kalypso simulation platform

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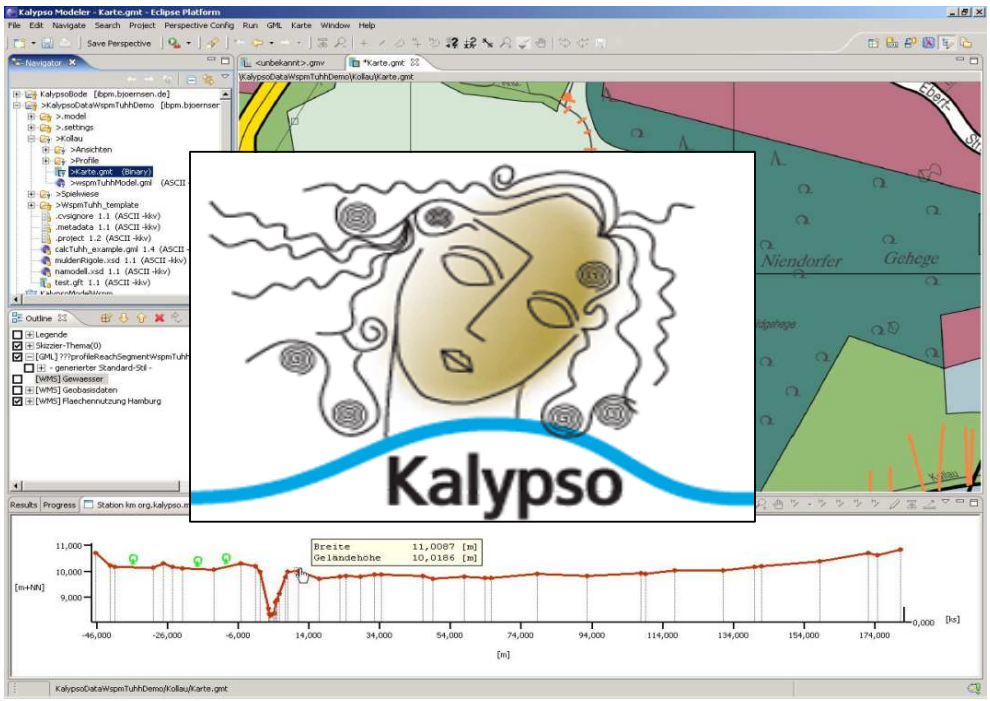
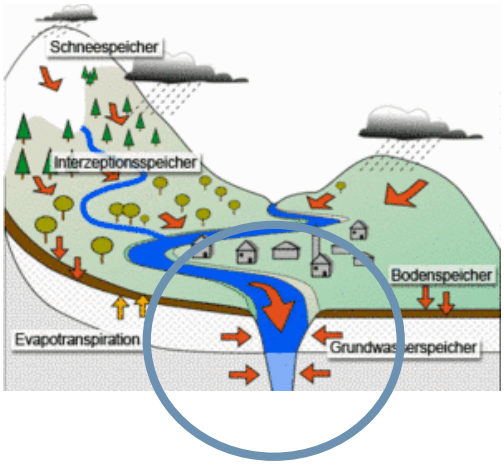
kalypso is a modelling and simulation platform for GML-based models

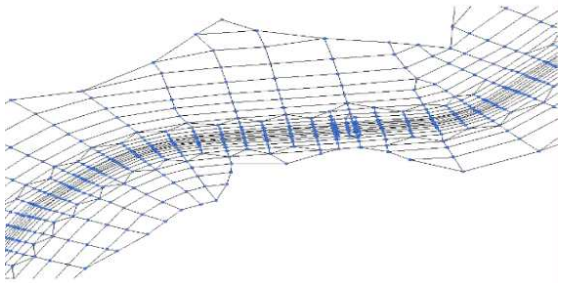


- **Motivation**
- **Introduction to Kalypso**
  - **Base Application**
  - **Customized Kalypso**
- **Modelling & GML – a generic approach**

Rainfall-Runoff-Model



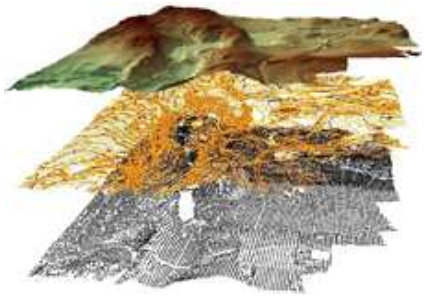
Riverflow model
2D/FEM

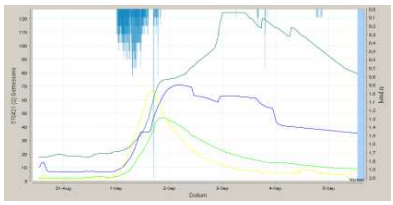


Water Surface
Profile Model

1D/Profile

Motivation - handling of model data





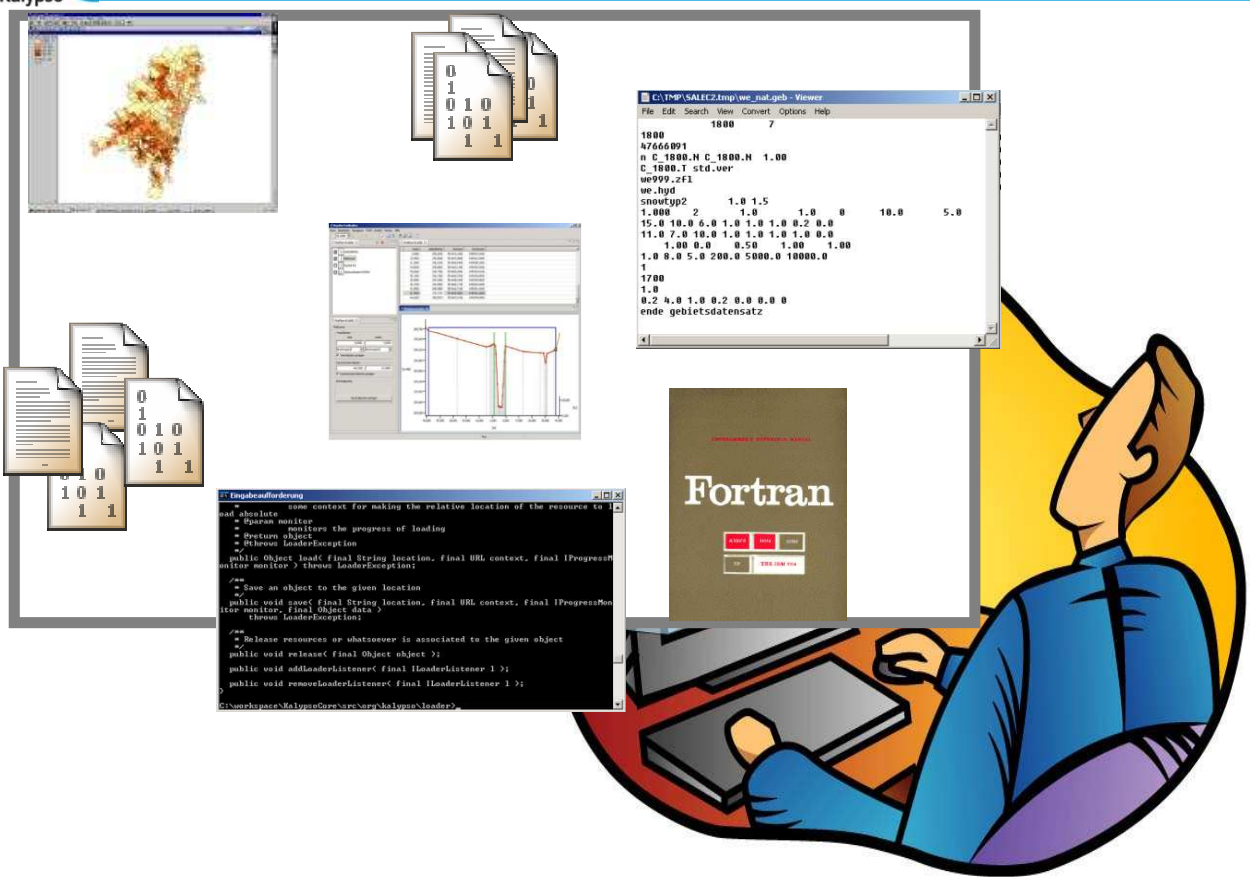
- **Terrain Model**
- **Soil Utilisation**
- **Soil Composition**

Measurements & forecasts

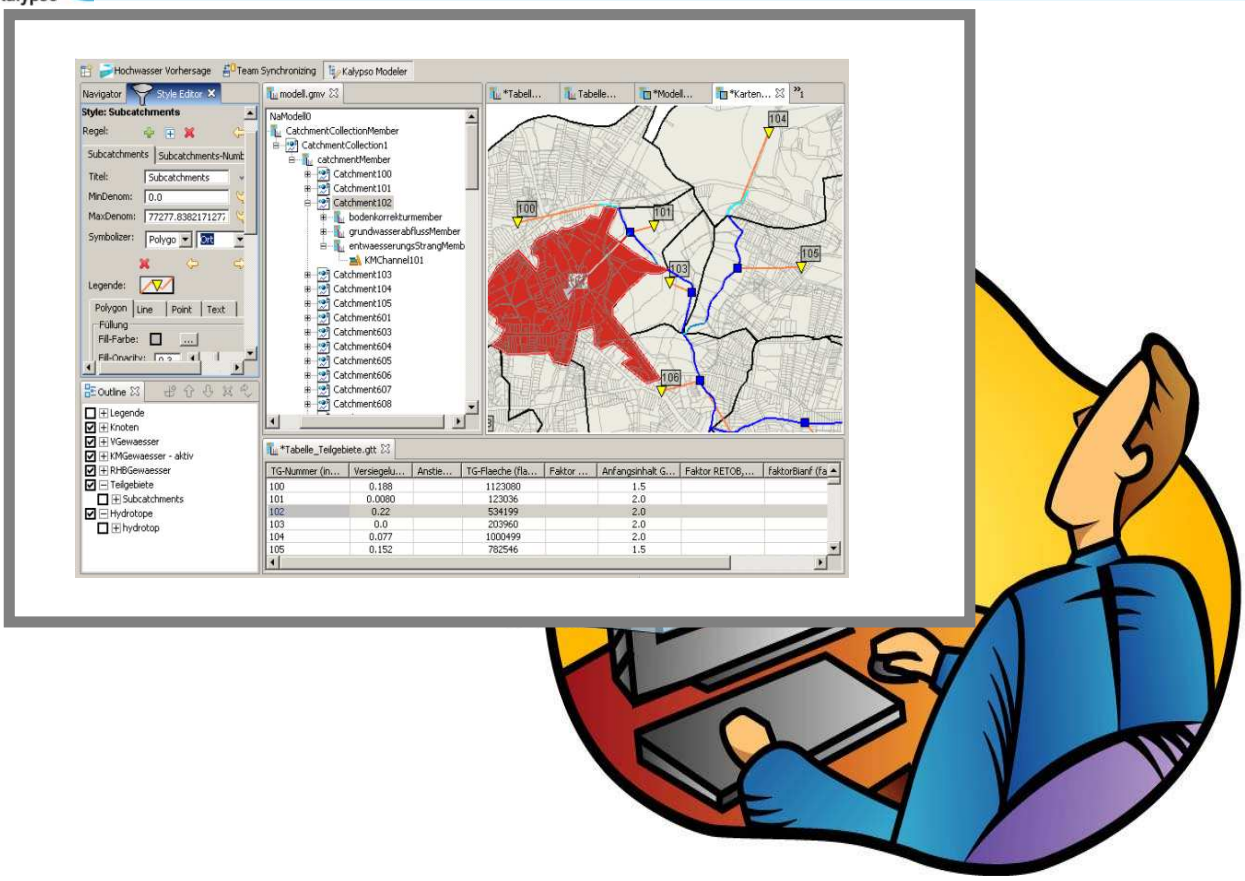
- **Rainfall**
- **Temperature**

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

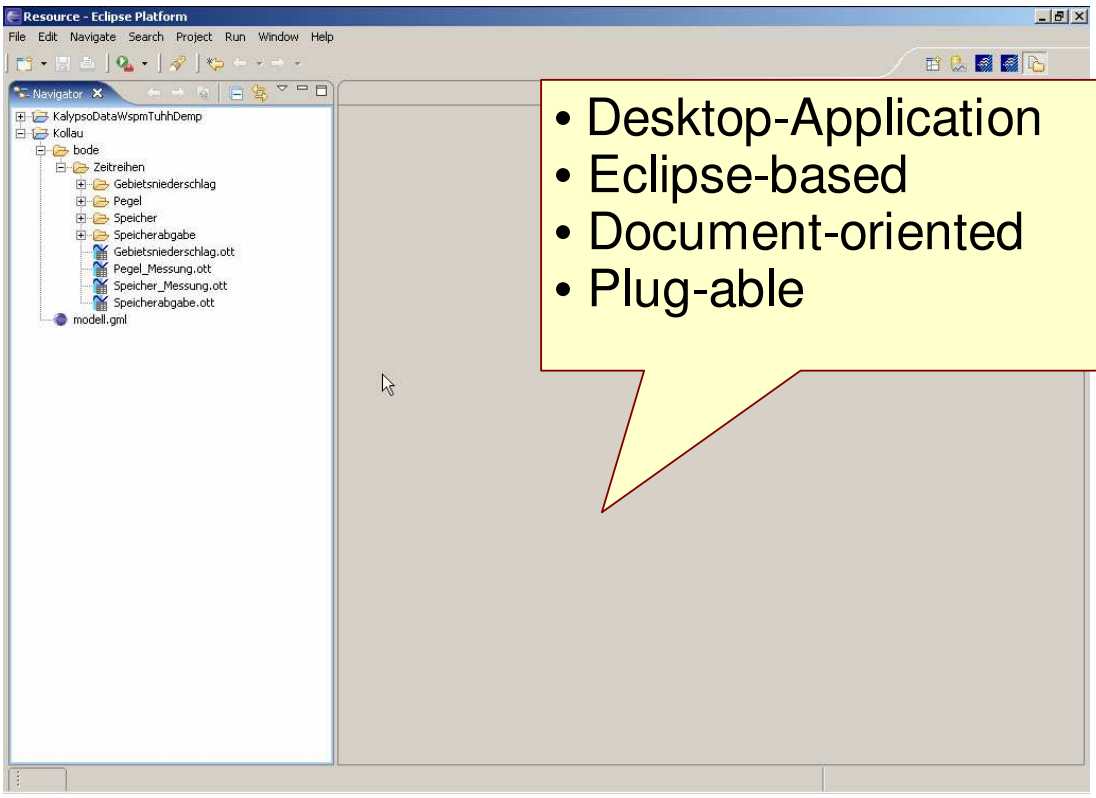
Motivation - avoid zoo of incompatible applications



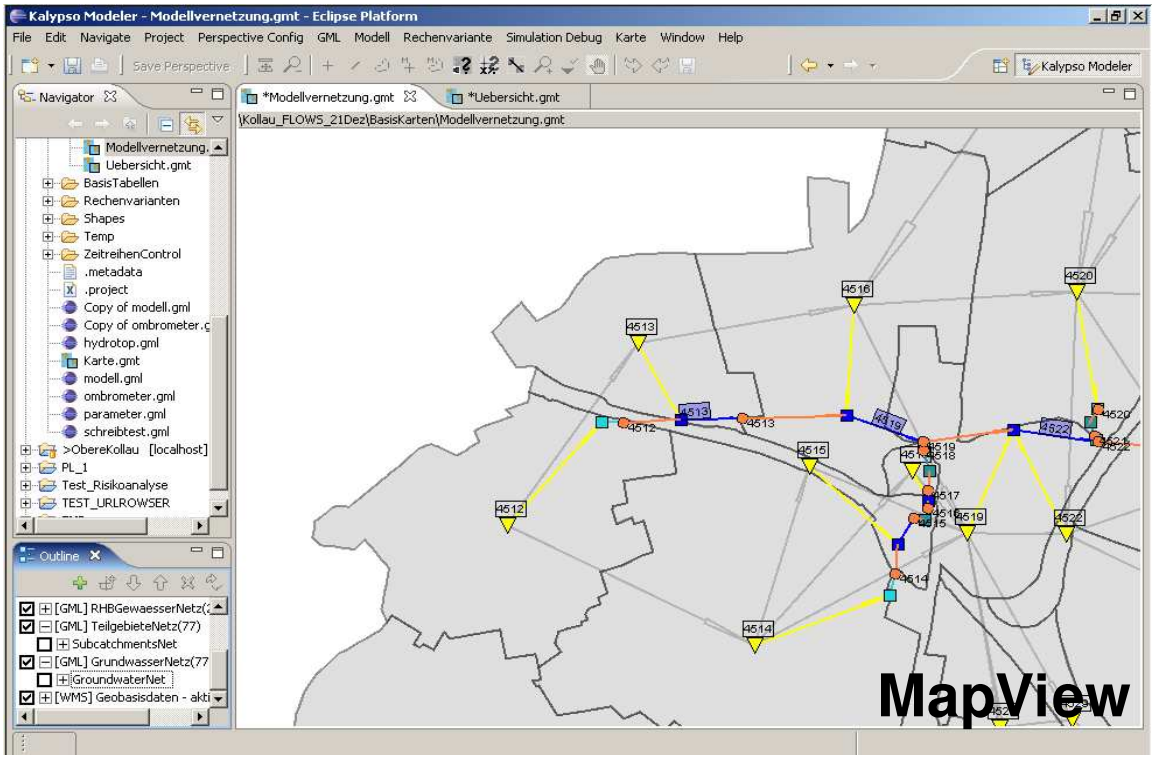
Motivation - Integration, Uniform & Consistent GUI



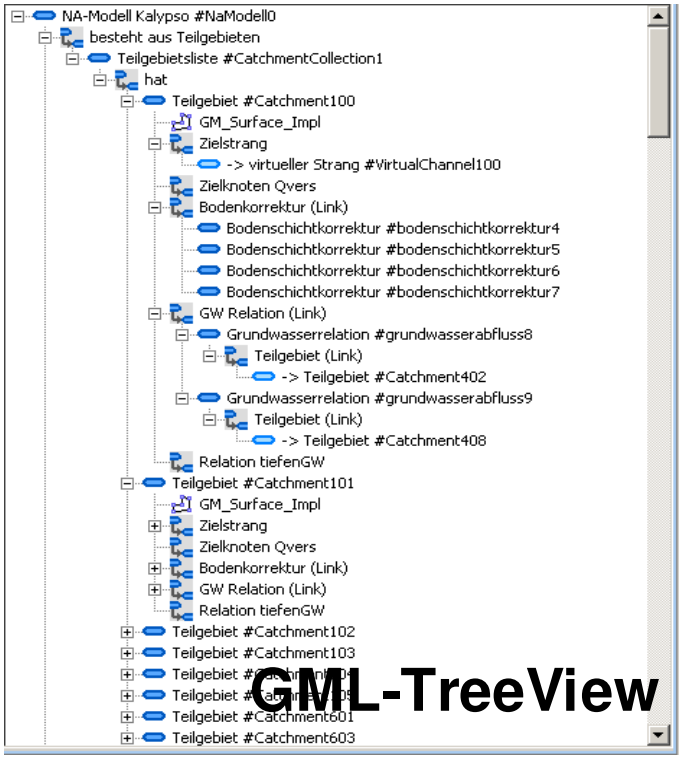
Base Application

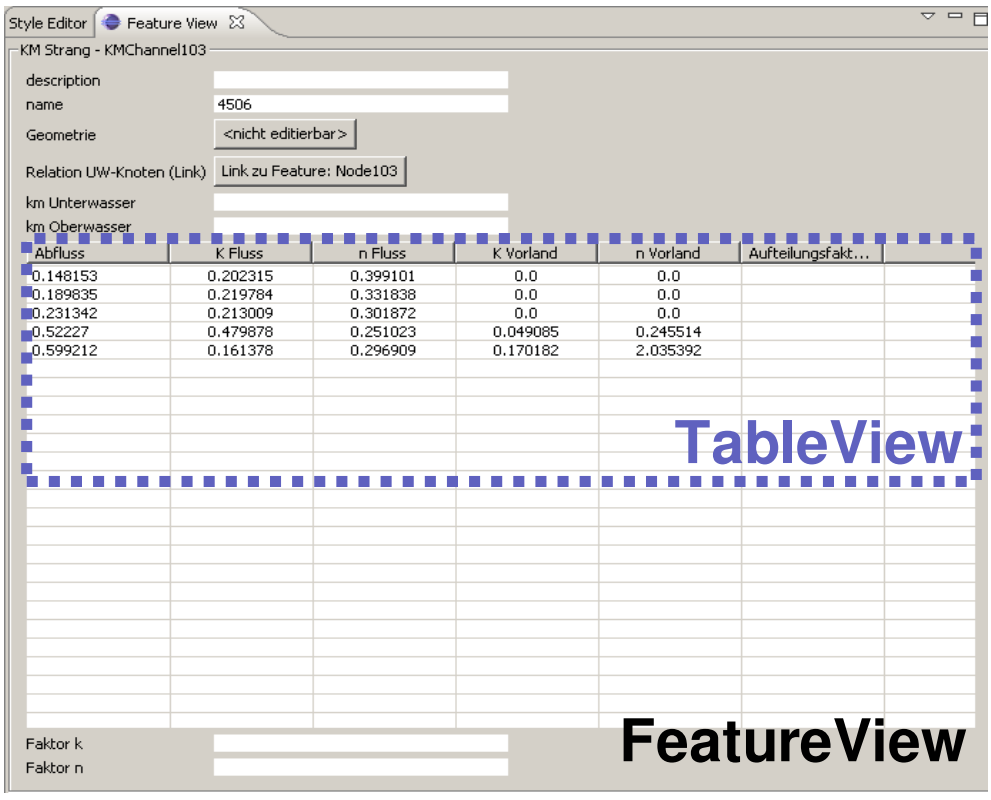


- Desktop-Application
- Eclipse-based
- Document-oriented
- Plug-able

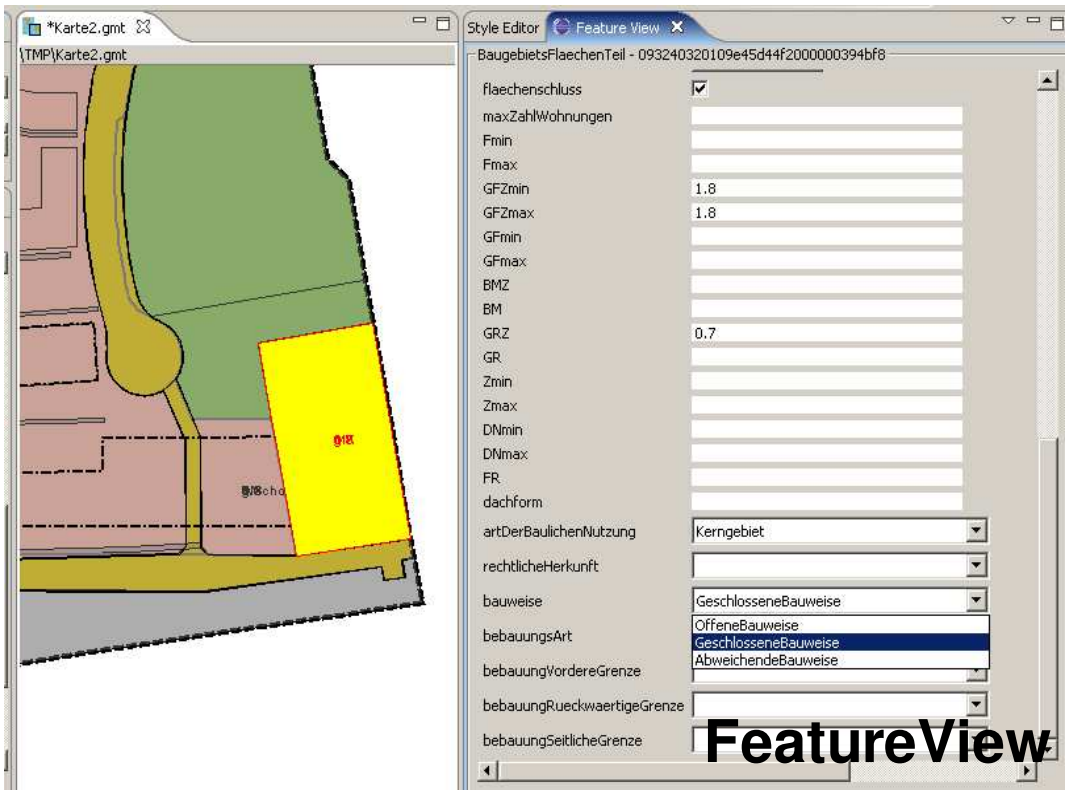


Local and remote (WMS) data

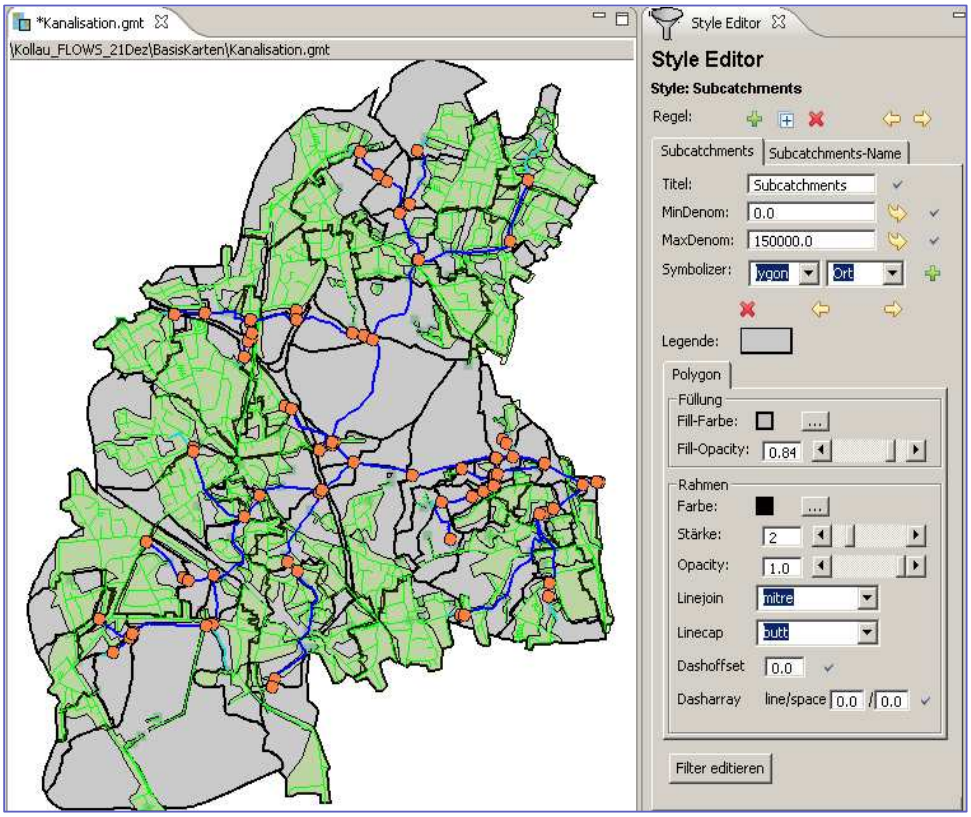

NA-Modell Kalypso #NaModell0
besteht aus Teilgebieten
Teilgebietsliste #CatchmentCollection1
hat
Teilgebiet #Catchment100
GM_Surface_Impl
Zielstrang
-> virtueller Strang #VirtualChannel100
Zielknoten Qvers
Bodenkorrektur (Link)
Bodenschichtkorrektur #bodenschichtkorrektur4
Bodenschichtkorrektur #bodenschichtkorrektur5
Bodenschichtkorrektur #bodenschichtkorrektur6
Bodenschichtkorrektur #bodenschichtkorrektur7
GW Relation (Link)
Grundwasserrelation #grundwasserabfluss8
Teilgebiet (Link)
-> Teilgebiet #Catchment402
Grundwasserrelation #grundwasserabfluss9
Teilgebiet (Link)
-> Teilgebiet #Catchment408
Relation tiefenGW
Teilgebiet #Catchment101
GM_Surface_Impl
Zielstrang
Zielknoten Qvers
Bodenkorrektur (Link)
GW Relation (Link)
Relation tiefenGW
Teilgebiet #Catchment102
Teilgebiet #Catchment103
Teilgebiet #Catchment601
Teilgebiet #Catchment603
GML-TreeView

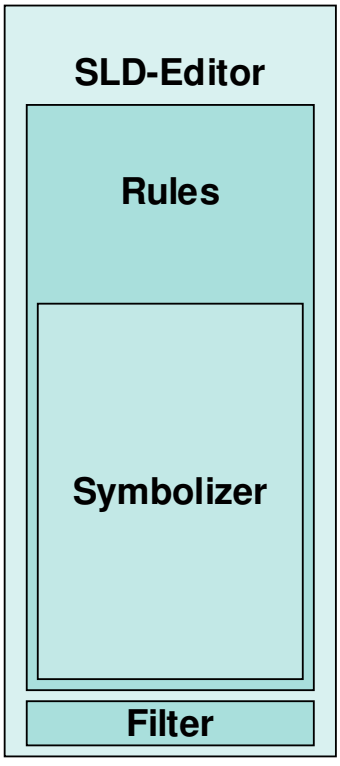

Style Editor
Feature View
KM Strang - KMChannel103
description
name
4506
Geometrie
<nicht editierbar>
Relation UW-Knoten (Link)
Link zu Feature: Node103
km Unterwasser
km Oberwasser
Abfluss
K Fluss
n Fluss
K Vorland
n Vorland
Aufteilungsfakt...
0.148153 0.202315 0.399101 0.0 0.0
0.189835 0.219784 0.331838 0.0 0.0
0.231342 0.213009 0.301872 0.0 0.0
0.52227 0.479878 0.251023 0.049085 0.245514
0.599212 0.161378 0.296909 0.170182 2.035392
TableView
Faktor k
Faktor n
FeatureView

Generic FeatureView

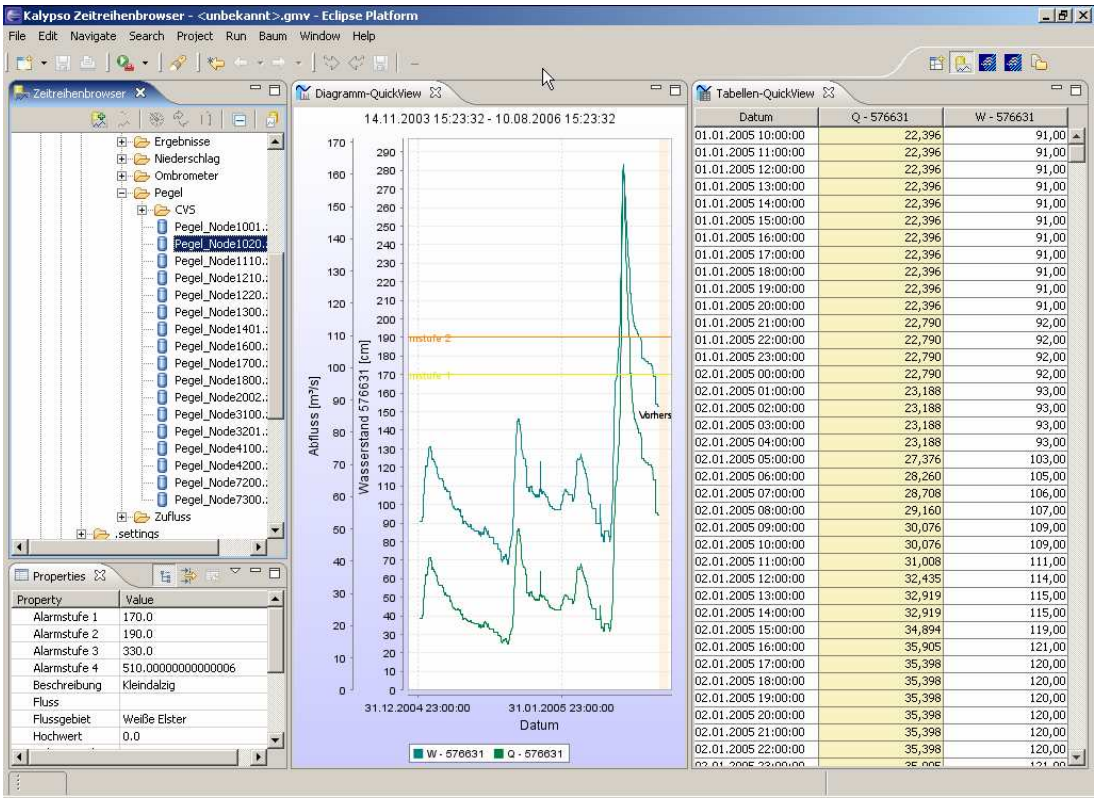


SLD-Editor

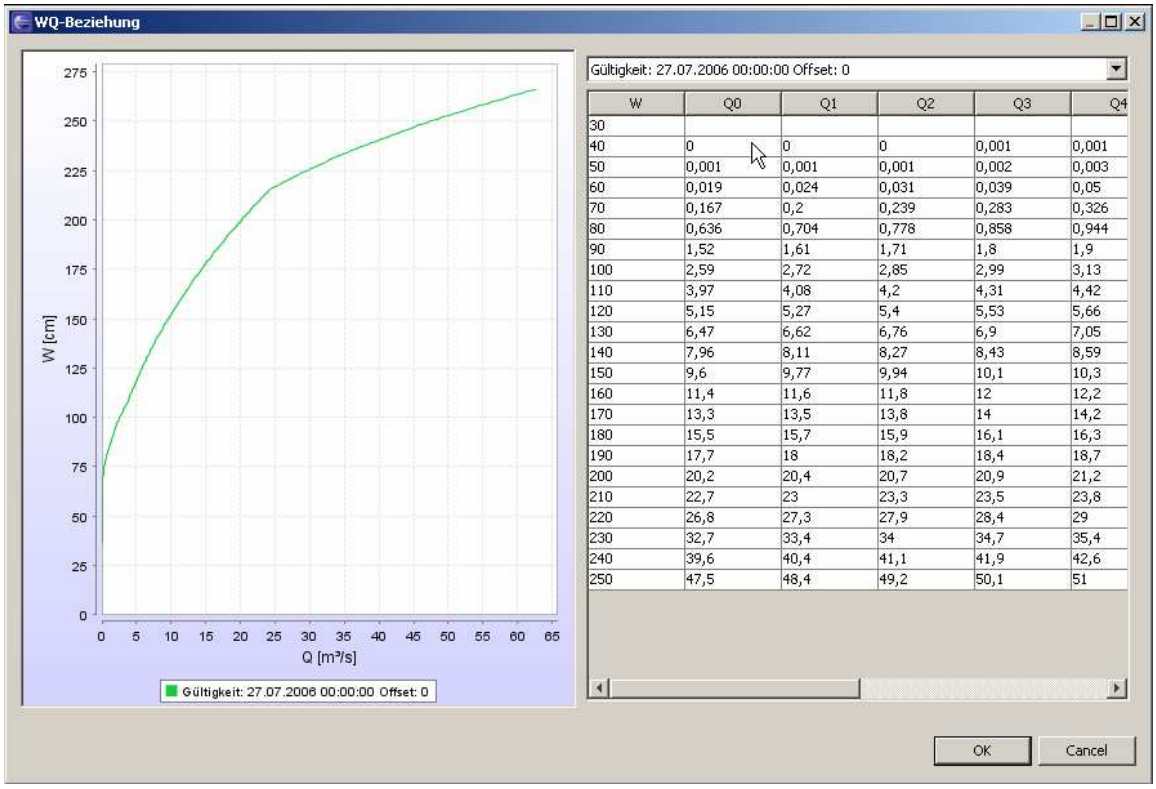




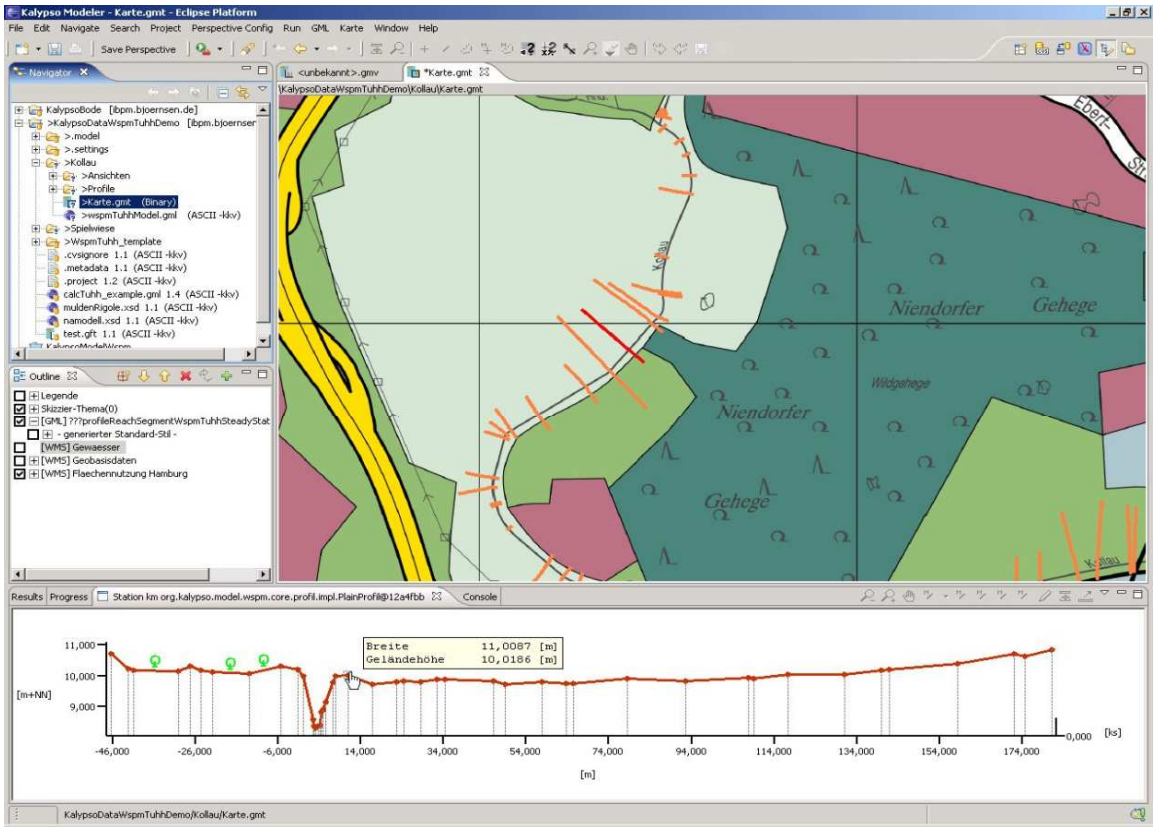
Timeseries Browser



Dedicated Views



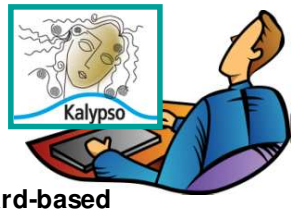
Dedicated view – profile editor



Wizard and Expert Perspectives

Kalypso-Workflow

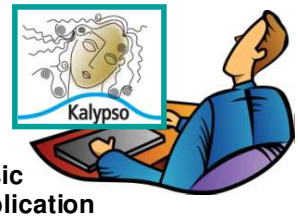
for specific Users
pre-configurated



Wizard-based

Kalypso-Base

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

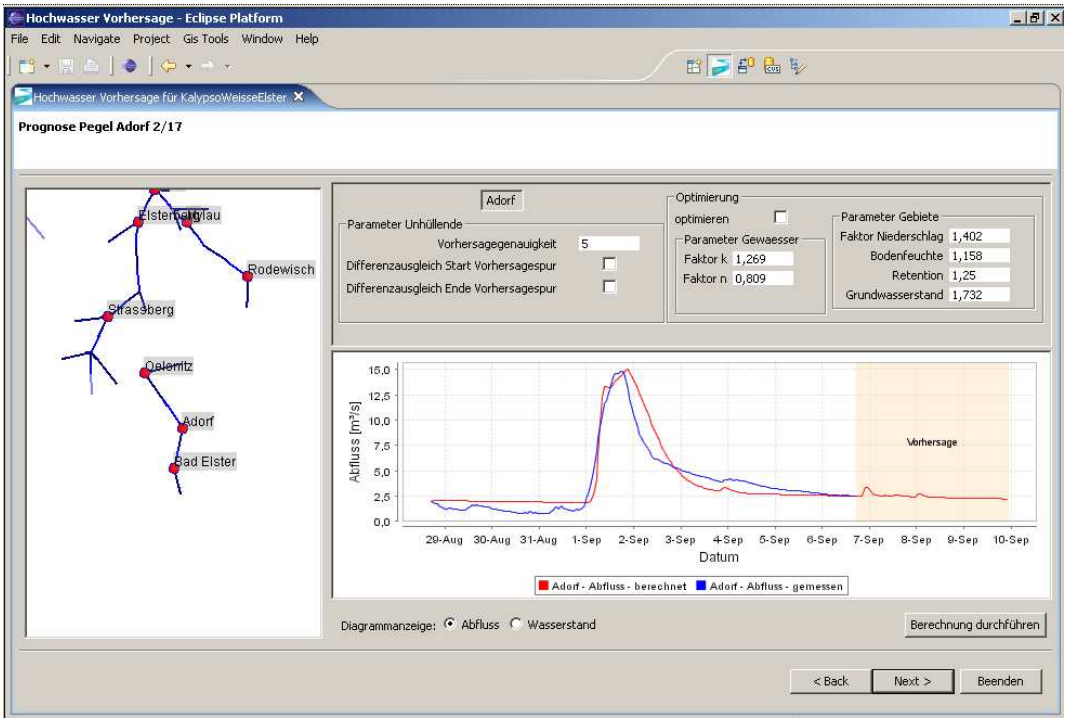


Basic Application

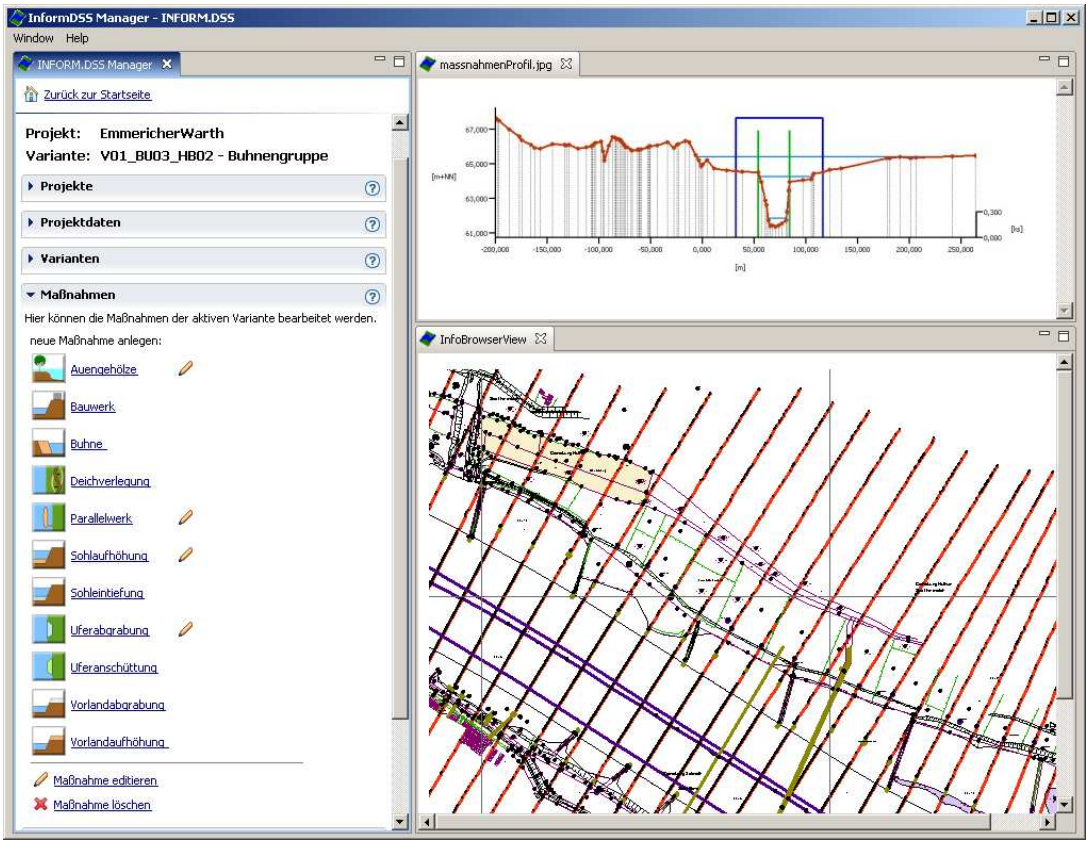
Services

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

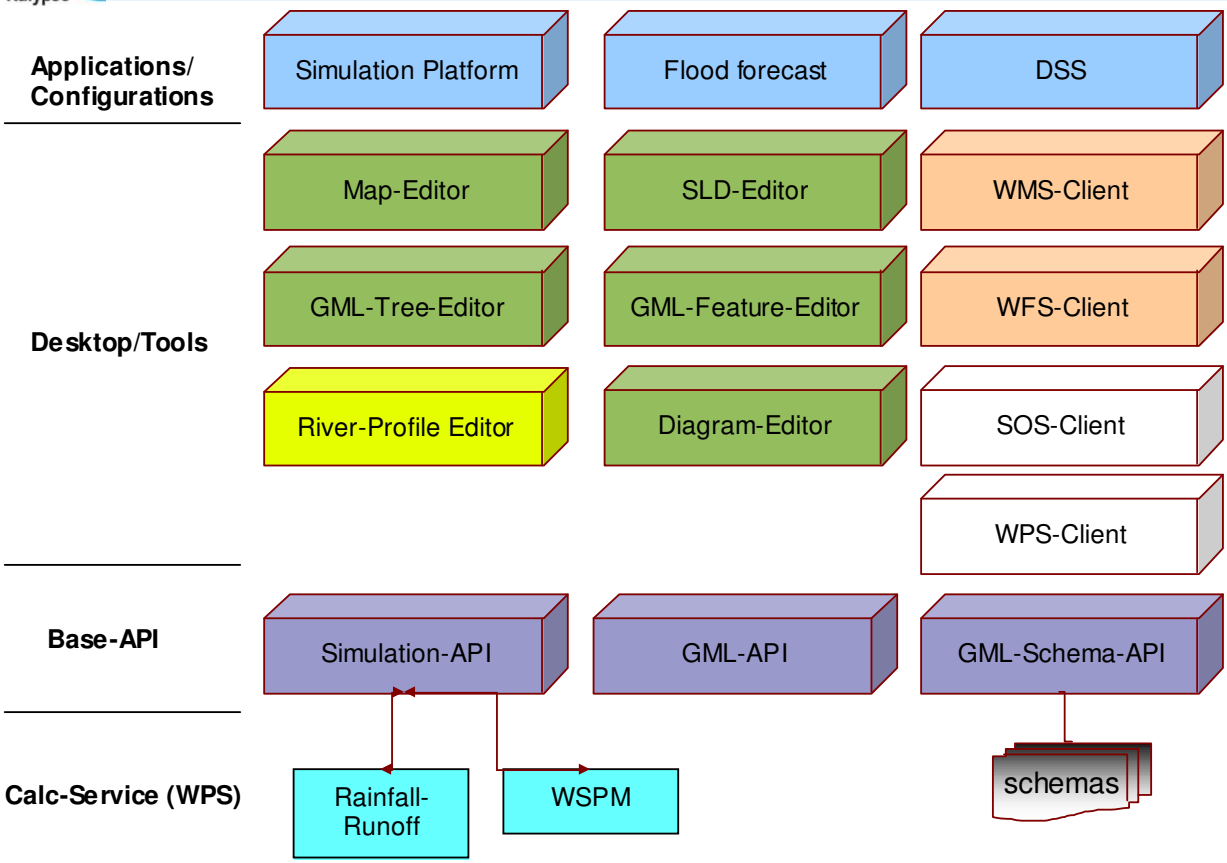
Flood Forecast



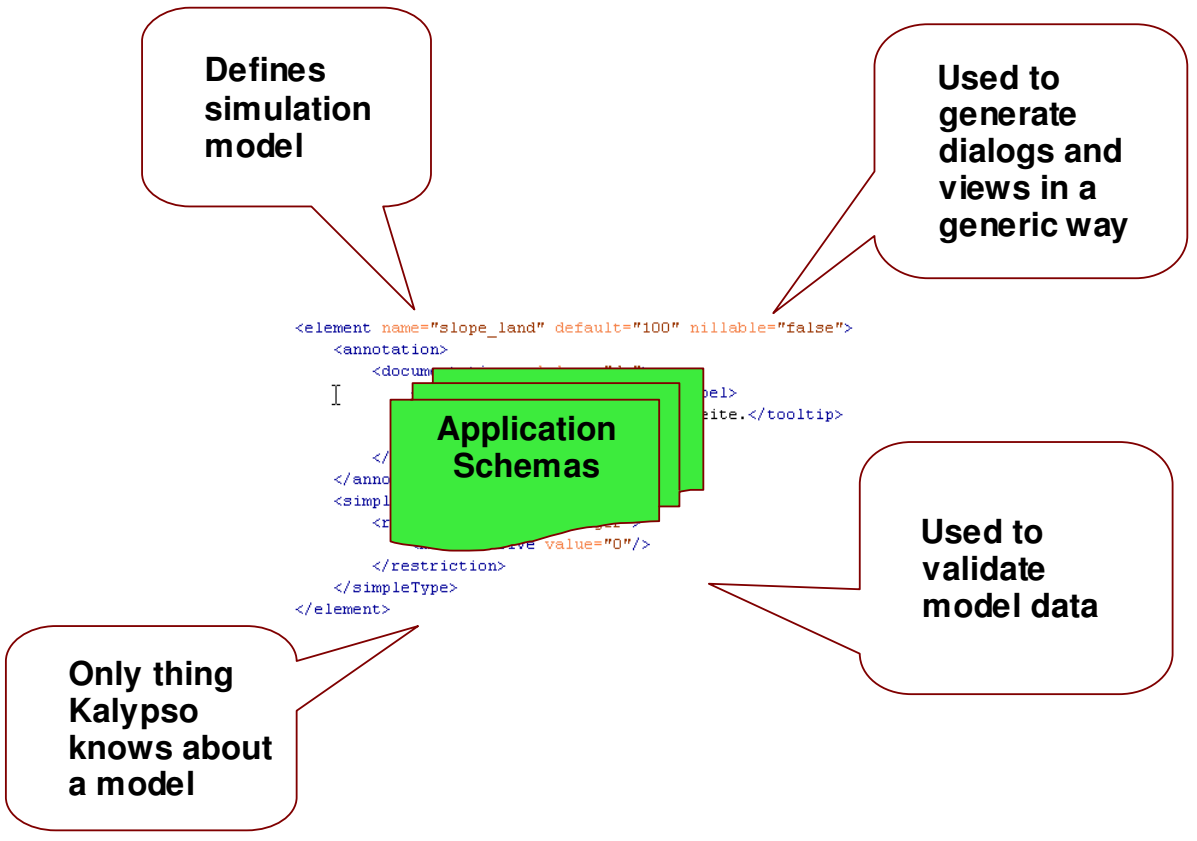
Decision Support Systems



API Components



Modelling & GML: Kalypso inside



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.wsp
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

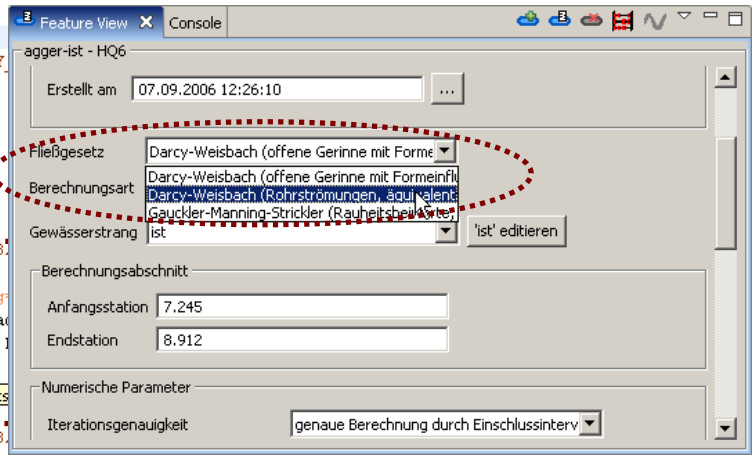
- Schema from local cache
- Schema from catalogue
- Schema via location

GML Support via generic approach

Enumerations

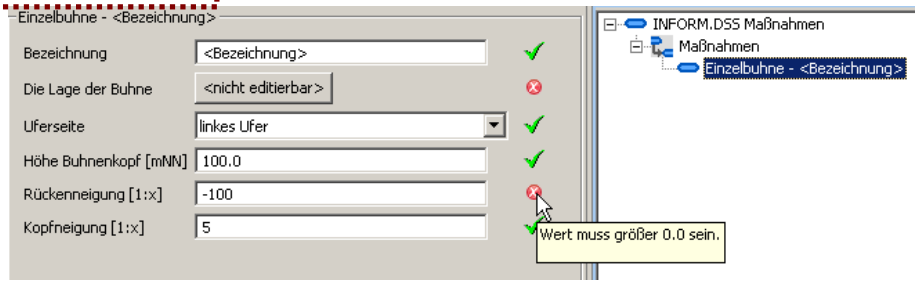
```
<element name="fliessgesetz" default="DARCY
    <annotation>
        <documentation xml:lang="de">
            <label>Fließgesetz</label>
        </documentation>
    </annotation>
    <simpleType>
        <restriction base="string">
            <enumeration value="DARCY_WEISB
                <annotation>
                    <documentation xml:lang
                        <label>Darcy-Weisba
                            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>
```

Defines text comments



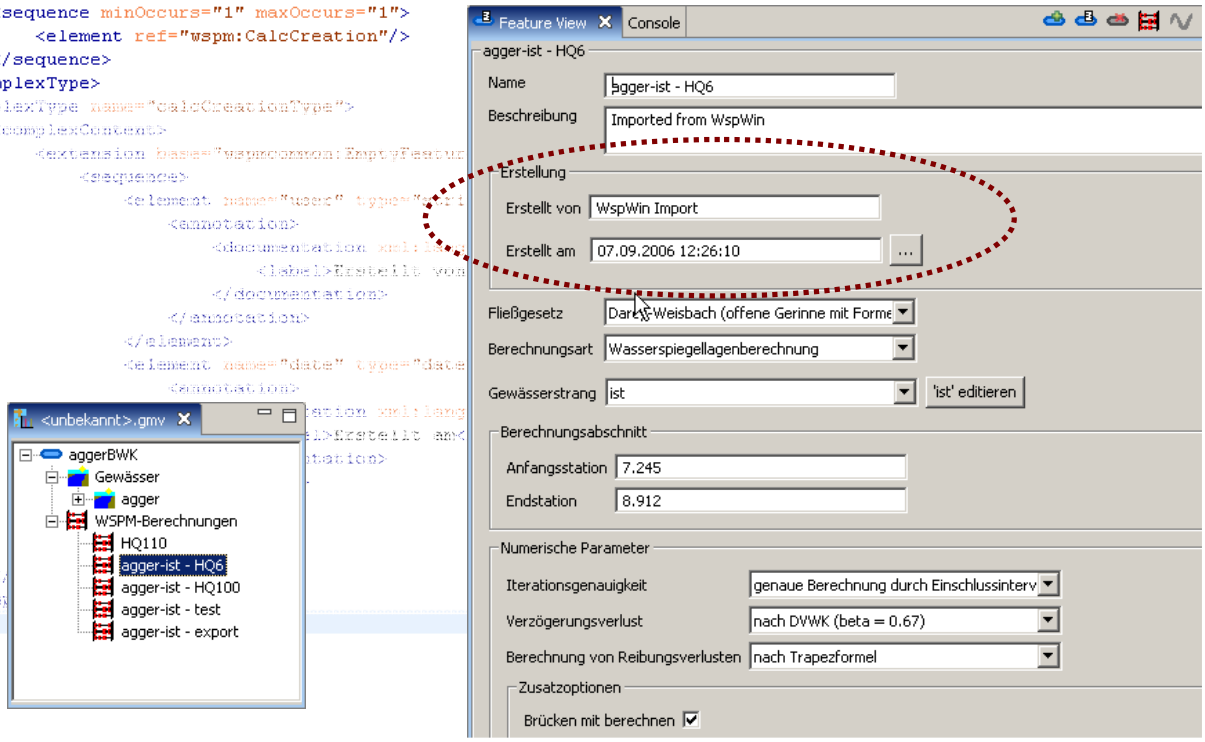
Rule based Validation

```
<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>
```



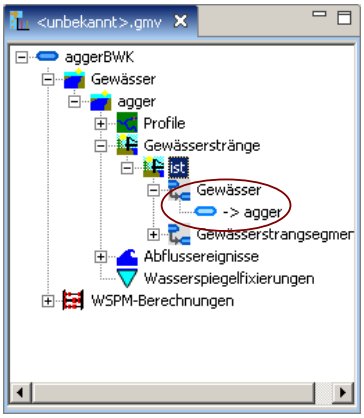
Inlined Features

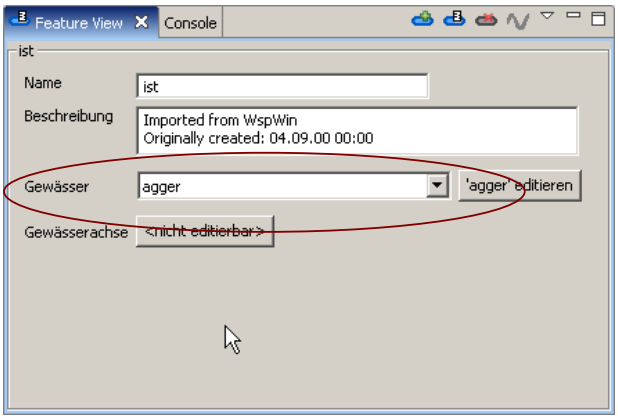
```
<complexType name="calcCreationInlinePropertyType">
    <sequence minOccurs="1" maxOccurs="1">
        <element ref="wspm:CalcCreation"/>
    </sequence>
</complexType>
```



Linked Feature

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





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**

open source

WPS

SOS

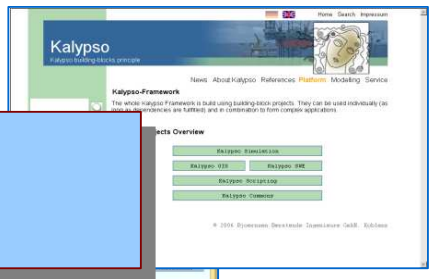
SWE

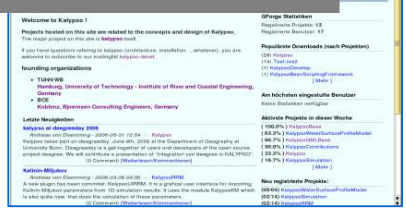
Modelling vs. Workflow

Coupling with Information-Systems

Thank you for attending!

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





BCE BJÖRNSEN BERATENDE INGENIEURE

TUHH WASSERBAU

Who we are...

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