The Wheel of Design – Usability Driven Improvements to the GeoVITe User Interface

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Geodata Access: The Conventional Way
GeoVITe

- **Geodata Visualization and Interactive Training Environment**
- Spatial Data Infrastructure (SDI) for ETH Zurich
- ETH-wide beta version launched in 2010
- Based on custom SVG technology (carto.net framework)

- Geo-portal functionalities: after Resch & Zimmer 2013
  - discover geo-datasets
  - portray data on map
  - retrieve data for further usage
GeoVITe Usage Workflow

- Select product

![Geodataset](image-url)
GeoVITe Usage Workflow

- Select product
- Select extent
GeoVITe Usage Workflow

- Select product
- Select extent
- Add to cart and download

<table>
<thead>
<tr>
<th>Source Product</th>
<th>Extent (CH1903/LV03)</th>
<th>Download Format / Projection</th>
<th>Action</th>
<th>Status / Download</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latest (1999), w/ relief (PK1000_krel_1999)</td>
<td>hor.: 691073, 708573 vert.: 184052, 196052</td>
<td>Format: GeoTIFF .tif Projection: CH1903 / LV03</td>
<td>Generate File</td>
<td>Click here to download result</td>
</tr>
<tr>
<td>Swissimage 50 (1999-2009) (si50)</td>
<td>hor.: 704620, 706033 vert.: 184052, 188009</td>
<td>Format: GeoTIFF .tif Projection: CH1903 / LV03</td>
<td>Generate File</td>
<td>Extracting Data... Please wait</td>
</tr>
<tr>
<td>swissALTI3D (2011) (SwissAlt11)</td>
<td>hor.: 653819, 661074 vert.: 209707, 218151</td>
<td>Format: GeoTIFF .tif Projection: CH1903 / LV03</td>
<td>Generate File</td>
<td></td>
</tr>
</tbody>
</table>

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The Wheel of Design: GeoVITe Evolution
The Wheel of Design

Requirements
(utility)

Feedback
(User)

New Prototype
(Usability)

after Roth et al. 2015
Usability Evaluation – Background

- **User Centered Design (UCD)** Tsou 2013
- **3 Components** Roth et al. 2015
  - Usability
  - Utility
  - User
- **Methodologies:**
  - Questionnaires
  - Interviews
  - Eye-tracking
Results: Eye-tracking
Results: Necessity of Functionality

- Draw rectangle to zoom in: 3.1
- Zoom slider for enlarging map: 1.9
- Pan map: 3.1
- Recenter map: 1.2
- Full extent: 1.9
- Map history forward and backward: 1.8
- Query information: 1.7
- Search location: 3.1
- Dataframe selection by coordinates: 3.1
- Moving the dataframe: 3.1
- Hide the dataframe: 1.7
- Zoom to dataframe: 2.9
- Snap to tile grid: 2.2
- Relief shading as background: 2.4

- Link to more information: 3.1
- Mouse coordinate (X/Y): 2.2
- Mouse coordinate (E/N): 2.2
- Scale bar: 2.4
- Overview map: 2.6
- Layer transparency: 2.9
- Max./current Area: 3.7
- 3D view (=>3D): 1.8
- Help page: 3.1
- Change download projection: 2.8
- Change download format: 3.4
- User map: 2.4
- Thumbnails: 3.2
The Next Design Step: Geodata4SwissEDU
Usability-Driven Recommendations

- Use a **Full Screen Map**
  - Overlay controls in collapsible & customizable menus
- Implement **“Standard” Navigation Controls**
  - Click and drag to pan, scroll to zoom, click to query, etc.

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Usability-Driven Recommendations

- Offer a **Multi-Purpose Search Function**
  - Search for places, coordinates, datasets, etc.
  - Allow imprecise search terms
  - Rank search terms according to relevance

GeoVITe:

[Image of GeoVITe's name search feature with settlement name 'Bern' entered and search results displayed]

Geodata4SwissEDU:

[Image of Geodata4SwissEDU's search results for places and datasets]

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Usability-Driven Recommendations

- Allow User Customization
  - Collapsible panels, adjustable menus
Usability-Driven Recommendations

- Allow **Map Mashups**
  - Content not limited to one topic, but layers arbitrarily combinable
Usability-Driven Recommendations

- Provide **Instant User Feedback** for errors
- Before usability study in GeoVITE:
Usability-Driven Recommendations

- After usability study in Geodata4SwissEDU
Outlook

- GeoVITe: more than just a User Interface
  - Expansion to national level (*Geodata4SwissEDU* project)
  - Goal: Swiss academic SDI

- Restructuring *under the hood*
  - New hard- & software for thousands of simultaneous users required
  - Intended solution: Amazon Web Services (AWS) Cloud
Outlook: Towards an AWS Cloud Solution
Thank you for your attention!
Literature


GeoVITe Roadmap

- Current technical limitations in GeoVITe:
  - Limited to small user groups (max. 20 simultaneous users)
  - Custom SVG-based GUI hard to maintain

- Upcoming: the Geodata4SwissEDU project:
  - Upscaling of GeoVITe to national level (in Switzerland)
  - Joint-collaboration between ETH Library, IKG/ETH Zurich & Hochschule für Technik Rapperswil (HSR)
  - Funded by swissuniversities.ch

→ Perfect time for a usability evaluation!
GeoVITe: Usability Evaluation

- 11 users (9 with previous GeoVITe experience)
- Predefined workflow:
  1. Pre-test interview: user behaviour, experience, etc.
  2. Eye-tracking on GeoVITe portal page
  3. Questionnaire: clearness of GUI elements, necessity of functionality
  4. Post-test survey: feedback on GeoVITe GUI quality
Usability Recommendations

- Use a **Full Screen Map**
  - Overlay controls in collapsible & customizable menus
- Implement **“Standard” Navigation Controls**
  - Click and drag to pan, scroll to zoom, click to query, etc.
- Be **Consistent** in the styling of **Controls**
  - Button symbols only if meaning salient, no automatic tab changes, etc.
- Offer a **Multi-Purpose Search Function**
  - Search for places, coordinates, datasets, etc.
  - Allow imprecise search terms
  - Rank search terms according to relevance
Usability Recommendations

- **Allow User Customization**
  - Collapsible panels, adjustable menus
- **Allow Map Mashups**
  - Content not limited to one topic, but layers arbitrarily combinable
- **Provide Instant User Feedback** for errors
The GeoVITE-Geodata4SwissEDU Portal

- Built from scratch with open source technology (OpenLayers 3, QGIS Server) → easier to maintain
- Based on usability evaluation feedback
- Omission of unused functionality
- Improved and new interoperability tools
- Much more customizability