

# Community/local Air Toxics Assessments:

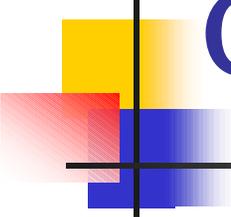
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## Interpreting and Understanding Measured And Modeled Data

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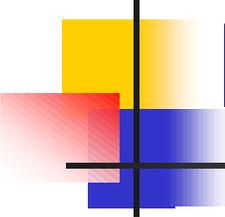
Detroit, 11/14/01



# Context of the Assessment

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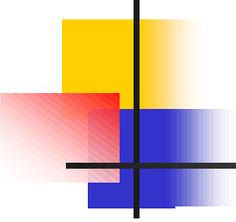
- In interpretation, consider assessment purpose and approach:
  - Answering what question?
  - How will the answer be used?
  - What is the audience?
  - What is the necessary level of certainty and scale?
  - What are the available resources



# Different Types of Monitoring/Modeling Data

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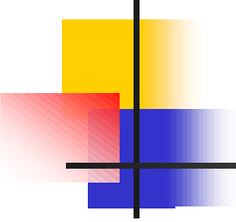
- Relevant to different community needs
  - Air Monitoring Data:
    - Regional/State                      Source-targeted
    - Project-specific      City/Community
  - Air Quality Modeling (e.g., of emissions data)
    - National modeling provides general characterization
    - More focused local modeling provides information more specific to your area
- Scope & purpose important to interpretation



# Air Monitoring Data ...

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- Reflect air concentrations at particular location during particular time
  - Proximity to sources is important to interpretation
    - Concentrations can vary significantly (in time & space)
  - Data from multiple sites and time points can provide sense of spatial and temporal variation for area of interest
  - Few people spend 24 hrs/day at air monitor site



# Air Monitoring Data...

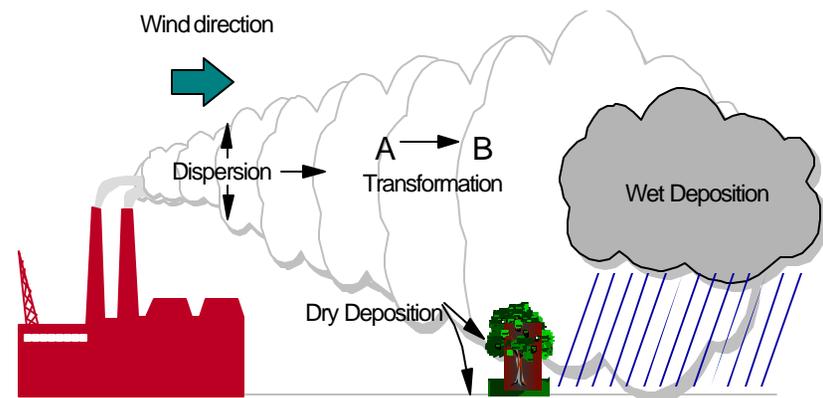
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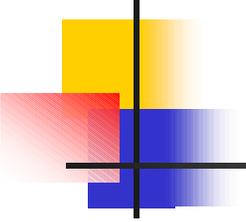
- Should be evaluated consistent with
  - Population of interest
    - Select monitors at locations representative of variety of areas frequented by study population
  - Duration/conditions of interest
    - Estimate long-term average concentrations for assessment related to chronic health risks
    - Estimate short-term (e.g., daily, hrly) average concentrations for assessment related to acute health risks

# Air Quality Modeling...

- Relies on:
  - Emissions estimates
  - Source characteristics
  - Meteorological data
  - Study area characteristics
  - Other inputs



- Level of detail and certainty of results can be no better than that of
  - inputs (e.g., emissions) &
  - modeling assumptions



# Air Quality Modeling

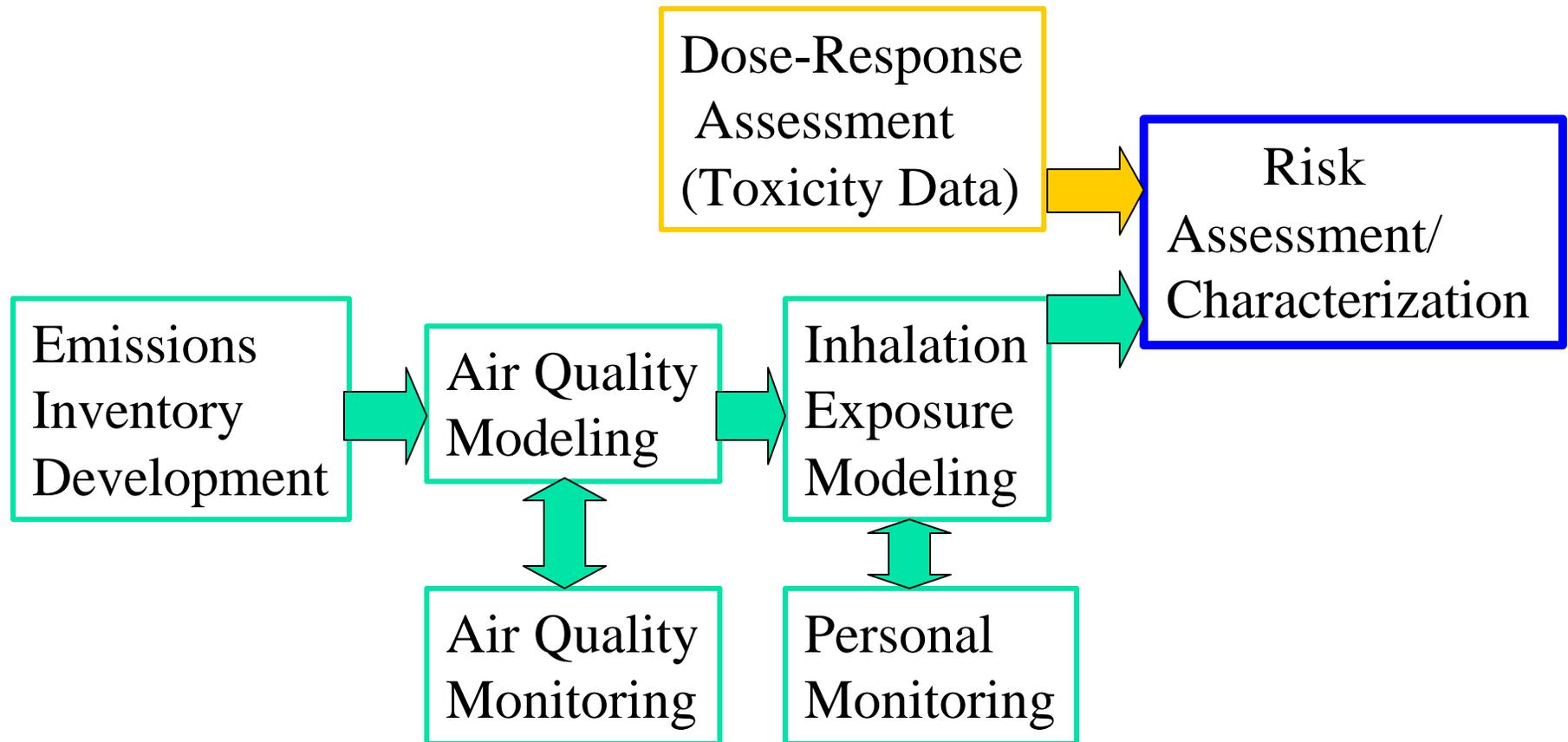
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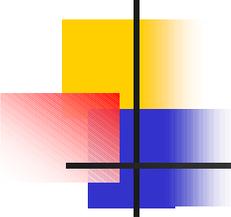
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- A **local** scale tool (w. **local** emissions inventory) is needed for **local** assessment
  - (e.g., ISCST, AERMOD)
    - “Guidance, Methodology & Applications for Modeling Toxics Pollutants in Urban Areas” (USEPA, July 1999)
    - <http://www.epa.gov/ttn/scram/>
- Larger scale tools cannot provide local area detail

# Air Toxics Assessment Steps

(Inhalation)

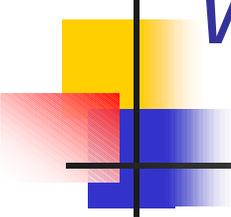




# Risk depends on **exposure** circumstances and chemical **toxicity**

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- Exposure information, e.g.,
  - Differing pollutant concentrations among locations (car, office, yard, home)
  - Amount of time spent in different locations
- Chemical toxicity information
  - What health effects are associated with what kind of exposures to chemical X? (Hazard)
  - How much of an exposure is needed to elicit effects? (Dose-response)



# *What are people's exposures?*

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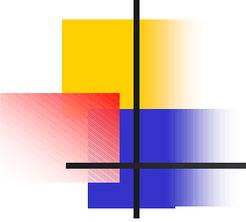
- **Simplistic assumption**

(people breathe air outside their house all day everyday)

- Useful for screening or comparative air quality assessments
- Does not provide exposure information needed for risk assessment

- **Exposure models can take into account:**

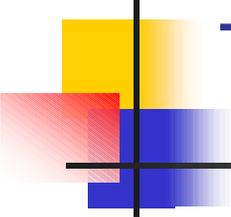
- Very few people spend all of their time outdoors
- Pollutant concentrations differ among locations (microenvironments)
- People move among microenvironments
- People often spend part of their day distant from their home
- Different people have different activity patterns
- Indoor pollutant sources



# *What pollutants are good risk reduction priorities?*

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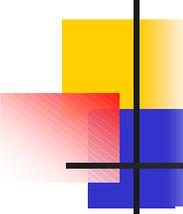
- Chemical toxicity information is needed
- Variety of assessment options differing in refinement and comprehensiveness,  
e.g.,
  - Hazard-based screening or ranking of emissions
  - Hazard-based screening or ranking of concentrations
  - Risk assessment (various degrees refinement)



# Toxicity Information

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- Hazard (what health effects with what exposures?)
- Dose-response (how much exposure to elicit effects?)
- Commonly summarized into values:
  - Reference Values (RfCs) – estimate of exposure unlikely to cause harm
  - Cancer Unit Risk Estimates – upper bound estimates of cancer risk per unit exposure ( $\mu\text{g}/\text{m}^3$ )
  - Simplifying protective assumptions employed in face of uncertainty/data gaps



# Characterization of Results

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Transparent, Clear, Concise, Reasonable:

- Consistent with objectives and purpose
  - In context of limitations in
    - analysis design/scope,
    - tools/methods (i.e., what they can and cannot tell you)
  - Transparent assumptions/simplifications
    - Emissions, Air quality, Exposure, Toxicity
- and recognition of their impact on interpretation