AN ADAPTIVE CYBERINFRASTRUCTURE FOR THREAT MANAGEMENT IN URBAN WATER DISTRIBUTION SYSTEMS

DDDAS Workshop

National Science Foundation

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Participants

- **North Carolina State University**
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- **University of Chicago**
  - ☐ Gregor von Laszewski
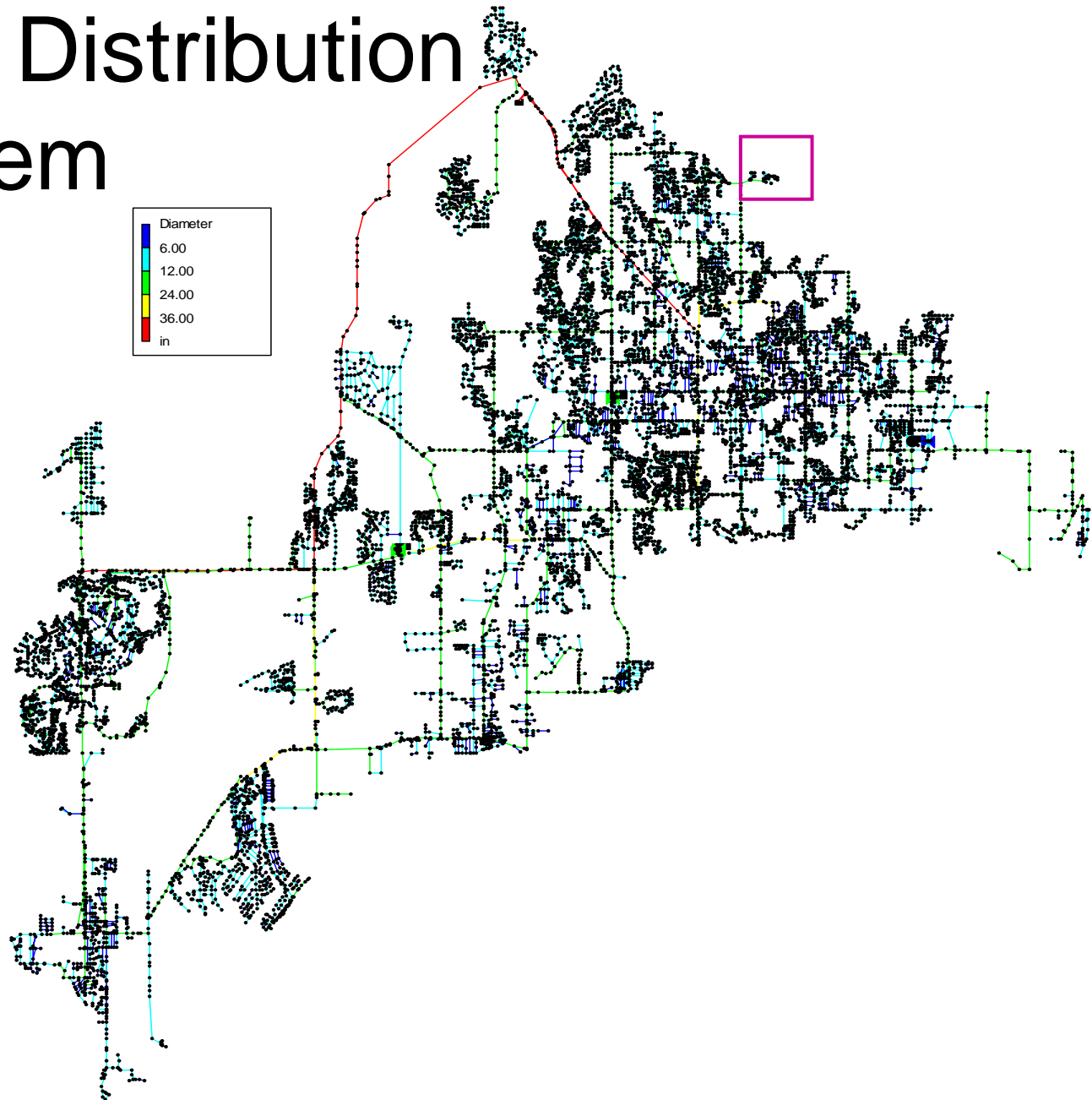- **University of Cincinnati**
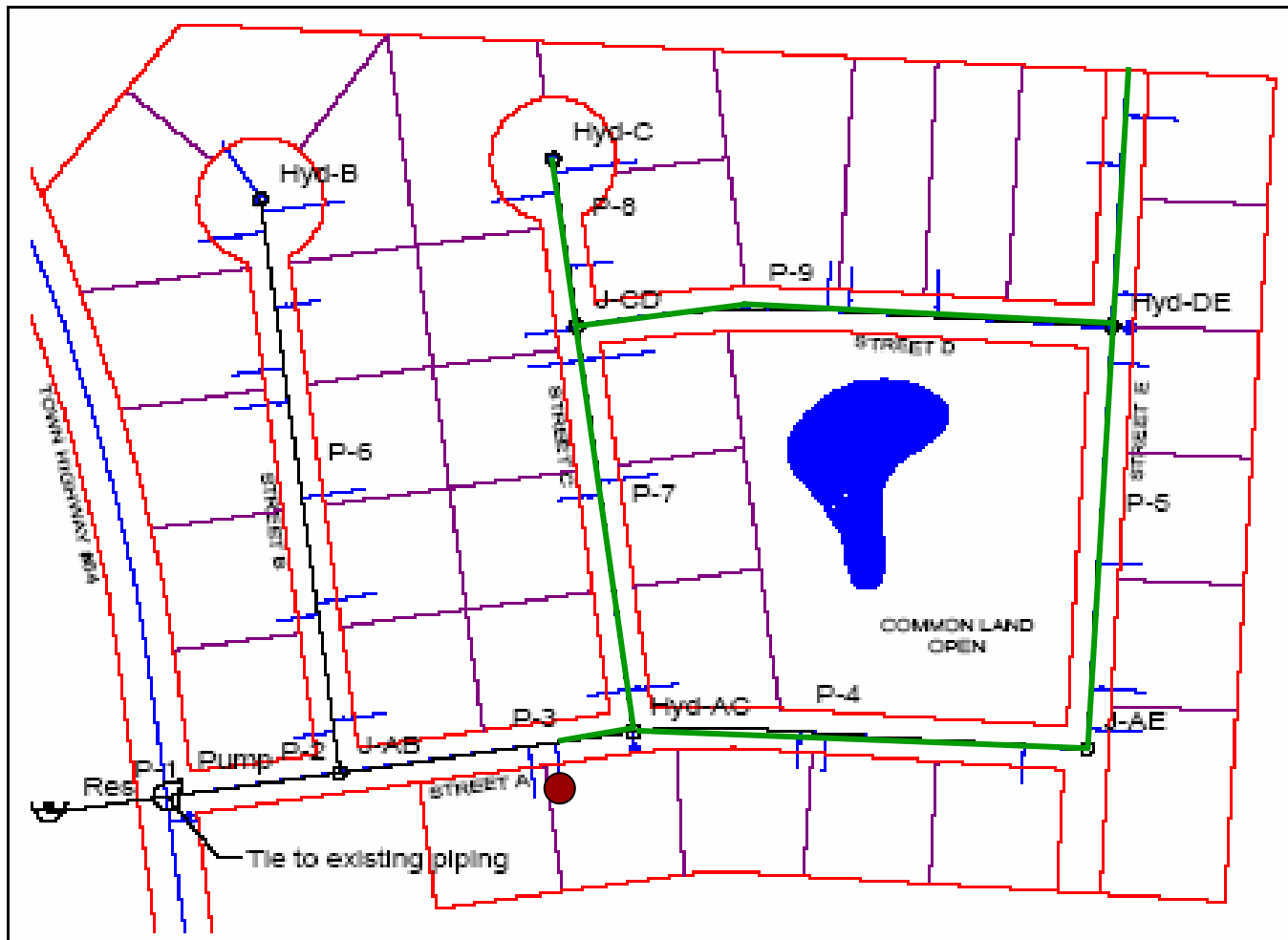 - ☐ Jim Uber
- **University of South Carolina**
  - ☐ Ken Harrison

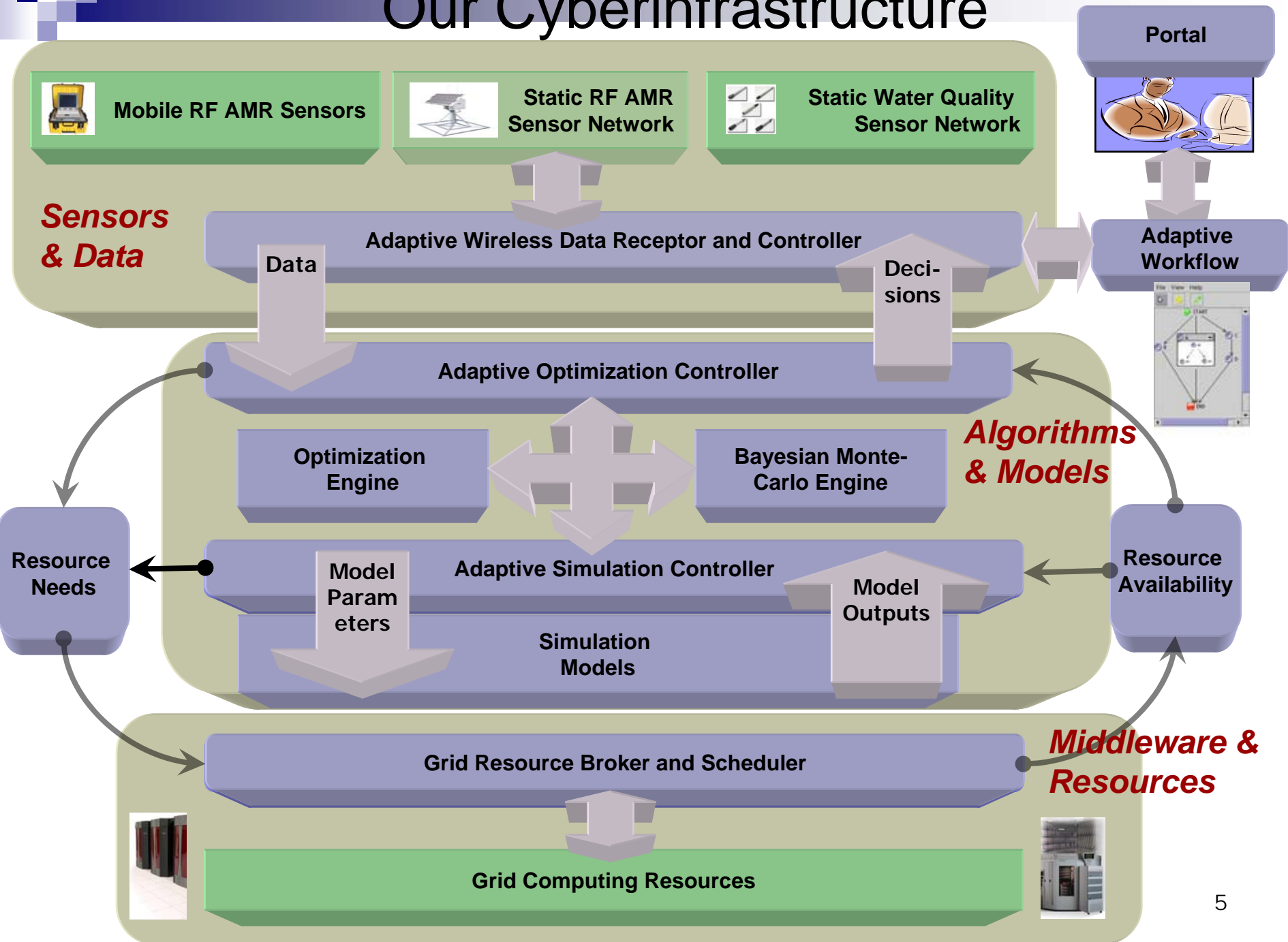**Greater Cincinnati Water Works**

Water Distribution Problem

Diagram legend:

Diameter
- 6.00
- 12.00
- 24.00
- 36.00
- in

Water Distribution Problem

Our Cyberinfrastructure

Sensors & Data

- Mobile RF AMR Sensors
- Static RF AMR Sensor Network
- Static Water Quality Sensor Network

Portal

Adaptive Wireless Data Receptor and Controller

Data

Deci-sions

Adaptive Workflow

Algorithms & Models

Adaptive Optimization Controller

Optimization Engine

Bayesian Monte-Carlo Engine

Resource Needs

Resource Availability

Adaptive Simulation Controller

Model Parameters

Model Outputs

Simulation Models

Middleware & Resources

Grid Resource Broker and Scheduler

Grid Computing Resources

DDDAS Aspects

- Dynamic
  - ☐ Data
  - ☐ Optimization
  - ☐ Simulation
  - ☐ Workflow
  - ☐ Computer Resources
- Data Driven and Vice Versa
  - ☐ Water Demand Data
  - ☐ Water Quality Data

Key DDDAS Developments

- Algorithm and Model Development
  - Dynamic Optimization
  - Bayesian Data Sampling and Probabilistic Assessment
  - Model Auto Calibration
  - Model Skeletonization
  - Network Assessment using Back Tracking
- Middleware Development
  - Adaptive Workflow Engine
  - Adaptive Resource Management
  - Controller Designs
- Cincinnati Application Scenario Development
  - Source Identification
  - Sampling Network Design

Questions?