Hobbes Data Management and Documentation System (DMDS) Specifications

Jay R. Lund, Samuel Sandoval-Solis, Josue Medellin-Azuara, Wei Chu, Alvar Escriva-Bou, Ashlee Vincent, Prudentia Zikalala, Rui Hui, Erik Porse, and Timothy Nelson

June 12, 2013

Data types

Туре		Set	Features
Network		Set of network elements (links	Name, version, Unique Element
Structure		and nodes)	Identifier (UEI) and connectivity
			matrix
Network Elements	Node	Junction, Source, and Sink	UEI, name, coordinates, aggregated component elements
	Link	 Conveyance: Artificial channels, pipelines, and rivers Storage: Surface and ground- water storages Facility: Power plants, pumping plants, potable and wastewater treatment plants Demands Area: Agricultural, urban, environmental 	UEI, name, version, coordinates of end points, length, capacities, unit or non-linear costs, unit or nonlinear energy use, energy source, aggregated component elements, and other specific features
Timeseries		Rim inflows, accretions and depletions, environmental constraints, evaporation, constrained flows	UEI, version, unit, corresponding physical elements, start and end time, and time steps
Paired Data (PD)		Cost and benefit functions, reservoir elevation-area-capacity relationships, energy use curves, environmental flows by year type relationships	UEI, version, unit, and other specific features
Spatial layers		Precipitation, temperature, ET, land cover	UEI, version, unit, spatial resolution, time, and projection
Grid cells		Grid cells for finite element/difference models of ground and surface water	UEI, version, location, shape, transmissivity, storativity, etc.

Element Versions

Each element can exist in several versions, perhaps reflecting different agency or aggregate representations. Each version would have a unique identifier and version designation to allow easy identification and swapping out of alternative representations within a schematic. Each version would have a distinct author, date, and metadata to aid version comparisons.

Metadata (Current CALVIN metadata format)

- 1. AUTHOR and DATE are automatically entered from login, eventually we will have both original author and revision authors tracked.
- 2. Commentary: provide information about the value, what it represents, particular assumptions involved, any revisions or changes to the original values reference, etc.
- 3. CONTACT: if further information regarding the value, the source, or any assumptions involved, the contact is the person who can provide any necessary explanations; this would be a different person than the author and often the person who provided the source data or manipulated it in a side-calculation file.
- 4. QUALITY: Provisional, Draft, Final (refers to confidence in the values)
- 5. Data CHECKING: person and date checking data and metadata.
- 6. SOURCE has 4 types:
 - a. Electronic: refers to an electronic file, such as a data file, WEB content or document, our own "side-calculation" files, our appendices, etc. (using a full URL pathname that references the internet location or computer)
 - b. Paper Document: traditional published literature or report.
 - c. Personal Communication (refers to verbal or informal information by telephone, email, not, letter, etc.)
 - d. "Other": to handle any miscellaneous types of sources not of the other 3 types.
- 7. SOURCE NOTES field: for details regarding the source, such as page number, table number, or any clarification or caveat about the information from the source.
- 8. LAST UPDATES: shows a set of dates such as element created, modifications to data, modifications to metadata as well as a link to the log file.

Log files

For each data file, there will be a corresponding log file to record the changes that have been applied to the data file. The following fields will be included in log files:

- 1. AUTHOR: the user who made the change and can be contacted if needed.
- 2. DATE: the date when the change was made.
- 3. COMMENTARY: information about the reasons of making the changes.
- 4. PROCEDURE: what actions had been applied? Ideally, the scripts of some standard operations can be stored.
- 5. PREVIOUS DATA: what happened to the data file before the change? Is it discarded or archived?

Fields 1 and 2 will be generated automatically by the system and 3 to 5 will be added by the author if needed.

Permissions to the Data Management and Documentation System

Administrator can READ and MODIFY all data files.

Author can READ all public data files and can MODIFY the data files uploaded by him/her. *General User* can READ all public data files.

APPENDIX: Proposed Network Database Schema

Network Structure

Network Name

- + Members: Nodes and facilities that are members of the network
- + Connectivity: Matrix that specifies connectivity of members

Example Network Elements

Node	Link: Conveyance (Link at Node: Facility)
+ UEI: Char	+ UEI: Char
+ Name: Char	+ Name: Char
+ Description: Text	+ Description: Text
+ Coordinates: Float	+ Origin Node: UEI
+ Link to Metadata	+ Destination Node: UEI
+ Link to Log File	+ Link Type: River, Channel, Diversion, Tunnel, Pipeline, Aqueduct, (Pumping or
	Hydropower Release, Treatment plants)
	+ Link Amplitude: Fixed or Time Varying
	+ Lower Bound: Constant, Constrained, Time Varying, Monthly Varying, or None
	+ Upper Bound: Constant, Constrained, Time Varying, Monthly Varying, or None
	+ Link Cost: Constant, Time Dependent, or None
	+ Environmental Constraints: None, Upper Bound, Lower Bound, Equality
	+ Spatial Layer: UEI
	+ Link to Metadata

- + Link to Kietadata + Link to Log File

Link at Node: Demand Area

- + UEI: Char
- + Name: Char
- + Description: Text
- + Origin Node: UEI
- + Destination Node: UEI
- + Link Amplitude: Fixed or Time Varying
- + Lower Bound: Constant, Constrained, Time Varying, Monthly Varying, or None
- + Upper Bound: Constant, Constrained, Time Varying, Monthly Varying, or None
- + Link Cost: Constant, Time Varying, Monthly Varying, or Table
- + Spatial Layer: UEI
- + Link to Metadata
- + Link to Log File

Metadata

<u>Metadata</u>

- + Corresponding Element UEI: Char
- + Author: Char
- + Date: Date
- + Commentary: Text
- + Quality: Provisional, Draft, or Final
- + Contact Information: Text
- + Data Checking: Text
- + Source: Text
- + Source Notes: Text
- + Last Updates: Text

Link at Node: Storage

- + UEI: Char
- + Name: Char
- + Description: Text
- + Type: Non-Storage, Surface Storage, and Groundwater Storage
- + Origin Node: Char
- + Initial Storage: Float
- + Ending Storage: Float
- + Area/Capacity Factor: Float, or Table
- + Evaporation Rate: Fixed, Monthly Varying, or Time Varying
- + Lower Bound: Constant, Constrained, Time Varying, Monthly Varying, or None
- + Upper Bound: Constant, Constrained, Time Varying, Monthly Varying, or None
- + Storage Cost: Constant, Time Dependent, or None
- + Spatial Layer: UEI
- + Link to Metadata
- + Link to Log File

Log File

Log File

- + Corresponding Element UEI: Char
- + Author: Char
- + Date: Date
- + Commentary: Text
- + Procedure: Text
- + Previous Data: Text