

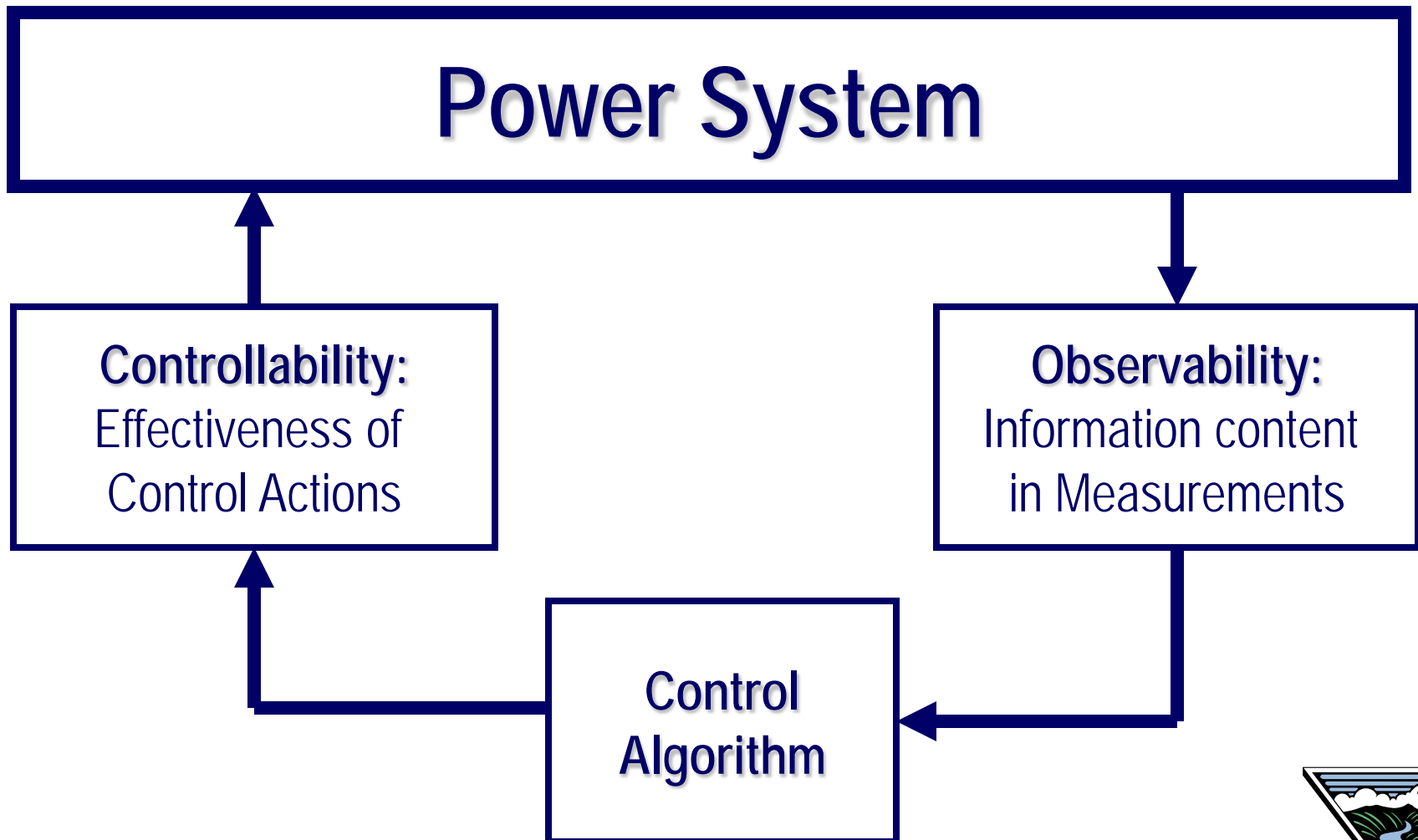
# BPA Power System Stability Controls

Bonneville Power Administration

NASPI Meeting - October 2008



# Power System Stability Controls



# What is Different This Time Around

- First, availability of wide-area signals for power system controls.
  - Better observability (information) leads to better decisions
  - Better information makes control algorithm simpler and more robust
  
- Second, greater acceptance of power electronic devices
  - Can deliver control actions more effectively
  
- Third, digital control implementation:
  - More effective and flexible control algorithms



# Power System Controls

- Voltage / Angle Stability Controls
- Oscillation Damping Controls
- Power Flow Controls
- Wind Power Plant Controls



# Controller Design Framework

- Controllability:
  - What control actions can we take to improve stability ?
  - Do we have appropriate devices, located in right places, and adequately sized ?
  - What investments can be made to achieve controllability ?
- Observability:
  - What types of measurements and locations provide the best visibility of the system conditions ?
  - Do we have an adequate wide-area control infrastructure ?
- Control Algorithm Design
  - Robustness and scalability
- Controller Implementation
- Communication / Acceptance by WECC and Industry



# BPA Team

- BPA Transmission Planning
- BPA Transmission Operations
- BPA Engineering and Design – Remedial Action Schemes, Measurement Systems
- Panel of top industry experts
- Consultants
- Pier review – CISO, SCE, PG&E, BCTC, NERC, CERTS



Controllability

Observability

Design

Implement

Voltage / Angle  
Stability Controls



Oscillation Damping Controls



Power Flow Controls



Wind Power Plant Controls

