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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:	© Copyright DGIWG, some rights reserved - (CC) (By:) Attribution You are free: - to copy, distribute, display, and perform/execute the work - to make derivative works - to make commercial use of the work Under the following conditions: - (By:) Attribution. You must give the original author (DGIWG) credit. - For any reuse or distribution, you must make clear to others the license terms of this work. Any of these conditions can be waived if you get permission from the copyright holder DGIWG. Your fair use and other rights are in no way affected by the above. This is a human-readable summary of the Legal Code (the full license is available from Creative Commons < http://creativecommons.org/licenses/by/2.0/ >).

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Executive Summary

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

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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.

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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 through 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: *- include final list here*

Chapter 3. Conformance

(Mandatory for standards)

3.1. Conformance classes

This document establishes xx conformance classe(s):

- DGIWG process,
- DGIWG generic xxx process profile,
- ...

"DGIWG process" class define requirements for defining generic process description "DGIWG generic xxx process profile" classes defines 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 generic processes profiles can be implemented by OGC WPS standards (verions 1 or 2) or possiblily other geoprocessing APIs. Annex A 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
DGIWG generic measurement process profile http://www.dgiwg.org/std/geoprocessing/1.0/conf/generic-measurement	DGIWG requirement y to z	-	Annex A.2.1
DGIWG generic elevation process profile http://www.dgiwg.org/std/geoprocessing/1.0/conf/generic-elevation	DGIWG requirement y to z	-	Annex A.2.2

Conformance class name	Operation or behavior	OGC WPS Conformance Test	DGIWG WPS Conformance Test
DGIWG generic xxxx process profile http://www.dgiwg.org/ std/geoprocessing/1.0/ conf/generic-xxxx	DGIWG requirement y to z	-	Annex A.2.3

Table 1. Conformance classes

3.2. Backward compatibility

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	-
<i>OGC® Testbed-14 ERs to be added here</i>	OGC 18-XXX	-

Chapter 5. Terms, definitions, and abbreviations

(As applicable)

5.1. Definitions

For the purposes of this document, terms and definitions found in WPS 2.0 ([\[Ref-1\]](#)) apply.

5.2. Abbrevations

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 additionally provide elements according to Table 5 for the description of a DGIWG generic process.	M
3	a DGIWG generic process profile shall additionally provide elements according to Table 6 for the description of input/output parameters.	mail
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 recommendations 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 additionally 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 change

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 metatadta 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-EN)
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 change
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.

CAUTION

template to be developped

what king of ows:metadata ?

WARNING

TBD recomandation for registering profile on DGIWG website/registry discussion

Chapter 7. DGIWG Processes Description (Normative)

7.1. Introduction

This chapter defines DGIWG processes at a generic level. These definitions may be implemented through WPS or other APIs. Following DGIWG processes are described below:

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

7.2. Elevation analysis

7.2.1. Generic process : elevation analysis

Process

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

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

Identifier elavation_data

Title elevationData

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

Identifier analysis_type

Title Choice of highest or lowest points

Keywords

Abstract Information providing if highest or lowest.

Metadata

Multiplicity 1

Output

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

7.2.2. Process implementation : elevation analysis

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

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/elevationanalysis</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 whether 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>
```

7.3. Distance measurement

7.3.1. Generic process : distance measurement

Process

```
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

```
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

```
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

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

Output

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

7.3.2. Process implementation : distance measurement

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

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>
```

Chapter 8. Range rings

8.1. Generic process : range rings

Process

Identifier `http://www.dgiwg.org/service/processing/process/rangerings`

Title Range rings analysis

Keywords

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

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

Identifier `radius_value`

Title Radius value(s)

Keywords

Abstract One or more radius value(s) with UOM defining the range(s) around the center point.

Metadata

Multiplicity `0..n`

Input

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

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

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

Output

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

Chapter 9. Viewshed analysis

9.1. Generic process : viewshed analysis

Process

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

Input

```
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

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

Input

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

Input

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

Input

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

Input

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

Input

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

Output

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

Chapter 10. Slope

10.1. Generic process : slope

Process

```
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

```
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

```
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

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

Output

Identifier slope_results
Title Slope analysis results
Keywords
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

Chapter 11. Helicopter Landing Zone

11.1. Generic process : HLZ

Process

```
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

```
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

```
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

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

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

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

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

Chapter 12. Routing

12.1. Generic process : routing

Process

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

Input

```
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

```
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

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

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

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

Output

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

Chapter 13. Geopackage

13.1. Generic process : geopackage

Process

```
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

```
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

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

Input

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

Input

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

Input

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

Input

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

Input

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

Input

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

Input

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

Identifier route
Title Calculated route
Keywords gpkg
Abstract Calculated route according specified 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 7. 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 8. 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 9. 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 10. 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/elevationanalysis</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
      ellipsoid).
    </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