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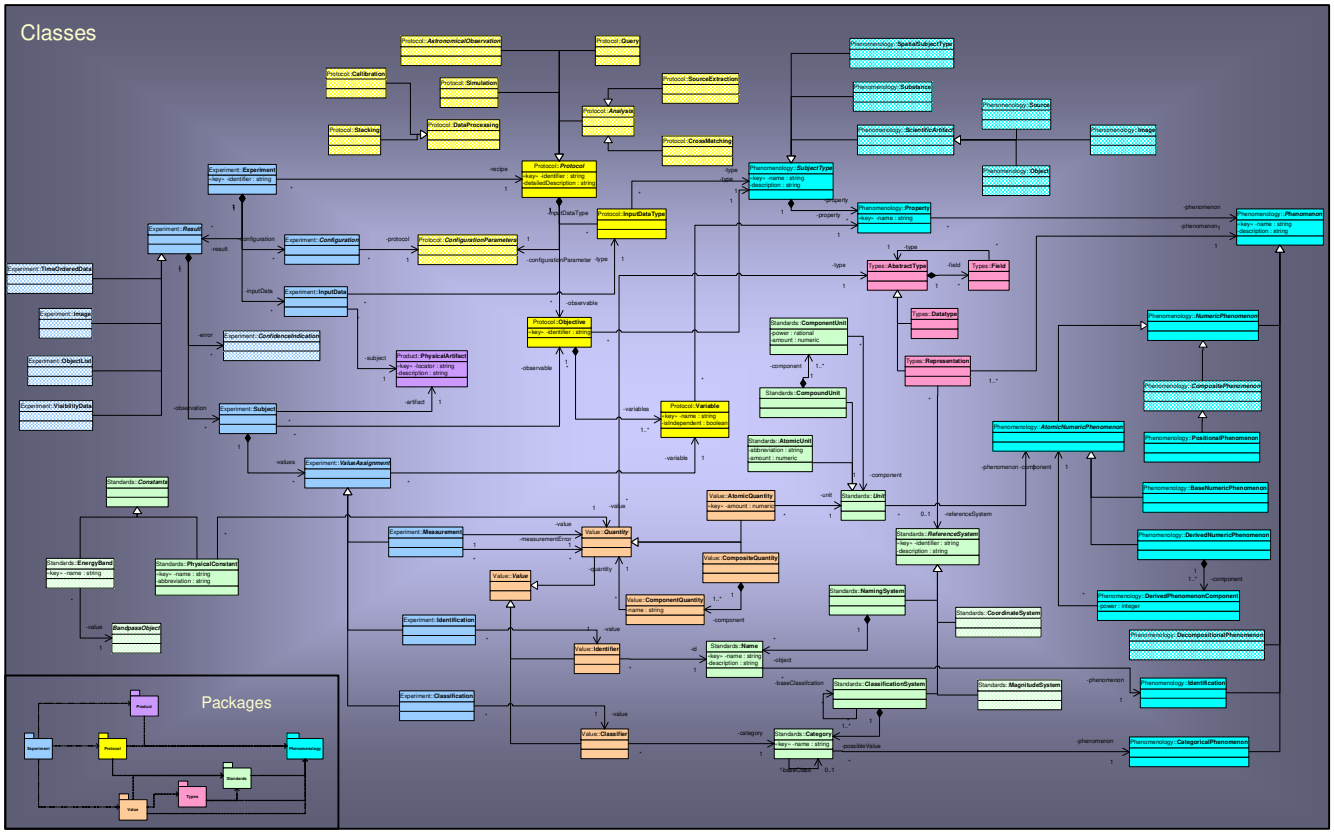
Abstract: *We present a comprehensive scientific data model for the Virtual Observatory. This is a logical model designed to describe the scientific process and results in a uniform fashion; it is not a physical data model one would implement directly. Rather, the design goal is to be able to transform a user data model into this logical model for exchange with other users (for inter-data-centre exchange, for example). The data model is composed of several packages (Protocol, Experiment, Value, Standards, Phenomenology, Types, and Product) which we describe in detail.*



FAQ

Q. What is a Source Catalog?

A source catalog is an Experiment:Result containing multiple Subjects. Each *source* is a Subject which assigns Values to Variables. *A Source* is a SubjectType with certain Property(s), where the Property(s) are Phenomenon(s) that are assigned to a SubjectType.

Q: How do I specify the shape of a source?

Shape is a CompositePhenomenon. A Source a Property with name = *shape*. The Value of a shape is assigned to a Variable using a CompositeQuantity with components *major*, *minor*, and *positionAngle*, or maybe *semimajor*, *ellipticity*, and *positionAngle* and AtomicQuantity(s) with (possibly) different units.

Q. What is the difference between a Protocol and an Experiment?

A Protocol is a type of operation with a defined Objective; an Experiment is an instance of a Protocol with specific input data, specific configuration, and specific output Result(s).

Q. Where does POS_EQ_RA_MAIN go?

POS is a Phenomenon:CompositePhenomenon with name = *position*. EQ is a Standards:CoordinateSystem. RA is the longitude component of a point in the specified CoordinateSystem. MAIN?

Q. How do I tell the difference between the dependent and independent variables in a result?

Variables are assigned values and collected together in an Subject. The Protocol declares which variables are dependent and which are independent in the Objective.

Q. What is the speed of light?

The speed of light is a Standard:PhysicalConstant with name = *speed of light*, abbreviation = *c*, and a Value:Quantity like 3×10^8 *m/s*.

Q. What is the V-band? What is a V magnitude?

The V-band is a Constant - a Standards:EnergyBand with name = *V band* and a value which is a Bandpass (TBD) specified using one or more Value:Quantity instances. A V magnitude is a measurement of the *luminosity* Phenomenon with independent variable (band) equal to the value of the *V-band* constant and value (an AtomicQuantity) represented in the *UBVRI* MagnitudeSystem.

References:
[1] Martin Fowler, *Analysis Patterns*, Addison-Wesley Pub Co; 1st edition (October 9, 1996)
[2] International System of Units (SI), http://physics.nist.gov/cuu/Units/introduction.html