# 537: How does reducing the range of P39 measured affect CRMsci?

**HW** presentation by MD –proposed changes are reflected in the diagram below



**Discussion points:**

SdS: The axiom declaring the equivalence btw O12 and E18 from E18 and its specializations only appears in the FOL, not in the scope note. Must be explicitly stated in the scope note too.

**Decision**:

* To accept changes in the model and in the definitions of S21, O16, O24, O12, O9 (details below).
* Start a **new issue** on correcting the definition of O12 (addition of the axiom in the scope-note) and resolve it in an e-vote.

**Issue closed**

## Definitions

### S21 Measurement

The definition changed

#### FROM (old)

**S21 Measurement**

Subclass of: [S4](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.1t3h5sf) Observation

[E16](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.4d34og8) Measurement

Superclass of: [S3](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.2s8eyo1) 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.

In First Order Logic:

S21(x) ⊃ S4(x)

S21(x) ⊃ E16(x)

Properties:

[O24](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.17dp8vu) measured (was measured by): [S15](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.3rdcrjn) Observable Entity

#### TO (new)

**S21 Measurement**

Subclass of: [S4](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.1t3h5sf) Observation

Superclass of: [S3](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.2s8eyo1) Measurement by Sampling

[E16](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.4d34og8) Measurement

Scope note: This class comprises actions measuring instances of S15 Observable Entity, 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:

* The magnitude measurement of the earthquake of Mexico city in 2017. (S21) [It had the magnitude 6.2 Richter] (Mindock, 2017) (<http://www.independent.co.uk/news/world/americas/mexico-earthquake-today-latest-mexico-city-magnitude-6-tremor-damage-a7963211.html> ).
* The sensor measurement by IGME in 1999 which measured the landslide displacement in the area of Parnitha, Greece. (S21) (InGeoCloudS - INspiredGEOdata CLOUD Services D2.2 2012;D2.3 2013)

In First Order Logic:

S21(x) ⊃ S4(x)

Properties:

[O24](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.17dp8vu) measured (was measured by): [S15](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.3rdcrjn) Observable Entity

### O16 observed value (value was observed by)

The definition changed

#### FROM (old):

**O16 observed value (value was observed by)**

Domain: [S4](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.1t3h5sf) Observation

Range: [E1](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.lnxbz9) CRM Entity

Subproperty of: [E13](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.35nkun2) Attribute Assignment. [P141](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.1ksv4uv) assigned (was assigned by): [E1](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.lnxbz9) CRM Entity

Superproperty of: [E16](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.4d34og8) Measurement. [P40](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.44sinio) observed dimension (was observed in): [E54](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.2jxsxqh) Dimension (inconsistent with E21 Measurement as long as Observable Entity is not moved to CRM.)

Quantification: many to one, necessary (1,1:0,n)

Scope note: This property associates a value assigned to an entity observed by S4 Observation.

Examples:

* The surface survey at the bronze age site of Mitrou in east Lokris carried out by Cornell University in 1989 *observed* *value* 600 (of sherds).) (Kramer-Hajos and O’Neill , 2008).

In First Order Logic:

 O16(x,y) ⊃ S4(x)

 O16(x,y) ⊃ E1(y)

O16(x,y) ⊃ P141(x,y)

#### TO (new):

**O16 observed value (value was observed by)**

Domain: [S4](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.1t3h5sf) Observation

Range: [E1](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.lnxbz9) CRM Entity

Subproperty of:    [E13](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.35nkun2) Attribute Assignment. [P141](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.1ksv4uv) assigned (was assigned by): [E1](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.lnxbz9) CRM Entity

Superproperty of: [E16](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.4d34og8) Measurement. [P40](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.44sinio) observed dimension (was observed in): [E54](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.2jxsxqh) Dimension

Quantification: many to one, necessary (1,1:0,n)

Scope note: This property associates a value assigned to an entity observed by S4 Observation.

Examples:

* The surface survey at the bronze age site of Mitrou in east Lokris carried out by Cornell University in 1989 *observed* *value* 600 (of sherds).) (Kramer-Hajos and O’Neill , 2008).

In First Order Logic:

 O16(x,y) ⊃ S4(x)

 O16(x,y) ⊃ E1(y)

O16(x,y) ⊃ P141(x,y)

### O24 measured (was measured by)

The definition changed

#### FROM (old):

**O24 measured (was measured by)**

Domain: [S21](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.z337ya) Measurement

Range: [S15](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.3rdcrjn) Observable Entity

Subproperty of: [S4](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.1t3h5sf) Observation. [O8](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.3j2qqm3) observed (was observed by): [S15](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.3rdcrjn) Observable Entity

[E16](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.4d34og8) Measurement. [P39](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.1y810tw) measured (was measured by): [E1](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.lnxbz9) CRM Entity

Quantification: many to one, necessary (1,1:0,n)

Scope note: This property associates an instance of S21 Measurement with the instance of S15 Observable Entity to which it applied. An instance of S15 Observable Entity may be measured more than once. Material and immaterial things and processes may be measured, e.g. the number of words in a text, or the duration of an event.

Examples:

* The sensor measurement by IGME in 1999 (S21) *measured* the landslide displacement (S15) in the area of Parnitha.(InGeoCloudS - INspiredGEOdata CLOUD Services D2.2 2012;D2.3 2013)

In First Order Logic:

 O24(x,y) ⊃ S21(x)

 O24(x,y) ⊃ S15(y)

O24(x,y) ⊃ O8(x,y)

O24(x,y) ⊃ P39(x,y)

#### TO (new):

**O24 measured (was measured by)**

Domain: [S21](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.z337ya) Measurement

Range: [S15](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.3rdcrjn) Observable Entity

Subproperty of:   [S4](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.1t3h5sf) Observation. [O8](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.3j2qqm3) observed (was observed by): [S15](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.3rdcrjn) Observable Entity

Superproperty of:[E16](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit%22%20%5Cl%20%22heading%3Dh.4d34og8) Measurement. [P39](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.1y810tw) measured (was measured by): E18 Physical Thing

Quantification: many to one, necessary (1,1:0,n)

Scope note: This property associates an instance of S21 Measurement with the instance of S15 Observable Entity to which it applied. An instance of S15 Observable Entity may be measured more than once. Material and immaterial things and processes may be measured, e.g. the number of words in a text, or the duration of an event.

Examples:

* The sensor measurement by IGME in 1999 (S21) *measured* the landslide displacement (S15) in the area of Parnitha.(InGeoCloudS - INspiredGEOdata CLOUD Services D2.2 2012;D2.3 2013)

In First Order Logic:

 O24(x,y) ⊃ S21(x)

 O24(x,y) ⊃ S15(y)

O24(x,y) ⊃ O8(x,y)

### O12 has dimension (is dimension of)

The definition changed

#### FROM (old):

**O12 has dimension (is dimension of)**

Domain: [S15](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.3rdcrjn) Observable Entity

Range: [E54](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.2jxsxqh) Dimension

Quantification: one to many, dependent (0,n:1,1)

Scope note: This property associates an instance of S15 Observable Entity with an instance of E54 Dimension that the observable entity has.

It offers no information about how and when an E54 Dimension was established.

Examples:

* The earthquake of Mexico city in 2017 *had dimension* magnitude 6.2 Richter (Mindock, 2017, <http://www.independent.co.uk/news/world/americas/mexico-earthquake-today-latest-mexico-city-magnitude-6-tremor-damage-a7963211.html> ).
* The landslide that was activated in Parnitha in 1999 after the earthquake*, had* dimension crest length > 70 (InGeoCloudS - INspiredGEOdata CLOUD Services D2.2 2012;D2.3 2013)

In First Order Logic:

 O12(x,y) ⊃ S15(x)

 O12(x,y) ⊃ E54(y)

#### TO (new):

**O12 has dimension (is dimension of)**

Domain: [S15](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.3rdcrjn) Observable Entity

Range: [E54](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.2jxsxqh) Dimension

Quantification: one to many, dependent (0,n:1,1)

Scope note: This property associates an instance of S15 Observable Entity with an instance of E54 Dimension that the observable entity has.

It offers no information about how and when an E54 Dimension was established.

Examples:

* The earthquake of Mexico city in 2017 *had dimension* magnitude 6.2 Richter (Mindock, 2017, <http://www.independent.co.uk/news/world/americas/mexico-earthquake-today-latest-mexico-city-magnitude-6-tremor-damage-a7963211.html> ).
* The landslide that was activated in Parnitha in 1999 after the earthquake*, had* dimension crest length > 70 (InGeoCloudS - INspiredGEOdata CLOUD Services D2.2 2012;D2.3 2013)

In First Order Logic:

 O12(x,y) ⊃ S15(x)

 O12(x,y) ⊃ E54(y)

[O12(x,y) ∧ E18(x)] ⇒ P43(x,y)

[P43(x,y) ∧ E18(x)] ⇒ O12(x,y)

### O9 observed property type (property type was observed by)

The definition changed

#### FROM (old):

**O9 observed property type (property type was observed by)**

Domain: [S4](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.1t3h5sf) Observation

Range: [S9](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.1ci93xb) Property Type

Subproperty of:   [E1](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.lnxbz9) CRM Entity. P2 has type: [E55](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.3whwml4) Type

Quantification: one to one (1,1:0,n)

Scope note: This property associates an instance of S4 Observation with the instance of S9 Property Type for which the observation provides a value or evidence, such as “concentration of nitrate” observed in the water from a particular borehole. Encoding the observed property by type, observed entity and value (properties O9, O10, O16) is a method to circumscribe the reification of the observed property by the respective instance of S4 Observation.

In an RDFS encoding, this circumscription can be transformed into an explicit representation of the observed property in terms of a formal ontology either by use of a reification construct or by the use of a Named Graph containing the observed property. The latter representation allows for more formal reasoning with the model, the former is more flexible about the kinds of observations.

Examples:

* The seismic hazard analysis and recording by EPPO in 1990 (S4), in the area of Attiki *observed* and recorded *property type*  share wave velocity (S9) (InGeoCloudS - INspiredGEOdata CLOUD Services D2.2 2012;D2.3 2013)
* The Gas Chromatography analysis (S4) of the sample “mid-blue paint from the sky” *observed property type* retention time (S9). (Foister, S. 2015)

#### TO (new):

**O9 observed property type (property type was observed by)**

Domain: [S4](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.1t3h5sf) Observation

Range: [S9](https://docs.google.com/document/d/1_OncdSda-mYNJtUmcyC3lVvnDVuZTo7O/edit#heading=h.1ci93xb) Property Type

Subproperty of:   E13 Attribute Assignment. P177 assigned property type: E55 Type

Quantification: one to one (1,1:0,n)

Scope note: This property associates an instance of S4 Observation with the instance of S9 Property Type for which the observation provides a value or evidence, such as “concentration of nitrate” observed in the water from a particular borehole. Encoding the observed property by type, observed entity and value (properties O9, O10, O16) is a method to circumscribe the reification of the observed property by the respective instance of S4 Observation.

In an RDFS encoding, this circumscription can be transformed into an explicit representation of the observed property in terms of a formal ontology either by use of a reification construct or by the use of a Named Graph containing the observed property. The latter representation allows for more formal reasoning with the model, the former is more flexible about the kinds of observations.

Examples:

* The seismic hazard analysis and recording by EPPO in 1990 (S4), in the area of Attiki *observed* and recorded *property type*  share wave velocity (S9) (InGeoCloudS - INspiredGEOdata CLOUD Services D2.2 2012;D2.3 2013)
* The Gas Chromatography analysis (S4) of the sample “mid-blue paint from the sky” *observed property type* retention time (S9). (Foister, S. 2015)

In First Order Logic:

 O9(x,y) ⊃ S4(x)

 O9(x,y) ⊃ S9(y)

 O9(x,y) ⊃ P177(x,y)