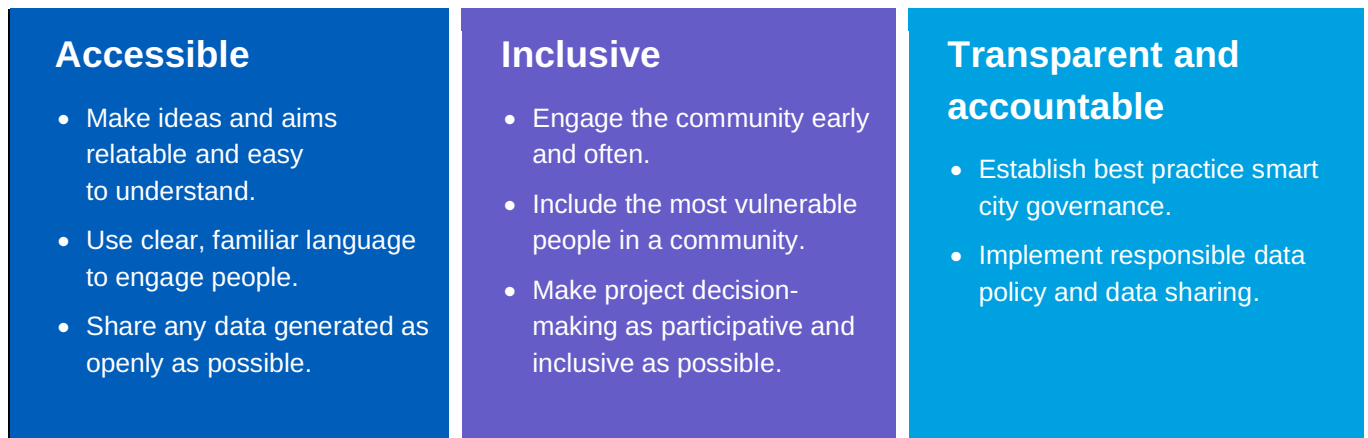


Figure 2. Practical approaches to enhance a project's accessibility, inclusivity, transparency, and accountability



TIP: Engage your community as early as possible, focusing on the real needs of real people. Allocate significant time and resources to this from the start of the project.

Impact design and process focus

Impact design involves identifying the desired outcomes and impacts of a project at the very start, and then designing a strategic approach that will deliver them. This focus on results can exist in harmony with a focus on process by expanding the concept of ‘impact’ to consider the benefits created along the way – for communities, for your own organisation, and for your partners (see Figure 3).



Figure 3. Practical approaches for cultivating a process focus for your project



TIP: We recommend using the OPENAIR *Impact Planning Cycle* and its associated tools and resources to plan your project from day one.

Interoperability, open technology, and data sharing

Interoperability refers to the ability of a device, platform, or service to exchange data and integrate functionality via common language and protocols. Open, interoperable technologies form the foundation of widespread data sharing, collaboration, and a maturing technology ecosystem. As the smart city sector matures, we can expect to see more interoperability and open technology standards.

Commercially available options for smart low-cost air quality sensing vary from closed proprietary solutions to more open solutions that might integrate multiple interoperable technologies and platforms. Simpler stand-alone systems make it easy to get started, and can be a cost-effective entry point, with low operational demands. However, such technologies can also limit the types of activities and impacts you are able to create. More open and interoperable technologies may require more work to establish and run, but they tend to support much better long-term outcomes, enabling a better systems approach to impact, more accessible and inclusive processes, heightened transparency, increased collaboration and participation, and improved innovation.



TIP: Consider adopting a procurement policy that explicitly favours open technology. The Spanish city of Barcelona, a global leader in smart city thinking, has done this to positive effect. The NSW Government has also taken an explicit policy position, stating, “Open-source systems are fundamental to interoperability. You should choose open technology where available to avoid vendor lock-in.”²

Triple bottom line: social, environmental, and economic benefits

Triple bottom line is the concept of giving equal attention to the social, environmental, and economic benefits of a project. It not only identifies social and environmental challenges as worthy of attention in their own right, but also frames economic prosperity as contingent upon the cultivation of a healthy and sustainable society and environment. Air quality is an intrinsically social concern, connected to human health, wellbeing, and social justice. It is also closely connected to efforts to mitigate and adapt to climate change impacts and challenges (such as urban heat or bushfire smoke). Healthy and thriving local economies can be supported by addressing these social and environmental challenges.

² Page 103, paragraph 2 of (Digital.NSW,2021)



TIP: To ensure longer-term success, local government engagement with air quality should be underpinned by sustainability and social impact policy that identifies air quality as a priority issue and connects it with intersecting concerns, such as climate change and social wellbeing. If air quality is not on your policy agenda, make a plan to get it there.

Challenges in the adoption of best practice

Several common challenges hinder the adoption of smart places best practice. This section describes some of these challenges and provides practical advice on how to address them.

Funding challenges

An over-reliance on limited external funding (such as grants) can cause a project to focus on the ‘bare essentials,’ and might hinder adoption of best practice, which can often be seen as an optional extra. While external funding sources can kickstart new projects that might not otherwise be initiated, they sometimes also shield project activities from the operational realities of your organisation, or from market realities of the wider economy. After the initial funding period ends, many projects are discontinued because they prove unsustainable upon exposure to these realities.

Advice:

Always ensure that a new project is supported with at least 25% of its funding sourced internally from your organisation. This helps to balance out dependence on external funds. It also indicates an intent for senior management to support the activity over the longer term.

Plan for operationalisation of your project from the very start. This means engaging with the staff who will inherit legacy technologies (e.g. a sensor network) to understand their constraints and operational requirements as part of your early procurement decision-making. It also means building a robust business case, with executive support.

Time constraints

Typical grant programs define a short project delivery period, seeking quick wins with good political optics. This can be at odds with more time-consuming best practice approaches, such as deep and prolonged community engagement.

A further constraint on time can come from internal annual funding cycles, which can require activities to be delivered within the same financial year in which funds were received.

Advice:

The key to securing longer-term project delivery periods is to secure longer-term funding. Certain grants may accommodate this; however, the best advice is to ground project activities in core policy, with a strong business case that supports an argument for sustained internal support. This requires strategic thinking about the longer-term big picture during the initial stages of project design.

Poor internal policy alignment

Internal policy, strategy, and other formal commitments may or may not align with your project. The more aligned internal policy there is, the more likely it is that your project will receive strong, deep, and lasting support, which is required for delivery of a project that exemplifies best practice approaches. The main types of policy and strategy to consider include environmental sustainability and climate change policy; planning policy; community engagement policy; data policy; and smart city policy.

Advice:

During the initial stages of project design, take time to explore existing internal policy, strategy, and formal commitments that might support your proposed activities. Adapt your project plans to align with existing commitments.

Investigate upcoming policy renewal processes. There may be opportunities to insert aspects of your project agenda into existing policy (e.g. add 'action on air quality' to a climate change resilience strategy).

Skills and expertise deficit

Many best practice approaches require specialised skills and expertise. If you decide to focus on community engagement, inclusion, and participation, this requires working with someone who has a deep knowledge of that practice, and ideally an existing relationship (and established trust) with the communities in question. If you focus on future-proofing your technology solution for interoperability and scalability, this requires working with an experienced Internet of Things (IoT) systems engineer who has knowledge of local government IT operations and can design and implement such a system.

Advice:

You have three options for securing the skills and expertise required for success:

1. Find people with the skills and expertise in-house.
2. Join with project partners who have the skills and expertise you need.
3. Hire contractors who have relevant skills and expertise.

When you are first developing a project, seek partners who contribute skills and expertise that is lacking within your organisation, and develop a close working relationship with them.

During initial project planning (ideally at the point where you are developing a funding proposal), try to characterise all the key activities that define project success. Next, list ideal skills and expertise required to deliver these activities in line with best practice. Aim to identify any high priority skills and expertise that you lack within your core project team, and include an accommodation for hiring contractors who can deliver these in your proposed budget.

Low ambidexterity (exploiting and operationalising innovation)

The concept of 'organisational ambidexterity' comes from business management literature and relates to the process by which the value that emerges from innovation is effectively exploited and embedded into an organisation's standard operations. Central to this is the recognition that the core competencies

required for innovation are different to those required for *exploitation* of that innovation, and that a balance of the two (i.e. ambidexterity) is necessary.

Advice:

One approach for achieving ambidexterity is to have a team and/or staff positions within your organisation that are dedicated to smart cities, IoT, innovation, or similar topics, and are connected to the strategic management of the business through effective governance frameworks. Such staff or teams should be able to take up an ambidextrous position, bridging the gap between innovation and operationalisation.

If you do not have such positions established, think about how you will approach innovation and exploitation as two distinct activities that might require quite different skills and expertise. Do you need to identify and recruit specific people, or establish governance structures, to support these activities?

Poor knowledge transfer

The ability to learn from, replicate, or scale a project is contingent upon capturing and transferring the knowledge that it generates. Effective and comprehensive knowledge transfer is critical to several best practice concepts for smart places, including sustainable long-term impact creation, systems thinking, collaboration, inclusivity, and transparency.

Project reporting can often be limited to funding acquittal requirements and may fail to capture deeper knowledge, particularly the tacit knowledge embedded within systems and staff. Staff turnover can also result in the loss of deeper knowledge.

Advice:

To ensure effective knowledge transfer, plan the production of detailed project reports as a distinct project activity with dedicated time and resources. These reports should include detailed technical and operational documentation, as well as a critical assessment of project design, processes, governance, business case, operations, and impact creation.

Aim to develop knowledge transfer materials through a participatory process of evaluation with the project team and partners.

References

Digital.NSW. (2021). *Internet of Things (IoT) Policy Guidance*. NSW Government.
<https://www.digital.nsw.gov.au/sites/default/files/2022-09/iot-policy-guidance.pdf>

ISO. (2021). *Sustainable cities and communities — Guidance on establishing smart city operating models for sustainable communities*. <https://www.iso.org/standard/82854.html>

Smart City PDX. (n.d.). Home <https://www.smartcitypdx.com/>

Additional resources

NSW Government | [Smart Places Strategy](#)

The NSW Smart Places Strategy aims to deliver outcomes for citizens and businesses by applying a consistent, seamless, place-based approach to Smart Places implementation in NSW. It is essential reading for any NSW local government engaging with smart places projects.

Transport for NSW | [Smart NSW Roadmap 2022-2027](#)

The Smart NSW Roadmap 2022-2027 provides a clear overview of the NSW Government's plans for supporting smart places in the coming years. It includes 14 actions for the NSW Government that will make it easier for agencies, local councils, and place-makers across NSW to adopt smart solutions to improve their operations and services.

Digital.NSW | [Internet of Things](#)

The NSW Internet of Things Policy aims to improve service delivery and infrastructure across the State. While it is aimed at state government agencies, the practical advice relating to the planning of projects, procurement, integration and operation of technology, and the management and utilisation of data is broadly applicable to local government, and to any organisation working with smart places.

UrbanTide | [Smart Cities Maturity Model](#)

Urban Tide is a private UK consultancy specialising in smart cities and technology. They worked on the creation of the world's first smart cities standard (British Standard PAS 181: 2014), which later became the international ISO standards for human-centred smart cities (from 2016). This resource was commissioned by the Scottish Government in 2016, and despite being several years old, it remains one of the best open access tools available for assessing smart city maturity.

Barcelona City Council | [Barcelona digital city: putting technology at the service of people](#)

The City of Barcelona's human-centred smart city strategy remains an example of applied smart city best practice at the municipal scale, and is a beacon and inspiration for local governments around the world.

Sunlight Foundation | [Smart Cities Best Practices](#)

The Sunlight Foundation was a US-based, non-partisan and non-profit organisation that advocated for open government. This web resource is a useful guide to accessibility, inclusivity, transparency, and accountability for smart cities.

Associated OPENAIR resources

Factsheets

The Impact Planning Cycle at a glance

This factsheet presents the OPENAIR Impact Planning Cycle, a simple practical framework designed to assist local governments with impact planning for a smart air quality monitoring project.

Best Practice Guides

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.

Supplementary resources

The Impact Planning Cycle in detail

This resource is a detailed extended guide to using 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.

Further information

For more information about this project, please contact:

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This Best Practice Guide chapter 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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