



DIGGS Pilot Testing

TRB 2016 Annual Meeting Workshop 127

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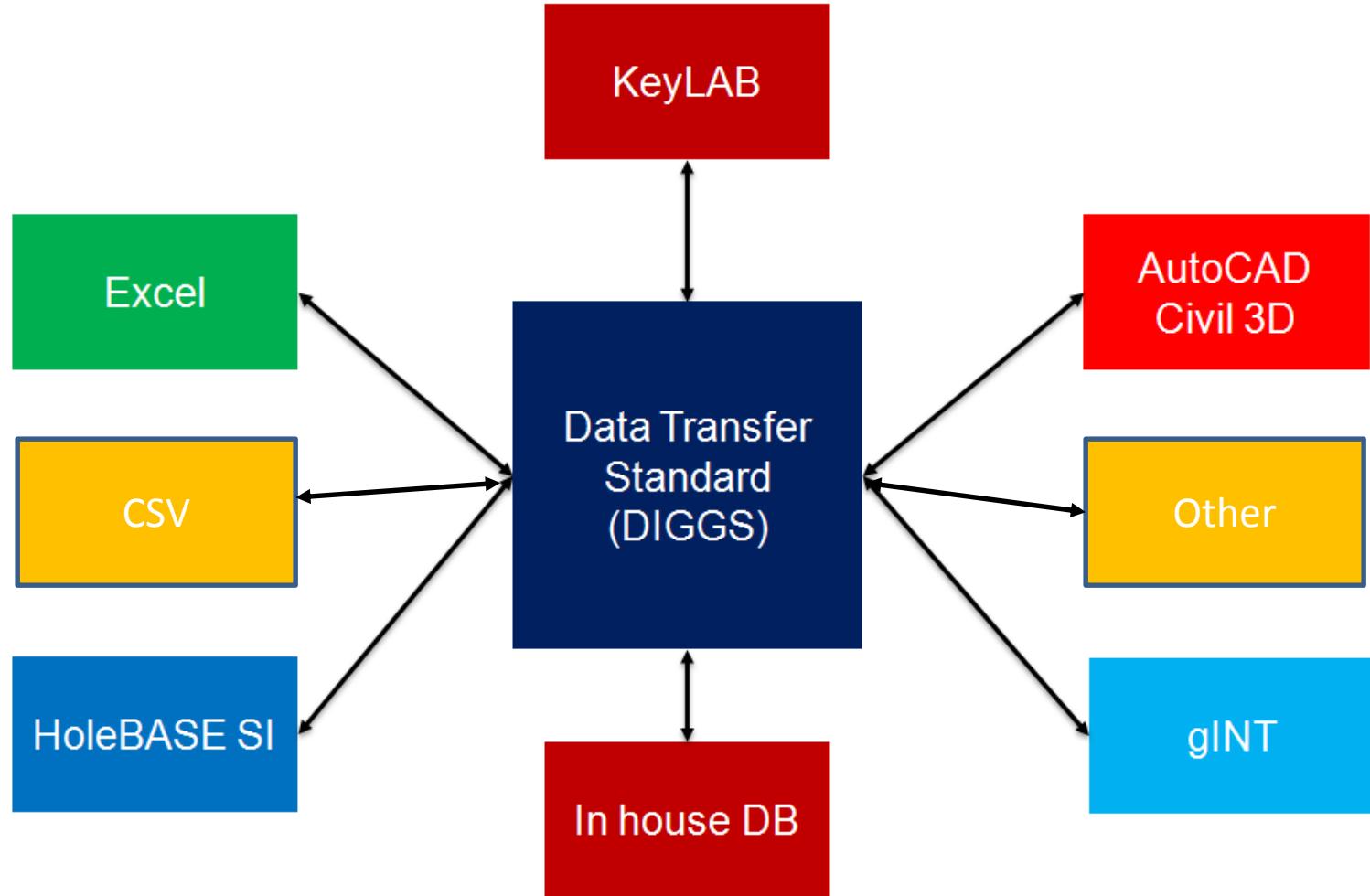
What is DIGGS?

- GeoTechnical/Environmental Data Exchange Format
- Standard Format based on International Standards
 - eXtensible Markup Language (XML)
 - Geography Markup Language (GML)
- XML/GML GeoTechnical/Environmental Schema (structure)
- Supporting Code Lists and Dictionaries (valid data values)
- XML/GML Instance (data) Documents (files)
- Basis for Data Management and Tool Interoperability among
 - Field and Lab Data Acquisition Equipment
 - Data Analysis, Visualization and Presentation Software
 - Databases and Cloud Data Storage
- Project for Software Engineers to Implement in Tools





DIGGS Data Transfer



(after Keynetix, 2014)



Pilot Testing

- Multi-Phase Project
- Phase 1 Development of Schemas, Code Lists and Dictionaries 2013 – 2015, versions 1, 2.0.a, and 2.0.b
- Phase 2 Community Review of Schemas, Code Lists and Dictionaries 2015
- Phase 3 Geo Tool Vendor Implementation Development and Testing 2016



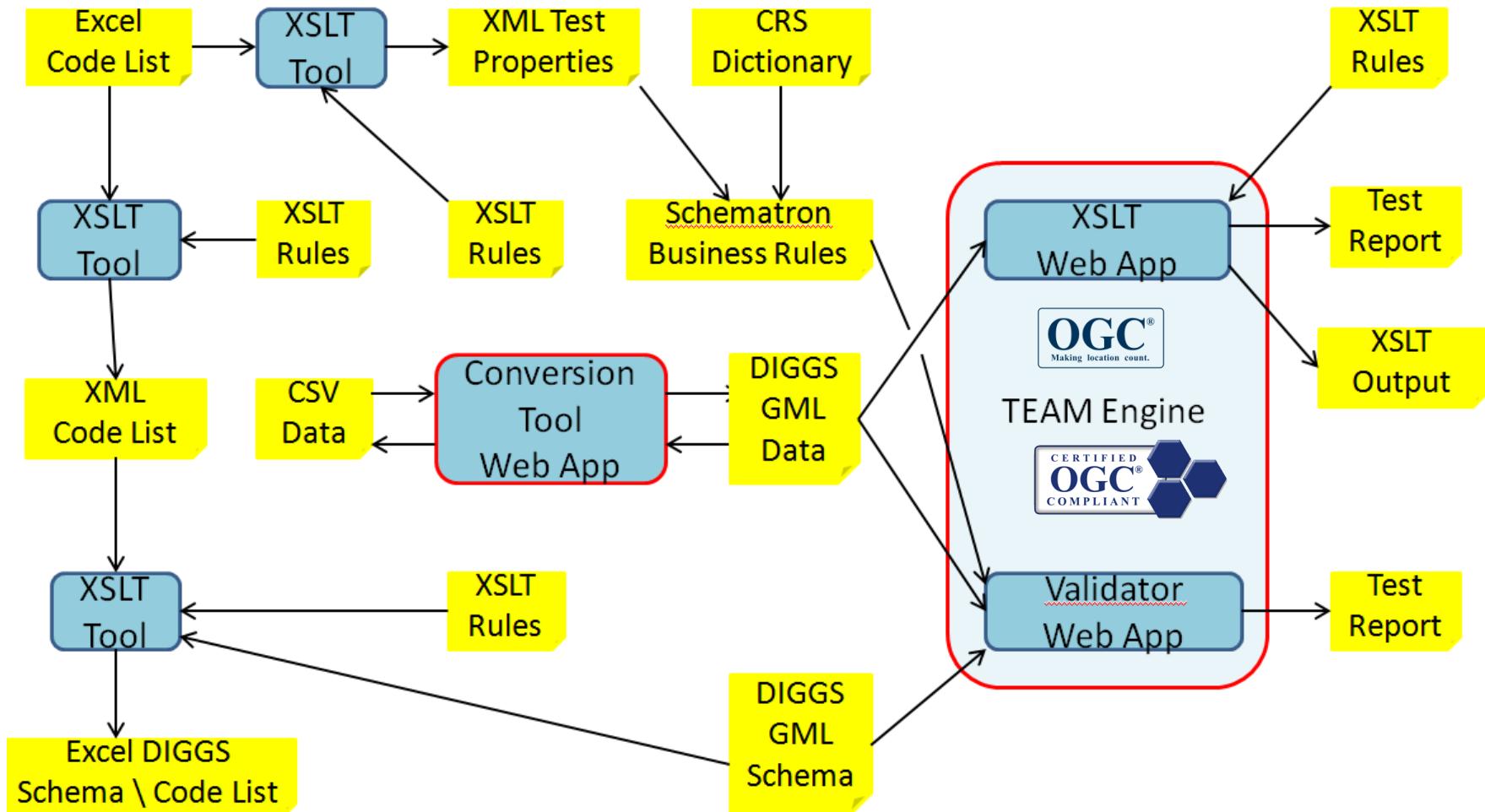
Web App Tools

- Tools
 - Conversion Tool
 - DIGGS GML Schema / Data Validator
 - Extensible Stylesheet Language Transformations
[W3C](#)(XSLT) Utility
- Uses
 - Phase 2: Used for DIGGS Schema, Code List and Dictionary development
 - Phase 3: To be used by GeoTechnical / GeoEnvironmental Tool Vendor Software Engineers to prototype, develop and test implementations of their products that can read and write DIGGS format data





DIGGS Tool Data Flow





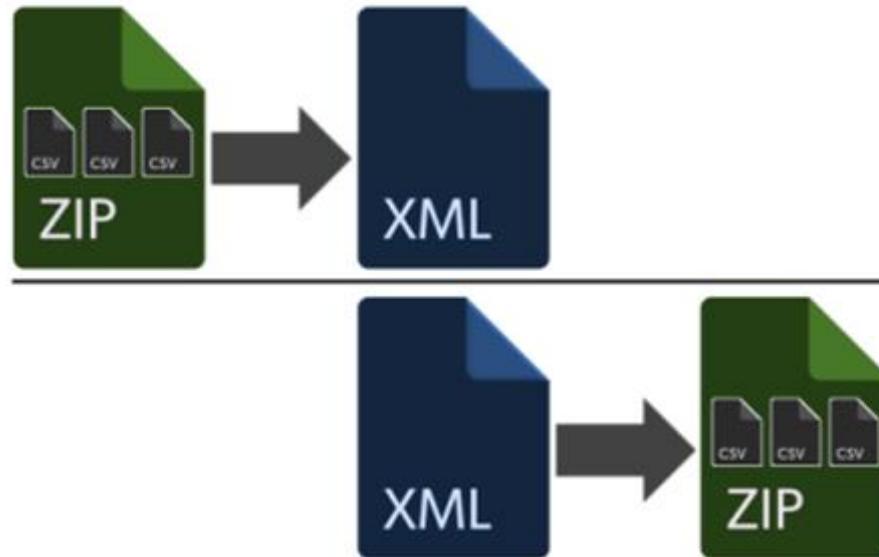
DIGGS Implementation Recommended Path

1. Write Native Geo Format to DIGGS Converter
 - a) Optional: Prototype via CSV with Converter Web App
2. Test Converter Output with DIGGS Validator
3. Write DIGGS to Native Geo Format Converter
 - a. Optional: Prototype with XSLT Web App
4. Test Converter Output with Native Geo Validator
5. Process Converter Output with Native Geo Tools
6. Display Converter Output with Native Geo Tools
7. Advertise DIGGS Compatibility
8. Sell DIGGS Compatible Tools



DIGGS Conversion Tool

Convert a set of DIGGS-compatible CSV files (within a single .ZIP) into DIGGS XML, or vice versa.



Input File*

File to convert, either DIGGS .XML or a .ZIP containing DIGGS .CSV files

Mapping Configuration

Optional mapping file in .CSV format

* Required



OGC TEAM Engine

<http://diggsml.org/teamengine>

Welcome



This web testing facility provides a testing service for [DIGGS v2.0.b](#) instance documents.

It is a specialization of the [open source](#) Testing Evaluation And Measurement (TEAM) Engine web testing facility for OGC standards as part of the [OGC Compliance Program](#) (CITE).

The official OGC testing site is available [here](#).

Available test suites

ASCE

Specification	Version	Test Suite Revision	Status
Data Interchange for GeoTechnical and GeoEnvironmental Specialists (DIGGS)	2.0.b	r14	Beta
Extensible Stylesheet Language Transformations (XSLT) Utility	1.0	r1	Beta

[Login](#)

TEAM Engine 4.0.3

If you have any questions or suggestions, feel free to contact the [site administrator](#).



TEAM Engine Test Sessions

The screenshot shows a web browser window with the following details:

- Tab title: Test Sessions
- Address bar: file:///C:/temp/x...mationResult.xml
- URL: diggsml.org/teamengine/viewSessions.jsp
- Header bar: Search, Favorites, Home, etc.
- Left sidebar: OGC logo (Making location count.)
- Right sidebar: User: DIGGSTester, Logout
- Main content area: TEAM Engine v4
- Background image: A close-up photograph of mechanical components, possibly a excavator bucket or similar machinery.

Test Sessions

Session	Test suite name	Description
s0001	ASCE_Data Interchange for GeoTechnical and GeoEnvironmental Specialists (DIGGS)_2.0.b_r14	Test Dan Ponti Schema Mods
s0002	ASCE_Extensible Stylesheet Language Transformations (XSLT) Utility_1.0_r1	XSLT Utility demonstration: reformat DIGGS XML data

[Create a new session](#)

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TEAM Engine Test Suite Selection

Compliance Testing [x](#) [+](#)

[←](#) [diggsmi.org/teamengine/createsession.jsp](#)

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Making location count.

TEAM Engine v4



Select a test suite:

Organization	Specification	Version	Revision
ASCE	Standard	Version	Revision

Standard

Data Interchange for GeoTechnical and GeoEnvironmental Specialists (DIGGS)
Extensible Stylesheet Language Transformations (XSLT) Utility

Select Profile(s):

Enter Session Description (Optional):

Start a new test session

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If you have any questions or suggestions, feel free to contact the [site administrator](#).



DIGGS Validator Parameters Page

DIGGS Conformance Test Suite GML 3.2.1 (ISO 19136:2007), GML 3.3 (OGC 10-129r1), DIGGS 2.0.b

The DIGGS GML document is checked against the following specifications:

- [ISO 19136:2007](#), Geographic information - Geography Markup Language (GML) v3.2
- [OGC 10-129r1](#), OGC Geography Markup Language (GML) v3.3 - Extended schemas and encoding rules
- [DIGGS Schemas](#), v2.0.b International geotechnical and geoenvironmental data interchange framework based on XML and GML. Written by geotechnical professionals, for geotechnical professionals.
- [XML Schema Part 1: Structures](#), Second Edition

DIGGS resources (GML data document file and XML schematron business rules file)

Enter location of DIGGS GML document ([http:](#) or [file:](#) URI)

OR Upload DIGGS GML document

No file selected.

Enter location of Schematron schema defining supplementary constraints ([http:](#) or [file:](#) URI)

|



TEAM Engine

Test Console Window

```
Console - Mozilla Firefox
localhost:8080/teamengine/console.html?t=1452277985655

Testing tns:Main type Mandatory in Retest Mode with defaultResult Pass (s0001)...
Assertion: The GML application schemas and data set satisfy all relevant constraints.
Test suite: gm1-3.2.1-r14
===== Test groups =====
All GML application schemas
    Passed: 6 | Failed: 1 | Skipped: 0
GML application schemas defining features and feature collections
    Passed: 2 | Failed: 0 | Skipped: 0
GML application schemas defining spatial geometries
    Passed: 2 | Failed: 0 | Skipped: 0
GML application schemas defining time
    Passed: 2 | Failed: 0 | Skipped: 0
GML application schemas defining spatial topologies
    Passed: 0 | Failed: 0 | Skipped: 2
GML Documents
    Passed: 5 | Failed: 1 | Skipped: 10

See detailed test report in the TE_BASE/users/DIGGStester/s0001/html/ directory.
Test method importFullGMLSchema:
    Unexpected number of imported GML element declarations. The full GML schema (gm1.xsd) must be imported.
Test method checkSchematronConstraints:
    3 schema validation error(s) detected.
<svrl:schematron-output xmlns:svrl="http://purl.oclc.org/dsdl/svrl"
    xmlns:glrov="http://www.opengis.net/gml/3.3/lrov"
    xmlns:iso="http://purl.oclc.org/dsdl/schematron"
    xmlns:xhtml="http://www.w3.org/1999/xhtml"
    xmlns:schold="http://www.ascc.net/xml/schematron"
    xmlns:xs="http://www.w3.org/2001/XMLSchema"
    xmlns:diggs="http://diggsml.org/schemas/2.0.b"
    xmlns:diggs_geo="http://diggsml.org/schemas/2.0.b/geotechnical"
    xmlns:gm1="http://www.opengis.net/gml/3.2"
    xmlns:g3.3="http://www.opengis.net/gml/ce"
    xmlns:qlr="http://www.opengis.net/gml/3.3/lr"
    + i + l o - """
```

← Test Suite Results Summary

← Schematron Test Results



TEAM Engine

Test Console Window (2)

Console - Mozilla Firefox

localhost:8080/teamengine/console.html?t=1452277985655

```
<svrl:ns-prefix-in-attribute-values uri="http://www.opengis.net/gml/3.3/lrov" prefix="glrov"/>
<svrl:active-pattern document="file:/C:/Tomcat7.0.62/temp/entity-7061380660307276906.xml"/>
<svrl:fire-rule context="diggs:procedure/*[1]"/>
<svrl:successful-report test="$propsCount > 0 and exists($propClasses[3]) and not(exists(index-of($testProps, $propClasses[3])))"
    location="/*[local-name()='Diggs']/*[local-name()='measurement'][1]/*[local-name()='Test']/*[local-name()='procedure']/*[local-name()='AtterbergLimitsTest']/*[local-name()='nosuch_property']"/>
<svrl:text>
    TestQname diggs_geo:AtterbergLimitsTest with gml:id alt1 PropertyClass 3 nosuch_property is not defined in SchematronSupportTestProperties.xml
</svrl:text>
</svrl:successful-report>
<svrl:fire-rule context="diggs:procedure/*[1]"/>
<svrl:successful-report test="$propsCount = 0"
    location="/*[local-name()='Diggs']/*[local-name()='measurement'][1]/*[local-name()='Test']/*[local-name()='procedure']/*[local-name()='ModelingProcedure']/*[local-name()='mp-1']"/>
<svrl:text>
    TestQname diggs_geo:ModelingProcedure with gml:id mp-1 is not defined in SchematronSupportTestProperties.xml
</svrl:text>
</svrl:successful-report>
<svrl:active-pattern document="file:/C:/Tomcat7.0.62/temp/entity-7061380660307276906.xml"/>
<svrl:fire-rule context="diggs:PointLocation"/>
<svrl:successful-report test="exists($srsName) and not(exists($srsNameDict)) and not($lsrsSrs)"
    location="/*[local-name()='Diggs']/*[local-name()='samplingFeature'][1]/*[local-name()='Borehole']/*[local-name()='referencePoint']/*[local-name()='srsName']"/>
<svrl:text>
    @srsName attribute value urn:diggs:def:crs:DIGGS:0.1:nonesuch of PointLocation with gml:id a33 or a parent element thereof
    must be defined in a (vector)LinearSpatialReferenceSystem or in DIGGS_GML_CRS_DICTIONARY.xml
</svrl:text>
</svrl:successful-report>
```



First Two Errors

The first two errors are about result properties reported for tests.

The first error,

TestQname diggs_geo:AtterbergLimitsTest with gml:id alt1 PropertyClass 3 nosuch_property is not defined in SchematronSupportTestProperties.xml This tells us that the SchematronSupportTestProperties.xml file (a DIGGS dictionary extract optimized for use by schematron) does not contain “nosuch_property” for the test geo:AtterbertLimitsTest.

The way to fix this error is to look in SchematronSupportTestProperties.xml and see what the valid test properties are, select a valid one, and use it in the DIGGS instance document file instead of “nosuch_property”.

The second error,

TestQname diggs_geo:ModelingProcedure with gml:id mp-1 is not defined in SchematronSupportTestProperties.xml tells us that the file does not contain test geo:ModelingProcedure.

If this test is in the DIGGS geotechnical.xsd schema, then the SchematronSupportTestProperties.xml file is out of date and needs to be updated. If not, then both the schema and xml file need to be updated. In either case, the way to fix this error is to contact DIGGS technical support.



SchematronSupport TestProperties.xml



```
- <test procedure="diggs_geo:AggregateImpactValueTest">
    <property>aggregate_impact_value</property>
</test>
- <test procedure="diggs_geo:LosAngelesAbrasionTest">
    <property>aggregate_LA_abrasion_loss</property>
    <property>aggregate_la_coefficient</property>
    <property>aggregate_la_wear_ratio</property>
</test>
- <test procedure="diggs_geo:AggregatePolishedStoneValueTest">
    <property>aggregate_polished_stone_value</property>
</test>
- <test procedure="diggs_geo:AggregateSlakeDurabilityTest">
    <property>slake_durability_classification</property>
    <property>slake_durability_index</property>
</test>
- <test procedure="diggs_geo:AggregateWaterAbsorptionTest">
    <property>aggregate_water_absorption</property>
</test>
- <test procedure="diggs_geo:AtterbergLimitsTest">
    <property>liquid_limit</property>
    <property>plastic_limit</property>
    <property>plasticity_index</property>
    <property>shrinkage_limit</property>
</test>
- <test procedure="diggs_geo:ChalkCrushingValueTest">
    <property>chalk_crushing_value</property>
</test>
- <test procedure="diggs_geo:CompactionTest">
    <property>max_dry_density</property>
    <property>optimum_moisture_content</property>
</test>
- <test procedure="diggs_geo:CompressiveStrengthTest">
    <property>compressive_strength</property>
    <property>youngs_modulus</property>
    <property>poisson_ratio</property>
    <property>shear_modulus</property>
</test>
```



Error 1 in DIGGS Doc

http://localhost:8080/teamengine/data/testinstance20bDemoErrors.xml

```
<property name="Liquid Limit"><property name="</property>
<typeData>integer</typeData>
<propertyClass codeSpace="urn:x-diggs:def:code-list:property">liquid_limit</propertyClass>
<uom>%</uom>
<measurementTechnique>measured</measurementTechnique>
<reportable>true</reportable>
</Property>
- <Property index="2" gml:id="atpp2">
  <propertyName>Plastic Limit</propertyName>
  <typeData>string</typeData>
  <propertyClass codeSpace="urn:x-diggs:def:code-list:property">plastic_limit</propertyClass>
  <uom>%</uom>
  <measurementTechnique>measured</measurementTechnique>
  <reportable>true</reportable>
</Property>
- <Property index="3" gml:id="atpp3">
  <propertyName>Plasticity Index</propertyName>
  <typeData>string</typeData>
  <propertyClass codeSpace="urn:x-diggs:def:code-list:property">nosuch_property</propertyClass>
  <uom>%</uom>
  <measurementTechnique>measured</measurementTechnique>
  <reportable>true</reportable>
</Property>
- <Property index="4" gml:id="atpp4">
  <propertyName>Shrinkage Limit</propertyName>
  <typeData>integer</typeData>
  <propertyClass codeSpace="urn:x-diggs:def:code-list:property">shrinkage_limit</propertyClass>
  <uom>%</uom>
  <measurementTechnique>measured</measurementTechnique>
  <reportable>true</reportable>
</Property>
</properties>
</PropertyParameters>
</parameters>
<dataValues cs="," decimal=". " ts="" >37 27 18 10</dataValues>
</ResultSet>
```

nosuch_property

Highlight All Match Case Reached end of page, continued from top



Third Error

The third error,

@srsName attribute value urn:diggs:def:crs:DIGGS:0.1:nonesuch of PointLocation with gml:id a33 or a parent element thereof must be defined in a (Vector) LinearSpatialReferenceSystem or in DIGGS_GML_CRS_DICTIONARY.xml

tells us that “urn:diggs:def:crs:DIGGS:0.1:nonesuch”
is not a valid srsName attribute value.

The way to fix this error is to look in DIGGS_GML_CRS_DICTIONARY.xml for a list of valid names, as shown on the next slide.



DIGGS CRS Dictionary

This XML file does not appear to have any style information associated with it. The document tree is shown below.

```
- <Dictionary gml:id="DIGGS_CompoundCRS_Dictionary" xsi:schemaLocation="http://www.opengis.net/gml/3.2 http://schemas.opengis.net/gml/3.2.1/gml.xsd">
  - <description>
    Compound CRS definitions generated from components based on EPSG Database V7.5.8
  </description>
  - <identifier codeSpace="urn:diggs:def:codelist:DIGGS:authorities:DIGGS">urn:diggs:def:dictionary:DIGGS:0.1:compoundCRS</identifier>
  - <dictionaryEntry>
    - <CompoundCRS gml:id="diggs-crs-63226405_5713">
      <identifier codeSpace="urn:diggs:def:codelist:DIGGS:authorities:DIGGS">urn:diggs:def:crs:DIGGS:0.1:63226405_5713</identifier>
      <name>WGS 72 (deg) + Canadian Vertical Datum of 1928</name>
      <domainOfValidity xlink:href="urn:ogc:def:area:EPSG::1289"/>
      <scope>Geodetic and engineering surveying.</scope>
      <componentReferenceSystem xlink:href="urn:ogc:def:crs:EPSG::63226405"/>
      <componentReferenceSystem xlink:href="urn:ogc:def:crs:EPSG::5713"/>
    </CompoundCRS>
  </dictionaryEntry>
  - <dictionaryEntry>
    - <CompoundCRS gml:id="diggs-crs-63246405_5713">
      <identifier codeSpace="urn:diggs:def:codelist:DIGGS:authorities:DIGGS">urn:diggs:def:crs:DIGGS:0.1:63246405_5713</identifier>
      <name>WGS 72BE (deg) + Canadian Vertical Datum of 1928</name>
      <domainOfValidity xlink:href="urn:ogc:def:area:EPSG::1289"/>
      <scope>Geodetic and engineering surveying.</scope>
      <componentReferenceSystem xlink:href="urn:ogc:def:crs:EPSG::63246405"/>
      <componentReferenceSystem xlink:href="urn:ogc:def:crs:EPSG::5713"/>
    </CompoundCRS>
  </dictionaryEntry>
  - <dictionaryEntry>
    - <CompoundCRS gml:id="diggs-crs-63266405_5713">
      <identifier codeSpace="urn:diggs:def:codelist:DIGGS:authorities:DIGGS">urn:diggs:def:crs:DIGGS:0.1:63266405_5713</identifier>
      <name>WGS 84 (deg) + Canadian Vertical Datum of 1928</name>
      <domainOfValidity xlink:href="urn:ogc:def:area:EPSG::1289"/>
      <scope>Geodetic and engineering surveying.</scope>
```



Error 3 in DIGGS Doc

http://localhost:8080/teamengine/data/testinstance20bDemoErrors.xml

```
<role>
    <rolePerformed codeSpace="urn:x-diggs:def:code-list:roles">drilling_company</rolePerformed>
    <businessAssociate>A-1 Drillers</businessAssociate>
</Role>
</role>
- <role>
- <Role>
    <rolePerformed codeSpace="urn:x-diggs:def:code-list:roles">geologist</rolePerformed>
    <businessAssociateRef xlink:href="#a24"/>
</Role>
</role>
<investigationTarget>Natural Ground</investigationTarget>
<projectRef xlink:href="#p1"/>
<associatedProjectRef xlink:href="#p3" identifierRef="urn:diggs:def:fi:USGS:usgs_p3"/>
<groupRef xlink:href="#g1"/>
<samplingActivityRef xlink:href="#xyz"/>
<samplingActivityRef xlink:href="#pointSample"/>
- <referencePoint>
    - <PointLocation gml:id="a33" srsName="urn:diggs:def:crs:DIGGS:0.1:nonesuch" srsDimension="3">
        <gml:pos srsName="urn:diggs:def:crs:DIGGS:0.1:26911_5703">387316.665116977 3742645.12297961 7.81507</gml:pos>
    </PointLocation>
</referencePoint>
- <referencePointAccuracy>
    - <LocationAccuracy>
        <measurementMethod>GPS</measurementMethod>
        <result uom="m">5</result>
    </LocationAccuracy>
</referencePointAccuracy>
- <centerLine>
    - <LinearExtent gml:id="ls" srsName="urn:diggs:def:crs:DIGGS:0.1:26911_5703" srsDimension="3">
        - <gml:posList>
            387316.665116977 3742645.12297961 7.81507 387316.665116977 3742645.12297961 -420.124129847717
        </gml:posList>
    </LinearExtent>
</centerLine>
- <linearReferencing>
    <LinearFeatureReferenceSystem>urn:diggs:linref:1020</LinearFeatureReferenceSystem>

```

nonesuch

Highlight All Match Case Reached end of page, continued from top



Third Error, Alternative Resolution

Or if the geometry involved is part of a (Vector)LinearSpatialReferenceSystem, to use one of the srsName values selected by the following XPath expressions applied to the DIGGS instance document file using an XML text editor. For example:

```
//descendant::diggs:LinearSpatialReferenceSystem/@gml:id  
sr123  
srw123  
cptsr1
```

```
//descendant::diggs:VectorLinearSpatialReferenceSystem/@gml:id  
Lsrs002
```

These values, when prefixed with a URI fragment identifier “#”, are also valid srsName values. For example:

```
<LinearExtent gml:id="bfls1" srsDimension="1" srsName="#sr123">  
    <gml:posList>5 10</gml:posList>  
</LinearExtent>
```



Linear Reference gml:id srsName

```
102 ▼      <linearReferencing>
103 ▽        <LinearSpatialReferenceSystem gml:id="srl23">
104          <gml:identifier codeSpace="urn:x-diggs:def:authority:DIGGSINC">urn:diggs:def:fi:DIGGSINC:srl23</gml:identifier>
105          <glr:linearElement xlink:href="#ls"/>
106 ▽        <glr:lrm>
107 ▽          <glr:LinearReferencingMethod gml:id="lrl23">
108            <glr:name>chainage</glr:name>
109            <glr:type>absolute</glr:type>
110            <glr:units>m</glr:units>
111            </glr:LinearReferencingMethod>
112          </glr:lrm>
113 ▶        <linearElementAccuracy> [5 lines]
114 ▶        <linearReferencingMethodAccuracy> [5 lines]
115      </LinearSpatialReferenceSystem>
116    </linearReferencing>
117    <totalMeasuredDepth uom="m">427.9392</totalMeasuredDepth>
118    <boreholePurpose>Multi-port Monitoring Well</boreholePurpose>
119 ▽    <backfill>
120      <Backfill gml:id="bfl">
121        <backfillDateTime> [5 lines]
122        <backfillLayer>
123          <BackfillLayer gml:id="bfl1">
124            <backfillInterval>
125              <LinearExtent gml:id="bf1sl" srsDimension="1" srsName="#srl23">
126                <gml:posList>5 10</gml:posList>
127              </LinearExtent>
128            </backfillInterval>
```



DIGGS Validator Test Results Summary

Test Session Results x +

[diggsml.org/teamengine/viewSessionLog.jsp?session=s0001&t=1451322268520](#)

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Making location count.

TEAM Engine v4

Results for session s0001

Test Suite: DIGGS 2.0.b Conformance Test Suite

[Test tns:Main \(View Details\)](#): Failed

Summary of results

Best Practice Passed Continue Not Tested Warning Skipped Failed Failed (Inherited)



See the [detailed test report](#).

[Execute this session again](#) | [Delete this session](#) | [Download log Files](#) | [Create execution log report file](#)

[Sessions list](#)

TEAM Engine 4.0.3

If you have any questions or suggestions, feel free to contact the [site administrator](#).



Detailed Test Report Suite Overview

TestNG Results x +

[diggsml.org/teamengine/reports/DIGGSTester/s0001/html/](#)

Search

Test suites overview

TestNG Results

Results overview Reporter output

Test suite: **gml-3.2.1-r14** (55%)

Groups: 7 Groups
2 / 17 / 12 / 31

Test cases:

- All GML application schemas (Failed: 6%)
- GML application schemas defining features and feature collections (Passed: 55%)
- GML application schemas defining spatial geometries (Skipped: 39%)
- GML application schemas defining time
- GML application schemas defining spatial topologies
- GML Documents

Test suites overview

Legend:
■ Failed (6%)
■ Passed (55%)
■ Skipped (39%)

Category	Count	Percentage
Failed	2	6%
Passed	17	55%
Skipped	12	39%

Test Case	Count	Percentage
All GML application schemas	1	6%
GML application schemas defining features and feature collections	2	100%
GML application schemas defining spatial geometries	0	100%
GML application schemas defining time	2	100%
GML application schemas defining spatial topologies	0	%
GML Documents	10	31%

Generated with TestNG XSLT



Test Results SVG

Screenshot of a web browser showing the TestNG Results page at <http://localhost:8080/teamengineer/reports/DIGGSTester/s0001/html/overview-chart.svg>. The page displays an SVG chart representing test results.

```
1 <?xml version="1.0" encoding="UTF-8"?>
2 <svg xmlns:testng="http://testing.org" xmlns="http://www.w3.org/2000/svg"
3   xmlns:math="http://exslt.org/math"
4   height="200"
5   preserveAspectRatio="xMidYMid meet"
6   viewBox="0 0 900 300"
7   width="600">
8   <defs>
9     <style type="text/css">
10       .axistitle { font-weight:bold; font-size:24px; font-family:Arial; text-anchor:middle; }
11       .xgrid, .ygrid, .legendtext { font-weight:normal; font-size:24px; font-family:Arial; }
12       .xgrid { text-anchor:middle; }
13       .ygrid { text-anchor:end; }
14       .gridline { stroke:black; stroke-width:1; }
15       .values { fill:black; stroke:none; text-anchor:middle; font-size:12px; font-weight:bold; }
16
17     </style>
18   </defs>
19   <svg id="graphzone" preserveAspectRatio="xMidYMid meet" x="0" y="0">
20     <rect height="20" style="fill:red;stroke-width:1;stroke:black;" width="20" x="10"
21       y="86"/>
22     <text class="legendtext" x="40" y="105">Failed (6%)</text>
23     <rect height="20" style="fill:green;stroke-width:1;stroke:black;" width="20" x="10"
24       y="125"/>
25     <text class="legendtext" x="40" y="143">Passed (55%)</text>
26     <rect height="20" style="fill:yellow;stroke-width:1;stroke:black;" width="20" x="10"
27       y="163"/>
28     <text class="legendtext" x="40" y="182">Skipped (39%)</text>
29
30     <g style="stroke:black;stroke-width:1" transform="translate(450,150)">
31       <g style="fill:red" transform="rotate(-139.3548387096774) translate(16, -3)">
32         <path d="M 0 0 h 130 A 130,130 0,0,0 119.46451983412699,-51.26625108979085 z"/>
33       </g>
34       <g style="fill:green" transform="rotate(-162.5806451612903)">
35         <path d="M 0 0 h 130 A 130,130 0,1,0 -124.0381312294007,38.91711707100065 z"/>
36       </g>
37       <g style="fill:yellow" transform="rotate(360)">
38         <path d="M 0 0 h 130 A 130,130 0,0,0 -98.63851310234479,-84.67847266548065 z"/>
39     </g>
40   </g>
41 </svg>
42 </svg>
43 </g>
44 </svg>
45 </svg>
```



GML Test Groups

TestNG Results +

localhost:8080/teamengine/reports/DIGGStester/s0017/html/

Search

TestNG Results

Results overview
Reporter output

gml-3.2.1-r14 55%
7 Groups
2 / 17 / 12 / 31

- All GML application schemas
- GML application schemas defining features and feature collections
- GML application schemas defining spatial geometries
- GML application schemas defining time
- GML application schemas defining spatial topologies
- GML Documents

Groups for suite: gml-3.2.1-r14

data

```
PropertyValueTests.validateLocationName()|pri:0, instance:org.opengis.cite.iso19136.data.PropertyValueTests@2e94af6|
PropertyValueTests.validateLocationReference()|pri:0, instance:org.opengis.cite.iso19136.data.PropertyValueTests@2e94af6|
SchematronTests.checkForDeprecatedGMLElements()|pri:0, instance:org.opengis.cite.iso19136.data.SchematronTests@73a43bcb|
SchematronTests.checkGMLSSchematronConstraints()|pri:0, instance:org.opengis.cite.iso19136.data.SchematronTests@73a43bcb|
SchematronTests.checkSchematronConstraints()|pri:0, instance:org.opengis.cite.iso19136.data.SchematronTests@73a43bcb|
XMLSchemaValidationTests.isXMLSchemaValid()|pri:0, instance:org.opengis.cite.iso19136.data.XMLSchemaValidationTests@291573d1|
```

feature

```
FeatureComponentTests.substitutesForAbstractFeature()|pri:0, instance:org.opengis.cite.iso19136.components.FeatureComponentTests@6a0ba8b8|
FeatureComponentTests.verifyFeatureMemberProperties()|pri:0, instance:org.opengis.cite.iso19136.components.FeatureComponentTests@6a0ba8b8|
```

general

```
ComplexPropertyTests.validateMembersOfGmlObjectCollection()|pri:0, instance:org.opengis.cite.iso19136.general.ComplexPropertyTests@69d217da|
ComplexPropertyTests.validateMetadataProperties()|pri:0, instance:org.opengis.cite.iso19136.general.ComplexPropertyTests@69d217da|
GeneralSchemaTests.declareTargetNamespace()|pri:0, instance:org.opengis.cite.iso19136.general.GeneralSchemaTests@7f468cd7|
GeneralSchemaTests.declareGMLObjects()|pri:0, instance:org.opengis.cite.iso19136.general.GeneralSchemaTests@7f468cd7|
GeneralSchemaTests.importFullGMLSchema()|pri:0, instance:org.opengis.cite.iso19136.general.GeneralSchemaTests@7f468cd7|
ModelAndSyntaxTests.verifyGMLObjectPropertyPattern()|pri:0, instance:org.opengis.cite.iso19136.general.ModelAndSyntaxTests@3bcb21ef|
```

geometry

```
GeometryComponentTests.substitutesForGMLGeometry()|pri:0, instance:org.opengis.cite.iso19136.components.GeometryComponentTests@32326703|
GeometryComponentTests.validateImplicitGeometryProperty()|pri:0, instance:org.opengis.cite.iso19136.components.GeometryComponentTests@32326703|
```

time

```
TemporalComponentTests.substitutesForAbstractTimeObject()|pri:0, instance:org.opengis.cite.iso19136.components.TemporalComponentTests@50009e5c|
TemporalComponentTests.validateImplicitTemporalProperty()|pri:0, instance:org.opengis.cite.iso19136.components.TemporalComponentTests@50009e5c|
```

topology

```
TopologyComponentTests.substitutesForGMLTopology()|pri:0, instance:org.opengis.cite.iso19136.components.TopologyComponentTests@420c2539|
TopologyComponentTests.validateImplicitTopologyProperty()|pri:0, instance:org.opengis.cite.iso19136.components.TopologyComponentTests@420c2539|
```

xmleschema

```
XMLSchemaTests.compileXMLSchema(org.testng.ITestContext)|pri:0, instance:org.opengis.cite.iso19136.general.XMLSchemaTests@5fe8032e|
```



All Methods in GML Test Suite

TestNG Results

diggsml.org/teamengine/reports/DIGGSTester/s0001/html/

Search

2 17 12 31 55%

Name	Started	Duration	Exception
importFullGMLSchema()	12:03:07	0 ms	java.lang.AssertionError: Unexpected number of imported GML element declarations. The full GML schema (gml.xsd) must be imported. expected [474] but found [1]
checkSchematronConstraints()	12:03:08	15 ms	java.lang.AssertionError: 2 schema validation error(s) detected. <svrl:schematron-output xmlns:svrl="http://purl.oclc.org/dsdl/svrl" xmlns:glosr="http://www.opengis.net/gml/featureMember">
compileXMLSchema(org.testng.TestRunner@60b215a4)	12:03:07	375 ms	
verifyGMLObjectPropertyPattern()	12:03:07	0 ms	
validateMembersOfGMLObjectCollection()	12:03:07	0 ms	
validateMetadataProperties()	12:03:07	16 ms	
declareTargetNamespace()	12:03:07	0 ms	
declaresGMLObjects()	12:03:07	0 ms	
substitutesForAbstractFeature()	12:03:07	0 ms	
verifyFeatureMemberProperties()	12:03:07	0 ms	
substitutesForGMLGeometry()	12:03:07	0 ms	
validateImplicitGeometryProperty()	12:03:07	15 ms	
validateImplicitTemporalProperty()	12:03:07	0 ms	
substitutesForAbstractTimeObject()	12:03:07	0 ms	
isXMLSchemaValid()	12:03:07	63 ms	
validateLocationName()	12:03:08	16 ms	
validateLocationReference()	12:03:08	31 ms	
checkForDeprecatedGMLElements()	12:03:07	93 ms	
checkGMLSchematronConstraints()	12:03:07	344 ms	
substitutesForGMLTopology()	12:03:07	0 ms	
validateImplicitTopologyProperty()	12:03:07	0 ms	
validCurveSegments()	12:03:08	0 ms	
curveHasValidCRS()	12:03:08	0 ms	
validSurfaceBoundary()	12:03:08	0 ms	
surfaceHasValidCRS()	12:03:08	0 ms	
validSurfaceOrientation()	12:03:08	0 ms	
pointHasValidPosition()	12:03:08	0 ms	
pointHasValidCRS()	12:03:08	0 ms	
envelopeHasCRSReference()	12:03:08	0 ms	
checkEnvelopePositions()	12:03:08	0 ms	
compositeCurveComponentsAreConnected()	12:03:08	0 ms	



DIGGS XSLT Utility Parameters Page

Executing Tests

diggsml.org/teamengine/test.jsp

OGC
Making location count.

TEAM Engine v4

DIGGS XSLT Utility

DIGGS resources (GML/XML data document file and XSLT stylesheet)

Enter location of DIGGS GML/XML document (http: or file: URI)

[View Default GML/XML](#)

OR Upload DIGGS GML/XML document

No file selected.

Enter location of XSLT stylesheet document (http: or file: URI)

←

[View Default XSLT](#)

OR Upload XSLT stylesheet document

No file selected.

|

<http://diggsml.org/teamengine/data/ReformatDiggsResults.xsl>



DIGGS Test Results

Test Sessions <http://diggsml.org/teamengine/data/testinstance20b3AlternativeFixed.xml> +

diggsml.org/teamengine/data/testinstance20b3AlternativeFixed.xml | C | Search | ☆ | 🏷 | 📎 | 📤 | ↴

```
<properties>
  - <Property gml:id="Ddle267" index="1">
    <propertyName>Qc</propertyName>
    <typeData>double</typeData>
    <propertyClass codeSpace="urn:x-diggs:def:code-list:property">tip_resistance</propertyClass>
    < uom>kN/m2</ uom>
    < nullValue reason="missing">9999</ nullValue>
  </Property>
  - <Property gml:id="Ddle284" index="2">
    <propertyName>Fs</propertyName>
    <typeData>double</typeData>
    <propertyClass codeSpace="urn:x-diggs:def:code-list:property">sleeve_friction</propertyClass>
    < uom>kN/m2</ uom>
    < nullValue reason="missing">9999</ nullValue>
  </Property>
  - <Property gml:id="Ddle301" index="3">
    <propertyName>Friction Ratio</propertyName>
    <typeData>double</typeData>
    <propertyClass codeSpace="urn:x-diggs:def:code-list:property">friction_ratio</propertyClass>
    < nullValue reason="missing">9999</ nullValue>
  </Property>
  - <Property gml:id="Ddle318" index="4">
    <propertyName>u1</propertyName>
    <typeData>double</typeData>
    <propertyClass codeSpace="urn:x-diggs:def:code-list:property">pore_water_pressure</propertyClass>
    < uom>kN/m2</ uom>
    < nullValue reason="missing">9999</ nullValue>
  </Property>
</properties>
<PropertyParameters>
</parameters>
<dataValues cs="," ts=" " decimal=".">
  0.1300,0.40,0.0000,0.0013 0.2400,0.40,0.1000,0.0078 0.5500,0.40,0.0040,0.0126 0.6800,0.40,0.0070,-0.0017 0.7800,0.30,0.0120,-0.0121 0.9000,0.30,0.0150,-0.0161 0.9600,0.40,0.0200,0.0191
  1.0400,0.40,0.0240,-0.0120 1.0700,0.30,0.0270,-0.0129 1.1000,0.30,0.1000,-0.0123 1.1300,0.40,0.0350,-0.0176 1.1800,0.30,0.0400,-0.0234 1.2400,0.40,0.0430,-0.0206 1.2600,0.40,0.0460,-0.0277
  1.2600,0.40,0.0480,-0.0303 1.2800,0.40,0.0490,-0.0413 1.2900,0.40,0.0500,-0.0482 1.2600,0.30,0.0500,-0.0455 1.2600,0.40,0.0500,-0.0514 1.2633,0.40,0.0500,-0.0486 1.2667,0.40,0.0490,-0.0483
  1.2700,0.40,0.0480,-0.0506 1.2600,0.40,0.0470,-0.0539 1.2500,0.40,0.0460,-0.0560 1.2100,0.40,0.0430,-0.0604 1.2000,0.40,0.0400,-0.0604 1.1900,0.40,0.0360,-0.0061 1.1900,0.40,0.0340,-0.0162
  1.1300,0.40,0.0320,-0.0359 1.0800,0.40,0.0300,-0.0353 0.9400,0.40,0.0290,-0.0095 0.8700,0.40,0.0280,-0.0075 0.8300,0.40,0.0270,-0.0077 0.8100,0.40,0.0270,-0.0080 0.8300,0.40,0.0270,-0.0075
  0.7600,0.40,0.0250,-0.0059 0.6900,0.40,0.0240,-0.0049 0.7000,0.40,0.0230,-0.0044 0.6500,0.40,0.0220,-0.0040 0.6200,0.40,0.1000,-0.0040 0.6000,0.40,0.1000,-0.0043 0.6000,0.40,0.1000,-0.0038
  0.5900,0.40,0.1000,-0.0035 0.5800,0.40,0.1000,-0.0032 0.5500,0.40,0.0200,-0.0084 0.5500,0.40,0.0180,-0.0154 0.5400,0.40,0.0190,-0.0187 0.5300,0.40,0.0180,-0.0220 0.5200,0.40,0.0180,-0.0296
  0.5300,0.40,0.0170,-0.0073 0.5400,0.40,0.0170,-0.0039 0.5500,0.40,0.0160,-0.0074 0.5500,0.40,0.0150,-0.0129 0.5500,0.40,0.0150,-0.0169 0.5700,0.40,0.0150,-0.0174 0.5800,0.40,0.0160,-0.0141
  0.6000,0.40,0.0170,-0.1000 0.6300,0.40,0.0190,-0.0027 0.6700,0.40,0.0200,-0.0031 0.6800,0.40,0.1000,-0.0028 0.6900,0.40,0.0220,-0.0040 0.7100,0.40,0.0230,-0.0070 0.6900,0.40,0.0230,-0.0095
  0.6900,0.40,0.0240,-0.0077 0.6867,0.40,0.0240,-0.0074 0.6833,0.40,0.0250,-0.0137 0.6800,0.40,0.0250,-0.0120 0.6900,0.40,0.0250,-0.0123 0.7000,0.40,0.0240,-0.0116 0.6900,0.40,0.0240,-0.0107
  0.7300,0.40,0.0220,-0.0117 0.7300,0.40,0.1000,-0.0167 0.7300,0.40,0.1000,-0.0203 0.7400,0.40,0.0200,-0.0228 0.7200,0.40,0.0200,-0.0222 0.7100,0.40,0.0190,-0.0222 0.7100,0.40,0.0190,-0.0200
```



ReformatDiggsResults.xslt

```
● ReformatDiggsResults.xsl ×
1  <?xml version="1.0" encoding="UTF-8"?>
2  <xsl:stylesheet xmlns:xsl="http://www.w3.org/1999/XSL/Transform"
3    xmlns:xs="http://www.w3.org/2001/XMLSchema"
4    xmlns:xd="http://www.oxygenxml.com/ns/doc/xsl"
5    xmlns:fn="http://www.w3.org/2005/xpath-functions"
6    xmlns:xdt="http://www.w3.org/2005/xpath-datatypes"
7    xmlns:diggs="http://diggsmml.org/schemas/2.0.b"
8    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
9    xmlns:xlink="http://www.w3.org/1999/xlink"
10   xmlns:diggs_geo="http://diggsmml.org/schemas/2.0.b/geotechnical"
11   xmlns:g3_3="http://www.opengis.net/gml/ce"
12   xmlns:gkr="http://www.opengis.net/gml/3.3/lr"
13   xmlns:glrov="http://www.opengis.net/gml/3.3/lrov"
14   xmlns:gml="http://www.opengis.net/gml/3.2" gml:id="bcd"
15   exclude-result-prefixes="xs xd"
16   version="2.0">
17  <xd:doc scope="stylesheet"> [20 lines]
18  <xsl:output method="xml" version="1.0" encoding="UTF-8" indent="yes" />
19
20  <!-- ----- -->
21  <xsl:template match="/">
22    <xsl:apply-templates select="diggs:Diggs"/>
23  </xsl:template>
24  <!-- ----- -->
25  <xsl:template match="diggs:Diggs" priority="2"> [2 lines]
26  <!-- ======2015-10-29 PwD===== -->
27  <xsl:template match="diggs:projects"> [3 lines]
28  <!-- ----- -->
29  <xsl:template match="diggs:measurements" priority="2"> [2 lines]
30  <!-- ----- -->
31  <xsl:template match="diggs:Test" priority="2"> [2 lines]
32  <!-- ----- -->
33  <xsl:template match="diggs:outcome" priority="2"> [2 lines]
34  <!-- ----- -->
35  <xsl:template match="diggs:TestResult" priority="2"> [2 lines]
36  <!-- ----- -->
37  <xsl:template match="diggs:results" priority="2"> [2 lines]
38  <!-- ----- -->
39  <xsl:template match="diggs:ResultSet" priority="2"> [74 lines]
40  <!-- ----- -->
41  <xsl:template match="*" priority="1"> [2 lines]
42  <!-- ----- -->
43  <xsl:template name="copyApply"> [7 lines]
44  <!-- ----- -->
45
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163
164  </xsl:stylesheet>
```

XSLT
Stylesheet
Contains
Declarative
Specification
of Transform
to be Performed



DIGGS XSLT Utility

Test Results Summary

Test Session Results

diggsml.org/teamengine/viewSessionLog.jsp?session=s0002&t=1451325099121

OGC
Making location count.

TEAM Engine v4

Results for session s0002

Test Suite: DIGGS XSLT Utility

- ✓ [Test tns:Main \(View Details\)](#): Passed
✓ [Test tns:xslt-transform \(View Details\)](#): Passed

Summary of results

✓ Best Practice ✓ Passed ⚠ Continue ⚠ NT Not Tested ⚠ Warning ⚠ Skipped ✗ Failed ✗ Failed (Inherited)



[Execute this session again](#) | [Delete this session](#) | [Download log Files](#) | [Create execution log report file](#) | [Download XSLT output file](#)

[Sessions list](#)

TEAM Engine 4.0.3

If you have any questions or suggestions, feel free to contact the [site administrator](#).



Open or Download XSLT Output File

Test Session Results x +

diggsml.org/teamengine/viewSessionLog.jsp?session=s0002&t=1451325099121

Search

OGC®
Making location count.

TEAM Engine v4

Results for session s0002

Test Suite: DIGGS XSLT Utility

[Test tns:Main \(View Details\)](#): Passed
 [Test tns:xslt-transform \(View Details\)](#): Passed

Summary of results

<input checked="" type="checkbox"/> Best Practice	<input checked="" type="checkbox"/> Passed	<input type="checkbox"/> Continue	<input type="checkbox"/> Not Tested	<input type="checkbox"/> Warning	<input type="checkbox"/> Skipped	<input checked="" type="checkbox"/> Failed	<input checked="" type="checkbox"/> Failed (Inherited)
0	2	0	0	0	0	0	0

Execute this session again | Delete this session | Download log Files | Create execution log report file | Download XSLT output file | Sessions list

Opening xsltTransformationResult.xml

You have chosen to open:

[xsltTransformationResult.xml](#)
which is: XML Document (1.9 MB)
from: <http://diggsml.org>

What should Firefox do with this file?

Open with [XML Editor \(default\)](#)
 Save File
 Do this automatically for files like this from now on.

OK Cancel

TEAM Engine 4.0.3

If you have any questions or suggestions, feel free to contact the [site administrator](#).



DIGGS Test Results Reformatted in Records

```
Test Session Results  file:///C:/temp/x...mationResult.xml +  
file:///C:/temp/xsltTransformationResult.xml  
- <results>  
  - <ResultSet>  
    - <dataRecords>  
      - <Record>  
        <tip_resistance index="1">0.1300</tip_resistance>  
        <sleeve_friction index="2">0.40</sleeve_friction>  
        <friction_ratio index="3">0.0000</friction_ratio>  
        <pore_water_pressure index="4">0.0013</pore_water_pressure>  
      </Record>  
      - <Record>  
        <tip_resistance index="1">0.2400</tip_resistance>  
        <sleeve_friction index="2">0.40</sleeve_friction>  
        <friction_ratio index="3">0.1000</friction_ratio>  
        <pore_water_pressure index="4">0.0078</pore_water_pressure>  
      </Record>  
      - <Record>  
        <tip_resistance index="1">0.5500</tip_resistance>  
        <sleeve_friction index="2">0.40</sleeve_friction>  
        <friction_ratio index="3">0.0040</friction_ratio>  
        <pore_water_pressure index="4">0.0126</pore_water_pressure>  
      </Record>  
      - <Record>  
        <tip_resistance index="1">0.6800</tip_resistance>  
        <sleeve_friction index="2">0.40</sleeve_friction>  
        <friction_ratio index="3">0.0070</friction_ratio>  
        <pore_water_pressure index="4">-0.0017</pore_water_pressure>  
      </Record>
```



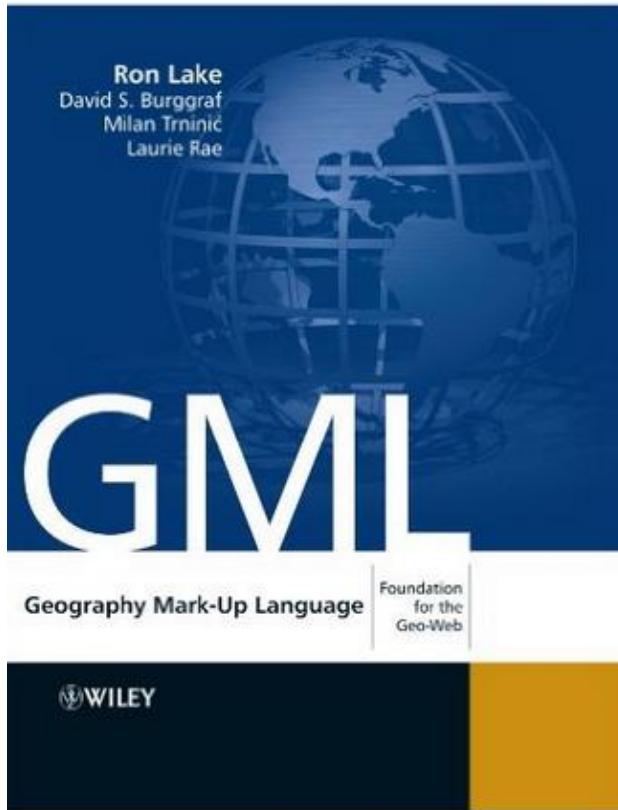
DIGGS Implementation Software Resources

- eXtensible Markup Language (XML)
- Geography Markup Language (GML)
- XML Path Language (XPath)
- Extensible Stylesheet Language Transformations (XSLT)
- Document Object Module (DOM)
- Programming Language: C / C++ / C# / Java
- Java Architecture for XML Binding (JAXB)
- Apache Xerces XML Parser / Validator
- Apache Xalan XSLT Processor
- Saxon XSLT / XPath / XQuery Processor
- Oxygen XML Editor
- Eclipse Integrated Development Environment

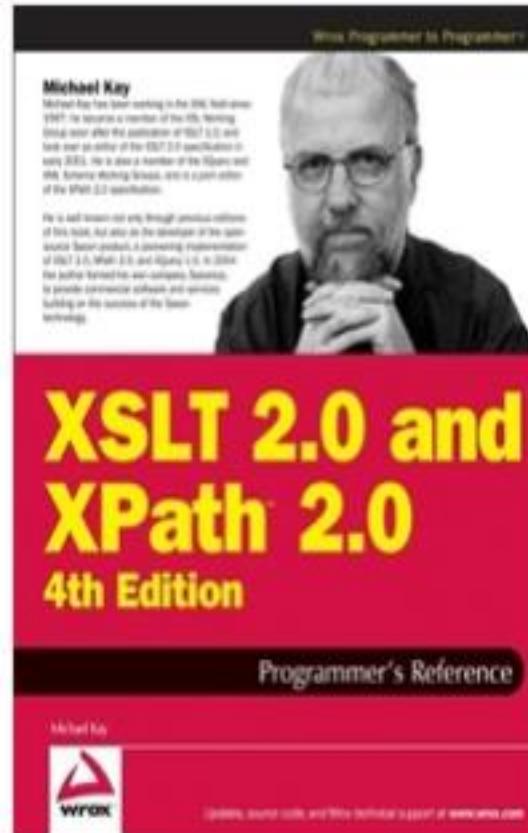




Technical References



Ron Lake initiated GML.
David Burggraf helped design
the DIGGS Schemas



Michael Kay, member of the W3C XSLT and XPath Working Groups, wrote the Saxon XSLT / XPath / XQuery processor.



Questions?

DIGGS Pilot Testing

- TRB 2016 Annual Meeting Workshop 127

Paul Daisey

Sr. Software Architect



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