A Brief Overview of Lessons Learned from Air Sensor Loan Pilot Programs

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National Ambient Air Monitoring Conference

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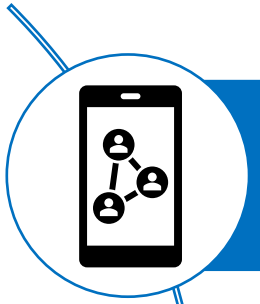
Presentation Overview

- Pilot Programs
- General Impact
- Resources Created
- Lessons Learned - Best Practices Guide
- Acknowledgements

Why is There a Need for Air Sensor Loan Programs?

- **Air quality education and supplemental monitoring are popular applications for air sensors**
- **Air sensors are not always accessible to potential users**
  - Initial purchase cost typically ranges from $100 to $5,000 (USD)
  - Additional costs are often needed (*e.g., maintenance, replacement, data storage and access, data analysis and visualization*)
- **Potential sensor users need guidance and resources such as…**
  - Background information on air pollution, air quality, sensors, etc.
  - How to select, purchase, and use sensors
  - How to plan and conduct a study
  - How to evaluate and interpret data
  - Educational materials to facilitate classroom or individual instruction

Goals of the Pilot Air Sensor Loan Programs



Make air sensor technologies accessible to the public

Facilitate air quality educational opportunities with a focus on topics of regional/local interest

Develop a “Best Practices” document to help others interested in developing similar loan programs

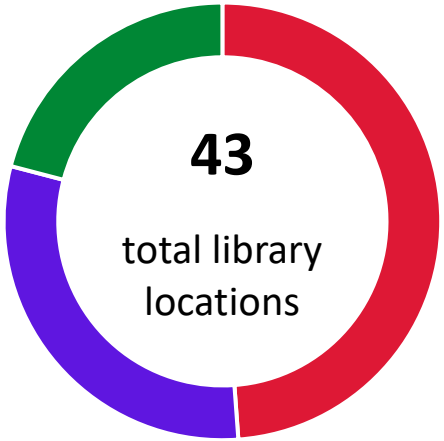
EPA launched pilot programs with 8 partners

Urban libraries

- Los Angeles Public Library, CA

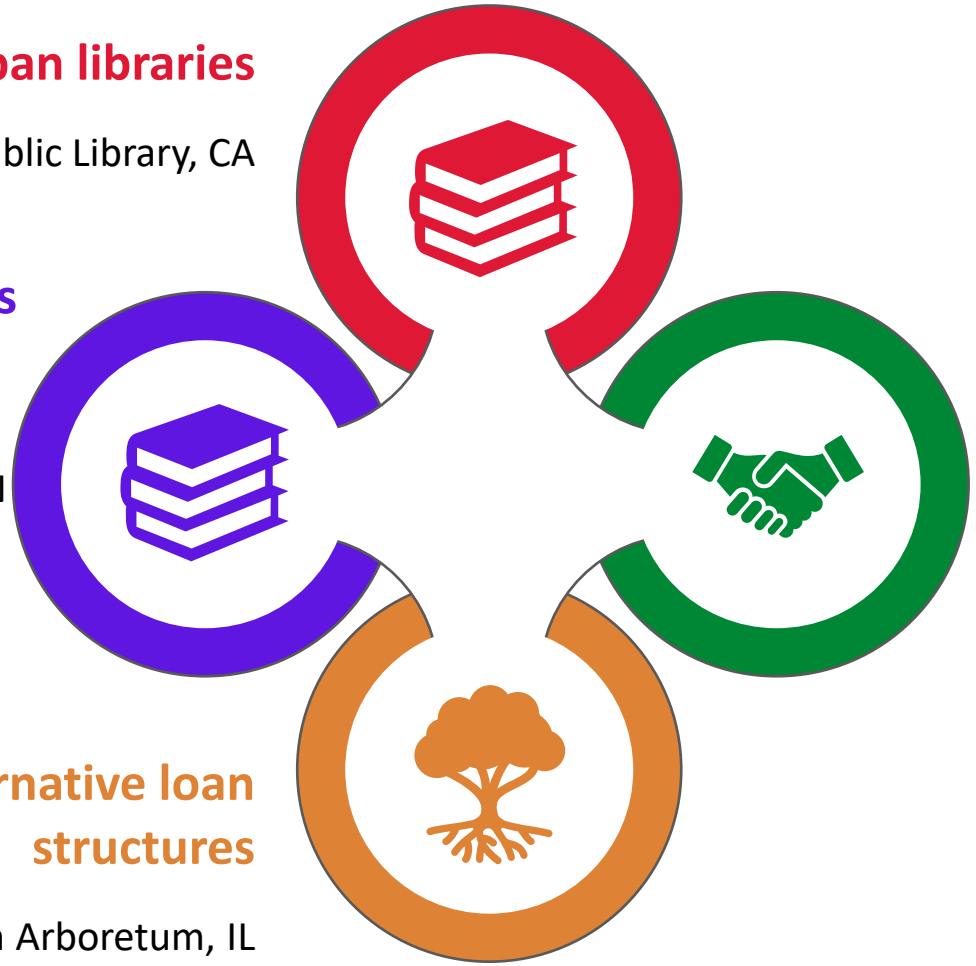
Rural & remote libraries

- Bayliss Public Library & Superior District Library System, MI
- Evansville Vanderburgh Public Library, IN
- L'Anse Area School/Public Library, MI



Alternative loan structures

- The Morton Arboretum, IL



Tribal communities

- Nez Perce Tribe, ID
- Heritage University on Yakama Reservation, WA
- Institute for Tribal Environmental Professionals (ITEP), AZ

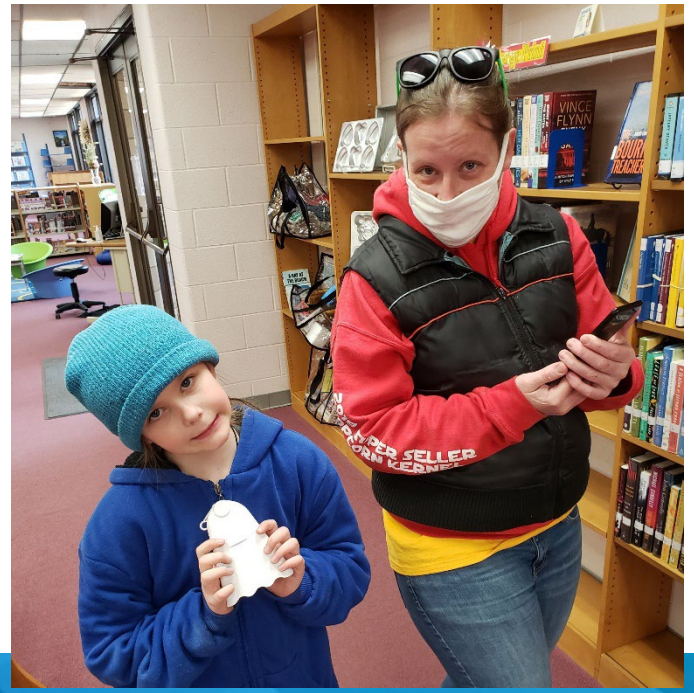
EPA participants

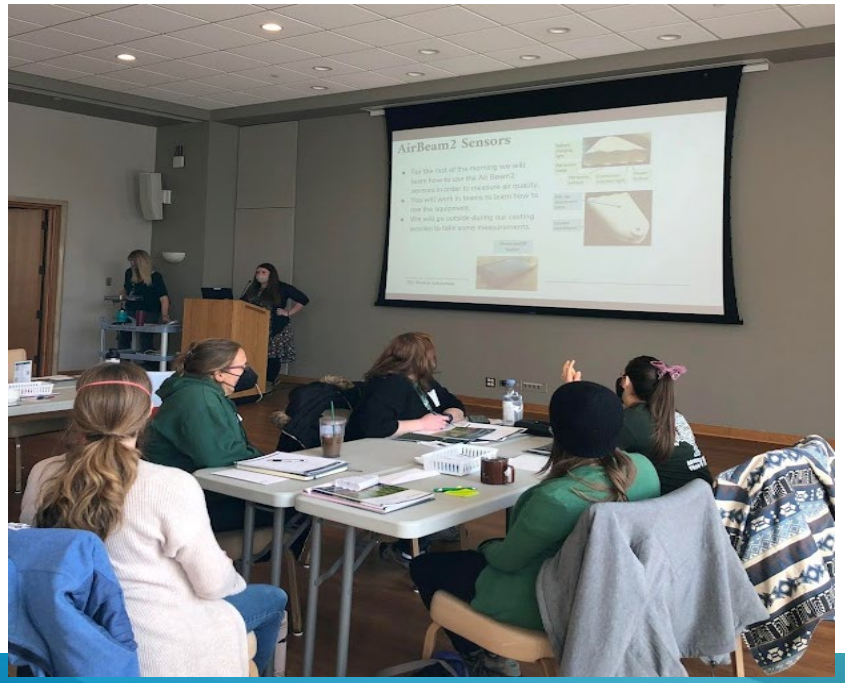
- Region 5
- Region 9
- Region 10
- ORD

Pilot programs funded by an EPA internal grant

General Impact of Pilot Programs

- Loan programs **put sensors in the hands of individuals** who might not know about or otherwise have the opportunity to access this technology
- The resources developed to support these programs have **improved the environmental literacy** of our partners helping them to offer education and programing within their communities

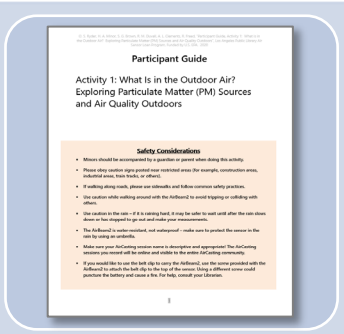




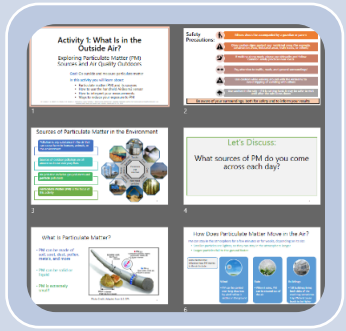
Resources Created

Five Hands-On Lesson Plans

1. What is in the Outdoor Air?
2. Hidden Particulate Matter Indoors!
3. My Pollution Bubble!
4. The Power of Plants! (*coming soon*)
5. Is that Smoke Affecting Me? (*coming soon*)



Instructor & Participant Guide



Introductory Slides

Participant Worksheet

Technology Resources

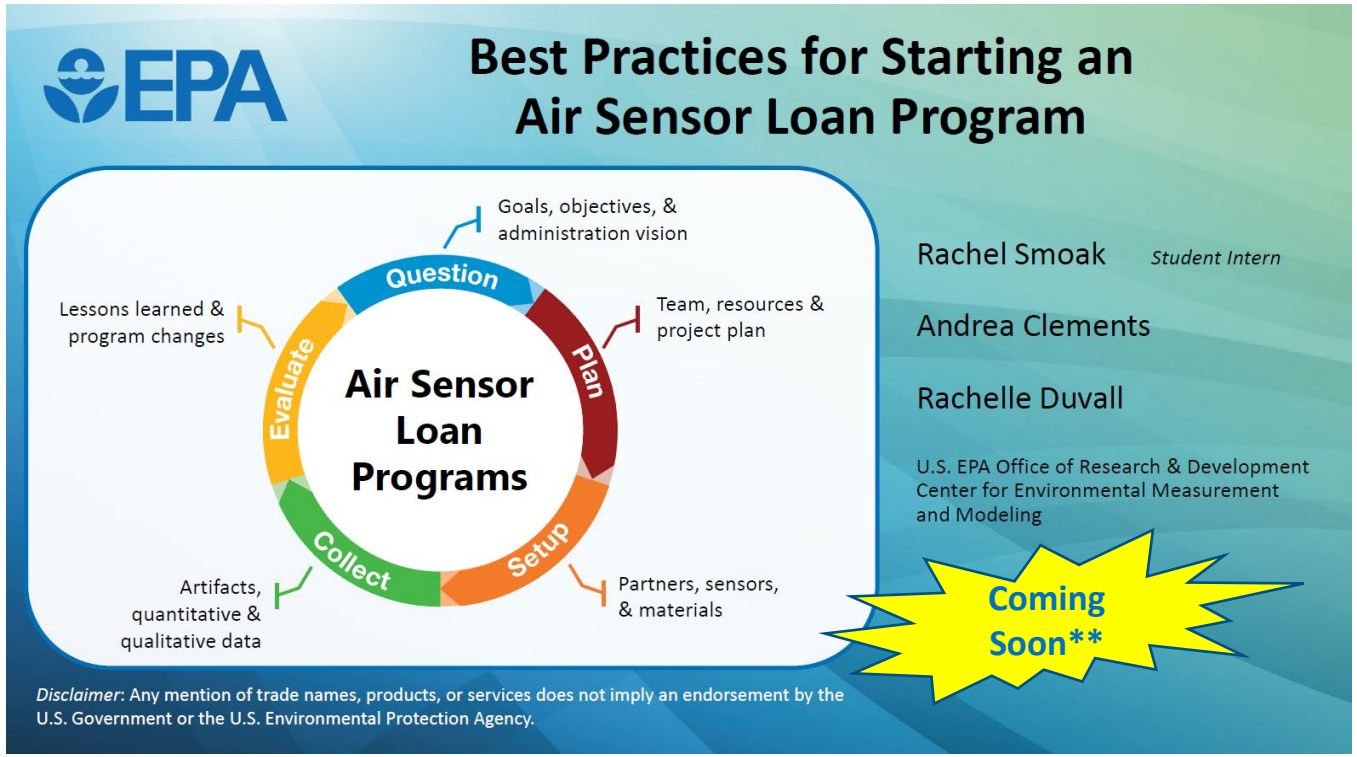
- AirBeam2 Quick Start Guide, Presentation, and Video
- PurpleAir Getting Started Guide, Presentation, and Solar Conversion

Additional Resources

- Resource Guide
- FAQ Document
- Air Quality 101 Presentation
- Advanced Topics in Air Sensor Use Presentation

Best Practices Guide

- ✓ **Walks through how to establish an air sensor loan program using EPA's Air Sensor Guidebook planning wheel**



Target Audience

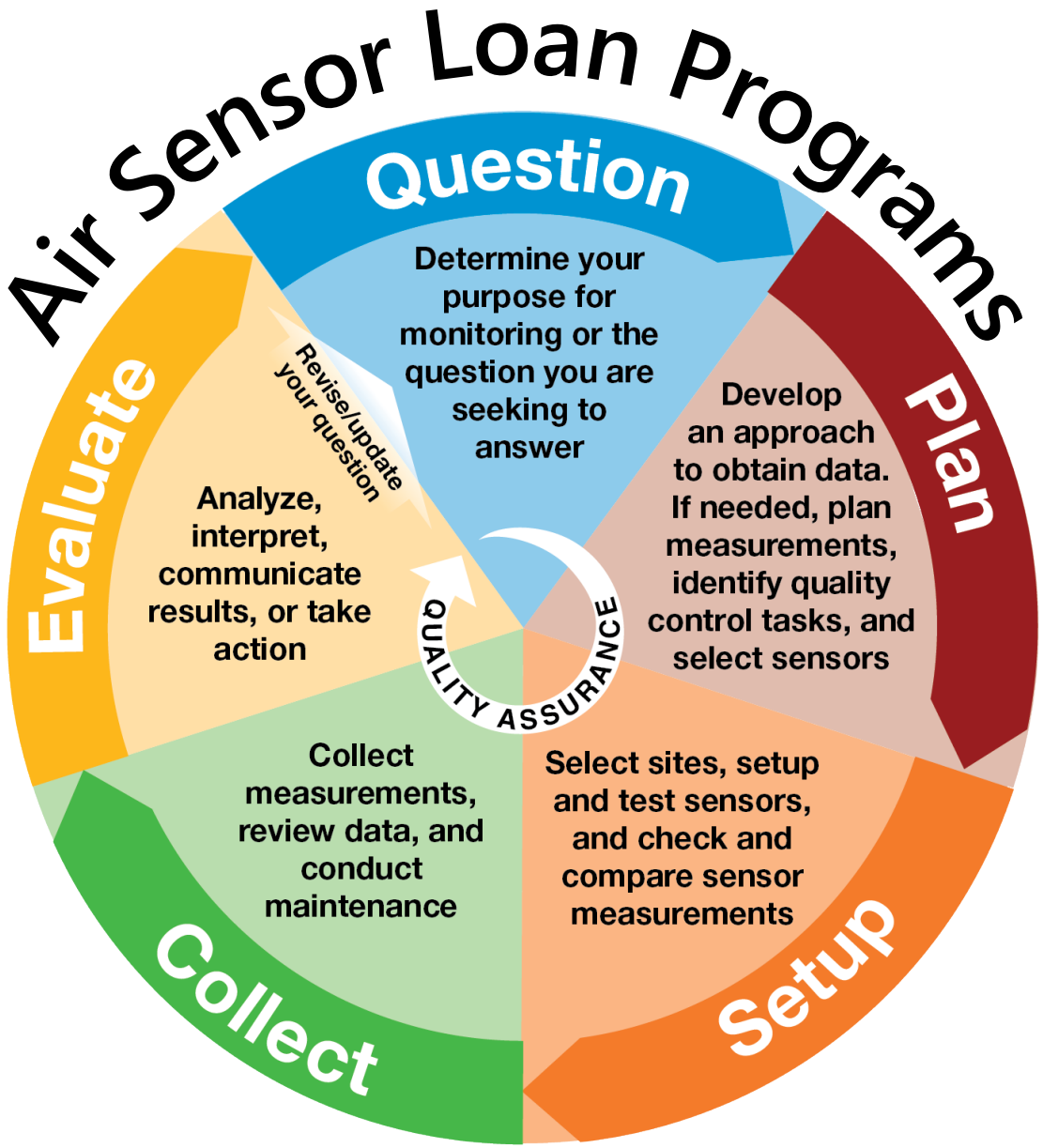
- Educators – schools, libraries, after-school programs, community organizations, etc.
- State/local/tribal air quality agencies
- Government agencies
- Academia
- Any group interested in starting an air sensor loan program

***Slides will be shared on the Air Sensor Toolbox Webpage*

Tools and Resource Webinar: EPA's Air Sensor Loan PilotPrograms: Successes, New Resources, and Lessons

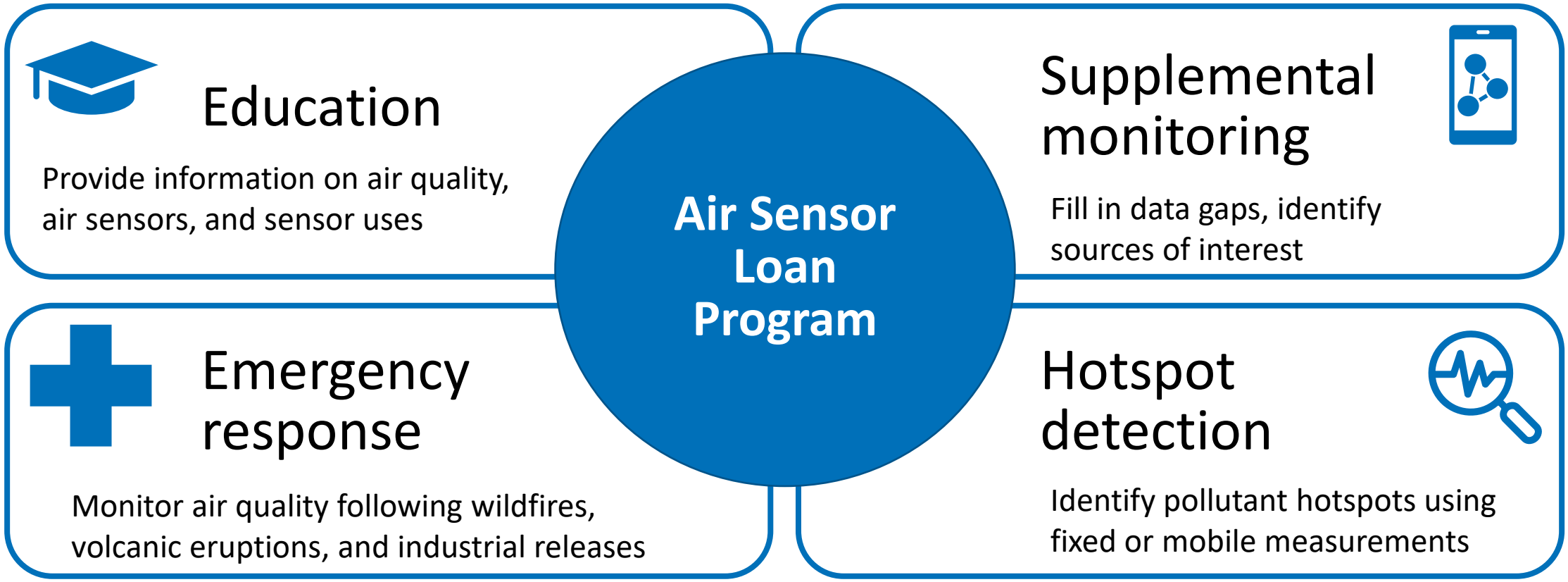
Purpose

This presentation walks through EPA's Air Sensor Guidebook planning guide and how each step is applicable to establishing an air sensor loan program



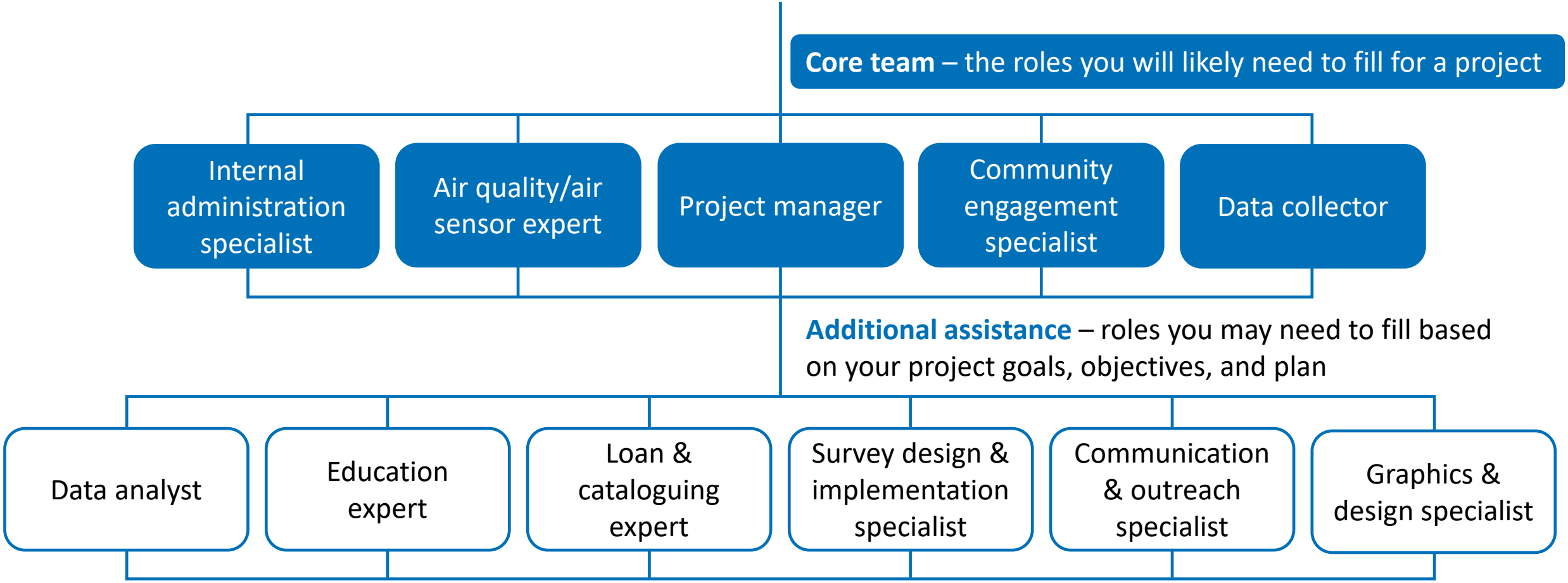
Question: Identify your program goals

Some common examples…



Different program goals have different data quality implications and quality assurance project plan (QAPP) requirements

Plan: Build your project team to support your goals and objectives



The same person can fill multiple roles on a project team, and the project team may include external partners

Plan: Resources and materials a sensor loan program might need

Funding for **air sensors** (including any ongoing costs for data storage, maintenance, etc.), printing materials and user guides, and **accessories** like cell phones, tablets, screen protectors, cases, covers, backpacks, binders, writing utensils, etc.

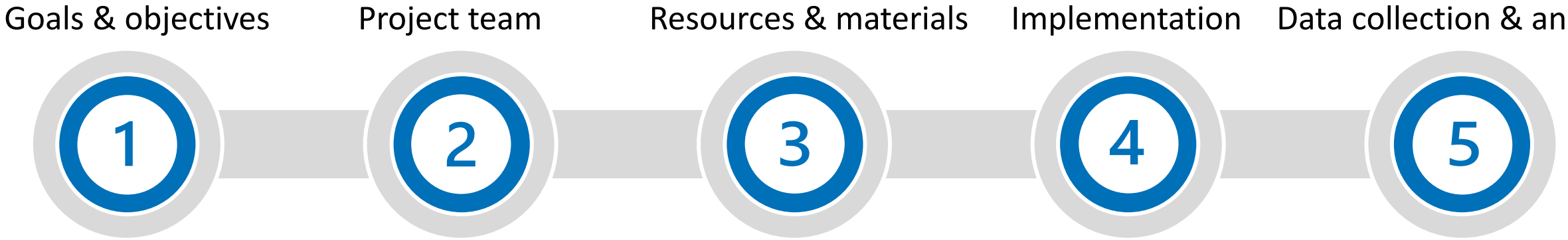
Access to expertise about air quality, air sensors, community engagement, teaching, loaning items, etc. as needed for your project

Educational materials including lesson plans, background material, and guidance on interpreting sensor data

Technical materials including standard operating procedures, sensor siting guidance, quality assurance guidance, etc.

EPA's Air Sensor Toolbox website has many technical and educational materials that might be helpful: https://www.epa.gov/air-sensor-toolbox

Plan: Write your project plan, which should include:



Identify your goals, objectives, and administration vision

List the roles and responsibilities of your team members

Gather and review existing materials and resources; identify any additional needs and who is responsible for them

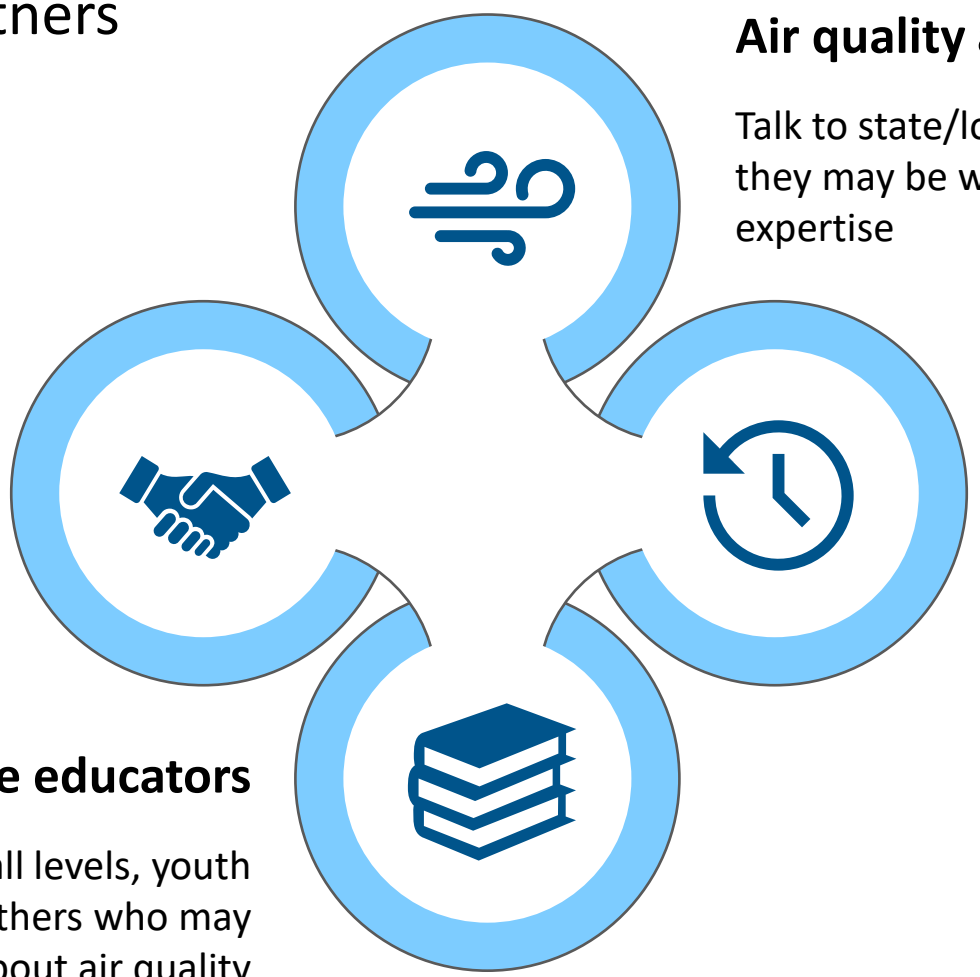
Plan logistics of how the loan program will run; this can be refined or detailed after you have secured your partner(s)

Identify how you want to document your project, what data you would like to collect, and how you will analyze data

The project plan is a living document and should be refined and updated throughout your project

Setup: Engage with potential partners

Some categories of partners you might consider:



Air quality agencies

Talk to state/local/tribal air quality agencies to see if they may be willing to provide technical support or expertise

Past partners

Reconnect with partners that your organization has successfully collaborated with before

People with previous interest

Contact individuals/organizations that have previously expressed interest in air quality projects. Individuals may be able to connect you with local organizations who may be potential partners.

Science educators

Reach out to science educators at all levels, youth program coordinators, librarians, and others who may have interest in teaching/learning about air quality and technology

Setup: Establish loan procedures

Consider answers to the following questions:

- Where will sensor and accessories be stored?
- How will the sensors get from the storage location to the user?
- How long will the loan period be?
- How will you track sensor and accessory inventory?
- What information do you need to catalogue items?
- Will each item you lend in a kit (sensor, user guide, etc.) be catalogued separately?
- What fines may you charge for overdue items?
- What replacement fee may you charge for a lost or damaged item?
- Is there a chance that you will collect personal or personally identifying information? How will you deal with that? How will you make sure that user data is deleted?
- How will you ensure that all peripheral materials (charger, guides, etc.) are returned?
- Would you like to label items to keep sets together (especially any paired items)?

Setup: Purchase sensors that support your goals and objectives

Technical specifications
Consider pollutant, environmental conditions, concentration levels, and collocation requirements

Privacy needs
Understand user registration and location information that sensors may require

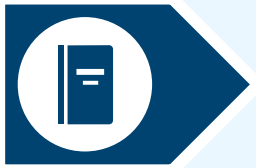
Interface & data processing needs
Match user interface, data processing, and data visualization to partner/user requirements

Data access & storage
Determine how you and others can access your data and where your data will be stored

Sensor cost
Consider upfront, ongoing, maintenance, and replacement costs of your chosen sensor

Procurement
Make sure that sensors are available for purchase and that lead times fit with your project timeline

Equipment lifetime
Look for warranties and know that lifetime varies with sensor type, sensor use, and use conditions



User manuals
Evaluate if the user manual will equip users to operate sensors and ease data processing

Ancillary technology
Identify other technology necessary for your sensor application (e.g., cell phones, weather data, etc.)

You may not be able to meet all your sensor preferences; balance your priorities against one another.

Setup: Develop training and materials as needed

Remember to consider:

Technical materials

Instructions for sensor collocation, operations, data processing, and data interpretation as required

Data collection mechanisms

Data collection sheets, surveys, forms, storage for electronic data, etc. as required

Comprehensive training

Training for partners to operate and maintain sensors and to use existing and newly-developed materials

Activity materials

Outreach materials and any materials that partners will need to support their programming

You may not need to reinvent the wheel. Look for materials you can use or adapt before starting from scratch. You may be able to find people or online forums who are willing to provide materials, share ideas, and discuss experiences.

Collect: Launch your program

Consider incorporating some or all of the following:

Launch events

Invite your target users to an event where you can **introduce your program**. This could be an educational event, a webinar, an opportunity to view/use a sensor, or having a technical expert talk about sensors.

Be creative and consider coordinating with other events/celebrations like Earth Day, Air Quality Awareness Week, or a community's event programming.

Advertising

Tell people in your target user group about your program. Information could be posted on your website or in a community newsletter, or you can directly reach out to contacts who may be interested.

Select programs be listed on the EPA website – go to https://www.epa.gov/air-sensor-toolbox/air-sensor-loan-programs and click the **contact** button to inquire if you are interested.

Outreach

Outreach is a great way to share your program with your target audience. It could be done through presentations to schools or other academic groups, meetings with community groups, webinars, or other venues.

Outreach is also an **educational opportunity** to teach about what air sensors can do and why air quality matters. It also bolsters your connections in the community and can increase positive associations people have with your organization.

Collect: Gather program artifacts and data

Program artifacts

What is it? Pictures, products, flyers, workshop materials, etc.

Be sure that you have a centralized location to store program artifacts and a clearly defined agreement among your partners on how they may or may not be used. Collect any participant consent required to share stories, photos, videos, etc.

Qualitative outcomes

What is it? Stories of people impacted, successes, changes in behavior, participant quotes, etc.

Also gather feedback from your partners and the project team. Collate data in one place so that you can look for exceptional stories and overarching themes.

Quantitative outcomes

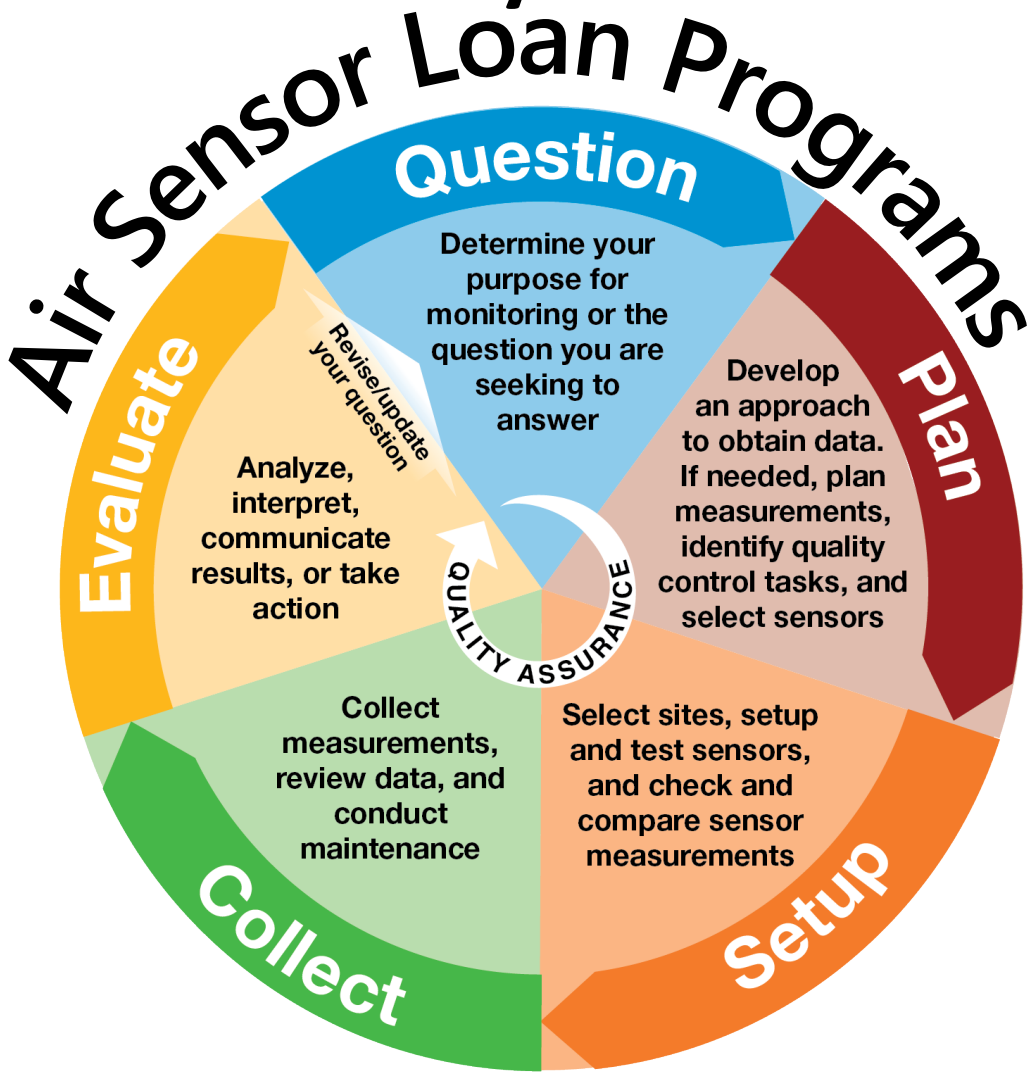
What is it? Air quality measurements, number of users, demographics of users, etc.

If you are working with a partner who routinely loans items, they may be able to pull data directly from their inventory management system. Be sure to document collection protocols, any metadata that might help interpretation, where data is stored, and how data is processed.

Evaluate: Refine your program as necessary

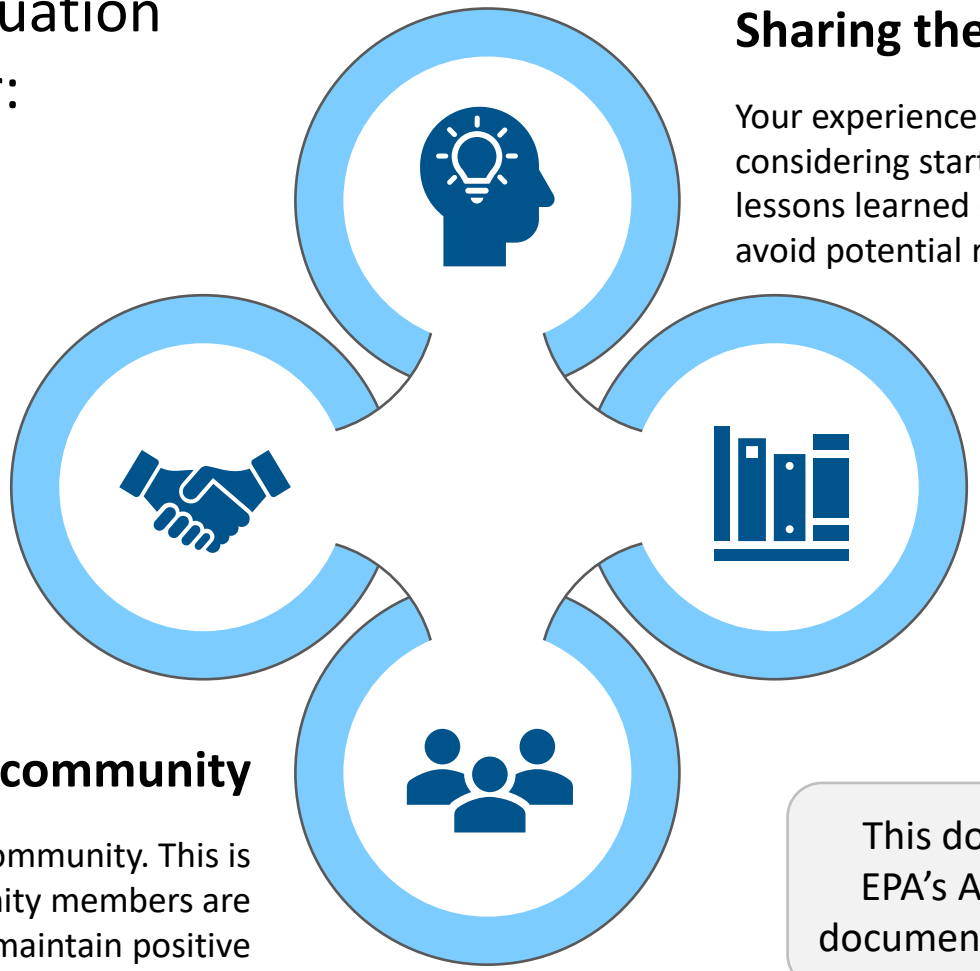
If your program is continuing, refine your project plan and operations based on the results of your evaluation. Start the cycle in in the planning guide again.

Be sure to plan for program continuity. Add members to your team to replace any lost or to add any helpful skills. Consider any anticipated turnover before your next evaluation cycle ends.



Evaluate: Share findings, materials developed, and lessons learned if possible

As you wrap up an evaluation of the project, consider:



Sharing the lessons learned

Your experience can be valuable to others who may be considering starting a similar program. Even a short list of lessons learned can help others know what works well and avoid potential roadblocks.

Informing other sensor users

Other sensor users or organizations with loan programs may be interested in the outcomes of your program. You may find interested people online, for example in a manufacturer or community forum.

Sharing the materials developed

Sharing materials can help save time as you develop a program. Others may adapt your materials, which can help expand the impacts of your program and give you and others additional materials to use.

Reporting back to the community

Share your findings with the community. This is especially important if community members are partners. Sharing can maintain positive relationships and potential future partnerships.

This document and the materials posted on EPA's Air Sensor Toolbox website are part of documenting and sharing the pilot loan projects.

Summary of best practices

- **Identify your project goals** and objectives before you start.
- **Build a project team** with different expertise to address all aspects of your project.
- **Develop a project plan** that clearly states objectives, goals, responsibilities of team members, implementation, required materials and resources, and data collection and analysis procedures.
- Maintain communication with your partners throughout the project.
- Plan for loan program sustainability from the start of your project.
- **Carefully select equipment** to meet your and your partner's goals.
- **Provide training and resources** for your partners and sensor users – different projects will have different needs.
- **Be flexible!** A project plan is a living document. There are many ways you can meet your and your partner's goals.
- **Collect qualitative and quantitative data/feedback** and use it to improve and inform future programs.
- **Share findings**, materials developed, and lessons learned if possible.
- If your project had significant community involvement, report back to the community throughout a project.

Many resources are available through EPA's Air Sensor Toolbox

General information

- Air quality & air sensor video series
- Frequently Asked Questions about Air Sensors
- Air Quality 101 presentation

More about air sensors

- Introduction to Air Sensors presentation
- Air Sensor Guidebook
- Sensor evaluations by EPA and other organizations
- Air Sensor Advanced Topics presentation
- Six Questions to Consider Before Purchasing Air Sensor Technology

Materials developed for pilot programs

- EPA's Air Sensor Loan Programs webpage
- Resource Guide
- Frequently Asked Questions
- AirBeam2 Quick Start Guide
- PurpleAir PA-II Quick Start Guide
- AirBeam2 Instructional Video
- Fully developed lesson plans related to/using air sensors

Additional resources

- Air Sensor Siting and Installation Guide
- Standard operating procedures for air sensors

Visit EPA's Air Sensor Toolbox Website: www.epa.gov/air-sensor-toolbox

Acknowledgements

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Rural and Remote Libraries

Bayliss Public Library and Superior District Library System – Lisa Waskin (Superior District); Pam Flood, Sabrina Neveu (Bayliss); Emily Hyde (Pickford); Jane French (Les Cheneaux); Megan Stefanski (DeTour)

Evansville Vanderburgh Public Library – Charles Sutton, Andrea Kappler, Katie Reineke

L'Anse Area School/Public Library – Sonya Evans, Susan Tollefson (L'Anse); Jane Kahkonen (Keweenaw Bay Indian Community)

Alternative Loan Structures

The Morton Arboretum – Meghan Wiesbrock

Urban Libraries

Los Angeles Public Library – Vivienne Byrd

Tribal Communities

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Heritage University
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Nez Perce Tribe Air Quality Program
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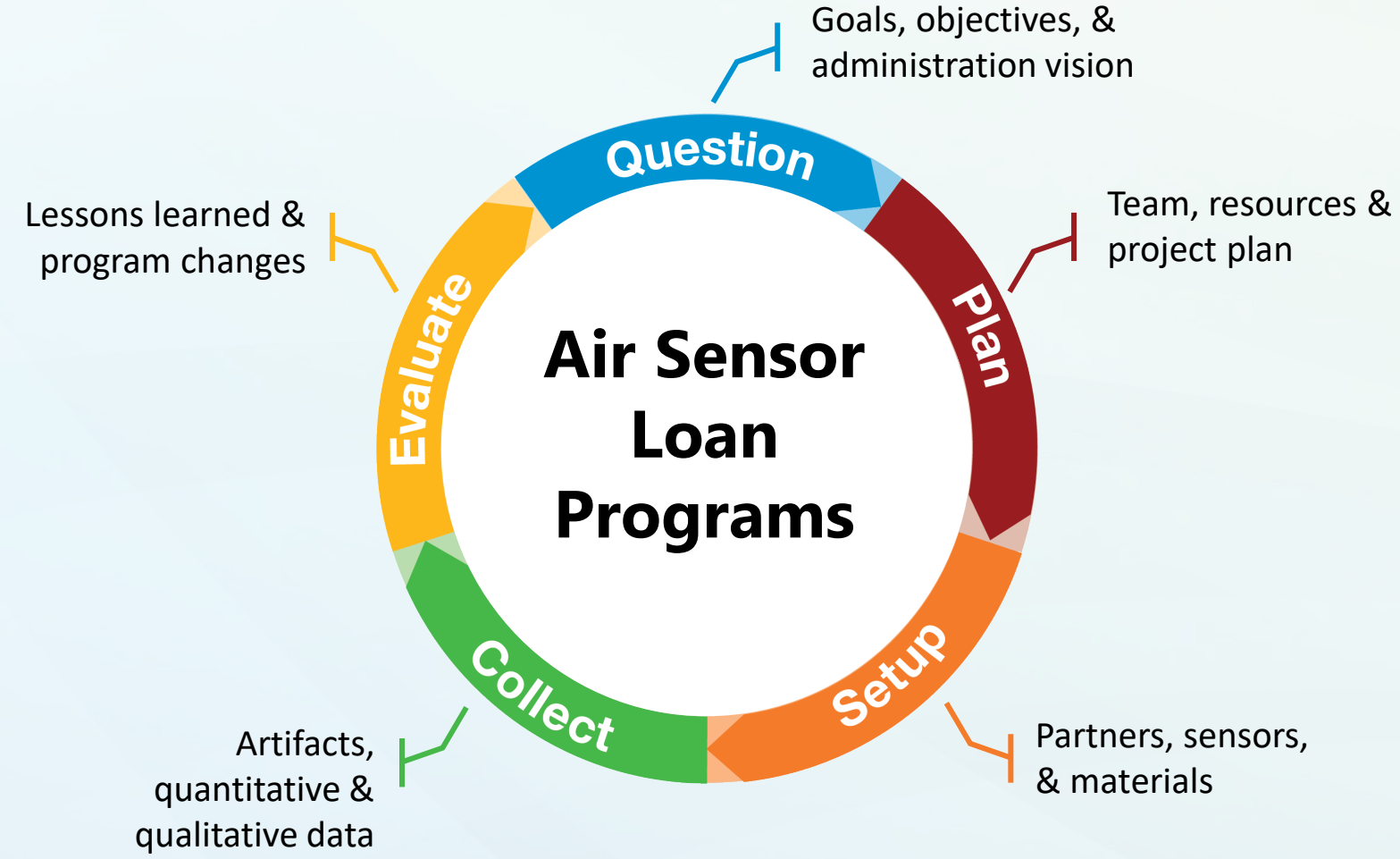

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