

# Analysis Framework Developer's Guide

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There are four steps required to add an Analysis to the Analysis Framework. Before these steps, you need to have a working [MAEviz development environment](#). Also, if the new analysis uses any new data schemas, you must define them following the steps of [Creating new Dataset schemas](#). When following these steps, it will be helpful to refer to the example of the standard Bridge Damage analysis in the `nca.maeviz.bridges` plugin. For each step, follow the link to the section below for the low-level details.

### Step One: Create the [#Analysis Description](#)

First, one must create a new Analysis Description file for the Analysis. This will require knowledge of the parameters, outputs, and runtime requirements of the Analysis to be implemented. Generally, this file is placed in a folder called `descriptions` which sits in the root of the defining plugin, and is named to match the analysis name, such as `BridgeDamage.xml`. See the [#Analysis Description](#) section for detail of how to write this file, and the syntax used within.

### Step Two: Create the [#Task](#)

Second, one must implement the Analysis as a Task. Pick the appropriate base class and implement the required methods. Remember that the keys given to the parameters in the Analysis Description must match the `set` methods in this class. Also, the column names given to the outputs must match the values given in the schema for the specific dataset type. The [#Task](#) section below gives details of how to extend the base class, and what java methods you must define.

### Step Three: Register with the [#nca.analysis.newAnalyses](#) extension point

Third, register this extension. Remember that the id here must match the id given in the Analysis Description and the tag must match the tag in the [#nca.tools.ogrescript.ogreTasks](#) extension point.

### Step Four: Register with the [#nca.tools.ogrescript.ogreTasks](#) extension point.

Lastly, register the Task with this extension point. Remember that the tag here must match the tag given in the `nca.analysis.newAnalyses` extension point above.

## Analysis Description

The Analysis Description file provides detailed information about the various sections of an Analysis. It is defined by using the following tags:

**<analysis-description>**

### Attributes

NAME	DEFAULT VALUE	DESCRIPTION
<i>id</i>	(required)	This id MUST match the id given to the Analysis in the <code>nca.analysis.newAnalyses</code> extension point.
<i>help-context</i>	(optional - no default)	Assigns a help context id to this analysis.

### Elements

NAME	REQUIRED	CARDINALITY	DESCRIPTION
<i>&lt;analysis-type&gt;</i>	(required)	1	
<i>&lt;custom-script&gt;</i>	(optional)	0-1	
<i>&lt;groups&gt;</i>	(required)	1	
<i>&lt;parameter&gt;</i>	(optional)*	0*-many	
<i>&lt;output&gt;</i>	(optional)	0-many	

### Text

This element has no text.

**<analysis-type>**

### Attributes

NAME	DEFAULT VALUE	DESCRIPTION
<i>type</i>	(required)	Defines how this analysis is to be executed, currently supports <code>simpleIteration</code>

## Elements

NAME	REQUIRED	CARDINALITY	DESCRIPTION
<code>&lt;property&gt;</code>	(optional)	0-many	a <code>nca.tools.common.Property</code> object. Additional properties required by the type of iterator.

## Text

This element has no text.

## Example

```
<analysis-type type="simpleIteration">
  <property name="iteratingDatasetKey" value="bridgeDamage" />
</analysis-type>
```

## `<custom-script>`

### Attributes

This element has no attributes.

### Elements

This element has no children.

## Text

Defines a location for a custom OGREScript to use instead of auto-generating one. The format for this script will be defined on a separate page. This location is relative to the bundle in which the analysis is shipped.

## Example

```
<custom-script>scripts/ogrescript-bridgeFunc.xml</custom-script>
```

## `<groups>`

The `<groups>` elements are currently unused by the analysis system. To place parameters in groups, use `group="groupName"` in the parameter element.

## `<parameter>`

A parameter element with key `<outputKey>.resultName` is required. This is the only way to change a `resultName` for a given output.

```
<parameter key="mappingResult.resultName" phylum="string" cardinality="single" friendly-name="Result Name" />
...
<output friendly-name="Mapping Result" key="mappingResult" phylum="dataset">
...
```

## Attributes

NAME	DEFAULT VALUE	DESCRIPTION
<i>group</i>	(unused)	a string which must match a member of <code>&lt;groups&gt;</code> above -- <b>currently unused</b>

<i>format</i>	<i>shapefile</i>	the format of whatever phylum of parameter this is. For datasets, indicates what type of dataset (mapping, shapefile,etc)
<i>phylum</i>	(required)	the type of the parameter, currently supports <code>string</code> , <code>dataset</code> , or <code>boolean</code>
<i>cardinality</i>	(required)	how many of this type, currently supports <code>single</code> or <code>multiple</code>
<i>key</i>	(required)	name of property for which value should be added
<i>friendly-name</i>	{required}	name of property for which value should be added
<i>optional</i>	<b>false</b>	A value of <code>true</code> denotes that this parameter need not have a value
<i>advanced</i>	<b>false</b>	A value of <code>true</code> denotes that this is an advanced parameter

## Elements

NAME	REQUIRED	CARDINALITY	DESCRIPTION
<code>&lt;types&gt;</code>	(optional)	0-many	A list of types that are accepted by this <code>&lt;parameter&gt;</code> .
<code>&lt;description&gt;</code>	(optional)	1	A textual description of the parameter. Mostly used to generate tooltips in the UI.

## Text

This element has no text.

## Example

```
<parameter group="Required" format="dataset" cardinality="single" key="functionalityTable" friendly-name="
Functionality Table">
  <types>
    <type>bridgeFunctionality</type>
  </types>
</parameter>
```

## Syntax for various parameter widget types

A list of the various parameter widget types available, and an example for each, can be found on the [Parameter Widget Examples](#) page.

## `<output>`

An `<output>` of type `dataset` requires two `<property>` elements.

- `base-dataset-key` - The key of the `<parameter>` which is the base for this new Dataset
- `schema` - The id of the schema that this Dataset implements.

## Attributes

NAME	DEFAULT VALUE	DESCRIPTION
<i>format</i>	(required)	the format of the parameter, currently supports <code>string</code> or <code>dataset</code>
<i>key</i>	(required)	name of property for which value should be added. No spaces allowed.
<i>friendly-name</i>	{required}	name of property for which value should be added

## Elements

NAME	REQUIRED	CARDINALITY	DESCRIPTION
<code>&lt;property&gt;</code>	(optional)	0-many	a <code>nca.tools.common.Property</code> object. Additional properties required by the <code>&lt;output&gt;</code> .

## Text

This element has no text.

## Example

```
<output friendly-name="Bridge Functionality" key="bridgeFunctionality" format="dataset">
  <property name="base-dataset-key" value="bridgeDamage" />
  <property name="schema" value="nca.maeviz.schemas.bridgeFunctionalityResults.v1.0" />
</output>
```

## Task class

Each Analysis MUST implement a class which extends `nca.analysis.maeviz.ogrescript.tasks.core.SimpleFeatureTask` or `nca.analysis.maeviz.ogrescript.tasks.core.SimpleFeatureCollectionTask`. If the Task class generate more then one feature, the later class must be used. In the future a choice of base class based on the specific implementation required will be available.

There are two required abstract methods.

```
protected abstract void preprocess() throws ScriptExecutionException;
protected abstract void handleFeature( IProgressMonitor monitor ) throws ScriptExecutionException;
```

## Requirements

For each `<parameter>` there must be a corresponding set method which corresponds to the key attribute in the `<parameter>`.

Example:

```
<parameter group="Required" format="dataset" cardinality="single" key="functionalityTable" friendly-name="
Functionality Table" />

public void setFunctionalityTable( Dataset d );
```

The `handleFeature` method is responsible for two things. First is computing the values that are to be added to the new Feature. Second is to populate the `resultMap`.

Example:

```
resultMap.put( COL_LS_SLIGHT, dmg[0] );
resultMap.put( COL_LS_MODERATE, dmg[1] );
```

Note: if the class extends `SimpleFeatureCollectionTask`, the member, `resultMapList` which is a `LinkedList` of `resultMap`, must be used to store the result of each feature in feature collection.

As a best practice, add `public final static` constants for each column in the Feature. These column names MUST match the fields as defined in the `gisSchema` for the created dataset.

## nca.analysis.newAnalyses extension point

Each Analysis must register an extension with the `nca.analysis.newAnalyses` extension point. This registration allows the Analysis Framework to find all Analyses automatically.

NAME	DEFAULT VALUE	DESCRIPTION
<i>id</i>	(required)	This id MUST match the id given in the <code>&lt;analysis-description&gt;</code>
<i>name</i>	(required)	This is the "friendly name" of the Analysis and should be i18n
<i>tag</i>	(required)	The tag MUST match the tag in the <code>nca.tools.ogrescript.ogreTasks</code> extension point. No spaces allowed.
<i>descriptor</i>	(required)	This points to the descriptor file.

## nca.tools.ogrescript.ogreTasks extension point

Each Analysis must register its implementing class with the `nca.tools.ogrescript.ogreTasks` extension point.

NAME	DEFAULT VALUE	DESCRIPTION
<i>id</i>	(required)	This id SHOULD match the fully qualified class name of the task

<i>name</i>	(required)	This is the "friendly name" of the Task and should be i18n
<i>tag</i>	(required)	The tag MUST match the tag in the <code>nca.analysis.newAnalyses</code> extension point. No spaces allowed.
<i>class</i>	(required)	This points to implementing class.