



# Best Practices for Web Mapping Design



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# 1 Introduction

Web Mapping is nothing else then distributing information and it should be:

- Easy to read and understand ...
- Easy to navigate ...
- Easy to query ...
- Easy to find ...

And last not least it should look good!

# 2 What is out there?

Before even starting to create Web Mapping Applications (or even just simple Web Sites) we should have a look at what to expect at the users' desk.

## 2.1 Browsers and Operating Systems

As we started off creating Web Mapping applications in 1998 all browsers were full of bugs and programming highly interactive applications was a nightmare. Fortunately some of them eventually disappeared and the ones surviving got better and better. Today browsers are luckily not an issue anymore, i.e. we were surprised to see our applications running smoothly on Mozilla Firefox without special care. The browsers and OS to take in account today to server 99.99% of the world are (I think the 0.01% still on DOS or OS/2 we can forget ☺):

- Internet Explorer 5 and higher (still way over 95%, see below)
- Mozilla and Mozilla Firefox
- Opera 7 and higher
- Konqueror (LINUX) and Safari (MAC)

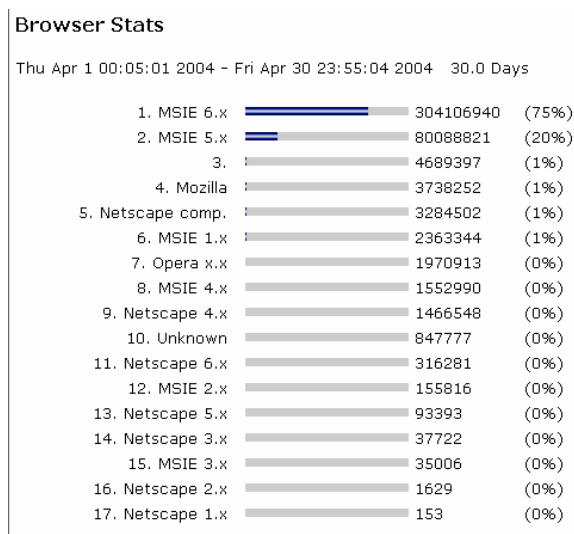


Image 1: Browser Usage Statistics



## 2.2 Screen Resolution: Surprise!

When I realized that for the first time I was really surprised. Fact is, that over 30% of the internet users are still working on a resolution of 800x600! These are 2004 numbers and do not vary too much from stats to stats or country to country. However, I would not be surprised if most of them have flat screens equal or larger then 17"! It's basically just the dumb setup PCs are delivered with today.

### Resolution Stats

Thu Apr 1 00:05:01 2004 - Fri Apr 30 23:55:04 2004 30.0 Days

1024x768		184410101	(48%)
800x600		153004388	(39%)
1280x1024		22278010	(5%)
1152x864		11106345	(2%)
Unknown		5468149	(1%)
640x480		5342288	(1%)
1600x1200		2344358	(0%)

Image 2: Screen Resolution Statistics

## 3 Optimizing a Web Page for Mapping

### 3.1 The usual Web Page Layout

A usual Web Page comes along with a lot of "waste of space", depending on how a user has setup his browser:

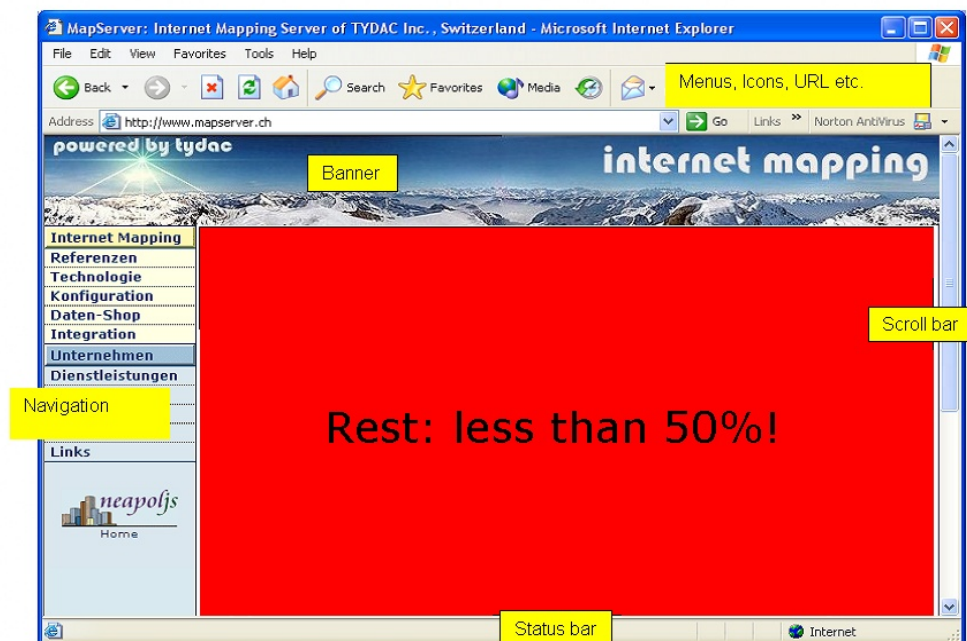


Image 3: Usual Web Page Layout



Normally we have the following setup:

- Toolbar
- Address bar
- Message bar
- Google bar and many more whatever bars
- Possibly history, navigation and so on
- Page banner
- Page navigation

So you end up with a lump of 50% of the screen and if you imagine being on 800x600, the size of your map will be the one of a post stamp!

## 3.2 Let's get some space!

The only solution to make space for the map is: get rid of the unneeded!

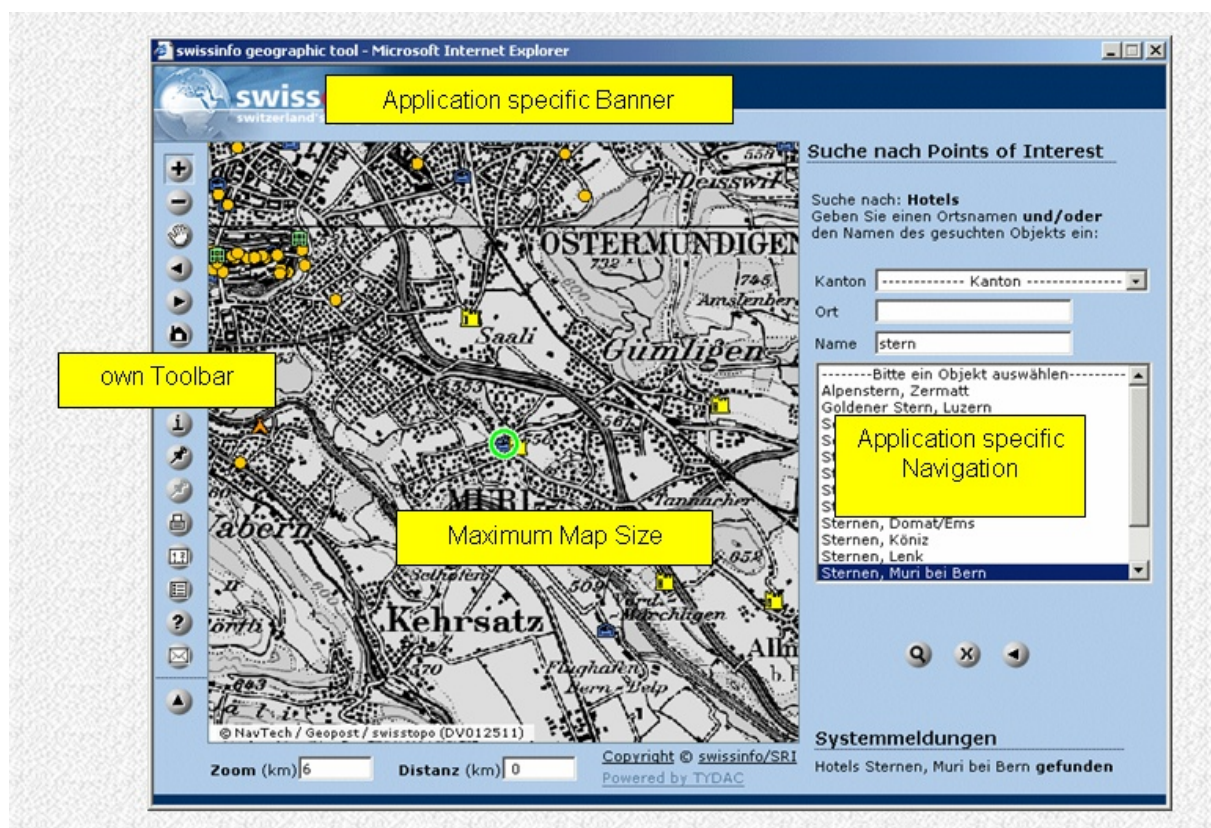


Image 4: Optimized Web Page Layout

The solution is simple, just open a new window for your Web Mapping Application. However, especially in larger companies or institutions you need to convince Corporate Design that this is the way to go. Up to date we could always convince them, even the most stubborn.



Some arguments for Corporate Design:

- The resolution issue (even 1024x768 is pretty small if you have to deal with all kind of unneeded "junk").
- The map is the most important and has to be as large as possible! The only alternatives are credit card size or infinite scrolling pains.
- Application functions can interfere with browser functions, especially the case with highly interactive web mapping applications (i.e. a back or a refresh can mess up everything).
- The positioning of all elements is under control (depending on the amount of "junk" scrolling becomes a real pain).

### 3.3 Attention: Pop-up blockers

Pop-up blockers are becoming popular as more and more sites miss-use pop-ups for nasty advertising. I.e. for the info tool, legends, routing results and so on, one often uses pop up windows. Think about this issue and use the following options:

- Use style sheets instead of pop-ups
- Alert the user to allow pop-ups for your site

## 4 Web-Mapping GUI Components

A Web Mapping application normally consists of the following components:

- Most Important: THE MAP(s)
- Map and/or Layer Control
- Overview/Navigation Map
- Functions (buttons): such as Navigation, Query etc. and helpful tooltips
- Search Options
- Query Info
- Online Help

### 4.1 The Map(s)

As said above, this is the most important thing of a web mapping application and should:

- Get as much space as possible.
- Speak to the user (did you read the book on "how to lie with maps?")
- Last not least look gorgeous, so spend some time on it!

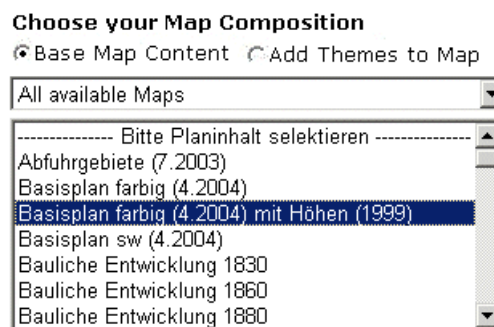
In addition you should think about on how to present the maps and the choice of maps to the user. Avoid if possible suffering from what I call the "ArcView Layer Syndrome".

### 4.1.1 The question: To Layer or To Map?

Depending on the amount of data that shall be published, a *Layer Approach* as used in Desktop Mapping Systems such as ArcGIS might not be suitable. As an example, the City of St. Gall in Switzerland (see 6.3) publishes up to date around 50 different kind of maps for all kind of purposes (such as surveying, planning, tourism, history and so on). All these maps are made of hundreds of layers; means a layer approach would be completely inapplicable. The choice in this case was a combination of both, maps and layers.

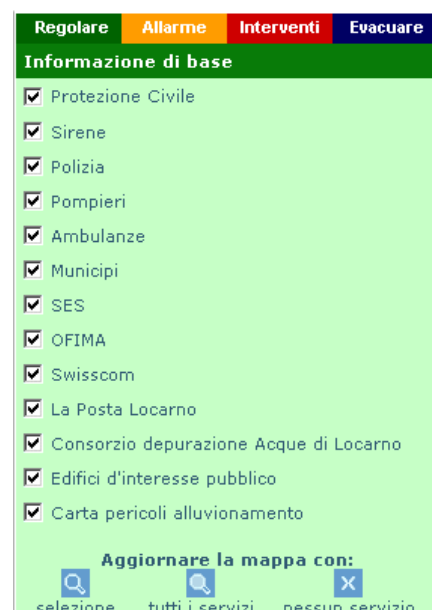
The following approaches can be discussed:

- **Categorized maps & layers combination** as scroll lists; suitable for a very large number of maps and a large number of layers:



Means:

- You can choose a base map content, which is comparable to an ArcGIS Project (a complete map composition). The list can be categorized (suitable if you have loads of maps)
  - To any base map, you can individually add layers (some can have none to add to it, the "add themes" would not appear in this case). These can be single Layers but as well combination of Layers (such as polygons, lines and labels combined to a map)
- **Simple maps & layers combination:** Same as above, however with a smaller amount of maps & layers. In this case the main map is handled by the tabs and the layers can be switched on and off using choice boxes. The amount of maps & layers should be limited, so that a scrolling is not necessary.







- **Map choice only:** Same as above, however no Layers to add. Suitable where there are just a few preconfigured maps to be published.

>> Planinhalt

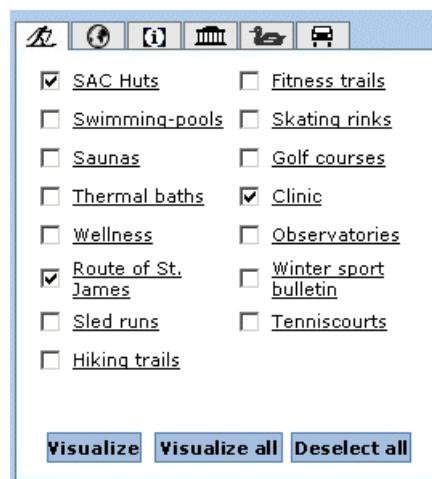
- Stadtplan - 11/2003
- Parzellenplan - 11/2003
- Zonenplan - 02/2003
- Points of Interest (POI) - 10/2003
- Sammelstellen - 11/2003
- Buslinien - 11/2003
- Baustellen - 03/2004

- **Layer choice only:** A base map is given and a predefined set of layers is selected; the user can turn them off and on. This is only suitable, if the amount of layers is small (<10). If the user has to create his maps by himself every time he launches the application clicking on hundreds of layers, the visits to your site might be very limited with the time. Therefore, the most common maps one might use should be "precooked".

**Verkaufsstellentyp**

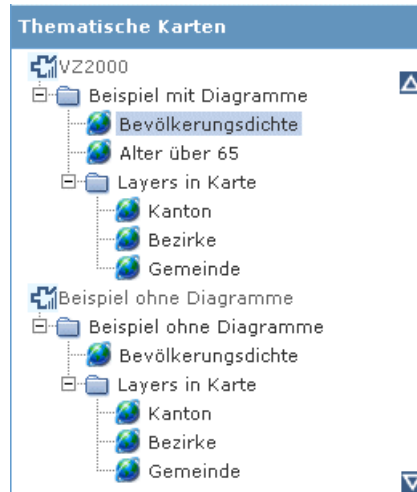
- Supermarkt
- Tankstelle
- Restaurant
- Vitality
- Pronto
- Galerie du Vin

- **Categorized layer choice using tabs:** Suitable if you have one or more maps and lots of layers (choice as well using Tabs):

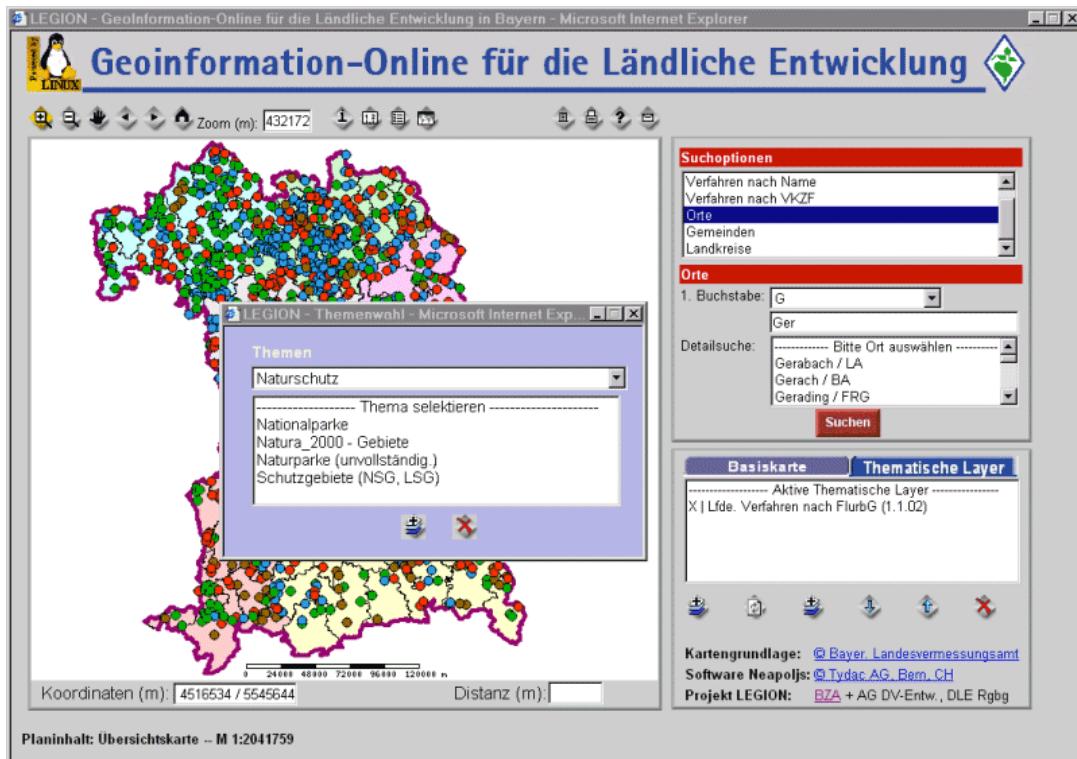


Using this approach, a user can not only turn the layers on and off. Clicking on the Layer description, the user enters a mask where she/he can search inside the selected the layer:

- **Categorized layer choice using a tree:** Suitable if you have one or more maps and lots of layers:



- **"Classic" Layer Control:** Such as i.e. used in MapInfo. Suitable where you have lots of maps and layers, and you need to add, remove, turn on/off and reorder Layers. Just for people who know how to use a GIS!





## 4.2 Overview/Navigation Map

Think about to make the display of the navigation map optional, it saves you space for more important things!



Image 5: Optional Navigation Map

## 4.3 Functions and Tooltips

The common web browser tooltips are useful, but they have a big disadvantage: they are displayed with a delay and if I "fly" over the function buttons I do not see them. In addition they disappear as soon as I'm out of the function area. Therefore, we created our own tooltips which have the following advantage:

- they are immediately displayed
- they are visible as long as the function is selected
- they can be quite long and meaningful ("pan" alone does not tell the user anything)
- they have always the same position

Example - explaining how to pan:

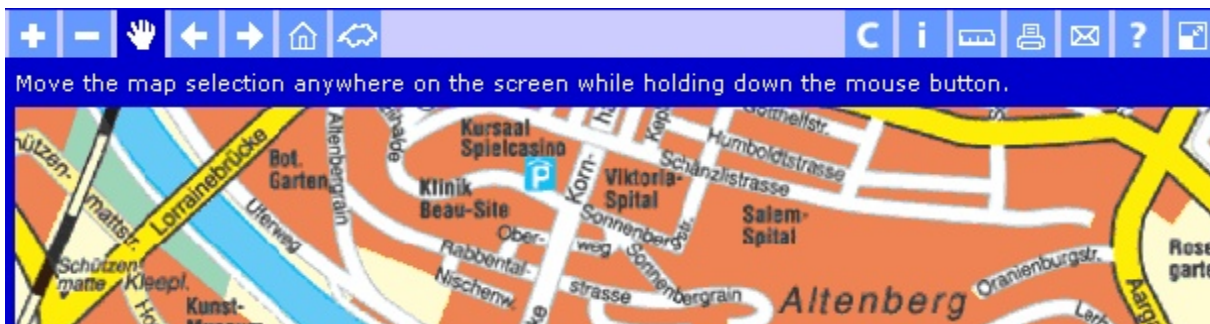


Image 6: Extended tooltips

## 4.4 Search Options

Whatever search options you integrate in your application, try to help the user as much as possible, making wide usage of suggestions and lists. Some examples:

- Street search: as soon as you type one or more letters a corresponding list is displayed:

**Strassenname oder Adresse**

fa

---- Bitte Strasse selektieren ----

- Falkenburgstrasse
- Falkenburgweg
- Falkensteinstrasse
- Farbgutstrasse
- Farbgutweg
- Favrestasse

- Categorized list of Points of Interest:

**Points of Interest**

Banken

----- Points of interest selektieren -----

- Banca Popolare di Sondrio
- Coop Bank
- Credit Suisse
- Ersparisanstalt der Stadt St.Gallen
- Migrosbank
- Raiffeisenbank Langgasse

- Search for Points of Interests on four different levels (type, canton, location and/or name):

**Search for points of interest**

Search for: Bed&Breakfast

Please fill in place name **and/or** the name of the object(s):

Canton: Graubünden

Location:

Name:

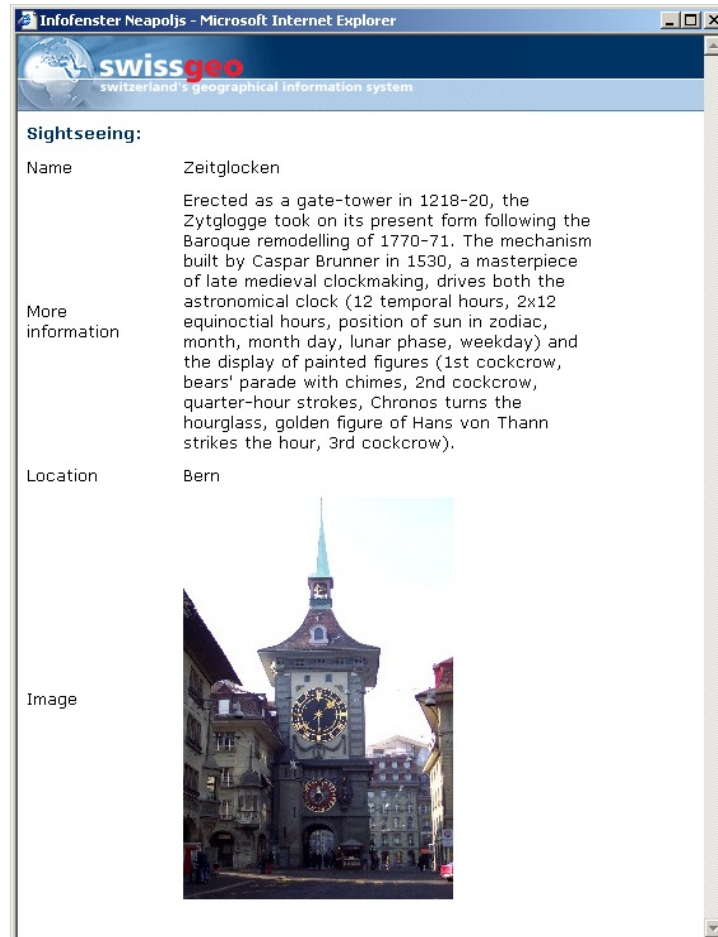
-Please click on an object to show a map -

- ACCOLA, Davos-Frauenkirch
- BÄNNINGER, Splügen
- BUCHLI-WIELAND, Valendas
- HAUSCHILD, Sta. Maria
- HERZOG-ZIPPERLEN, Davos-Platz
- LEUTHOLD, Carrera
- MAYER, Scuol
- MISCHOL, Zernez
- SOUTTER, Trin Mulin
- TINNER, Sta. Maria
- TROLLER, Surava

## 4.5 Query Info

Here you have all the freedom to basically create own web-pages responding to information request integrating hyperlinks, photos, audio and much more.

Example 1: Sightseeing with history and image



Example 2: If you found a cinema you obviously want to know what's playing:





## 4.6 Online Help

Even if nobody uses it (the well known RTFM Syndrome ...), a good online help is crucial and should contain:

- explanation to all functions of the application
- information about vintage of the data shown
- information about the maps & data (metadata)

You could as well go as far as Swissgeo goes:

**Help as Flash-Animation**  
To view this page, you need min. [Flash 6 Plug-in](#)

**Help as Text**

Tools  
Just select one and click or drag your mouse on the map

Geographic search  
All can be found with a map

Points of interest  
Show or hide on the map the items of your interest. If you search for something specific, click on the item's name and a search engine will guide you to locate your dream

Routing  
Find a route with, if needed, a via point. Passes informations are updated every hours

**Help in images**

## 4.7 More functionality ...

### 4.7.1 Printing

There are basically two ways of setting up a page for decent printing:

- HTML page
- PDF

**HTML pages** are very limited when it comes to printing as you can't access any paper information. However it is quick and easy to achieve and it is suitable to create a decent printable page for standard paper sizes (letter or A4).

**PDF** is the only common and wide used alternative to HTML which allows you to create perfect layouts and control quality (resolution) and scale basically for any paper size (really large paper size might be a bit of a choppy for your server and your line).

A propos **scale** ... I'm always amused about people asking for on-screen scale display such as 1:5'000 ... There is no such thing as on-screen scale, except everybody uses exactly the same screen (hardware) and resolution and you calibrate the map display accordingly. The best answer I heard on such a question was at one of our user meetings from one user to another: "go and measure it on a high resolution laptop on a large screen with low resolution and using a beamer and tell me it's the same scale!".

Example of managing PDF Output handling the following:

- different scales
- map resolution (150 and 300 dpi)
- paper size, i.e. A4 and A3
- paper orientation
- map rotation

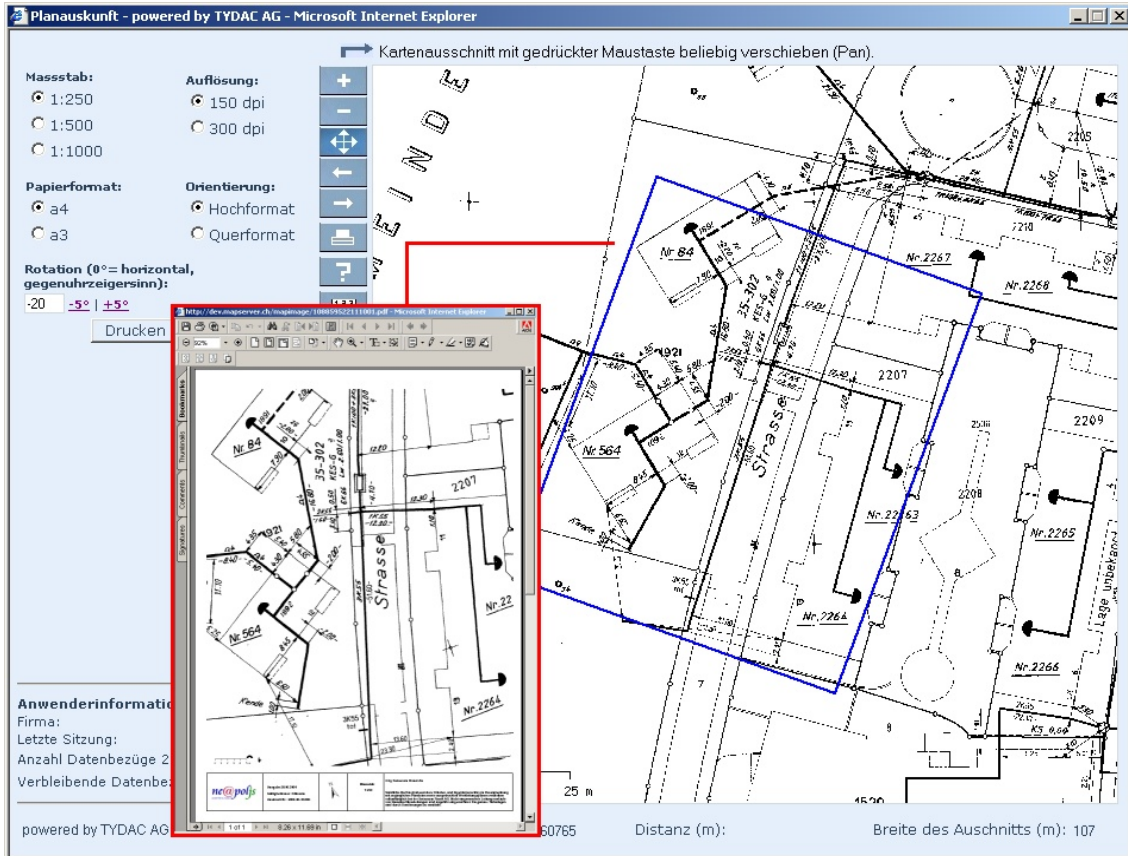


Image 7: Sophisticated PDF output

## 4.7.2 Business Graphs

Map Information can be accompanied by business graphs, i.e. when querying data. See 6.2 GeoPolitics - Over 30 Years of Democracy online!

## 4.7.3 User Access Control

Different users have different needs and some information is for certain eyes only. User Access Control can handle all of it.

## 4.7.4 Logging

A lot of applications lack of one of the most important functions: Logging. Logging can answer a lot of questions, such as:

- Is an application used?
- What browsers and resolutions are used?
- What functions are used?
- How long is somebody staying?
- Proof of usage, i.e. when did a user print that map and what was on the map. This is for example really important if you provide information such as location of power lines to construction companies and they go and cut you off ...

And, last not least, are we GIS users or not? The Map below shows all zooming activities on a site in November 2003:

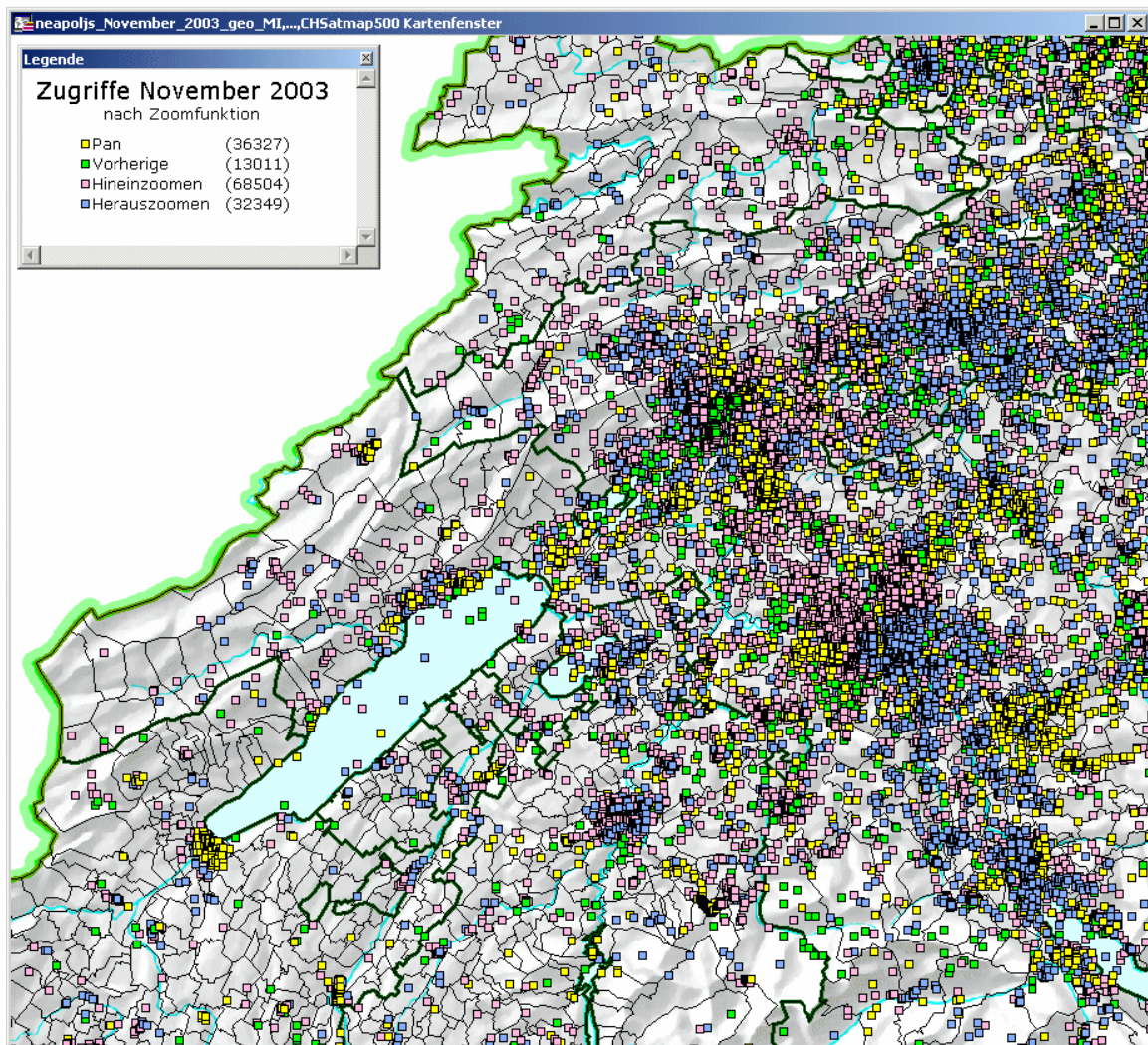


Image 8: Logging: zoom activities





## 5 How do I proceed?

To finish some hints on how to proceed when creating a site:

- Write down your ideas on paper
- Discuss it with others: programmers, users, your kids, your husband, your wife ...
- Using a drawing package to create a draft (personally I use Paintshop Pro and PhotoImpact) and use a (web) designer if you are not the creative type
- Discuss it again

Or, best and easiest: give [TYDAC](#) the contract to do it ☺!

## 6 Appendix: Samples

### 6.1 Swissgeo - Your Guide through Switzerland

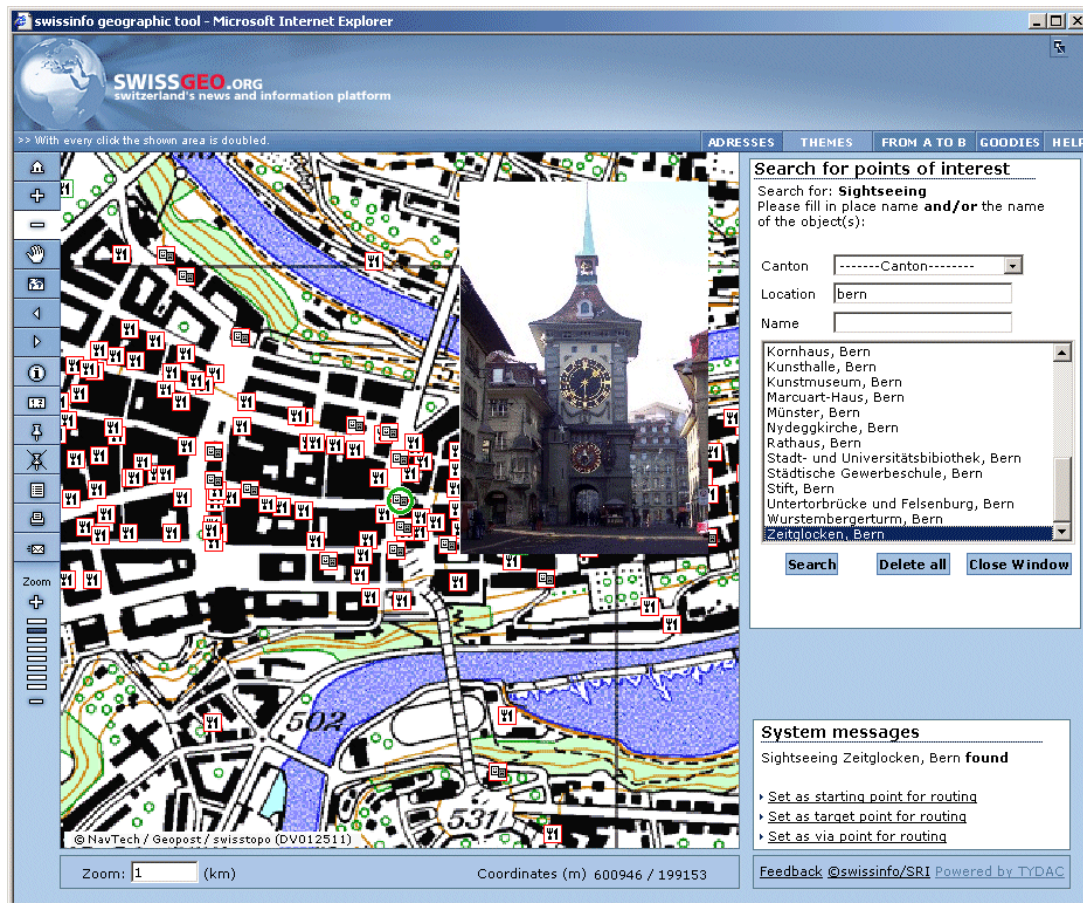


Image 9: Swissgeo - Your guide through Switzerland

Swissgeo is the most complete online Geographical Information System about Switzerland. The really impressive part of the application is the wide collection of points of interest and the related information coming along with them:

- **Tourism:** Hotels, Castles, Tourist Information Offices, Camping, Youth Hostels, Bars etc.
- **Culture:** Museums, Theaters, Sightseeing, Breweries etc.
- **Entertainment and Sport:** Skiing Areas, Alpine Huts, Wellness, Thermal Bath etc.
- **Mobility:** "real-time" traffic situation, webcams, gas stations, car rental, parking, routing etc.
- **Nature:** lakes, waterfalls, mountain peaks, zoos etc.
- **Services:** pharmacies, hospitals, cash machines, universities, libraries, embassies etc.

The application is available in **10 Languages (!)**: Arabic, Chinese, German, English, Italian, Japanese, French, Portuguese, Romanic and Spanish.

## 6.2 GeoPolitics - Over 30 Years of Democracy online!

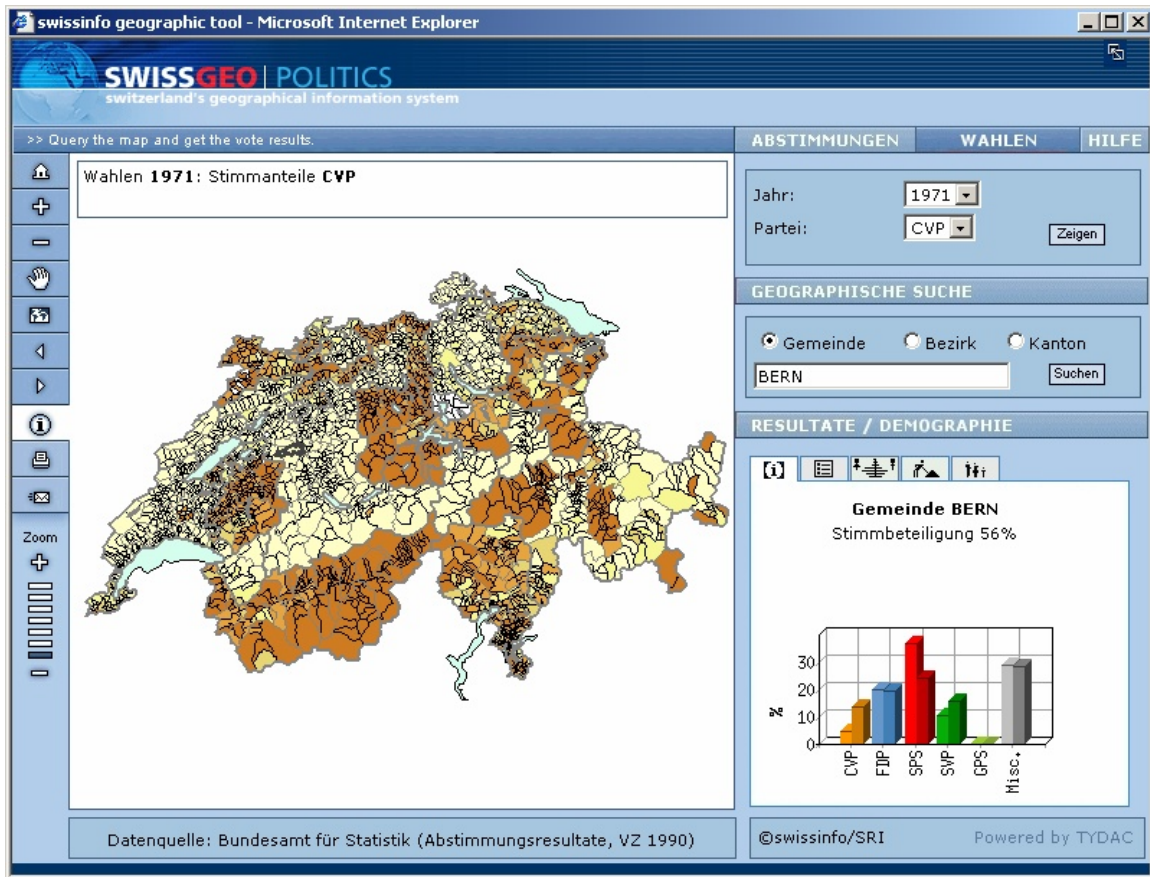


Image 10: GeoPolitics - 30 years of democracy online

Switzerland is known as one of the oldest democracies in the world. Fact is that we have referendums about more or less important things taking place almost every month. GeoPolitics is a review of all elections since 1971 (mean since we made the mistake to allow women to vote ☺ - that's how old the democracy really is ...) and of all referendums since 1981.

The application allows you:

- To search for any referendum by year or keyword and visualize the resulting thematic map
- Search and see the results on a canton, district or commune level (over 3'000 communes) along with diagrams about age, employment and household size
- See all elections since 1971 for the five largest political parties

The application is available in the four national languages.



## 6.3 The most complete City Guide: St. Gall

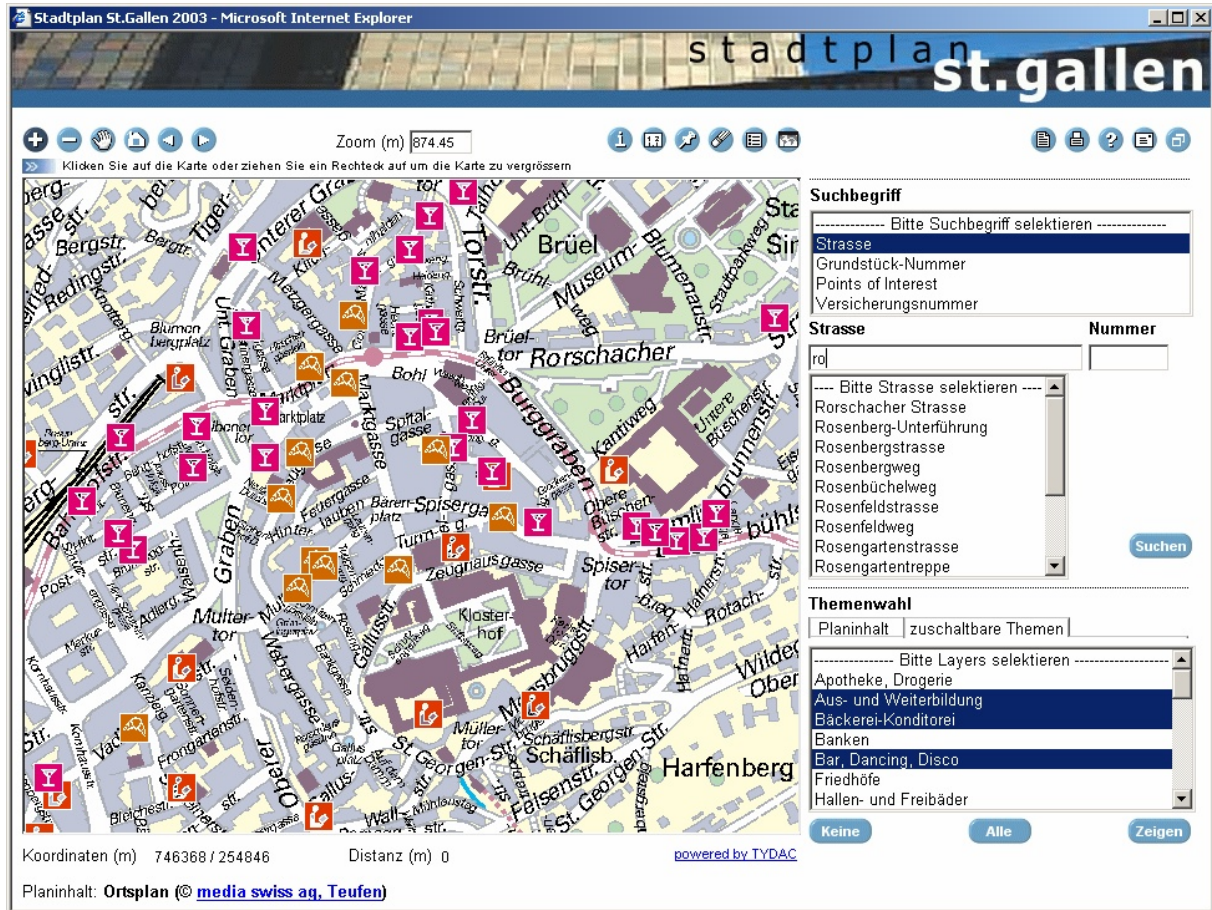


Image 11: 7.3 The most complete City Guide

The amount of geographical information published on this site is with over hundred different maps simply mind-blowing:

- Historical maps since 1830
- Surveying, Parcels
- Land use, planning, protected areas
- Arial photos, City map, Bus lines
- Noise cadastre, street maps, mobile antennas locations, garbage collection locations and so on

In addition one can search and display thousands of Points of Interest, such as even bakeries, butcheries, kindergartens, banks, cinemas, kiosk and so on.

If one moves to St. Gall, there is no question that this application can't answer!



## About the Author

Name            Flavio Hendry  
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e-mail          flavio@tydac.ch



Flavio Hendry is civil engineer by profession and has over fifteen years experience in the field of GIS. After a few years working in the civil engineering field, all started 1988 within IBM meeting up with a product called SPANS, which made him start up his own company in 1991 using the same name as the former Canadian developers of SPANS: TYDAC, based in Bern, Switzerland. During in career in GIS he gained experience in many application areas, such as forestry, planning, geomarketing, environment, telecommunications and so on. As CEO at TYDAC he is currently mainly in charge of Web Mapping Application Design, the TYDAC Web Sites and helps out in marketing, technical support, teaching etc.

## Who is TYDAC?

TYDAC, founded 1991 and based in Bern, Switzerland, has gone on to become a leading GIS company with over 450 clients across Europe who are using TYDAC's solutions in many application areas including forestry, planning, geomarketing, environment, telecommunications and so on. Today TYDAC builds its own solutions as well as it integrates leading technology such as from MapInfo, ESRI and Safe Software.

TYDAC has up to date carried out over 40 intranet / internet mapping projects throughout Europe using as base its own product Neapoljs.

More about TYDAC: [www.tydac.ch](http://www.tydac.ch).