PI Export

Introduction

The Delft-FEWS Published Interface (PI) xml format is widely used to get scalar data exported from the Delft-FEWS database. This Delft-FEWS PI xml format is described in detail in the Delft-Fews published interface documentation. The format is also used in the Delft-FEWS PI Rest Webservice, not all functionality from the PI Webservice is supported in this PI Export function.

Configuration of the the PI Export is following the same rules as other Delft-FEWS Export functions. The export type to configure in the general section of the Export Module in <exportTypeStandard>pi</exportTypeStandard>. Because there are many versions of the PI Export function it is best to use the latest version <exportTypeStandard>pi 1.31</exportTypeStandard>.

Example PI Export Module Instance Config file

```
<timeSeriesExportRun 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/timeSeriesExportRun.
xsd">
        <export>
                <general>
                        <exportTypeStandard>pi 1.31</exportTypeStandard>
                        <folder>$REPORT_ROOT_DIR$\Observations</folder>
                        <exportFileName>
                                <name>Lake_Levels_Remote_Observed_.xml</name>
                                <suffix>
                                        <timeZeroFormattingString>yyyyMMddHHmm</timeZeroFormattingString>
                                </suffix>
                        </exportFileName>
                        <exportMissingValue>-999</exportMissingValue>
                        <exportTimeZone>
                                <timeZoneName>GMT</timeZoneName>
                        </exportTimeZone>
                </general>
                <timeSeriesSet>
                        <moduleInstanceId>Import_LakeLevel</moduleInstanceId>
                        <valueType>scalar</valueType>
                        <parameterId>H.obs</parameterId>
                        <locationSetId>hydro_lakes</locationSetId>
                        <timeSeriesType>external historical</timeSeriesType>
                        <timeStep unit="nonequidistant"/>
                        <relativeViewPeriod unit="day" start="-365" end="0"/>
                        <readWriteMode>read only</readWriteMode>
                </timeSeriesSet>
        </export>
</timeSeriesExportRun>
```

This export function will export water level time series in the PI XML format, see below

```
   <series>
        <header>
            <type>instantaneous</type>
            <moduleInstanceId>Import_LakeLevel</moduleInstanceId>
            <locationId>LakeVictoria</locationId>
            <parameterId>H.obs</parameterId>
            <timeStep unit="nonequidistant"/>
            <startDate date="2022-05-10" time="07:00:00"/>
            <endDate date="2023-05-10" time="07:00:00"/>
            <missVal>-999</missVal>
            <stationName>Lake Victoria</stationName>
            <lat>-0.69</lat>
            <lon>33.56</lon>
            <x>33.56</x>
            <y>-0.69</y>
            <units>m</units>
        </header>
        <event date="2022-05-11" time="18:49:00" value="1136.81" flag="0"/>
        <event date="2022-05-21" time="16:48:00" value="1136.83" flag="0"/>
        <event date="2022-05-31" time="14:46:00" value="1136.84" flag="0"/>
        <event date="2022-06-10" time="12:45:00" value="1136.78" flag="0"/>
        <event date="2022-06-20" time="10:43:00" value="1136.75" flag="0"/>
        <event date="2022-06-30" time="08:42:00" value="1136.71" flag="0"/>
        <event date="2022-07-10" time="06:40:00" value="1136.65" flag="0"/>
    </series>
</TimeSeries>
```

Different versions of the PI XML export support additional functionality, compared with the first basic version. Support of the validation status, it is possible since PI timeseries version 1.19 (<exportTypeStandard>pi 1.19</exportTypeStandard>). It is then possible to export flagSourceColumns and (custom)flagSources in the PI-XML timeseries format. For example a flag source column named 'V3' that has a custom flag source value 'OK' will result in an attribute fs:V3="OK". This does not require additional configuration of the export module.

```
<TimeSeries
        xmlns="http://www.wldelft.nl/fews/PI"
        xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
        xsi:schemaLocation="http://www.wldelft.nl/fews/PI http://fews.wldelft.nl/schemas/version1.0/pi-schemas
/pi_timeseries.xsd"
        version="1.19" xmlns:fs="http://www.wldelft.nl/fews/fs">
    <timeZone>1.0</timeZone>
    <series>
        <header>
            <type>instantaneous</type>
            <moduleInstanceId>WerkFilter</moduleInstanceId>
            <locationId>140-w_Leidsche Rijn</locationId>
            <parameterId>HGTE_METING_15M</parameterId>
            <timeStep unit="second" multiplier="900"/>
            <startDate date="2012-06-25" time="17:45:00"/>
            <endDate date="2012-06-25" time="21:45:00"/>
            <missVal>NaN</missVal>
            <stationName>AANVOERDER_140-w_Leidsche Rijn</stationName>
            <lat>52.082416488309036</lat>
            <lon>5.075337740730613</lon>
            <x>133623.0</x>
            <y>454951.0</y>
            <z>-9999.0</z>
            <units>mNAP</units>
        </header>
        <event date="2012-06-25" time="19:30:00" value="-0.414" flag="0" fs:V3="OK" fs:V4="OK"/>
        <event date="2012-06-25" time="21:45:00" value="-0.385" flag="0" fs:V2="OK" fs:V3="OK"/>
    </series>
</TimeSeries>
```

Since PI version 1.23, it is possible to add time and value ranges in the PI-XML timeseries format, as shown in the example below:

```
<TimeSeries xmlns="http://www.wldelft.nl/fews/PI" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:
schemaLocation="http://www.wldelft.nl/fews/PI http://fews.wldelft.nl/schemas/version1.0/pi-schemas
/pi_timeseries.xsd" version="1.23" xmlns:fs="http://www.wldelft.nl/fews/fs">
    <timeZone>0.0</timeZone>
    <series>
        <header>
            <type>instantaneous</type>
            <moduleInstanceId>moduleInstanceId</moduleInstanceId>
            <locationId>loc</locationId>
            <parameterId>par</parameterId>
            <qualifierId>A</qualifierId>
            <qualifierId>B</qualifierId>
            <timeStep unit="nonequidistant"/>
            <startDate date="1000-01-01" time="00:00:00"/>
            <endDate date="1000-01-01" time="00:00:00"/>
            <forecastDate date="2000-01-01" time="00:00:00"/>
            <missVal>NaN</missVal>
            <longName>a long name</longName>
            <lat>1.0</lat>
            <lon>2.0</lon>
            <x>2.0</x>
            <y>1.0</y>
            <z>3.0</z>
            <units>m</units>
            <sourceOrganisation>a source organisation</sourceOrganisation>
            <sourceSystem>a source system</sourceSystem>
            <fileDescription>a description</fileDescription>
            <creationDate>2100-01-01</creationDate>
            <creationTime>00:00:00</creationTime>
        </header>
        <properties>
            <string key="organisation" value="Deltares"/>
            <dateTime key="request time" date="2000-01-01" time="12:00:00"/>
        </properties>
        <event date="1000-01-01" time="00:00:00" startDate="0999-12-31" endDate="1000-01-02" value="4.0"
minValue="3.5" maxValue="5.5"/>
    </series>
</TimeSeries>
```

Since PI version 1.24, it is possible to add minutes attribute to time steps. Below is an example which shows how to add a minutes attribute to time steps:

```
<TimeSeries xmlns="http://www.wldelft.nl/fews/PI" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:
schemaLocation="http://www.wldelft.nl/fews/PI http://fews.wldelft.nl/schemas/version1.0/pi-schemas
/pi_timeseries.xsd" version="1.24" xmlns:fs="http://www.wldelft.nl/fews/fs">
    <timeZone>0.0</timeZone>
    <series>
        <header>
            <type>instantaneous</type>
            <locationId>loc</locationId>
            <parameterId>par</parameterId>
            <timeStep minutes="15 50"/>
            <startDate date="2018-02-12" time="09:15:00"/>
            <endDate date="2018-02-12" time="10:50:00"/>
            <missVal>NaN</missVal>
            <units>m</units>
        </header>
        <event date="2018-02-12" time="09:15:00" value="0.186" flag="2"/>
        <event date="2018-02-12" time="09:50:00" value="0.183" flag="2"/>
    </series>
</TimeSeries>
```

PI version 1.25 does not contain any changes relevant to export.

Since PI version 1.26, product information can be exported in the time series header. This will be automatically exported when forecast products are linked to the exported time series. Below is an example which shows how this is exported.

```
<TimeSeries xmlns="http://www.wldelft.nl/fews/PI" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:
schemaLocation="http://www.wldelft.nl/fews/PI http://fews.wldelft.nl/schemas/version1.0/pi-schemas
/pi_timeseries.xsd" version="1.26" xmlns:fs="http://www.wldelft.nl/fews/fs">
    <timeZone>0.0</timeZone>
    <series>
        <header>
            <type>instantaneous</type>
            <moduleInstanceId>Forecast</moduleInstanceId>
            <locationId>amerongen_beneden</locationId>
            <parameterId>H.voorspeld.daily</parameterId>
            <timeStep unit="second" multiplier="86400"/>
            <startDate date="2012-12-31" time="00:00:00"/>
            <endDate date="2013-01-05" time="00:00:00"/>
            <forecastDate date="2013-07-09" time="17:05:00"/>
            <missVal>-999.0</missVal>
            <stationName>amerongen beneden</stationName>
            <lat>51.98</lat>
            <lon>5.4</lon>
            <x>5.4</x>
            <y>51.98</y>
            <z>0.0</z>
            <units>m</units>
            <firstValueTime date="2013-01-01" time="00:00:00"/>
            <lastValueTime date="2013-01-04" time="00:00:00"/>
            <maxValue>4</maxValue>
            <minValue>1</minValue>
            <valueCount>4</valueCount>
            <product id="ANiceProduct" name="ANiceProduct">
                <productDate date="2019-06-25" time="11:31:59"/>
                <category id="Meteo" name="Meteo"/>
                <productInfo>
                    <user>Erik Pelgrim</user>
                    <confidence>MEDIUM</confidence>
                    <classification>INTERNAL</classification>
                    <comment>Awww</comment>
                </productInfo>
                <productInfo>
                    <user>Anne Hommelberg</user>
                    <confidence>MEDIUM</confidence>
                    <classification>CONFIDENTIAL</classification>
                    <comment>It is a very nice product!</comment>
                </productInfo>
                <productInfo>
                    <user>Onno van den Akker</user>
                    <confidence>LOW</confidence>
                    <classification>PUBLIC</classification>
                    <comment>Theoretically impossible!</comment>
                </productInfo>
                <productInfo>
                    <user>Erik Pelgrim</user>
                    <confidence>MEDIUM</confidence>
                    <classification>INTERNAL</classification>
                    <comment>Awww</comment>
                </productInfo>
            </product>
        </header>
        <event date="2012-12-31" time="00:00:00" value="-999.0" flag="8"/>
        <event date="2013-01-01" time="00:00:00" value="3" flag="0"/>
        <event date="2013-01-02" time="00:00:00" value="1" flag="0"/>
        <event date="2013-01-03" time="00:00:00" value="4" flag="0"/>
        <event date="2013-01-04" time="00:00:00" value="1" flag="0"/>
        <event date="2013-01-05" time="00:00:00" value="-999.0" flag="8"/>
    </series>
</TimeSeries>
```


Since PI version 1.27, it is possible to add threshold label, description and comments to time steps. For exporting thresholds the element <exportThresholds>true</exportThresholds> need to be added to the general section of the Export configuration.

Below is an example which shows how this can be done:

```
<general>
        <exportTypeStandard>pi 1.31</exportTypeStandard>
        <folder>$REPORT_ROOT_DIR$\Observations</folder>
        <exportFileName>
                <name>Lake_Levels_Remote_Observed_.xml</name>
                <suffix>
                        <timeZeroFormattingString>yyyyMMddHHmm</timeZeroFormattingString>
                </suffix>
        </exportFileName>
        <exportMissingValue>-999</exportMissingValue>
        <exportTimeZone>
                <timeZoneName>GMT</timeZoneName>
        </exportTimeZone>
        <exportThresholds>true</exportThresholds>
</general>

will export the thresholds.

<TimeSeries xmlns="http://www.wldelft.nl/fews/PI" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:
schemaLocation="http://www.wldelft.nl/fews/PI http://fews.wldelft.nl/schemas/version1.0/pi-schemas
/pi_timeseries.xsd" version="1.26" xmlns:fs="http://www.wldelft.nl/fews/fs">
    <timeZone>0.0</timeZone>
    <series>
        <header>
            <type>instantaneous</type>
            <locationId>loc</locationId>
            <parameterId>par</parameterId>
            <timeStep unit="second" multiplier="3600"/>
            <startDate date="2014-10-19" time="00:00:00"/>
            <endDate date="2014-10-19" time="03:00:00"/>
            <missVal>NaN</missVal>
            <units>m</units>
            <thresholds>
                <highLevelThreshold id="FaseA" name="Fase A: Verhoogde waakzaamheid" label="label for
threshold" description="description" comment="comment" value="1.15" groupId="Alarm" groupName="Alarm"><
/highLevelThreshold>
            </thresholds>
        </header>
        <event date="2014-10-19" time="00:00:00" value="0.186" flag="2"/>
        <event date="2014-10-19" time="01:00:00" value="0.183" flag="2"/>
    </series>
</TimeSeries>
```