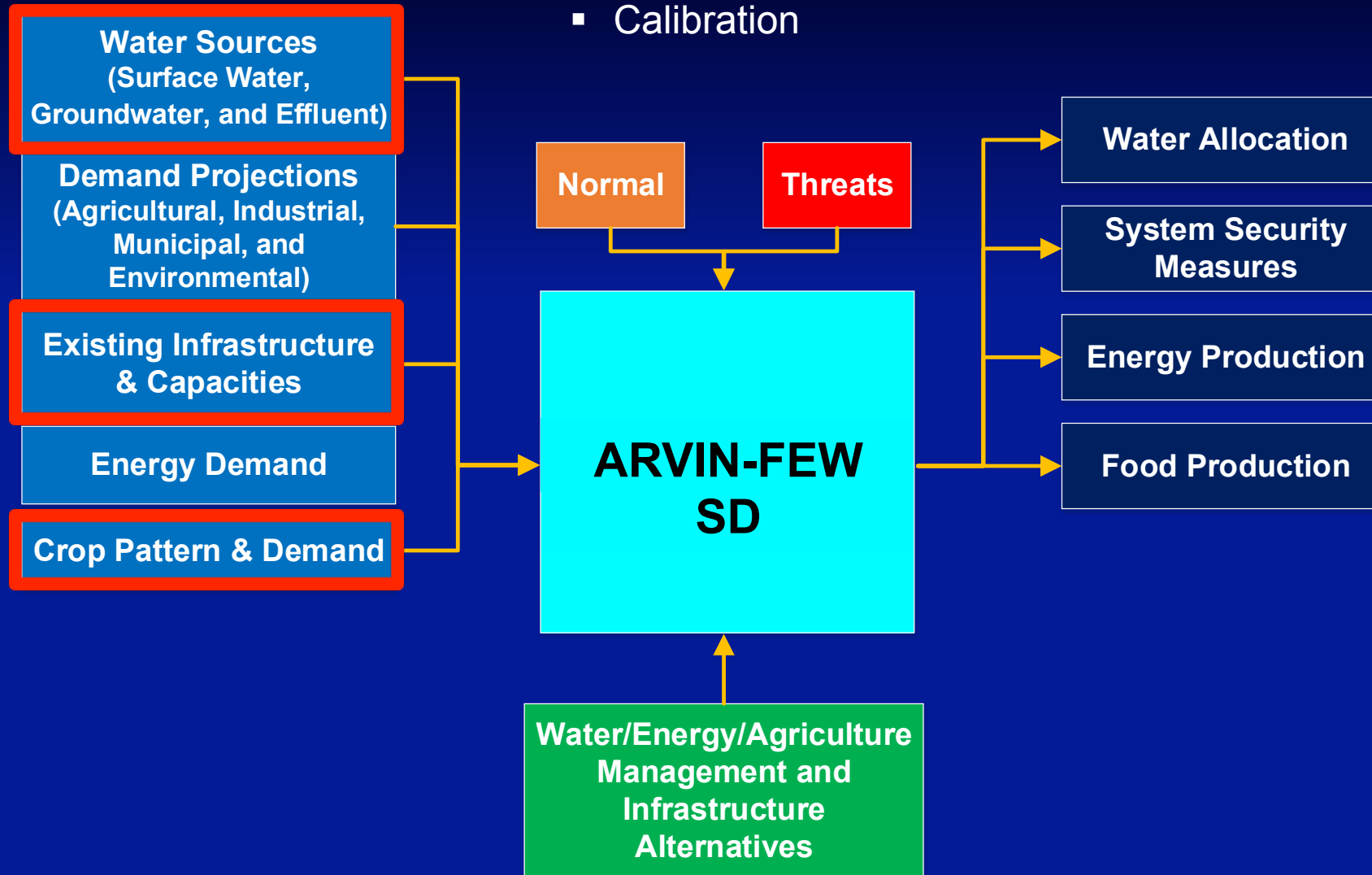
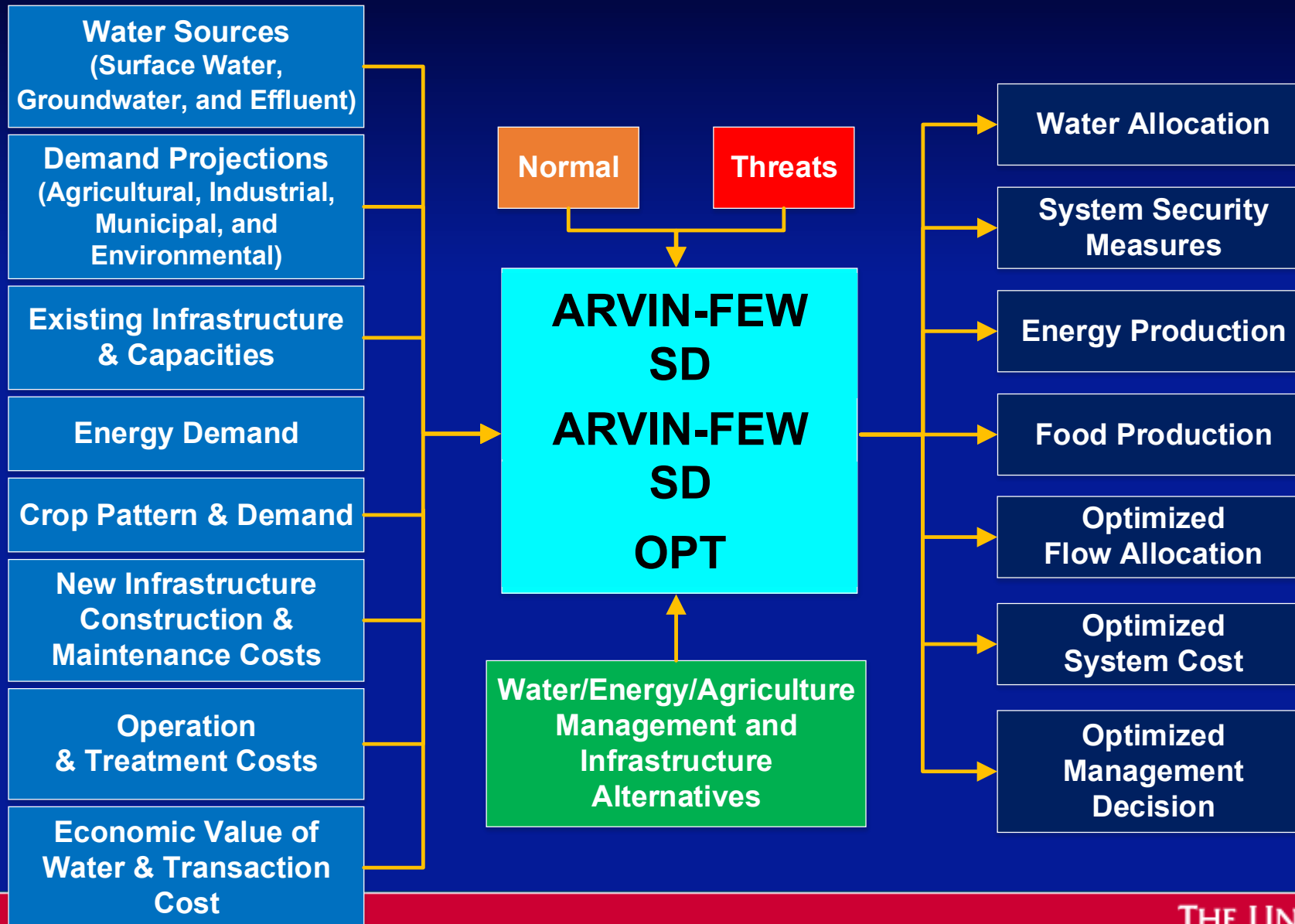


Future Work

- Improve water supply and demand data and allowable groundwater withdrawals
- Develop ARVIN for AZ agriculture system
- Calibration



ARVIN-FEW OPT Structure

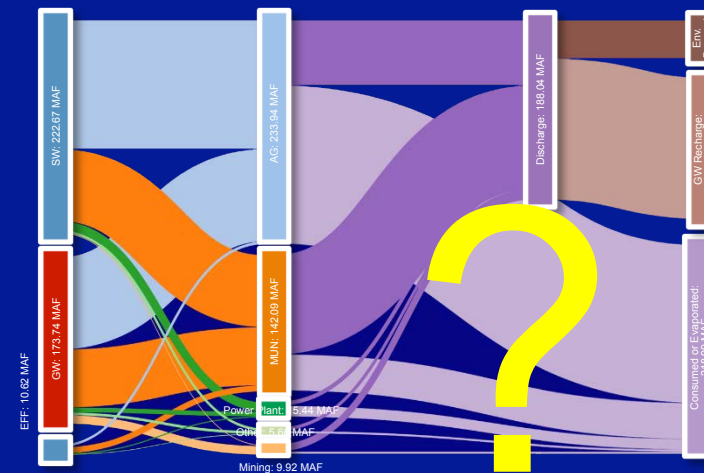


Modeling Technique



Model Calibration and Representation

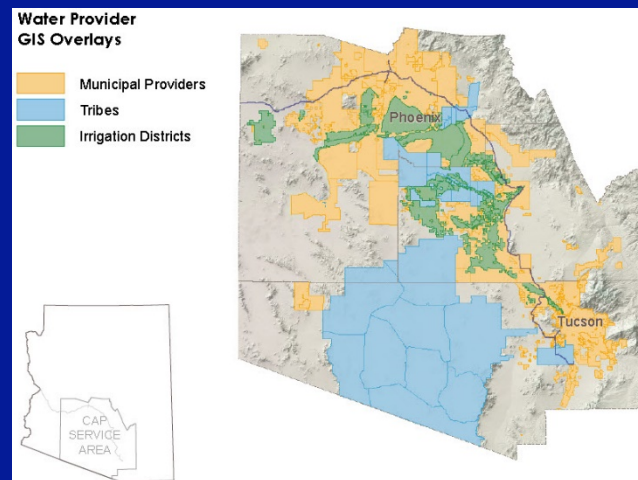
- Initial GW Conditions
- Hydrology
 - Inflows – natural recharge/CR flows
 - Outflow – Distribution
- Water quality → SALT
 - Accumulation over time
 - Impact of water softeners



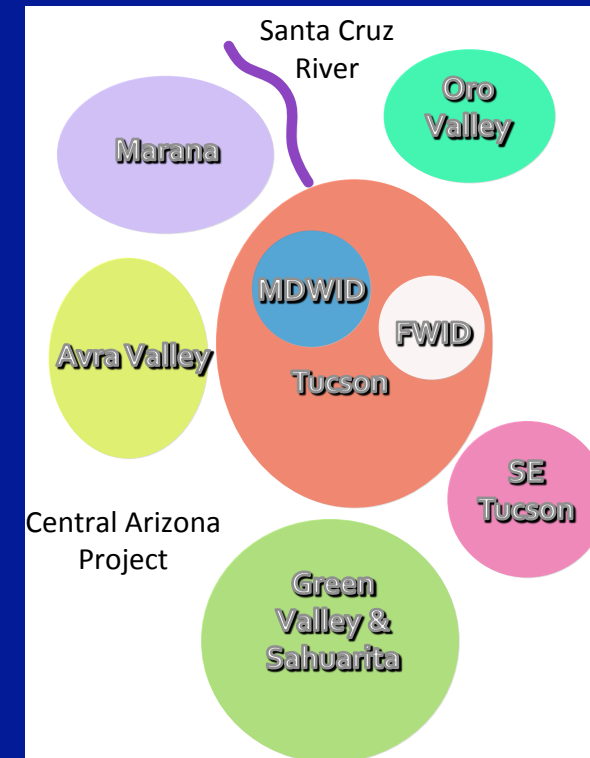
Modeling Representation



- Source and demand representation
- Spatial detail in building water and power demands
- Cropping patterns
- Environmental demands



<http://www.goldsim.com/Web/Solutions/Showcase/EnvironmentalExamples/CAPSAM/>



Alternatives/Scenarios



- Determine vulnerability to acute events
 - Infrastructure failures
 - Shock to economy
 - Climatic event
- Identify chronic events for adaptive planning
 - Population growth (distribution and water/energy efficiencies)
 - Climate change
 - Conservation and development practice adoption
 - Fuel cost
 - Water & energy policies

Technological and Policy Solutions



- Reduced cost solar conversion
- Agricultural conservation practices/adaptations
- Controlled environmental agriculture
- Conservation and building/land development practices
- Energy/water pricing structures
- Gulf water desalination

Water Market/Trading Benefits

- Model estimates net benefits from innovative trading structures
- Trading increases economic value from limited water and energy resources
- Trading delays infrastructure expenditures
- Trading transmits incentives to promote conservation
- Trading reduces impact of cascading effects in food-water-energy systems



Water/Energy Market Next Steps

- Trading models nested spatially to consider exchanges of water and energy across sub-areas and states, between coastal areas (desal) and inland
- Trading models address multiple temporal scales
 - long term infrastructure investment decisions
 - short-term response to infrastructure disruption during extreme events
- Economic severity indicators for energy-water system disruptions, to prioritize investments in system robustness and resilience



Model Extensions

- Employ ARVIN within scenario planning and other planning processes
- ARVIN-OPT
 - Advanced optimization techniques
- Lower Colorado Basin (ARVIN/CALVIN)
- Other infrastructures
 - Transportation systems
 - Air quality
 - Land development

