**ISSUE 531, 537 Generalization**

Dear All,

In the course of elaborating the epistemology of measurement, issue 388,

I propose the following:

**For CRMsci:**

* Change S15 Observable Entity to superclass of E4 Period, S10 Material Substantial.
* Change S21 Measurement to superclass of E16 Measurement.
* Change O24 measured (was measured by) to superproperty of P39 measured (was measured by)
* Declare O24 measured (was measured by) and O12 has dimension (is dimension of) as top properties of CRMsci.
* Declare O12 to be identical with P43 for S10 Material Substantial (and subclasses)
* O12 has dimension (is dimension of) ≡ P43 has dimension (is dimension of), for S10 Material Substantial (and subclasses) (Issue 537).
* O9 observed property type (property type was observed by) : **subproperty of** P177 assigned property of type (is type of property assigned)

**Current definitions** [**CRMSci 1.2.9**]**:**

**S4 Observation**

Subclass of: [E13](file:///C:\Users\martin\Documents\projects\chios\CRM_Extensions\CRM_Sci\CRMsci%20v.1.2.9_0.docx#_E13_Attribute_Assignment_1) Attribute Assignment

Superclass of: [S21](file:///C:\Users\martin\Documents\projects\chios\CRM_Extensions\CRM_Sci\CRMsci%20v.1.2.9_0.docx#_S21_Measurement_(equivalent) Measurement

[S19](file:///C:\Users\martin\Documents\projects\chios\CRM_Extensions\CRM_Sci\CRMsci%20v.1.2.9_0.docx#_S19_Encounter_Event) Encounter Event

Scope note: This class comprises the activity of gaining scientific knowledge about particular states of physical reality through empirical evidence, experiments and measurements.

We define observation in the sense of natural sciences, as a kind of human activity: at some place and within some time-span, certain physical things and their behavior and interactions are observed by human sensory impression, and often enhanced by tools and measurement devices.

The output of the internal processes of measurement devices that do not require additional human interaction are in general regarded as part of the observation and not as additional inference. Manual recordings may serve as additional evidence. Measurements and witnessing of events are special cases of observations. Observations result in a belief about certain propositions. In this model, the degree of confidence in the observed properties is regarded to be “true” by default, but could be described differently by adding a property *P3 has note* to an instance of S4 Observation, or by reification of the property *O16 observed value*.

Primary data from measurement devices are regarded in this model to be results of observation and can be interpreted as propositions believed to be true within the (known) tolerances and degree of reliability of the device.

Observations represent the transition between reality and propositions in the form of instances of a formal ontology, and can be subject to data evaluation from this point on. For instance, detecting an archaeological site on satellite images is not regarded as an instance of S4 Observation, but as an instance of S6 Data Evaluation. Rather, only the production of the images is regarded as an instance of S4 Observation.

Examples:

* The excavation of unit XI by the Archaeological Institute of Crete in 2004[[1]](#footnote-1).The observation (S4) of the density (S9) of the X-Ray image of cupid's head from the painting “Cupid complaining to Venus” (S15) as “high density” (E1), on the 19th of March 1963 (Cranach Digital Archive, http://lucascranach.org/UK\_NGL\_6344).
* The observation (S4) of visible light absorption (S9) of the painting “Cupid complaining to Venus” (S15) as “having red pigment”, in 2015 (Foister, S., 2015).

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In First Order Logic:

S4(x) ⊃ E13(x)

Properties:

[O8](file:///C:\Users\martin\Documents\projects\chios\CRM_Extensions\CRM_Sci\CRMsci%20v.1.2.9_0.docx#_O8_observed_(was) observed (was observed by): [S15](file:///C:\Users\martin\Documents\projects\chios\CRM_Extensions\CRM_Sci\CRMsci%20v.1.2.9_0.docx#_S15_Observable_Entity) Observable Entity

[O9](file:///C:\Users\martin\Documents\projects\chios\CRM_Extensions\CRM_Sci\CRMsci%20v.1.2.9_0.docx#_O9_observed_property) observed property type (property type was observed by): [S9](file:///C:\Users\martin\Documents\projects\chios\CRM_Extensions\CRM_Sci\CRMsci%20v.1.2.9_0.docx#_S9_Property_Type) Property Type

[O16](file:///C:\Users\martin\Documents\projects\chios\CRM_Extensions\CRM_Sci\CRMsci%20v.1.2.9_0.docx#_O16_observed_value)observed value (value was observed by): [E1](file:///C:\Users\martin\Documents\projects\chios\CRM_Extensions\CRM_Sci\CRMsci%20v.1.2.9_0.docx#_E1_CRM_Entity) CRM Entity

O?observed: Situation?

**S15 Observable Entity**

Subclass of: [E1](#_E1_CRM_Entity) CRM Entity

Superclass of: [E2](#_E2_Temporal_Entity_1) Temporal Entity

[E77](#_E77_Persistent_Item_1) Persistent Item

Scope note:

This class comprises instances of E2 Temporal Entity or E77 Persistent Item, i.e. items or phenomena, such as physical things, their behavior, states and interactions or events, that can be observed by human sensory impression, often enhanced by using tools and measurement devices.

Conceptual objects manifestthrough their carriers such as books, digital media, or even human memory. Attributes of conceptual objects, such as number of words, can be observed on their carriers. If the respective properties between carriers differ, either they carry different instances of conceptual objects or the difference can be attributed to accidental deficiencies in one of the carriers. In that sense even immaterial objects are observable. By this model we address the fact that frequently, the actually observed carriers of conceptual objects are not explicitly identified in documentation, i.e., they are assumed to have existed but they are unknown as individuals.

Examples:

* The domestic goose from Guangdong/1/1996 (H5N1) (S15) that was identified in 1996 in farmed geese in southern China as circulating highly pathogenic H5N1 (Wan, 2012)[[2]](#footnote-2) .The crow flight he observed over the waters of Minamkeak Lake during the summer of 2015[[3]](#footnote-3)The eruption of Krakatoa volcano at Indonesia in 1883 (F.A.R., Archibald and Whipple, 1888)[[4]](#footnote-4).The density of the cupid head area in the X-Ray of the painting “Cupid complaining to Venus” (http://lucascranach.org/UK\_NGL\_6344).

In First Order Logic:

S15(x) ⊃ E1(x)

Properties:

[O12](#_O12_has_dimension) has dimension (is dimension of): [E54](#_E54_Dimension) Dimension

**S21 Measurement**

Subclass of: [S4](#_S4_Observation) Observation

[E16](#_E16_Measurement) Measurement

Superclass of: [S3](#_S3_Sample_Taking) Measurement by Sampling

Scope note: This class comprises actions measuring instances of E2 Temporal Entity or E77 Persistent Items, properties of physical things, or phenomena, states and interactions or events, that can be determined by a systematic procedure. Primary data from measurement devices are regarded to be results of an observation process.

Examples:

* .

In First Order Logic:

S21(x) ⊃ S4(x)

S21(x) ⊃ E16(x)

Properties:

[O24](#_O24_measured_(was) measured (was measured by): [S15](#_S19_Observable_Entity) Observable Entity

**I1 Argumentation**

Subclass of: E7 Activity

Superclass of: [S4](#_S4_Observation_1) Observation

[I5](#_I5_Inference_Making) Inference Making/[S5](#_S5_Inference_Making_1) Inference Making

[I7](#_I7_Belief_Adoption) Belief Adoption

Scope note: This class comprises the activity of making honest inferences or observations. An honest inference or observation is one in which the E39 Actor carrying out the I1 Argumentation justifies and believes that the I6 Belief Value associated with resulting I2 Belief about the I4 Proposition Set is the correct value at the time that the activity was undertaken and that any I3 Inference Logic or methodology was correctly applied.

Only one instance of E39 Actor may carry out an instance of I1 Argumentation,though the E39 Actor may, of course, be an instance of E74 Group.

.Properties: [J2](#_J2_concluded_that) concluded that (was concluded by): [I8](#_I8_Conviction) Conviction

Examples:

* My classification and dating of this bowl (I5)
* My adoption of the belief that Dragendorff type 29 bowls are from the 1st Century AD (I7)

**Proposed New definitions:**

**S4 Observation**

Subclass of: [E13](file:///C:\Users\martin\Documents\projects\chios\CRM_Extensions\CRM_Sci\CRMsci%20v.1.2.9_0.docx#_E13_Attribute_Assignment_1) Attribute Assignment

Superclass of: [S21](file:///C:\Users\martin\Documents\projects\chios\CRM_Extensions\CRM_Sci\CRMsci%20v.1.2.9_0.docx#_S21_Measurement_(equivalent) Measurement

[S19](file:///C:\Users\martin\Documents\projects\chios\CRM_Extensions\CRM_Sci\CRMsci%20v.1.2.9_0.docx#_S19_Encounter_Event) Encounter Event

Scope note: This class comprises the activity of gaining scientific knowledge about particular states of physical reality through empirical evidence, experiments and measurements.

We define observation in the sense of natural sciences, as a kind of human activity: at some place and within some time-span, certain physical things and their behavior and interactions are observed by human sensory impression, and often enhanced by tools and measurement devices.

The output of the internal processes of measurement devices that do not require additional human interaction are in general regarded as part of the observation and not as additional inference. Primary data from measurement devices are regarded in this model to be results of observation and can be interpreted as propositions believed to be true within the (known) tolerances and degree of reliability of the device.

Measurements and witnessing of events are special cases of observations. Observations result in a belief about certain propositions. In this model, the degree of confidence in the observed properties is regarded to be “true” by default, but could be described differently by adding a property *P3 has note* to an instance of S4 Observation, or by reification of the property *O16 observed value*.

Observations represent the transition between reality and propositions in the form of instances of a formal ontology, and can be subject to data evaluation from this point on. For instance, detecting an archaeological site on satellite images is not regarded as an instance of S4 Observation, but as an instance of S6 Data Evaluation. Rather, only the production of the images is regarded as an instance of S4 Observation.

Examples:

* The excavation of unit XI by the Archaeological Institute of Crete in 2004[[5]](#footnote-5).
* The observation (S4) of the density (S9) of the X-Ray image of cupid's head from the painting “Cupid complaining to Venus” (S15) as “high density” (E1), on the 19th of March 1963 (Cranach Digital Archive, http://lucascranach.org/UK\_NGL\_6344).
* The observation (S4) of visible light absorption (S9) of the painting “Cupid complaining to Venus” (S15) as “having red pigment”, in 2015 (Foister, S., 2015).

In First Order Logic:

S4(x) ⊃ E13(x)

Properties:

[O8](file:///C:\Users\martin\Documents\projects\chios\CRM_Extensions\CRM_Sci\CRMsci%20v.1.2.9_0.docx#_O8_observed_(was) observed (was observed by): [S15](file:///C:\Users\martin\Documents\projects\chios\CRM_Extensions\CRM_Sci\CRMsci%20v.1.2.9_0.docx#_S15_Observable_Entity) Observable Entity

[O9](file:///C:\Users\martin\Documents\projects\chios\CRM_Extensions\CRM_Sci\CRMsci%20v.1.2.9_0.docx#_O9_observed_property) observed property type (property type was observed by): [S9](file:///C:\Users\martin\Documents\projects\chios\CRM_Extensions\CRM_Sci\CRMsci%20v.1.2.9_0.docx#_S9_Property_Type) Property Type

[O16](file:///C:\Users\martin\Documents\projects\chios\CRM_Extensions\CRM_Sci\CRMsci%20v.1.2.9_0.docx#_O16_observed_value)observed value (value was observed by): [E1](file:///C:\Users\martin\Documents\projects\chios\CRM_Extensions\CRM_Sci\CRMsci%20v.1.2.9_0.docx#_E1_CRM_Entity) CRM Entity

O?observed: Situation?

**May be O9, O16 superfluous, because of E13 properties. Validity time missing. Situation as a proposition set, may be a straight-forward generalization.**

**S15 Observable Entity**

Subclass of: [E1](#_E1_CRM_Entity) CRM Entity

Superclass of: E5 Event

E18 Physical Thing

Scope note:

This class comprises instances of E5 Event and E18 Physical Thing i.e. items or phenomena, such as physical things, their behavior, current state and interactions or events, that can be observed by human sensory impression as well as enhanced by using tools and measurement or detection devices.

Conceptual objects manifestthrough their carriers such as books, digital media, or even human memory. Attributes of conceptual objects, such as number of words, can be observed on their carriers. If the respective properties between carriers differ, either they carry different instances of conceptual objects or the difference can be attributed to accidental deficiencies in one of the carriers. In that sense even immaterial objects are observable. By this model we address the fact that frequently, the actually observed carriers of conceptual objects are not explicitly identified in documentation, i.e., they are assumed to have existed but they are unknown as individuals.

Examples:

* The domestic goose from Guangdong/1/1996 (H5N1) (S15) that was identified in 1996 in farmed geese in southern China as circulating highly pathogenic H5N1 (Wan, 2012)[[6]](#footnote-6) .
* The crow flight he observed over the waters of Minamkeak Lake during the summer of 2015[[7]](#footnote-7)The eruption of Krakatoa volcano at Indonesia in 1883 (F.A.R., Archibald and Whipple, 1888)[[8]](#footnote-8).
* The density of the cupid head area in the X-Ray of the painting “Cupid complaining to Venus” (http://lucascranach.org/UK\_NGL\_6344).

In First Order Logic:

S15(x) ⊃ E1(x)

Properties:

[O12](#_O12_has_dimension) has dimension (is dimension of): [E54](#_E54_Dimension) Dimension

**S21 Measurement**

Subclass of: [S4](#_S4_Observation) Observation

Superclass of: [S3](#_S3_Sample_Taking) Measurement by Sampling

[E16](#_E16_Measurement) Measurement

Scope note: This class comprises actions measuring quantifiable properties of instances of E5 Event or E18 Physical Thing, that can be determined by a systematic, ob procedure. In particular, it also includes spatial and temporal distances and other quantifiable relationships between two or three distinct items. Primary data from measurement devices are regarded to be results of an observation process.

Examples:

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In First Order Logic:

S21(x) ⊃ S4(x)

S21(x) ⊃ E16(x)

Properties:

[O24](#_O24_measured_(was) measured (was measured by): [S15](#_S19_Observable_Entity) Observable Entity

**This property needs to be harmonized with new properties of E21!**

**P40 observed dimension (was observed in)**

1. *Fake example* (fictitious) [↑](#footnote-ref-1)
2. [↑](#footnote-ref-2)
3. *Fake example* (fictitious) [↑](#footnote-ref-3)
4. [↑](#footnote-ref-4)
5. *Fake example* (fictitious) [↑](#footnote-ref-5)
6. [↑](#footnote-ref-6)
7. *Fake example* (fictitious) [↑](#footnote-ref-7)
8. [↑](#footnote-ref-8)