Bringing Semantics to Citizen Science Data – A Semantic Extension of Open Data Kit 1

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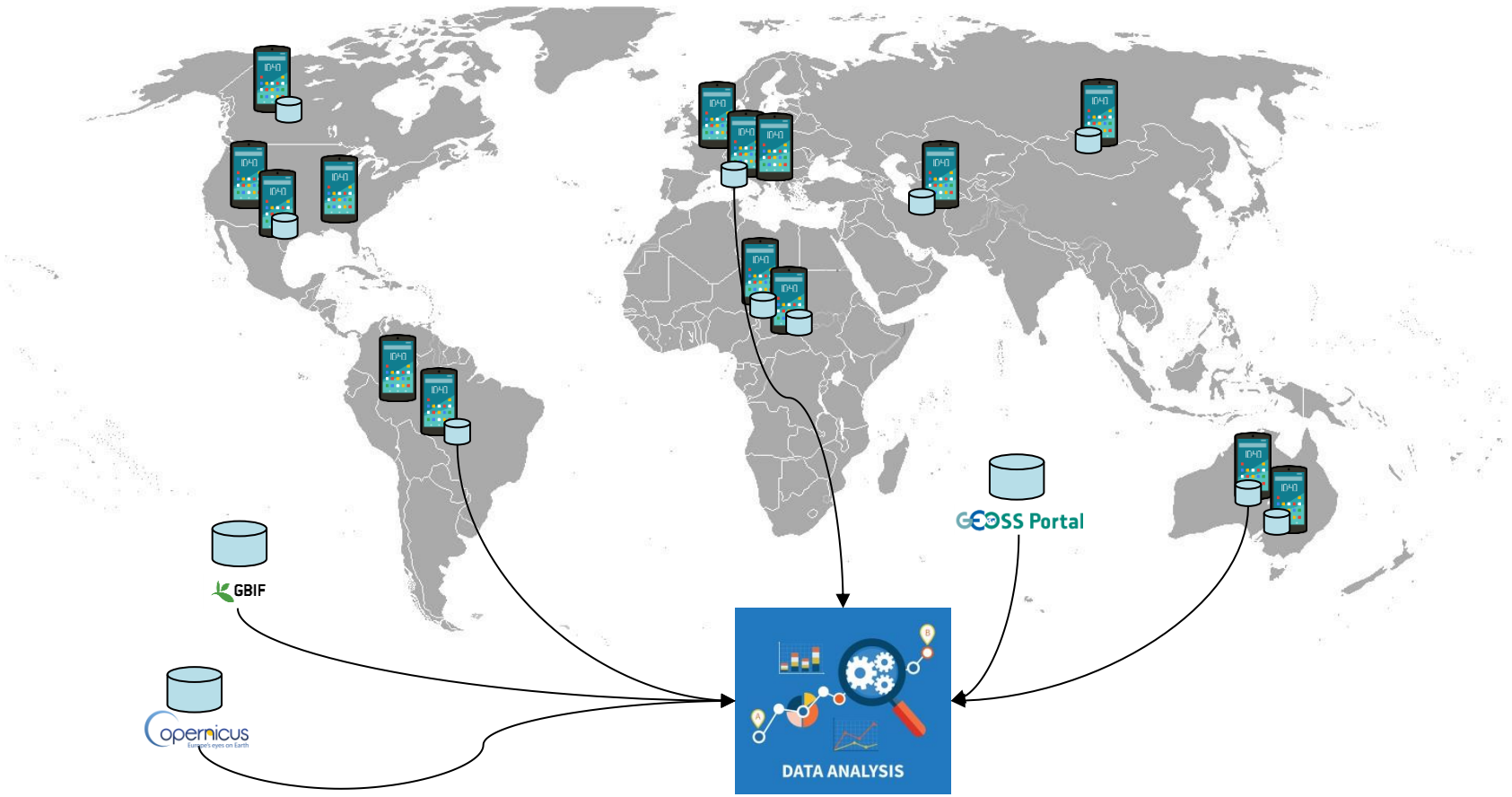
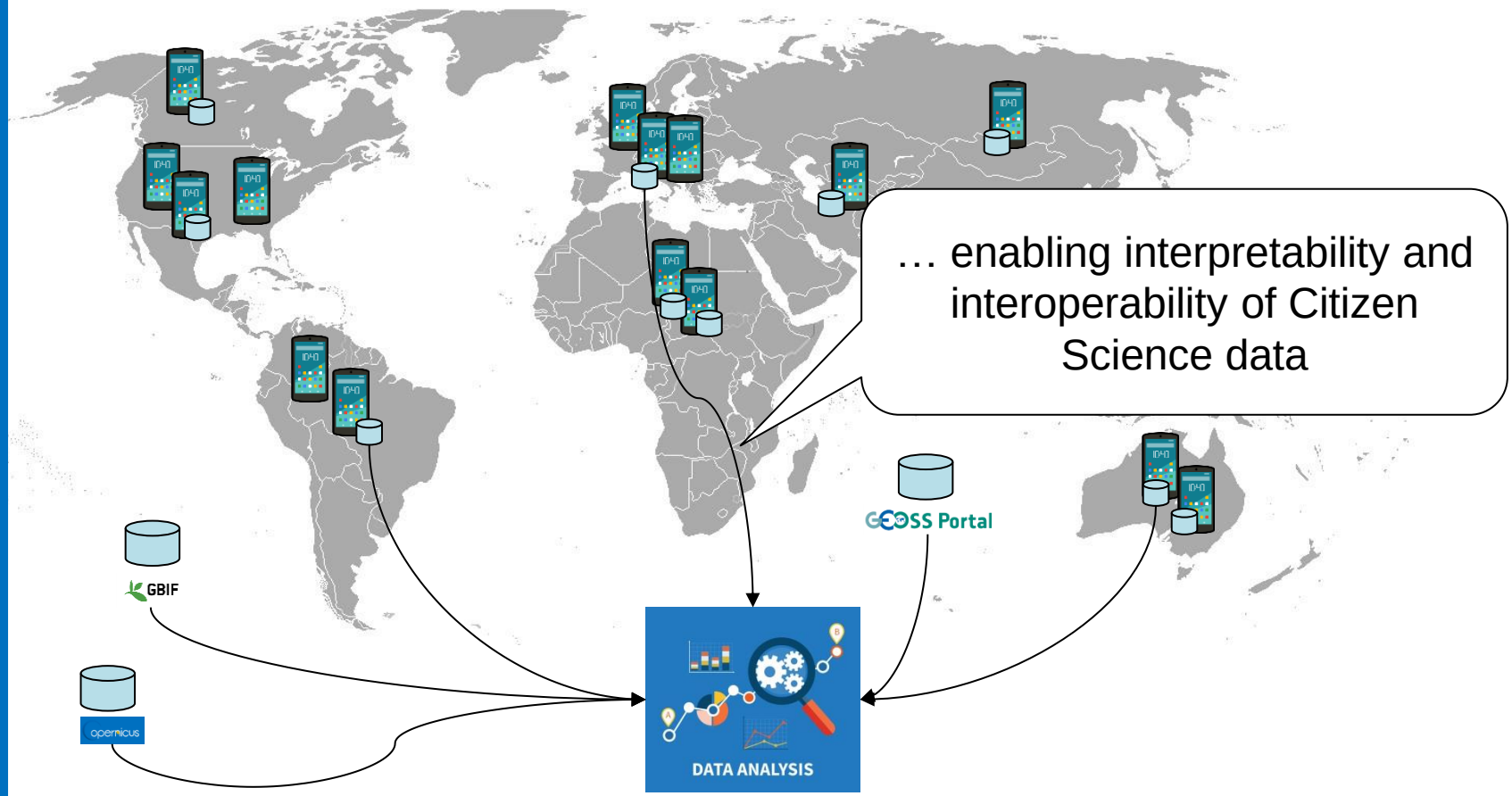
EGU2019-19123

Unlocking the Value of Citizen Contributions by …



Unlocking the Value of Citizen Contributions by …

Reusable Software & Best Practices



DLR

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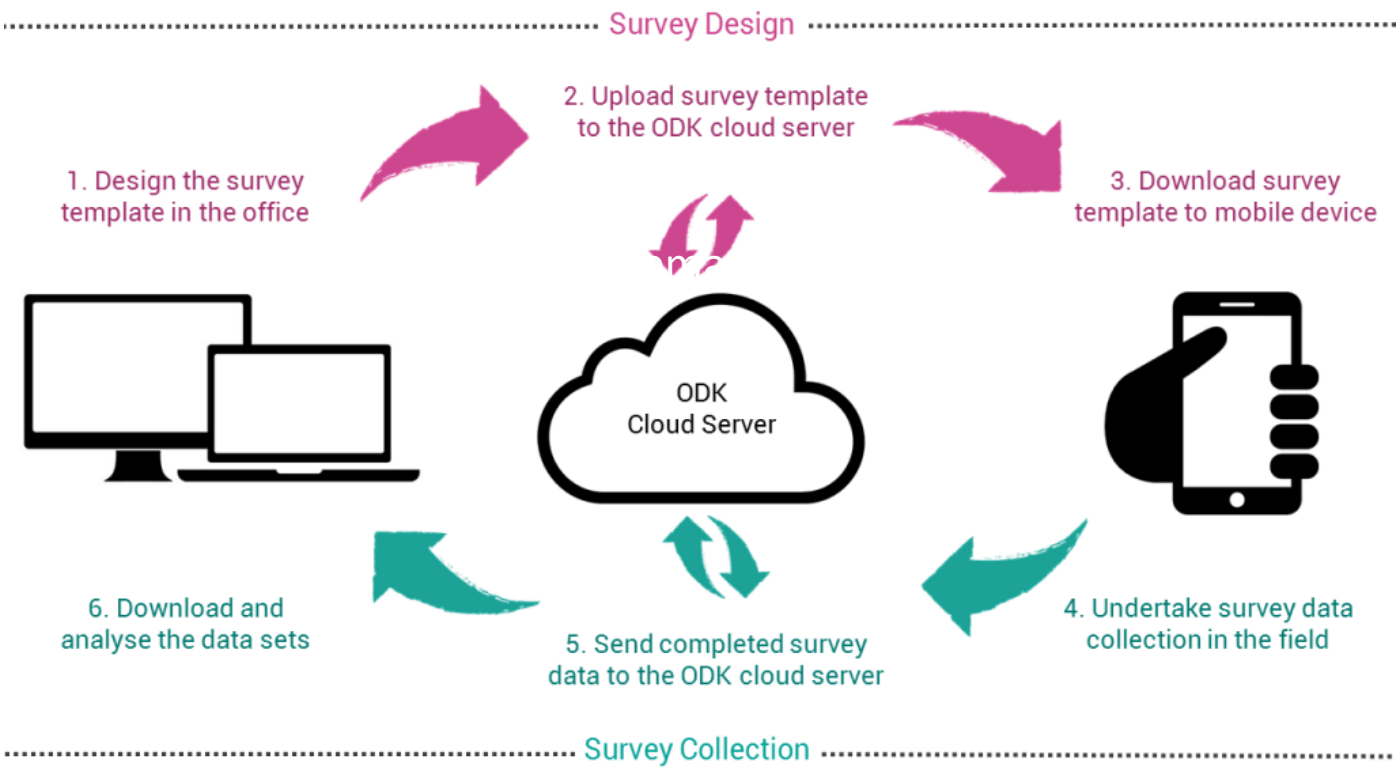
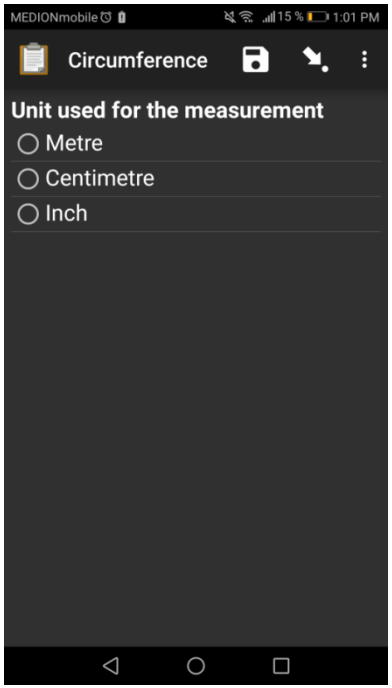
Mobile Data Collection (with ODK)



Enabling CS Data Interoperability & Reuse



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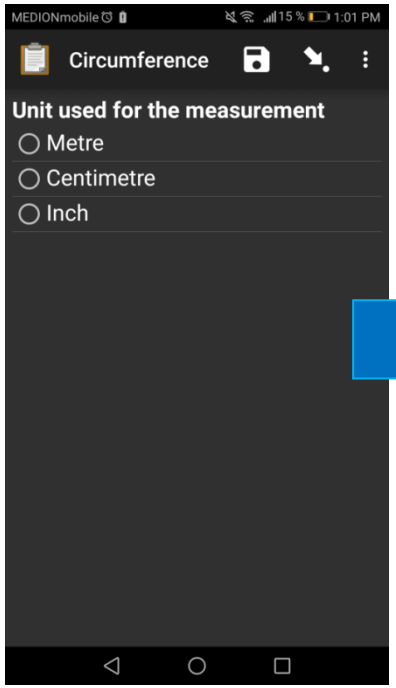
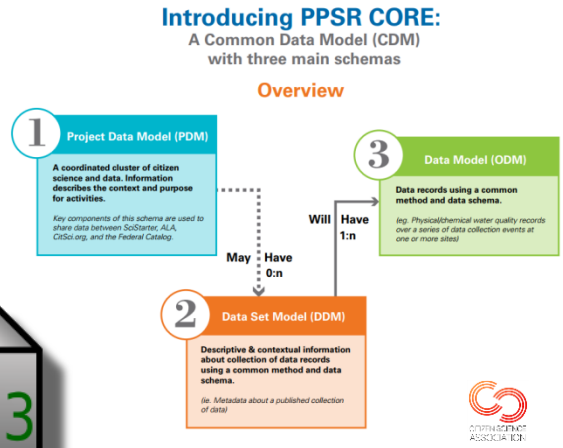
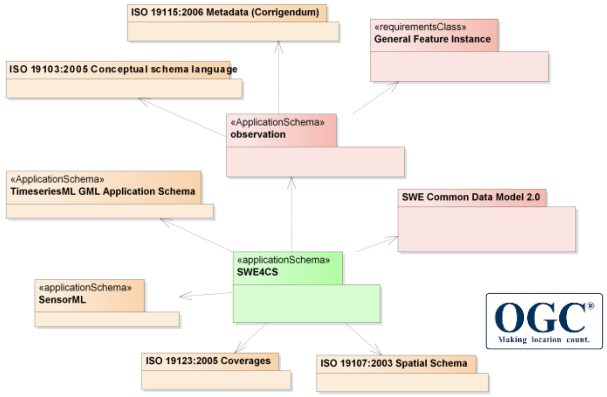
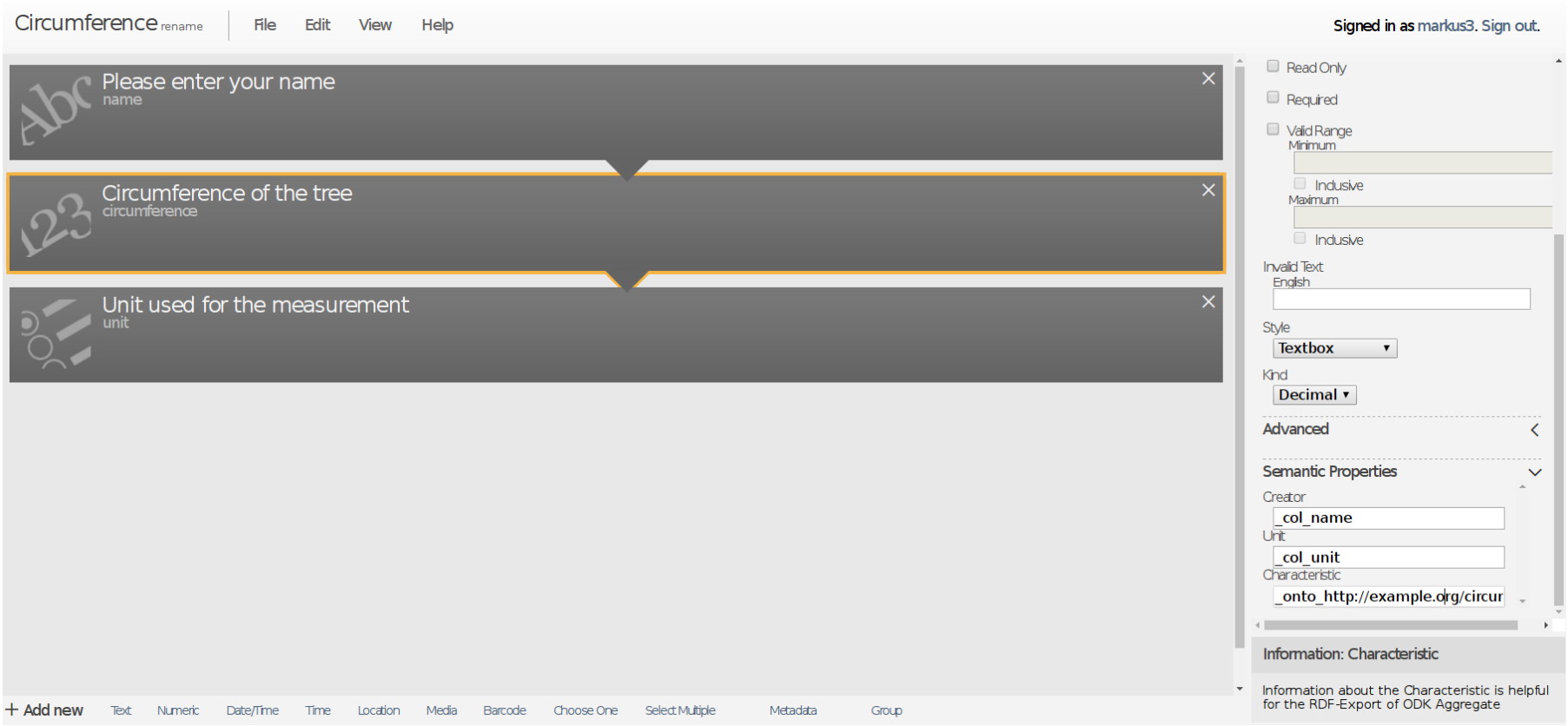






(1) Semantic Annotation at Design Time



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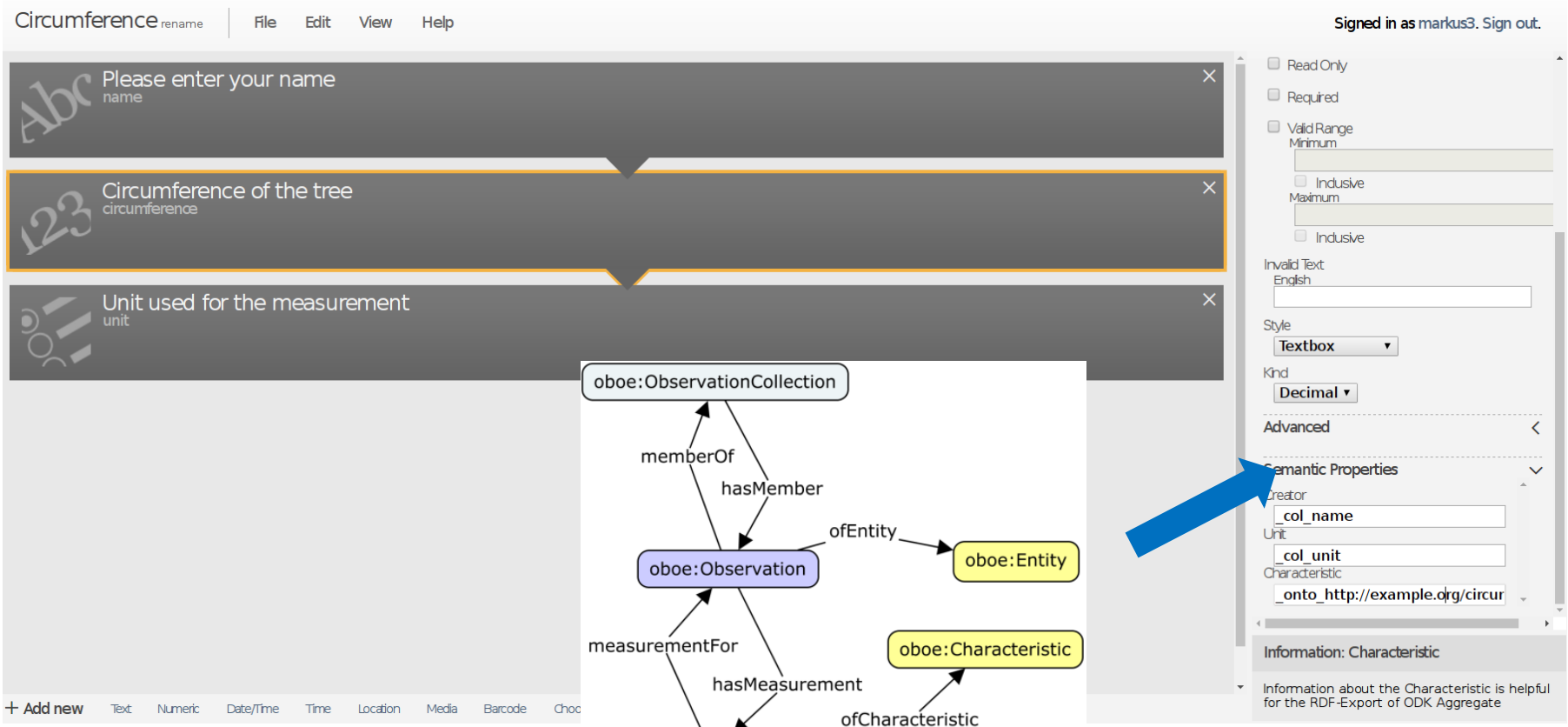

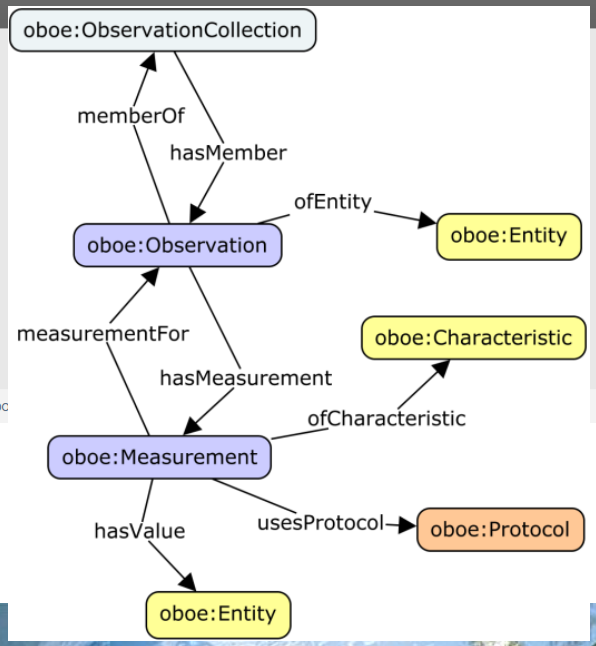

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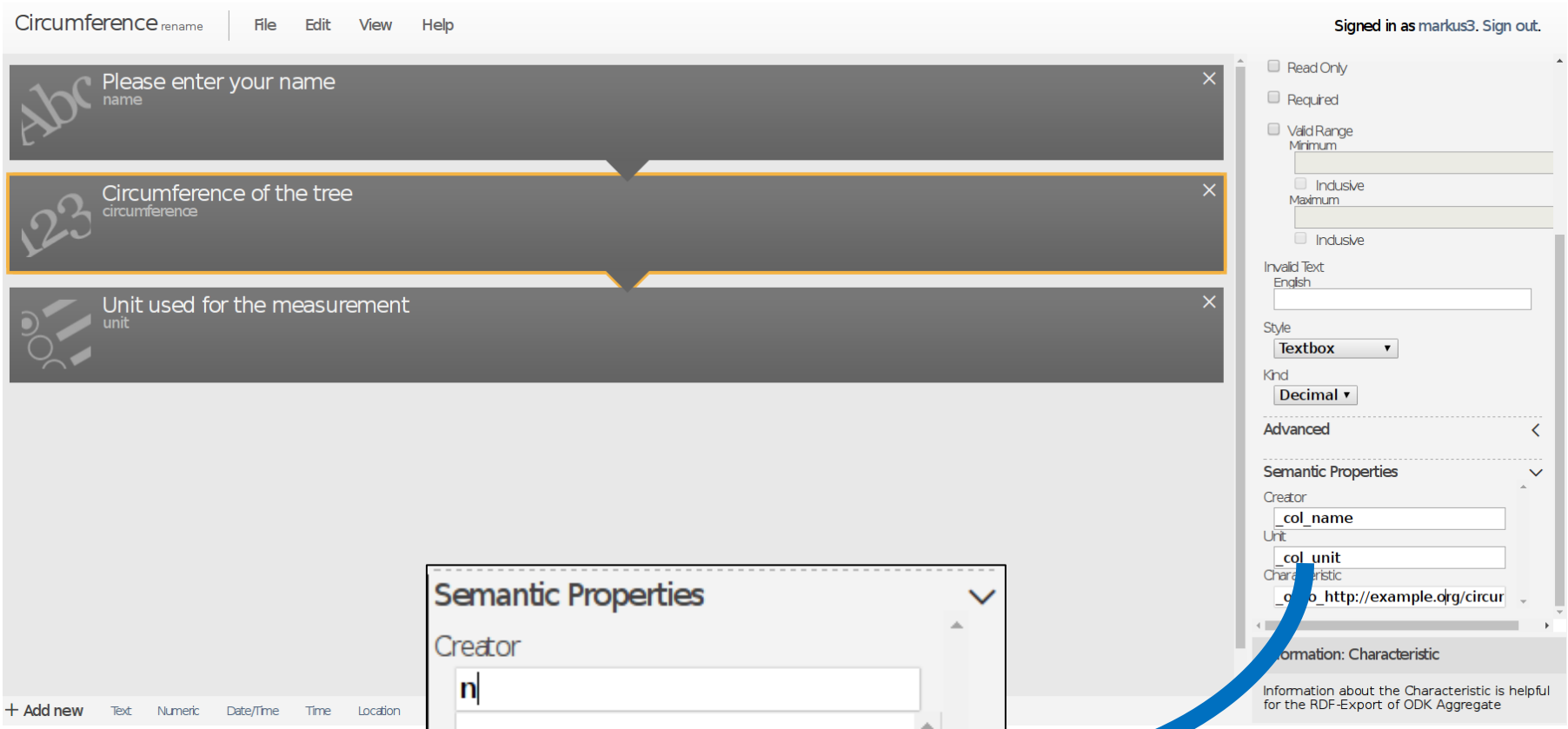

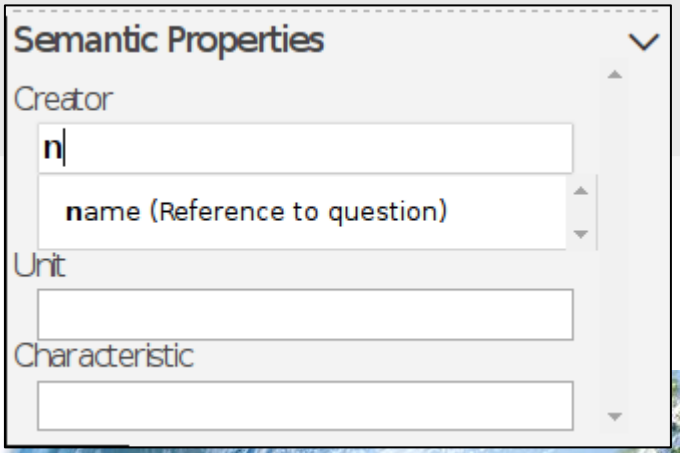

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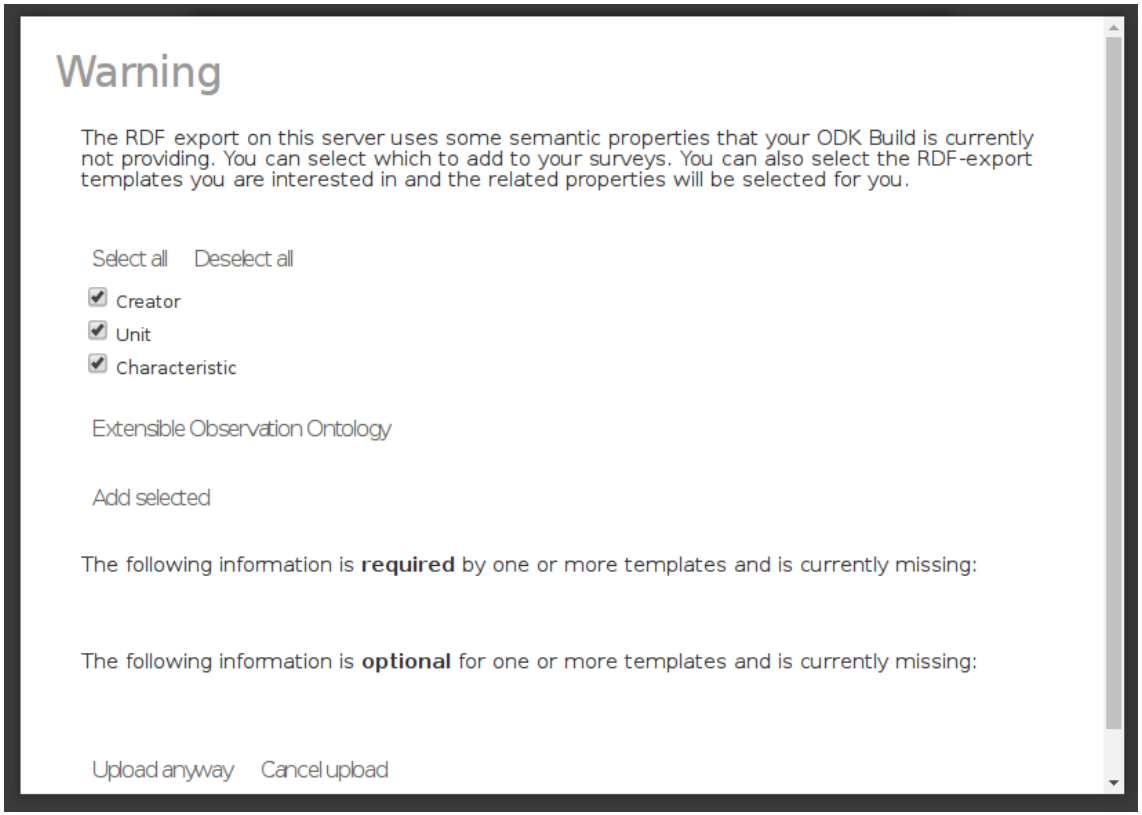

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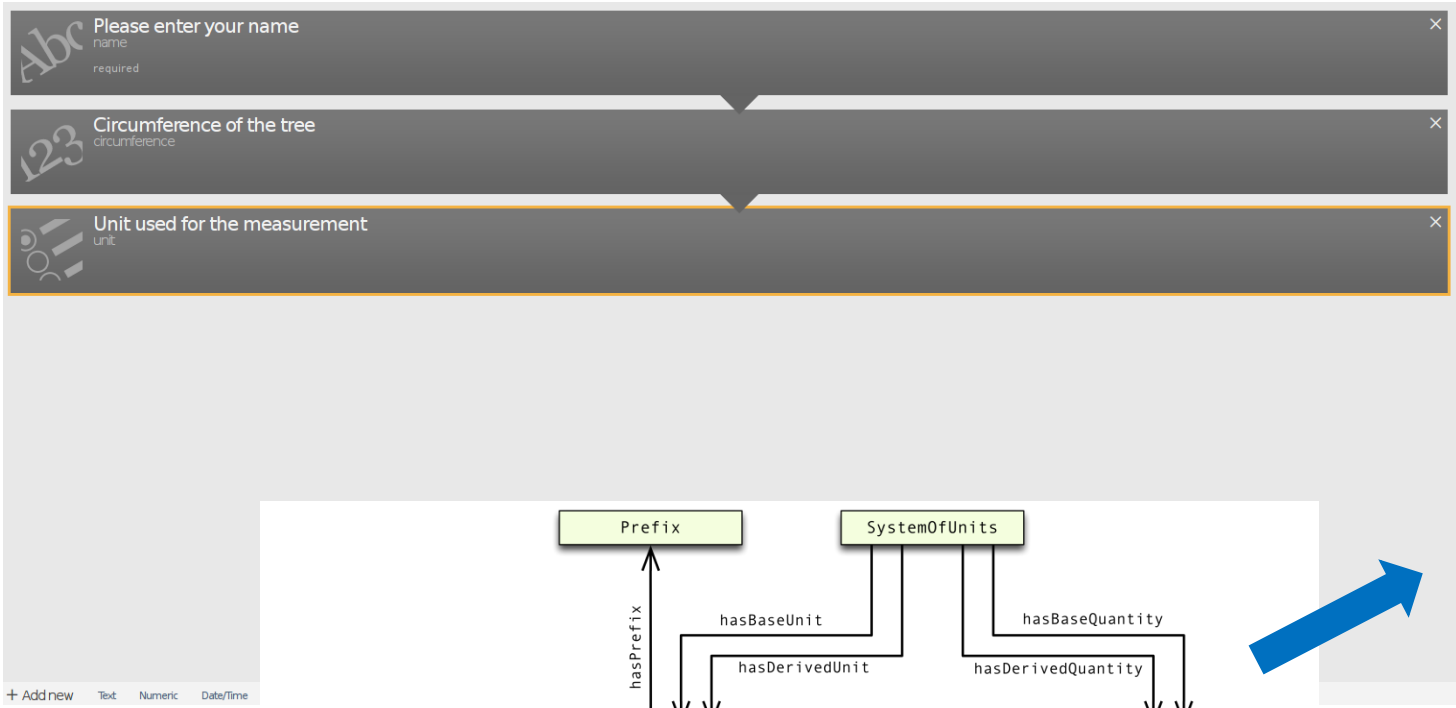

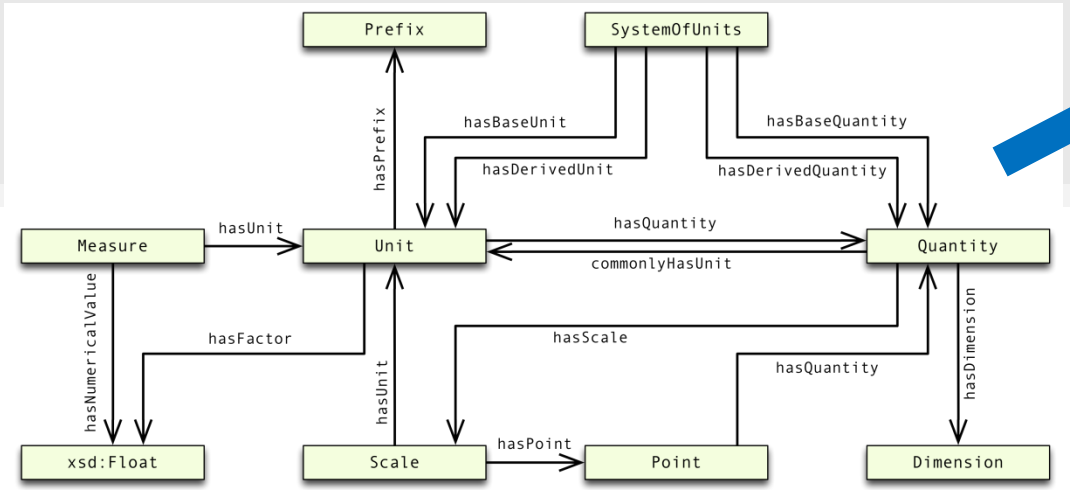

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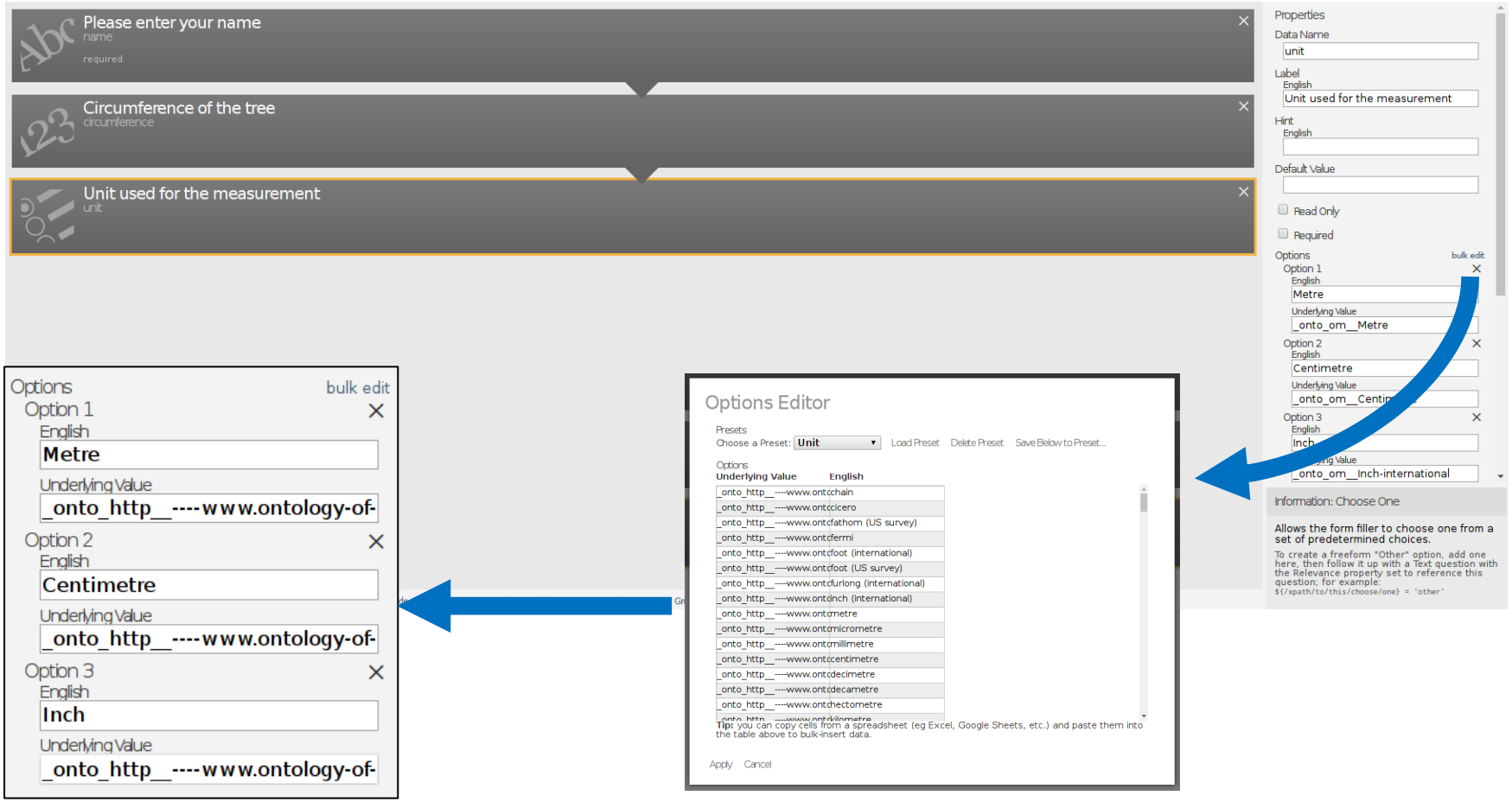
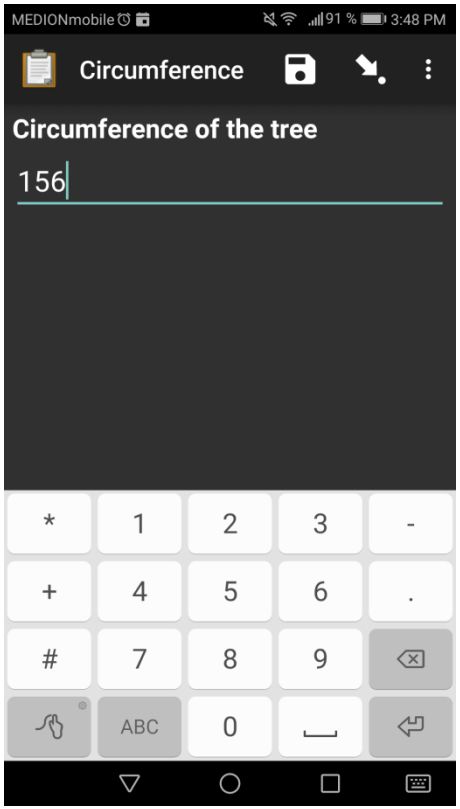
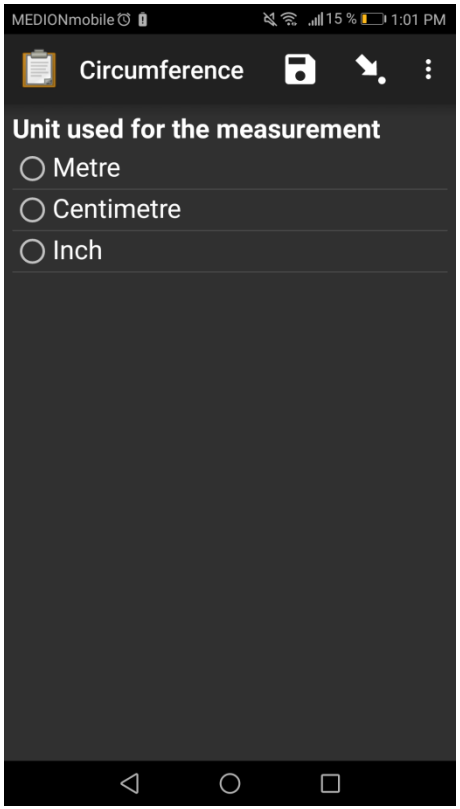
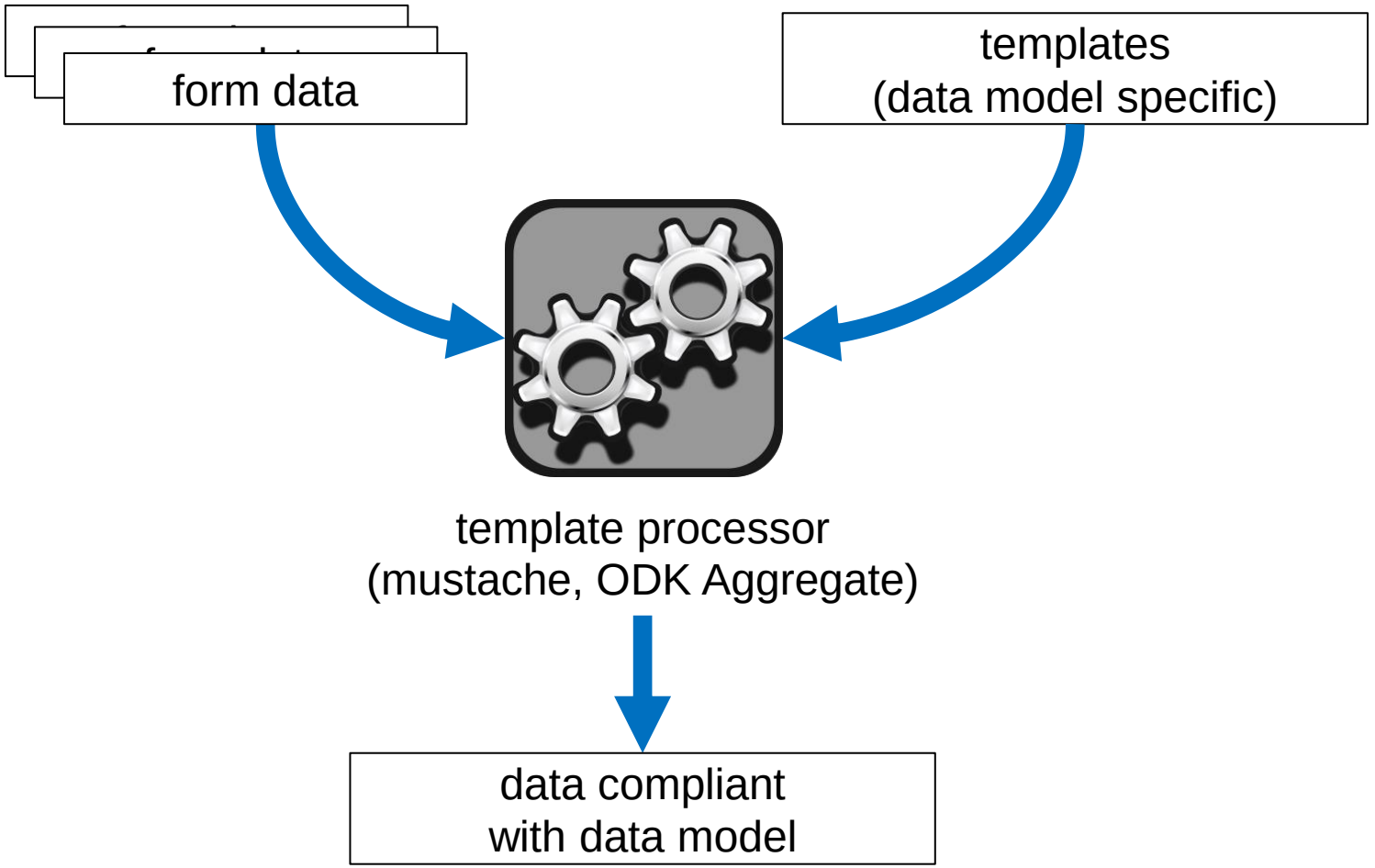


(2) Transparent during Data Collection



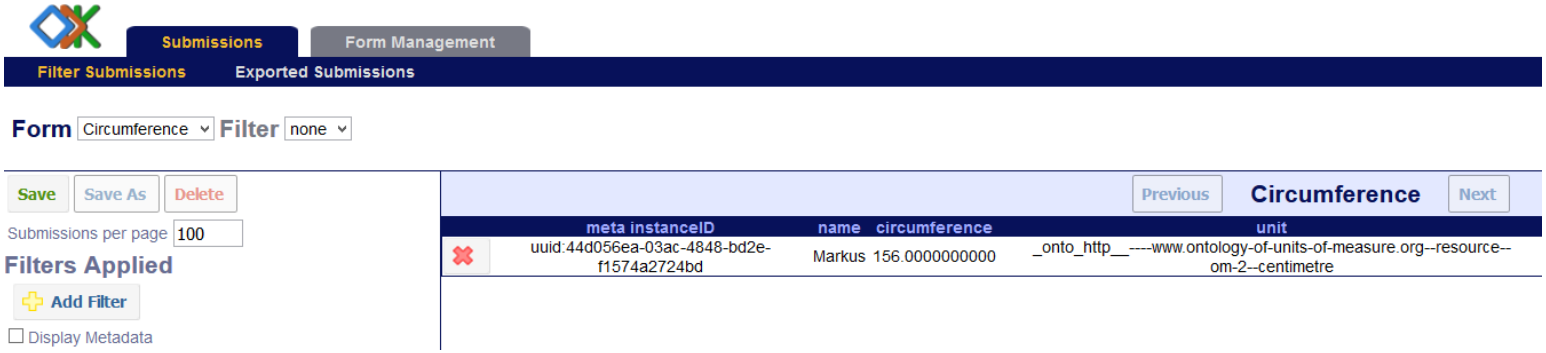


(3) Flexible Data Export via Templates



mustache - https://mustache.github.io/
Open Data Kit (ODK) - https://opendatakit.org/

(3) Flexible Data Export via Templates




```
{{!Construct an oboe-core:Measurement for the cell}}
{{cellEntityIdentifier}} rdf:type oboe-core:Measurement .

{{!Relate the Measurement to the Observation}}
{{columnModel.columnEntityIdentifier}} oboe-core:hasMeasurement {{cellEntityIdentifier}} .

{{!Construct an oboe-core:MeasuredValue for the cell}}
:measuredValue_{{rowModel.rowId}}_{{columnModel.columnHeader}}
        rdf:type oboe-core:MeasuredValue .

{{!Relate the Measurement to the MeasuredValue}}
{{cellEntityIdentifier}}
        oboe-core:hasValue :measuredValue_{{rowModel.rowId}}_{{columnModel.columnHeader}} .
```

```
{{^semantics.Unit.isLiteral}}
    {{cellEntityIdentifier}} om:hasUnit <{{{semantics.Unit.value}}}> .
{{/semantics.Unit.isLiteral}}
```

```
:measurement_1_circumference rdf:type oboe-core:Measurement .
:column_circumference oboe-core:hasMeasurement
:measurement_1_circumference .
:measuredValue_1_circumference rdf:type oboe-core:MeasuredValue .
:measurement_1_circumference oboe-core:hasValue
:measuredValue_1_circumference .

:measurement_1_circumference dcterms:creator
:creator_circumference_1 .
:creator_circumference_1 rdf:type foaf:Person .
:creator_circumference_1 foaf:name "Markus" .

:measurement_1_circumference
      oboe-core:ofCharacteristic <http://example.org/circumference>
.
:measurement_1_circumference
      om:hasUnit <http://www.ontology-of-units-of-
measure.org/resource/om-2/centimetre> .

:measuredValue_1_circumference oboe-core:hasCode
"156.0000000000"^^xsd:decimal .
```

Contact

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Sirko Schindler sirko.schindler@dlr.de
Friederike Klan friederike.klan@dlr.de

Publications

M. D. Steinberg, S. Schindler, F. Klan: Software Solutions for Form-Based, Mobile Data Collection - A Comparative Evaluation,
18th Conference on Datenbanksysteme für Business, Technologie und Web (BTW 2019), Rostock, 2019, https://arxiv.org/abs/1901.11053

M.D. Steinberg, S. Schindler, F. Klan: Bringing Semantics to Citizen Data Collection - A Semantic Extension of Open Data Kit 1, Geophysical Research Abstracts, Vol. 21, EGU2019-19123, EGU General Assembly 2019

Software

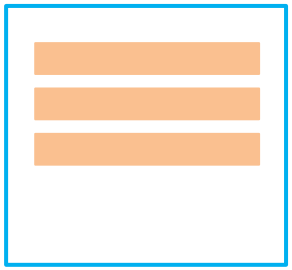
https://github.com/MaSteinberg/aggregate
https://github.com/MaSteinberg/build

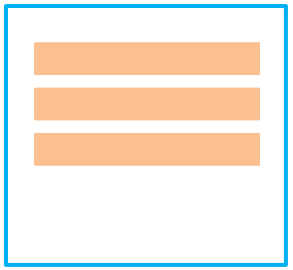
Image Sources

- p.2/3:
  - https://commons.wikimedia.org/wiki/File:BlankMap-World-v2.png
  - http://www.geoportal.org/documents/20181/24501/geoss-portal-beta.png/5b52dbab-a3c8-4962-8708-010ccff65c94?t=1480584717161
  - https://tr1.cbsistatic.com/hub/i/r/2015/09/30/f66fef72-5d57-48cc-bd8c-7ec0941e73ef/resize/770x/ac0363c3e414d51bafb1dd9b1c8a604a/dataanalysisistockrobuart.jpg
  - https://www.eea.europa.eu/about-us/who/copernicus-1/copernicus-logo/image
  - https://images.ctfassets.net/uo17ejk9rkwj/4rmEF9F4ZGiCwQk2WSMcce/b47146eacaf7b0dfc166656678c7ffe6/GBIF-2015.png
- p.4/15:
  - https://opendatakit.org/
- p.6:
  - https://openclipart.org
  - A. Bowser, P. Brenton, R. Stevenson, G. Newman, S. Schade, L. Bastin, A. Parker, J. Oliver: Citizen Science Association Data & Metadata Working Group: Report from CSA 2017 and Future Outlook, Wilson Center 2017
  - Ingo Simonis, Rob Atkinson: OGC Discussion Paper Standardized Information Models to Optimize Exchange, Reusability and Comparability of Citizen Science Data, OGC 16-129, http://www.opengis.net/doc/DP/16-129, 2016
  - http://www.opengeospatial.org/pub/www/files/OGC_Logo_2D_Blue_x_0_0.png
- p.8:
  - https://www.w3.org/TR/vocab-ssn, Fig.22
- p.11:
  - https://github.com/HajoRijgersberg/OM/blob/master/images/OM2.0-UML-diagram.png
- p.14:
  - https://www.clipartsfree.net

(3) Flexible Data Export via Templates

time





namespaces.ttl

toplevel.ttl

column.ttl . . . column.ttl

row.ttl

cell.ttl

booleanCell.ttl | dateCell.ttl | decimalCell.ttl

geoshapeCell.ttl | . . . | multipleChoiceCell.ttl

select1Cell.ttl | string.ttl | timeCell.ttl

. . .

row.ttl

.
.
.

(3) Flexible Data Export via Templates

namespaces.ttl.mustache

```
@BASE <{{base}}> .
@PREFIX : <{{base}}> .
{{#namespaces}}
    @PREFIX {{prefix}}: <{{uri}}> .
{{/namespaces}}
@PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
@PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#> .
@PREFIX owl: <http://www.w3.org/2002/07/owl#> .
@PREFIX oboe-core: <http://ecoinformatics.org/oboe/oboe.1.2/oboe-core.owl#> .
...
```

toplevel.ttl.mustache

```
{{toplevelEntityIdentifier}} rdf:type oboe-core:ObservationCollection .
```

(3) Flexible Data Export via Templates

column.ttl.mustache

```
{{columnEntityIdentifier}} rdf:type oboe-core:Observation .
{{topLevelModel.toplevelEntityIdentifier}} oboe-core:hasMember {{columnEntityIdentifier}} .
```

cell.ttl.mustache

```
{{cellEntityIdentifier}}
      rdf:type             oboe-core:Measurement ;
      oboe-core:hasValue   :measuredValue_{{rowModel.rowId}}_{{columnModel.columnHeader}} .
      om:hasUnit           <{{{semantics.Unit.value}}}> .
```

decimalCell.ttl.mustache

```
:measuredValue_{{rowModel.rowId}}_{{columnModel.columnHeader}}
      oboe-core:hasCode "{{{cellValue}}}"^^xsd:decimal .
```

Exported Data

```
:measurement_1_circumference rdf:type oboe-core:Measurement .
:column_circumference oboe-core:hasMeasurement :measurement_1_circumference .
:measuredValue_1_circumference rdf:type oboe-core:MeasuredValue .
:measurement_1_circumference oboe-core:hasValue :measuredValue_1_circumference .

:measurement_1_circumference dcterms:creator :creator_circumference_1 .
:creator_circumference_1 rdf:type foaf:Person .
:creator_circumference_1 foaf:name "Markus" .

:measurement_1_circumference oboe-core:ofCharacteristic <http://example.org/circumference> .
:measurement_1_circumference
         om:hasUnit <http://www.ontology-of-units-of-measure.org/resource/om-2/centimetre> .

:measuredValue_1_circumference oboe-core:hasCode "156.0000000000"^^xsd:decimal .
```

Template Configuration

The following snippets show a parts of a template configuration:

```yaml
displayName: Extensible Observation Ontology
templateProperties:
  optionalProperties:
    - Creator
  requiredProperties:
    - Characteristic
    - Unit
```

```yaml
availableProperties:
  Creator:
    Endpoint:
    Query:
  Unit:
    Endpoint: http://192.168.0.8:7200/repositories/om
    Query: |-
      PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
      PREFIX : <http://ecoinformatics.org/oboe/oboe.1.2/oboe.owl#>
      PREFIX om: <http://www.ontology-of-units-of-measure.org/resource/om-2/>
      PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>

      SELECT DISTINCT ?uri ?displayName
      WHERE {
          ?uri rdf:type om:Unit .
          OPTIONAL{
              ?uri rdfs:label ?displayName .
              FILTER (lang(?displayName) = 'en')
          }
      }
```