

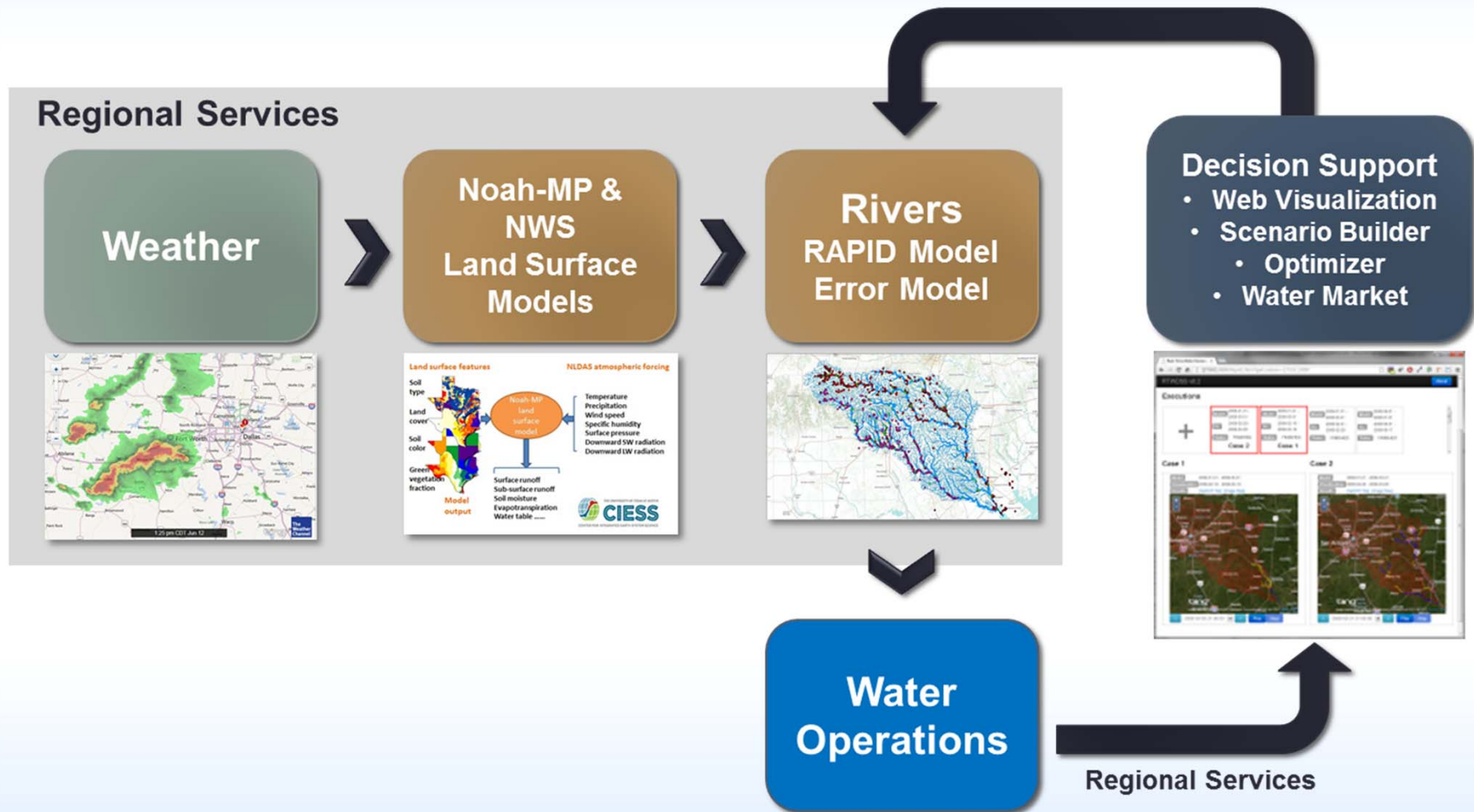


Real-Time Water Modeling and Decision Support Framework

U. of Illinois: Barbara S. Minsker
(minsker@illinois.edu), Erhu Du, Jong Lee, Tingting
Zhao

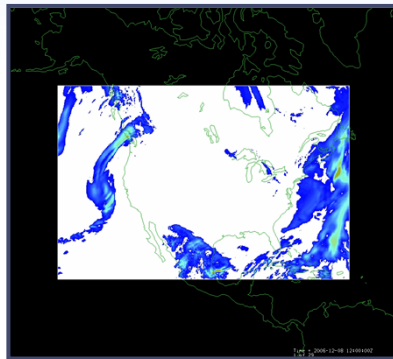
U. of Texas: David Maidment, Fernando Salas,
Zong-Liang Yang

Real-Time Water Operations Decision Support System

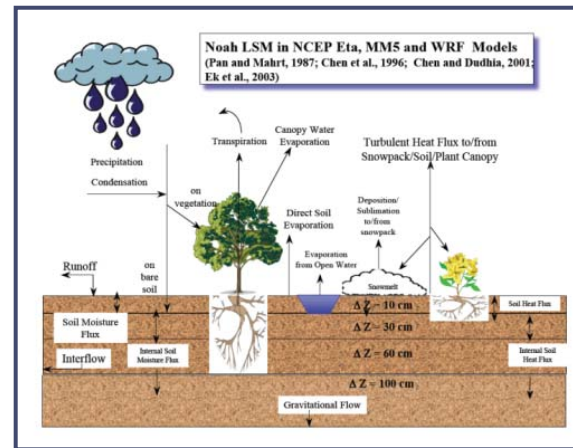




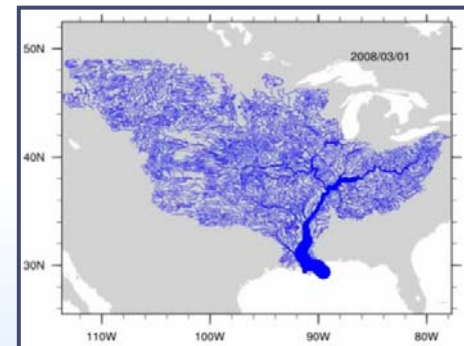
River Flow – Model as a Service



Observations
Datasets, Numerical
Weather Model



Land Surface Model



RAPID River Flow Model



Automated workflow at Univ. of Illinois uses LDAS data from NASA to run river model at Univ. of Texas

River Modeling Web Application

<http://rapid.ncsa.illinois.edu:8080/rapid2/>

Real-Time Water Decision x

127.0.0.1:8888/Rapid2.html?gwt.codesvr=127.0.0.1:9997

RTWDSS v0.2 [About](#)

Executions

+	Model: 2008-01-01 - 2008-03-31	Model: 2008-01-01 - 2008-03-31	Model: 2008-01-01 - 2008-03-31	Model: 2008-06-01 - 2008-07-31
	Viz: 2008-02-20 - 2008-03-05	Viz: 2008-02-18 - 2008-03-18	Viz: 2008-02-01 - 2008-02-29	Viz: 2008-06-01 - 2008-06-17
	Status: FINISHED	Status: FINISHED	Status: FINISHED	Status: FINISHED
	Case 2	Case 1		

Case 1

Model: 2008-01-01 - 2008-03-31
Visualization: 2008-02-18 - 2008-03-18
Results: [\[NetCDF file\]](#) [\[Image files\]](#)

2008-03-05 21:00:00 [Play](#) [Stop](#)

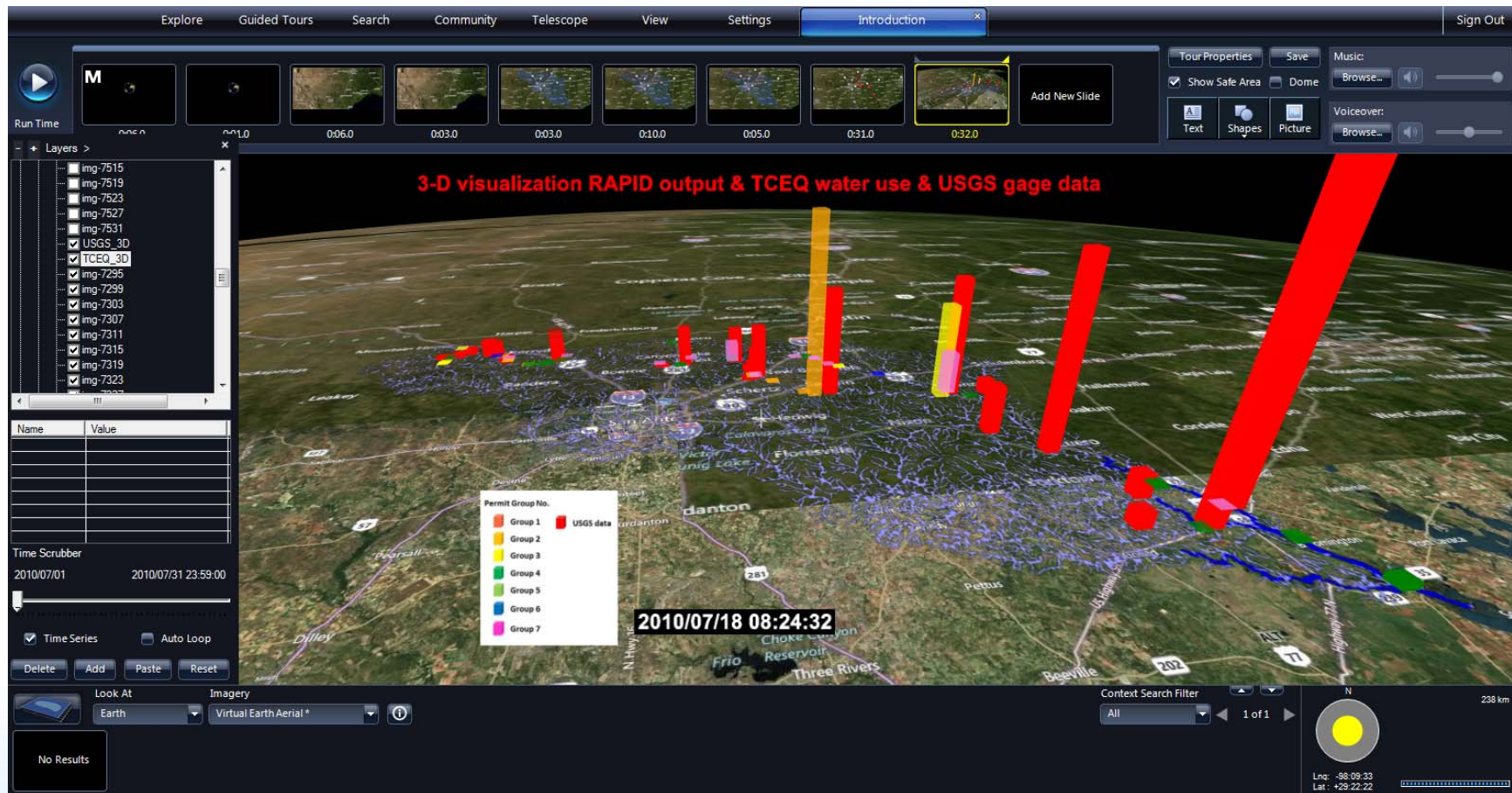
Case 2

Model: 2008-01-01 - 2008-03-31
Visualization: 2008-02-20 - 2008-03-05
Results: [\[NetCDF file\]](#) [\[Image files\]](#)

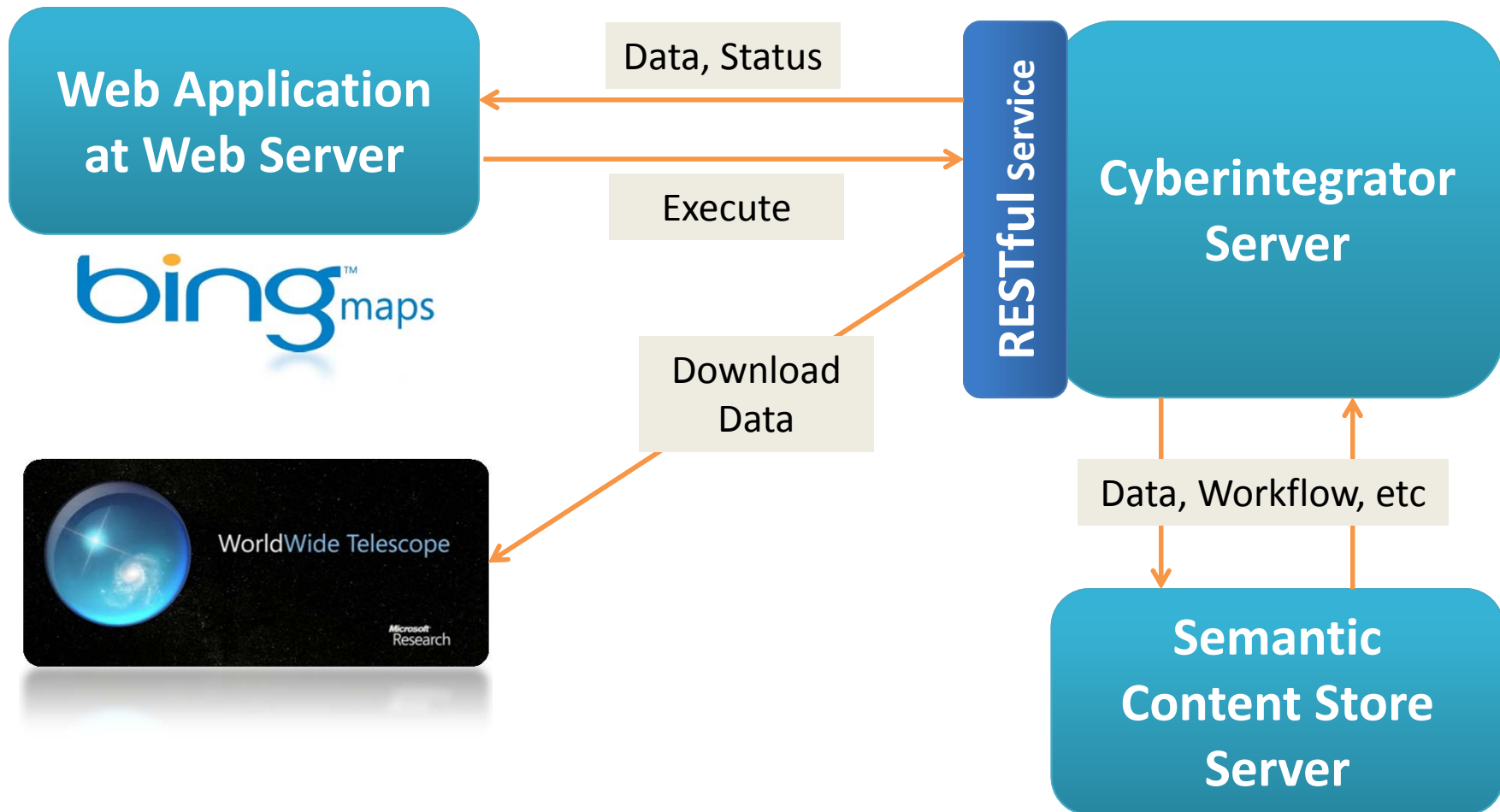
2008-02-21 21:00:00 [Play](#) [Stop](#)



WorldWide Telescope Visualization



Real-Time Model Service Architecture



Implement in CyberIntegrator: Exploratory Workflow

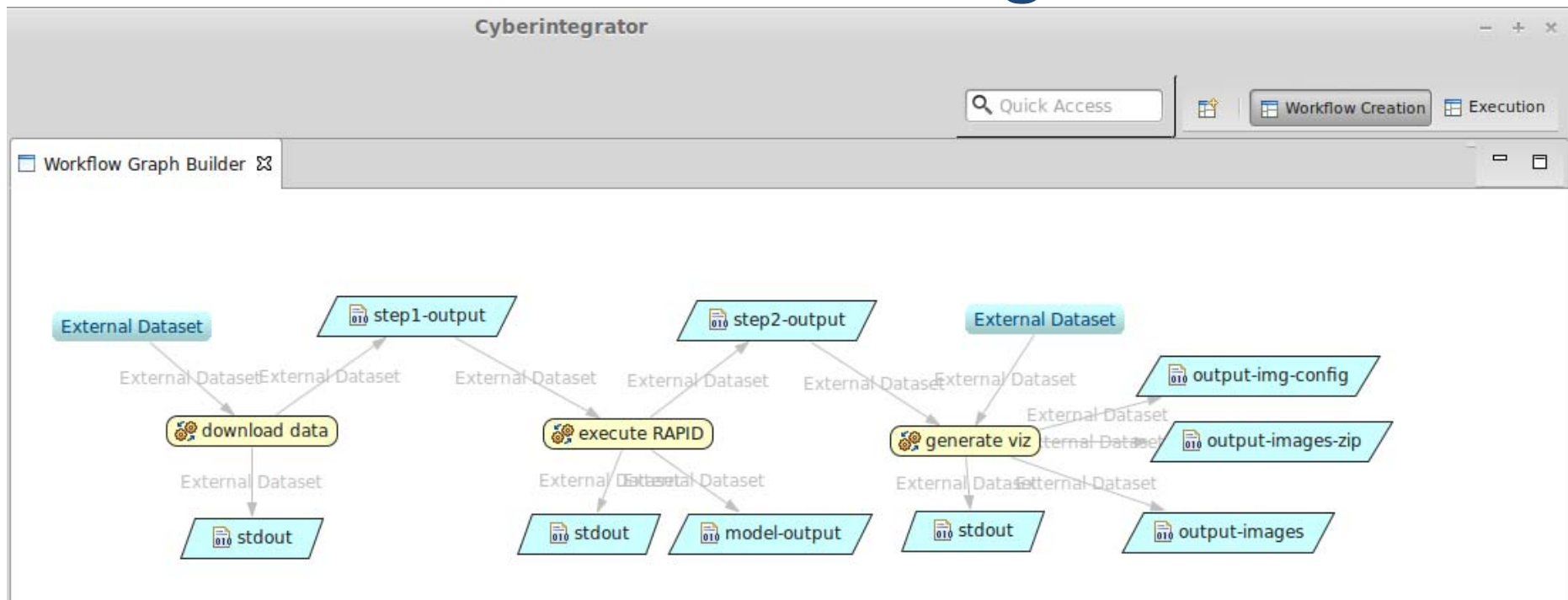
The screenshot displays the CyberIntegrator application window. The top menu bar includes 'File', 'Edit', 'Window', and 'Help'. The main interface is divided into several panes:

- Data Pane:** Lists data sources: Data [DONE], Frame Description [DONE], coloredkml [DONE], raindata [DONE], and sewersheds.kml [IMPORTED].
- Tools Pane:** Lists available tools: DataStream Fetch (v1), DataStream Publish (v1), KML Colorer (v1), and Polygon Transformation (v1).
- Workflow Pane:** Shows the configuration for the 'Polygon Transformation' workflow. It includes fields for Name, Creator, Date, and Contributors, along with a Description field.
- Workflow Graph Pane:** Displays a visual representation of the workflow. It starts with 'sewersheds.kml' and 'DataStream Fetch'. 'DataStream Fetch' feeds into 'Data' and 'Frame.Description'. 'Data' feeds into 'Polygon Transformation', which outputs 'raindata'. 'raindata' feeds into 'KML Colorer', which outputs 'coloredkml'. 'coloredkml' feeds into 'DataStream Publish', which outputs 'sewersheds.kml'.

The bottom status bar shows 'sensorweb-dev', 'http://cet.ncs...rson/anonymous', 'Q.0 R.0', and '46M of 50M'.

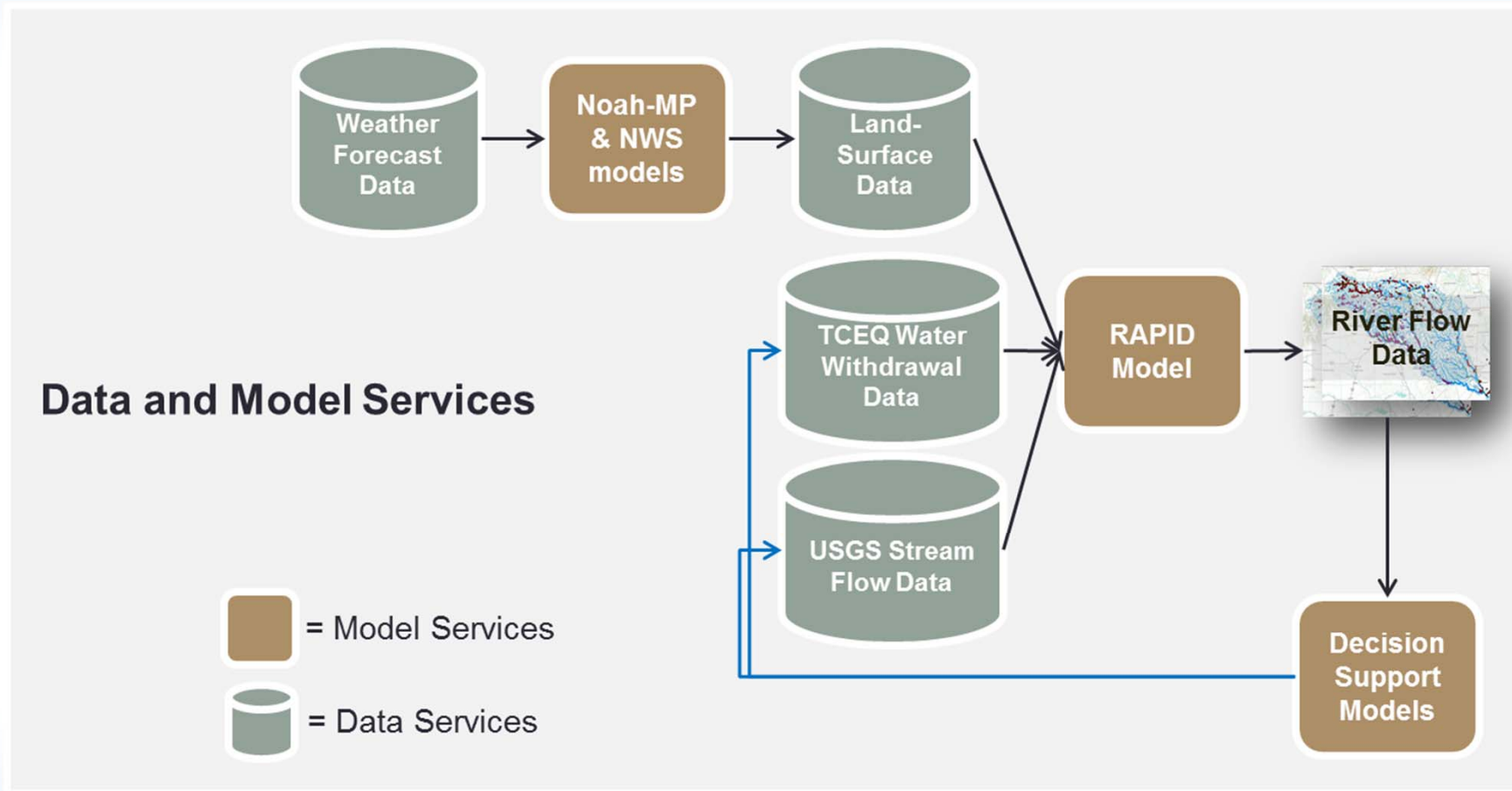
- Identify Inputs
 - (e.g. NEXRAD data)
- Link analyses and models
 - Could be Matlab, or C/C++ or Fortran code
- Provenance tracking
 - All data, metadata, configuration information stored
 - Future users know where analyses came from

Cyberintegrator Workflow for Real-Time River Modeling

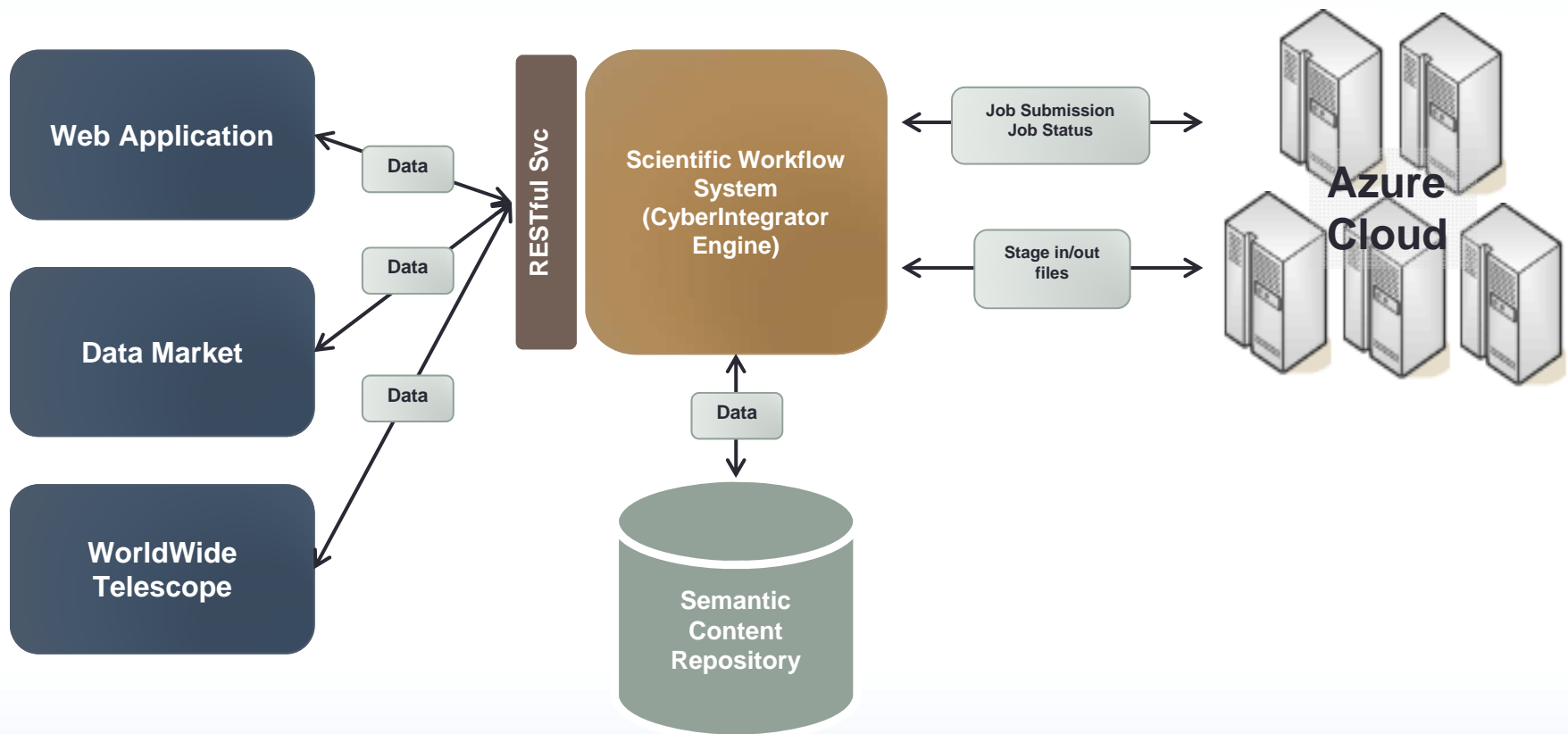


- Download NLDAS data
- Execute RAPID model
- Generate visualization (images) of the model results

Next Steps: Real-Time Data and Model Services

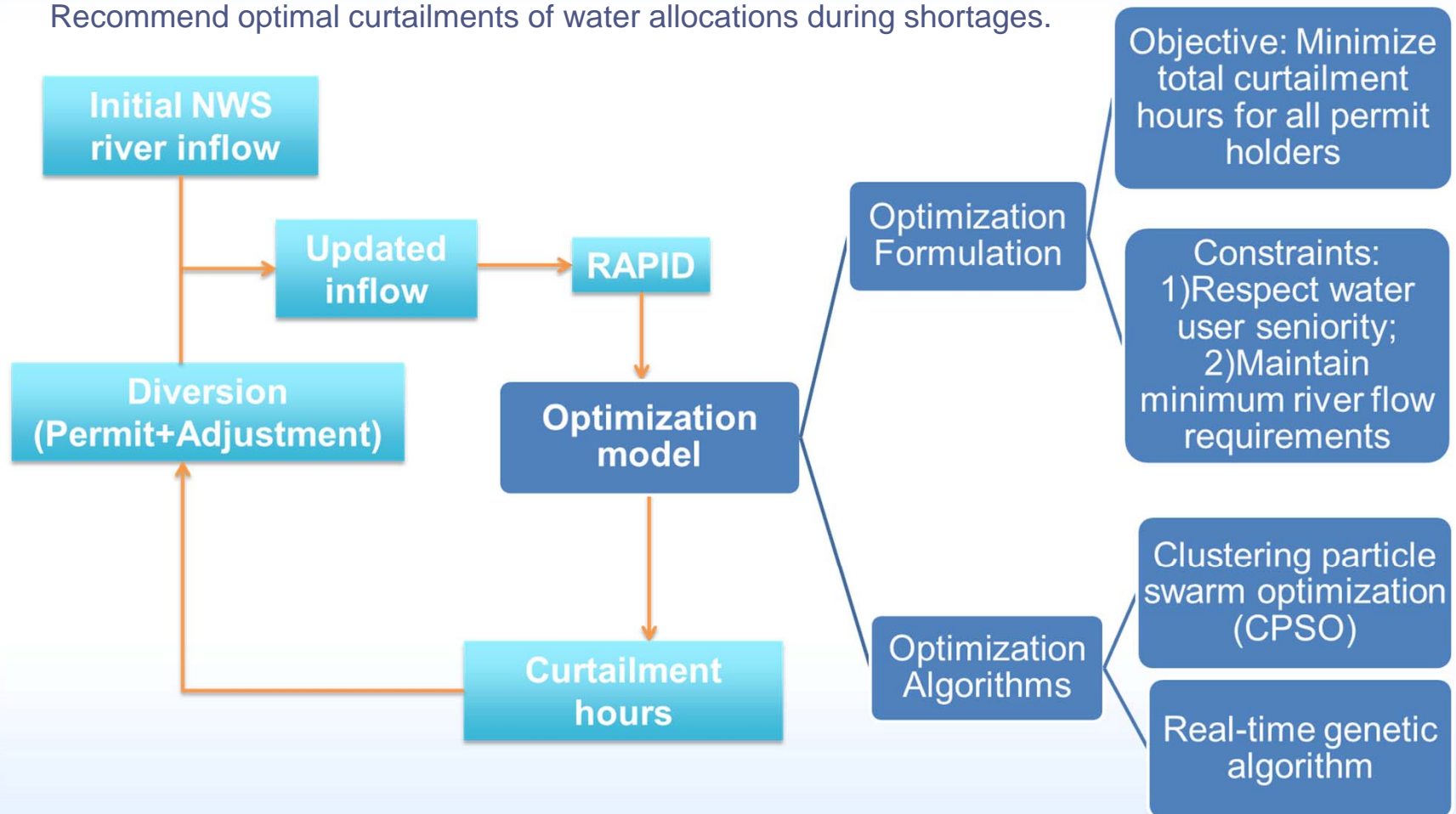


Next Steps: Decision Support Services in the Cloud

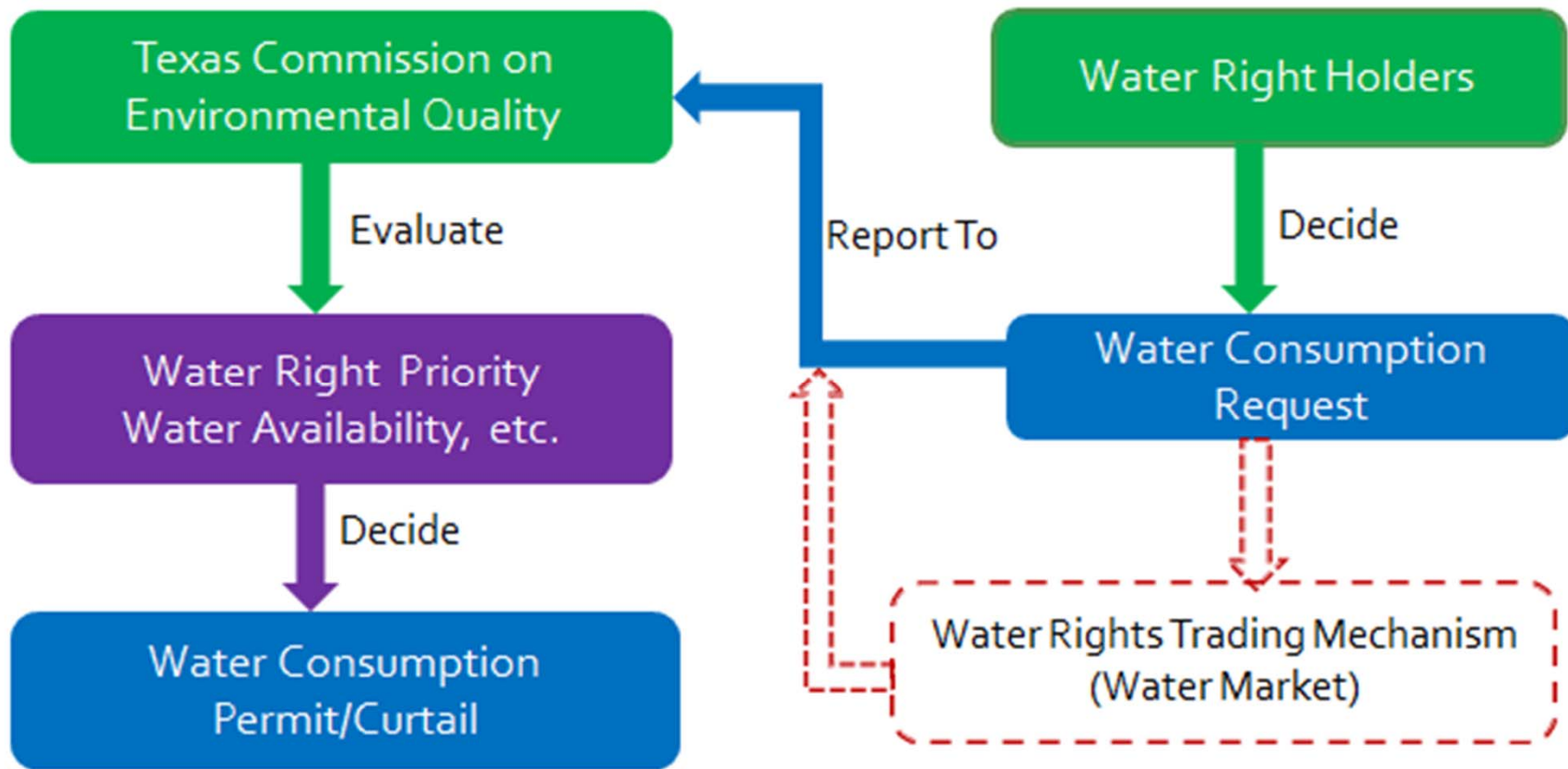


Decision Support Services: Optimizing Real-Time Water Allocation During Droughts

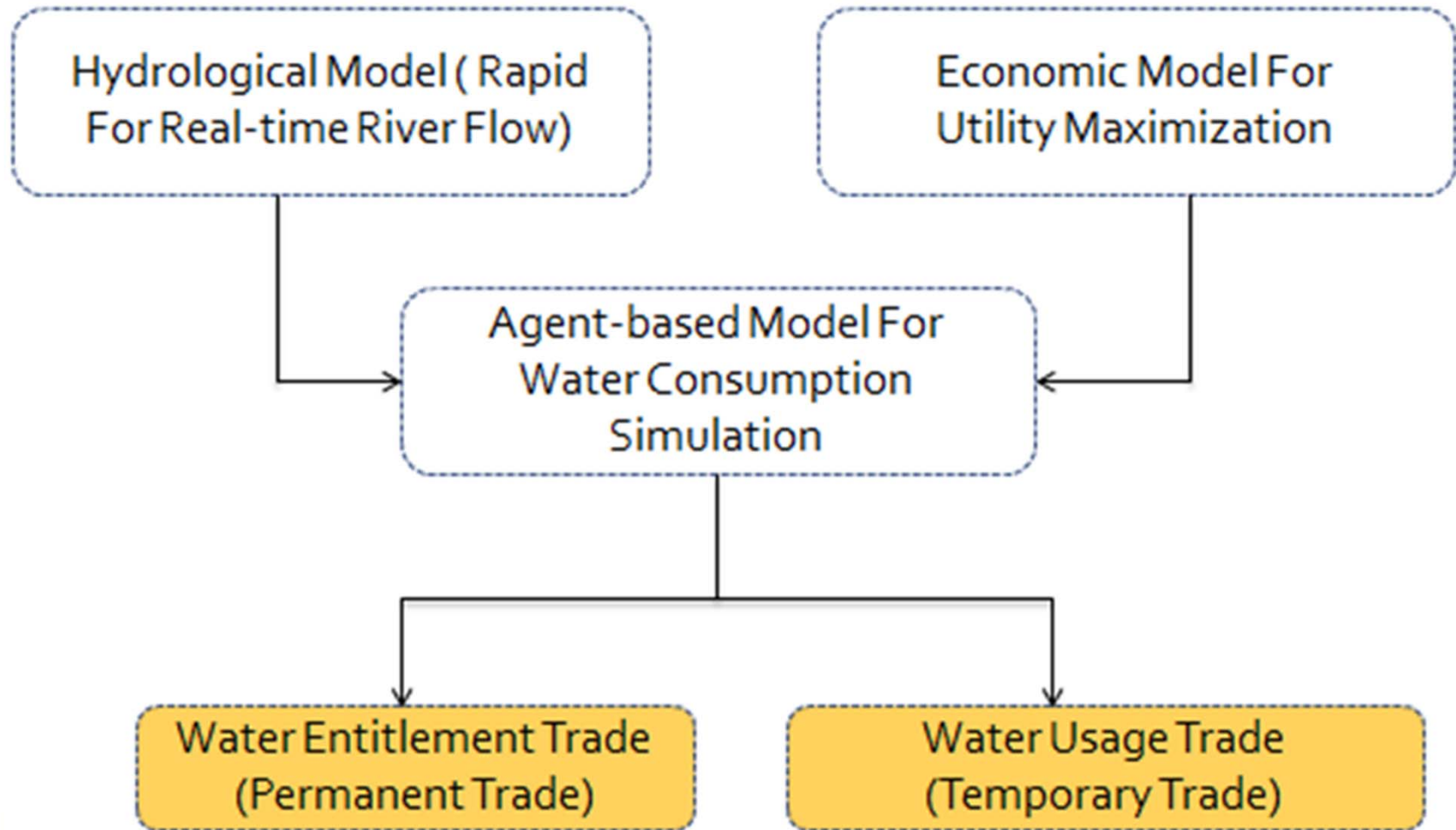
Recommend optimal curtailments of water allocations during shortages.



Decision Support Services: Feasibility of a Real-Time Water Trading Market



Decision Support Services: Simulating Impacts of a Real-Time Water Trading Market





Acknowledgments

- Funding Support
 - National Science Foundation
 - Microsoft Research
- Kathy Alexander, Cindy Hooper, Jordan Gouger, and others at TCEQ provided data and assistance in conceptualizing the framework