

International Conference

Nature-oriented Flood Damage Prevention
Planning, Evaluation and Communication



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nofdp

nofdp IDSS - an interactive planning and communication software



Part 1: Introduction

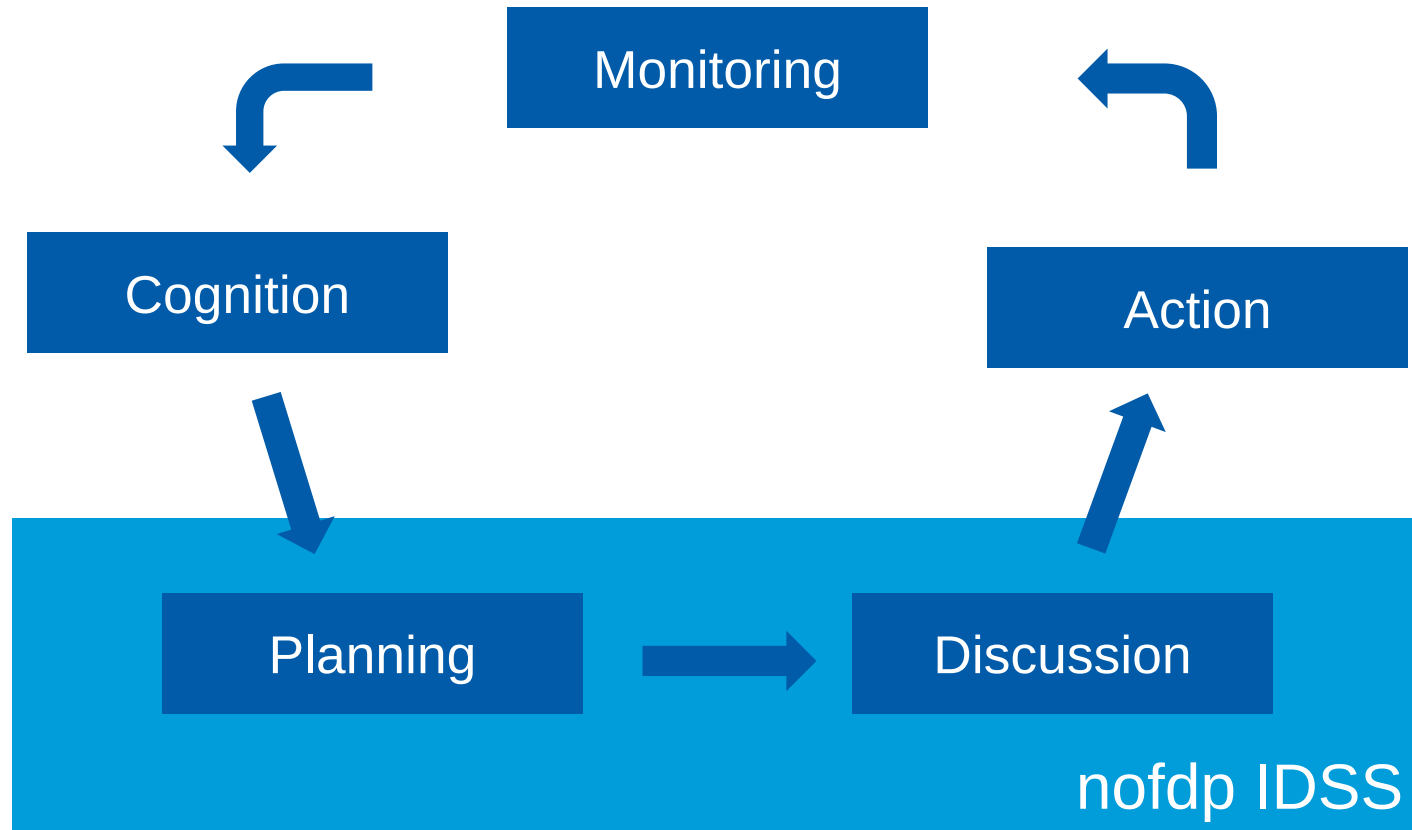
Christoph Hübner



Characteristics of Decision Support Systems

- Support for decision makers in semi-structured and unstructured problems
- Support individuals and groups
- Support for interdependent or sequential decisions
- Support variety of decision processes and styles
- DSS should be adaptable and flexible
- DSS should be interactive and provide ease of use
- Ease of development by (modification to suit needs and changing environment) end users
- Model-, communication-, data-, document-, knowledge-driven

Decision Process



Simon (1960)

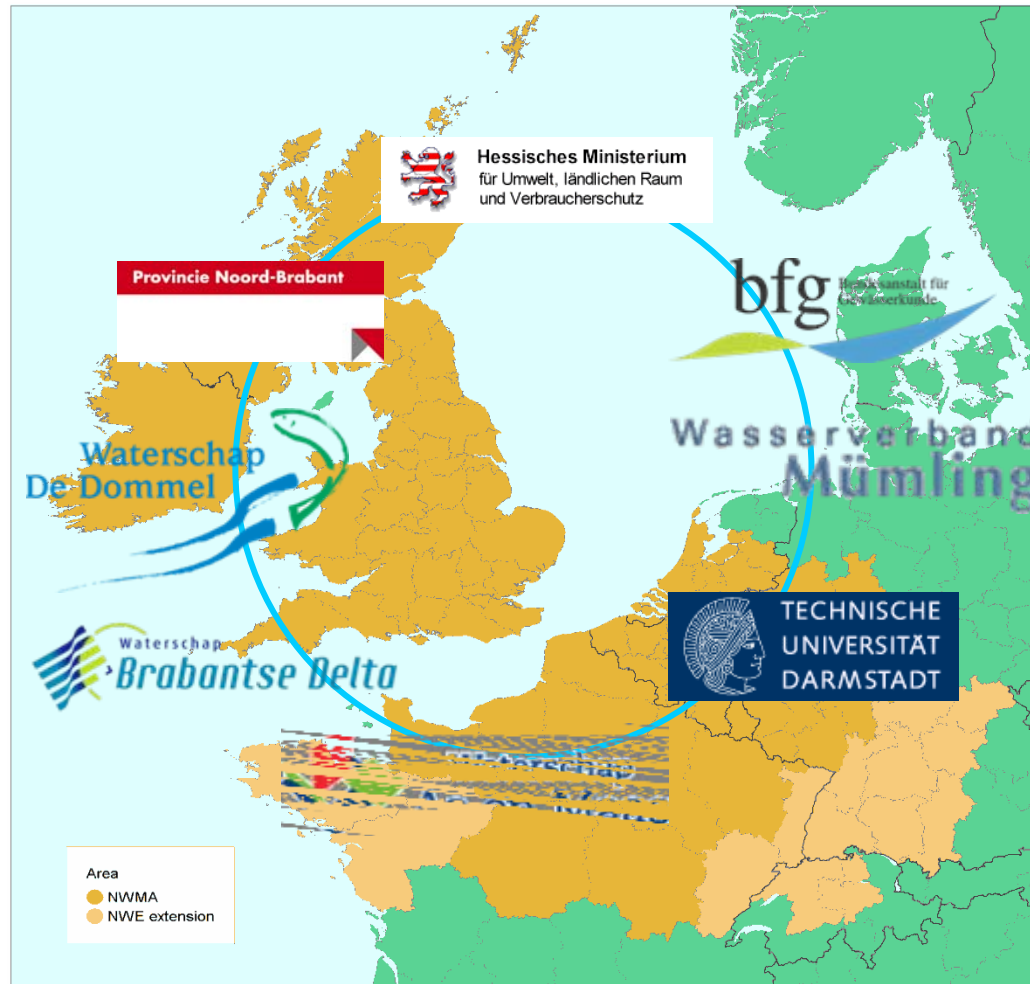
IDSS requirements

- Reliable Results
- Simple and clear demonstration of results
- Not make decisions, but deliver information
- Multicriteria Evaluation
- Support discussions
- Maximum on transparency
- Model-, communication- and data-driven
- Standalone
- Free of charge

IDSS Concept Development



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Implemented by:



Objective



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The overall objective of the project is to:

develop a computer based decision support system

**that provides the information required,
as well as suitable models and methods**

**to demonstrate the expected function
of flood prevention measures / projects**

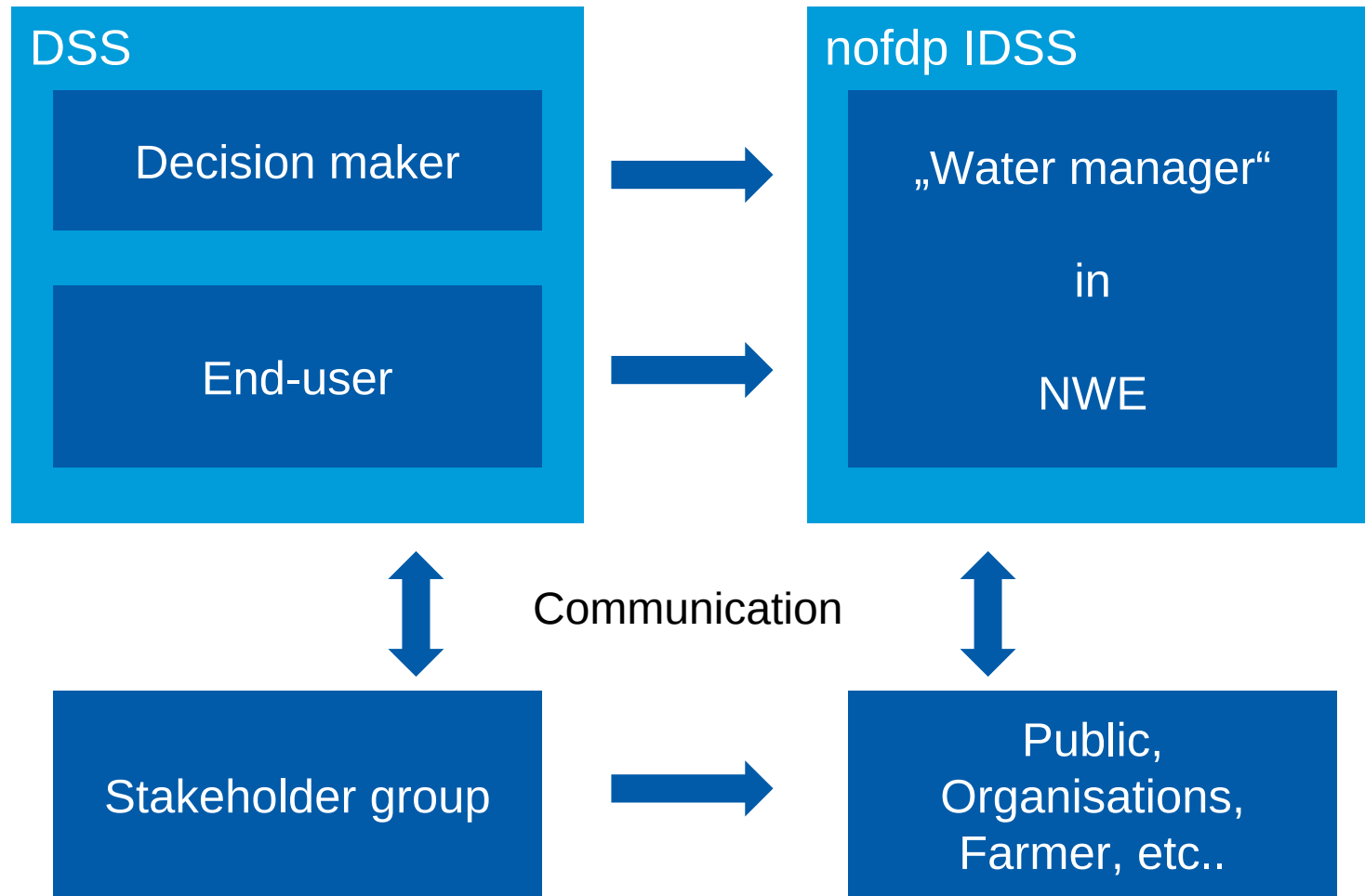
on different scales, in an integrated temporal



Stakeholder and user



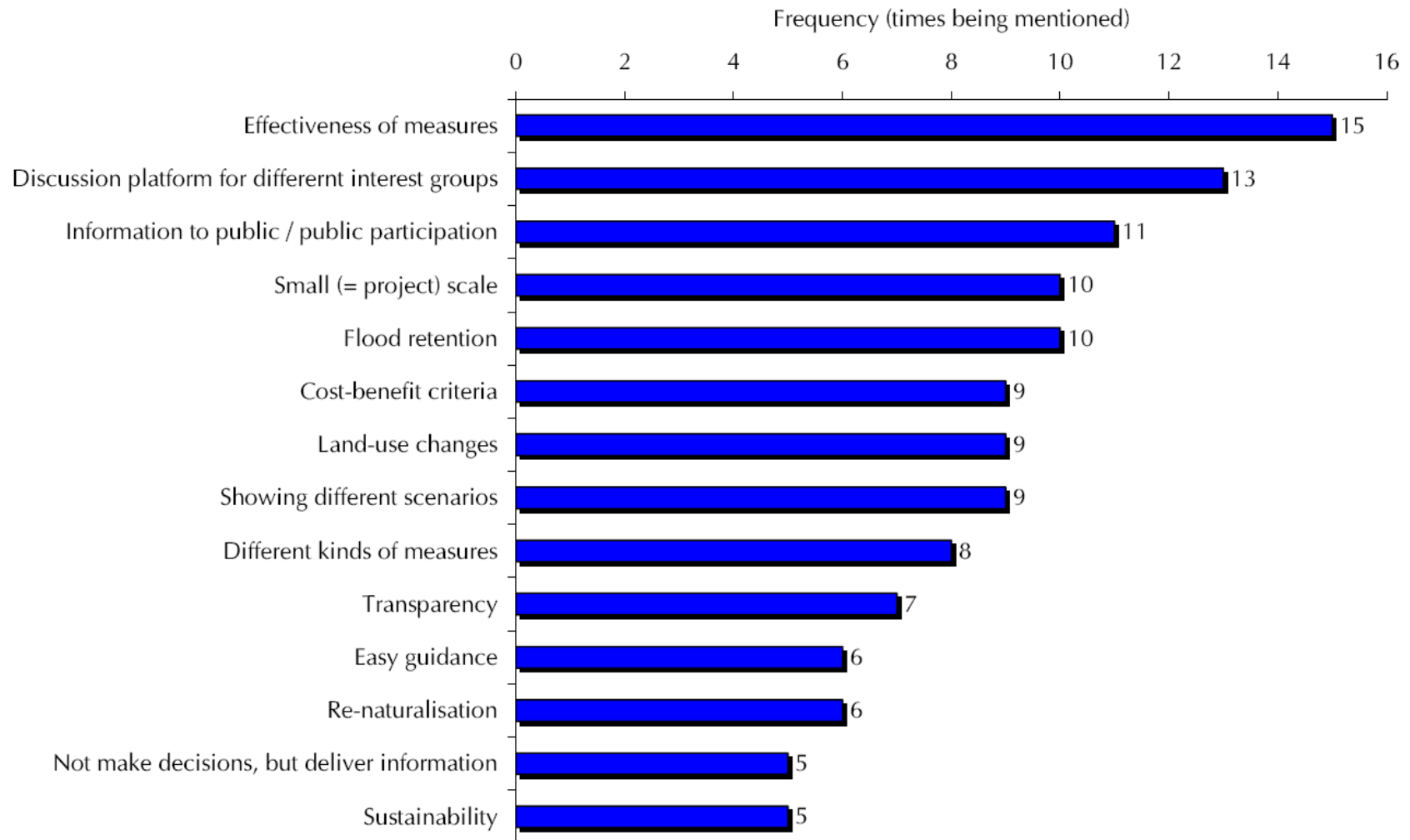
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End-user demands



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Measures



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Category	Sub-category	Measure
Constructive Measures	Flood retention	Polder
		Retarding basin (controlled and uncontrolled)
		Excavation works within floodplains
		Lowering floodplains
	Hydraulic conveyance capacity	Bank recession and –fill up
		Change of bottom slope or level
		Obstacles and line-structures on floodplains
		Diversion flood discharge
		Weirs
	Activation of retention area	Relocation of dykes
		Earth walls in the valley
Measures of nature conservancy and spatial planning	Flood protection	Construction of dykes, increasing dyke height
		Mobile walls for local flood protection
	Flood retention	Ecological flooding of floodplains and polders
	Hydraulic conveyance capacity	Establishment of buffer strips with free vegetation succession on river banks
		Meandering of river course (controlled and uncontrolled)
	Activation of retention area	Adapted forest management
		Forest development on floodplains (controlled and uncontrolled)
		Adapted cultivation on floodplains
		Zoning plan modifications
	Flood protection	Urban land use planning -precautionary measures against flood damage

Management levels

Time horizon of
decisions

Management
levels

Characteristics of
present information

nofdp-DSS

long-term

Planning

external, aggregated,
prognostic,
unstructured,
uncertain

medium-term

Management



short-term

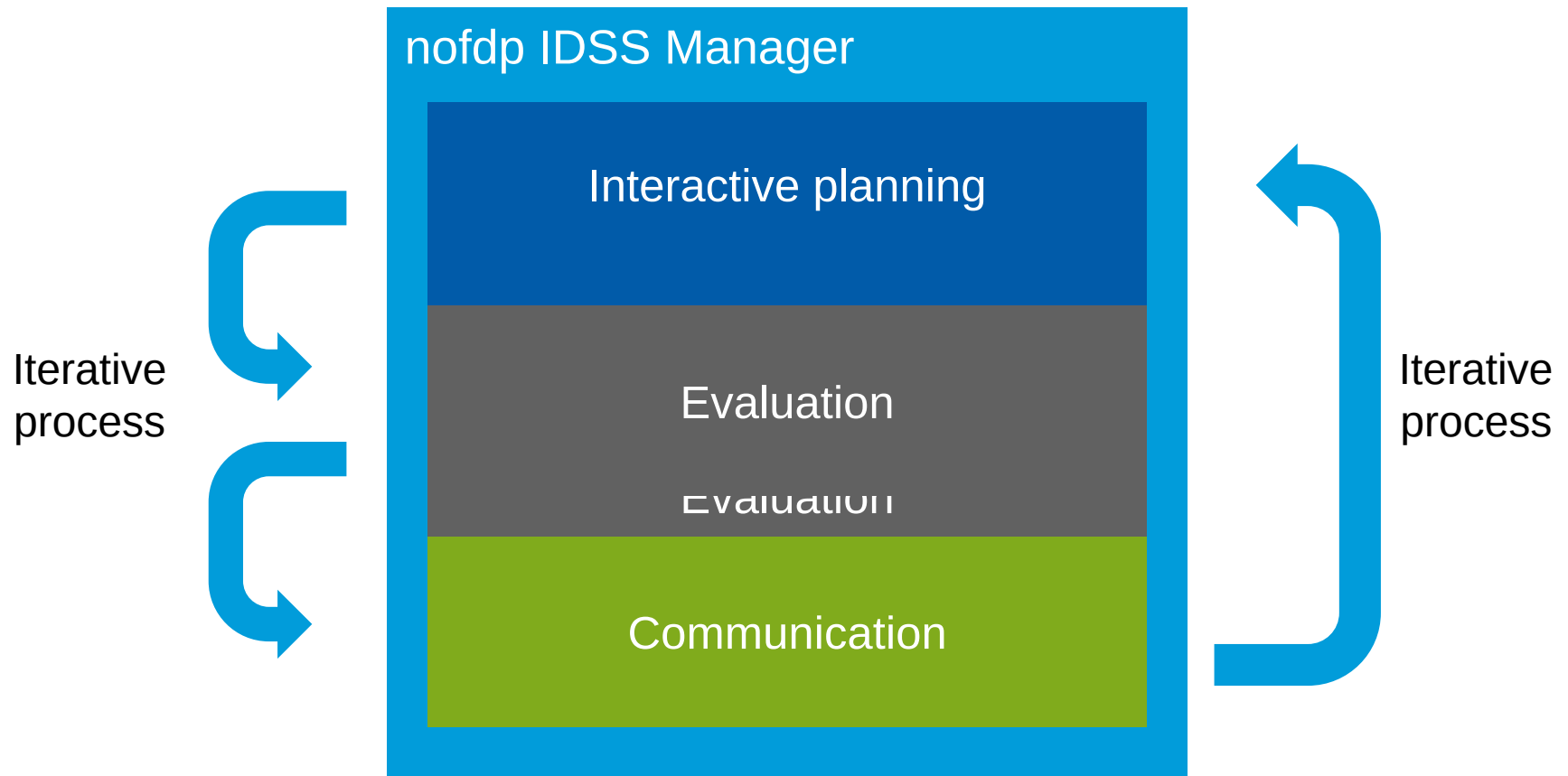
Concrete Measures

internal, detailed,
Field Data, structured,
rel. certain

Interactive planning



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Conclusions



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- Decision Support for planning of flood control measures and variants
- The nofdp IDSS is transferable to other catchments, up to 50 km length
- Existing and therefore validated data can be used by the system
- Information and data can be prepared transparent
- Interactive planning and decision process is supported
- Planning variants can be evaluated and discussed
- Modular structured, for interdependent or sequential decisions



Fin



*Thank you very
much*

*for your
attention!*

www.nofdp.net

www.riverscape.eu

[www.ihwb.tu-
darmstadt.de](http://www.ihwb.tu-darmstadt.de)

International Conference

Nature-oriented Flood Damage Prevention
Planning, Evaluation and Communication



nofdp IDSS - an interactive planning and communication software



Part 2: Implementation

Dr. Kaj Lippert



German and Dutch Co-operation



<http://www.bjoernsen.de/>



<http://www.deltares.nl/>

Design and Development of
Graphical User Interface and
Modules / Tools

Implementation of

SOBEK and 
OpenMI



Content



- Dilemma of the Developer
- Software Architecture (Open Source)
- User-Friendly Design (Plug and Play?)
- Data Management (High Degree of Freedom)
- How to Get Started
- IDSS Highlights
- Release 1.0



Dilemma of the Developer



The nofdp IDSS should be:

- a multitasking talent
- a system with high degree of freedom
- a plug and play system
- open source
- free of charge (... for the End User)



Software Architecture



external programs



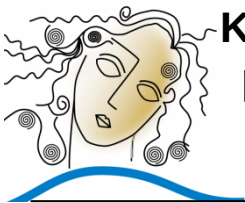
IDSS modules

Project Setup	Analysis	Interactive Planning	Evaluation	Communication
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IDSS tools

Geodata import	ISAR Web	Conflict detection	Ranking	Screenshot
Cross section	ISAR Appl.	Measure construction	Rating	Report
Time series	Vegetation	Hydraulic comp.	Cost-Effectiveness	Export
Flow network	Water Storage	Variant manager	Cost Benefit	Google Earth

Kalypso Enterprise plugins and views



navigator GIS desktop (map view, style editor) table view chart view tree view time series manager (connected to GIS) cross section manager (connected to GIS)



Development Framework



reporting



*

hydraulic computation



*

SLD, filter encoding
map rendering,
coordinate transformation
WMS, ...



*

geometric operations



*

basic application



*

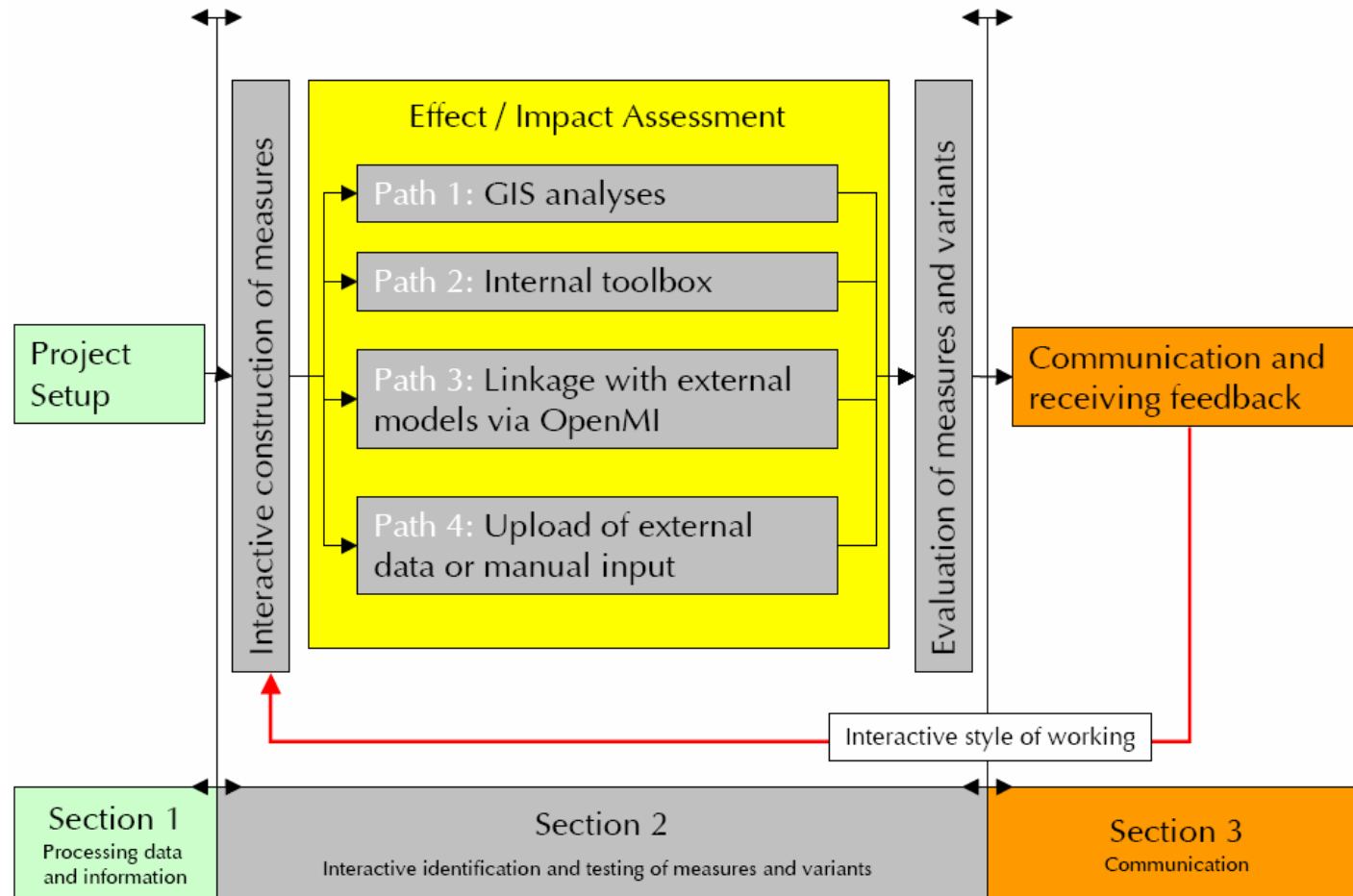
Registered Trademark*



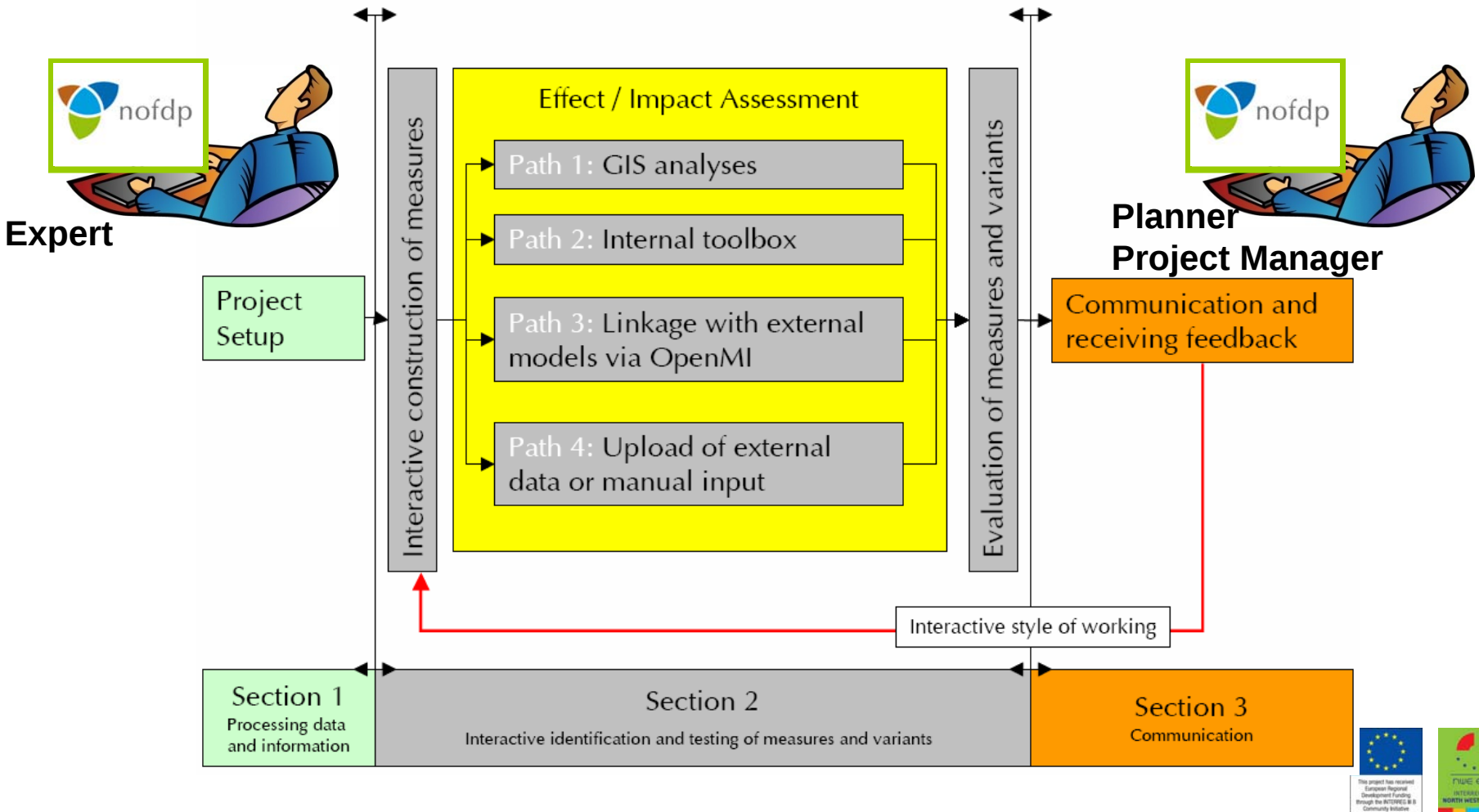
nofdp IDSS: The Five Headed Monster?



Procedure of Using the nofdp IDSS



Outcome of 2nd user workshop, Cologne 2006



User Profiles and Tasks



Interactive Planning, Evaluation and Communication

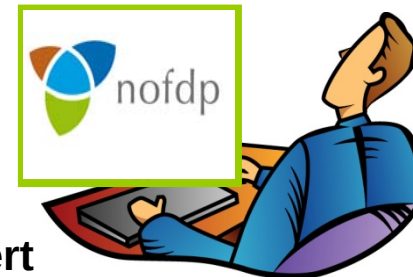
User with basic knowledge
concerning GIS and modeling.
Familiar with Office, Internet,...



**Planner
Project Manager**

Project Setup and Analysis

Experienced user in processing of
geodata and modeling
(hydraulic and environmental)



Expert



IDSS User Interface: Navigation



Project: Mümling - Example Project

PROJECT SETUP

- Geodata Import
- Cross Section Manager
- Time Series Manager
- Flow Network Setup

ANALYSIS TOOLS

- ISAR Web
- ISAR Application
- Vegetation Suitability
- Water Storage Suitability

INTERACTIVE PLANNING

- Conflict Detection**
- Variant Manager
- Flood Risk
- Measure Construction
- Hydraulic Computation
- Inundation Duration

EVALUATION

- Ranking
- Rating
- Cost-Effectiveness Analysis
- Assessment Manager
- Value Benefit Analysis

COMMUNICATION

- Screenshot Manager
- Google Earth (TM) Interface
- Report Manager
- Export Manager

Conflict Detection

Provides an overview on possible conflicts and existing restraints as well as opportunities for water storage and natural development at a regional scale by overlaying topical maps. Choose a conflict detection from the catalog of predefined items or define a new conflict detection. Use the results as background information for "Measure Construction."

Conflicts

- Corine vs. Inundation Area**

Conflict Detection

Conflict: Corine vs. Inundation Area

Category

Geodata Set

Dataset Attribute

Determine Combinations of Conflict Attributes

List of Conflicts:

Land-Use (Corine)	Inundation Area	Conflict
Discontinuous urban fabric	inundated	high
Industrial or commercial units	inundated	very high
Non-irrigated arable land	inundated	medium
Pastures	inundated	low
Complex cultivation patterns	inundated	medium
Land principally occupied by agriculture, with significance	inundated	low
Coniferous forest	inundated	low
Mixed forest	inundated	low

Generate Conflict Map

Conflict Detection

Outline (conflict)

- ☒ conflict
- ☐ none
- ☐ low
- ☐ medium
- ☐ high
- ☐ very high
- ☐ not yet considered
- ☐ no data
- ☒ Scale
- ☒ Mümling
- ☒ Orthophoto

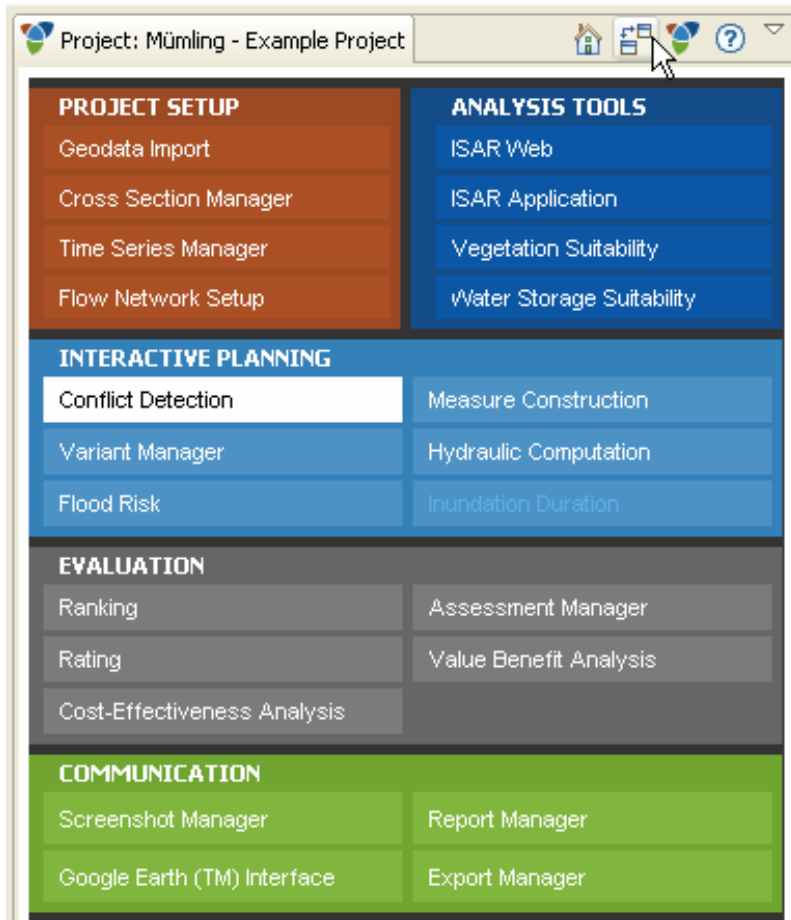
3499699.83 | 5507130.18 | Scale 1 : 9180



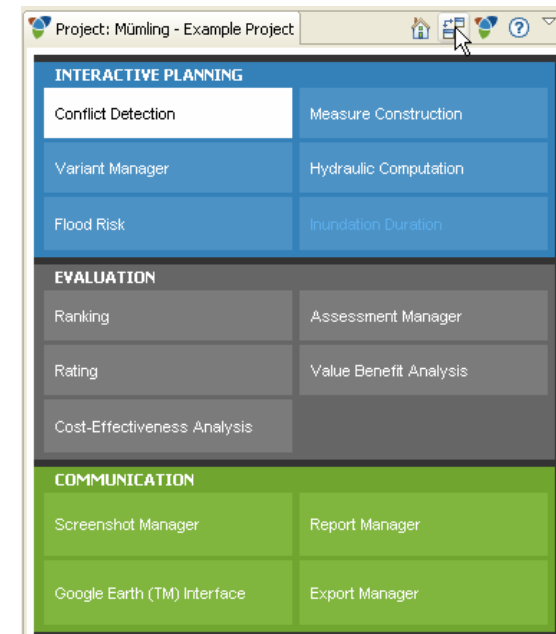
IDSS User Interface: Expert vs. Planner



„fat“ Expert



„thin“ Planner



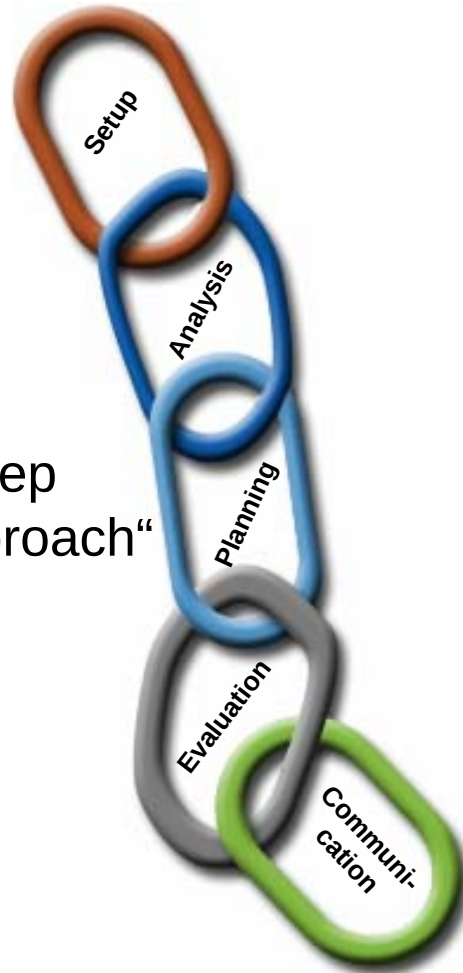
supported data types

- Geodata
 - SHAPE data (SHP format)
 - Raster data (ASC format)
 - Image data, geo-referenced (e.g. orthophotos, topographical base maps)
 - GeoTIFF
 - TIFF with World file (TFW)
 - JPEG with World file (JGW, JPW)
- Cross Section data as special geodata
 - ASCII format (XYZ format)
- Time series data
 - ASCII format (selectable delimiter and date format)
 - ZML format (internal time series format, XML)

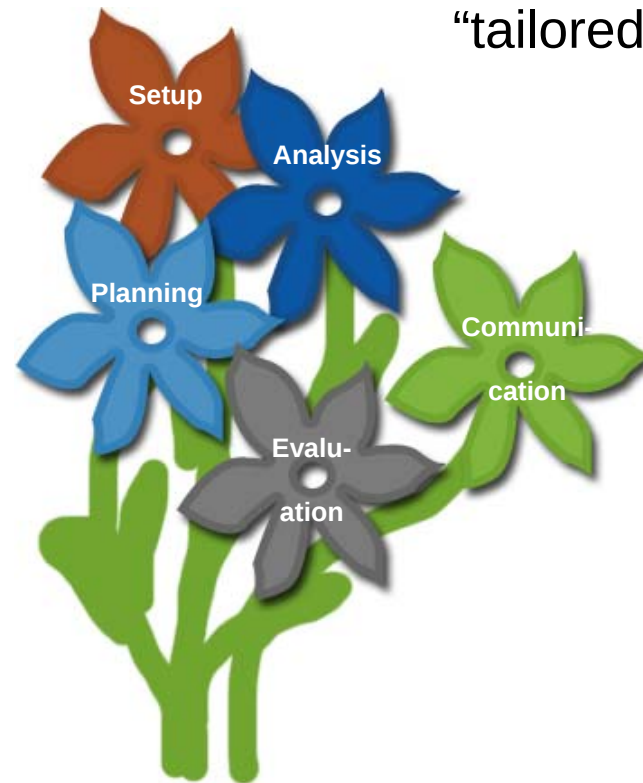
data categories

-  nofdp category
-  nofdp verified image file
-  nofdp verified raster file
-  nofdp verified shape file
-  user category
-  image file
-  raster file
-  shape file

How to Get Started



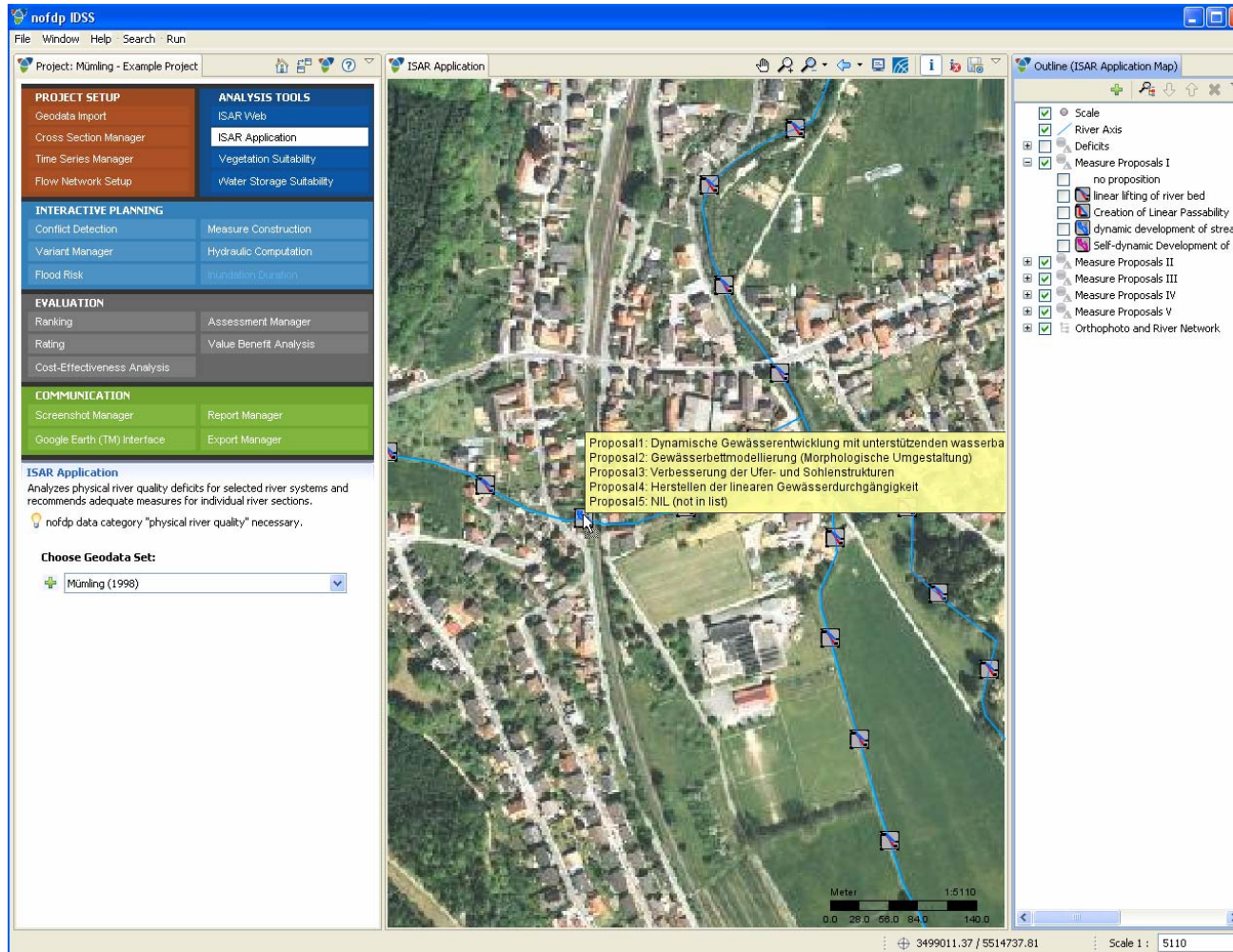
step by step
“workflow approach”



“tailored approach”



Use Case No. 1: Analysis of Hydromorphological Conditions



Use Case No. 2: Calculation of Flood Damage and Risk Mapping



nofdp IDSS

File Window Help Search Run

Project: Mümling - Example Project

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- Google Earth (TM) Interface

Flood Risk

Identification of risk-zones based on a land-use mapping and water depths of different annuality.

Results

- Copy of Corine - Germany - Hessen
- Copy of Corine - Germany - Hessen

Inundation Risk Setup

Land Use

- Land-Use
- Corine
- CORINE
- Muemling Corine Landnutzung
- Muemling korrigierte Landnutzung
- Vegetation Structure, successional stage and land-use
- Mümling

Inundation Geodata Sets

- Annuality: 1
- Annuality: 2
- Annuality: 5
- Annuality: 18
- Annuality: 50
- Annuality: 100

Variant Measures Relevant to the Flood Risk

Start Flood Risk Computation

Flood Risk

Flood Risk Statistic Result

Outline (Flood Risk)

Result of Flood Risk Template: Cop

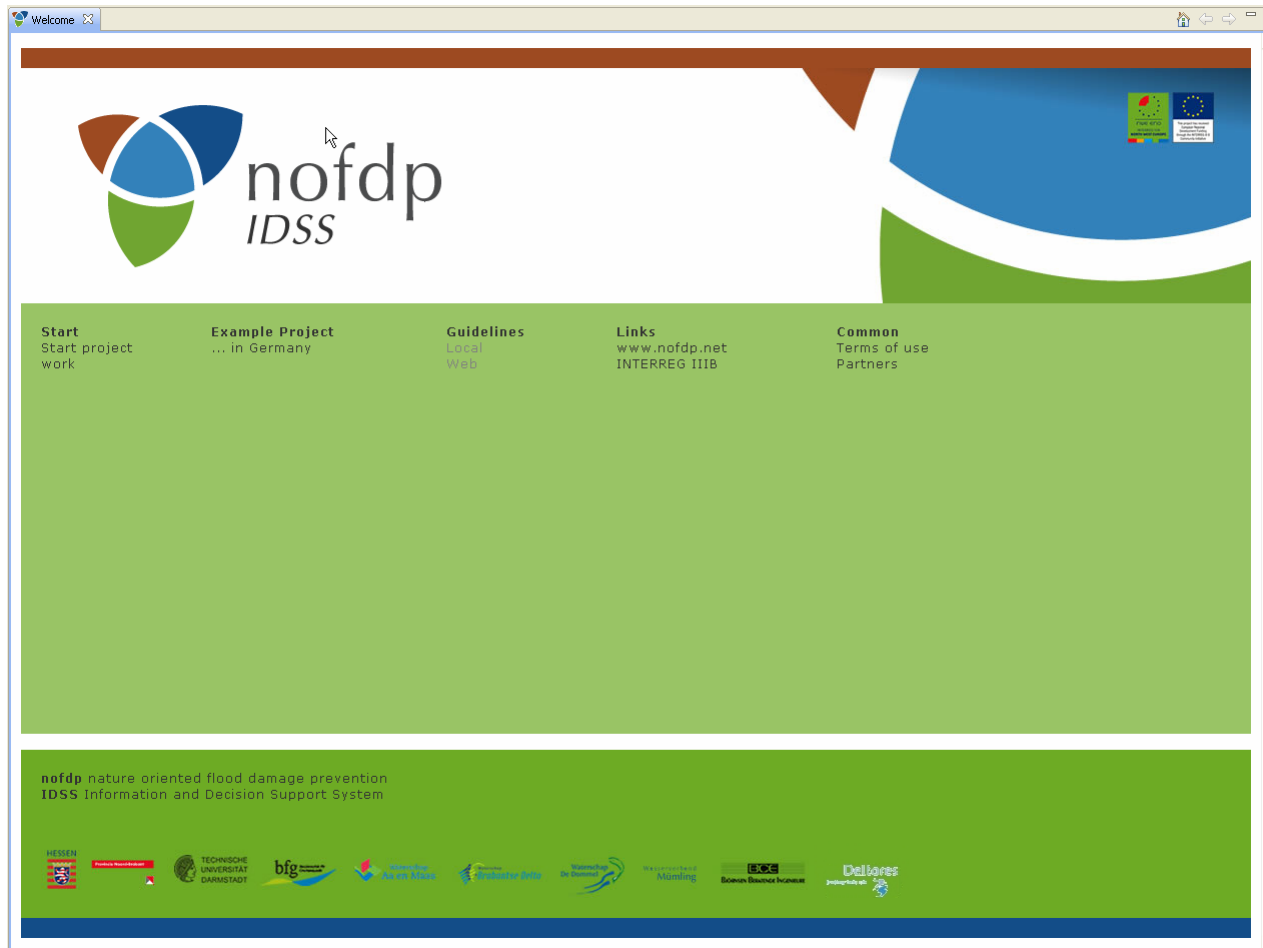
- Risk Zones
- Risk Zones
- Inundation Depth data sets
- Annuality: 1
- Annuality: 2
- Annuality: 5
- Annuality: 18
- Annuality: 50
- Annuality: 100
- Landuse data set
- Scale
- Mümling
- Orthophoto
- Topography

Risk Zone: Heavily Affected, Developed Area

3499567.81 / 5509215.73 Scale 1 : 11900



IDSS Highlights

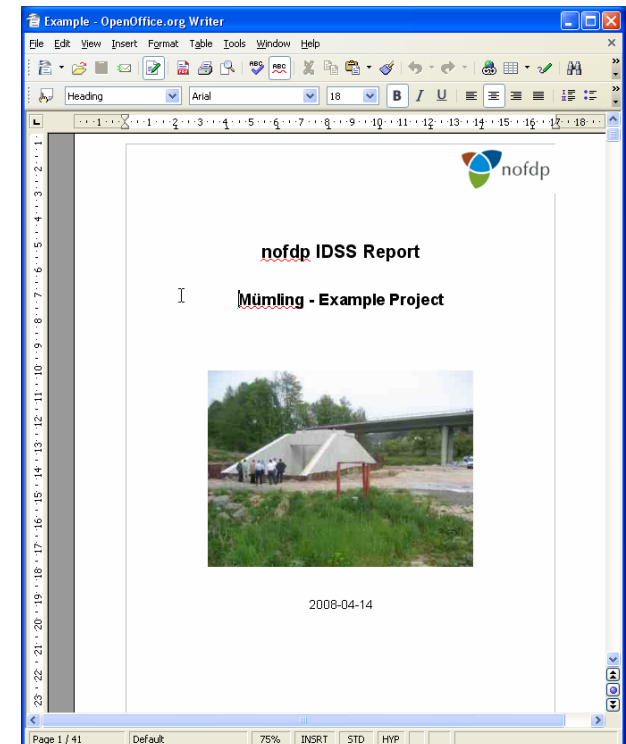
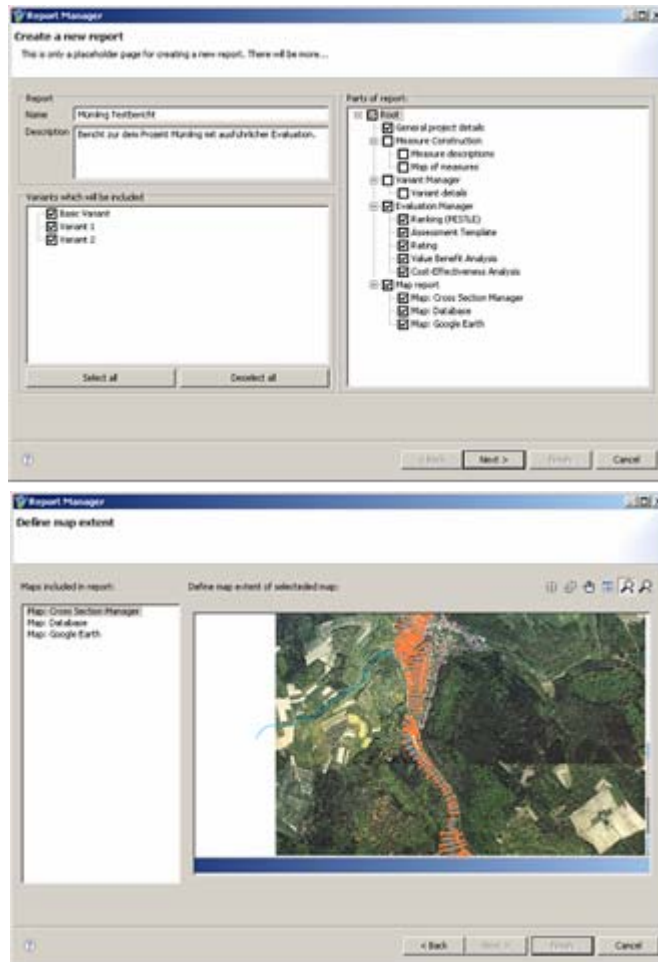


Report Manager

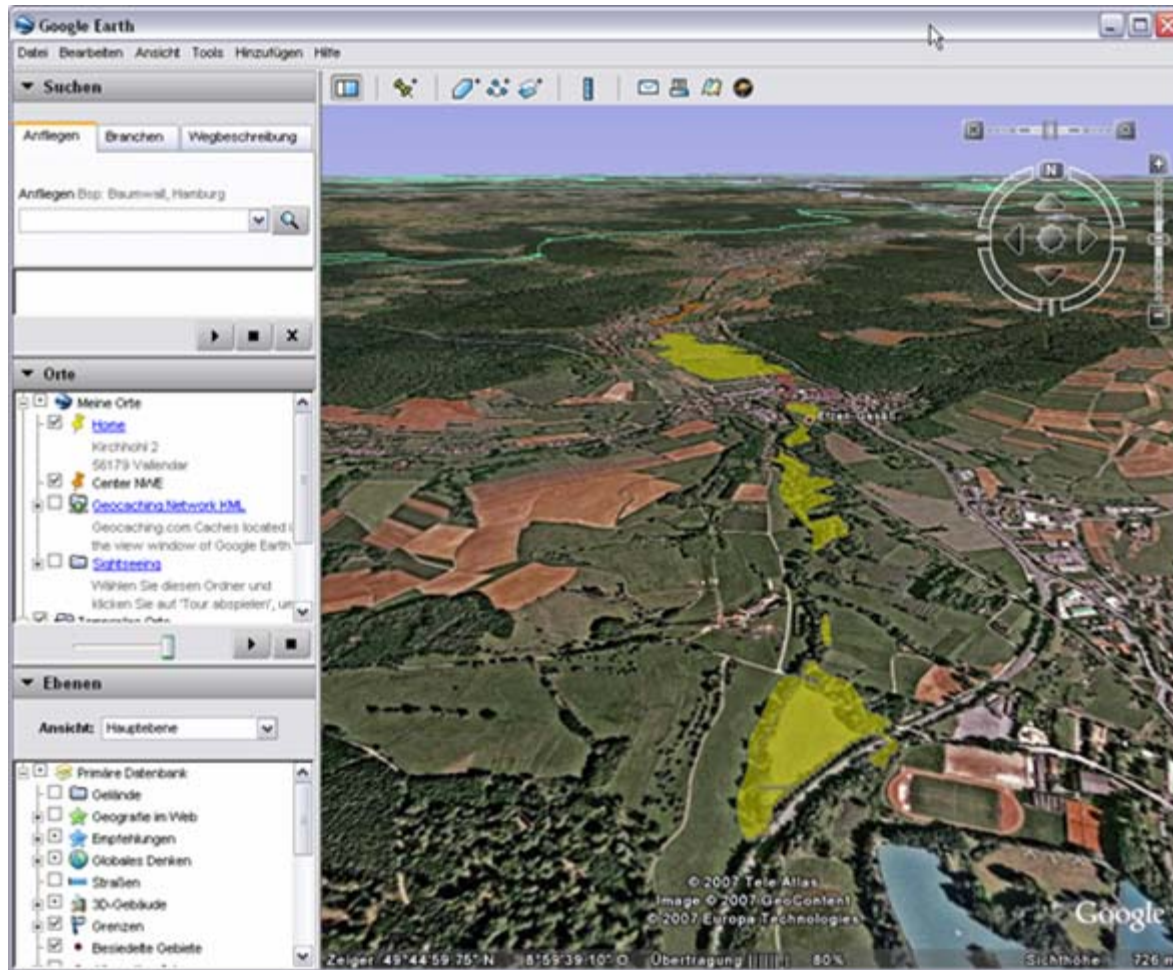


User-specific, automatic creation of project reports

Output: OpenOffice and PDF-document



Google Earth Export



3D-Visualization of objects created by the nofdp IDSS



Release 1.0



- implementation of SOBEK
- new tool: “Flood Duration and Frequency”
- English and German version

Available from June 2008



Fin



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IDSS Presentations



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