kalypso simulation platform

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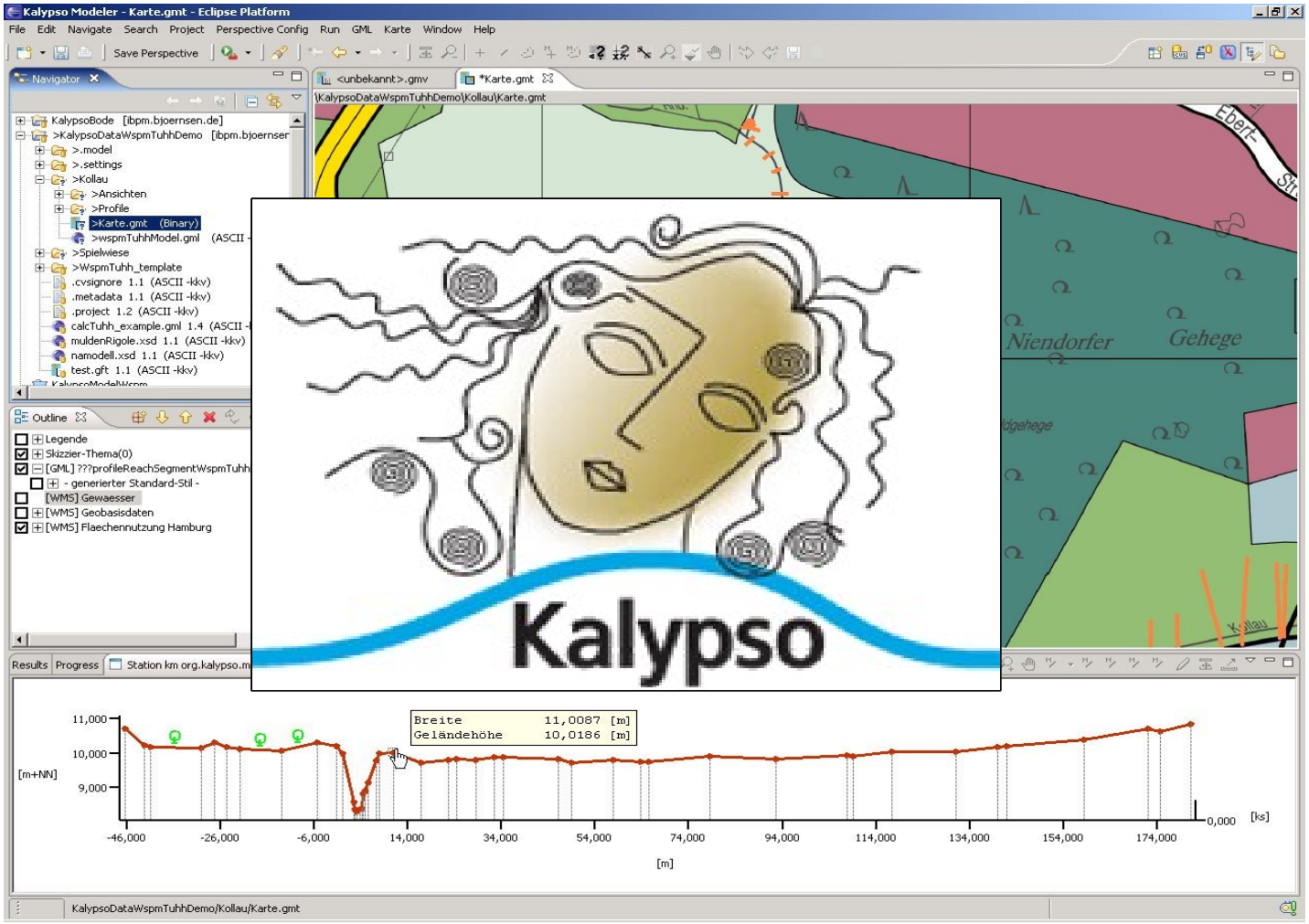
Marc Schlienger

BCE
BJÖRNSEN BERATENDE INGENIEURE

TUHH
WASSERBAU

kalypso is a modelling and simulation platform for GML-based models

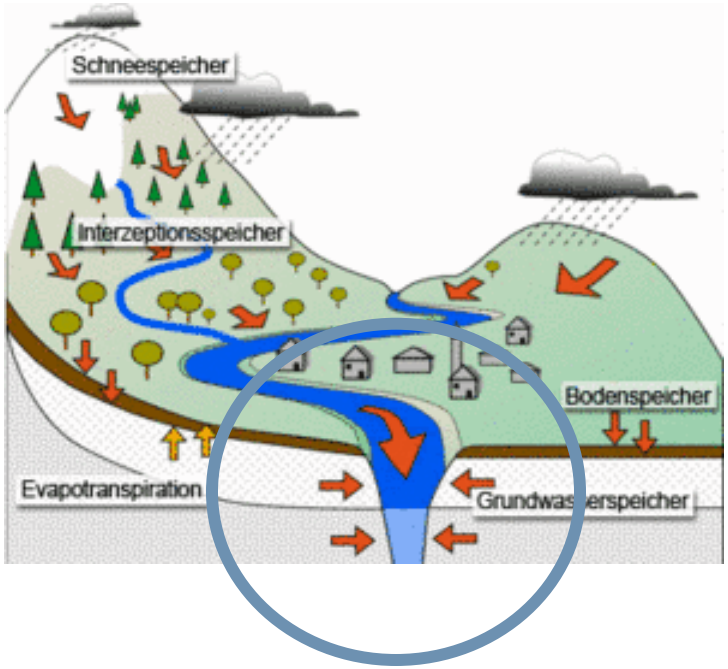


Agenda

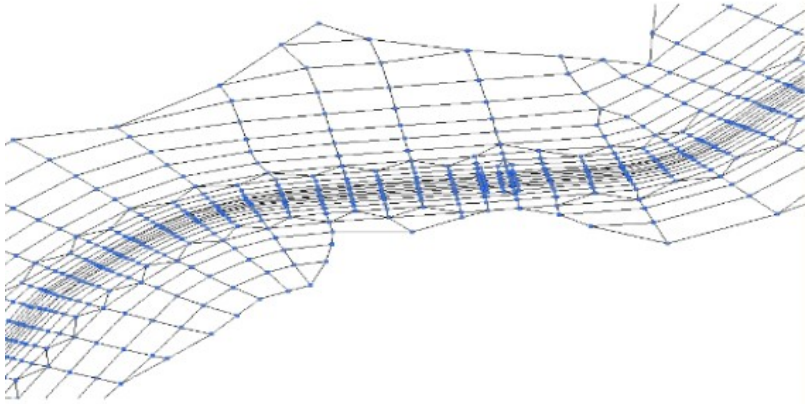
- Motivation
- Introduction to Kalypso
  - Base Application
  - Customized Kalypso
- Modelling & GML – a generic approach

Motivation - Models in Hydraulic Engineering

Rainfall-Runoff-Model



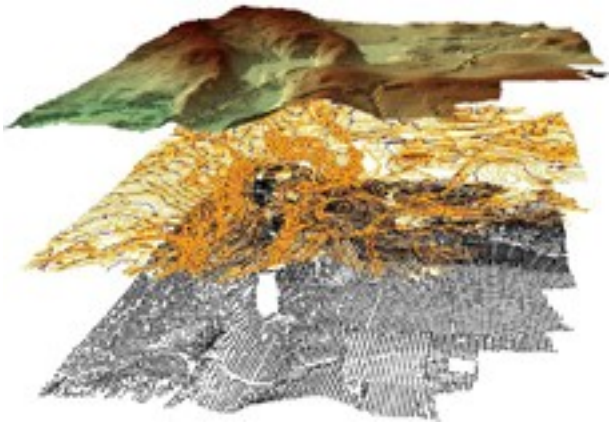
Riverflow model
2D/FEM

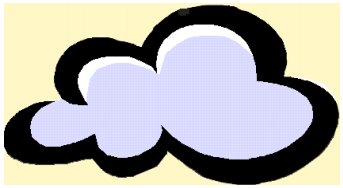


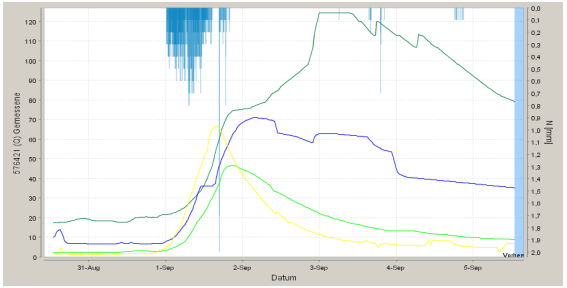
Water Surface
Profile Model

1D/Profile

Motivation - handling of model data







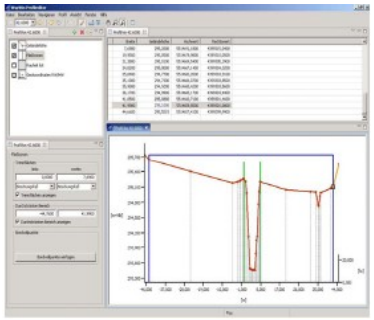
- **Terrain Model**
- **Soil Utilisation**
- **Soil Composition**

Measurements & forecasts

- **Rainfall**
- **Temperature**

- **Water Stage**
- **Influent / discharge**
- **Inundation areas**

Motivation - avoid zoo of incompatible applications



C:\TMP\SALEC2.tmp\we_nat.geb - Viewer

File Edit Search View Convert Options Help

```
          1800      7
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47666091
n C_1800.N C_1800.N  1.00
C_1800.T std.ver
we999.zf1
we.hyd
snowtyp2       1.0 1.5
1.000    2       1.0       1.0    0      10.0       5.0
15.0 10.0 6.0 1.0 1.0 1.0 0.2 0.0
11.0 7.0 10.0 1.0 1.0 1.0 1.0 0.0
    1.00 0.0    0.50    1.00    1.00
1.0 8.0 5.0 200.0 5000.0 10000.0
1
1700
1.0
0.2 4.0 1.0 0.2 0.0 0.0 0
ende gebietsdatensatz
```
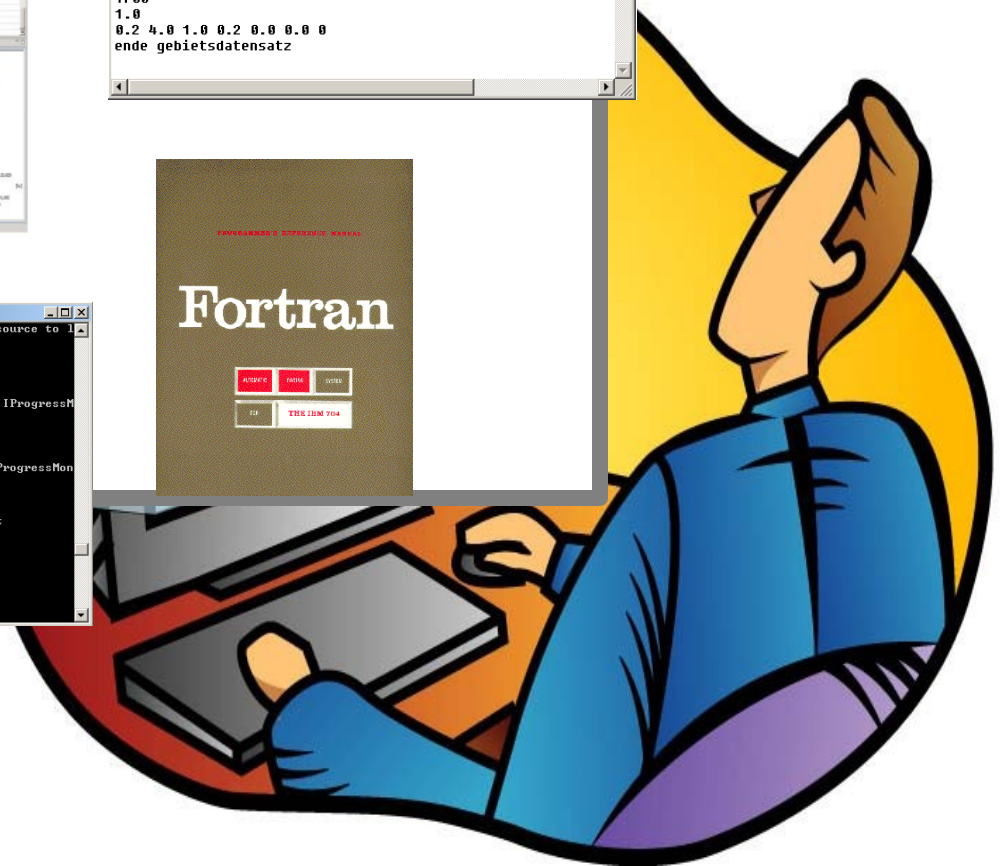
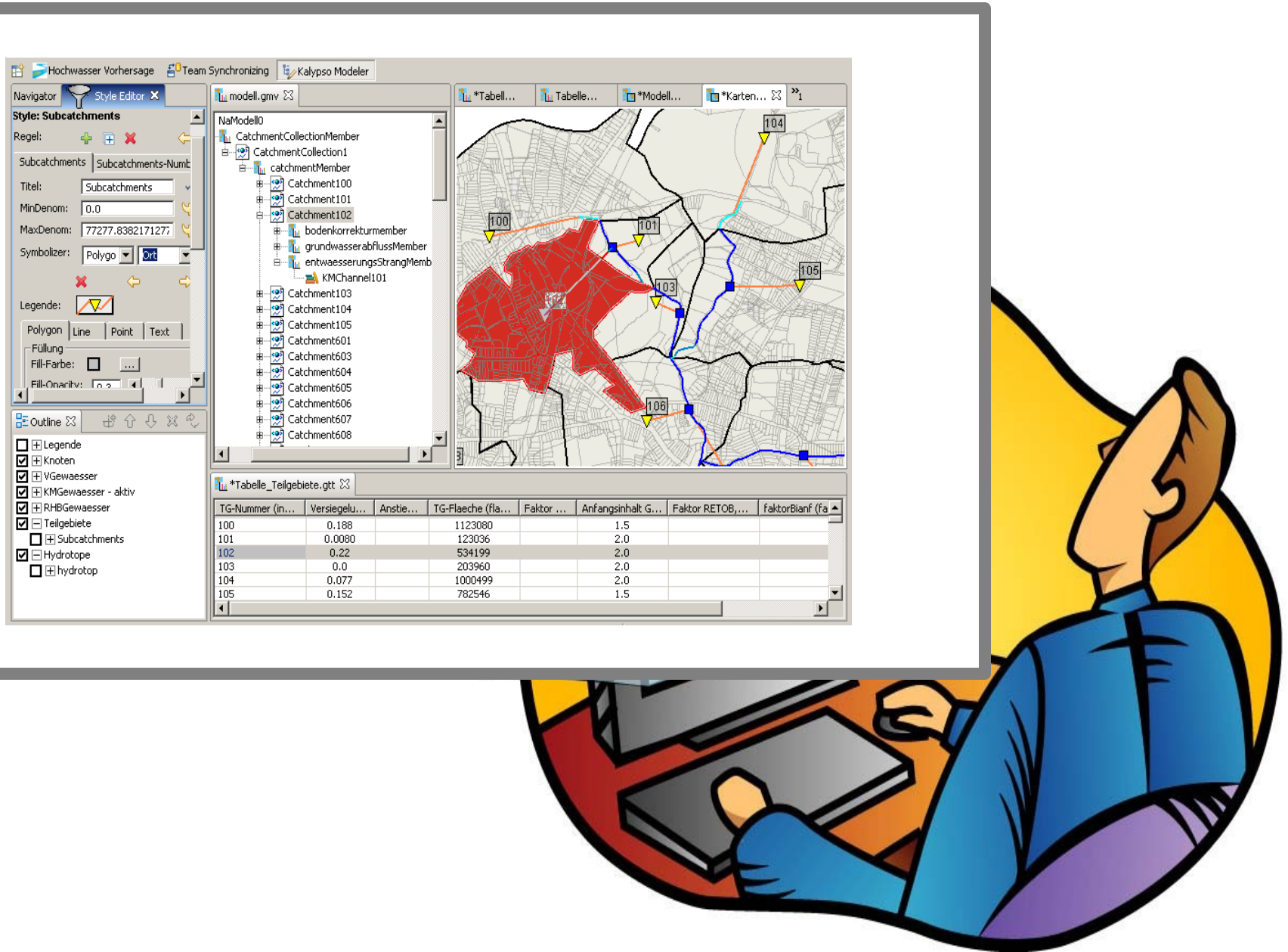


Eingabeaufforderung

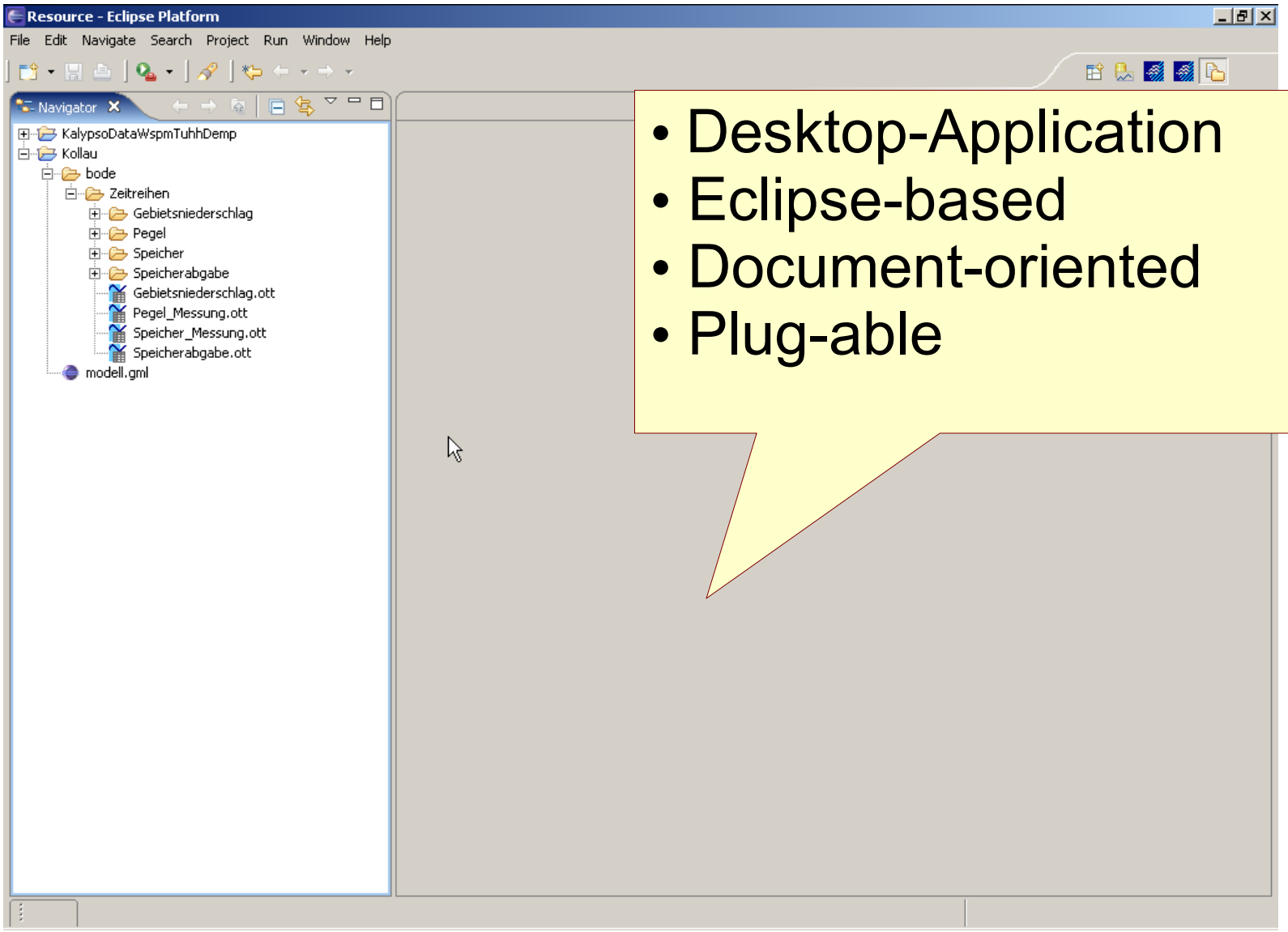
```
    *          some context for making the relative location of the resource to l
oad absolute
    * @param monitor
    *          monitors the progress of loading
    * @return object
    * @throws LoaderException
    */
  public Object load( final String location, final URL context, final IProgressM
onitor monitor ) throws LoaderException;

  /**
   * Save an object to the given location
   */
  public void save( final String location, final URL context, final IProgressMon
itor monitor, final Object data )
      throws LoaderException;

  /**
   * Release resources or whatsoever is associated to the given object
   */
  public void release( final Object object );

  public void addLoaderListener( final ILoaderListener l );

  public void removeLoaderListener( final ILoaderListener l );
}

C:\workspace\KalypsoCore\src\org\kalypso\loader>_
```



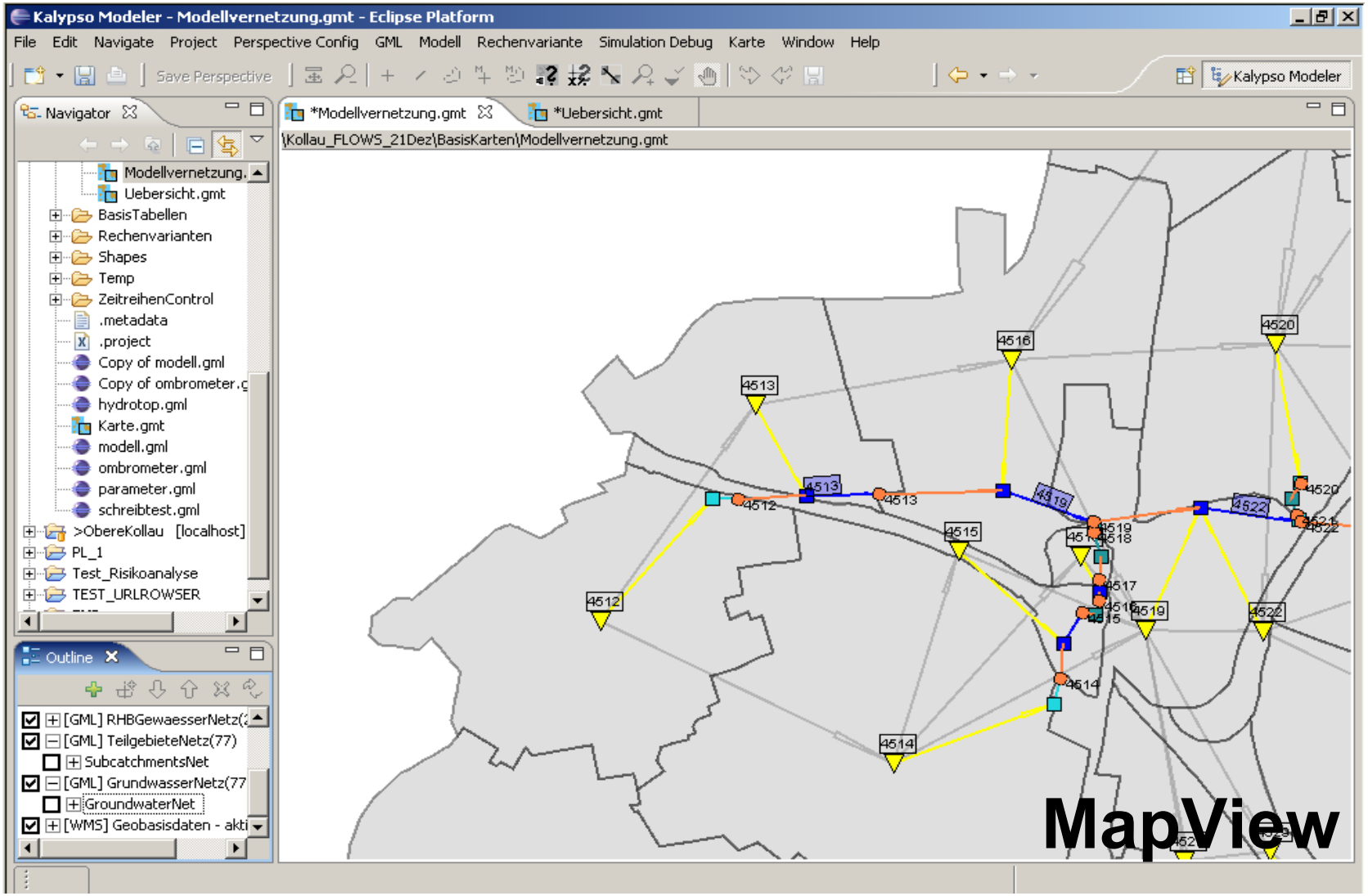
Motivation - Integration, Uniform & Consistent GUI



Base Application



Map View


Kalypso Modeler - Modellvernetzung.gmt - Eclipse Platform
File Edit Navigate Project Perspective Config GML Modell Rechenvariante Simulation Debug Karte Window Help
Save Perspective
Kalypso Modeler
Navigator
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*Uebersicht.gmt
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Modellvernetzung.
Uebersicht.gmt
BasisTabellen
Rechenvarianten
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Copy of ombrometer.g
hydrotop.gml
Karte.gmt
modell.gml
ombrometer.gml
parameter.gml
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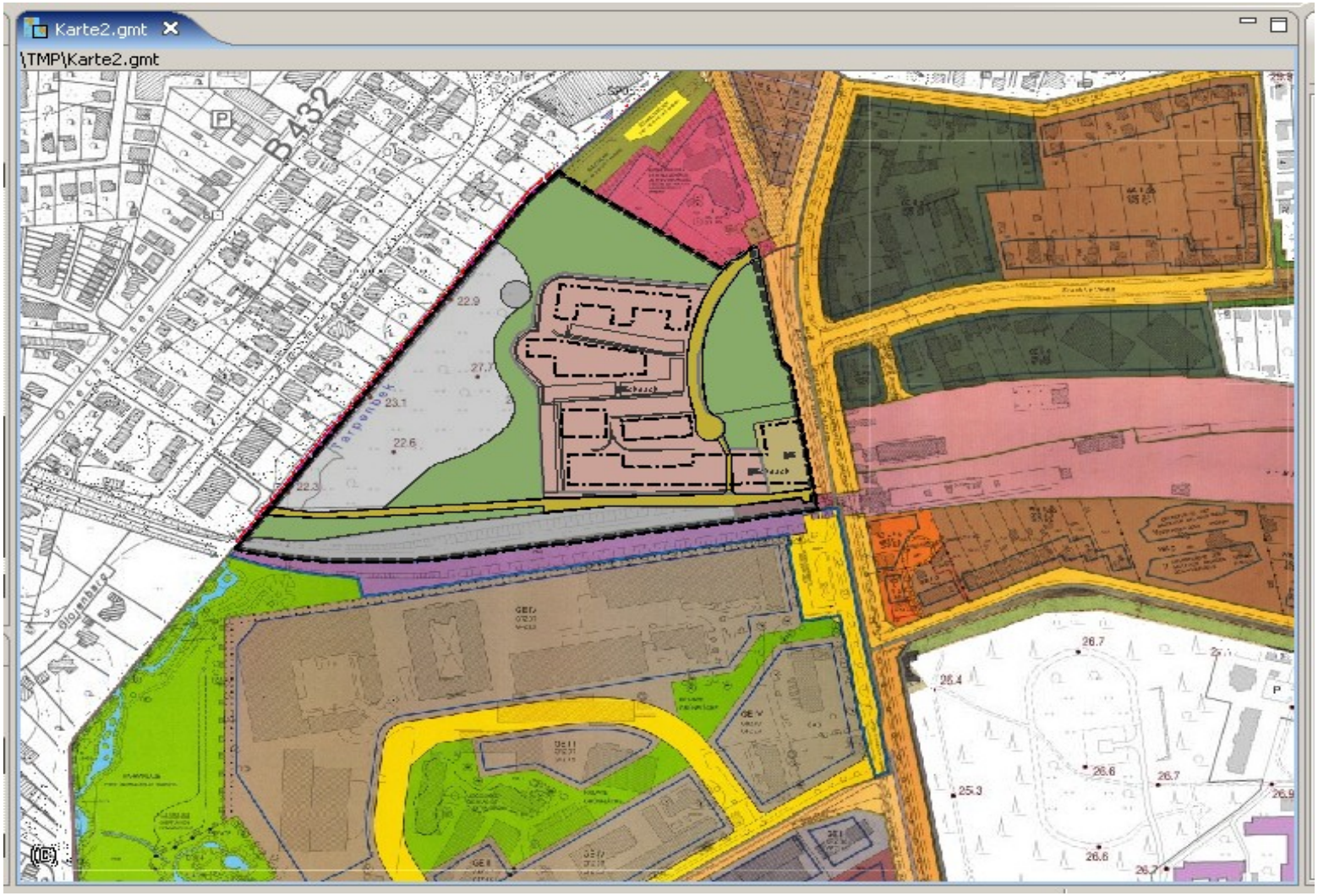
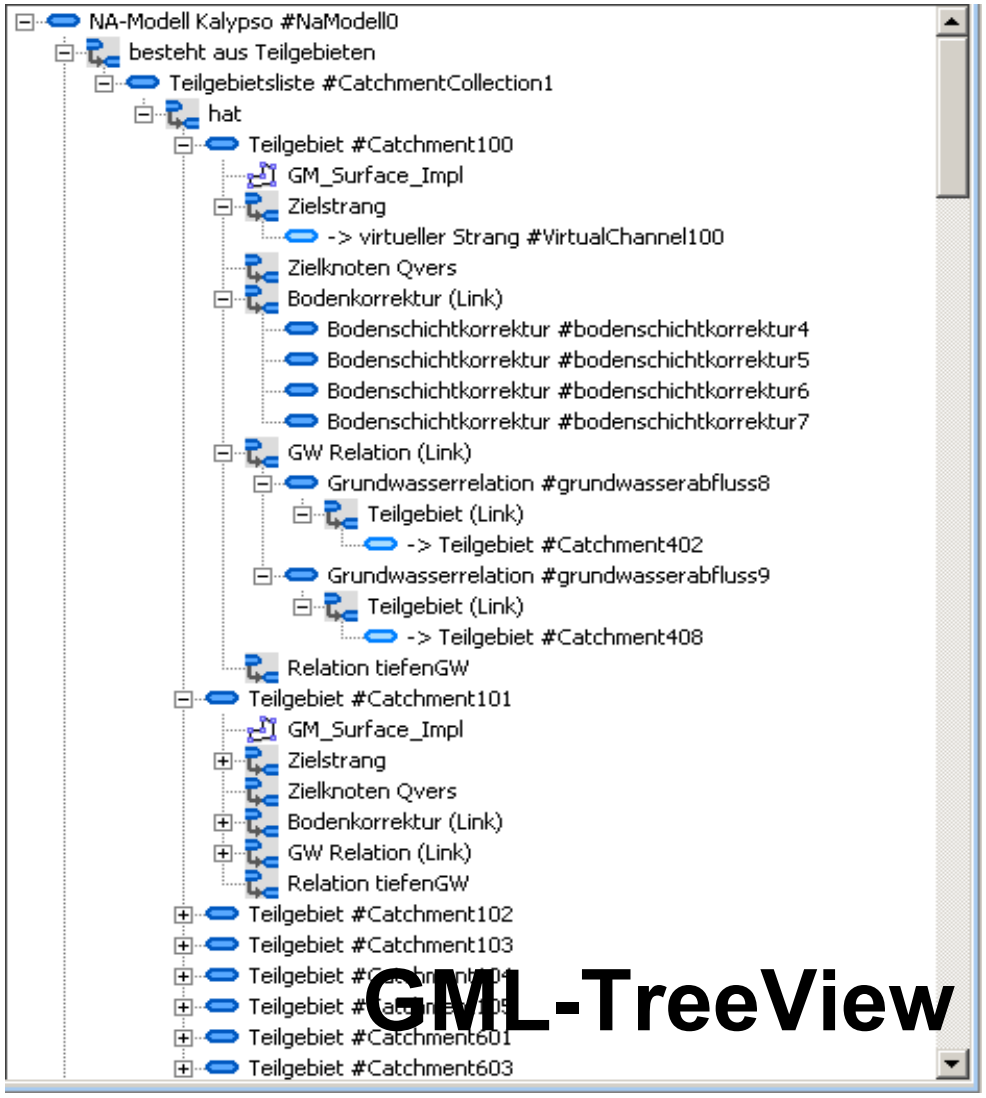
MapView

Map View

Local and remote (WMS) data

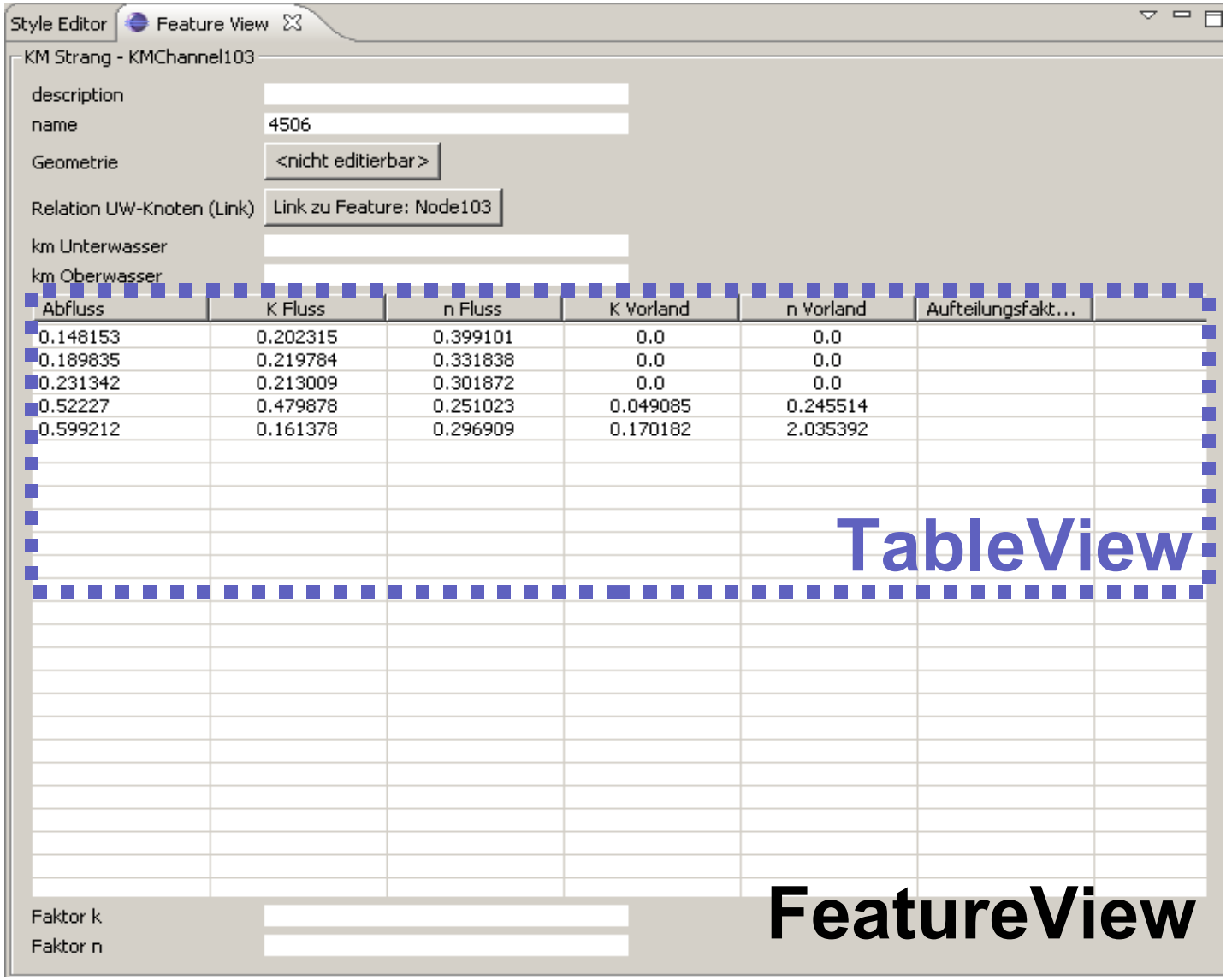


GML Views / Editors

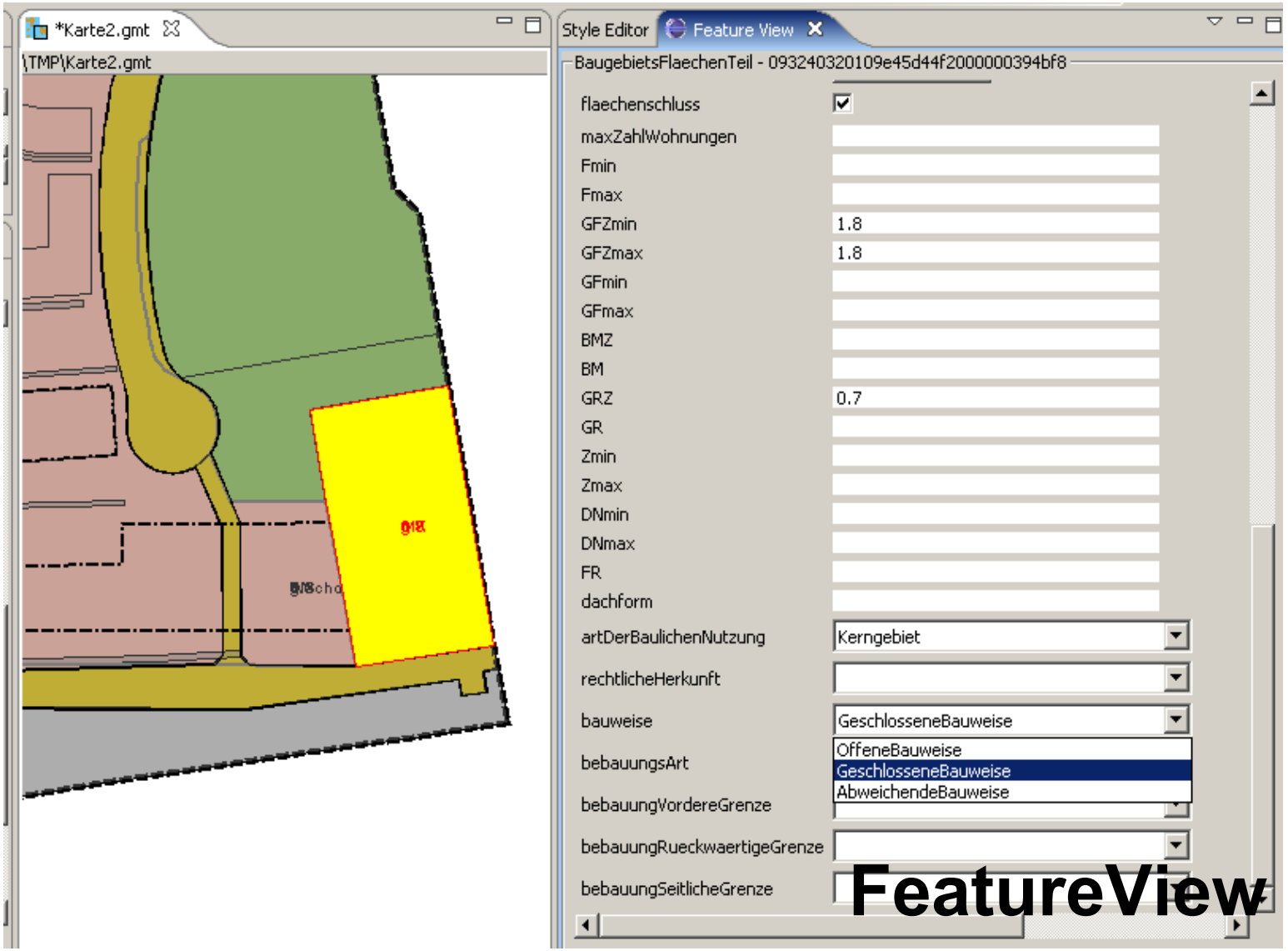


GML-TreeView

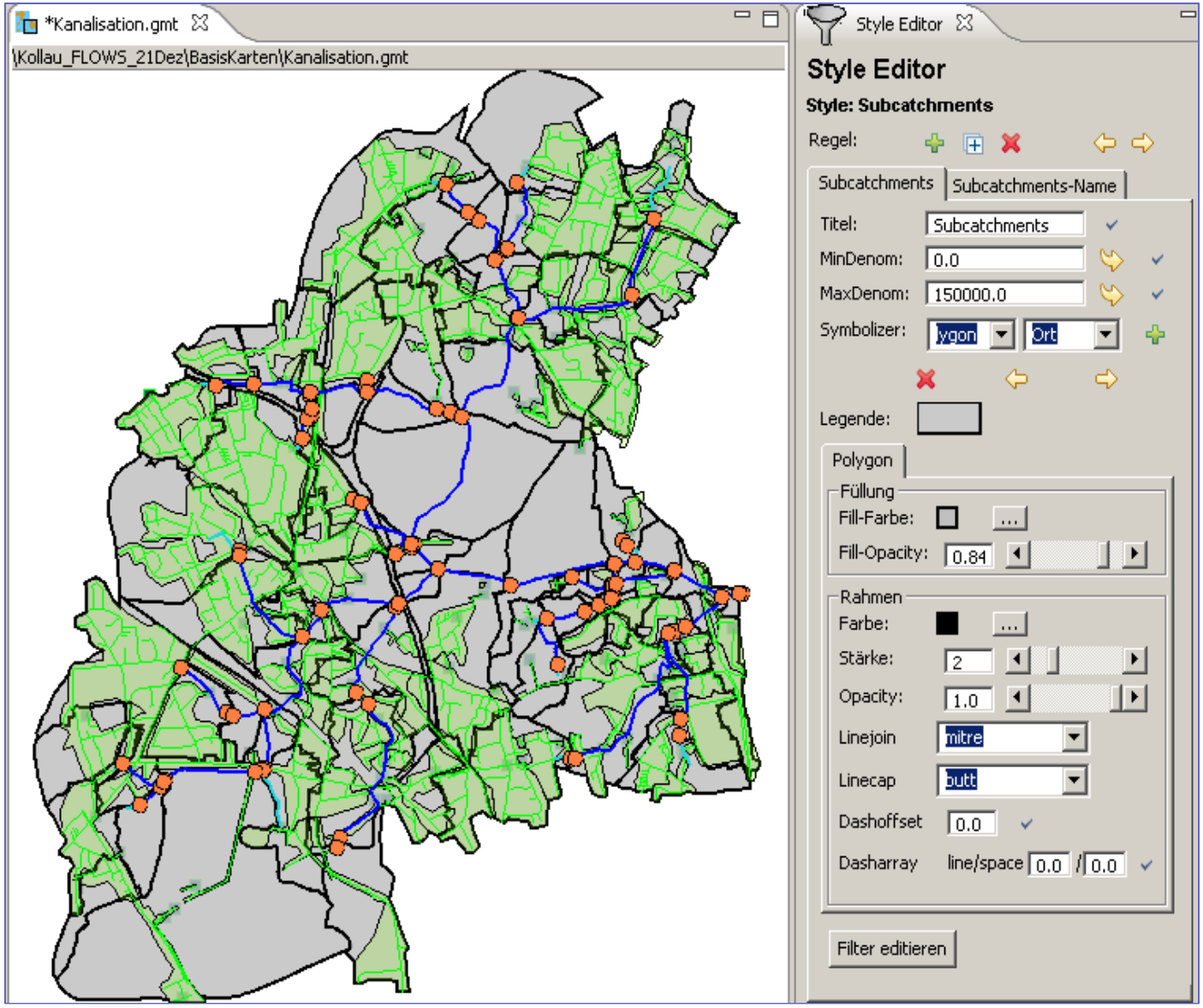
Generic FeatureView



Generic FeatureView



SLD-Editor


*Kanalisation.gmt
\Kollau_FLOWS_21Dez\BasisKarten\Kanalisation.gmt
Style Editor
Style Editor
Style: Subcatchments
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Subcatchments-Name
Titel:
Subcatchments
MinDenom:
0.0
MaxDenom:
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Symbolizer:
ygon
Ort
Legende:
Polygon
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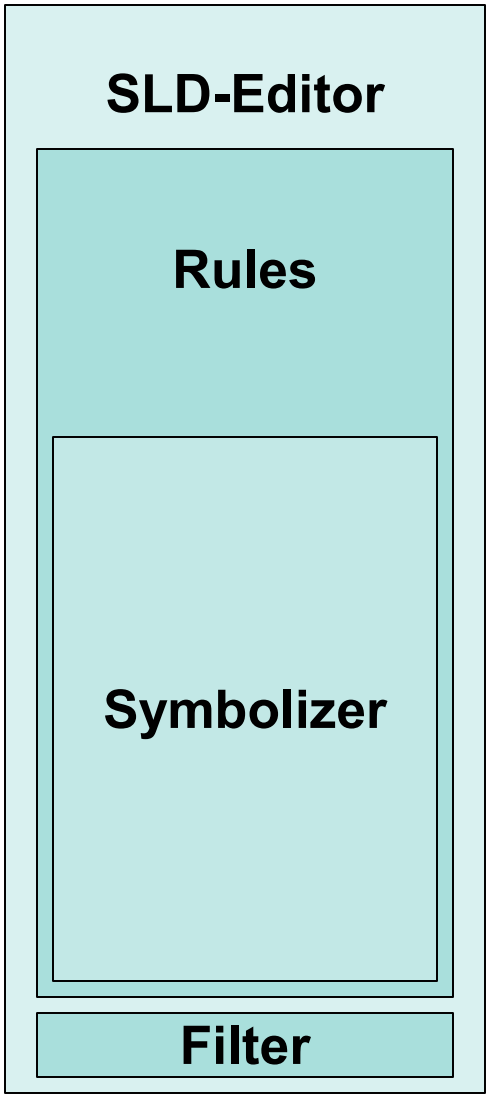
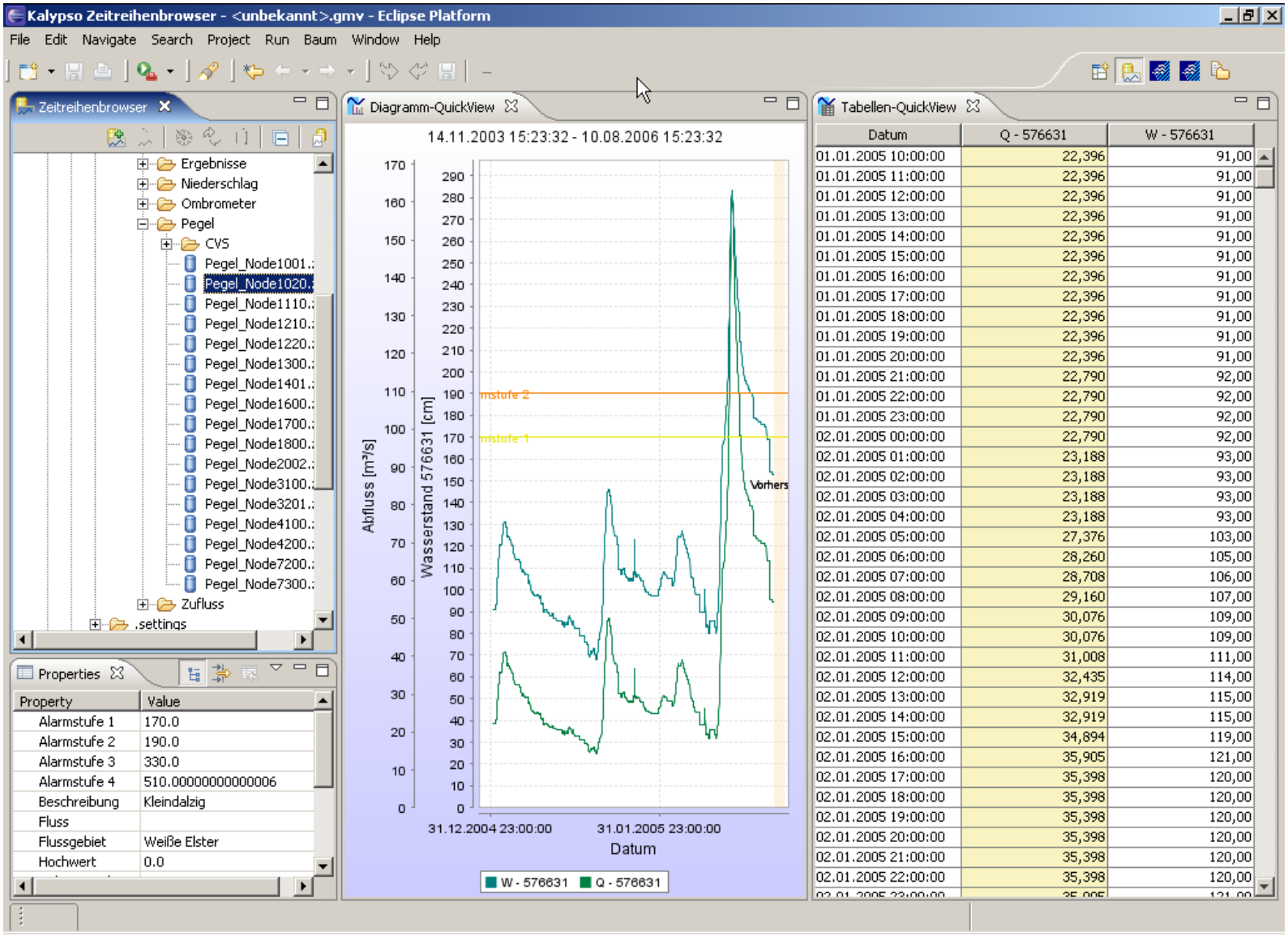
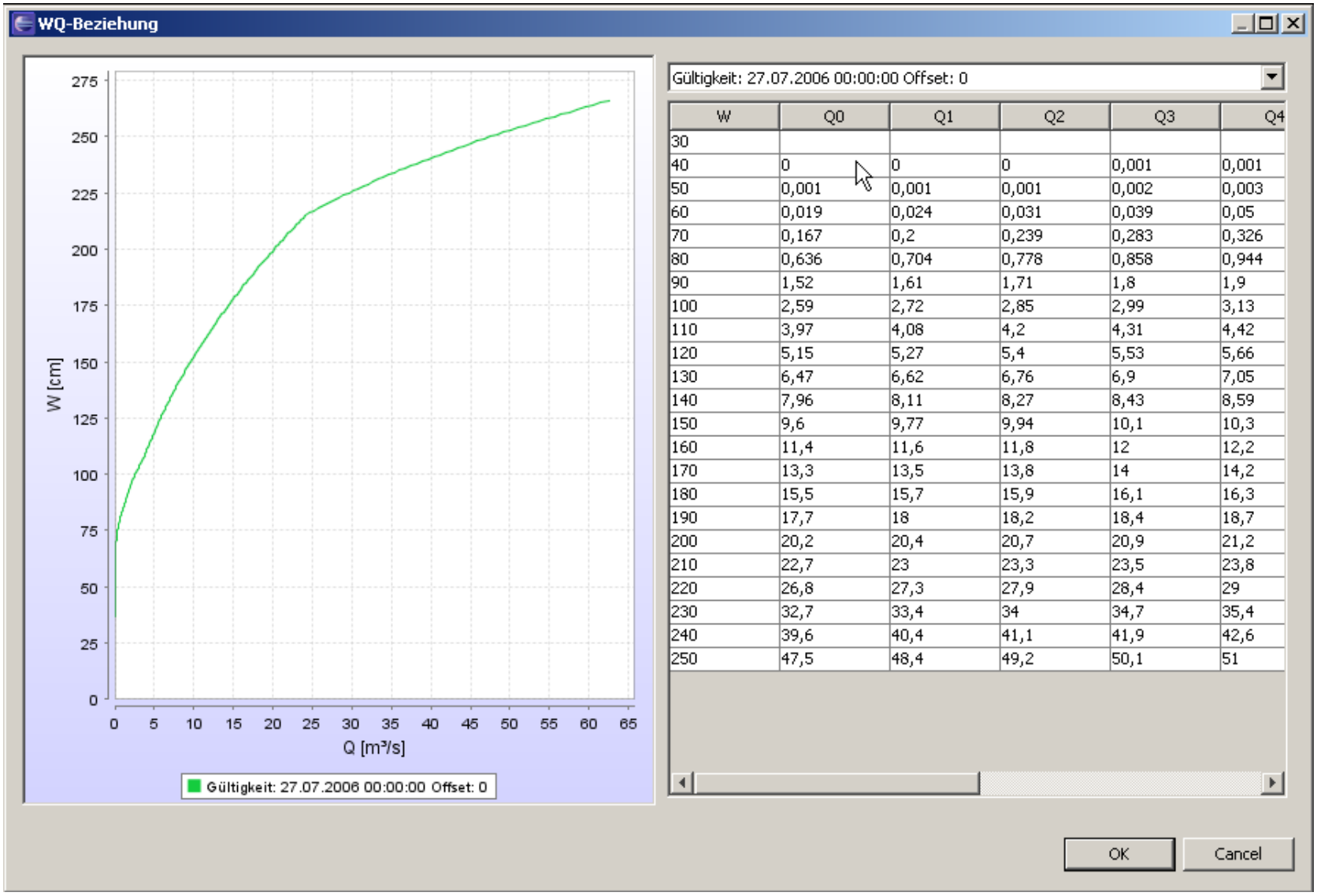
Filter editieren


SLD-Editor
Rules
Symbolizer
Filter

Timeseries Browser

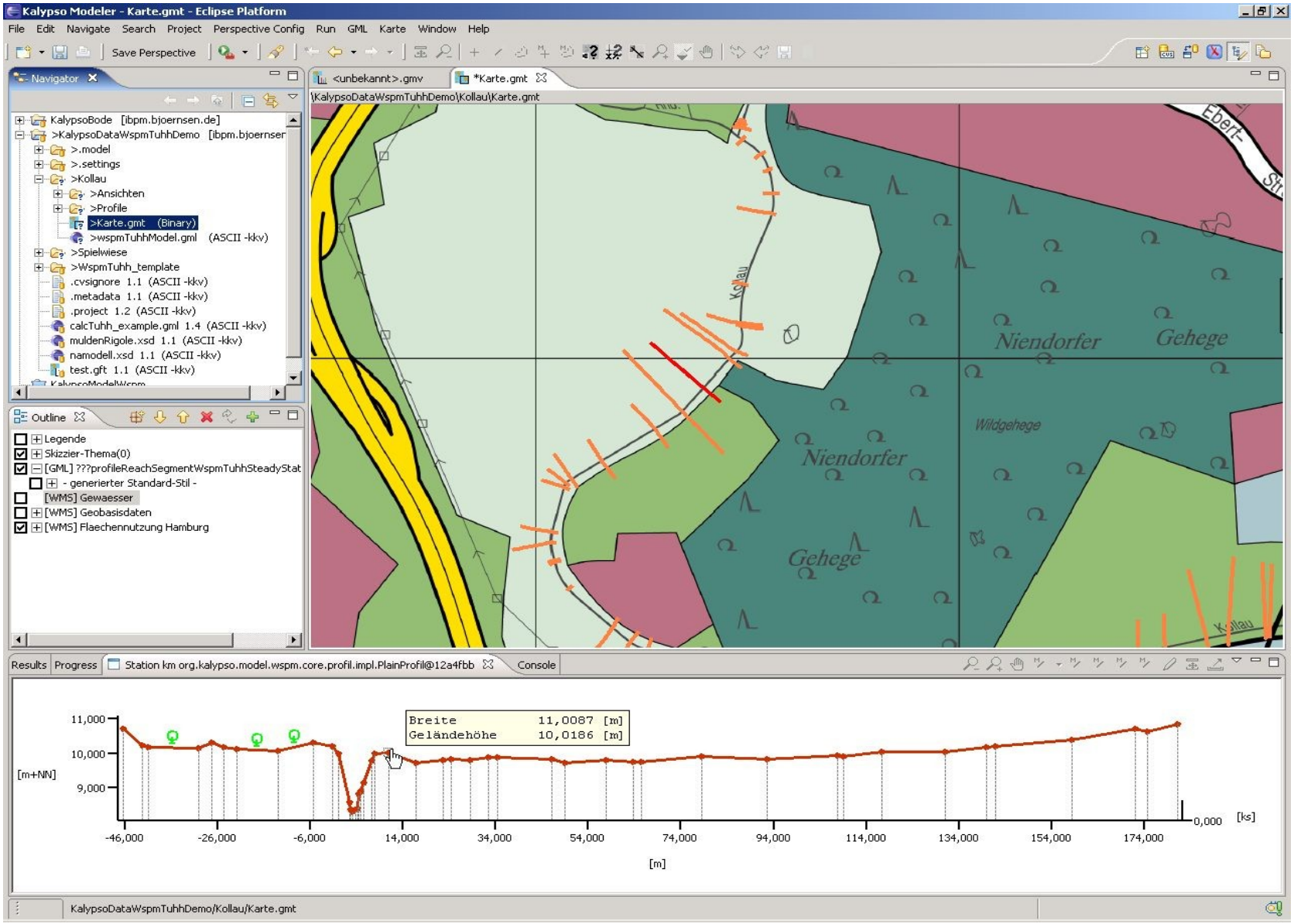


Dedicated Views



W	Q0	Q1	Q2	Q3	Q4
30					
40	0	0	0	0,001	0,001
50	0,001	0,001	0,001	0,002	0,003
60	0,019	0,024	0,031	0,039	0,05
70	0,167	0,2	0,239	0,283	0,326
80	0,636	0,704	0,778	0,858	0,944
90	1,52	1,61	1,71	1,8	1,9
100	2,59	2,72	2,85	2,99	3,13
110	3,97	4,08	4,2	4,31	4,42
120	5,15	5,27	5,4	5,53	5,66
130	6,47	6,62	6,76	6,9	7,05
140	7,96	8,11	8,27	8,43	8,59
150	9,6	9,77	9,94	10,1	10,3
160	11,4	11,6	11,8	12	12,2
170	13,3	13,5	13,8	14	14,2
180	15,5	15,7	15,9	16,1	16,3
190	17,7	18	18,2	18,4	18,7
200	20,2	20,4	20,7	20,9	21,2
210	22,7	23	23,3	23,5	23,8
220	26,8	27,3	27,9	28,4	29
230	32,7	33,4	34	34,7	35,4
240	39,6	40,4	41,1	41,9	42,6
250	47,5	48,4	49,2	50,1	51

Dedicated view – profile editor



Wizard and Expert Perspectives

Kalypso-Workflow

for specific Users
pre-configurated

Wizard-based

Kalypso-Base

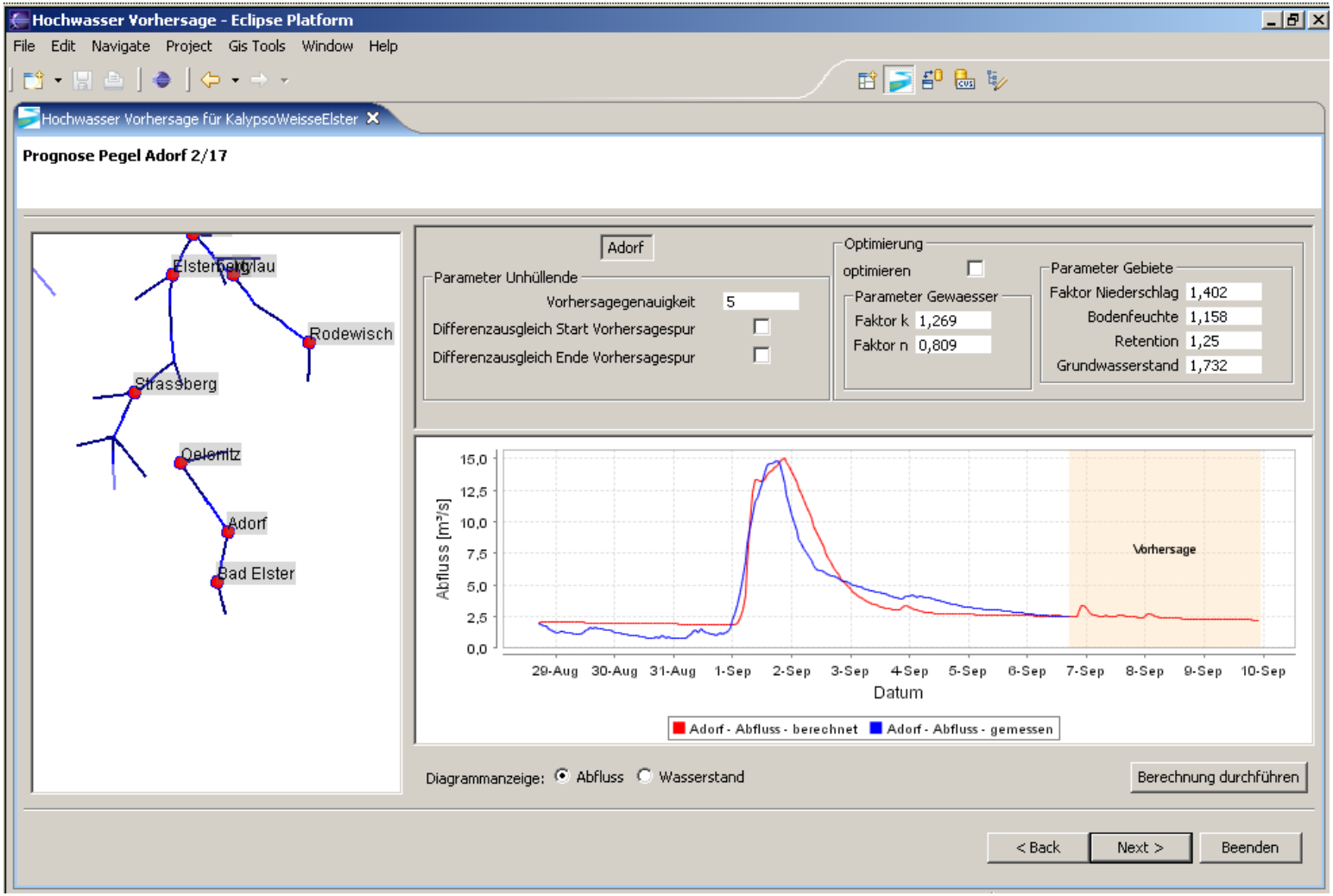
Views and Data-Management
(GML2, GML3.1 ,O&M ,SWE)
strong type-based API
for GML-Application-Schema

Basic Application

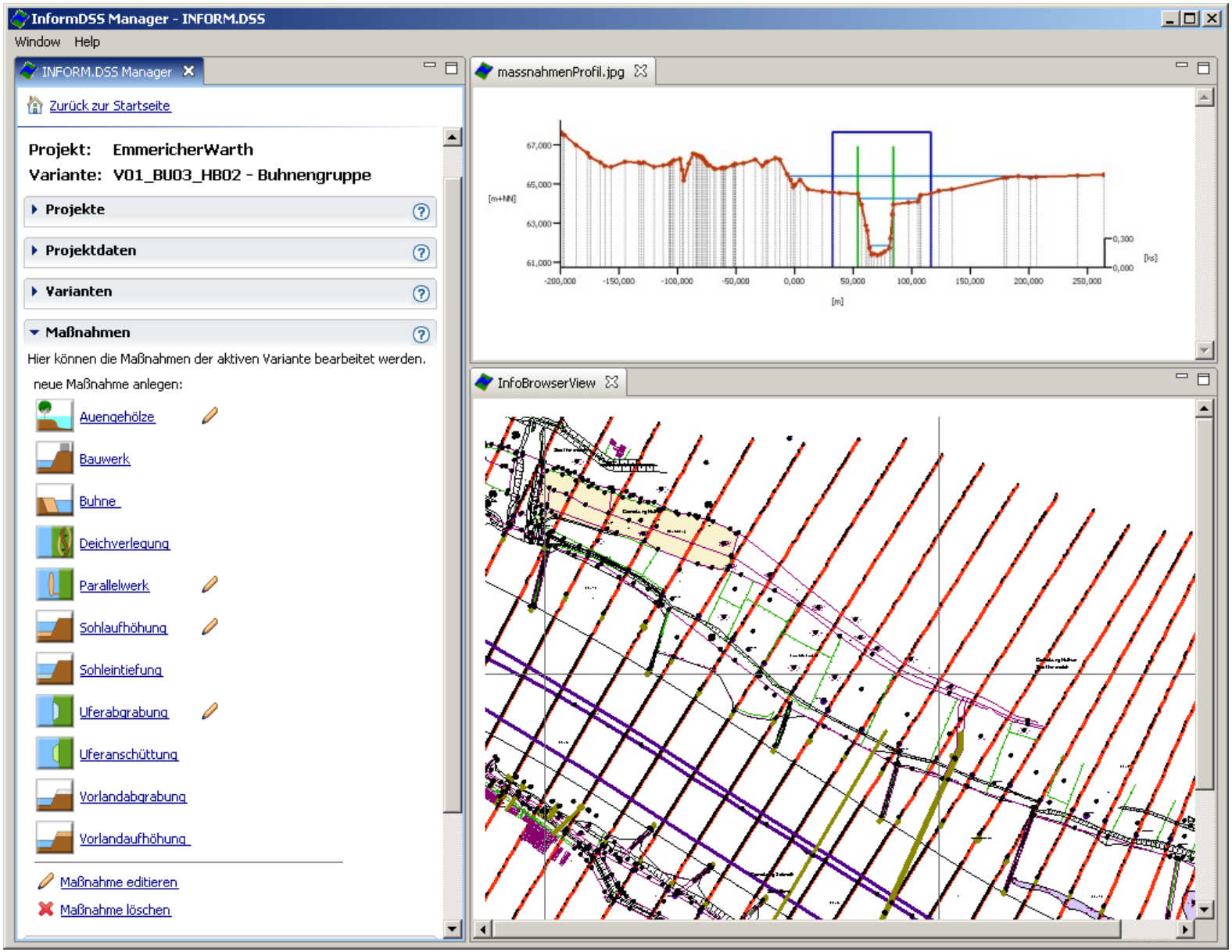
Services

(WMS, WFS, Observations, Simulation)
SOS in development
WPS in consideration

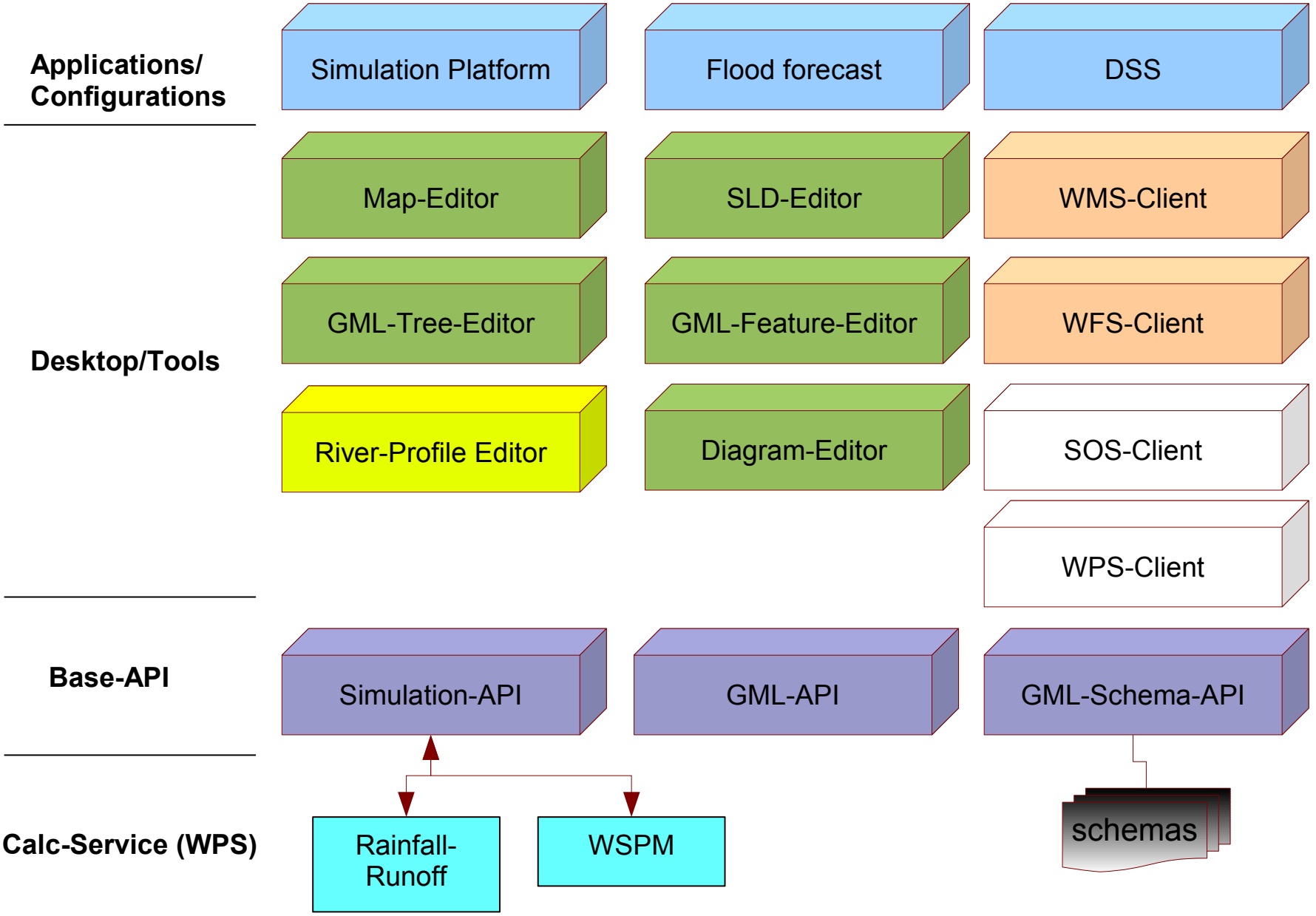
Flood Forecast



Decision Support Systems



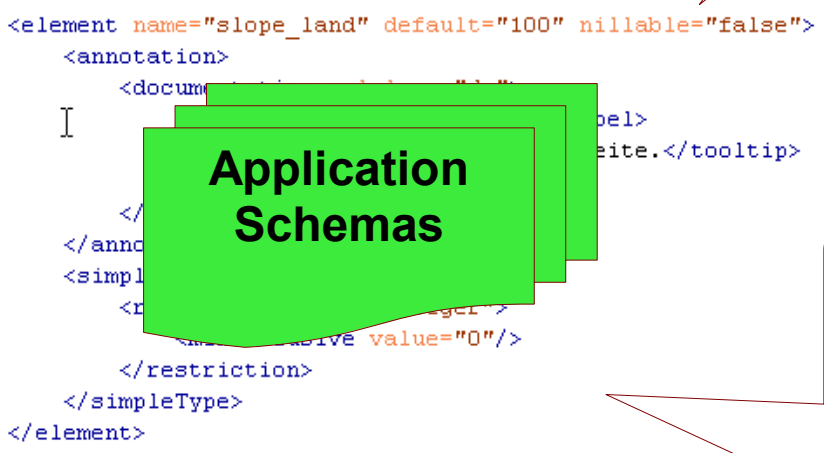
API Components



Modelling & GML: Kalypso inside

Defines simulation model

Used to generate dialogs and views in a generic way



Used to validate model data

Only thing Kalypso knows about a model

Complex schema dependencies

```
<?xml version="1.0" encoding="UTF-8"?>
<schema targetNamespace="org.kalypso.model.wspm.tuhh"
xmlns:tuhh="org.kalypso.model.wspm.tuhh"
xmlns:wspm="org.kalypso.model.wspm"
xmlns:wspmcommon="org.kalypso.model.wspmcommon"
xmlns:runoff="org.kalypso.model.wspr
xmlns:gml="http://www.opengis.net/g
xmlns:om="http://www.opengis.net/om
xmlns="http://www.w3.org/2001/XMLSc
elementFormDefault="qualified" vers
```

Resolving namespaces

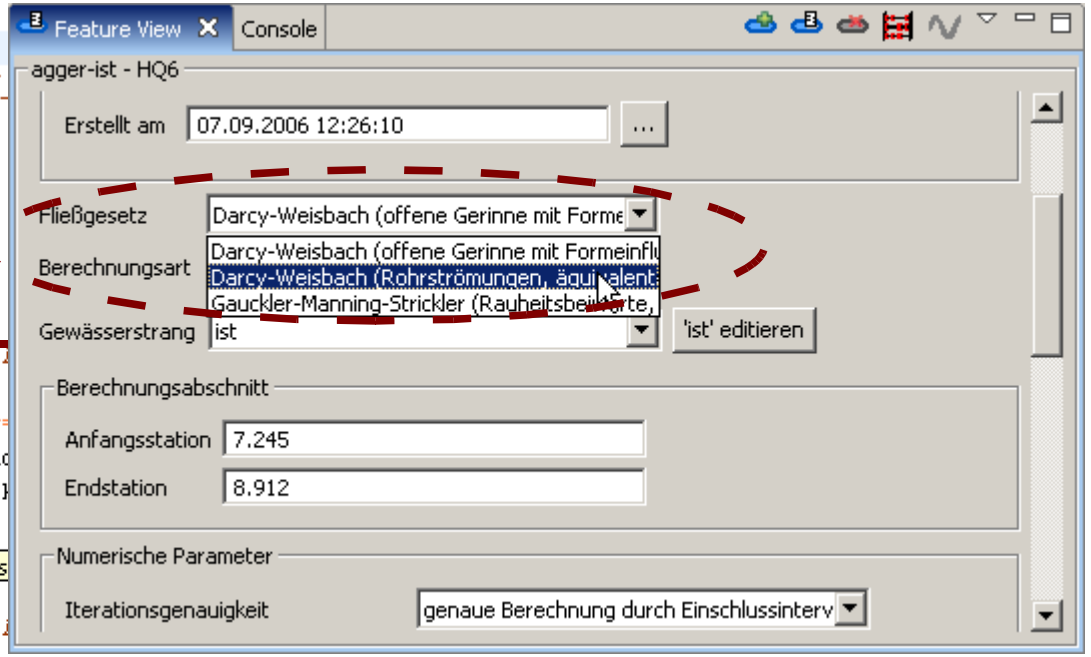
- Schema from local cache
- Schema from catalogue
- Schema via location

GML Support via generic approach

Enumerations

```
<element name="fliessgesetz" default="DARCY_
    <annotation>
        <documentation xml:lang="de">
            <label>Fließgesetz</label>
        </documentation>
    </annotation>
    <simpleType>
        <restriction base="string">
            <enumeration value="DARCY_WEISB
                <annotation>
                    <documentation xml:lang=
                        <label>Darcy-Weisbac
                            Sandrauheiten, k
                    </documentation>
                </annotation>
            </enumeration>
            <enumeration value="DARCY_WEISB
                <annotation>
                    <documentation xml:lang="de">
                        <label>Darcy-Weisbach (offene Gerinne mit Formeinfluss,
                            äquivalente Sandrauheiten, ks)</label>
                    </documentation>
                </annotation>
            </enumeration>
            <enumeration value="MANNING_STRICKLER">
                <annotation>
                    <documentation xml:lang="de">
                        <label>Gauckler-Manning-Strickler (Rauheitsbeiwerte,
                            kst)</label>
                    </documentation>
                </annotation>
            </enumeration>
```

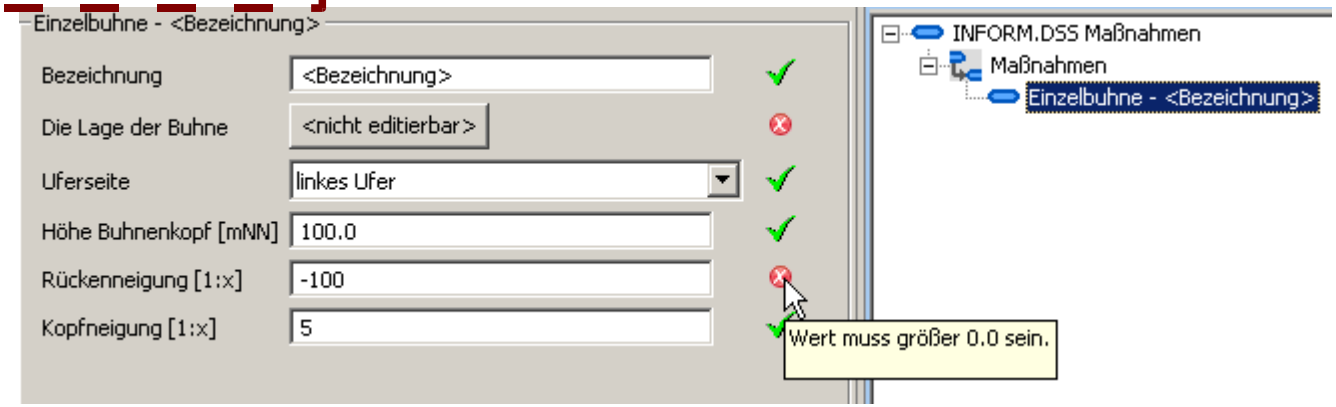
Defines text comments



GML Support via generic approach

Rule based Validation

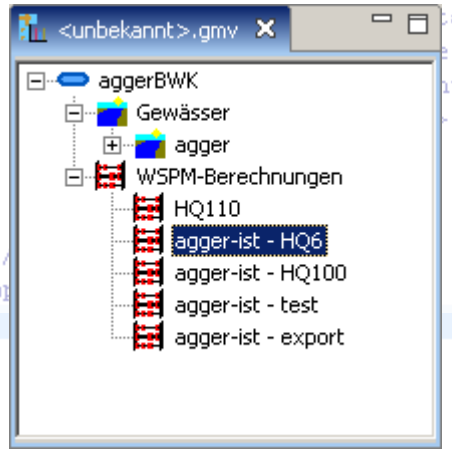
```
<element name="slope_land" default="100" nillable="false">
    <annotation>
        <documentation xml:lang="de">
            <label>Rückenneigung [1:x]</label>
            <tooltip>Die Neigung zur Landseite.</tooltip>
            <description>...</description>
        </documentation>
    </annotation>
    <simpleType>
        <restriction base="integer">
            <minExclusive value="0"/>
        </restriction>
    </simpleType>
</element>
```

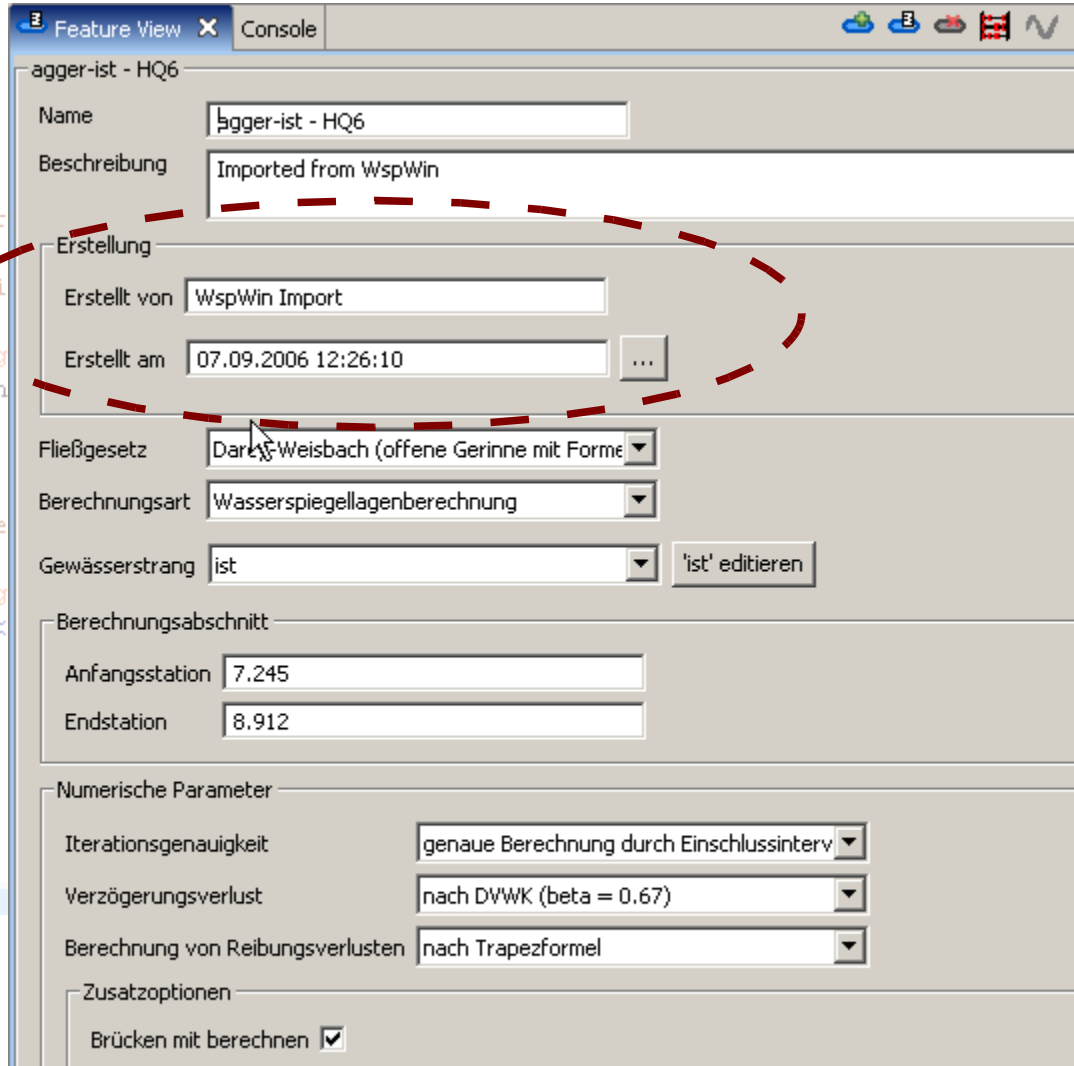


GML Support via generic approach

Inlined Features

```
<complexType name="calcCreationInlinePropertyType">
    <sequence minOccurs="1" maxOccurs="1">
        <element ref="wspm:CalcCreation"/>
    </sequence>
</complexType>
<complexType name="calcCreationType">
    <complexContent>
        <extension base="wspmcommon:EmptyFeatur
            <sequence>
                <element name="user" type="
                    <annotation>
                        <documentation xml:l
                            <label>Erstellt von
                        </documentation>
                    </annotation>
                </element>
                <element name="date" type="date
                    <annotation>
                        ation xml:lang
                        l>Erstellt am<
                        ntation>
</comp
```

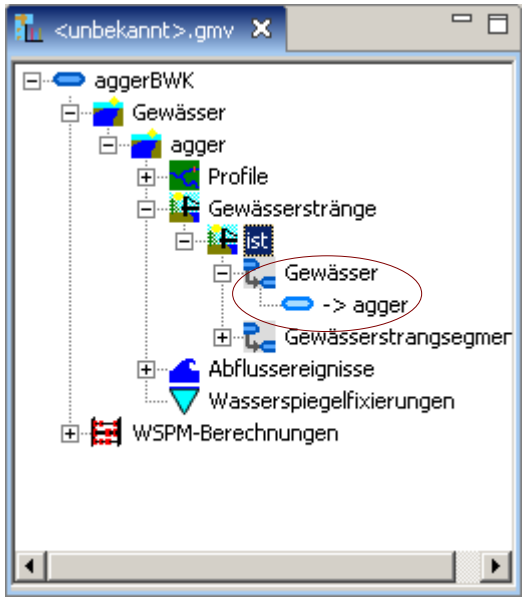


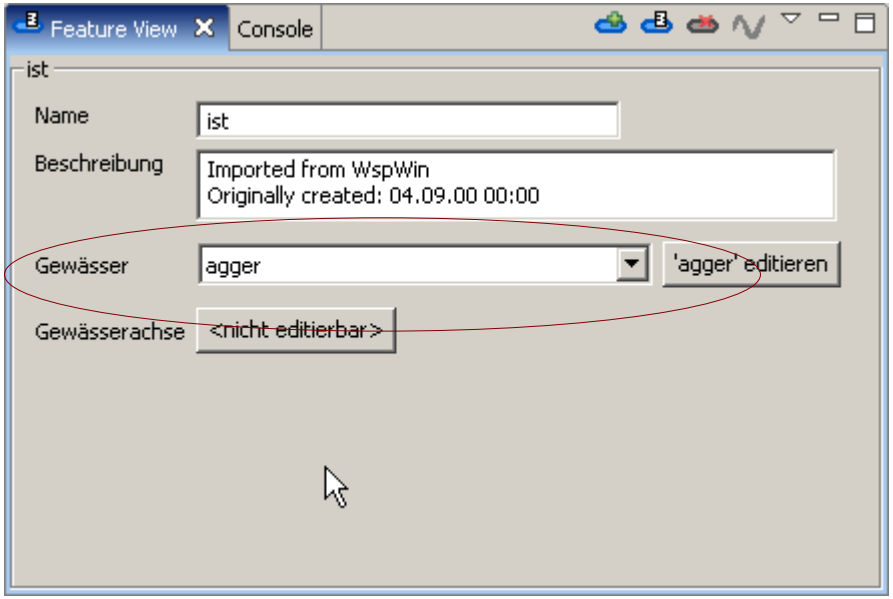


GML Support via generic approach

Linked Feature

```
<complexType name="WaterBodyLinkPropertyType">
    <sequence minOccurs="0" maxOccurs="0">
        <element ref="wspm:WaterBody"/>
    </sequence>
    <attributeGroup ref="gml:AssociationAttributeGroup"/>
</complexType>
```





Kalypso's GML-Support

supported

- **GML2 and GML3 at the same time**
- **distributed Application Schemas (include, import, substitutions)**
- **complex Features (deep hierarchy, xlinks)**
- **observations (O&M) (tuple-based)**

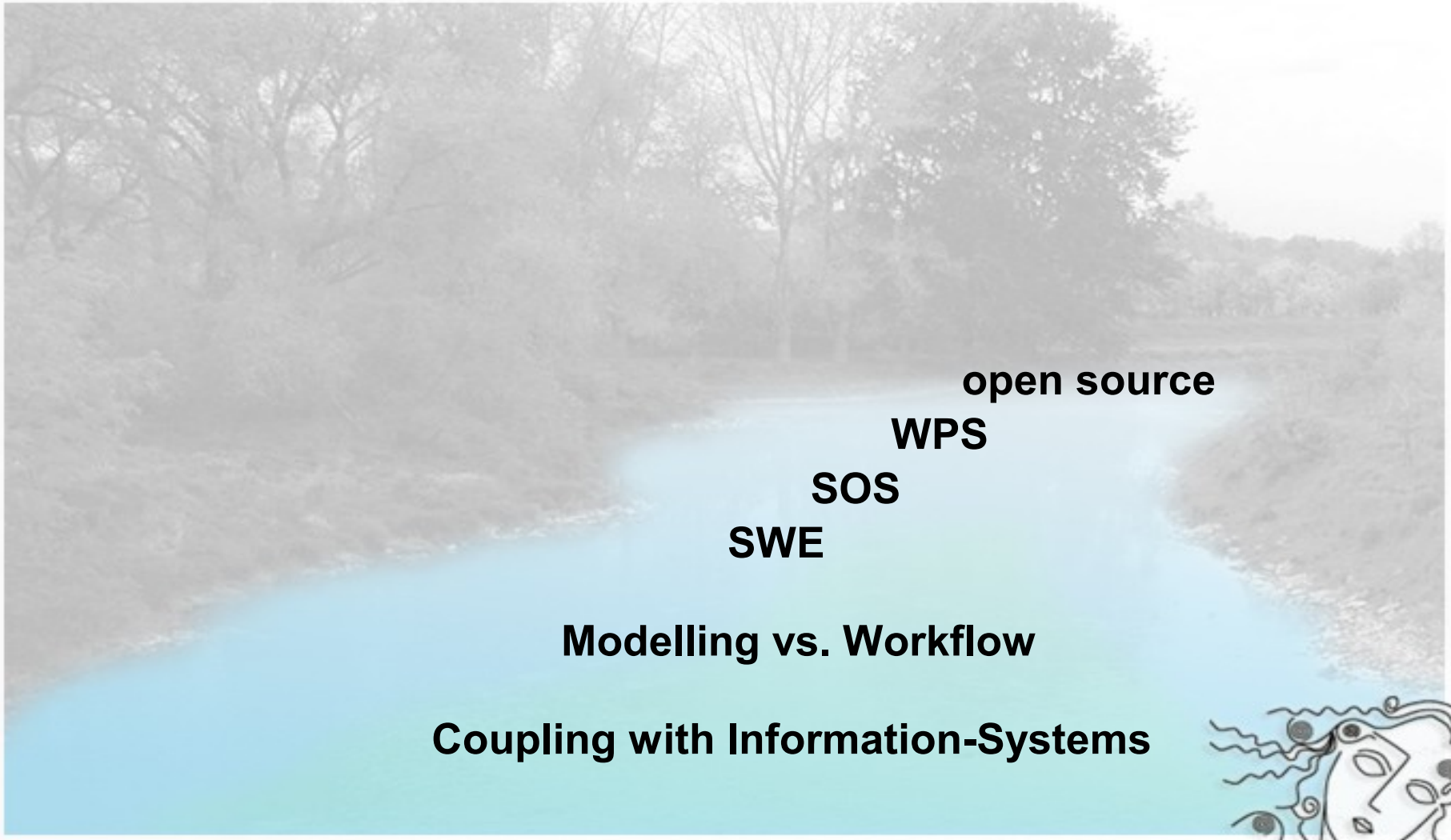
under development

- **external xlinks (user editable)**
- **GridCoverage**

not supported

- **new GML3 geometries**
- **choice (only rudimentary)**
- **schema cyclic dependendies**

Future – Kalypso, where do you flow ?



open source

WPS

SOS

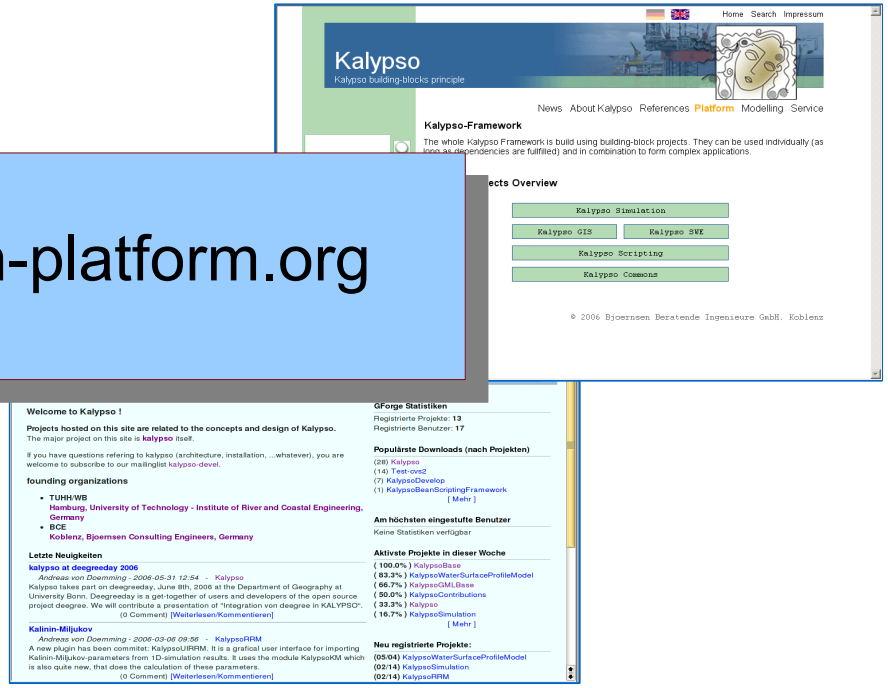
SWE

Modelling vs. Workflow

Coupling with Information-Systems

Thank you for attending!

http://www.kalypso-simulation-platform.org



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Who we are...

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