

Deltares

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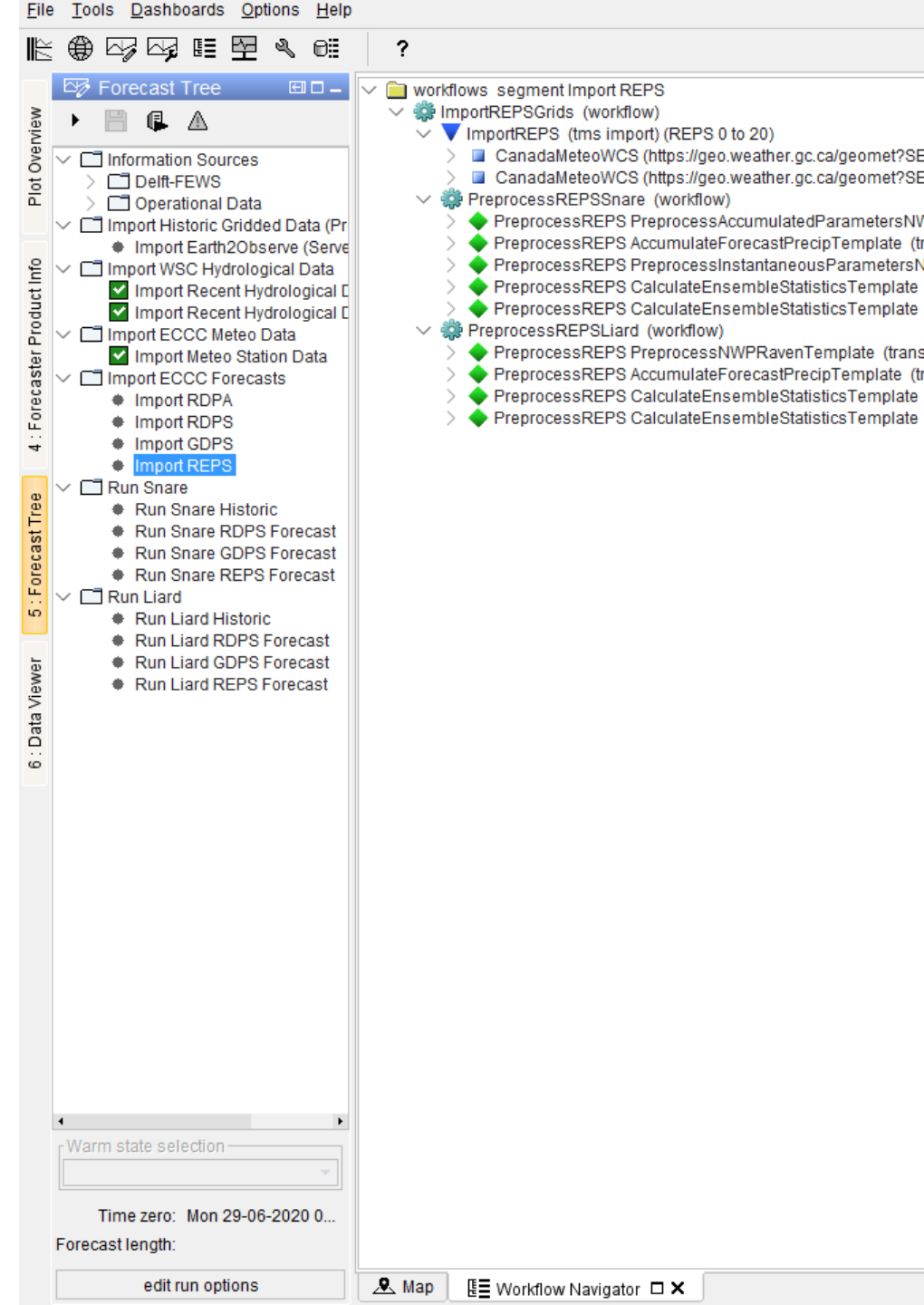
Delft-FEWS

Basic Configuration Course

Module: Workflows and Modules

Module Motivation

- Workflows and modules are the data processing instructions
- Be able to build your own workflow and modules also you to customize tasks
- The structure can be quite simple (i.e. a workflow can contain one module to run) or quite complex (a workflow can contain multiple other workflows and modules to be run in sequence).
- Learning this, means you learn how to structure your tasks in Delft-FEWS



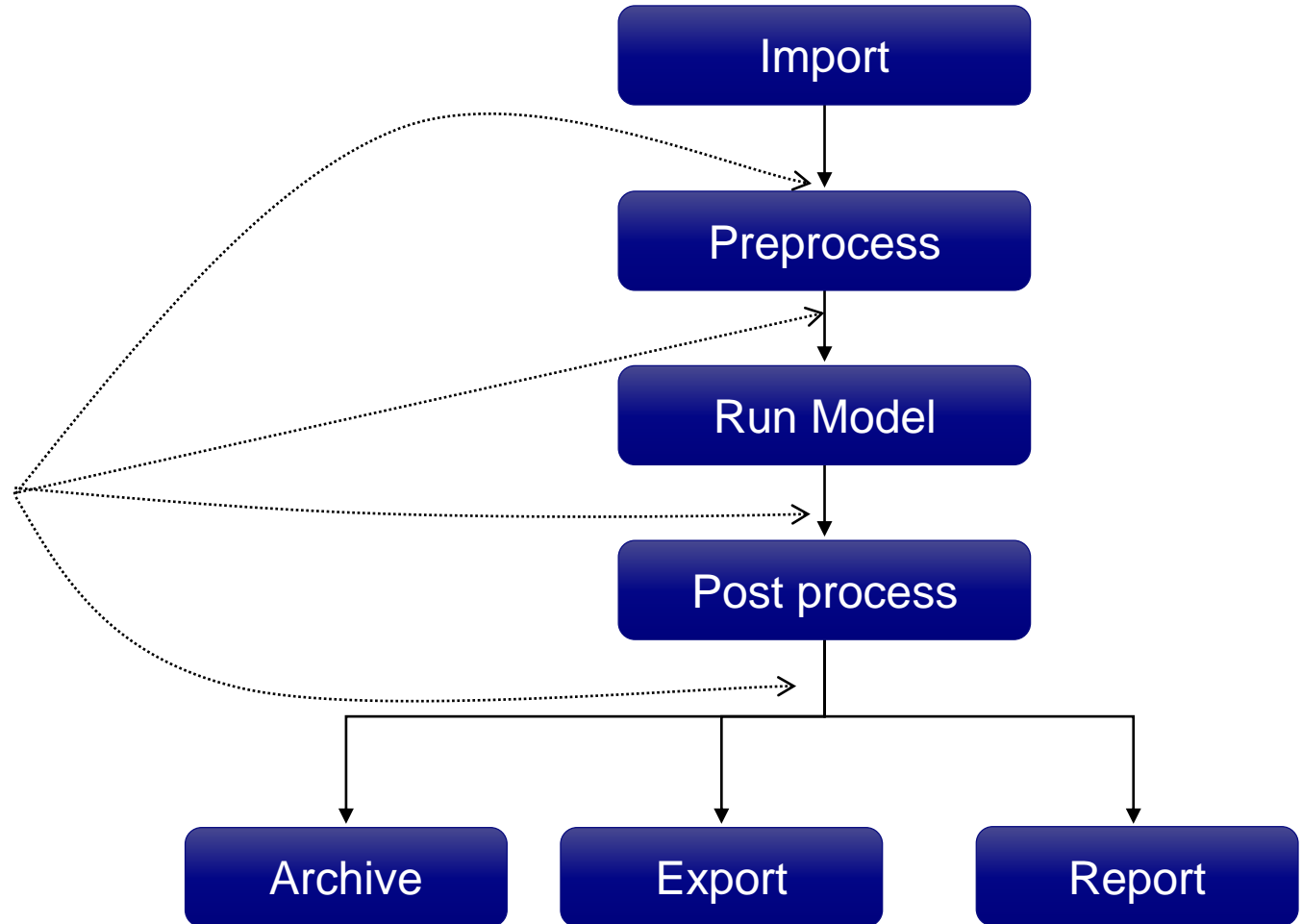
Learning Objectives

By the end of this module, you will have met the following learning objectives:

- 1) Understand the role of modules, how to create and register them
- 2) Understand the role of workflows, how to create them around modules and register them.
- 3) Have knowledge of additional workflow options in the workflow descriptors such as properties

Workflows and Modules

- Workflow – A sequence of modules
- Module instance – Configured module
- Task run – Actual execution of a workflow
- Time series connect the dataflow between the module instances



Configuring Workflows

- Google “Delft-FEWS Workflows” to find instructions on how to configure a workflow

The screenshot shows a web browser window with the address bar displaying `publicwiki.deltares.nl/display/FEWSDOC/06+Configuring+Workflows`. The page has a blue header with navigation links: Deltares, Spaces, and Blogs. A left sidebar contains a 'Blog' section and a 'PAGE TREE' with the following items: Delft-FEWS Administrators' guide, Delft-FEWS Technical Documentation, Background of Delft-FEWS, Configuring Delft-FEWS - Configuration Guide (expanded), 01 Structure of a Delft-FEWS Configuration, 02 Data Handling in Delft-FEWS, 03 System Configuration, 04 Regional Configuration, 05 Configuring the available Delft-FEWS modules, and 06 Configuring Workflows (highlighted). The main content area shows the breadcrumb 'Dashboard / Home / Configuring Delft-FEWS - Configuration Guide' and the title '06 Configuring Workflows'. Below the title are two tabs: '05 Configuring the available Delft-FEWS modules' and 'Configuring Delft-FEWS - Configuration Guide' (active). A table provides details about workflows:

What	A <i>workflow.xml</i>
Required	no
Description	Definition of sequence of moduleInstances (or workflows) in logical order
schema location	http://fews.wldelft.nl/schemas/version1.0/workflow.xsd

Below the table is a list of links: Introduction, Workflows, Activities, and activity (indented under Activities).

Example of a simple workflow

Schema Definition

```
<workflow xmlns="http://www.wldelft.nl/fews" xmlns:xsi="http://www.w3.org/2001/XMLSchema-  
instance" xsi:schemaLocation="http://www.wldelft.nl/fews http://fews.wldelft.nl/schemas/version1.0/workflow.xsd" version="1.1">
```

```
<activity>  
  <moduleInstanceId>ImportForecast</moduleInstanceId>  
  <description>Example Description</description>  
</activity>
```

Module to be run

```
</workflow>
```


Using Properties in Your Workflow

- Properties can be used define values in the module

```
<workflow xmlns="http://www.wldelft.nl/fews" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="http://www.wldelft.nl/fews
http://fews.wldelft.nl/schemas/version1.0/workflow.xsd" version="1.1">
  <properties>
    <string key="STARTTIME" value="-10"/>
    <string key="ENDTIME" value="0"/>
  </properties>
  <activity>
    <runIndependent>true</runIndependent>
    <moduleInstanceId>ImportScalarData</moduleInstanceId>
  </activity>
  <activity>
    <runIndependent>true</runIndependent>
    <moduleInstanceId>PreprocessScalarData</moduleInstanceId>
  </activity>
</workflow>
```

- In the Module, the property is referenced with \$*\$
- For example \$STARTTIME\$ will be replaced with -10 in this example
- Properties can also be set globally, in the global.properties file in the Root Folder

Use of Template Files

- Template files can be used in conjunction with properties
- For example, running the same model with a different NWP forecast
- Two workflow files can use a common module template, containing \$FORECAST\$

```
<!-- Model Forecast-->
<activity>
  <properties>
    <string key="FORECAST" value="GDPS"/>
  </properties>
  <runIndependent>true</runIndependent>
  <moduleInstanceId>ModelGDPSForecast</moduleInstanceId>
  <moduleConfigFileName>ModelForecastTemplate</moduleConfigFileName>
</activity>
```

```
<!-- Model Forecast-->
<activity>
  <properties>
    <string key="FORECAST" value="RDPS"/>
  </properties>
  <runIndependent>true</runIndependent>
  <moduleInstanceId>ModelRDPSForecast</moduleInstanceId>
  <moduleConfigFileName>ModelForecastTemplate</moduleConfigFileName>
</activity>
```

ModelForecastTemplate.xml

Registering workflow in WorkflowDescriptors.xml



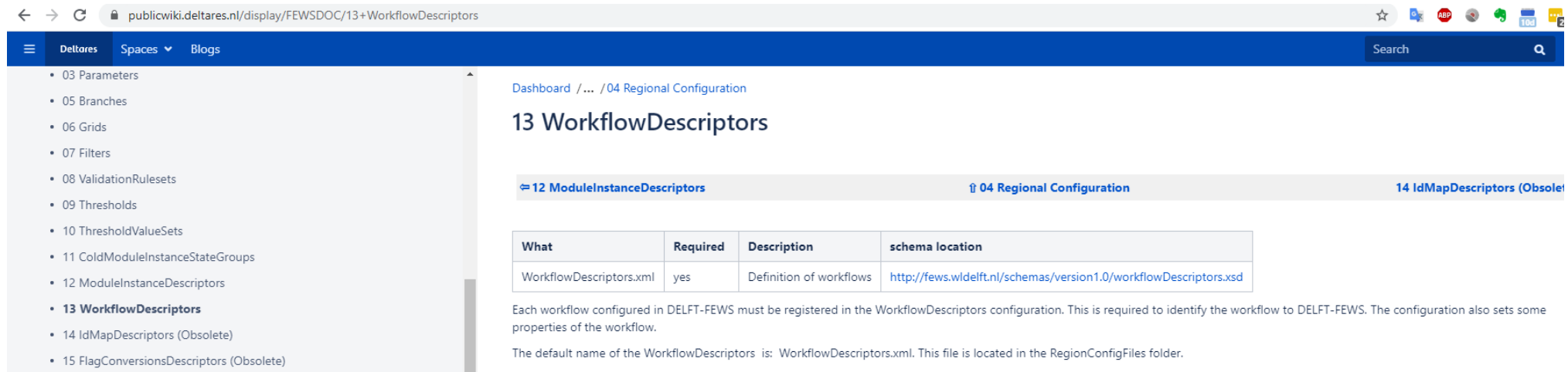
- Located in WorkflowFiles Folder
- Multiple Files
- Flexible Naming Structure

- Located in RegionConfig Files Folder
- Single file
- Always named WorkflowDescriptors

- If you forget to register a workflow, or misspell it in configuration, you'll get a message that it is not recognized

WorkflowDescriptors.xml

- Find the best documentation by Googling “Delft-FEWS Workflow Descriptors”
- Or check the schema (.xsd file) for complete set of options. This is true for all .xml files.



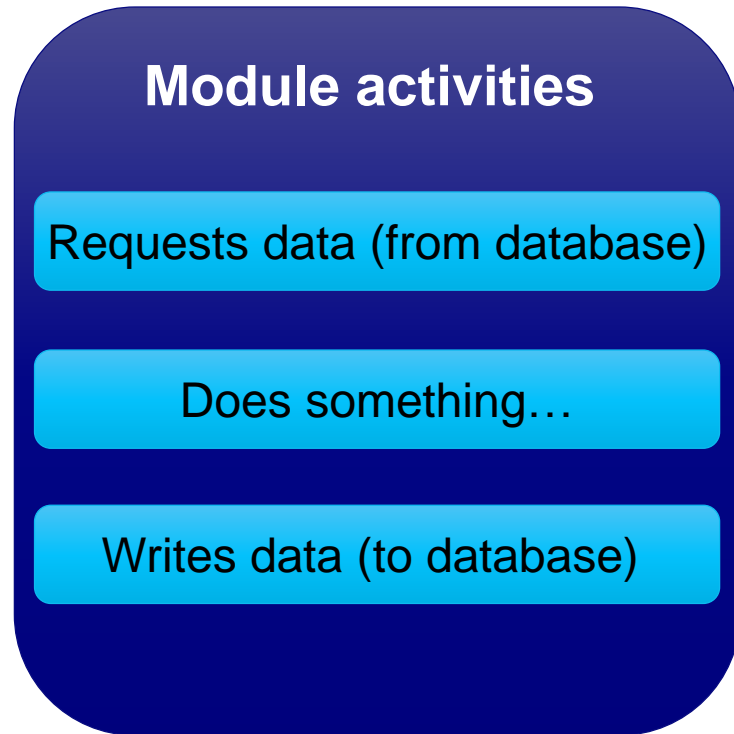
The screenshot shows a web browser displaying a page from the Deltares publicwiki. The URL is publicwiki.deltares.nl/display/FEWSDOC/13+WorkflowDescriptors. The page has a blue header with navigation links: Deltares, Spaces, and Blogs. A search bar is located on the right. A left sidebar contains a list of topics, with '13 WorkflowDescriptors' highlighted. The main content area shows the breadcrumb 'Dashboard / ... / 04 Regional Configuration' followed by the title '13 WorkflowDescriptors'. Below the title, there are three tabs: '12 ModuleInstanceDescriptors', '04 Regional Configuration' (which is active), and '14 IdMapDescriptors (Obsolete)'. A table is displayed with the following content:

What	Required	Description	schema location
WorkflowDescriptors.xml	yes	Definition of workflows	http://fews.wldelft.nl/schemas/version1.0/workflowDescriptors.xsd

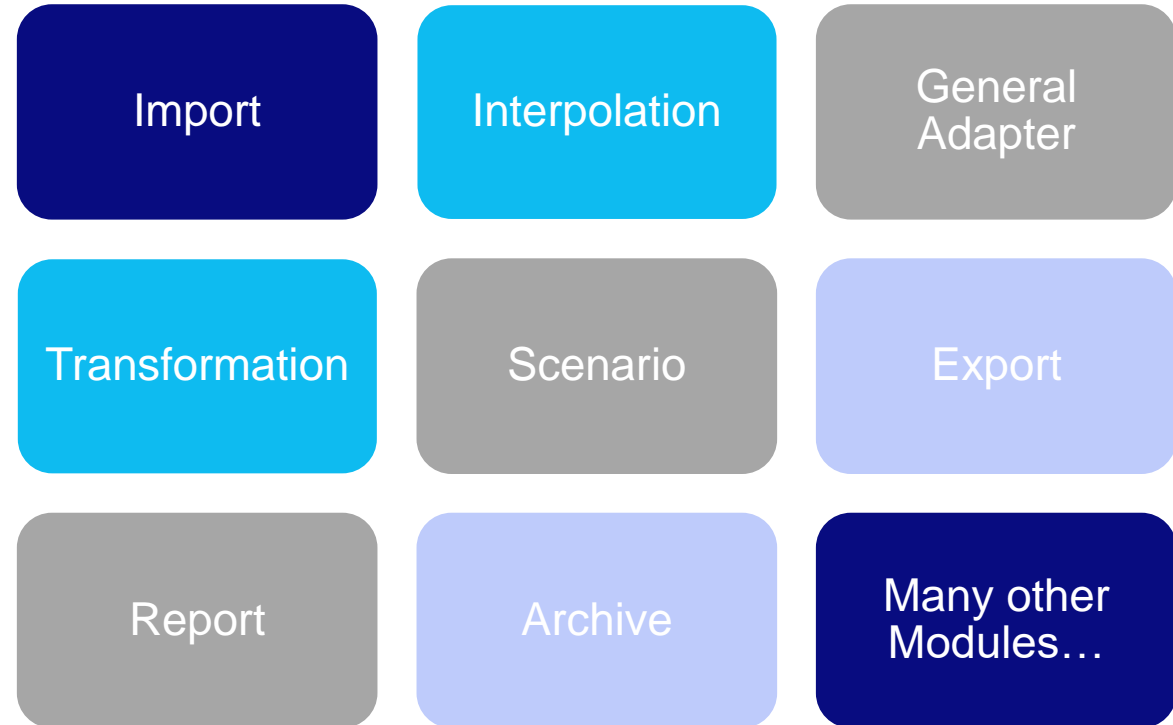
Below the table, there is explanatory text: 'Each workflow configured in DELFT-FEWS must be registered in the WorkflowDescriptors configuration. This is required to identify the workflow to DELFT-FEWS. The configuration also sets some properties of the workflow.' and 'The default name of the WorkflowDescriptors is: WorkflowDescriptors.xml. This file is located in the RegionConfigFiles folder.'

- Options will also be covered in the Exercises

Delft-FEWS Concepts - Modules



Types of Modules



Finding Available Delft-FEWS Modules

- Google “Delft-FEWS Modules” to find a complete list and description on the WIKI
- Many available, both generic (Import Modules) and specific (Error Correction Module (ARMA))

The screenshot shows a web browser window displaying the Delft-FEWS Documentation Wiki. The browser's address bar shows the URL: `publicwiki.deltares.nl/display/FEWSDOC/05+Configuring+the+available+Delft-FEWS+modules`. The page has a blue header with navigation links: **Deltares**, **Spaces**, and **Blogs**. On the left side, there is a sidebar with a search icon and a list of pages, including "Delft-FEWS Documentation", "Pages", "Blog", and a "PAGE TREE" section. The "PAGE TREE" section lists several pages, with "05 Configuring the available Delft-FEWS modules" selected and expanded. The main content area of the page is titled "05 Configuring the available Delft-FEWS modules" and includes a breadcrumb trail: [Dashboard](#) / [Home](#) / [Configuring Delft-FEWS - Configuration Guide](#). Below the title, there are two navigation links: [04 Regional Configuration](#) and [Configuring Delft-FEWS - Configuration Guide](#). The main content area is divided into two columns. The left column is titled "Overview" and contains two paragraphs of text. The right column is titled "Contents" and contains a list of 13 modules, each with a link to its respective page. The list includes: 01 Interpolation Module, 02 Transformation Module, 03 Import Module, 04 Export modules, 05 General Adapter Module, 06 Lookup Table Module, 07 Correlation Module, 08 Error Correction Module (ARMA), 09 Report Module, 10 Performance Indicator Module, 11 Amalgamate Module (Replaced), 12 Archive Module, and 13 Compact index and cache files.

05 Configuring the available Delft-FEWS modules

Dashboard / Home / Configuring Delft-FEWS - Configuration Guide

05 Configuring the available Delft-FEWS modules

04 Regional Configuration Configuring Delft-FEWS - Configuration Guide

Overview

All functionality used by Delft-FEWS in processing data, running external forecasting modules and running external adapters is achieved with use of modules and workflows. A Module is a tool, and a configuration on how to apply it (with what options and on what data) is a module instance. A Workflow is a sequence of module instances and thus describes in what order the module configurations should be executed. A common way to start a workflow is in the manual forecast dialog or by running a node in the Interactive forecast dialog (IFD).

The availability of modules is set, but module instances and workflows are configured (Note that multiple module instances can make use of the same module). For a new module instance or workflow, make a new xml file in the ModuleConfigFiles or WorkflowFiles folder, and make an entry in the ModuleInstanceDescriptors or WorkflowDescriptors file. The entry should have an id that corresponds to the xml file name that was just created. Look at the schema below for more details.

Contents

- [01 Interpolation Module](#)
- [02 Transformation Module](#)
- [03 Import Module](#)
- [04 Export modules](#)
- [05 General Adapter Module](#)
- [06 Lookup Table Module](#)
- [07 Correlation Module](#)
- [08 Error Correction Module \(ARMA\)](#)
- [09 Report Module](#)
- [10 Performance Indicator Module](#)
- [11 Amalgamate Module \(Replaced\)](#)
- [12 Archive Module](#)
- [13 Compact index and cache files](#)

Registering Module in ModuleInstanceDescriptors.xml



- Located in ModuleConfigFiles Folder
- Multiple Files
- Flexible Naming Structure

- Located in RegionConfig Files Folder
- Single file
- Always named ModuleInstanceDescriptors.xml

- If you forget to register a workflow, or misspell it in configuration, you'll get a message that it is not recognized

ModuleInstances and ModuleInstanceDescriptors

- Modules are configured in a **ModuleConfigFile**
 - holds the instructions to retrieve data, do something and store data
- **ModuleInstances** are instances of a module as it is called in the workflow
 - identified by ModuleInstancelId
 - registered in *\RegionConfigFiles\ModuleInstanceDescriptors.xml*
- One ModuleConfigFile can act as a template for multiple moduleInstances
 - \$PROPERTIES\$ can be used to make time series explicit
 - \$PROPERTIES\$ can be provided by the workflow
 - \$PROPERTIES\$ are resolved at run-time

Module Summary

- Workflows and Modules are used to structure pre-defined tasks in Delft-FEWS
- At the simplest level, they take data, do something to it, then return it in a modified format.
- Workflows could be import, processing and model runs... or all combined into one
- Modules are the building blocks of workflows, completing one modular function at a time
- Workflows and Modules can be given any name, but the name must be registered.

Additional Resources

🏠 Google [“Delft-FEWS WIKI”](#)

🏠 Google [“Delft-FEWS Configuration Guide”](#)

🏠 Google [“Delft-FEWS Forum”](#)

✉ Email fews-pm@Deltares.nl



Next Steps

- Along with the use of structured workflows and modules, Delft-FEWS is very location centered.
- We want to read, manipulate and write data, but how do we define what data to use?
- Using Locations and LocationSets allows you to define what data (by station for example) should be used.
- All this information will be combined in TimeSeriesSets, which is the ultimate identifier for data in FEWS.