



EPA
United States
Environmental Protection
Agency

2008 NARSTO Executive Assembly

Air Quality Accountability; A Work in Progress

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Office of Research and Development
National Exposure Research Laboratory

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Outline

- **Introduce Concept of Accountability**
- **Discuss the elements of an Air Accountability System**
- **Present Preliminary data from an EPA Air Quality Accountability feasibility study**

EPA's Mission

**“To protect Human Health
and the Environment”**

BUT...

**How do we measure our
effectiveness?**



The Concept of Air Quality Accountability

Accountability at the EPA

“...measure and report on progress toward environmental and human health goals and to ensure the Agency’s accountability to the public.” (EPA, 2003)

“To assess the effectiveness of its regulatory and non-regulatory environmental decisions with respect to improved human health or environmental conditions.” (ORD Framework, 2007)

The Concept of Air Quality Accountability

Interest in Accountability Beyond the EPA

“Evaluating the extent to which air quality regulations improve public health and the environment...”
(HEI, 2003)

“Measuring progress in air quality management is demonstrating that reductions in pollutant emissions and improvements in air quality have resulted in measurable health benefits.” (NRC, 2004)

“...measuring the effectiveness of air quality management actions in meeting air quality management goals.” (NARTSO, 2008)

Drivers of Accountability

- **Public Interest**
- **Impact of Federal Funding**
- **Air Quality Management Activities**

Drivers of Accountability Public Interest

The Detroit News

Sunday, May 7, 2000

The Detroit News

The EPA *Assessing its record, defining its future*

◀ INDEX ▶

**Air and water cleaner, but
health gains unclear**

**Environmental cleanup's benefits fail to
translate into disease reductions**

Drivers of Accountability

Impact of Federal Funding

- **The Government Performance and Results Act (GPRA):** requires agencies to set strategic goals and measure/report on performance
- **Office of Management and Budget (OMB):** requires agencies to evaluate the benefits (outcomes) of their policy decisions

Drivers of Accountability

Air Quality Management Activities

“...develop and apply the capability and capacity to monitor, assess, and report on how changes in emissions impact air quality, atmospheric deposition, exposure, and effects on human health and ecosystems.”

(Recommendations from the Clean Air Act Advisory Committee)

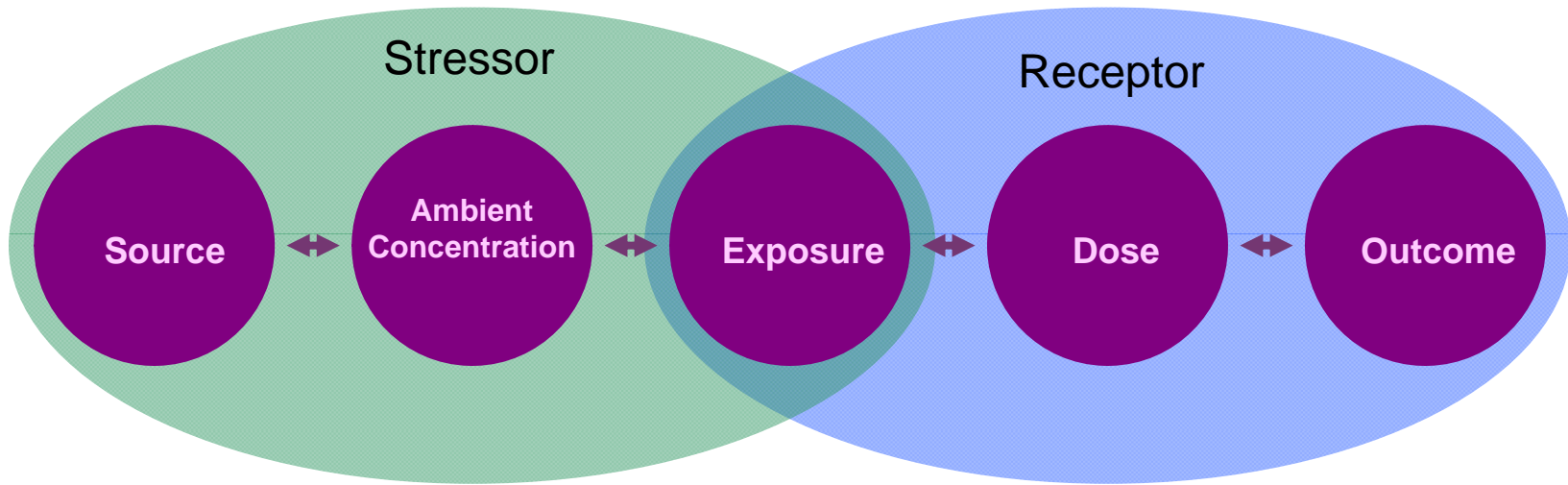
Key Elements for Developing an Air Accountability System

- Design an Accountability Framework
- Incorporate accountability into air quality management systems
- Develop data management systems
- Track progress in demonstrating accountability
- Conduct research to improve accountability mechanisms (indicators, process models and feasibility studies)

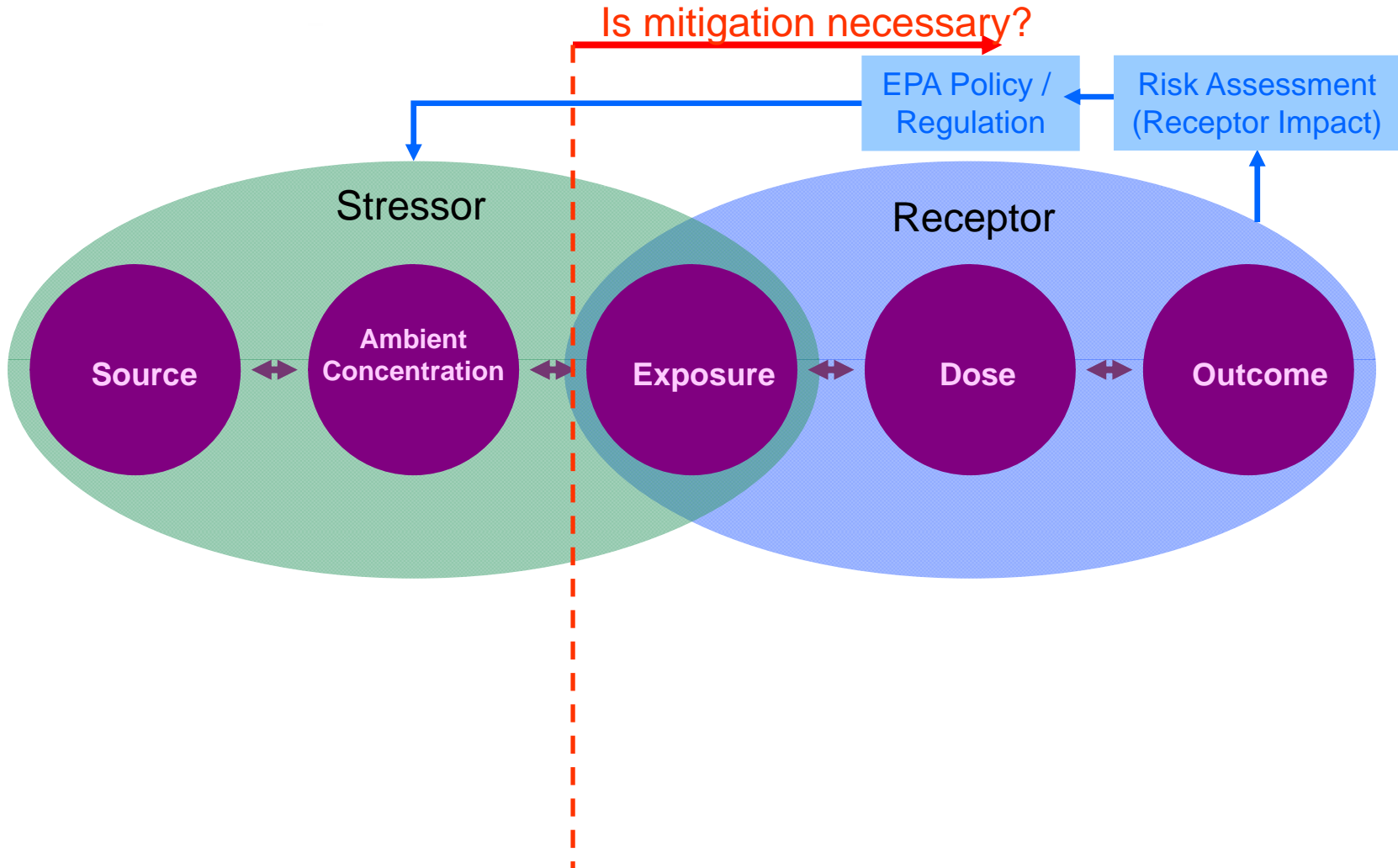
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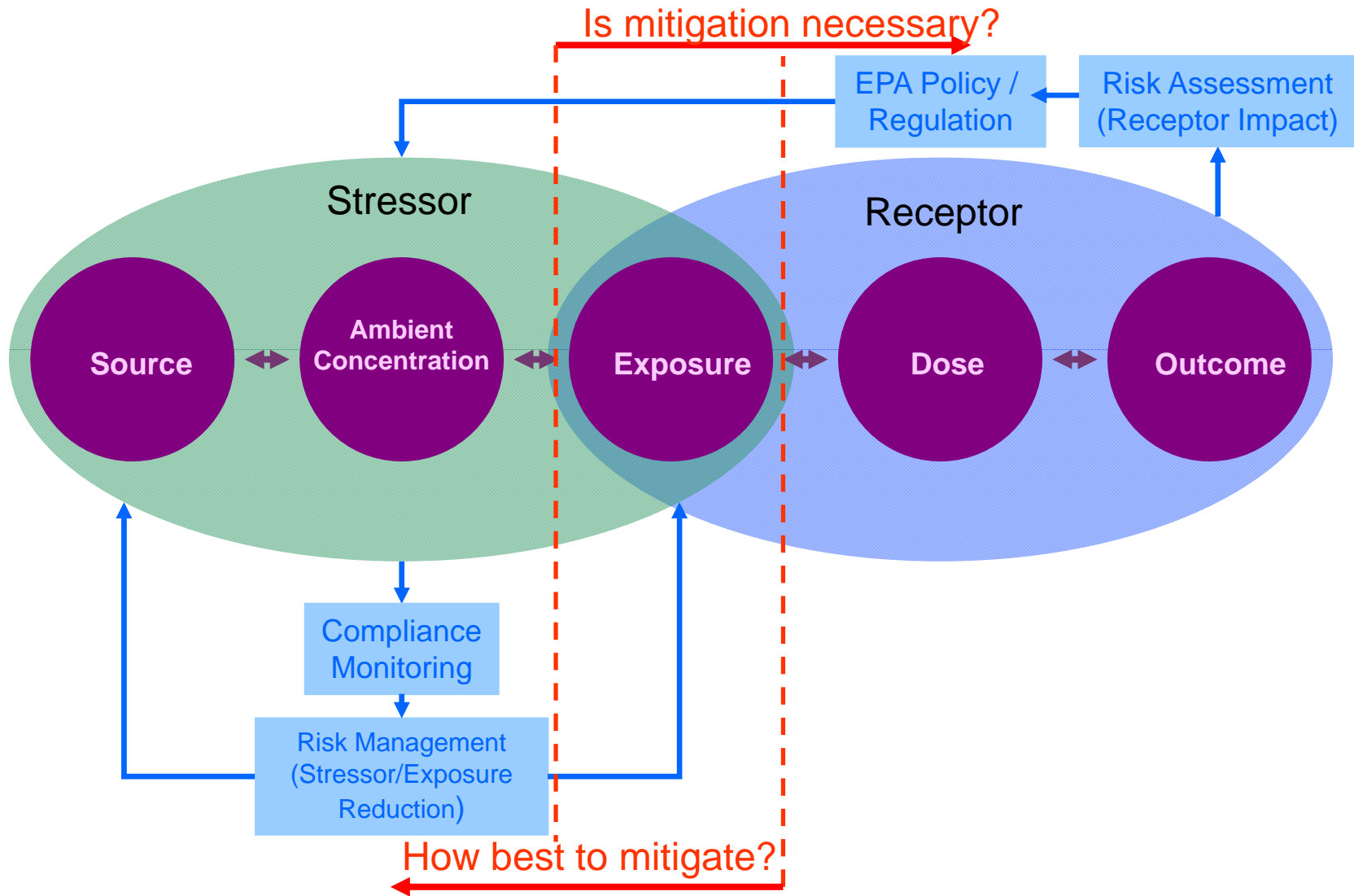
Source to Outcome Continuum



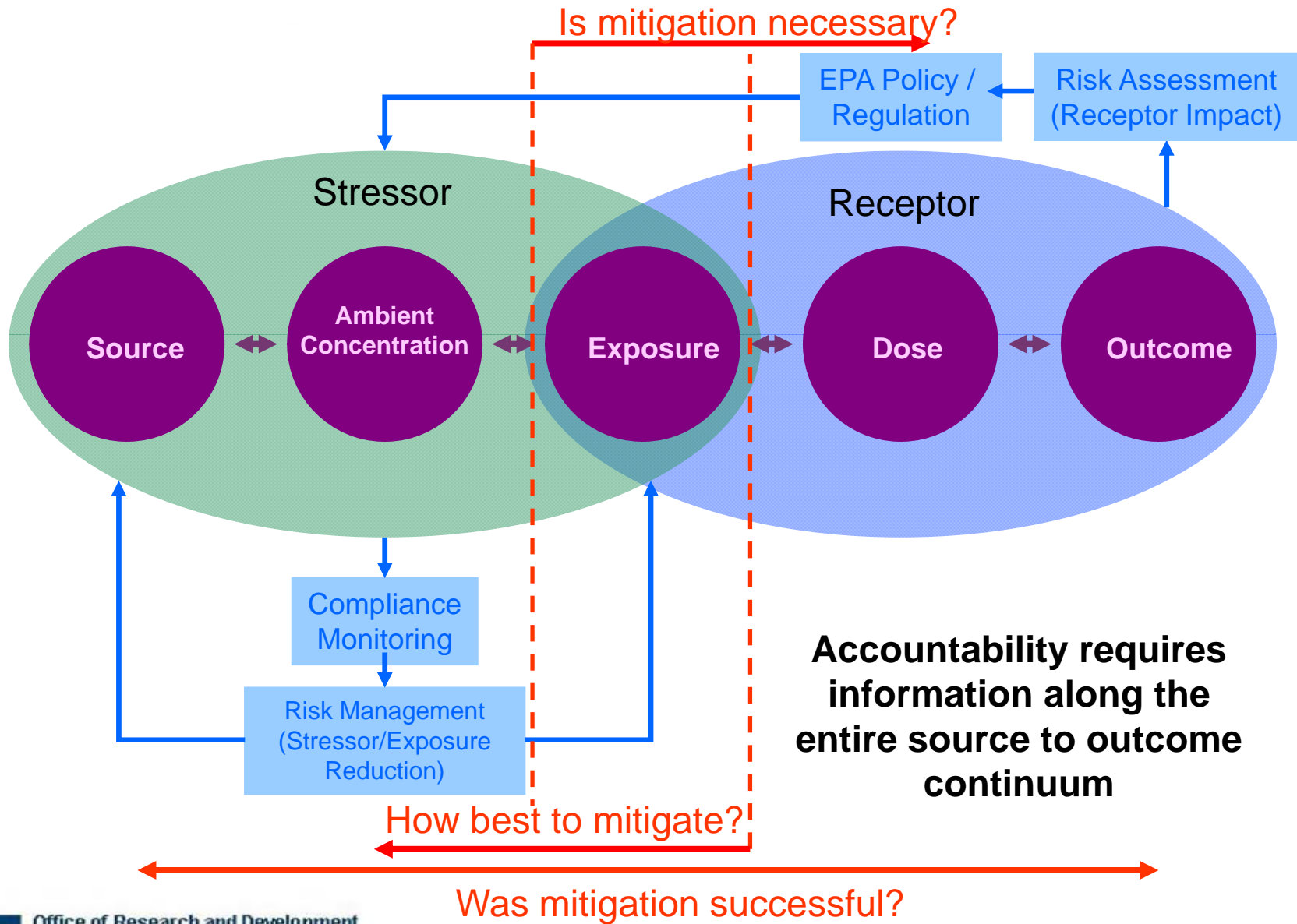
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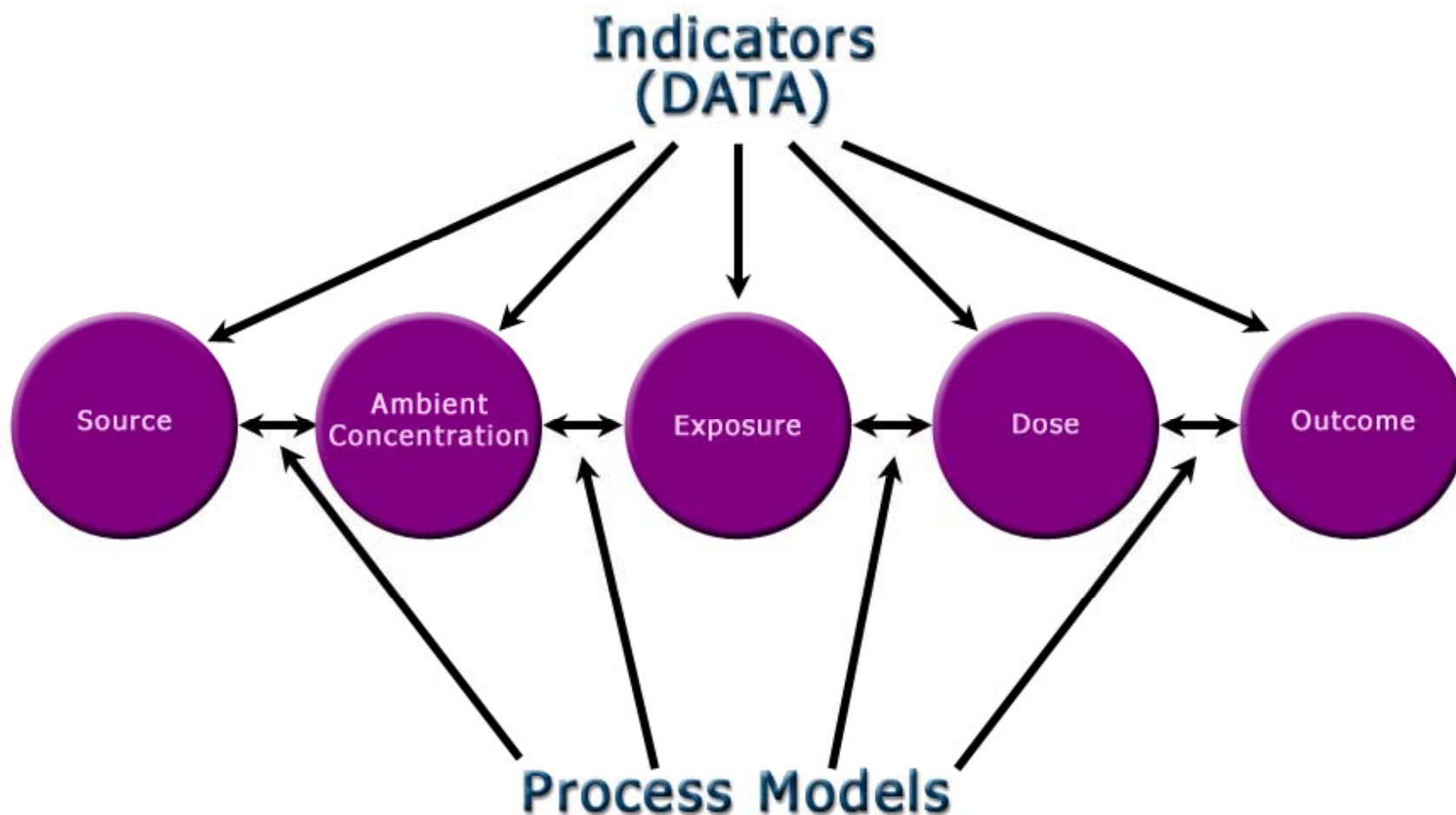


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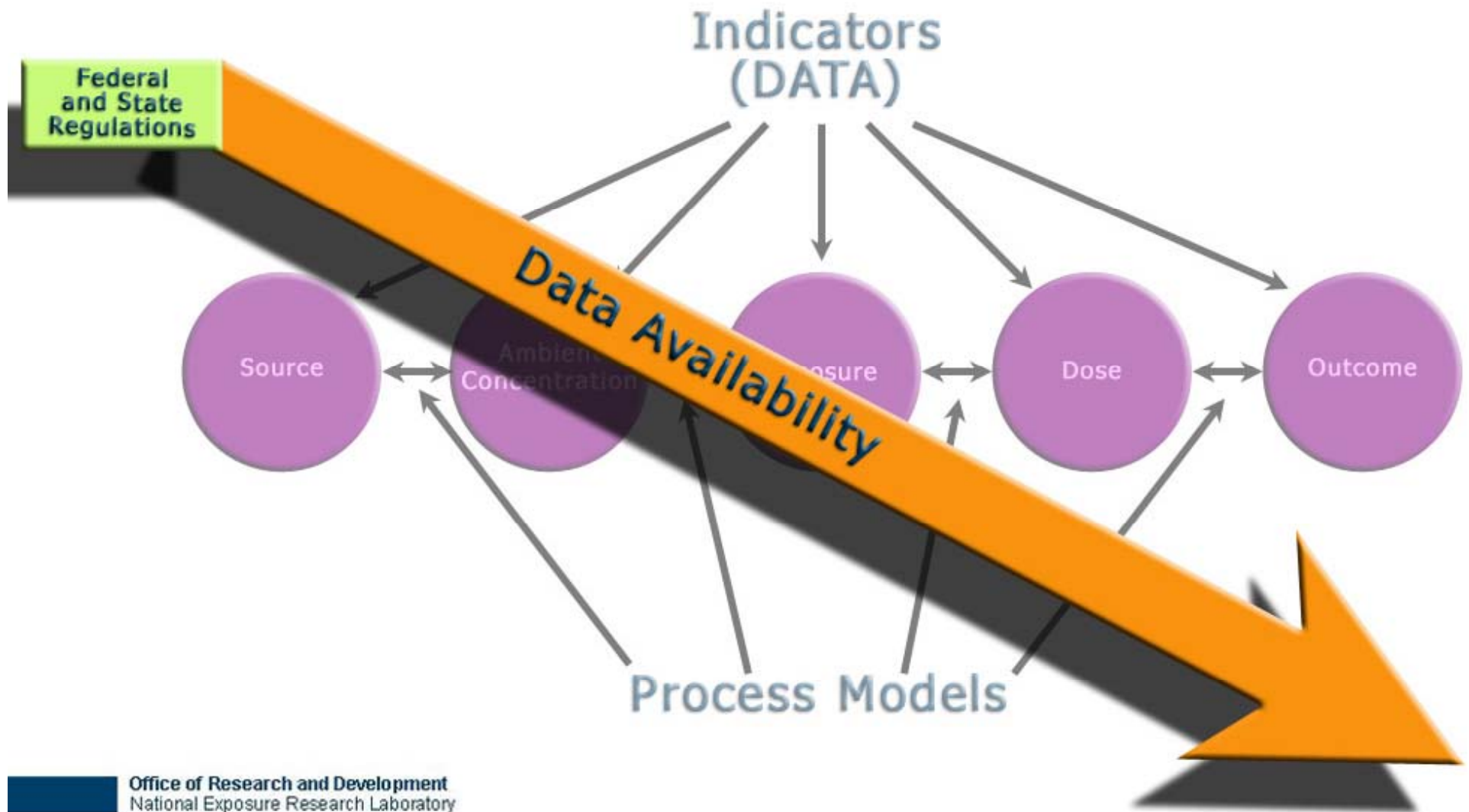
Accountability Framework

A collection of indicators and scientifically based conceptual models used to evaluate and demonstrate linkages between elements of the source to outcome continuum.

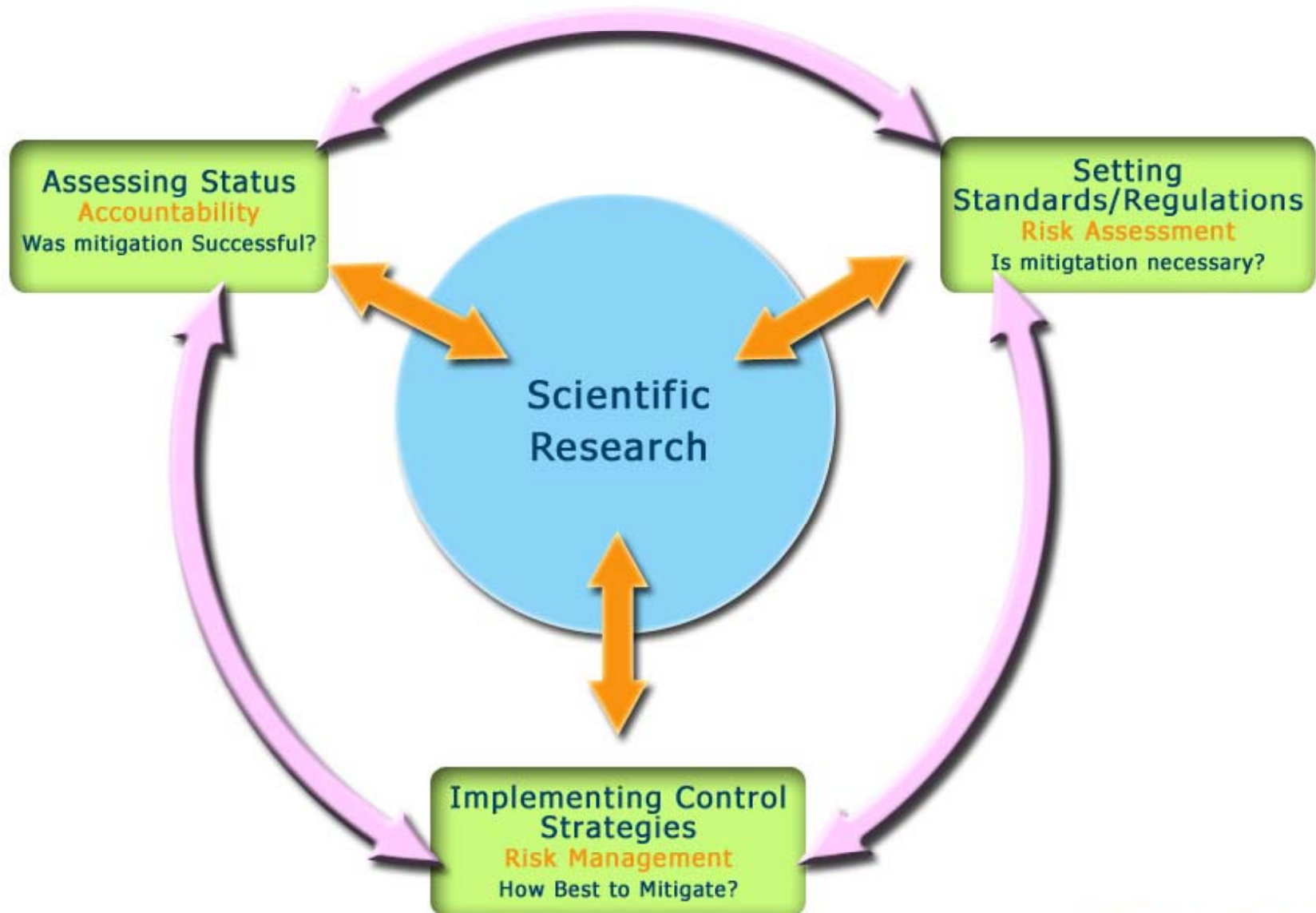


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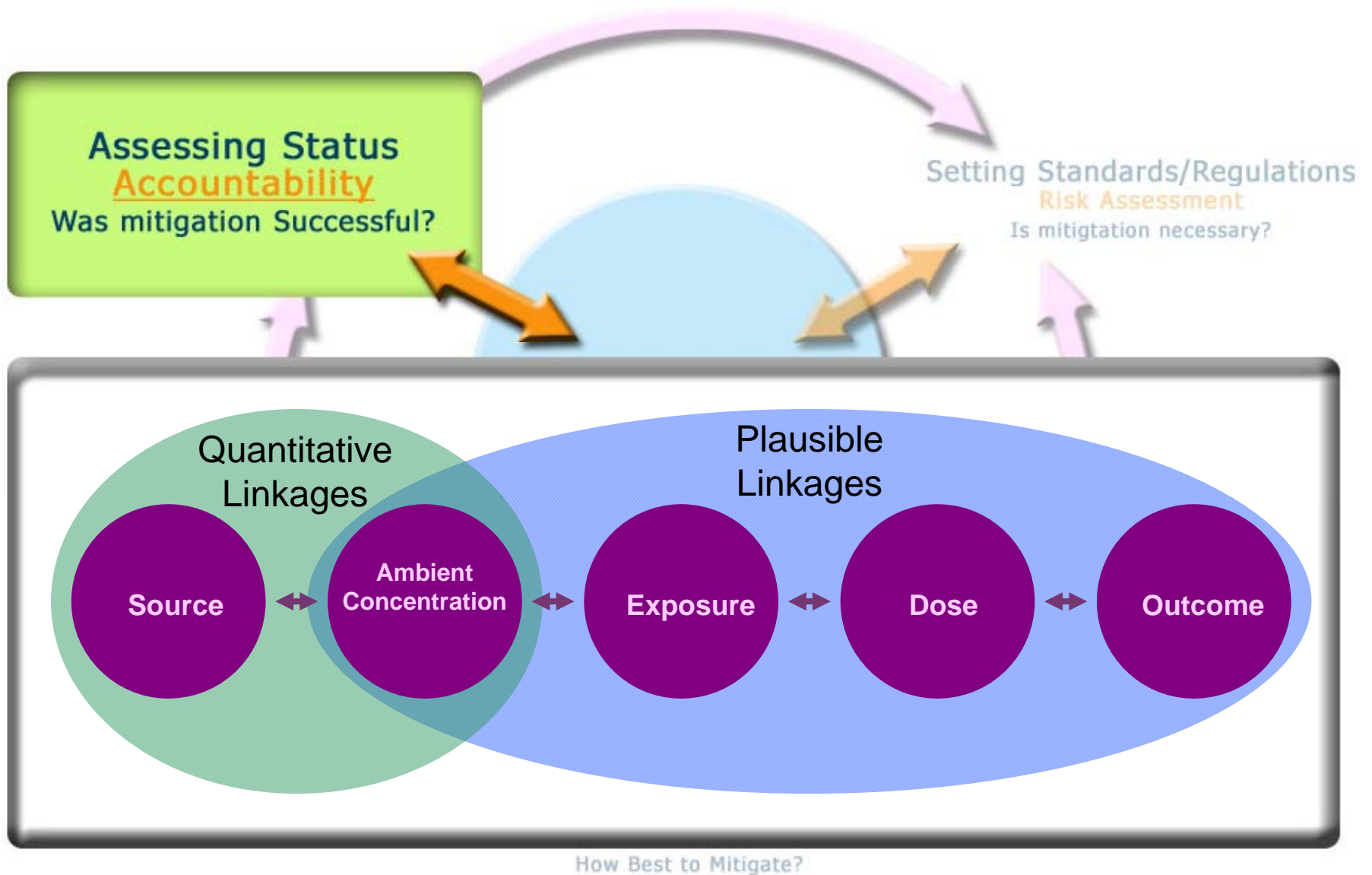


Air Quality Management System

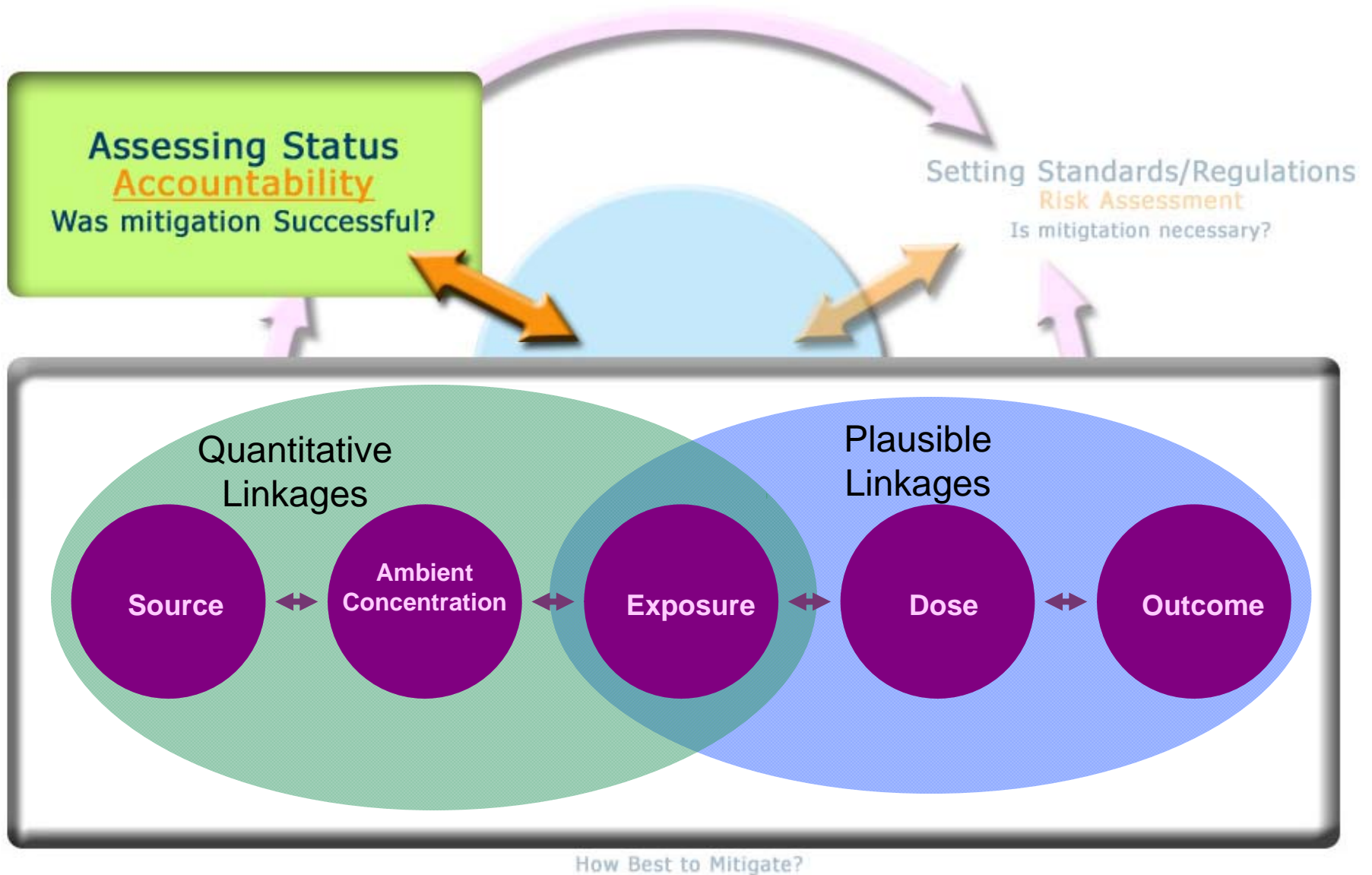


(Adapted from NRC, 2004)

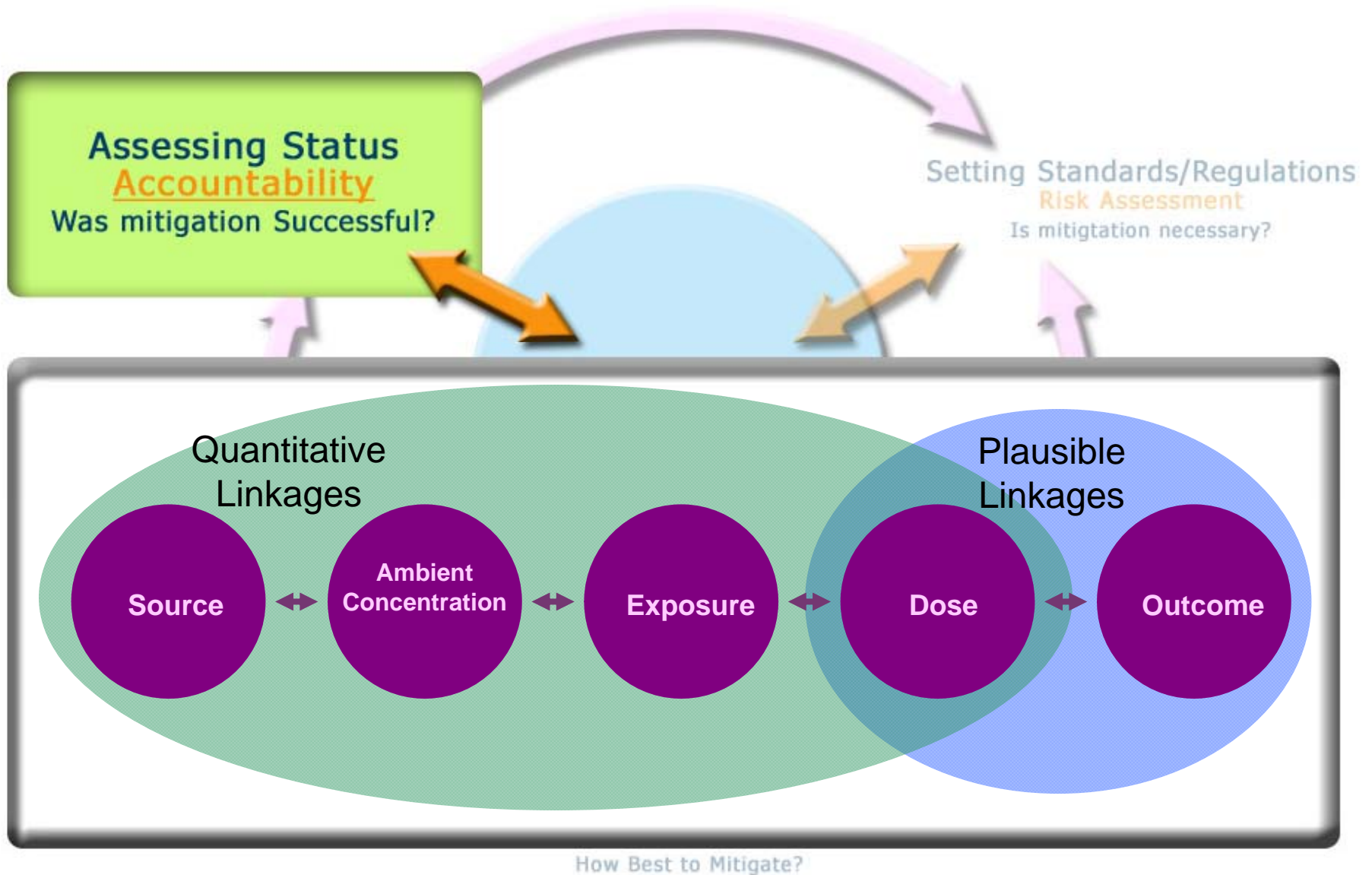
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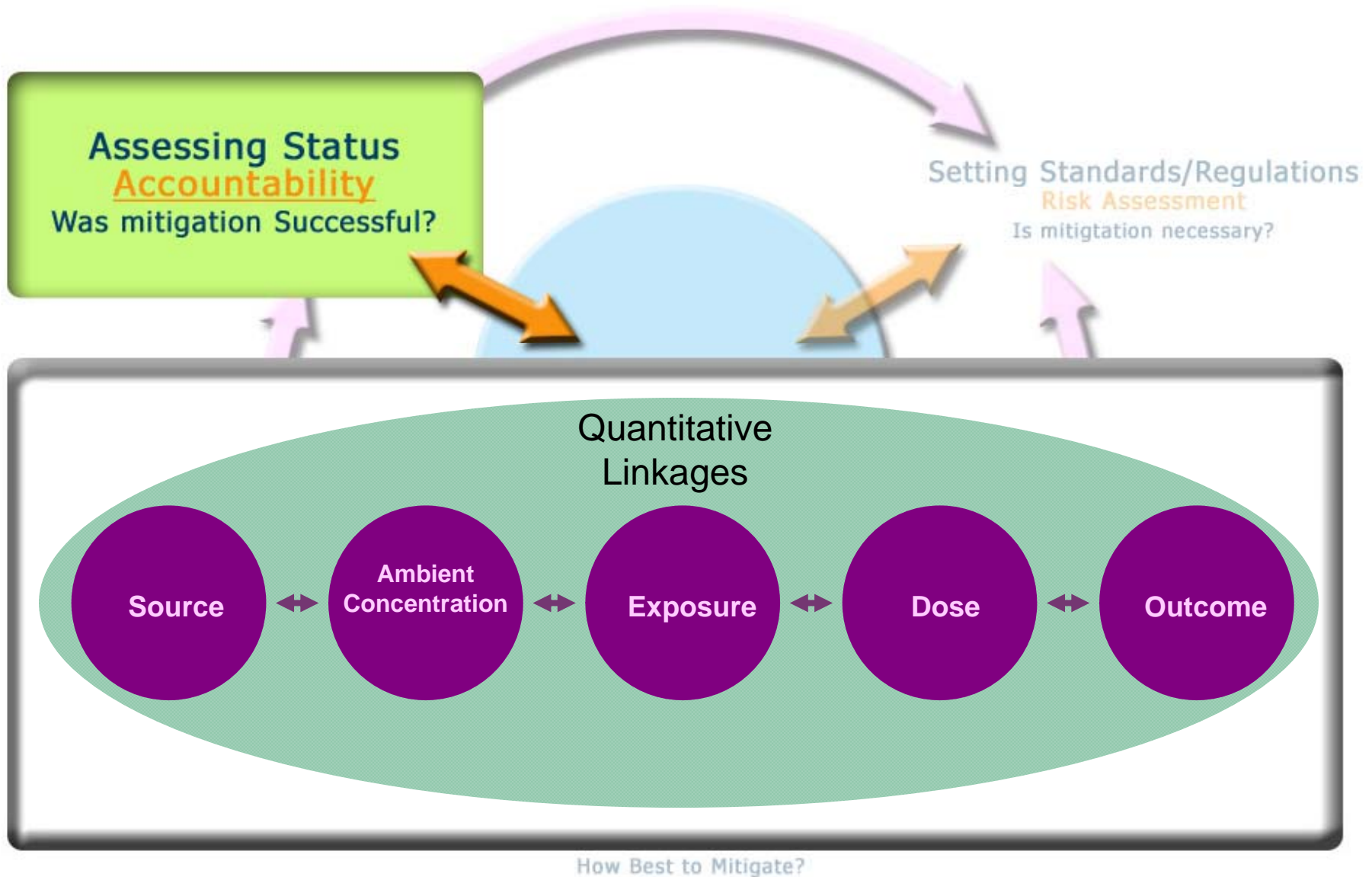
Air Quality Management System



Air Quality Management System



Air Quality Management System



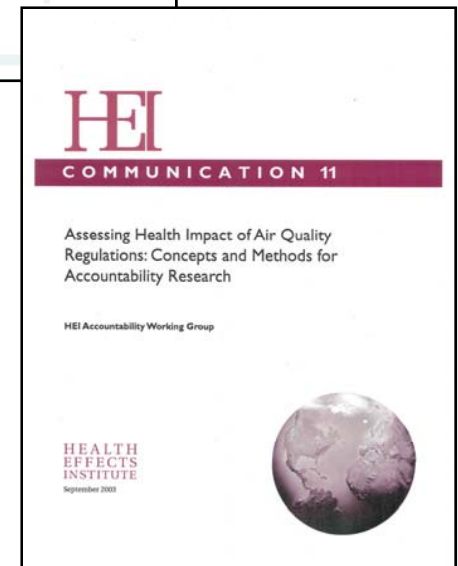
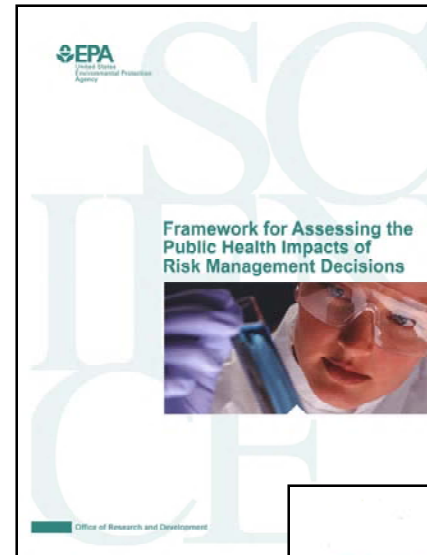
Air Accountability Research

Development and evaluation of indicators (e.g., biomarkers)

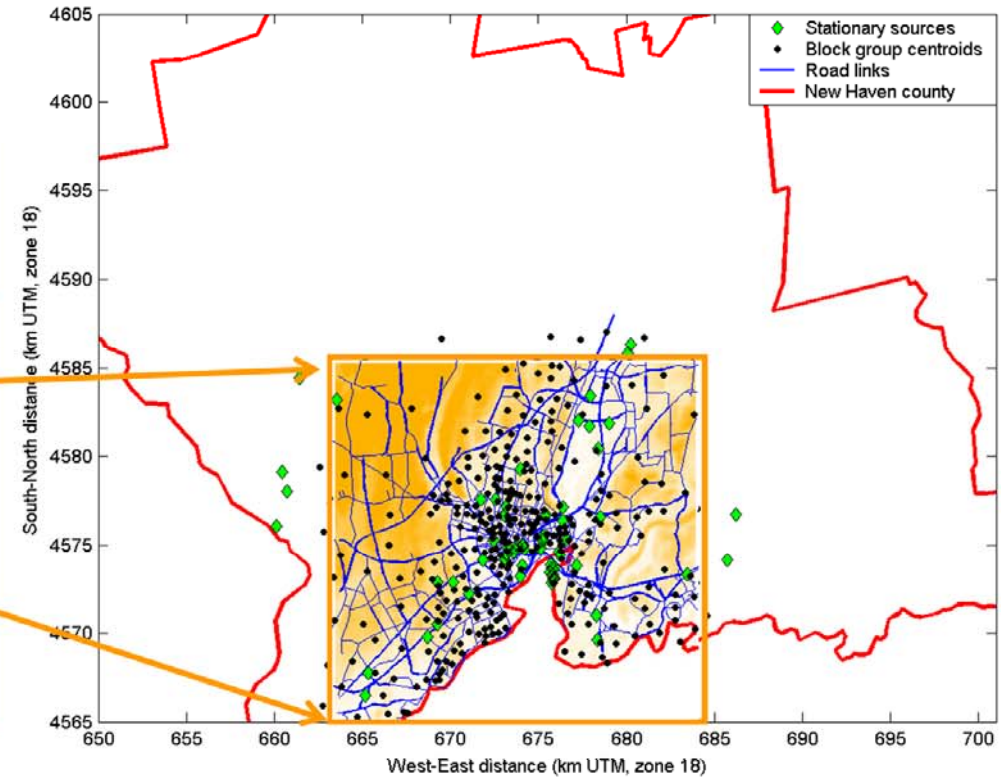
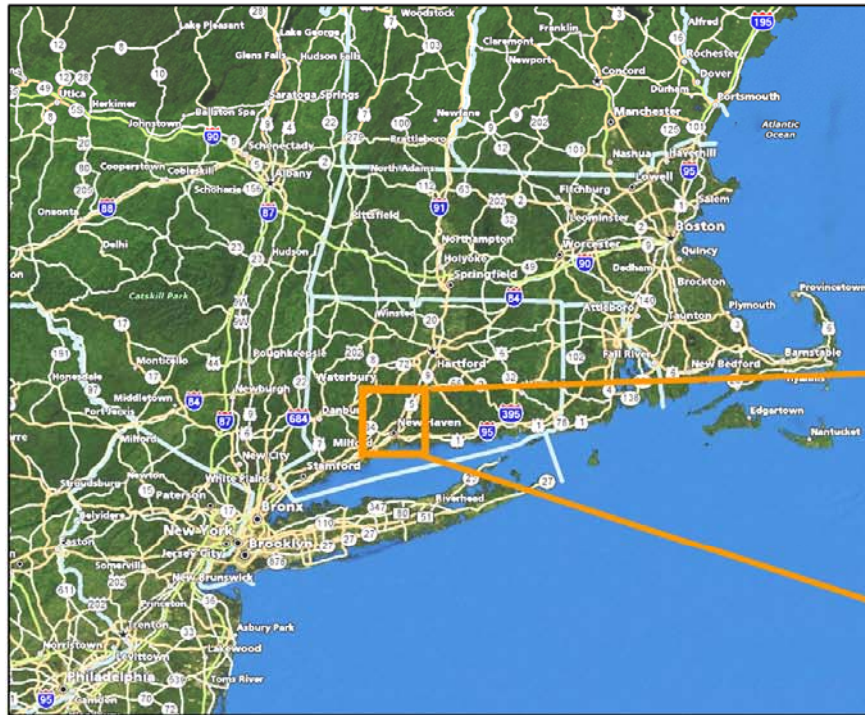
Development and evaluation of conceptual process models to link indicators from source to outcome

Feasibility Studies

- Targeted exposure, toxicological, and epidemiological studies to build plausible linkages
- Intervention studies
 - Post regulation
 - Unique events (e.g., Olympics)



New Haven Accountability Project



Study Objective: assess the feasibility of conducting a cumulative air accountability study at a local scale, New Haven, CT

New Haven Accountability Project Study Aims

Short Term

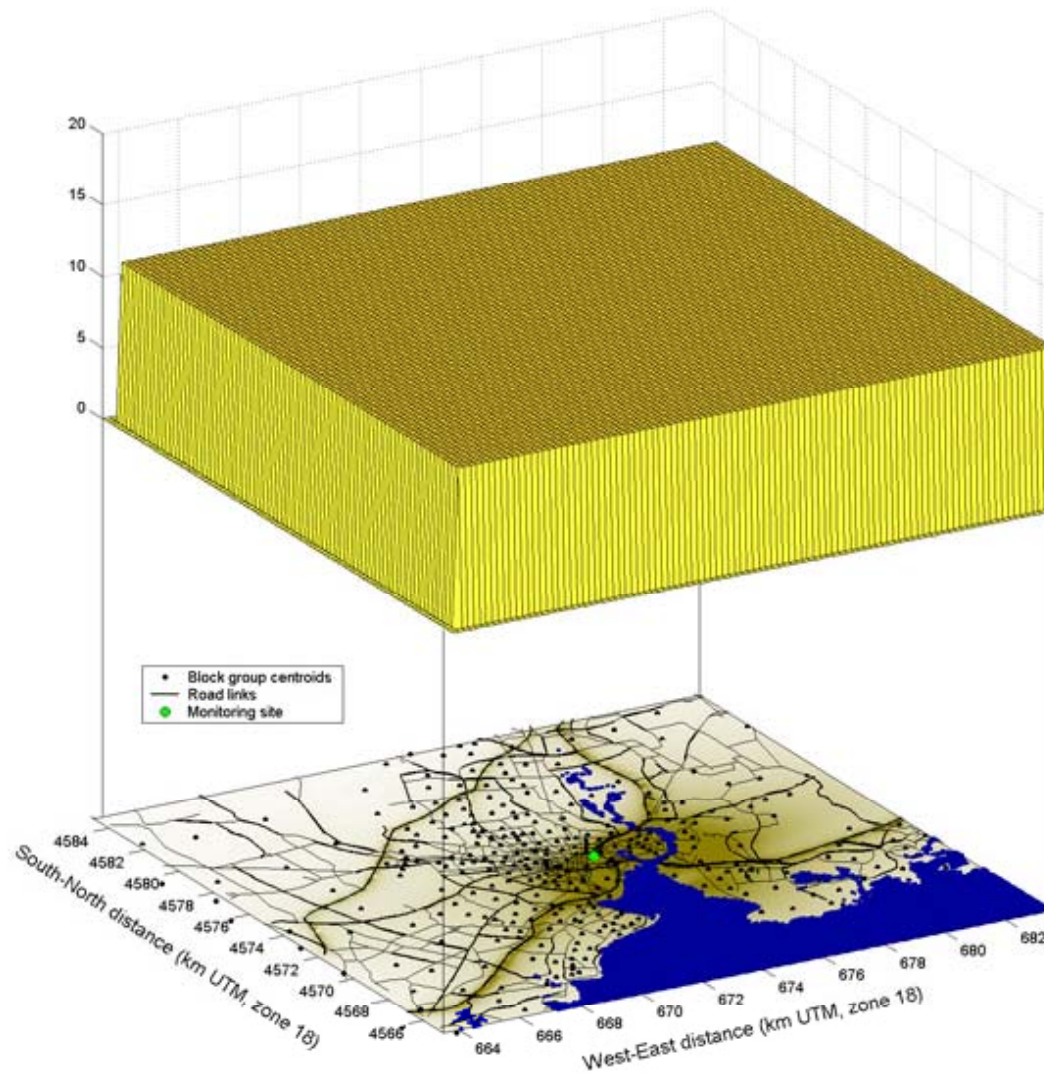
- Refine, apply and evaluate air quality and human exposure models for application to community health studies

Long Term

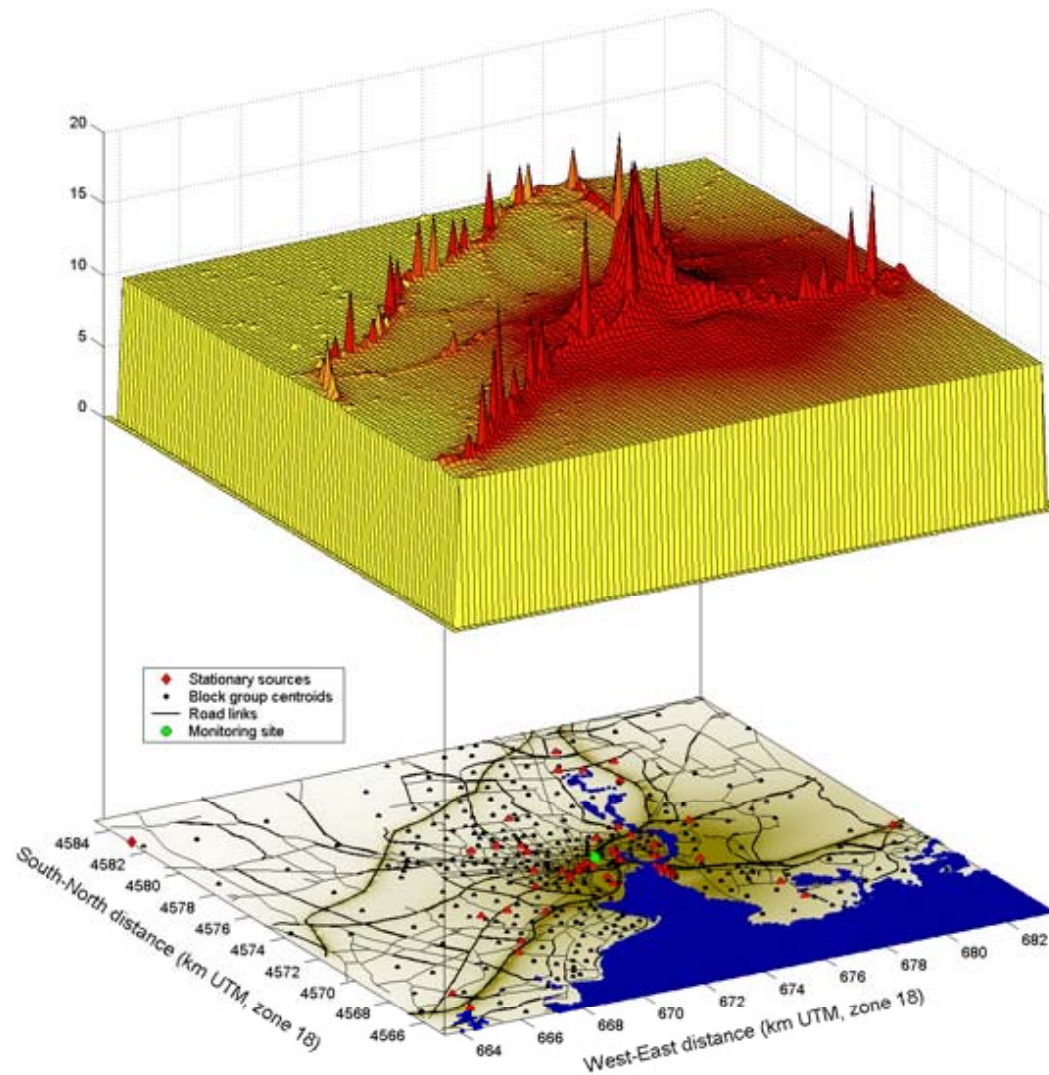
- Examine the association between exposure and health outcomes
- Evaluate the effectiveness of risk mitigation activities that reduce emission for public health benefits

New Haven Accountability Project

PM 2.5
Regional Background
(CMAQ)



New Haven Accountability Project



PM 2.5
Regional Background
+
Local Sources
(CMAQ+AERMOD)

New Haven Accountability Project Findings

- Exposure modeling must account for both regional and local pollutant sources (stationary and mobile)
- Data fusion techniques (CMAQ+AERMOD) integrate the contribution of the regional background with contributions from local sources to produce more spatially resolved estimates of air quality concentrations
- Results from data fusion modeling can be used as input into human exposure models (data not shown) to provide an enhanced exposure assessment (e.g., at the census block) for use in community scale air quality-health analyses

Summary

- In the U.S., there is a growing need to demonstrate the effectiveness of risk management decisions in protecting public health and the environment.
- In order to demonstrate effectiveness, both indicators and process models are needed to make quantitative linkages across the source to outcome continuum.
- Ongoing feasibility studies provide opportunities to apply and evaluate indicators and process models to advance accountability efforts.

Acknowledgements

Lawrence W. Reiter, Ph.D., Director, EPA NERL

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NARSTO Assessment

NARSTO Charge

- State of science evaluation of tools, opportunities, gaps and limitations addressing accountability and North American approach to technical support for multipollutant air quality management.
- Account for end to end progress from emissions to exposure to human health effects and ecosystem effects.
- Include “integration” of pollutant classes (e.g. Criteria pollutants and HAPs), and climate alteration interface.