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DEFENCE GEOSPATIAL INFORMATION WORKING GROUP
DGIWG
SPECULUM ORBIS TERRARUM

DGIWG – xxx + Defence Geoprocessing generic profiles

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Abstract:	This document defines specific DGIWG requirements, recommendations and guidelines for implementations of the OGC Web Processing Service standards.
Copyright:	

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Executive Summary

(The inclusion of an Executive Summary is the discretion of the author(s)).

Acknowledgement

(The acknowledgement clause is optional. Acknowledgements are listed after the Executive Summary, if present, and precede the table of contents)

(Clauses i-iv are optional, and not mandated for approval of issue, however assist in the management of the document)

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For Document approved for public release use: All questions regarding this document shall be directed to the secretariat@dgiwg.org [mailto:secretariat@dgiwg.org] NOTE: All personal information will be removed when an internal document is made public. This includes names and personal e-mail accounts.

iii.Revision history

Date	Edition number	Primary clauses modified	Description
2019.08.10	0.1	Dimitri Sarafinof	first draft from DGIWG adoc template
2019.10.11	0.2	Dimitri Sarafinof	first draft with generic processes description

Date	Edition number	Primary clauses modified	Description
2020.01.28	0.3	Dimitri Sarafinof	second draft with generic processes description (with feedback from Tallinn meeting)

iv. Future work

Chapter 1. Introduction

(Mandatory. The introduction is located on a separated page preceding the 'Scope' statement. The introduction is not numbered.)

Geoprocessing is a GIS operation used to manipulate spatial data. A typical geoprocessing operation takes an input dataset, performs an operation on that dataset, and returns the result of the operation as an output dataset. Common geoprocessing operations include geographic feature overlay, feature selection and analysis, topology processing, raster processing, and data conversion. Geoprocessing allows for definition, management, and analysis of information used to form decisions.[Wade, T. and Sommer, S. eds. A to Z GIS]. Geoprocessing may be done locally or remotely on a server (typically trhough the web or a network).

This document defines geoprocesses at the generic level which may be implemented by any version of OGC WPS standard or eventually another geoprocessing API.

Chapter 2. Scope

(Mandatory)

This document defines geoprocesses at the generic level which may be implemented by any version of OGC WPS standard or eventually another geoprocessing API. Following geoprocesses are defined: - elevation analysis, - distance measurement, - range rings, - viewshed analysis, - slope analysis, - helicopter landing zone, - routing, - geopackage creation.

Chapter 3. Conformance

(Mandatory for standards)

3.1. Conformance classes

This document establishes 9 conformance classe(s):

- DGIWG process,
- DGIWG process profile for elevation analysis,
- DGIWG process profile for distance measurement,
- DGIWG process profile for range rings,
- DGIWG process profile for viewshed analysis,
- DGIWG process profile for slope analysis,
- DGIWG process profile for helicopter landing zone,
- DGIWG process profile for routing,
- DGIWG process profile for geopackage creation.

"DGIWG process" class define requirements for defining generic process description

"DGIWG process profile for X" classes define generic process profiles according to "DGIWG process" conformance class. Process profiles are blueprints for process implementations and are meant to harmonize process implementations to a certain degree. They serve as a reference for process implementations by providing a description of what the process actually does. These are defined at a generic level, meaning, these processes profiles may be implemented by OGC WPS standards (versions 1 or 2) or possibly other geoprocessing APIs. Abstract Test Suite lists the conformance abstract tests which shall be exercised on process profiles claiming to implement these conformance classes.

Conformance class name	Operation or behavior	OGC WPS Conformance Test	DGIWG WPS Conformance Test
DGIWG process http://www.dgiwg.org/std/geoprocessing/1.0/conf/process	DGIWG requirement y to z	-	Annex A.1

Conformance class name	Operation or behavior	OGC WPS Conformance Test	DGIWG WPS Conformance Test
DGIWG process profile for elevation analysis http://www.dgiwg.org/std/geoprocessing/1.0/conf/process-elevationAnalysis	DGIWG requirement y to z	-	Annex A.2.1
DGIWG process profile for distance measurement http://www.dgiwg.org/std/geoprocessing/1.0/conf/process-distanceMeasurement	DGIWG requirement y to z	-	Annex A.2.2
DGIWG process profile for range rings http://www.dgiwg.org/std/geoprocessing/1.0/conf/process-rangeRings	DGIWG requirement y to z	-	Annex A.2.3
DGIWG process profile for viewshed analysis http://www.dgiwg.org/std/geoprocessing/1.0/conf/process-viewshedAnalysis	DGIWG requirement y to z	-	Annex A.2.4
DGIWG process profile for slope analysis http://www.dgiwg.org/std/geoprocessing/1.0/conf/process-slopeAnalysis	DGIWG requirement y to z	-	Annex A.2.5
DGIWG process profile for helicopter landing zone http://www.dgiwg.org/std/geoprocessing/1.0/conf/process-hlz	DGIWG requirement y to z	-	Annex A.2.6

Conformance class name	Operation or behavior	OGC WPS Conformance Test	DGIWG WPS Conformance Test
DGIWG process profile for routing http://www.dgiwg.org/std/geoprocessing/1.0/conf/process-routing	DGIWG requirement y to z	-	Annex A.2.7
DGIWG process profile for geopackage creation http://www.dgiwg.org/std/geoprocessing/1.0/conf/process-geopackageCreation	DGIWG requirement y to z	-	Annex A.2.8

Table 1. Conformance classes

table to be updated accordingly to processes description

3.2. Backward compatibility

This is the first version of the DGIWG processes description.

Chapter 4. References

(As applicable)

4.1. Normative references

ID	Title	Reference	Version
[1]	OGC® WPS 2.0.2 Interface Standard	OGC 14-065	2.0.2
[2]	OGC® OWS-Common 2.0 Implementation Specification	06-121r9	2.0.0

4.2. Informative references

Title	Reference	Version
OGC® Testbed-13: Workflows ER	OGC 17-029	r1
OGC® Testbed-13: Cloud ER	OGC 17-035	-
OGC® Testbed-14: Application Package Engineering Report	OGC 18-049	r1
OGC® Testbed-14: WPS-T Engineering Report	OGC 18-036	r1
OGC® Testbed-14: ADES & EMS Results and Best Practices Engineering Report	OGC 18-050	r1
OGC® Testbed-15: Catalogue and Discovery Engineering Report	OGC 19-020	r1
OGC® Testbed-15: Delta Updates Engineering Report	OGC 19-012	r1
OGC® Testbed-15: Federated Clouds Analytics Engineering Report	OGC 19-026	-
OGC® Testbed-15: Machine Learning Engineering Report	OGC 19-027	r2

Chapter 5. Terms, definitions, and abbreviations

(As applicable)

5.1. Definitions

For the purposes of this document, terms and definitions found in [OGC-WPS-2.0] apply.

5.2. Abrevations

BBox	Bounding Box
CRS	Coordinate Reference System
HTTP	Hypertext Transfer Protocol
WPS	Web Processing Service
XML	Extensible Markup Language

Chapter 6. DGIWG Process (Normative)

6.1. Introduction

This chapter defines normative requirements to implement "DGIWG process" class.

6.2. Normative requirements

The Normative requirements requested by this conformance class are summarized in Table 2.

No.	Requirement	Compliance
1	a DGIWG generic process profile shall satisfy requirements from http://www.opengis.net/spec/WPS/2.0/req/native-process/model/profile/generic ([OGC-WPS-2.0]) requirement class.	M
2	a DGIWG generic process profile shall additionaly provide elements according to Table 5 for the description of a DGIWG generic process.	M
3	a DGIWG generic process profile shall additionaly provide elements according to Table 6 for the description of input/output parameters.	M
4	a DGIWG generic process profile shall be documented using template provided in Annex XX.	M

Table 2. DGIWG process Normative Requirements

6.3. Non-Normative Recommendations for Implementation

The non-normative recommandations defined by this conformance class are summarized in Table 3.

No.	Requirement	Compliance
1	A DGIWG process should …	O
2	A DGIWG process should …	O
3	…	…

Table 3. DGIWG process Non-normative Recommendations for DGIWG processes.

6.4. General

While this document definitions and requirements may be used by any geoprocessing implementation, OGC WPS 2.0 specification ([OGC-WPS-2.0]) provides a mechanism to define common processing functionality. Aiming at harmonization, the definitions of process profiles

may be used to foster a common understanding of widely used processing functions. However, they may also be used to harmonize the technical details of process interfaces and thus document particular interoperability arrangements between process providers and consumers.

A process profile is a description of a process on an interface level. Process profiles may have different levels of abstraction and cover several aspects. On a generic level, a process profile may only refer to the provided functionality of a process, i.e. by giving a verbal or formal definition how the outputs are derived from the inputs. On a concrete level a process profile may completely define inputs and outputs including data type definitions and formats. This document specifies requirement to develop process profiles at a generic level.

Figure below provides an UML description of the generic process model. .Generic process model (source [OGC-WPS-2.0]) image::./images/GenericProcess.png[WPS_GenericProcess,align=center]

Requirement 1: a DGIWG generic process profile shall satisfy requirements from http://www.opengis.net/spec/WPS/2.0/req/native-process/model/profile/generic ([OGC-WPS-2.0]) requirement class.

For convenience, detailed requirement from <<>> are repeated below:

Requirement	http://www.opengis.net/spec/WPS/2.0/req/native-process/model/profile/generic/structure A process description shall comply with the structure defined in Figure 13 and Table 18.
Requirement	http://www.opengis.net/spec/WPS/2.0/req/native-process/model/profile/generic/description-language The language of the human-readable elements within the process description shall be identified by a language identifier as specified in IETF RFC 4646.
Requirement	http://www.opengis.net/spec/WPS/2.0/req/native-process/model/profile/generic/io-description-type The description of process inputs and outputs shall comply with the structure defined in Figure 13, Table 19, and Table 20.

Table 4. WPS 2.0 requirements for generic profile requirement class (http://www.opengis.net/spec/WPS/2.0/req/native-process/model/profile/generic)

Requirement 2: a DGIWG generic process profile shall additionaly provide elements according to Table 5 for the description of a DGIWG generic process.

Name	Definition	Data type and Values	Multiplicity and use	DGIWG
Title	Title of the process, input, and output. Normally available for display to a human.	ows:Title	One (mandatory)	No channge

Name	Definition	Data type and Values	Multiplicity and use	DGIWG
Abstract	Brief narrative description of a process, input, and output. Normally available for display to a human.	ows:Abstract	Zero or one (optional) Include when available and useful.	One (mandatory)
Keywords	Keywords that characterize a process, its inputs, and outputs.	ows:Keywords	Zero or more (optional) Include when available and useful.	Mandatory (at least one)
Identifier	Unambiguous identifier of a process.	ows:Identifier Value is a URI or HTTP-URI a	One (mandatory)	HTTP-URI shall be defined with following template http://www.dgiwg.org/service/processing/process/{process-name}.
Metadata	to additional metadata about this item.	ows:Metadata Allowed values are specified in Table 5.	Zero or more (optional)	It is recommended to provide metatatda on the process profile.
Language	Language identifier for the human readable process description elements.	Character String. This language identifier shall be as specified in IETF RFC 4646.	One (mandatory)	English is mandatory in a coalition implementation (en-GB)
Input	Input items (arguments) of a process.	GenericInput structure, see Table 167.	Zero or more (optional)	no change
Output	Output items (results) of a process	GenericOutput structure, see Table 178.	One or more (mandatory)	no change

Table 5. DGIWG generic process structure (edited from Table 18 [OGC-WPS-2.0])

Requirement 3: a DGIWG generic process profile shall additionaly provide elements according

to Table 6 for the description of input/output parameters.

Name	Definition	Data type and Values	Multiplicity and use	DGIWG
Title	Title of the process, input, and output. Normally available for display to a human.	ows:Title	One (mandatory)	No channge
Abstract	Brief narrative description of a process, input, and output. Normally available for display to a human.	ows:Abstract	Zero or one (optional) Include when available and useful.	One (mandatory)
Keywords	Keywords that characterize a process, its inputs, and outputs.	ows:Keywords	Zero or more (optional) Include when available and useful.	Mandatory (at least one)
Identifier	Unambiguous identifier of a process.	ows:Identifier Value is a URI or HTTP-URI a	One (mandatory)	HTTP-URI shall be defined with following template http://www.dgiwg.org/service/processing/parameter/{parameter-name} or just parameter name ?.
Metadata	to additional metadata about this item.	ows:Metadata Allowed values are specified in Table 5.	Zero or more (optional)	It is recommended to provide metatatda on the process profile.

Name	Definition	Data type and Values	Multiplicity and use	DGIWG
minOccurs	Minimum number of times that values for this parameter are required.	Non-negative integer; defaults to “1”, ‘0’ means the input is optional.	Zero or one (optional)	no change
maxOccurs	Maximum number of times that this parameter may be present.	Non-negative integer, defaults to “1”.	Zero or more (optional)	no change
Input	Nested Input.	GenericInput structure, Table 19 (this table).	Zero or more (optional)	no change

Table 6. DGIWG generic process structure (edited from Table 19 [OGC-WPS-2.0])

Requirement 4: a DGIWG generic process profile shall be documented using template provided in Annex XX.

template to be developped

what king of ows:metadata ?

TBD recomandation for registering profile on DGIWG website/registry discussion

measurement== DGIWG Processes Description (Normative)

6.5. Introduction

This chapter defines DGIWG processes at a generic level. These definitions are conformant to ***"DGIWG process"*** conformance class; they may be implemented through WPS or other APIs. Following DGIWG processes are described below:

- elevation analysis
- distance measurement
- range rings
- viewshed analysis
- slope analysis
- helicopter landing zone

- geocoding
- routing
- geopackage creation

Chapter 7. Normative requirements

The Normative requirements requested by this conformance class are summarized in Table 7.

No.	Requirement	Compliance
5	a DGIWG process for elevation analysis shall implement a process description accordingly to parameters defined in Elevation analysis.	M
6	a DGIWG process for distance measurement shall implement a process description accordingly to parameters defined in Distance measurement.	M
7	a DGIWG process for range rings shall implement a process description accordingly to parameters defined in Range rings.	M

Table 7. DGIWG process profiles Normative Requirements

7.1. Elevation analysis

Requirement 5: a DGIWG process for elevation analysis shall implement a process description accordingly to parameters defined in Elevation analysis.

7.1.1. Generic process: Elevation analysis

```
  Identifier
http://www.dgiwg.org/service/processing/process/elevationanalysis
  Title Elevation analysis
  Keywords  elevation, analysis, highest point, lowest point
  Abstract  It provides lowest and highest point(s) on a given area.
  Metadata
```

Input: Area of interest

```
  Identifier    aoi
  Title Area of interest
  Keywords
  Abstract  Area of interest where a process will be executed. This could be
a BBOX, a polygon, or any surface geometry.. (GM_Surface)
  Metadata
  Multiplicity  1
```

Input: Elevation data

```
  Identifier    elavation_data
  Title Elevation data
  Keywords  elevation, height, Digital Surface Model, Digital Elevation Model
  Abstract  Digital representation of the earth's surface. Elevation data on
which the process will be executed. It may be internal data (with a choice
for the users) or data provided by the user itself (URI, external service,
…).
  Metadata
  Multiplicity  0..1
```

Input: Choice of highest or lowest points

```
  Identifier    analysis_type
  Title Choice of highest or lowest points
  Keywords
  Abstract  Information providing if highest or lowest.
  Metadata
  Multiplicity  1
```

Output: Highest or lowest points

```
  Identifier    result_points
  Title Highest or lowest points
  Keywords
  Abstract  Highest or lowest points returned by the process on the provided
area of interest. This may also contain metadata describing the data sources
used, the vertical CRS of the result.
  Metadata
```

7.1.2. Process implementation : elevation analysis

Find below a WPS 2.0 example of the elevation analysis generic process profile.

elevationAnalysis.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<wps:GenericProcess
    xmlns:ows="http://www.opengis.net/ows/2.0"
    xmlns:wps="http://www.opengis.net/wps/2.0"
    xmlns:xlink="http://www.w3.org/1999/xlink"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://www.opengis.net/wps/2.0
```

```
http://schemas.opengis.net/wps/2.0/wps.xsd">
    <ows:Title>Elevation analysis</ows:Title>
    <ows:Abstract>It provides lowest and highest point(s) on a given
area.</ows:Abstract>
    <ows:Keywords>
        <ows:Keyword>elevation</ows:Keyword>
        <ows:Keyword>analysis</ows:Keyword>
        <ows:Keyword>highest point</ows:Keyword>
        <ows:Keyword>lowest point</ows:Keyword>
    </ows:Keywords>

<ows:Identifier>http://www.dgiwg.org/service/processing/process/elevationanal
ysis</ows:Identifier>
    <!--
    HTML page providing human readable description of the generic profile
with examples.
    -->
    <ows:Metadata xlink:role=
"http://www.opengis.net/spec/wps/2.0/def/process/description/documentation"
xlink:href="http://www.dgiwg.org/service/processing/process/elevationanalysis
.html"/>
    <ows:Metadata xlink:role=
"http://www.opengis.net/spec/wps/2.0/def/process/description/documentation"
xlink:href="generic_processes/elevationAnalysis.html"/>
    <wps:Input>
        <ows:Title>Area of interest</ows:Title>
        <ows:Abstract>Area of interest where a process will be executed. This
could be a BBOX, a polygon, or any surface geometry
(GM_Surface).</ows:Abstract>
        <ows:Identifier>aoi</ows:Identifier>
        <ows:Metadata xlink:role=
"http://www.opengis.net/spec/wps/2.0/def/process/description/documentation"
xlink:href="http://www.dgiwg.org/service/processing/process/elevationanalysis
.html#aoi"/>
    </wps:Input>
    <wps:Input>
        <ows:Title>Elevation data</ows:Title>
        <ows:Abstract>Digital representation of the earth's surface.
Elevation data on which the process will be executed. It may be internal data
(with a choice for the users) or data provided by the user itself (URI,
external service, ⋯).</ows:Abstract>
        <ows:Keywords>
            <ows:Keyword>elevation</ows:Keyword>
            <ows:Keyword>height</ows:Keyword>
            <ows:Keyword>Digital Surface Model</ows:Keyword>
            <ows:Keyword>Digital Elevation Model</ows:Keyword>
        </ows:Keywords>
```

```
        <ows:Identifier>elevationData</ows:Identifier>
        <ows:Metadata xlink:role=
"http://www.opengis.net/spec/wps/2.0/def/process/description/documentation"
xlink:href="http://www.dgiwg.org/service/processing/process/elevationanalysis
.html#elevationData"/>
    </wps:Input>
    <wps:Input>
        <ows:Title>Choice of highest or lowest points</ows:Title>
        <ows:Abstract>Parameter indicating wether lowest points or highest
points are requested.</ows:Abstract>
        <ows:Identifier>analysis_type</ows:Identifier>
        <ows:Metadata xlink:role=
"http://www.opengis.net/spec/wps/2.0/def/process/description/documentation"
xlink:href="http://www.dgiwg.org/service/processing/process/elevationanalysis
.html#analysis_type"/>
    </wps:Input>
    <wps:Output>
        <ows:Title>Highest or lowest points</ows:Title>
        <ows:Abstract>Highest or lowest points returned by the process on the
provided area of interest. This may also contain metadata describing the data
sources used, the vertical CRS of the result.</ows:Abstract>
        <ows:Identifier>result_points</ows:Identifier>
        <ows:Metadata xlink:role=
"http://www.opengis.net/spec/wps/2.0/def/process/description/documentation"
xlink:href="http://www.dgiwg.org/service/processing/process/elevationanalysis
.html#result_points"/>
    </wps:Output>
</wps:GenericProcess>
```

7.2. Distance measurement

Requirement 6: a DGIWG process for distance measurement shall implement a process description accordingly to parameters defined in Distance measurement.

7.2.1. Generic process: Distance measurement

```
  Identifier
http://www.dgiwg.org/service/processing/process/distancemeasurement
  Title Distance measurement
  Keywords  distance
  Abstract  It provides the distance between two or more points.
  Metadata
```

Input: List of points

```
  Identifier    points_list
  Title List of points
  Keywords
  Abstract  List of two or more points in a given CRS. CRS may be 2D or 3D
(with Z or height information).
  Metadata
  Multiplicity  1
```

Input: Method of measurement

```
  Identifier    measurement_method
  Title Method of measurement
  Keywords
  Abstract  Method of measurement to be used for the calculation (for example
euclidean, geodesic, …). This could include Z coordinate (or height above
elispoid).
  Metadata
  Multiplicity  0..1
```

Input: Unit of measure

```
  Identifier    uom
  Title Unit of measure
  Keywords
  Abstract  Unit of measure for the measured distance(s) to be returned.
  Metadata
  Multiplicity  1
```

Output: Distance results

```
  Identifier    distance_results
  Title Distance results
  Keywords
  Abstract  Result set containing individual distance between each point pair
and/or the sum. This should include uom.
  Metadata
```

Process implementation : distance measurement

Find below a WPS 2.0 example of the distance measurement generic process profile.

distanceMeasurement.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<wps:GenericProcess xmlns:ows="http://www.opengis.net/ows/2.0" xmlns:wps=
"http://www.opengis.net/wps/2.0" xmlns:xlink="http://www.w3.org/1999/xlink"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation=
"http://www.opengis.net/wps/2.0 http://schemas.opengis.net/wps/2.0/wps.xsd">
    <ows:Title xml:lang="en-GB">Distance measurement</ows:Title>
    <ows:Abstract>It provides the distance between two or more
points.</ows:Abstract>
    <ows:Keywords>
        <ows:Keyword xml:lang="en-GB">distance</ows:Keyword>
    </ows:Keywords>

<ows:Identifier>http://www.dgiwg.org/service/processing/process/distancemeasu
rement</ows:Identifier>
    <!--
    HTML page providing human readable description of the generic profile
with examples.
    -->
    <ows:Metadata xlink:role=
"http://www.opengis.net/spec/wps/2.0/def/process/description/documentation"
xlink:href="http://www.dgiwg.org/service/processing/process/distancemeasureme
nt.html"/>
    <ows:Metadata xlink:role=
"http://www.opengis.net/spec/wps/2.0/def/process/description/documentation"
xlink:href="generic_processes/distanceMeasurement.html"/>
    <wps:Input>
        <ows:Title xml:lang="en-GB">List of points</ows:Title>
        <ows:Abstract xml:lang="en-GB">List of two or more points in a given
CRS. CRS may be 2D or 3D (with Z or height information).</ows:Abstract>
        <ows:Identifier>points_list</ows:Identifier>
        <ows:Metadata xlink:role=
"http://www.opengis.net/spec/wps/2.0/def/process/description/documentation"
xlink:href="http://www.dgiwg.org/service/processing/process/elevationanalysis
.html#points_list"/>
    </wps:Input>
    <wps:Input>
        <ows:Title xml:lang="en-GB">Method of measurement</ows:Title>
        <ows:Abstract xml:lang="en-GB">Method of measurement to be used for
the calculation (for example euclidean, geodesic, ⋯). This could include Z
coordinate (or height above elispoid).</ows:Abstract>
        <ows:Identifier>measurement_method</ows:Identifier>
```

```
        <ows:Metadata xlink:role=
"http://www.opengis.net/spec/wps/2.0/def/process/description/documentation"
xlink:href="http://www.dgiwg.org/service/processing/process/elevationanalysis
.html#measurement_method"/>
    </wps:Input>
    <wps:Input>
        <ows:Title xml:lang="en-GB">Unit of measure</ows:Title>
        <ows:Abstract xml:lang="en-GB">Unit of measure for the measured
distance(s) to be returned.</ows:Abstract>
        <ows:Identifier>uom</ows:Identifier>
        <ows:Metadata xlink:role=
"http://www.opengis.net/spec/wps/2.0/def/process/description/documentation"
xlink:href="http://www.dgiwg.org/service/processing/process/elevationanalysis
.html#uom"/>
    </wps:Input>
    <wps:Output>
        <ows:Title xml:lang="en-GB">Distance results</ows:Title>
        <ows:Abstract xml:lang="en-GB">Result set containing indivual
distance between each point pair and/or the sum. This should include
uom..</ows:Abstract>
        <ows:Identifier>distance_results</ows:Identifier>
        <ows:Metadata xlink:role=
"http://www.opengis.net/spec/wps/2.0/def/process/description/documentation"
xlink:href="http://www.dgiwg.org/service/processing/process/elevationanalysis
.html#distance_results"/>
    </wps:Output>
</wps:GenericProcess>
```

7.3. Range rings

Requirement 7: a DGIWG process for range rings shall implement a process description accordingly to parameters defined in Range rings.

7.3.1. Generic process : Range rings

```
  Identifier    http://www.dgiwg.org/service/processing/process/rangerings
  Title Range rings analysis
  Keywords radius, range
  Abstract  It creates ranges rings. Two methods are proposed, either by
providing a list of radius values (radius_value), or by providing a number of
rings (rings_nb) and an equal spacing (rings_spacing). Radials may be added
(radials_nb) to divide range rings into sectors.
  Metadata
```

Input: A center point

```
  Identifier    center_point
  Title A center point
  Keywords
  Abstract  A center point from which the rings will be defined in a given
CRS.
  Metadata
  Multiplicity  1
```

Input: Radius value(s)

```
  Identifier    radius_value
  Title Radius value(s)
  Keywords radius
  Abstract  One or more radius value(s) with UOM defining the range(s) around
the center point.
  Metadata
  Multiplicity  0..n
```

Input: Number of rings

```
  Identifier    rings_nb
  Title Number of rings
  Keywords
  Abstract  The number of ring(s) around the center points, with an equal
space (rings_spacing).
  Metadata
  Multiplicity  0..1
```

Input: Spacing between rings

```
  Identifier    rings_spacing
  Title Spacing between rings
  Keywords
  Abstract  The spacing with UOM that is used to create ring_nb ring(s).
  Metadata
  Multiplicity  0..1
```

Input: Number of radials

```
  Identifier    radials_nb
  Title Number of radials
  Keywords
  Abstract  The number of the radials dividing the range rings into sectors.
  Metadata
  Multiplicity  0..1
```

Output: Range rings

```
  Identifier    range_rings
  Title Range rings
  Keywords
  Abstract  A geometry representing the created range rings and optional
radials.
  Metadata
```

7.3.2. Process implementation : range rings

Find below a WPS 2.0 example of the range rings generic process profile.

rangeRings.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<wps:GenericProcess
    xmlns:ows="http://www.opengis.net/ows/2.0"
    xmlns:wps="http://www.opengis.net/wps/2.0"
    xmlns:xlink="http://www.w3.org/1999/xlink"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://www.opengis.net/wps/2.0
http://schemas.opengis.net/wps/2.0/wps.xsd">
    <ows:Title>Range rings analysis</ows:Title>
    <ows:Abstract>It creates ranges rings. Two methods are proposed, either
by providing a list of radius values (radius_value), or by providing a number
of rings (rings_nb) and an equal spacing (rings_spacing). Radials may be
added (radials_nb) to divide range rings into sectors.</ows:Abstract>
    <ows:Keywords>
        <ows:Keyword>radius</ows:Keyword>
        <ows:Keyword>range</ows:Keyword>
    </ows:Keywords>

<ows:Identifier>http://www.dgiwg.org/service/processing/process/rangerings</o
ws:Identifier>
```

```
    <!--
    HTML page providing human readable description of the generic profile
with examples.
    -->
    <ows:Metadata xlink:role=
"http://www.opengis.net/spec/wps/2.0/def/process/description/documentation"
xlink:href="http://www.dgiwg.org/service/processing/process/rangerings.html"/
>
    <ows:Metadata xlink:role=
"http://www.opengis.net/spec/wps/2.0/def/process/description/documentation"
xlink:href="generic_processes/rangeRings.html"/>
    <wps:Input>
        <ows:Title>A center point</ows:Title>
        <ows:Abstract>A center point from which the rings will be defined in
a given CRS.</ows:Abstract>
        <ows:Identifier>center_point</ows:Identifier>
        <ows:Metadata xlink:role=
"http://www.opengis.net/spec/wps/2.0/def/process/description/documentation"
xlink:href="http://www.dgiwg.org/service/processing/process/rangerings.html#c
enter_point"/>
    </wps:Input>
    <wps:Input>
        <ows:Title>Radius value(s)</ows:Title>
        <ows:Abstract>One or more radius value(s) with UOM defining the
range(s) around the center point.</ows:Abstract>
        <ows:Keywords>
            <ows:Keyword>radius</ows:Keyword>
        </ows:Keywords>
        <ows:Identifier>radius_value</ows:Identifier>
        <ows:Metadata xlink:role=
"http://www.opengis.net/spec/wps/2.0/def/process/description/documentation"
xlink:href="http://www.dgiwg.org/service/processing/process/rangerings.html#r
adius_value"/>
    </wps:Input>
    <wps:Input>
        <ows:Title>Number of rings</ows:Title>
        <ows:Abstract>The number of ring(s) around the center points, with an
equal space (rings_spacing).</ows:Abstract>
        <ows:Identifier>rings_nb</ows:Identifier>
        <ows:Metadata xlink:role=
"http://www.opengis.net/spec/wps/2.0/def/process/description/documentation"
xlink:href="http://www.dgiwg.org/service/processing/process/rangerings.html#r
ings_nb"/>
    </wps:Input>
    <wps:Input>
        <ows:Title>Spacing between rings</ows:Title>
        <ows:Abstract>The spacing with UOM that is used to create ring_nb
```

```
ring(s).</ows:Abstract>
        <ows:Identifier>rings_spacing</ows:Identifier>
        <ows:Metadata xlink:role=
"http://www.opengis.net/spec/wps/2.0/def/process/description/documentation"
xlink:href="http://www.dgiwg.org/service/processing/process/rangerings.html#r
ings_spacing"/>
    </wps:Input>
    <wps:Input>
        <ows:Title>Number of radials</ows:Title>
        <ows:Abstract>The number of the radials dividing the range rings into
sectors.</ows:Abstract>
        <ows:Identifier>radials_nb</ows:Identifier>
        <ows:Metadata xlink:role=
"http://www.opengis.net/spec/wps/2.0/def/process/description/documentation"
xlink:href="http://www.dgiwg.org/service/processing/process/rangerings.html#r
adials_nb"/>
    </wps:Input>
    <wps:Output>
        <ows:Title>Range rings</ows:Title>
        <ows:Abstract>  A geometry representing the created range rings and
optional radials.</ows:Abstract>
        <ows:Identifier>range_rings</ows:Identifier>
        <ows:Metadata xlink:role=
"http://www.opengis.net/spec/wps/2.0/def/process/description/documentation"
xlink:href="http://www.dgiwg.org/service/processing/process/elevationanalysis
.html#result_points"/>
    </wps:Output>
</wps:GenericProcess>
```

7.4. Viewshed analysis

Requirement 8: a DGIWG process for viewshed analysis shall implement a process description accordingly to parameters defined in Viewshed analysis.

7.4.1. Generic process : Viewshed analysis

```
  Identifier    http://www.dgiwg.org/service/processing/process/viewshed
  Title Viewshed analysis
  Keywords  visibility, sight
  Abstract  Visibility of one observer around him (at 360°)
  Metadata
```

Input: Elevation data

```
  Identifier    elavation_data
  Title Elevation data
  Keywords  elevation, height, Digital Surface Model, Digital Elevation Model
  Abstract  Digital representation of the earth's surface. Elevation data on
which the process will be executed. It may be internal data (with a choice
for the users) or data provided by the user itself (URI, external service,
…).
  Metadata
  Multiplicity  0..1
  Data format   raster, tif
```

Input: Marker/point(s) denoting observer(s)

```
  Identifier    observer_position
  Title Marker/point(s) denoting observer(s)
  Keywords  observer
  Abstract  Marker/point(s) in a given CRS.
  Metadata
  Multiplicity  1
```

Input: Height of observer

```
  Identifier    observer_height
  Title Height of observer
  Keywords  observer, height
  Abstract  Eye-level height of observer(s).
  Metadata
  Multiplicity  1
```

Input: Line of sight target

```
  Identifier    target_height
  Title Line of sight target
  Keywords  observer, height, target
  Abstract  Height of observable objects
  Metadata
  Multiplicity  1
```

Input: Line of sight distance

```
  Identifier    viewshed_distance
  Title Line of sight distance
  Keywords  observer, distance, target
  Abstract  Limit of viewshed analysis
  Metadata
  Multiplicity  1
```

Input: Earth curvature

```
  Identifier    earth_curvature
  Title Earth curvature
  Keywords  curvature
  Abstract  Whether earth curvature shall be taken into account or not.
  Metadata
  Multiplicity  0..1
```

Input: Atmosphere refraction

```
  Identifier    Athm_refraction
  Title Atmosphere refraction
  Keywords  refraction
  Abstract  Whether Athmosphere refraction shall be taken into account or
not.
  Metadata
  Multiplicity  0..1
```

Output: Viewshed results

```
  Identifier    viewshed_results
  Title Viewshed results
  Keywords
  Abstract  The unimpeded view or access from one point to another point
across a terrain or surface.  Compound line of sight results in areas visible
by multiple observers.
  Metadata
```

7.5. Slope analysis

Requirement 9: a DGIWG process for slope analysis shall implement a process description accordingly to parameters defined in Slope analysis.

7.5.1. Generic process : Slope analysis

```
  Identifier    http://www.dgiwg.org/service/processing/process/slope
  Title Slope analysis
  Keywords  slope
  Abstract  Calculates the slope on a given area of interest. Slope may be
percentage or angle in degrees. Result is a raster coverage.
  Metadata
```

Input: Area of interest

```
  Identifier    aoi
  Title Area of interest
  Keywords
  Abstract  Area of interest where a process will be executed. This could be
a BBOX, a polygon, or any surface geometry.. (GM_Surface)
  Metadata
  Multiplicity  1
```

Input: Elevation data

```
  Identifier    elavation_data
  Title Elevation data
  Keywords  elevation, height, Digital Surface Model, Digital Elevation Model
  Abstract  Digital representation of the earth's surface. Elevation data on
which the process will be executed. It may be internal data (with a choice
for the users) or data provided by the user itself (URI, external service,
…).
  Metadata
  Multiplicity  0..1
```

Input: Slope units

```
  Identifier    slope_units
  Title Slope units
  Keywords  slope, units, degrees, percentage
  Abstract  Units to be used for the slope measurement.
  Metadata
  Multiplicity  1
```

Output: Slope analysis results

```
  Identifier    slope_results
  Title Slope analysis results
  Keywords slope, analysis
  Abstract  Slope (in degrees or percentage) calculated by the analysis
representing  the steepness of each cell. This may also contain metadata
describing the data sources and the units used.
  Metadata
```

7.6. Helicopter Landing Zone

Requirement 10: a DGIWG process for helicopter landing zone shall implement a process description accordingly to parameters defined in Helicopter Landing Zone.

7.6.1. Generic process : Helicopter landing zone

```
  Identifier    http://www.dgiwg.org/service/processing/process/hlz
  Title Helicopter landing zone
  Keywords  helicopter, landing zone, slope, obstacle
  Abstract  Helicopter landing zones contain one or more helicopter landing
sites.
  Metadata
```

Input: Elevation data

```
  Identifier    elevation_data
  Title Elevation data
  Keywords  elevation, height, Digital Surface Model, Digital Elevation Model
  Abstract  Digital representation of the earth's surface. Elevation data on
which the process will be executed. It may be internal data (with a choice
for the users) or data provided by the user itself (URI, external service,
…).
  Metadata
  Multiplicity  0..1
```

Input: Land cover

```
  Identifier    land_cover
  Title Land cover
  Keywords  land, cover, vegetation, water, brush;
  Abstract  General land cover and vegetation types over areas of land,
including water.
  Metadata
  Multiplicity  0..1
```

Input: Maximum slope tolerance

```
  Identifier    max_slope_tolerance
  Title Maximum slope tolerance
  Keywords  slope, units
  Abstract  The maximum slope tolerance with units (degrees or percentage).
  Metadata
  Multiplicity  1
```

Input: Minimum radius

```
  Identifier    min_radius
  Title Minimum radius
  Keywords  radius
  Abstract  The minimum necessary radius of landing zone, based on aircraft
used.  See aircraft specs or operational guidance.
  Metadata
  Multiplicity  1
```

Input: Surface obstructions height tolerance

```
  Identifier    height_tolerance
  Title Surface obstructions height tolerance
  Keywords  z value, obstacle
  Abstract  Maximum size object suitable in HLZ with UOM ; ground clearance
of aircraft.
  Metadata
  Multiplicity  1
```

Output: HLZ analysis results

```
  Identifier    hlz_results
  Title HLZ analysis results
  Keywords
  Abstract  A coverage depicting zones large enough for a helicopter to land
and take off.
  Metadata
```

7.7. Routing

Requirement 11: a DGIWG process for routing shall implement a process description accordingly to parameters defined in Routing.

7.7.1. Generic process : Routing

to be checked if conistency with OGC routing API pilot is wanted https://app.swaggerhub.com/apis/cportele/wps-routing-api/1.0.0#/Option%20WPS/getProcessDescription

```
  Identifier    http://www.dgiwg.org/service/processing/process/routing
  Title Routing
  Keywords  route
  Abstract  It provides route according specified parameters.
  Metadata
```

Input: Way points

```
  Identifier    way_points
  Title Way points
  Keywords
  Abstract  A list of points along the route. At least two points have to be
provided (start and end point).
  Metadata
  Multiplicity  2..n
```

Input: Routing preference

```
  Identifier    preference
  Title Routing preference
  Keywords  shortest, fastest
  Abstract  The routing preference (shortest, fastest or other specific by
the service or API). Fastest is the default value.
  Metadata
  Multiplicity  0..1
```

Input: Maximum height of the vehicle

```
  Identifier    max_height
  Title Maximum height of the vehicle
  Keywords
  Abstract  A height restriction for vehicles in meters to consider when
computing the route. Support for this parameter is not required and the
parameter may be removed from the API definition.
  Metadata
  Multiplicity  0..1
```

Input: Maximum weight of the vehicle

```
  Identifier    max_weight
  Title Maximum weight of the vehicle
  Keywords
  Abstract  A weight restriction for vehicles in tons to consider when
computing the route. Support for this parameter is not required and the
parameter may be removed from the API definition.
  Metadata
  Multiplicity  0..1
```

Input: Input dataset

```
  Identifier    dataset
  Title Input dataset
  Keywords
  Abstract  The source dataset to use for calculating the route.
  Metadata
  Multiplicity  1
```

Input: Routing engine

```
  Identifier    engine
  Title Routing engine
  Keywords
  Abstract  The routing engine to use for calculating the route.
  Metadata
  Multiplicity  0..1
```

Input: Graph solving algorithm

```
  Identifier    algorithm
  Title Graph solving algorithm
  Keywords
  Abstract  The routing / graph solving algorithm to use for calculating the
route.
  Metadata
  Multiplicity  0..1
```

Input: Time of departure or arrival

```
  Identifier    when
  Title Time of departure or arrival
  Keywords
  Abstract   The time of departure or arrival. Default is "now".
  Metadata
  Multiplicity  0..1
```

Input: Departure

```
  Identifier    departure
  Title Departure
  Keywords
  Abstract  Specifies whether the value of `when` refers to the time of
departure or arrival. Default is departure.
  Metadata
  Multiplicity  0..1
```

Output: Calculated route

```
  Identifier    route
  Title Calculated route
  Keywords
  Abstract  Calculated route according specified parameters.
  Metadata
```

7.8. Geopackage Creation

Requirement 12: a DGIWG process for geopackage Creation implement a process description accordingly to parameters defined in Geopackage Creation.

7.8.1. Generic process : Geopackage creation

```
  Identifier    http://www.dgiwg.org/service/processing/process/geopackage
  Title Geopackage creation
  Keywords  Geopackage, vector, raster, imagery, coverage
  Abstract  It provides geopackage file from input data.
  Metadata
```

Input: Area of interest

```
  Identifier    aoi
  Title Area of interest
  Keywords
  Abstract  Area of interest where a process will be executed. This could be
a BBOX, a polygon, or any surface geometry.. (GM_Surface)
  Metadata
  Multiplicity  1
```

Input: Geopackage name

```
  Identifier    name
  Title Geopackage name
  Keywords
  Abstract  Name of the generated geopackage
  Metadata
  Multiplicity  1
```

Input: Geopackage description

```
  Identifier    description
  Title Geopackage description
  Keywords
  Abstract  Description of the generated geopackage
  Metadata
  Multiplicity  0..1
```

Input: Data sources

```
  Identifier    data_sources
  Title Data sources
  Keywords  tiles, chart maps, imagery, vector, elevation
  Abstract  Selection of input data to compute the geopackage file. A same
source can contain different layers; desired layers to be package shall be
specified in the request.
  Metadata
  Multiplicity  1..n
```

Output: Geopackage file

```
  Identifier    geopackage
  Title Geopackage file
  Keywords  gpkg
  Abstract  Generated geopackage file according to input data and provided
parameters.
  Metadata
```

Appendix A: Abstract Test Suite

Test identifier	/test/case/id
Test purpose:	Confirm that the IUT satisfies all applicable requirements for conformance class xxx.
Test method:	Functional testing performed in an automated and/or manual manner. Verify the behaviour …
Requirement:	DGIWG-XXX : clause 2.2
Test type:	Capability

Table 8. A.1.1 Conformance level 1

Test identifier	http://www.dgiwg.org/xxx/xxx
Test purpose:	The XML response entity is valid.
Test method:	Validate content of response entity against corresponding element declaration.
Requirement:	DGIWG-XXX : clause. 10.2.5.1, p. 118
Test type:	Capability

Table 9. A.1.2 Test case for validity of XML response entity

Test identifier	/test/case/id
Test purpose:	Confirm that the IUT satisfies all applicable requirements for conformance level 1.
Test method:	Functional testing performed in an automated and/or manual manner. Verify the behaviour of …
Requirement:	DGIWG XXX: cl. 2.2
Test type:	Capability

Table 10. A.2.1 Conformance level 2

Test identifier	http://www.dgiwg.org/xxx/xxx
Test purpose:	The XML response entity is valid.
Test method:	Validate content of response entity against corresponding element declaration.
Requirement:	OGC DGIWG XXX: clause. 10.2.5.1, p. 118
Test type:	Capability

Table 11. A.2.2 Test case for validity of XML response entity

Appendix B: DGIWG Generic profiles examples

elevationAnalysis.xml

```
<wps:GenericProcess xmlns:ows="http://www.opengis.net/ows/2.0" xmlns:wps=
"http://www.opengis.net/wps/2.0" xmlns:xlink="http://www.w3.org/1999/xlink"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation=
"http://www.opengis.net/wps/2.0 http://schemas.opengis.net/wps/2.0/wps.xsd">
  <ows:Title>Elevation analysis</ows:Title>
  <ows:Abstract> It provides lowest and highest point(s) on a given
area.</ows:Abstract>
  <ows:Keywords>
    <ows:Keyword>elevation</ows:Keyword>
    <ows:Keyword>analysis</ows:Keyword>
    <ows:Keyword>highest point</ows:Keyword>
    <ows:Keyword>lowest point</ows:Keyword>
  </ows:Keywords>

<ows:Identifier>http://www.dgiwg.org/service/processing/process/elevationanal
ysis</ows:Identifier>
 <!--

    HTML page providing human readable description of the generic profile
with examples.

-->
  <ows:Metadata xlink:role=
"http://www.opengis.net/spec/wps/2.0/def/process/description/documentation"
xlink:href="http://www.dgiwg.org/service/processing/process/elevationanalysis
.html"/>
  <wps:Input>
    <ows:Title>Area of interest</ows:Title>
    <ows:Abstract>
      Area of interest where a process will be executed. This could be a
BBOX, a polygon, or any surface geometry (GM_Surface).
    </ows:Abstract>
    <ows:Identifier>aoi</ows:Identifier>
    <ows:Metadata xlink:role=
"http://www.opengis.net/spec/wps/2.0/def/process/description/documentation"
xlink:href="http://www.dgiwg.org/service/processing/process/elevationanalysis
.html#aoi"/>
  </wps:Input>
  <wps:Input>
    <ows:Title>Elevation data</ows:Title>
    <ows:Abstract>
```

```
      Digital representation of the earth's surface. Elevation data on which
the process will be executed. It may be internal data (with a choice for the
users) or data provided by the user itself (URI, external service, …).
    </ows:Abstract>
    <ows:Keywords>
      <ows:Keyword>elevation</ows:Keyword>
      <ows:Keyword>height</ows:Keyword>
      <ows:Keyword>Digital Surface Model</ows:Keyword>
      <ows:Keyword>Digital Elevation Model</ows:Keyword>
    </ows:Keywords>
    <ows:Identifier>elevationData</ows:Identifier>
    <ows:Metadata xlink:role=
"http://www.opengis.net/spec/wps/2.0/def/process/description/documentation"
xlink:href="http://www.dgiwg.org/service/processing/process/elevationanalysis
.html#elevationData"/>
  </wps:Input>
  <wps:Input>
    <ows:Title>Choice of highest or lowest points</ows:Title>
    <ows:Abstract>
      Parameter indicating wether lowest points or highest points are
requested.
    </ows:Abstract>
    <ows:Identifier>analysis_type</ows:Identifier>
    <ows:Metadata xlink:role=
"http://www.opengis.net/spec/wps/2.0/def/process/description/documentation"
xlink:href="http://www.dgiwg.org/service/processing/process/elevationanalysis
.html#analysis_type"/>
  </wps:Input>
  <wps:Output>
    <ows:Title>Highest or lowest points</ows:Title>
    <ows:Abstract>
    Highest or lowest points returned by the process on the provided area of
interest. This may also contain metadata describing the data sources used,
the vertical CRS of the result.
    </ows:Abstract>
    <ows:Identifier>result_points</ows:Identifier>
    <ows:Metadata xlink:role=
"http://www.opengis.net/spec/wps/2.0/def/process/description/documentation"
xlink:href="http://www.dgiwg.org/service/processing/process/elevationanalysis
.html#result_points"/>
  </wps:Output>
</wps:GenericProcess>
```

distanceMeasurement.xml

```
<wps:GenericProcess xmlns:ows="http://www.opengis.net/ows/2.0" xmlns:wps=
```

```
"http://www.opengis.net/wps/2.0" xmlns:xlink="http://www.w3.org/1999/xlink"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation=
"http://www.opengis.net/wps/2.0 http://schemas.opengis.net/wps/2.0/wps.xsd">
  <ows:Title>Distance measurement</ows:Title>
  <ows:Abstract>
    It provides the distance between two or more points.
  </ows:Abstract>
  <ows:Keywords>
    <ows:Keyword>distance</ows:Keyword>
  </ows:Keywords>
  <ows:Identifier>
  http://www.dgiwg.org/service/processing/process/distancemeasurement
  </ows:Identifier>
   <!--

    HTML page providing human readable description of the generic profile
with examples.

  -->
  <ows:Metadata xlink:role=
"http://www.opengis.net/spec/wps/2.0/def/process/description/documentation"
xlink:href="http://www.dgiwg.org/service/processing/process/distancemeasureme
nt.html"/>
  <wps:Input>
    <ows:Title>List of points</ows:Title>
    <ows:Abstract>
    List of two or more points in a given CRS. CRS may be 2D or 3D (with Z or
height information).
    </ows:Abstract>
    <ows:Identifier>points_list</ows:Identifier>
    <ows:Metadata xlink:role=
"http://www.opengis.net/spec/wps/2.0/def/process/description/documentation"
xlink:href="http://www.dgiwg.org/service/processing/process/elevationanalysis
.html#points_list"/>
    </wps:Input>
    <wps:Input>
    <ows:Title>Method of measurement</ows:Title>
    <ows:Abstract>
      Method of measurement to be used for the calculation (for example
euclidean, geodesic, ⋯). This could include Z coordinate (or height above
elispoid).
    </ows:Abstract>
    <ows:Identifier>measurement_method</ows:Identifier>
    <ows:Metadata xlink:role=
"http://www.opengis.net/spec/wps/2.0/def/process/description/documentation"
xlink:href="http://www.dgiwg.org/service/processing/process/elevationanalysis
.html#measurement_method"/>
```

```
  </wps:Input>
  <wps:Input>
    <ows:Title>Unit of measure</ows:Title>
    <ows:Abstract>
    Unit of measure for the measured distance(s) to be returned.
    </ows:Abstract>
    <ows:Identifier>uom</ows:Identifier>
    <ows:Metadata xlink:role=
"http://www.opengis.net/spec/wps/2.0/def/process/description/documentation"
xlink:href="http://www.dgiwg.org/service/processing/process/elevationanalysis
.html#uom"/>
  </wps:Input>
  <wps:Output>
    <ows:Title>Distance results</ows:Title>
    <ows:Abstract>
    Result set containing indivual distance between each point pair and/or
the sum. This should include uom..
    </ows:Abstract>
    <ows:Identifier>distance_results</ows:Identifier>
    <ows:Metadata xlink:role=
"http://www.opengis.net/spec/wps/2.0/def/process/description/documentation"
xlink:href="http://www.dgiwg.org/service/processing/process/elevationanalysis
.html#distance_results"/>
  </wps:Output>
</wps:GenericProcess>
```

Appendix C: Bibliography