Overview
OFCM National Joint Urban Test Bed: Concept of Operations

Walter D. Bach, Jr.
Co-chair JAG / Joint Urban Test Beds
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Outline

- Definition
- Capabilities and Benefits
- Characteristics of Urban Scales
- Management Structure
- Infrastructure Requirements
- Selection Process
- Implementation Framework

Definition

Urban Test Bed

A multifunctional infrastructure that provides multi-year continuous measurement and archival of environmental data, across a metropolitan area and through the atmospheric boundary layer, supporting improvements in a range of activities from scientific research to user applications.

Capabilities and Benefits

- Long term, continuous, high resolution meteorological observations of urban domain
- Tools to use the data for public benefit
- Purpose - Enable use scientific knowledge to identify atmospheric role connecting incident to consequences affecting public interests and concerns.

Improve National Capabilities

- Impacts on health due to weather and climate factors
- Air quality forecasts (PM, ozone, …)
- Urban scale forecasting of severe weather, weather extremes (heat and cold), and other impacts on stakeholders (in terms of safety, economics, and operations)
- Dispersion forecasts for airborne contaminants
- Warnings for flash floods and other results of localized heavy rainfall
- Forecasts of water contamination due to deposition of airborne contaminants
- Urban scale climate predictions

Improve National Capabilities

- Understanding the elements of urban ecosystems and how the elements interact
- Understanding socioeconomic impacts of weather and climate in urban areas
- Management and mitigation of risks associated with the environment in urban areas
- “Tailored” products for the many urban stakeholders, i.e. products that are compatible with the stakeholder’s decision-making process
- Protection of natural resources and ecosystems
- Managing wildland fires in the wildland/urban interface

Ultimate Benefit to Stakeholders

Save lives, resources, and infrastructure

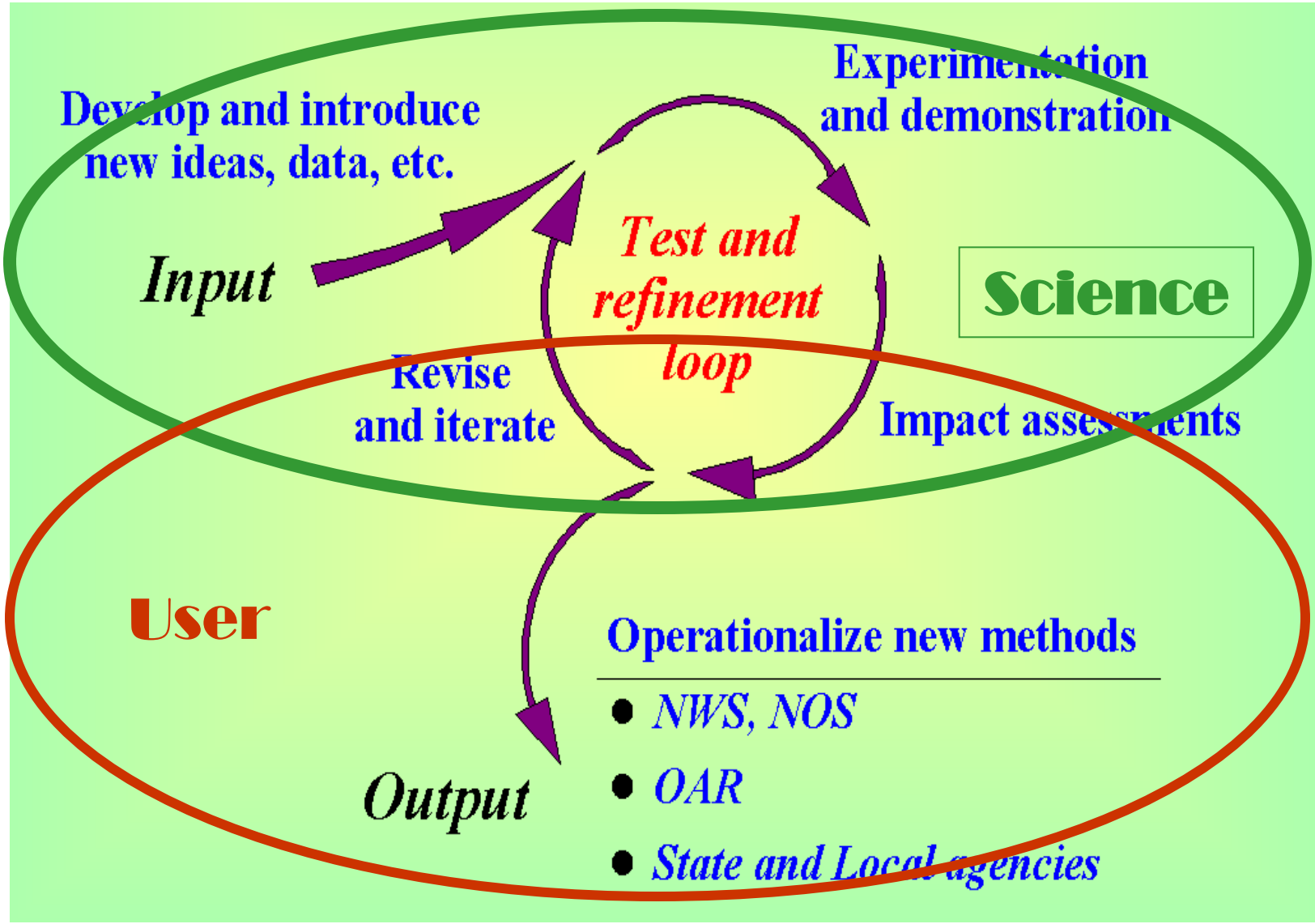
Healthier population

More robust economy

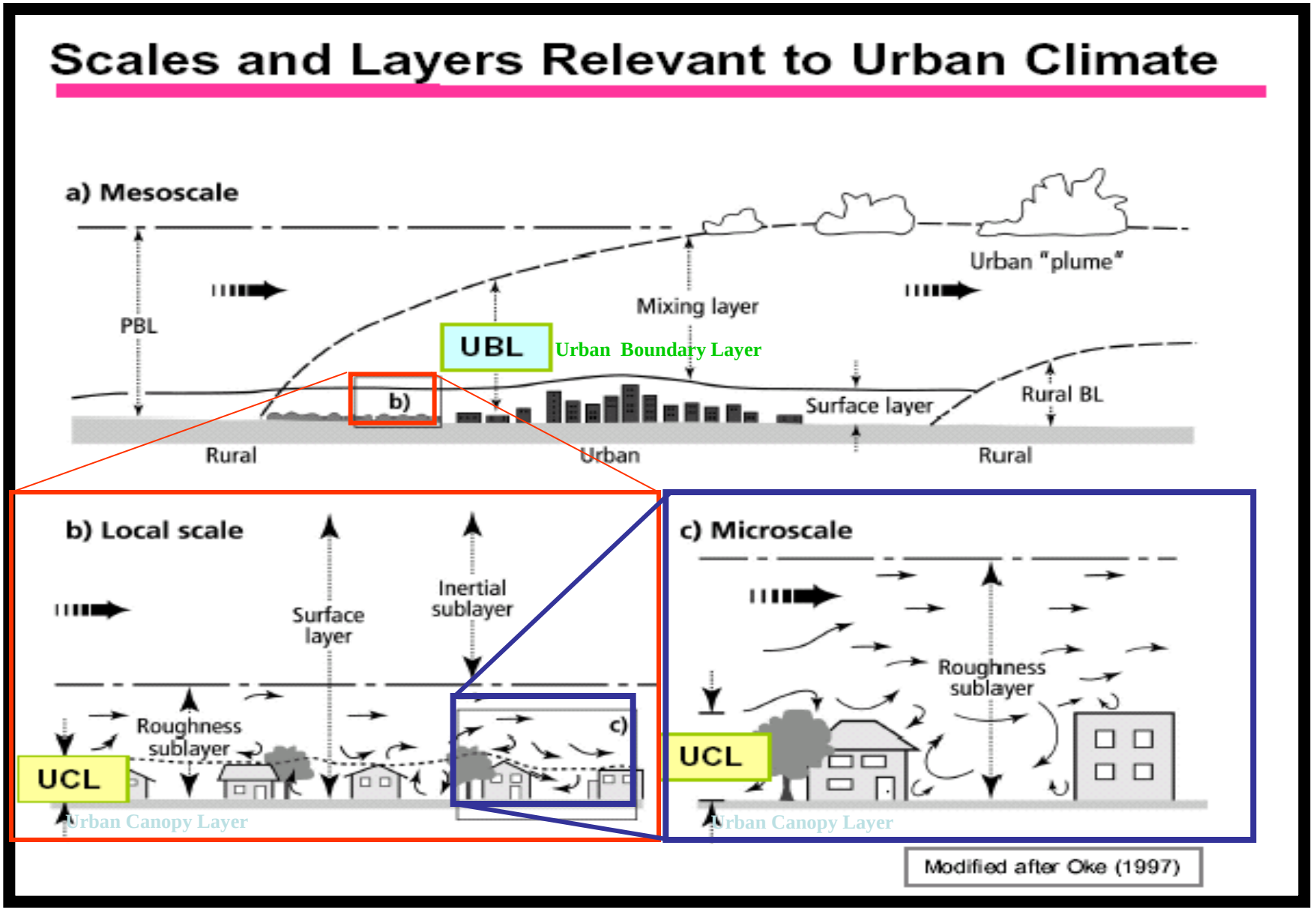
Protect critical ecosystems

Improved risk management and mitigation

Test Bed Concept



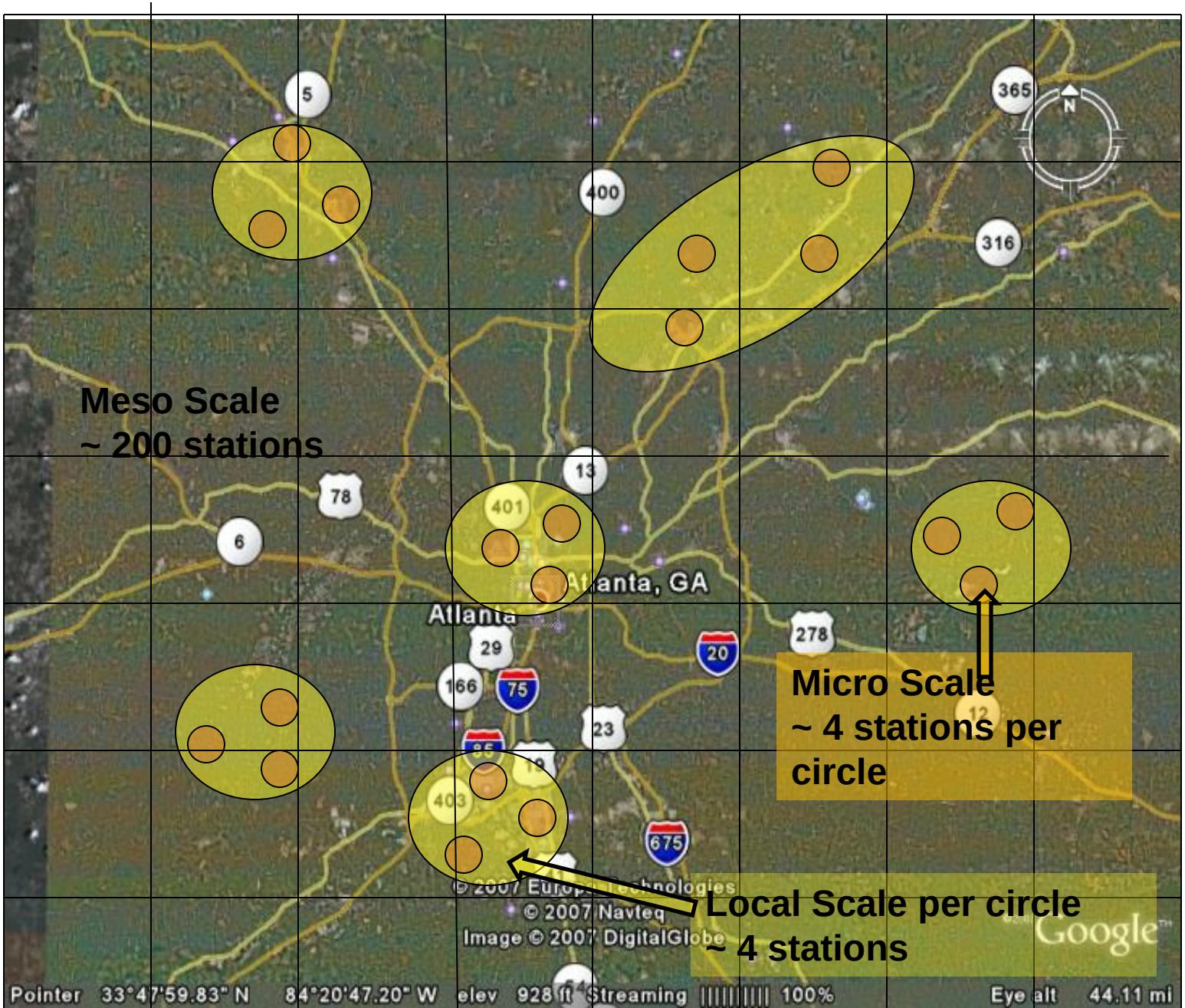
Characteristics of Urban Scales



Characteristics of Urban Scales

- Meso: ~ 40 km radius
  - IDEAL: Pre-urban to post urban influences; Measure wind (u,v,w), T, q through PBL; Dz = 10 m; Dt = 1 min; Spacing ~ 3 -5 km; precip type, rate
  - CURRENT CAPABILITY: BL wind profiler (100m – 4km) (with RASS); Dz = 50 m; Dt = 15 min; Spacing ~ 1/city; Precip variable; Sodar; Radar;
  - USERS: Air quality, Homeland Security, Transportation, Severe Storm (SS), County and City Gov't (City Planners), Media, Agriculture, Public Safety, Public Health, Land Managers, Fire, Weather Enterprise, Industry; R&D for modeling, Quantify Uncertainty, Develop/Test parametric relationships
- Local ~ 8 km radius
  - IDEAL: 3 to 5 sub-areas inside Meso; Flux & flux divergence (momentum, heat, water, radiation) subsurface through surface layer to ~ 300 m; Dz =5 to 10 m; >10 Hz sampling rates. Integrated roughness. Include >3 Meso sites per Local; Co-locate with AQ instrumentation.
  - CURRENT CAPABILITY: 10 to 30 m towers in special programs; Surface based obs networks. Radar;
  - USERS: R&D, Health, AQ, WQ, SS, Nowcasting; Emergency response;
- Micro ~ 1 km radius
  - IDEAL: 3 to 5 sub-areas inside each Local; Flux & flux divergence at discontinuities inside of area. Roughness characterization.
  - CURRENT CAPABILITY: Specialized programs; Historical studies (Urban 2000; Joint Urban 2003).
  - USERS: R&D, Emergency response

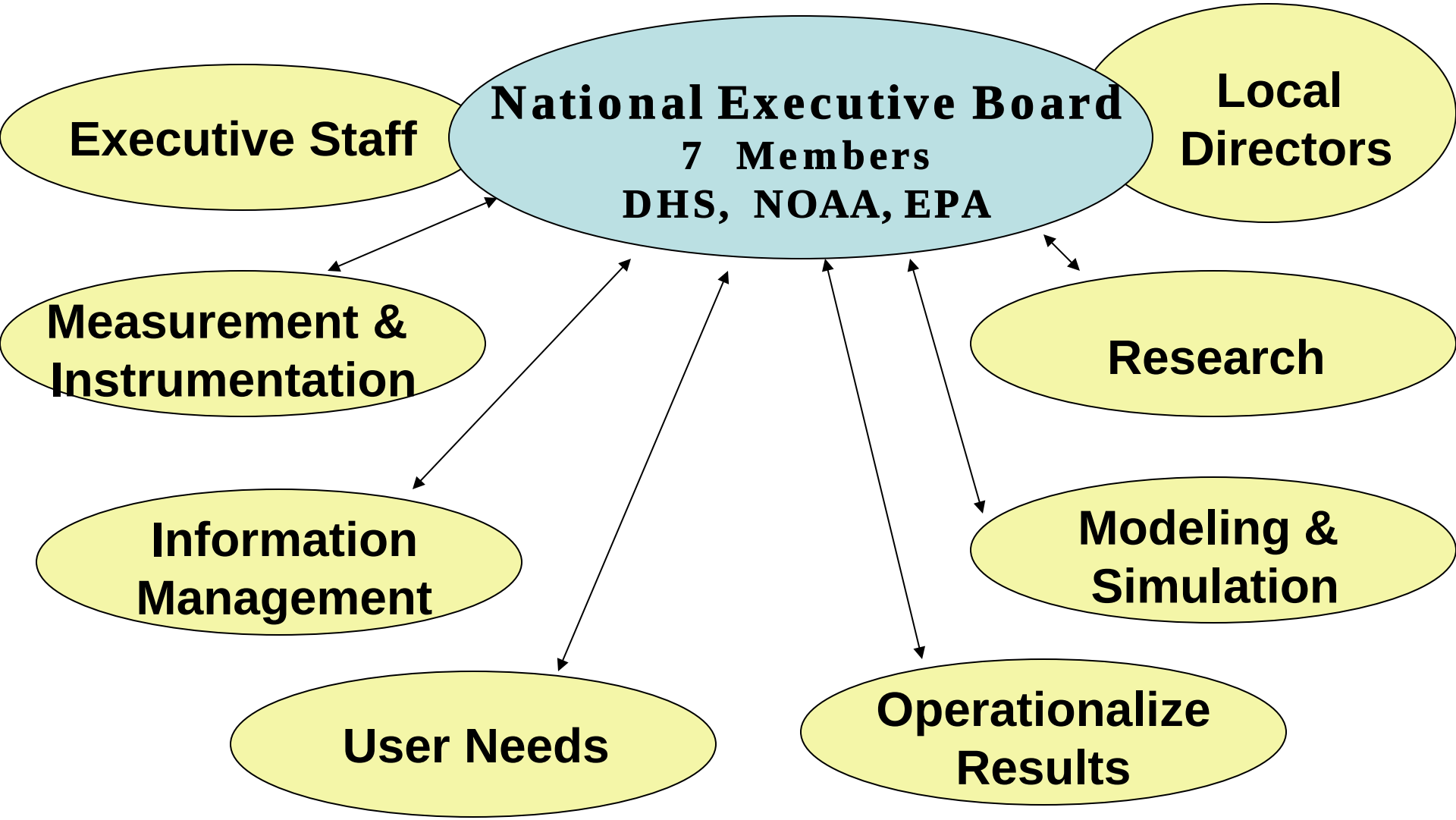
Atlanta Metro



Management Structure

- National Executive
- National Operational
- Local Executive
- Local Operational

Executive Management Structure



Measurement & Instrumentation

- Establish a minimum set of standard measurements, density, and sampling frequency for each urban scale
- Establish system reliability standards
- Establish system accuracy standards
- Recommend types of systems that need to be developed

Information Management

- Recommends acquisition, archiving, and distribution of JUTB data
- Provide basic guidelines for JUTB system architecture
- Provide basic guidelines for representation of products to multiple users, to include compatibility with GIS
- Provide data format standards and guidelines, to include meta-data
- Recommend linkages to and from other data sources
- Establish minimum standards for QA and QC of data
- Establish appropriate levels of data security and information assurance
- Establish standards for data availability during power and/or communications outages

Research

- Identify national research requirements that are applicable to JUTBs
- Synchronize national research requirements with local JUTB research efforts
- Solicit and support research efforts applicable to the urban environment from appropriate agencies and institutions

Modeling & Simulation

- Modeling: Includes diagnostic and prognostic environmental-related models
- Assess performance of existing models and model ensembles for different urban scales and applications
- Recommend existing models for use within specific JUTBs
- Recommend development of new models, or changes to existing models
- Recommend research initiatives to better simulate urban scales and meet user needs
- Recommend improved instrumentation and measurements

User Needs

- Assess, approve, and prioritize user needs
- Showcase results that successfully address local user needs

Operationalize Results

- Review JUTB results and recommend implementation of successful practices throughout JUTBs and outside of JUTBs, as appropriate
- Publicize and market JUTB results throughout the community
- Conduct routine national conferences, symposia, or workshops to discuss and highlight JUTB activities at least annually

Local JUTB

- Local JUTB Manager – approved by Executive Board
- Local Infrastructure Managers (serve on National panels)
  - Measurement & Instrumentation
  - Modeling
  - Information management
  - Research
  - Operationalize results
- Local Stakeholders (Identified by local interests)

Selection Process

- National priority
- Local ability to support a test bed
- Uniqueness and/or commonality of the test bed environment
- Competitive Proposal Process

Selection Criteria

- **National Priority**
  - Political importance (National Treasures)
  - Strategic importance (Ports, Nuclear, Power Grid, Transportation Hubs, Communication Hubs, Critical Industry)
  - Economic importance
  - Population density (Health and Public Safety)
  - Level of interest and fiscal support at the national level

Selection Criteria

- **Local ability to support a test bed**
  - Local/state support (interest / priority / commitment of personnel, infrastructure, and other resources)
  - Financial commitment (money available, money required to start… complete)
  - Private sector support
  - Academic support
  - Community involvement - public safety, elected executives (mayors, councils, county boards & commissioners), local emergency response committees, citizen support
  - Outreach – community education
  - Existing test bed infrastructure elements
  - Experienced personnel – users, providers

Selection Criteria

- **Uniqueness and/or Commonality of the Test Bed Environment**
  - Climate
  - Weather variability
  - Terrain complexity (elevation, slopes, land use, buildings, water interfaces)
  - Scientific challenges
  - Ability to design and support special field experiments (e.g. tracer experiments) and studies

Selection Criteria

- **Competitive Proposal Process**
  - Recommend that general objective be based on above criteria as determined by the Executive Board and published in a formal solicitation with a stated fiscal level of support.
  - Urban communities would respond to the solicitation addressing their capabilities in those areas and to the User criteria that the community will provide in fiscal and/or services in kind.
  - Selection made on peer review of proposals.

Implementation Framework

- Successful transition to operations
  - Grow networks incrementally
  - Choose near-term objectives carefully
  - Share results among users & across test beds
  - Learn and adjust

Comments

Questions