Umsetzung einer Geodateninfrastruktur für den ETH-Bereich

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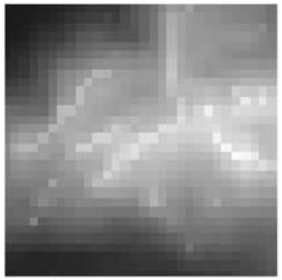
ETH Zürich

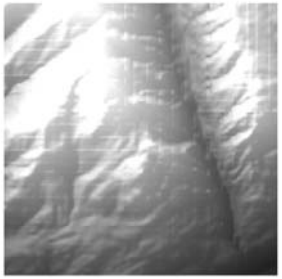
GIS/SIT 2010 Zürich

Geodatensituation ETH

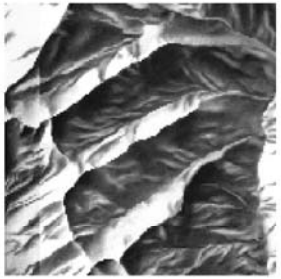
- swisstopo liefert schweizweite Geodaten an ETH für Lehre / Forschung (Geodatenvertrag), u.a.:



RIMINI 250m



DHM 25m, DHM-AV 2m, DOM-AV 2m



Relief (div. Massstäbe)

Geolog. Atlas 1:25'000

SwissNames (div. Mass-stäbe)

DHM 1:25'000 Basismodell

Landsat 25m

SPOT 5m

SwissImage 50cm, 25cm

Pixelkarte (div. Mass-stäbe)

VECTOR 200, VECTOR 25, GG 25

Histor. Karten: Dufourkarte, Siegfriedkarte

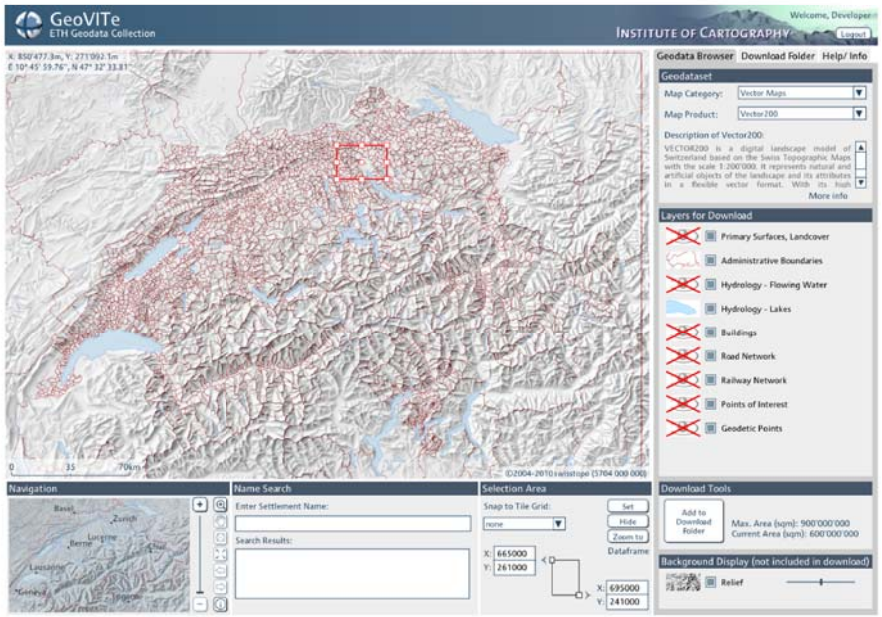
Geodatensituation ETH

- Geodatenspeicherung auf Server (mehrere Terabytes!)
  - komprimiert
  - verschiedene Ordner
  - unübersichtlich (Kacheln selbst aussuchen)
  - zerstückelt (selbst zus.setzen + ausschneiden)
  - zu gross (Datenmengen -> Programmabsturz)
  - Spezialwissen (GIS+Bildverarbeitungskenntnisse)
  - Bereitstellungskosten pro Datensatz

⇛ Überforderung des Benutzers, lange Datenaquirierungs- und -bearbeitungswege

GeoVITe – Projekt und Ziel

- GeoVITe – Geovisualisation and Interactive Training Environment
- Geodatenportal (view / download) für ETH-Intranet inklusive e-learning Tutorial (Umgang mit Geodaten)



GeoVITe – Vorgehensweise

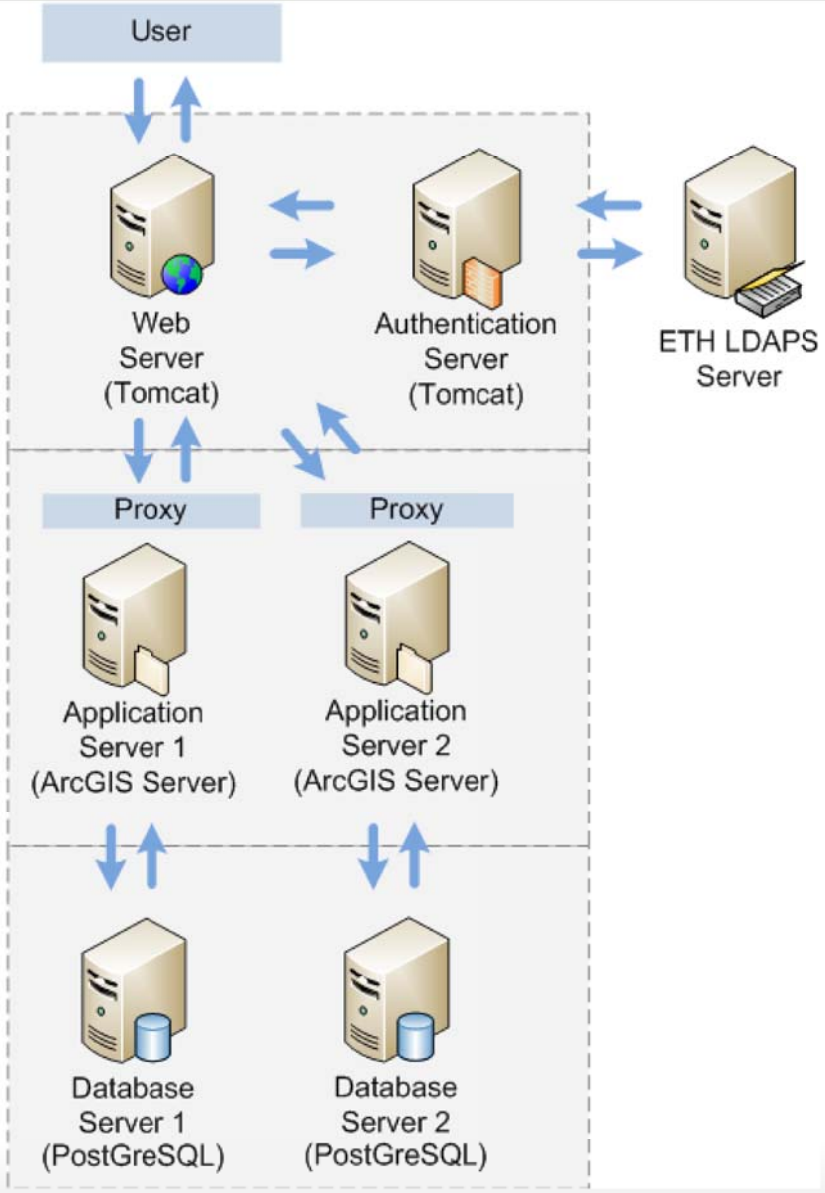
- Einbindung / Bedürfnisabklärung von:
  - Institut für Kartografie ETH
  - Kartensammlung ETH
  - Informatikdienste ETH
  - div. Forschungsinstitute wie EAWAG, WSL, PSI
- Design des Systems und Definition des Workflows
- Organisation / Installation von Hardware- und Software
- Datenaufbereitung und -integration
- Erstellung des GUI
- Sicherung des Systems, Benutzertests

GeoVITe - Bedürfnisse

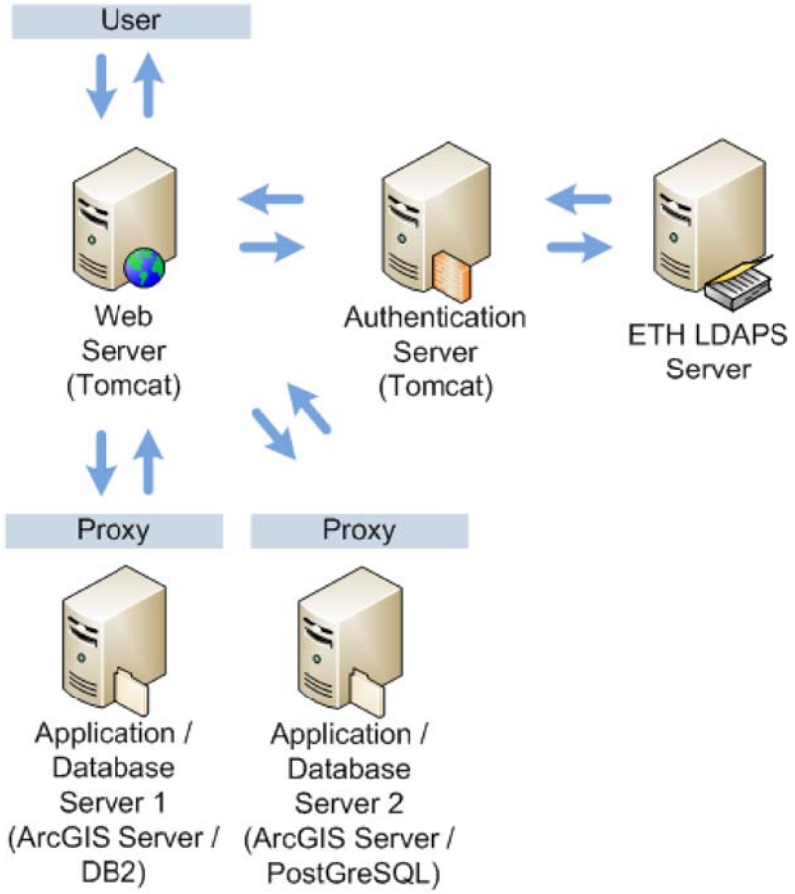
- blattschnittfreies Anbieten aktueller Daten im Schweizer Landeskoordinatensystem CH1903 LV03 (später auch WGS84/geograf. KS)
- Ausschneiden von Raster- und Vektordaten
- Speicherung der Ausschnitte in die Formate tif, png (Raster), shp, dxf, dwg (Vektor), agr (DHM, DOM)
- heruntergeladene Daten müssen exakt mit Originaldaten übereinstimmen – wichtig für Analysen!

GeoVITe – geplanter Systemaufbau

Three – Tier Architektur



GeoVITe – z.Z. realisierter Systemaufbau



GeoVITe – Aufsetzen des Systems

Modularität!

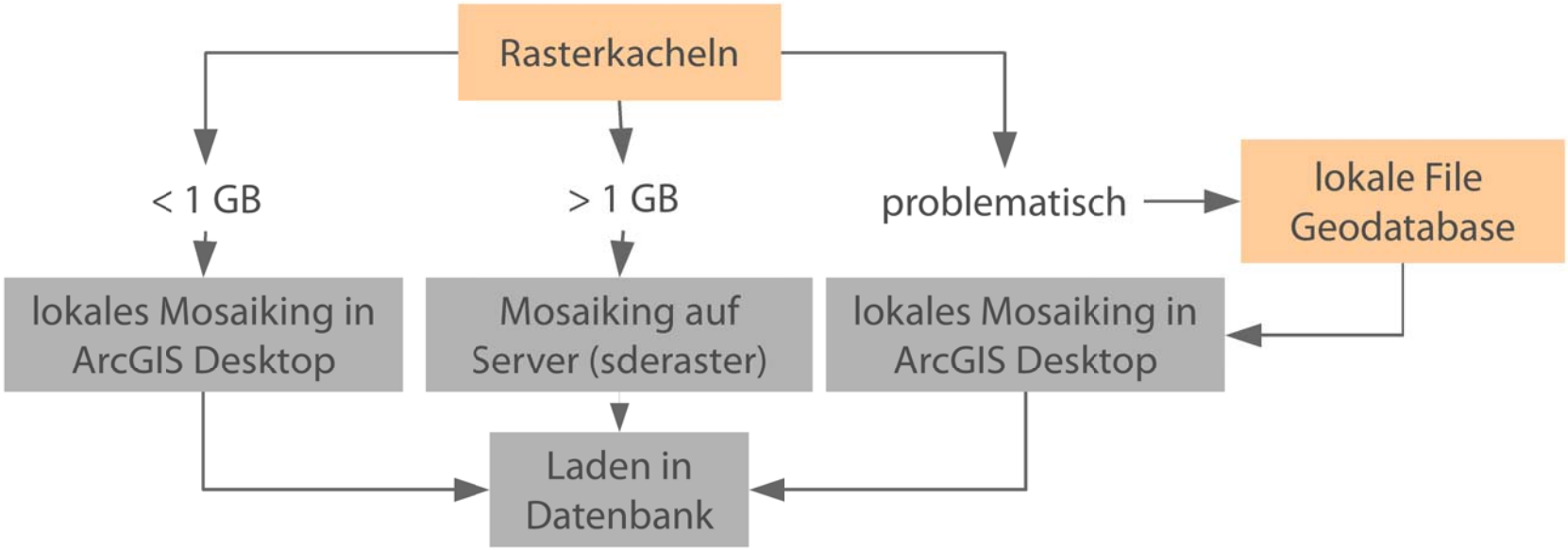
Betriebssystem	Windows Server 2003 mittelfristige Ablösung durch Windows Server 2008
Datenbank	IBM DB2 Enterprise Server + Spatial Extender mittelfristige Ablösung durch PostGreSQL + PostGIS Extension
Abstraktions-schicht	ESRI ArcSDE
WMS-/Geopro-cessing-Server	ESRI ArcGIS Server (Java)
Webserver	Apache Tomcat
Hardware	2 Standard-Server (Web, Login/Authentication) 2 High Performance Server (Primergy, 8 GB RAM, Raid-5, z.Z. je 2 TB (erweiterbar))

GeoVITe - Datenaufbereitung

- Erstellung von lokalen, vollständigen Datensätzen
- Überprüfung / Behebung von Problemen in den Originaldatensätzen (Anzahl Bänder, Zellgrössen, Rotationen)
- Automatisierung der Prozesse (Datenaufbereitung und -integration)

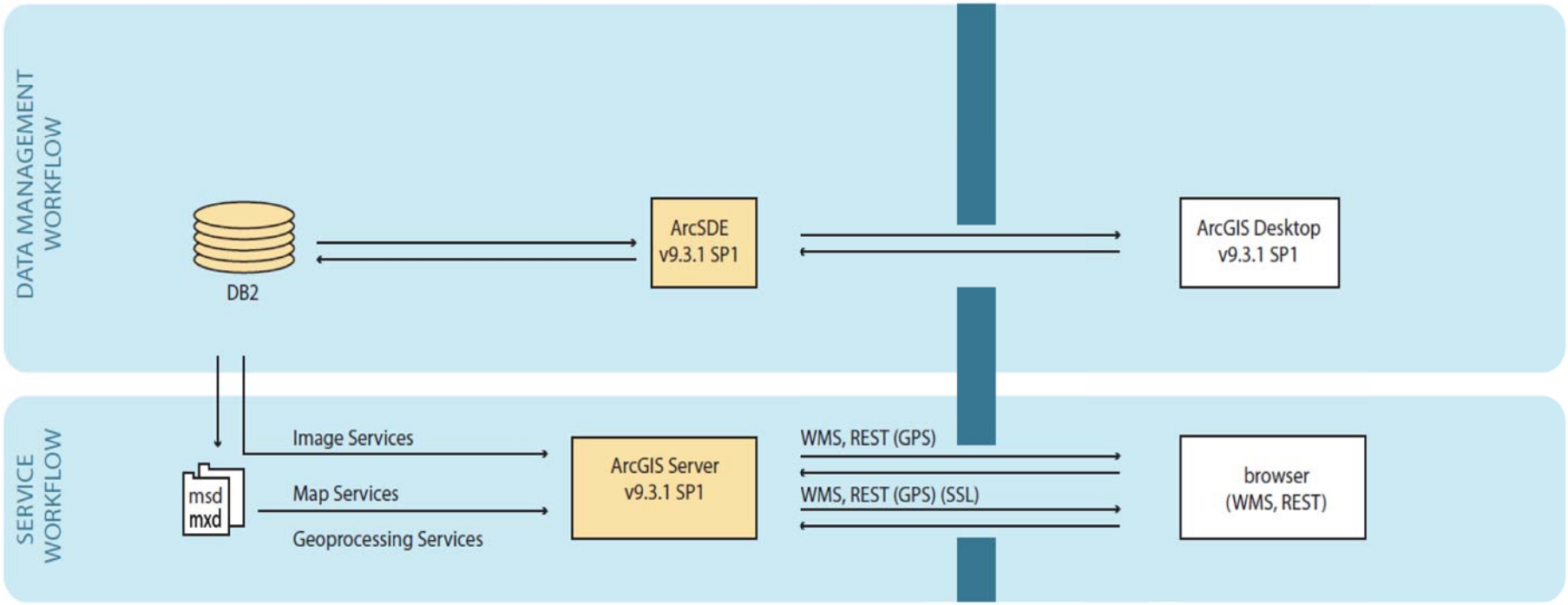
GeoVITe - Datenintegration

- Einladen von Vektordaten in Datenbank per ArcSDE
- Einladen von Rasterdaten in Datenbank



GeoVITe – Erzeugung von Services

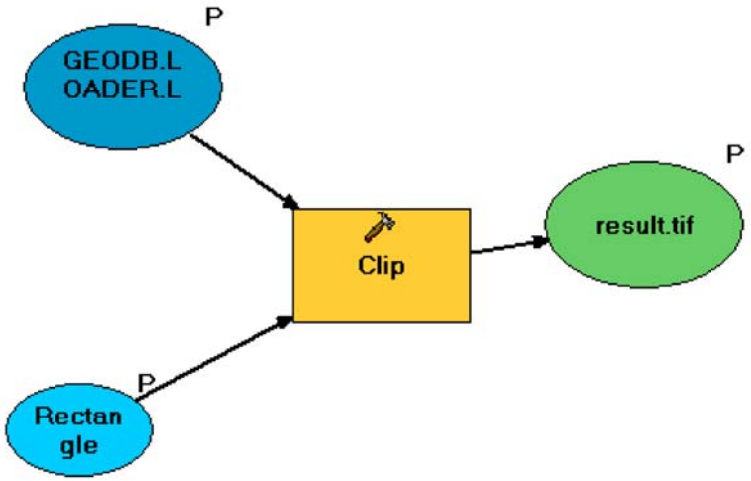
- Publikation mit ArcGIS Server als WMS (Image Services, Map Services) bzw. Geoprocessing Services

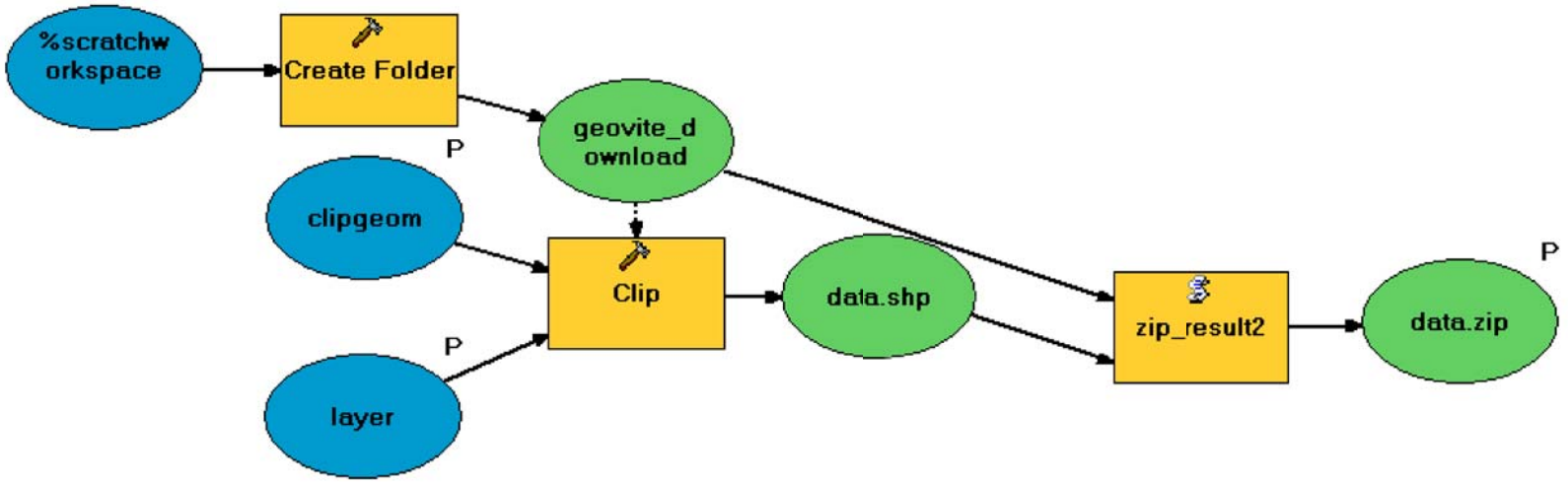


GeoVITe – Geoprocessing Services

vordefinierte Services:

+ Ausschneiden
+ Umprojizierung
+ Konvertierung in ge-wünschte Datenformate



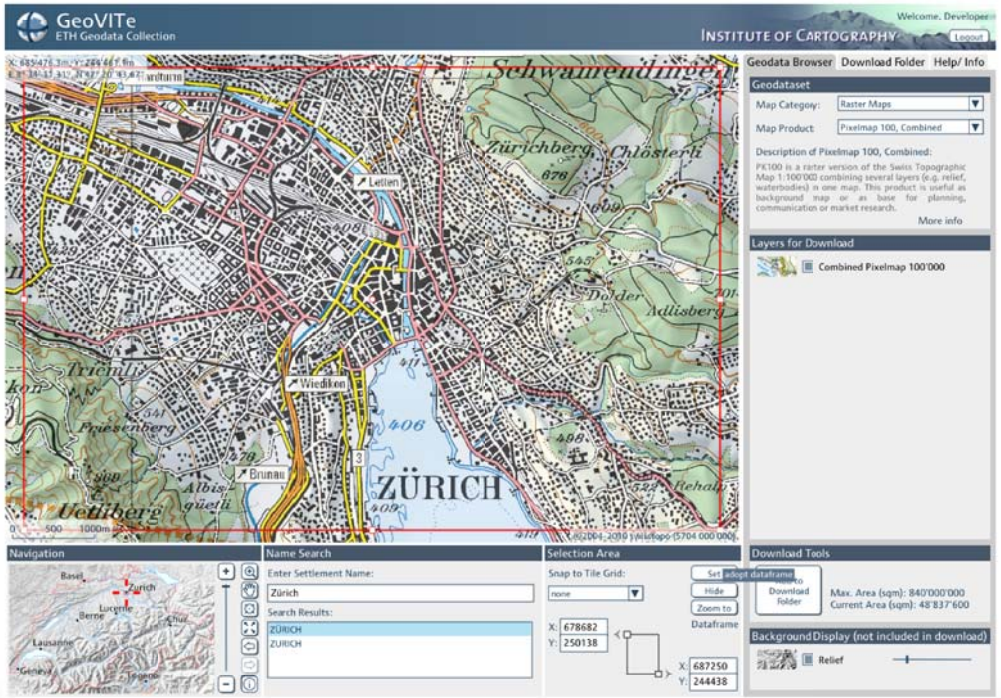


GeoVITe – GUI

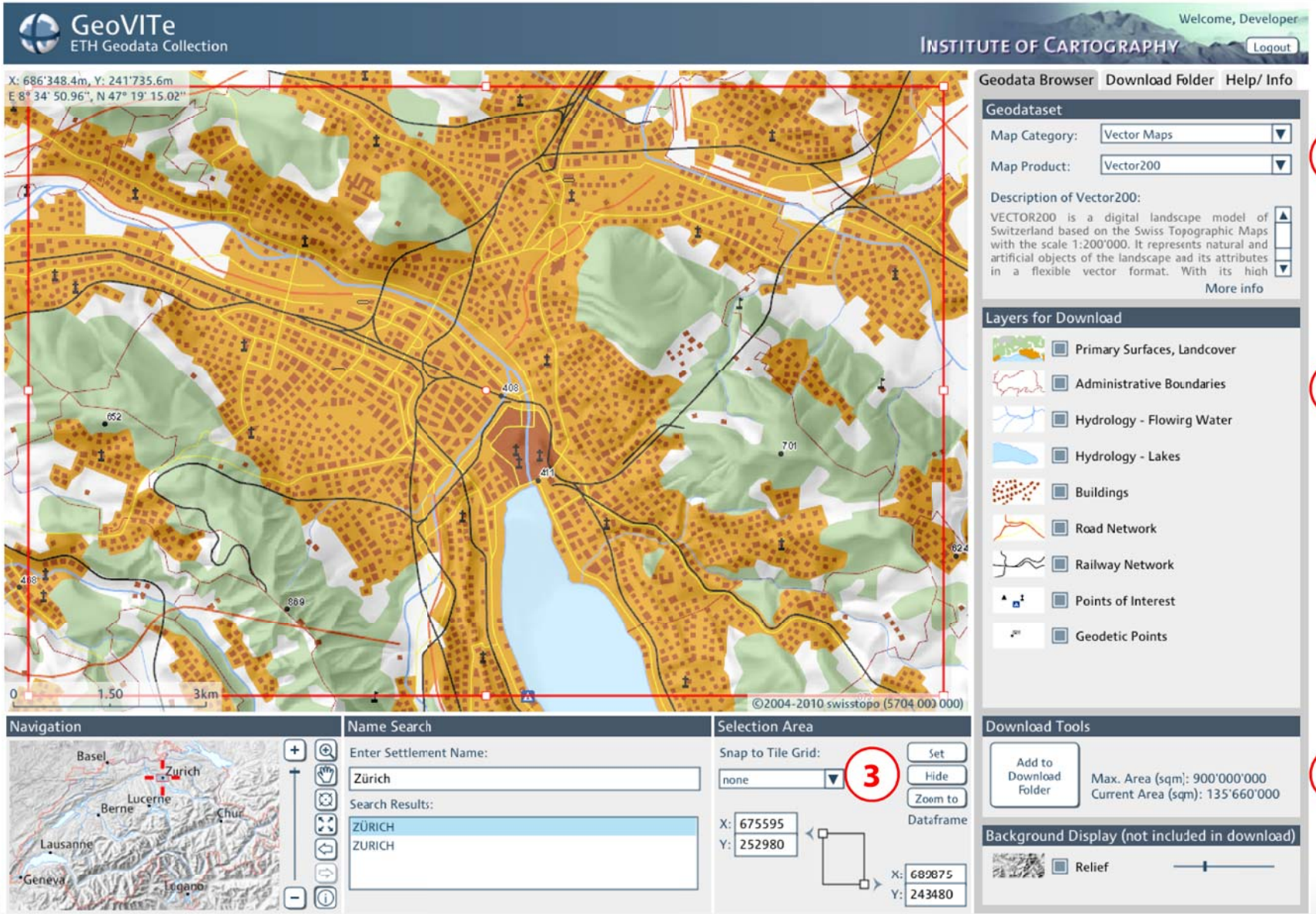

GeoVITe - ETH Geodata Portal (beta)
Project GeoVITe
The project "Geodata Visualization and Interactive Training Environment" aims to offer an easy-to-use online access to the most important of the Swisstopo geodatasets available through IDES. Additional e-learning tutorials offer help and explain how to work with geodatasets.
To view the available datasets you must first identify yourself with your nethz login and make sure that you are accessing this service from inside the ETH network (VPN connections are also allowed). To download datasets, you must subscribe to each geodata product of interest via IDES.
All geodatasets may only be used for research and educational purposes. Restrictions concerning online publications and publications in print apply. The license conditions for each product may differ. Please read carefully the Terms of Use (in German) for more information. If you are further distributing geodatasets to students, it will be your responsibility that the students abide the Terms of Use (in German). The e-learning tutorials on working with geodatasets may be accessed freely by all ETH members.
Disclaimer
Any liability arrising from the use of this service is hereby explicitly disclaimed. This service is provided by the Institute of Cartography and is currently available to all ETHZ employees for Beta testing. If you download data, you oblige yourself to subscribe to each downloaded geodata product via IDES.
In addition, if using this service during the Beta testing phase, you oblige yourself to register as a Beta tester (by sending an email to iosifescu [at] karto.baug.ethz.ch) and to report any bugs or problems that you may encounter.
GeoVITe Login
I have read and hereby explicitly accept the Terms of Use and the Disclaimer.
User name: developer
Password:
Log in
Browser Limitations
Firefox 3.5 or higher (recommended)
Opera 9 or higher (recommended)
Chrome 3 or higher and other browsers with native SVG support
Internet Explorer and Safari are not supported.

GeoVITe – GUI

- flexibles, skalierbares carto.net Framework: SVG + JavaScript
- Einlesen einer XML-basierten Service-Beschreibung (Name, WMS-Link, max. Downloadgrösse, Ebenen, GP-Link, etc.)



GeoVITe – GUI


GeoVITe
ETH Geodata Collection
Welcome, Developer
INSTITUTE OF CARTOGRAPHY
Logout
X: 686'348.4m, Y: 241'735.6m
E 8° 34' 50.96", N 47° 19' 15.02"
0
1.50
3km
©2004-2010 swisstopo (5704 000 000)
Geodata Browser
Download Folder
Help/ Info
Geodataset
Map Category:
Vector Maps
Map Product:
Vector200
Description of Vector200:
VECTOR200 is a digital landscape model of Switzerland based on the Swiss Topographic Maps with the scale 1:200'000. It represents natural and artificial objects of the landscape and its attributes in a flexible vector format. With its high
More info
1
Layers for Download
Primary Surfaces, Landcover
Administrative Boundaries
Hydrology - Flowing Water
Hydrology - Lakes
Buildings
Road Network
Railway Network
Points of Interest
Geodetic Points
2
Navigation
Basel
Zurich
Lucerne
Berne
Chur
Lausanne
Geneva
Lugano
Name Search
Enter Settlement Name:
Zürich
Search Results:
ZÜRICH
ZURICH
Selection Area
Snap to Tile Grid:
none
3
Set
Hide
Zoom to Dataframe
X: 675595
Y: 252980
X: 689875
Y: 243480
Download Tools
Add to Download Folder
Max. Area (sqm): 900'000'000
Current Area (sqm): 135'660'000
4
Background Display (not included in download)
Relief

GeoVITe – GUI


GeoVITe
ETH Geodata Collection
Welcome, Developer
INSTITUTE OF CARTOGRAPHY
Logout
X: 686'348.4m, Y: 241'735.6m
E 8° 34' 50.96", N 47° 19' 15.02"
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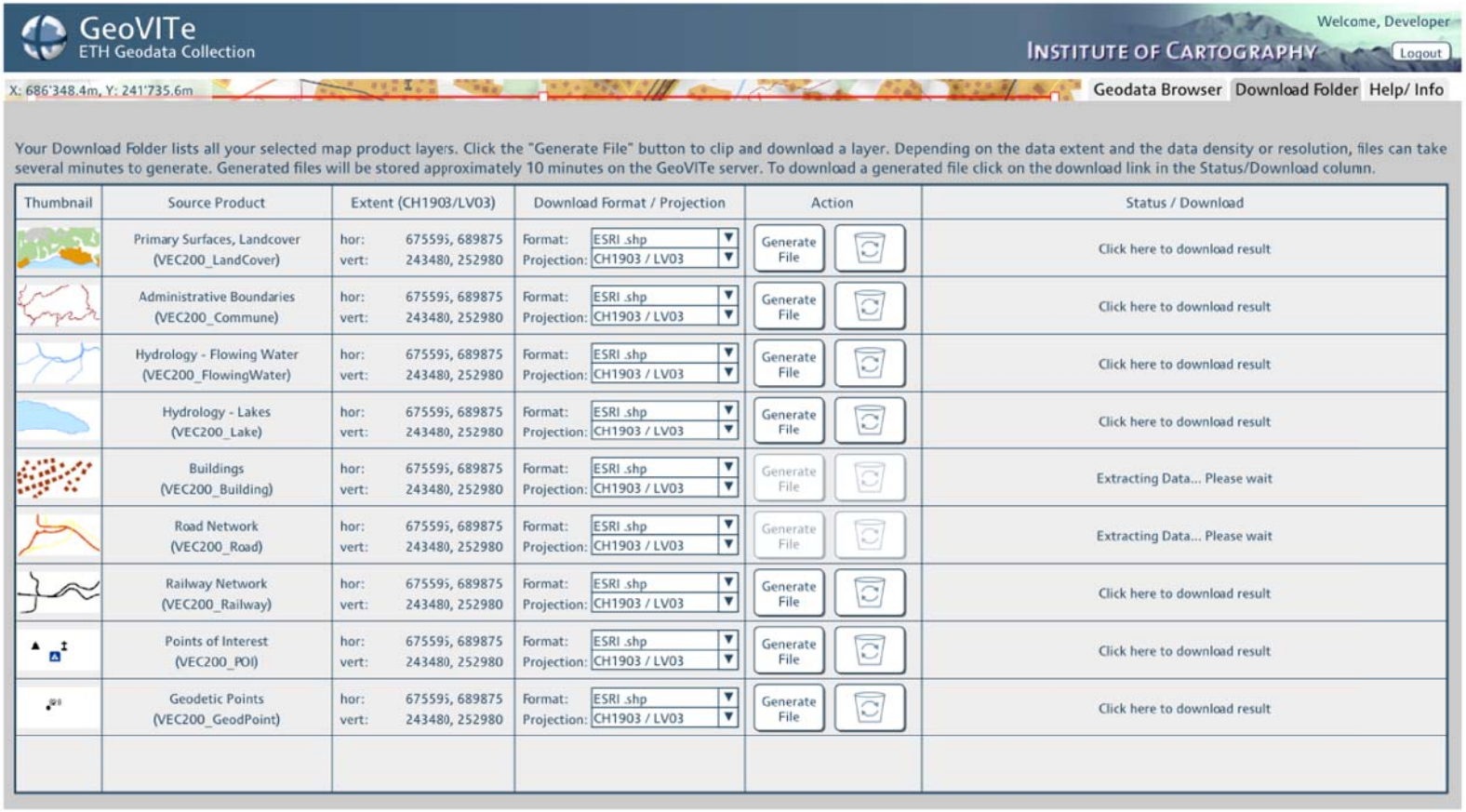
More info
Link zu swisstopo Webseite
Layers for Download
Primary Surfaces, Landcover
Hydrological Network
Road Network
Buildings
Facilities as Areas
Hedges and Trees
Single Objects as Lines
Railway Network
Ebene sichtbar und aktiv
Ebene nicht sichtbar, aber aktiv
Ebene nicht sichtbar u. nicht aktiv
Oberalppass
0
1.50
3km
©2004-2010 swisstopo (5704 000 000)
Navigation
Basel
Zurich
Lucerne
Berne
Chur
Lausanne
Geneva
Lugano
Name Search
Enter Settlement Name:
Zürich
Search Results:
ZÜRICH
ZURICH
Selection Area
Snap to Tile Grid:
none
Set
Hide
Zoom to
Dataframe
X: 675595
Y: 252980
X: 689875
Y: 243480
Download Tools
Add to Download Folder
Max. Area (sqm): 900'000'000
Current Area (sqm): 135'660'000
Background Display (not included in download)
Relief

GeoVITe – GUI (Warenkorb)



GeoVITe – GUI (Hilfe, Liste verfügbarer Daten)

GeoVITe - Available Datasets

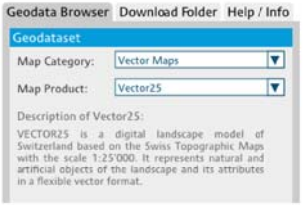
Dataset	Version	Format
Municipality borders 25	Q1/2007	shp,dwg,dxf
Vector25	Q3/2008	shp,dwg,dxf
Vector200	Q1/2009	shp,dwg,dxf
DHM25 Base Model (lines)	Q3/2003	shp,dwg,dxf
Pixelmap 25, combined with relief	Q4/2004,Q1/2006,Q4/2007,Q4/2008,Q4/2009	tif
Pixelmap 50, combined with relief	Q4/2004,Q1/2006,Q4/2007,Q4/2008,Q4/2009	tif
Pixelmap 100, combined with relief	Q4/2004,Q1/2006,Q4/2007,Q4/2008,Q4/2009	tif
Pixelmap 200, combined with relief	Q4/2004,Q4/2009	tif
Pixelmap 500, combined with relief	Q4/2008	tif
Pixelmap 1000, combined with relief	Q3/2003	tif
Geological Atlas 25	Q2/2007	tif
Landsat Satellite Image Mosaic 25 m	Q2/2004	tif
SPOT Satellite Image Mosaic 5 m	Q2/2008	tif
Swissimage Aerial Image Mosaic 0.5 m	Q1/2005,Q1/2006,Q1/2007,Q3/2007,Q2/2008,Q3/2009	tif
Swissimage Aerial Image Mosaic 0.25 m	Q1/2007,Q2/2008,Q3/2009	tif
Dufour Map, First Edition 100	Q2/2008	tif
Dufour Map, Last Edition 100	Q2/2008	tif
Siegfried Map, First Edition 25 and 50	Q2/2008	tif
Siegfried Map, Last Edition 25 and 50	Q2/2008	tif
SwissNames 25	Q2/2008,Q2/2009	shp,dwg,dxf
SwissNames 50	Q2/2008,Q2/2009	shp,dwg,dxf
SwissNames 100	Q2/2008,Q2/2009	shp,dwg,dxf
SwissNames 200	Q2/2008,Q2/2009	shp,dwg,dxf
SwissNames 500	Q2/2008,Q2/2009	shp,dwg,dxf
SwissNames Settlements	Q2/2008,Q2/2009	shp,dwg,dxf
Rimini, 250m resolution	Q4/1999	tif,agr
DHM25 Matrix Model, 25m resolution	Q3/2003	tif,agr
DTM-AV Grid, 2m resolution	Q3/2009	tif,agr
DOM	Q1/2009	tif,xyz

Datasets marked in grey are not integrated until now.

GeoVITe Help

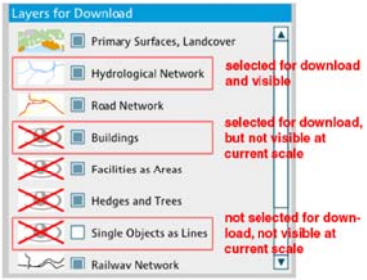
Step 1: Chosing a Geodataset for Download

In the "Geodata Browser" panel chose a "Map Category" and "Map Product" from the drop down menus. The dataset will be shown in the map window and a short description of the dataset will be displayed.



Step 2: Chosing Layers for Download

Chose the layers you would like to include in the download by activating the checkbox next to them. Detailed layers may not be displayed at the scale you are currently looking at the map. These layers are indicated in the legend field with a crossed out eye. They will still be included in the download if you activate the checkbox. To see them, please zoom further in.



Step 2a (optional): Activating a Background Layer

To display a background layer for better orientation, activate a checkbox in the background layer tab. With the slider

GeoVITe – GUI (eLearning Tutorial)

GeoVITe - Geodata Visualization & Interactive Training Environment

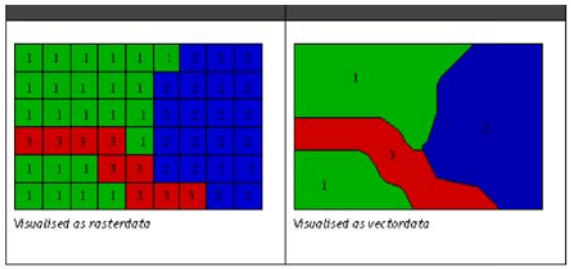
1.4. Vector Data vs. Raster Data

In the previous units, you have seen raster data and vector data apart. In this units, you are able to compare the two data types and see the differences between them.

1.4.1. Differences

Vector data sets and raster data sets are both important in a GIS. Every one has its strenths, therefore, it's cour to use just one form of these datasets. An important difference between these two data sets is noticeable in th of the data set. The graphical representation of raster or vector data results in raster graphics or vector graphics. In a raster data set, the attributes are associated with a raster cell, therefore, the appearance is only changeable by modificating the color value of the raster cell. In comparison, vector data stores the information associated with the object, the appearance may be modified easily by adding graphical components to every object. In a GIS the difference between a raster or a vector data set could look like this:

vector graphics
Vector graphics is the combination of vector data with graphical attributes. Various attributes can be modified, a polygon may vary in its outline color and thickness, hatching, etc. Common formats are .svg, .dxf, .shp, .pdf.

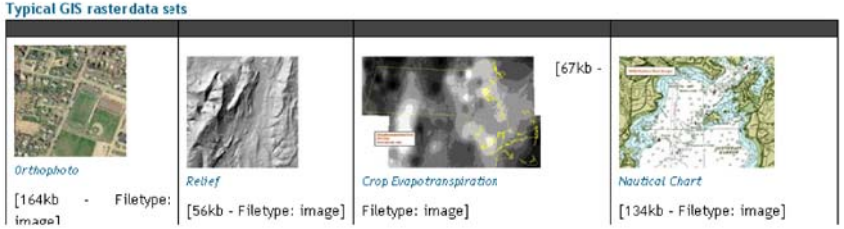


Visualised as rasterdata | *Visualised as vectordata*

1.4.2. Different use of the data in GIS

Since rasterdata refers directly to spatial extensions instead of lines or points, as it is in vectordata, it is difficult to overlay with other rasterdata information, that's why it is often used as background information. The following datasets show the difference between typical GIS rasterdata sets and vectordata sets:

Typical GIS rasterdata sets



Orthophoto [164kb - Filetype: image]

Relief [56kb - Filetype: image]

Crop Evapotranspiration [67kb - Filetype: image]

Nautical Chart [134kb - Filetype: image]

GeoVITe – Backup / Systemsicherung

- Acronis TrueImage Echo Enterprise Server (auch für Partitionen > 2 TB geeignet)
- Ersetzen des internen, in ArcGIS Server genutzten Tomcat
- Einführung von Proxys (Java Servlets, die Nutzung der Web Services nur von berechtigten Servern zulassen)
- Authentifizierung per ETH LDAPS-Server (Mitarbeiter: View/Download, Studenten: View)
- > 20 Personen gleichzeitig: "Bitte warten"-Seite
- AJAXProxy Servlet, damit GUI per Javascript auf Resultate der Geoprocessing Services zugreifen kann

Ausblick

- weiterer Ausbau des Server-Clusters (2 zusätzl. virtuelle Server)
- Benutzertests (z.T. schon durchgeführt)
- Aktualisierung aller Datensätze
- kompletter Wechsel von DB2 auf PostGreSQL
- Einbau älterer Datensätze (Problem: Metadaten!)

Vielen Dank für Ihre Aufmerksamkeit ...