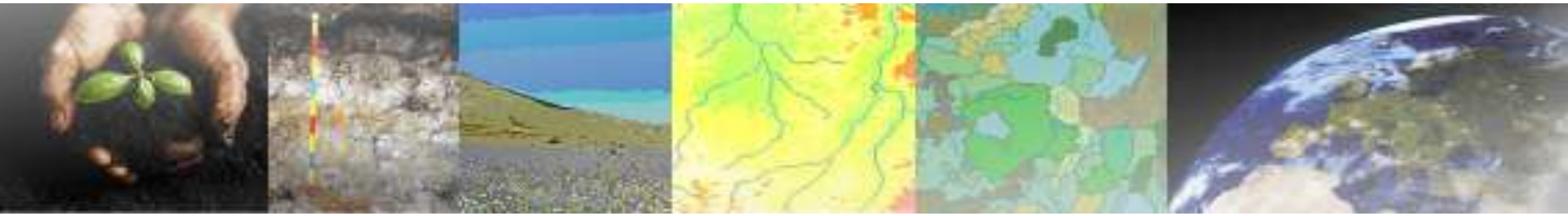
e-SOTER

Regional pilot platform as EU contribution to a Global Soil Observing System

Standards and services for Soil and Terrain Data Exchange: SoTerML

Daniel Simms, Stephen Hallett



Cranfield UNIVERSITY

e-SOTER work package 6 team

Amir Pourabdollah, The University of Nottingham
Andrew Rayner, Cranfield University
Daniel Simms, Cranfield University
Didier Leibovici, The University of Nottingham
Einar Eberhardt, BGR
Hannes I. Reuter, ISRIC
Piet Tempel, ISRIC
Rainer Baritz, BGR
Stephen Hallett, Cranfield University
Vit Penizek, Czech University of Life Sciences / IES JRC
Yusuf Yigini, JRC

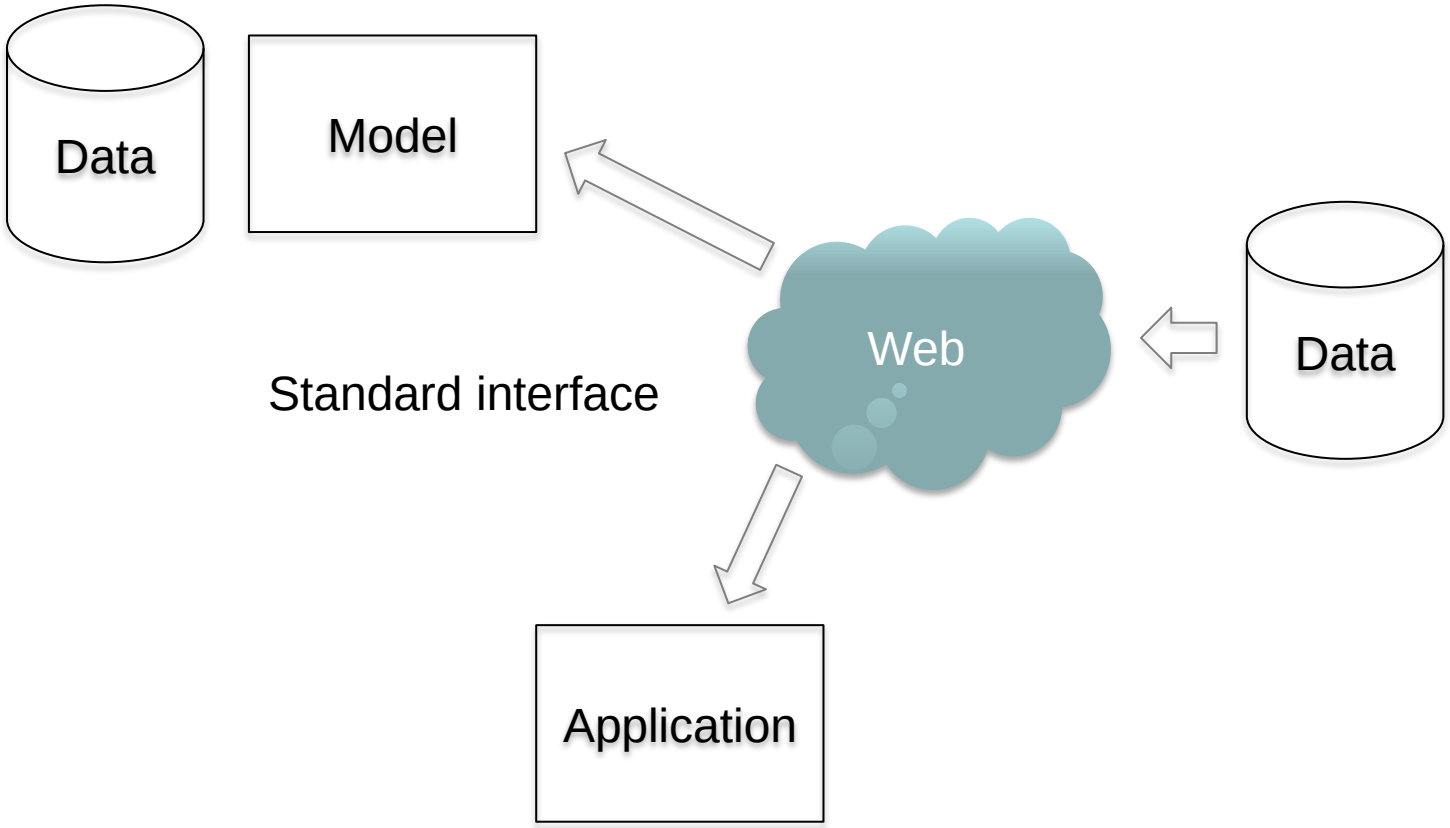
Reporting based on our paper:

Pourabdollah, A., Leibovici, D.G., Simms, D.M., Tempel, P., Hallett, S.H. and Jackson, M.J. Towards a standard for soil and terrain data exchange: SoTerML (2012) Computers and Geosciences. http://dx.doi.org/10.1016/j.cageo.2011.11.026.

Introduction

- Development of an exchange format for soil and terrain data
- Based on interoperability principles
- Separate the data from the application
- Use existing interfaces

Introduction



XML

- XML is the language of the web
  - machine and human readable
  - standard interfaces (OGC & ISO) use XML
  - structured and addressable elements
  - Integration

- Schema - describes the data

- Instance document – the data

Cranfield UNIVERSITY

GML

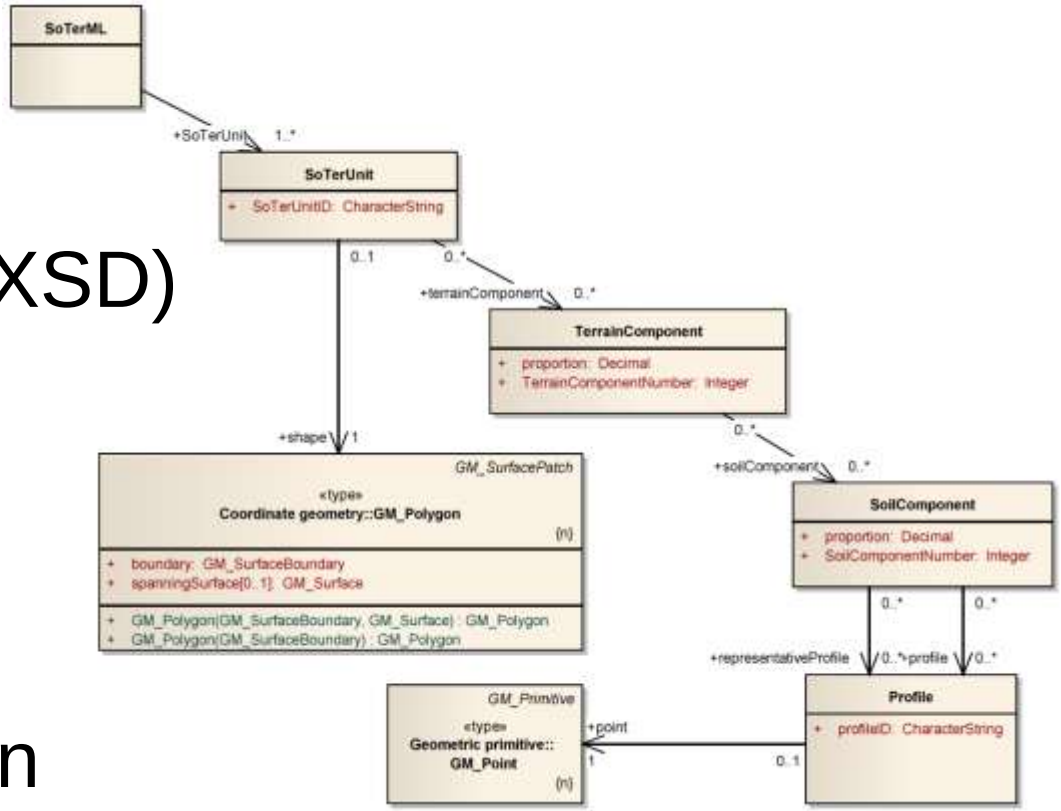
- Geography Markup Language
- XML grammar for structuring and exchanging geographic data
- Application schemas allow user communities to add there own grammar based around GML
- Interoperability of geographical datasets led by OGC
- OGC Web Feature Services

Related works

- INSPIRE – spatial data infrastructure based on OGC standards
- GEOSS – European ‘system of systems’
- GeoSciML – GML application schema developed by European geological community for query and exchange of data
- SODA – ENVASSO soil database
- ESD and SOMIS services
- ISO – Recording and exchange of soil-related data
- Soil-ML – Conceptional model for global adoption

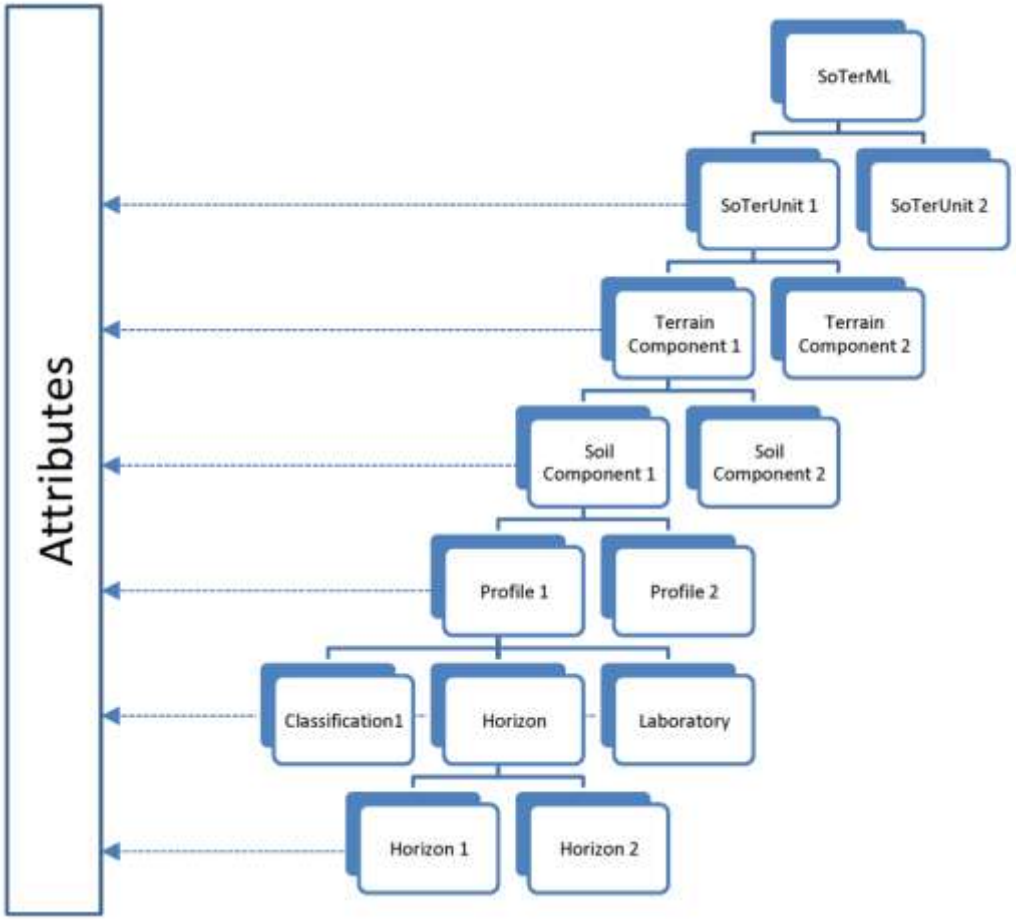
SoTerML design

- Data model (UML)
- XML schema (XSD)
- Attribute pattern



Attribute pattern design

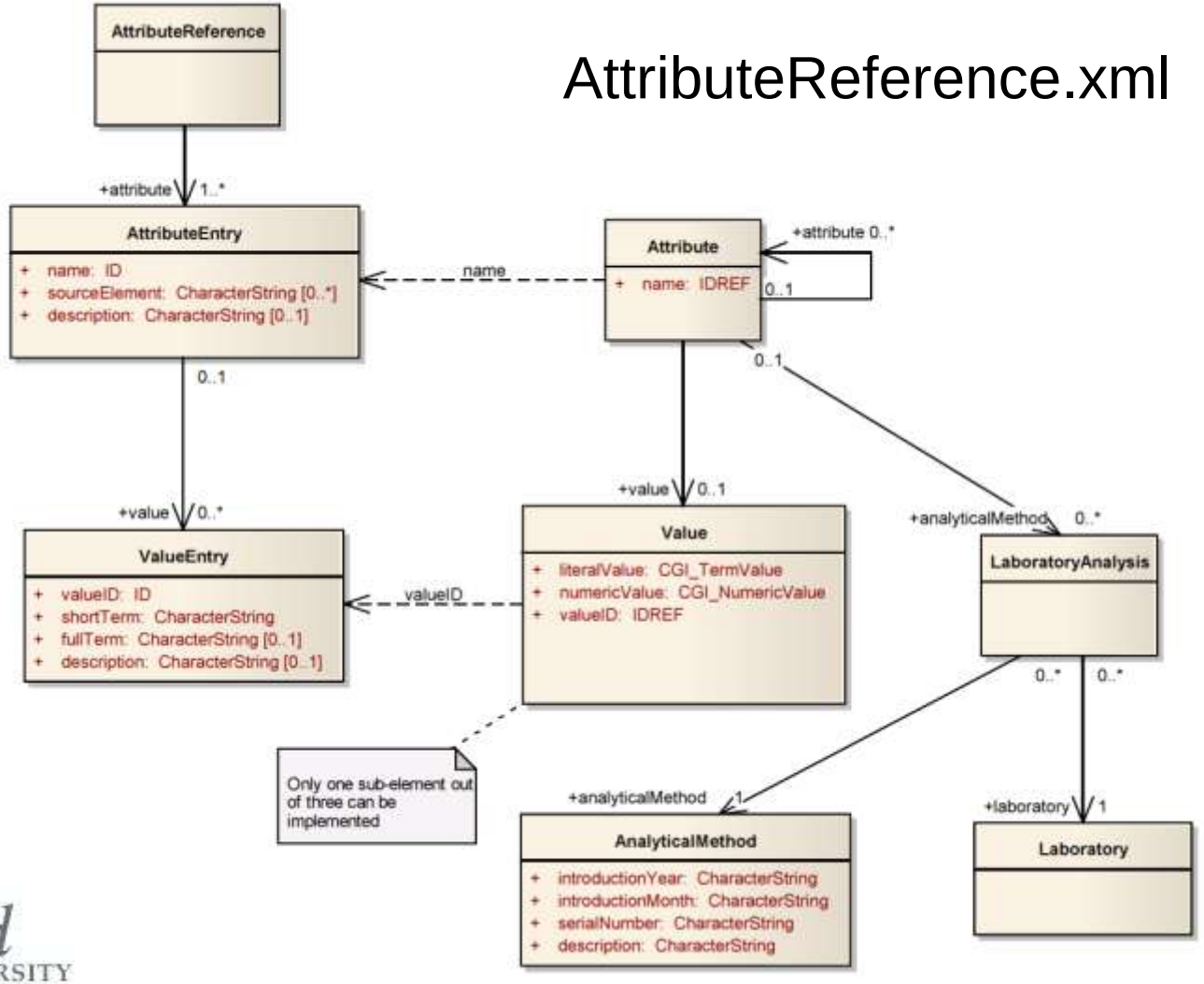
- Separation of attributes from class hierarchy



Cranfield UNIVERSITY

Attribute pattern design

- Acceptable value defined in the attribute pattern



Cranfield UNIVERSITY

Attribute pattern design

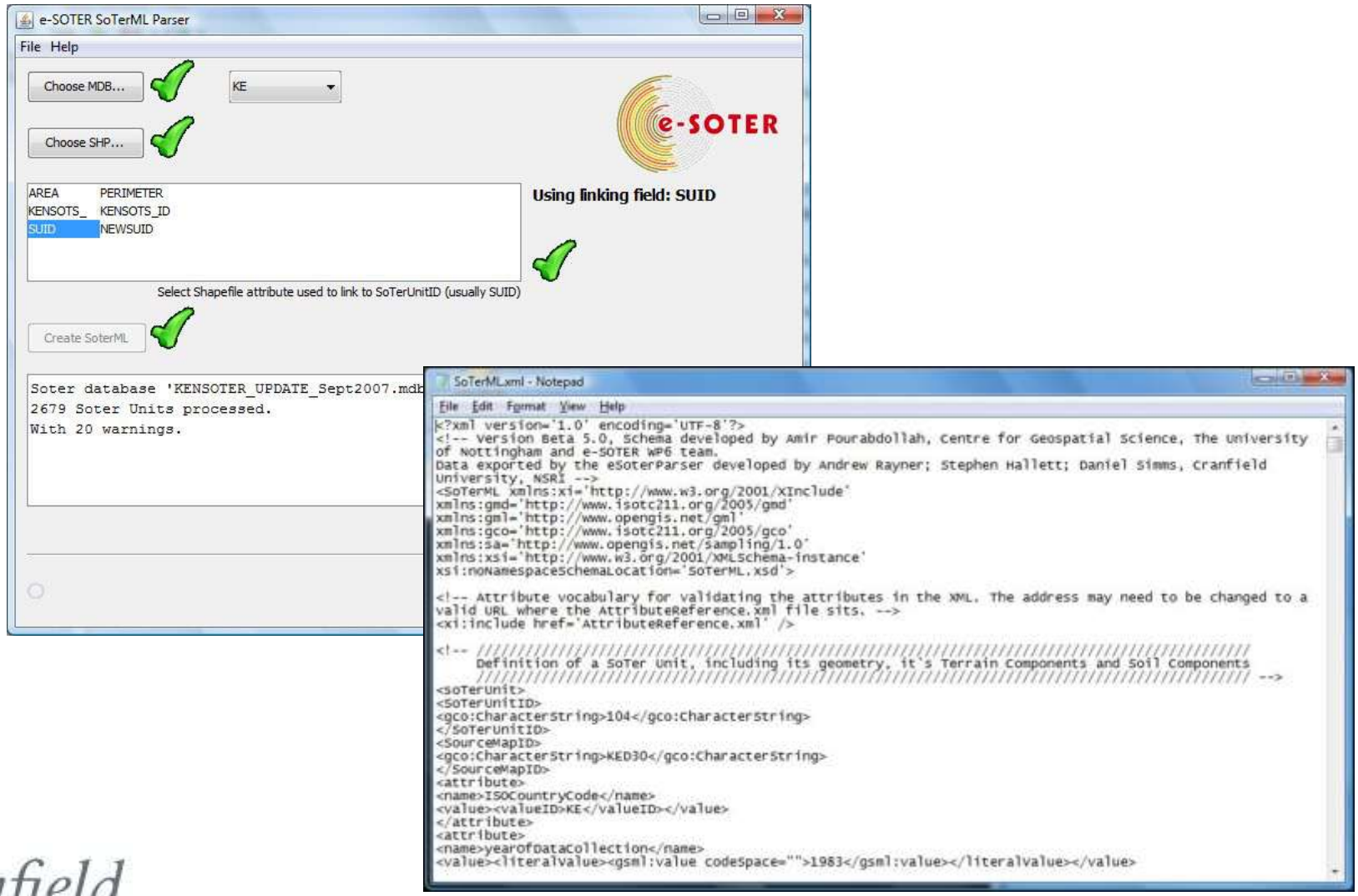
- Fixed

```
...
<horizon>
  <clayMineralogy>CH</clayMineralogy>
...
```

- Open approach used

```
...
<horizon>
  <attribute name="clayMineralogy">
    <value>CH</value>
...
```

Implementation

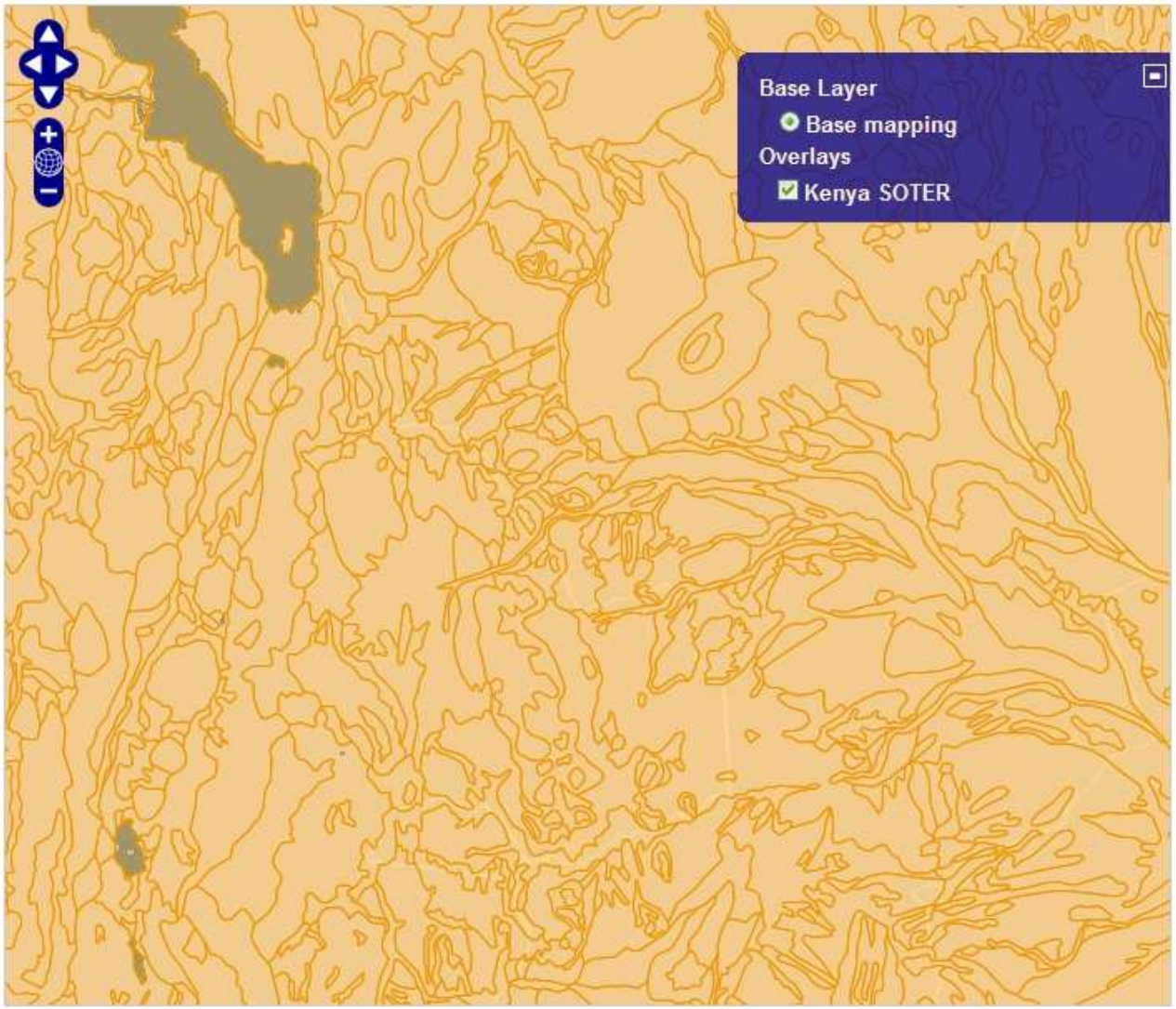


OGC Web Feature Service


```
- <wfs:FeatureCollection numberOfFeatures="2" timeStamp="2012-03-16T18:26:08.001Z" xsi:schemaLocation="http://www.esoter.net/stml/5.0 http://www.schema.esoter.net/SoTerML50.xsd
  http://www.opengis.net/wfs http://localhost:8080/geoserver/schemas/wfs/1.1.0/wfs.xsd">
  - <gml:featureMembers>
    - <stml:SoTerUnit gml:id="soter_unit.18">
      - <stml:SoTerUnitID>
          <gco:CharacterString>111</gco:CharacterString>
        </stml:SoTerUnitID>
      - <stml:project>
          <gco:CharacterString>2</gco:CharacterString>
        </stml:project>
      + <stml:attribute></stml:attribute>
      + <stml:attribute></stml:attribute>
      + <stml:attribute></stml:attribute>
      + <stml:attribute></stml:attribute>
      + <stml:attribute></stml:attribute>
      + <stml:attribute></stml:attribute>
      + <stml:attribute></stml:attribute>
      + <stml:attribute></stml:attribute>
      + <stml:attribute></stml:attribute>
      + <stml:attribute></stml:attribute>
      - <stml:attribute>
        - <stml:Attribute>
            <stml:name>permanentWaterSurface</stml:name>
          - <stml:value>
            - <stml:literalValue>
                <gco:CharacterString>0</gco:CharacterString>
              </stml:literalValue>
            </stml:value>
          </stml:Attribute>
        </stml:attribute>
      - <stml:shape srsDimension="2" srsName="http://www.opengis.net/gml/srs/epsg.xml#4326">
        - <gml:exterior>
          - <gml:LinearRing>
            - <gml:posList>
                4.98395299911499 35.38332748413086 4.997069835662842 35.39085388183594 5.011755466461182 35.400020599365234 5.019562244415283 35.405513763427734 5.025993824005127
                35.41055679321289 5.023290157318115 35.41679000854492 5.015798568725586 35.42486572265625 5.013450622558594 35.427757263183594 5.009220123291016 35.43295669555664
                4.997368812561035 35.43805694580078 4.984344959259033 35.43833541870117 4.969208240509033 35.42964172363281 4.9572434425354 35.41632843017578 4.946897506713867 35.4062385559082
                4.9328932762146 35.39546585083008 4.919130325317383 35.38631057739258 4.897607803344727 35.378108978271484 4.885279655456543 35.378379821777344 4.869315147399902
                35.380985260009766 4.857717990875244 35.387943267822266 4.85664701461792 35.39854049682617 4.863558292388916 35.408180236816406 4.8747878074646 35.41504669189453 4.88302755355835
                35.418235778808594 4.892208576202393 35.42579650878906 4.902994155883789 35.434043884277344 4.912613868713379 35.4386100769043 4.922266960144043 35.44801712036133
                4.935127258300781 35.45901870727539 4.946156024932861 35.469112396240234 4.962980270385742 35.492759704589844 4.960297584533691 35.50197982788086 4.955103397369385
                35.511680603027344 4.94948673248291 35.52666091918945 4.9518327713012695 35.53677749633789 4.963551044464111 35.547794342041016 4.972952842712402 35.55350875854492
                4.984659671783447 35.56244659423828 4.995265483856201 35.578060150146484 4.999647617340088 35.584712982177734 5.006124973297119 35.59781265258789 5.010319232940674
```


```
- <stml:attribute>
  - <stml:Attribute>
      <stml:name>permanentWaterSurface</stml:name>
    - <stml:value>
      - <stml:literalValue>
          <gco:CharacterString>0</gco:CharacterString>
        </stml:literalValue>
      </stml:value>
    </stml:Attribute>
  </stml:attribute>
```

OGC Web Feature Service



Cranfield UNIVERSITY

Summary

Standard for soil and terrain data, schema and attribute reference

Data available over the internet in a standard format (OGC WFS)

Integration with other services and applications

Merging legacy and new data across domains

Cranfield UNIVERSITY