Delft-FEWS
Basic Configuration Course

Basic Configuration Course

Content

- Overview and basic configuration
- Tools
- Exercises

- Working with data – imports, validation, thresholds
- Displays and workflows
- Interpolation and transformation
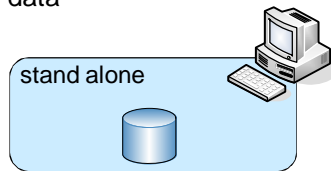- Introduction to the general adapter

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Introduction to the course

The course exercises will be based around the Isle of Man (IoM) – a small island between England and Ireland

We will:
- add locations
- import, analyse and process data
- run unit hydrograph model
- display data

stand alone

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Configuration and XML files

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Firstly – what is XML anyway?

- All FEWS configuration files are written in XML format
- XML stands for E**X**tensible **M**arkup **L**anguage – written in simple plain text
- XML tags are predefined by FEWS.

Example:

```
<note>
    <to>Martin</to>
    <from>Alex</from>
    <heading>Reminder</heading>
    <body>Don't forget support this weekend!</body>
</note>
```

```
<location id="1009" name="Pen Y Coed">
    <description>Meteorological Gauge</description>
    <shortName>Pen-Y-Coed</shortName>
    <x>297800</x>
    <y>314400</y>
    <z>305.00</z>
</location>
```

```
<ComplexType first_attribute="id" second_attribute="name">
    <Element> value </Element>
    <Element> value </Element>
</ComplexType >
```

- FEWS interprets the XML files using an XSD

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What is an XSD?

- **X**ML **S**chema **D**efinition
- An XML Schema defines the building blocks of an XML document
- States what can be included and in what order
- XML is valid when organised according (open) schema XSD
  Every time you open FEWS it checks all configuration files are valid
- Also simple text files
- Can be found in a zipped file in the 'bin' directory
  (Delft_FEWS_schemas.jar)

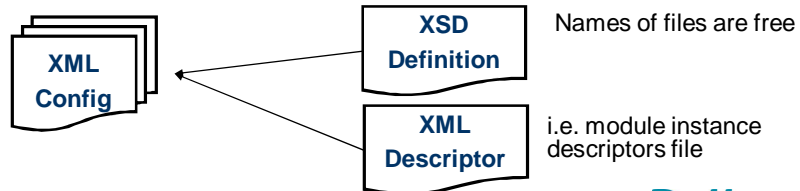| parameterGroups	
version	1.0
xmlns	http://www.wldelft.nl/fews
xmlns:*xsi*	http://www.w3.org/2001/XMLSchema-instance
*xsi:*schemaLocation	http://www.wldelft.nl/fews http://fews.wldelft.nl/schemas/version1.0/parameters.xsd
parameterGroup (17)	

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XML Configuration and XSD Schemas

Each XML configuration adheres to a XSD schema

Two types of configuration items

Singular configuration – e.g. Locations

XML Config ← **XSD Definition**	Names of files are fixed

Multiple configurations – e.g. Import Modules

XML Config ← **XSD Definition**	Names of files are free
← **XML Descriptor**	i.e. module instance descriptors file

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Naming Conventions & Version management

File naming convention – Singular configuration

Locations 1.00 default.xml

optional

Don't use this when you use a version system like subversion

Locations	**Fixed filename**
1.00	**Version number**
default	**Flag indicating "active" configuration**

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Naming Conventions & Version management

File naming convention – Multiple configuration

ImportRTS **1.00 default.xml**

ImportRTS	**Filename for this instance of the ImportModule**
1.00	**Version number**
default	**Flag indicating "active" configuration**

Each file must be "registered" in a descriptor file

- Allowes for "readable" name
- Identifies *what* configuration is

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Tools – XML-Spy or oXygen

Create, edit and validate XML files
Create and view XSD schema's

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Exercise

Exercise 1: XML-Spy

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Basic Configuration Files

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FEWS Configuration

[..]
[ColdStates]
[Config]
[DumpFiles]
[FailedImports]
[Import]
[ImportBackup]
[localDataStore]
[Modules]
clientConfig
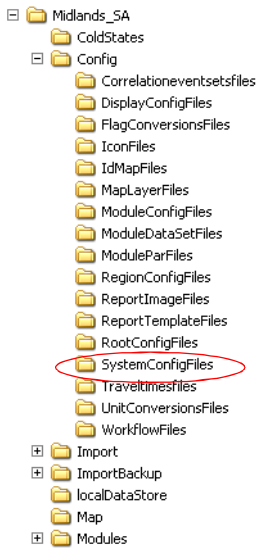copy of Help
fews-splash
Help
log
Log4jConfig
sa_global
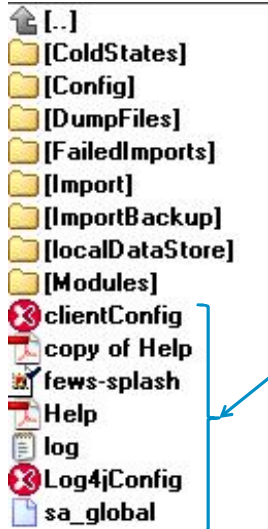
Elements of the DELFT-FEWS configuration

- Config directory: Main DELFT-FEWS configuration

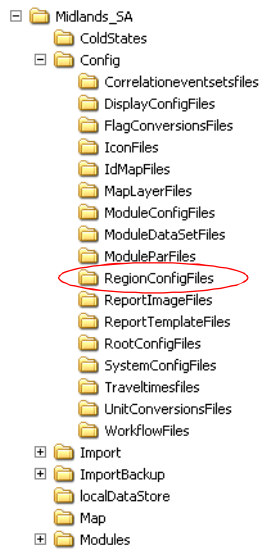- Root configuration files

Let's open the Config and have a look…

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Main Configuration – *SystemConfigFiles*

Midlands_SA
  ColdStates
  Config
    Correlationeventsetsfiles
    DisplayConfigFiles
    FlagConversionsFiles
    IconFiles
    IdMapFiles
    MapLayerFiles
    ModuleConfigFiles
    ModuleDataSetFiles
    ModuleParFiles
    RegionConfigFiles
    ReportImageFiles
    ReportTemplateFiles
    RootConfigFiles
    SystemConfigFiles
    Traveltimesfiles
    UnitConversionsFiles
    WorkflowFiles
  Import
  ImportBackup
  localDataStore
  Map
  Modules

Primary part of the configuration of DELFT-FEWS
as a <u>system</u>, including

- Explorer
    > FEWS Explorer (main GUI)
- Time Series Display
    > line style, line color, view period
- ModuleDescriptors
    > plug-in modules available for Delft-FEWS
- DisplayDescriptors
    > plug-in displays available for Delft-FEWS
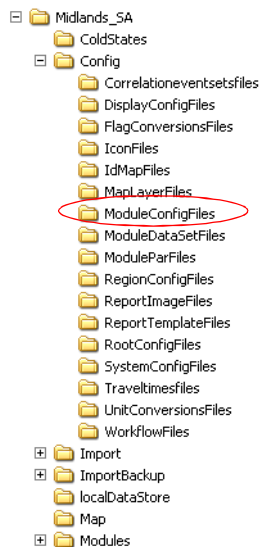- DisplayGroups
    > pre-defined displays / shortcuts

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Main Configuration – *RegionConfigFiles*

```
☐ 📁 Midlands_SA
    📁 ColdStates
  ☐ 📁 Config
        📁 Correlationeventsetsfiles
        📁 DisplayConfigFiles
        📁 FlagConversionsFiles
        📁 IconFiles
        📁 IdMapFiles
        📁 MapLayerFiles
        📁 ModuleConfigFiles
        📁 ModuleDataSetFiles
        📁 ModuleParFiles
        📁 RegionConfigFiles
        📁 ReportImageFiles
        📁 ReportTemplateFiles
        📁 RootConfigFiles
        📁 SystemConfigFiles
        📁 Traveltimesfiles
        📁 UnitConversionsFiles
        📁 WorkflowFiles
  ⊞ 📁 Import
  ⊞ 📁 ImportBackup
    📁 localDataStore
    📁 Map
  ⊞ 📁 Modules
```

Basis of the specific configuration of Delft FEWS for a particular <u>region</u>, including

- Parameters
- Locations
- LocationSets
- Filters
- ValidationRuleSets
- Thresholds
- ModuleInstanceDescriptors
- WorkflowDescriptors
- etc.

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Main Configuration – *ModuleConfigFiles*

```
☐ 📁 Midlands_SA
    📁 ColdStates
  ☐ 📁 Config
        📁 Correlationeventsetsfiles
        📁 DisplayConfigFiles
        📁 FlagConversionsFiles
        📁 IconFiles
        📁 IdMapFiles
        📁 MapLayerFiles
        📁 ModuleConfigFiles
        📁 ModuleDataSetFiles
        📁 ModuleParFiles
        📁 RegionConfigFiles
        📁 ReportImageFiles
        📁 ReportTemplateFiles
        📁 RootConfigFiles
        📁 SystemConfigFiles
        📁 Traveltimesfiles
        📁 UnitConversionsFiles
        📁 WorkflowFiles
  ⊞ 📁 Import
  ⊞ 📁 ImportBackup
    📁 localDataStore
    📁 Map
  ⊞ 📁 Modules
```

Module Configuration:

- This directory contains the "working" files
- can be organised in sub-directories

Examples of module files:

- Interpolation
- Transformation
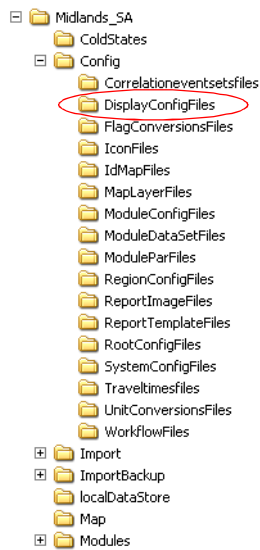- Import
- Export
- Archive
- Report
- General adapter

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Main Configuration – *WorkflowFiles*

```
□ 📁 Midlands_SA
    📁 ColdStates
    □ 📁 Config
        📁 Correlationeventsetsfiles
        📁 DisplayConfigFiles
        📁 FlagConversionsFiles
        📁 IconFiles
        📁 IdMapFiles
        📁 MapLayerFiles
        📁 ModuleConfigFiles
        📁 ModuleDataSetFiles
        📁 ModuleParFiles
        📁 RegionConfigFiles
        📁 ReportImageFiles
        📁 ReportTemplateFiles
        📁 RootConfigFiles
        📁 SystemConfigFiles
        📁 Traveltimesfiles
        📁 UnitConversionsFiles
        📁 WorkflowFiles
    ⊞ 📁 Import
    ⊞ 📁 ImportBackup
        📁 localDataStore
        📁 Map
    ⊞ 📁 Modules
```

Workflow Files:

- This directory contains the "control" files
- Each workflow gives a list of modules that you want to run…

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Main Configuration – *DisplayConfigFiles*

```
□ 📁 Midlands_SA
    📁 ColdStates
    □ 📁 Config
        📁 Correlationeventsetsfiles
        📁 DisplayConfigFiles
        📁 FlagConversionsFiles
        📁 IconFiles
        📁 IdMapFiles
        📁 MapLayerFiles
        📁 ModuleConfigFiles
        📁 ModuleDataSetFiles
        📁 ModuleParFiles
        📁 RegionConfigFiles
        📁 ReportImageFiles
        📁 ReportTemplateFiles
        📁 RootConfigFiles
        📁 SystemConfigFiles
        📁 Traveltimesfiles
        📁 UnitConversionsFiles
        📁 WorkflowFiles
    ⊞ 📁 Import
    ⊞ 📁 ImportBackup
        📁 localDataStore
        📁 Map
    ⊞ 📁 Modules
```

Display Configuration

This directory contains most of the files relating to the displays:

- Longitudinal display
- Spatial display
- System monitor display
- Schematic Status display

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Root configuration

Differs between Stand Alone and Operator Client

Common files

- *clientConfig.xml* – SA or OC?
- *global.properties* – location of reference folders
- Help.pdf – Help document
- *log.txt* – Log of messages
- Log4jConfig.xml – What should be logged?
- (20xx0x_)patch.jar – includes bug fixes / enhancements of current bin ("update" of bin)
- fews-splash.jpg – Start up picture

Additional for OC

- synchChannels – synch activities
- synchProfiles – different profiles for synch activities
- synchConfig – location for synchronization

Archive
ColdStates
Config
DumpFiles
Export
FailedImports
Import
localDataStore.bck
Modules
Reports
temp
clientConfig
copy of patch
global.properties
Help
log
Log4jConfig
Log4jConfig-ConfigurationManager
patch
user_settings
fews-splash
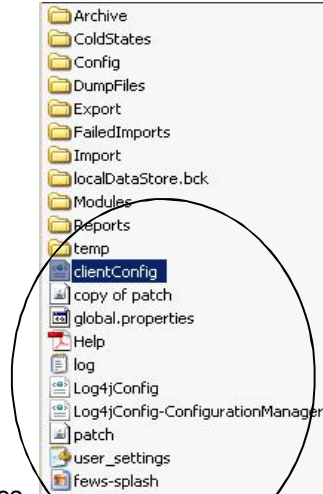
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FEWS Configuration

Where is the configuration?

- **Primary Location** (checked first): Local file system
- All files available as XML config file
- Naming convention described applies

- **Secondary Location** (synchronised): database
- Corresponding table for each section of configuration (e.g. Regional, System etc.)
- Associated default version table to identify active version

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FEWS Static Configuration

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FEWS Static Configuration Data

Location data
- Locations
- Location Sets
- Location Icons

Parameters
- Parameters
- Time Series Display Configuration
- Parameter Unit Conversions

Maps and FewsExplorer
- OpenMap properties
- Grid Display
- FEWS Explorer

Other Static Configurations
- Grids
- Branches

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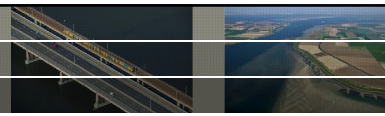
Locations

Information for each location in the FEWS Config
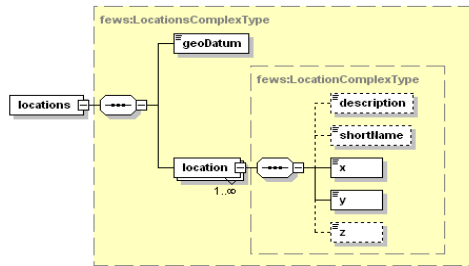
	= id	= name	( ) description	( ) shortName	( ) x	( ) y	( ) z
1	Hydro1	Hydro Gauge 1	Training Hydro 1	Hydro1	-4.61	54.17	0
2	Hydro2	Hydro Gauge 2	Training Hydro 2	Hydro2	-4.46	54.31	25
3	Meteostation	Meteo Gauge	Training Meteo	Meteostation	-4.41	54.27	76
4	Raingauge	Rain Gauge	Training Raingauge	Raingauge	-4.53	54.16	0

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LocationSets

LocationSets define groups of locations

```
<locationSet id="Gauges_H.obs_IoM" name="Hydrological Gauges (Isle of Man only)">
  <locationId>Hydro1</locationId>
  <locationId>Hydro2</locationId>
```
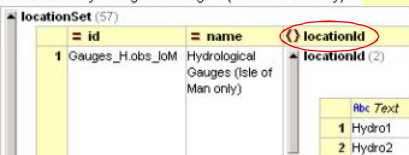

LocationSets can be nested!

```
<locationSet id="hydgauges" name="Hydrological Gauges">
  <locationSetId>Gauges_H.obs_US</locationSetId>
  <locationSetId>Gauges_H.obs_LS</locationSetId>
  <locationSetId>Gauges_H.obs_UT</locationSetId>
  <locationSetId>Gauges_H.obs_LT</locationSetId>
  <locationSetId>Gauges_H.obs_IoM</locationSetId>
</locationSet>
```

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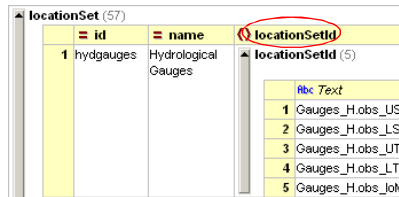
LocationSets - the meta data approach

- XML was the basis for FEWS for many years ...but

- Location meta data often managed in other systems (e.g. GIS)
- Location coordinates in shape (.shp), associated attributes in tabular form (.dbf)
- Introduced to FEWS in 2007/2008
- Since 2013 also in .csv files
- easier to maintain locations

- Location attributes can be used to:
  - compose location sets with similar characteristics
  - define idmaps (translation tables for importing/export data)
  - define threshold crossing values
  - define range values for validation rules
  - define coefficients for calculations

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Xml and CSV – the meta data approach

3 step definition
1. The CSV file defines per location (row) the value for a specific attribute (by column)

Values example from: NSW_sensors.csv

	A	B	C	D	E
1	HYFS_SENSORID	LAT	LONG	SHORT_NAME	NAME
2	H541067-01	-28.6931	150.8906	GLENARBON WEIR	GLENARBON WEIR TM
3	H054065-01	-29.605	151.267	NULLAMANNA (SILVERDALE)	NULLAMANNA (SILVERDALE)
4	H559008-01	-30.4653	152.8222	KOOROOWI (SCOTCHMAN)	KOOROOWI-SCOTCHMAN (KALANG RIVER)

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Xml and CSV – the meta data approach

3 step definition
1. The CSV file defines per location (row) the value for a specific attribute (by column)

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3	H054065-01	-29.605	151.267	NULLAMANNA (SILVERDALE)	NULLAMANNA (SILVERDALE)
4	H559008-01	-30.4653	152.8222	KOOROOWI (SCOTCHMAN)	KOOROOWI-SCOTCHMAN (KALANG RIVER)

2. LocationSets.xml file tells FEWS how to read the CSV file
   by allocating '%column_name%' to location attribute

```
<locationSet id="NSW_Sensors">
  <csvFile>
    <file>NSW_sensors</file>
    <geoDatum>WGS 1984</geoDatum>
    <id>%HYFS_SENSORID%</id>
    <name>%NAME%</name>
    <shortName>%SHORT_NAME%</shortName>
```

3. Other configuration files apply these attribute values for various purposes
   Replace '@attribute-name@' with attribute value

```
<attribute id="HYFS_SENSORID">
  <description>HYFS sensor location identifier</de
  <text>%HYFS_SENSORID%</text>
</attribute>
<attribute id="HYFS_STATIONID">
  <description>Associated HYFS station location i
  <text>%HYFS_STATIONID%</text>
</attribute>
<attribute id="NAME">
  <description>Long name</description>
  <text>%NAME%</text>
</attribute>
<attribute id="STATE">
  <description>State where station physically resi
  <text>%STATE%</text>
</attribute>
```

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Composing locationSets with location attributes

LocationSets can be generated from another locationSet by using attributes and conditions:

- attribute equals
- attribute contains
- attribute starts with
- id contains
- attribute exists
- …
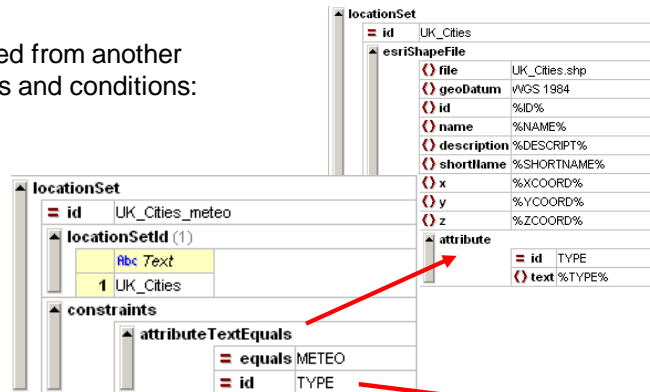
ID	NAME	DESCRIPT	SHORTNAME	XCOORD	YCOORD	ZCOORD	TYPE
London	London	City	London	0.00	51.50	0	METEO
London_hyd	London	City	London	0.00	51.50	0	HYDRO
Birmingham	Birmingham	City	Birmingham	-1.90	52.48	0	METEO
Birmingham_hyd	Birmingham	City	Birmingham	-1.90	52.48	0	HYDRO

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Calculation coefficients via location attributes

1. Define attributes for Gauge datum correction

Example from: LocationSets_NSW.xml
Definition is part of locationSet NSW_sensors

2. Allocate attribute values per sensor

Example from: NSW_sensors.csv

3. Apply attribute value in calculation

Example from: Process_Surge.xml

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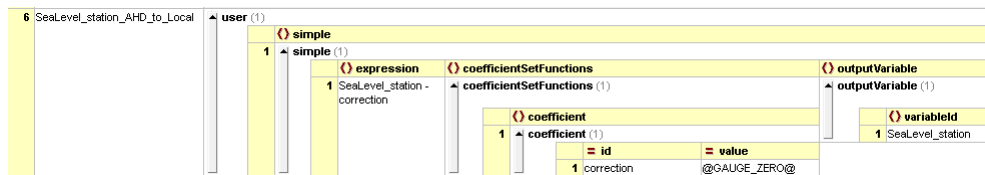
Location Icons

Location Icons are used to help identify types of locations

- catchment site
- coastal
- fluvial site
- meteo site
- radar site

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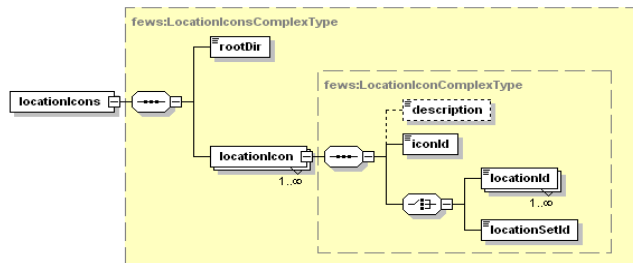
Exercise

Exercise 2: Locations and LocationSets

- Add 4 new locations to the locations xml file
  - 2 hydro locations using 'standard' configuration
  - 2 meteo locations using the dbf method
  - 2 meteo locations using the csv method

- Add the locations to appropriate location sets

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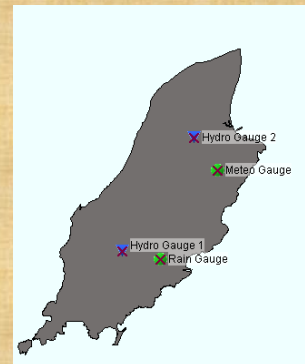
Parameters

Parameters are organised into parameter groups with a unique id and name
Parameters have a unique id and a name
The parameter is a primary key in the time series
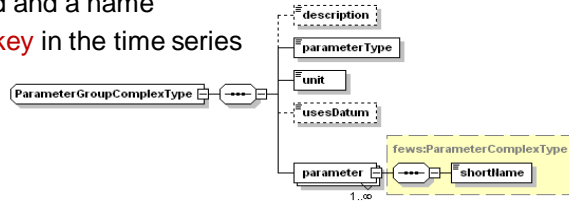
2	Water Level	instantaneous	m	true	⯆ parameter (16)
3	Precipitation	instantaneous	mm/hr		⯆ parameter (10)
4	Temperature	instantaneous	oC		⯆ parameter (15)
5	Evaporation	instantaneous	mm/hr		⯅ parameter (5)

	= id	= name	() shortName
1	E.metoffice	Evaporation MOSES	E.metoffice
2	E.simulated	Simulated Evaporation	E.simulated
3	E.simulated.merged	Simulated Evaporation Merged	E.simulated.merged
4	E.profile	Standard Profile Evaporation	E.profile
5	E.backup	Backup Evaporation	E.backup

6	Radiation	instantaneous	W/m2		⯆ parameter (2)

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Parameters – unit conversions

Units are a property of a parameter group
Units can be converted during importing or exporting activities
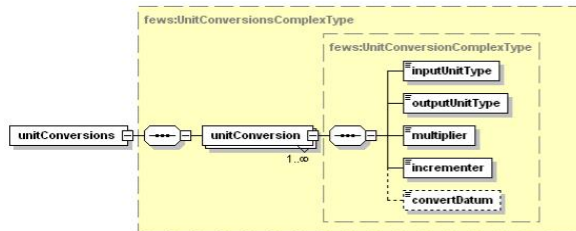
	() inputUnitType	() outputUnitType	() multiplier	() incrementer	() convertDatum
1	mAOD	m	1	0	true
2	deg C	oC	1	0	
3	deg F	oC	0.5556	-17.7778	
4	K	oC	1	-273.15	
5	in	m	0.0254	0	

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Parameters – time series display configuration

Set default plot attributes per parameter in TimeSeriesDisplayConfig.xml

	= id	() preferredColor	() lineStyle	() markerStyle	() markerSize	() min	() max
parameterDisplayOptions (155)							
1	H-0C.ifx	red	solid	none	3	200	4300
2	H-0C.im	red	solid	none	3	200	4300
3	H.fh	red	solid	none	3		
4	H.flh	red1	solid	none	3		
5	H.m	black	solid	rectangle	3		
6	H.rated	black	solid	square	3		
7	H.uh	red	solid	none	3		

	= id	() preferredColor	() lineStyle	() markerStyle	() markerSize
parameterDisplayOptions (113)					
1	Q.obs	blue violet	solid	x	3
2	Q.rated	blue	solid	circle	3
3	Q.simulated	dark olive green4	dashed	none	3
4	Q.simulated.historical	medium sea green	dashed	none	3
5	Q.simulated.forecast	lime green	dashed	none	3
6	Q.updated	orange	solid	none	3

Exercise

Exercise 3: Parameter properties

Change some attributes of lines plotted for parameters
- Add minimum and maximum scaling
  - > P.obs   min = 0 and max = 25
  - > T.obs.drybulb min = -5 and max = 30
- Change display precision (default = 3 decimals)
  - > P.obs   precision = 2 decimals
  - > T.obs.drybulb precision = 2 decimals
  - > Q.rated   precision = 4 decimals
- Change some parameter line colours

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FEWS Maps

FEWS explorer contains a component to show map layers and location icons

- ArcView Shape layers
- TIF images
- ESRI ASCII grids/images

- located in the "\MapLayerFiles" directory or in the database
- configuration file: "Explorer 1.00 default.xml" (SystemConfigFiles)

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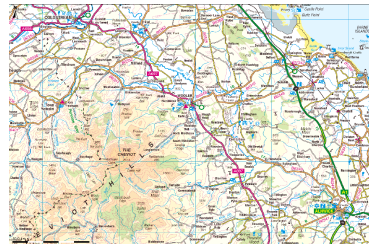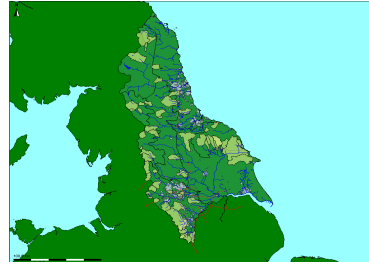
FEWS Maps

- In FEWS explorer options map layers can be toggled on and off

- In the Maps tab the scale bar and north arrow can be toggled on and off (Through Options menu)

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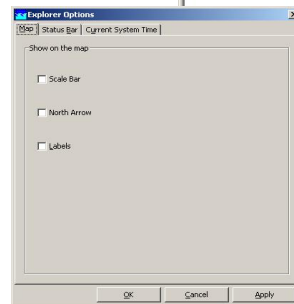
FEWS Maps

Other FEWS component
with map layers:

Spatial Display

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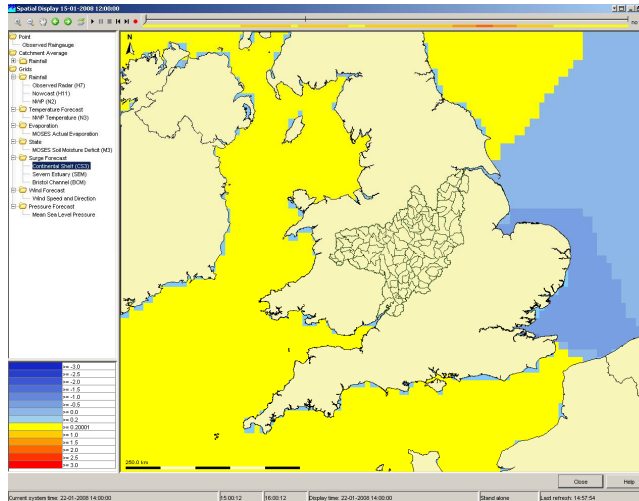
FEWS Maps – Configuration

- Geodatum
- Projection
- Default view extent
- Extra extents
- Default options
- Options to add shapefiles
- Options to add grids
- Switch to visible

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FEWS Explorer

FEWS Explorer is the main GUI

Includes many configuration elements

Configured through the "Explorer" XML file

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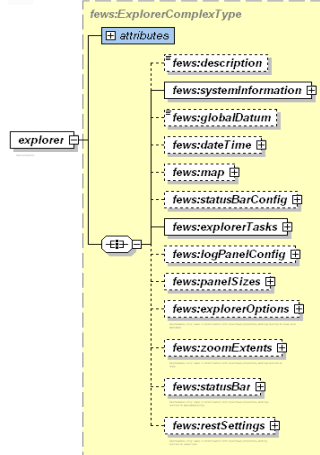
FEWS Explorer – explorer options

Elements that are by default visible
in the status bar when the system is started

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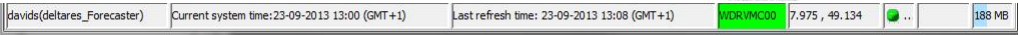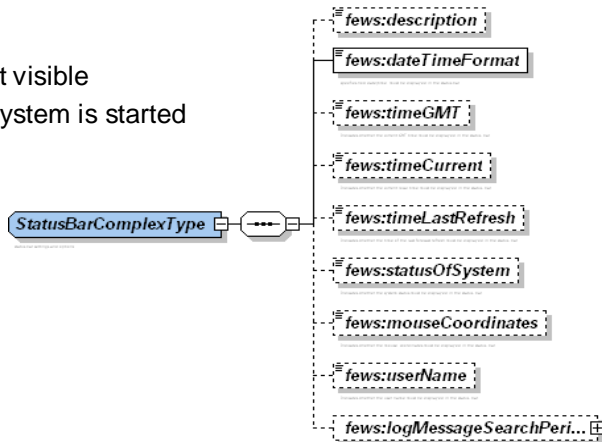
FEWS Explorer – zoom extents

Pre-configured zoom levels that can be selected from FEWS explorer
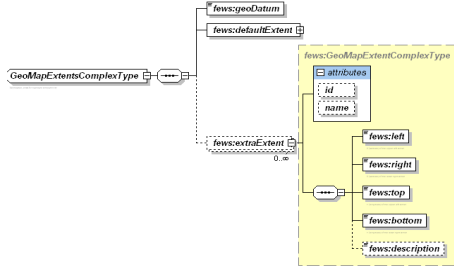
extraExtent (3)		left	right	top	bottom
1	North Area	260000	470000	600000	460000
2	Central Area	260000	470000	520000	380000
3	South Area	260000	470000	455000	315000

Deltares

FEWS Explorer – tasks

Tasks that can be carried out from the explorer
- Text
- Icons

Deltares

FEWS Explorer – additional settings

Configuration of:
- display date time format
- time zone
- geodatum
- cardinal timestep
- log panel etc.

Deltares

Exercise

Exercise 4: FEWS Explorer Elements

- Change explorer visible items on start up
- Add predefined zoom level for Isle of Man

Deltares
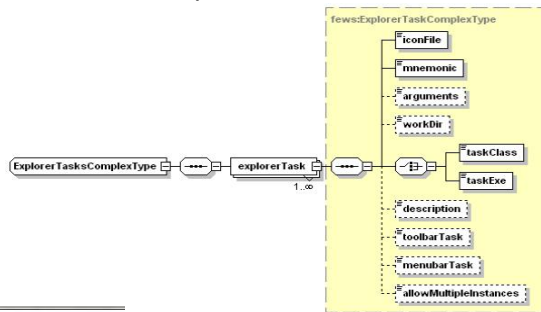
FEWS Static Configurations - Profiles

- Profile time series are one dimensional time series
- A location is required in the locations XML file
- Branches configuration file contains the time series

Deltares
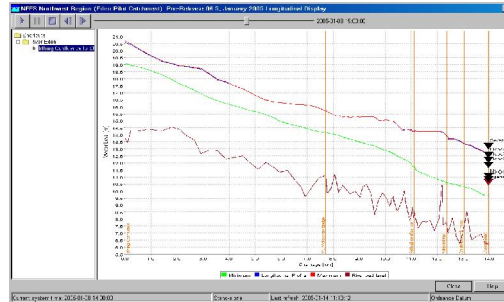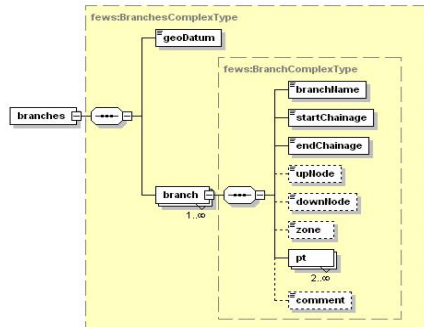
FEWS Static Configurations - Grids

- Grid time series are two dimensional time series
- A grid location is required in the locations XML file
- Grids configuration file defines the grid
- The spatial display file is used to configure the display of grids.

Deltares
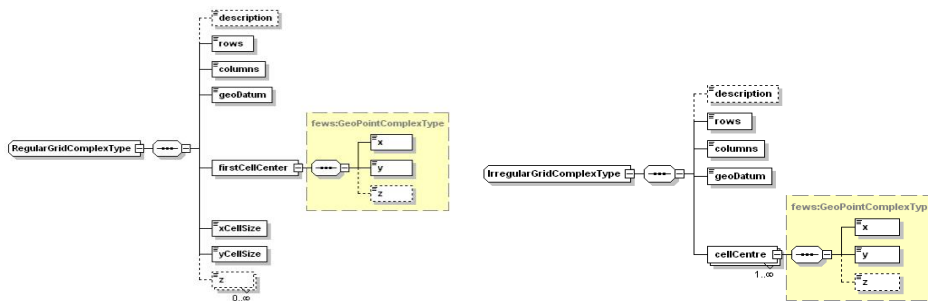
Tools

Tools

- Workflow Navigator
- Database Viewer
- Diplays
- WIKI
- XML Spy, oXygen
  - creating, editing, validating (schema)

_____

- FEWS Configuration manager (special class in OC)
  - Managing the (operational) configuration
  - Distribute through the database(s)

- Admin interface (Web application)
  - System Management
  - Scheduling tasks/workflows
  - Health checking

Tools – Workflow Navigator

Demonstration

- Check configuration step by step
- helps you finding errors in the configuration
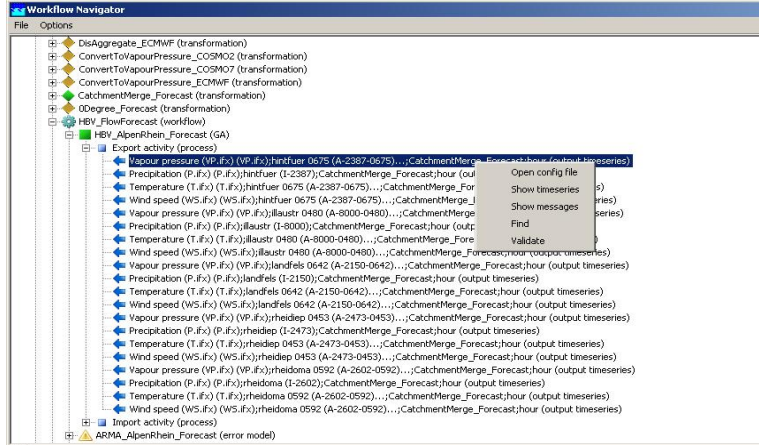
Tools – Database Viewer

Demonstration

- Check what has actually been imported to your local data store
- helps you finding errors in the configuration

Tools - WIKI

Documentation on Public Wiki

Demonstration

http://public.wldelft.nl/display/FEWSDOC

Deltares

Tools - Displays

Exercises
tomorrow

Deltares

Slide 1
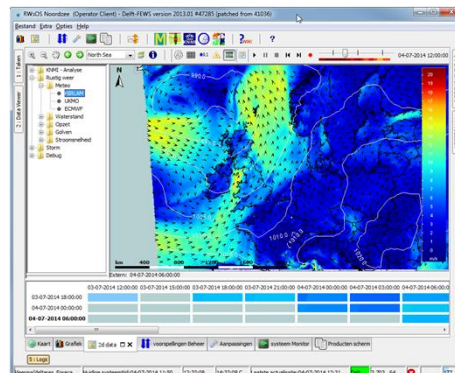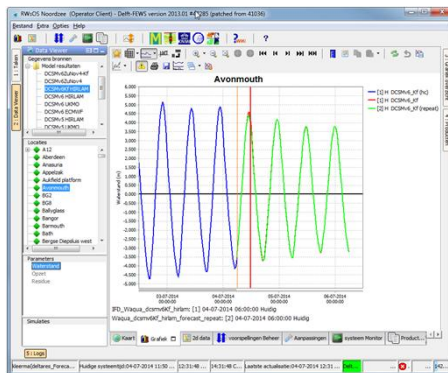
Tools – Configuration Manager

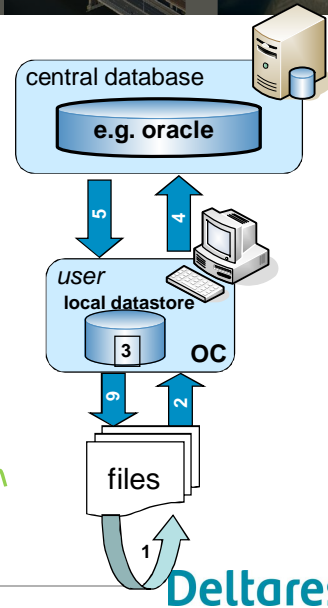Management of the configuration files

To the central database
1. update XML-files
2. import to OC
3. validate changes
4. upload config change to MC

To the file system
5. download configuration to OC
6. export from OC to file system
7. go to 1

Demonstration tomorrow

central database

e.g. oracle

user
local datastore

3 OC

files

1

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Slide 2

Deltares
Enabling Delta Life Delft Hydraulics

Tessella

Delft FEWS - Anglian

Tools – Admin Interface

Administration tool for live system

Direct access to Central Database

Main tasks

- Monitoring (health) of live system components
- Scheduling of tasks (*current*!)
- Monitoring of task queues
- Management of Forecasting Shell Servers
- Setting enhanced forecasting etc.

Demonstration tomorrow

Deltares