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enabling delta life

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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
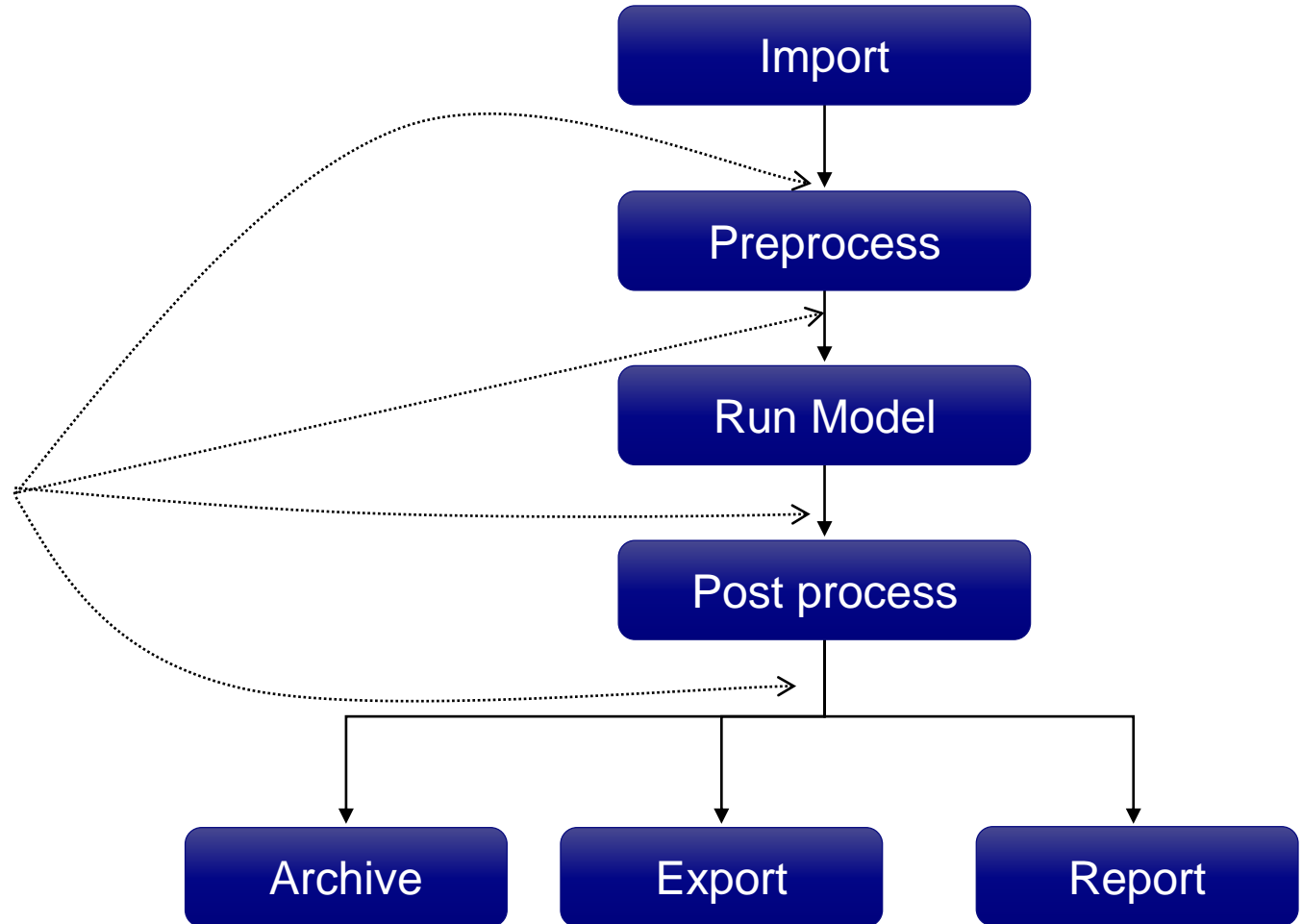
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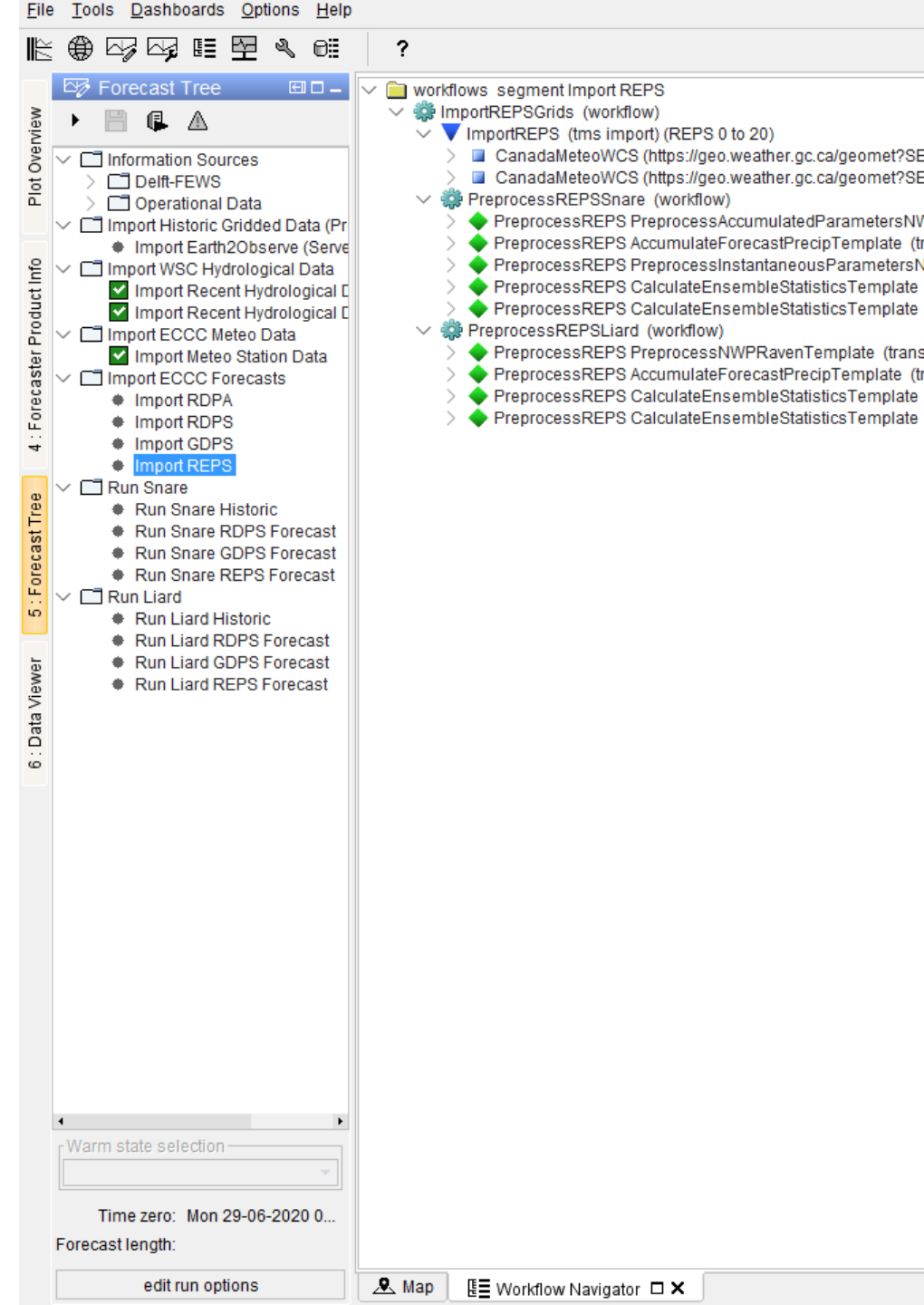
Learning Objectives

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

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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

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Configuring Workflows

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

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>

</workflow>
```

Module to be run

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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

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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 $FORECAST$

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

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

ModelForecastTemplate.xml

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Registering workflow in WorkflowDescriptors.xml

ImportForecastGrids.xml

"Register" Name →
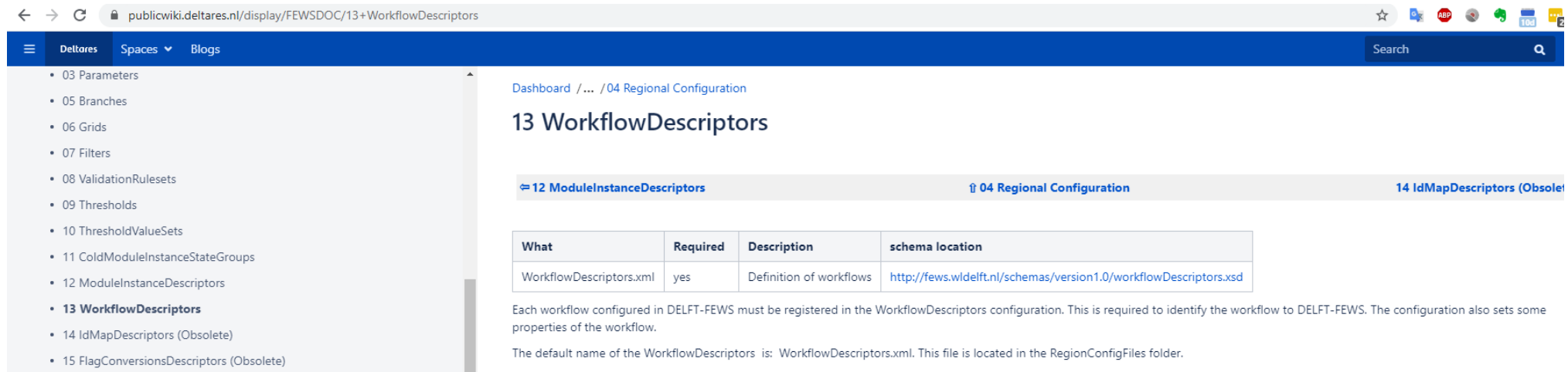
WorkflowDescriptors.xml

- 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

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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.

- Options will also be covered in the Exercises

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Delft-FEWS Concepts - Modules

Module activities

Requests data (from database)

Does something…

Writes data (to database)

Types of Modules

Import	Interpolation	General Adapter
Transformation	Scenario	Export
Report	Archive	Many other Modules…
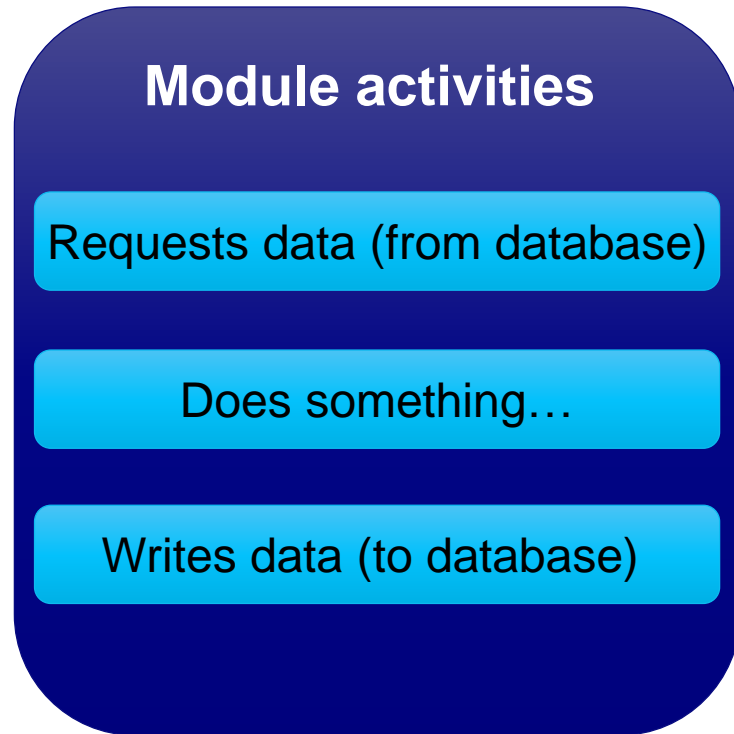
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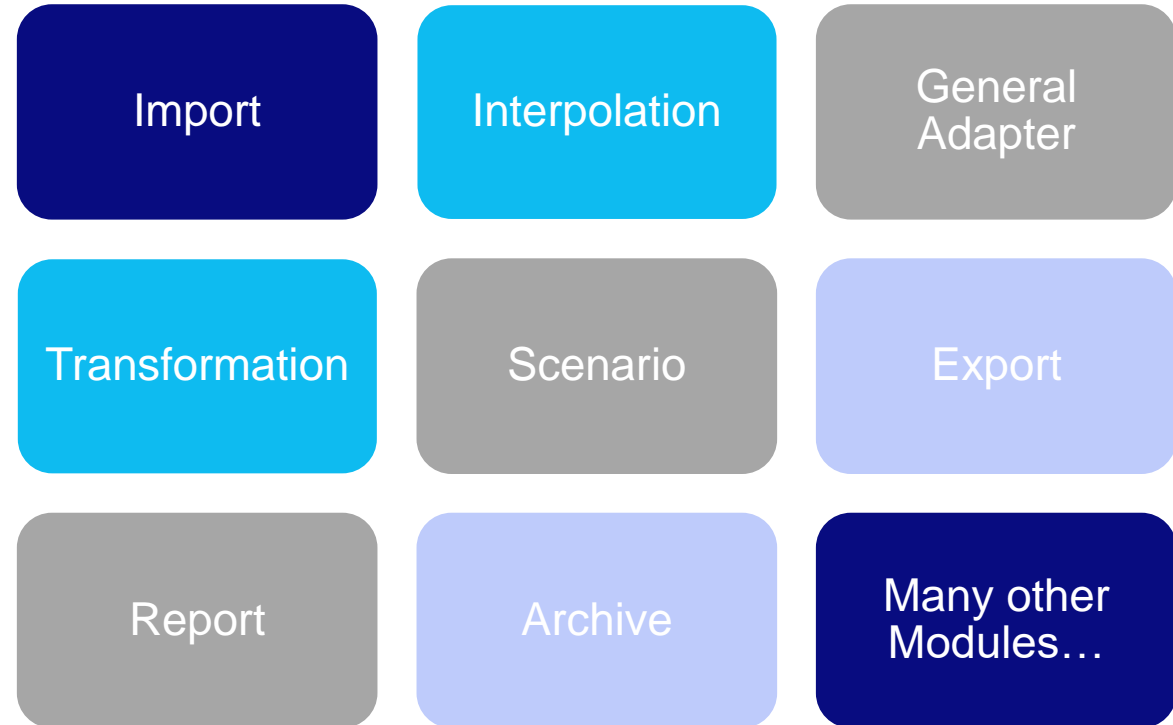
Finding Available Delft-FEWS Modules

- 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))

Registering Module in ModuleInstanceDescriptors.xml

ImportForecast.xml

"Register" Name

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

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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 ModuleInstanceId
  - 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

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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, the 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.

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Additional Resources

🏠 Google "Delft-FEWS WIKI"

🏠 Google "Delft-FEWS Configuration Guide"

🏠 Google "Delft-FEWS Forum"

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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.

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