

Free and Open Source Desktop GIS Projects and Software: An Analysis



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GIS Editor

Desktop GIS

JUMP

MapWindow

Thuban



SAGA

GRASS

Kosmo



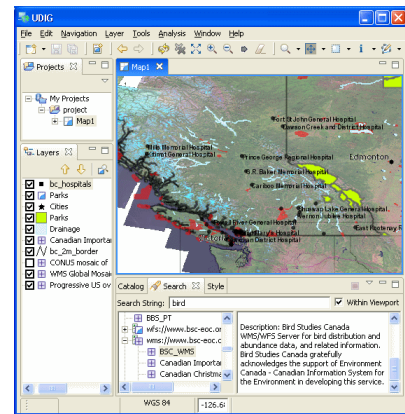
iGeoDesktop

OpenJUMP

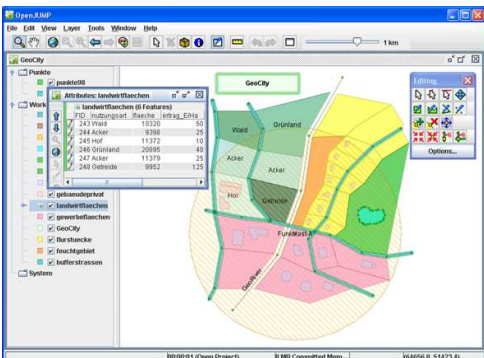
GIS Viewer

GIS Analyst

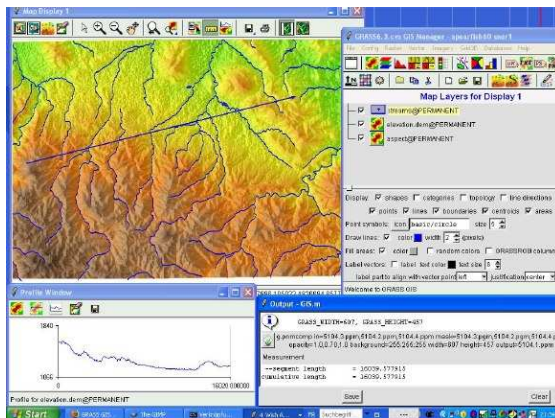
gvSIG



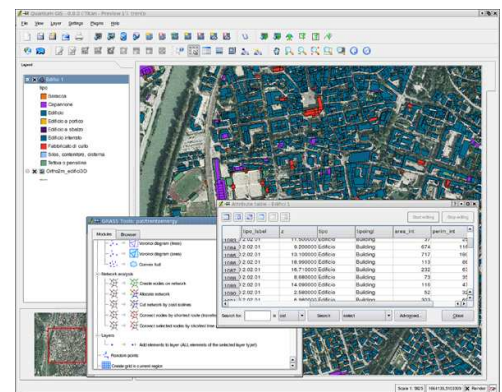
uDIG, Image: Refractions.net



OpenJUMP, Image: Uwe Dallüge



GRASS GIS, Image: M. Lennert (<http://grass.itc.it>)



Quantum GIS, Image: M. Neteler
(pinus.chinju.ac.kr)

Questions that I want to answer:

- What distinguishes Free and Open Source Desktop GIS (FOSGIS) projects from proprietary projects?
- Are FOS GIS ready for the Desktop?
- Are FOS Desktop GIS becoming a success story?



vs.



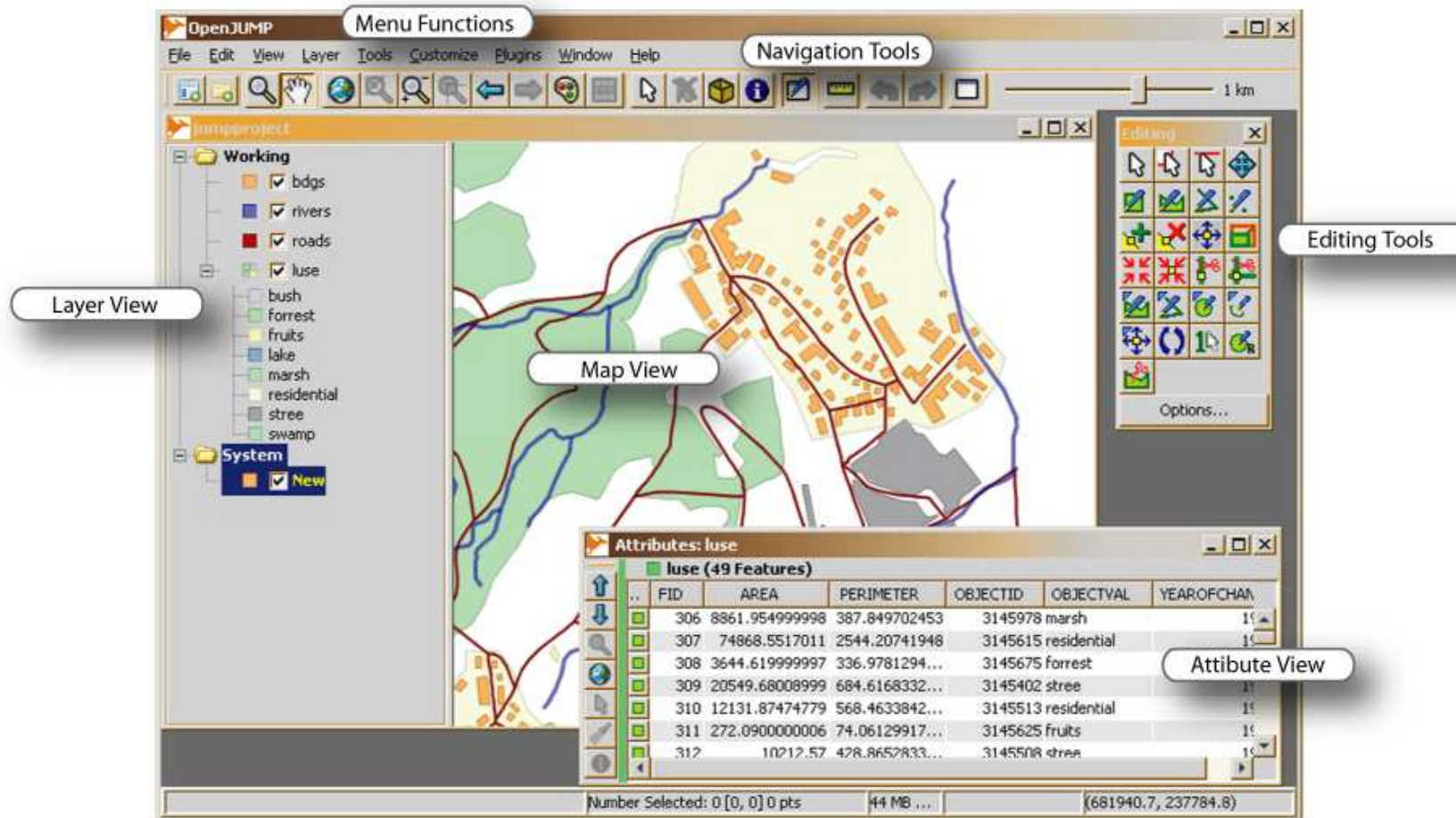
Outline

- I. What's a Desktop GIS?
- II. FOS Desktop GIS projects – a selection
- III. Comparing FOS vs. Proprietary (Desktop) GIS
- IV. Challenges in FOS GIS management
- V. So what?

I. What's a Desktop GIS?

Background (I)

What does a “Desktop GIS” look like?



a typical user interface ... a bit like Google Earth or Google Maps

Background (II)

What can I do with a “Desktop GIS”?



Viewing (exploration)



Creation (& extend dataset)



Editing (modify dataset)



Conflation (integrating datasets from different sources)



Transformation (coordinate systems, raster/vector, resampling,...)



Query (new views/selections)






Analysis (new datasets with new information)



Create maps

Background (III)

So - what is a “Desktop GIS”?

- distinguishing between different types of GIS software by user tasks*
- desktop GIS tasks: 1 viewing, 2 creating, 3 editing, 4 storage, 5 conflation, 6 transformation, 7 query, 8 analysis, 9 creating maps
- types of desktop GIS:
 - . GIS Viewer: 1,4,7,(9); 
 - . GIS Editor: 1-4,(6),7,9; 
 - . GIS Analyst: 1-9 
- or as ESRI says:

A desktop GIS is a mapping software that is installed onto and runs on a personal computer and allows users to display, query, update, and analyse data about geographic locations and the information linked to those locations. (www.esri.com)

II. FOS Desktop GIS – a selection

Background (IV)

- since 2002 a number of free Desktop GIS projects started (> 5)
- GRASS and OpenMap earlier, but with military background
- different foci:



- . **user background:** novice, experienced, expert, research
- . **application:** data editing, conflation, analysis, viewing
- . main data type: raster vs. vector
- . devel. **platform:** C++, Java, Python, (PhP?)

- possible evaluation criteria:



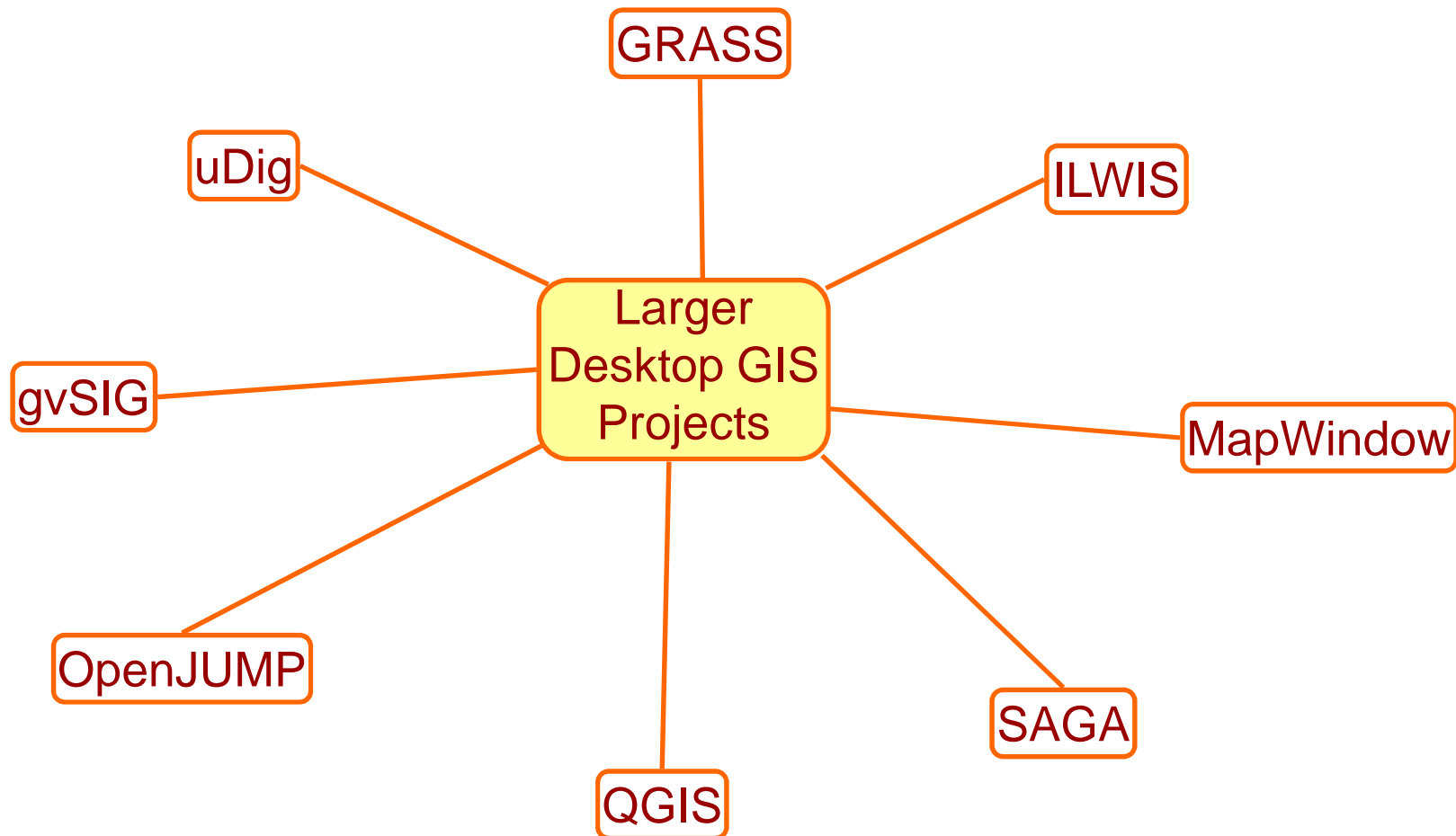
- . features/functionality
- . documentation*
- . software modular*
- . user **community***
- . support**
- . useability
- . supported (OGC) standards***
- . transparent devel team*
- . developer community*
- . license**
- . platforms & tech. requirements**
- . development API

*P Ramsey (2004, 2006); ** JO Wagner (2006), ***J Reid (2001)

Background (V)

- 01. **GRASS**
- 02. **Quantum GIS** (QGIS)
- 03. **JUMP GIS** family: OpenJUMP – SkyJUMP – deeJUMP - PirolJUMP
- 04. **uDig** : (recently joined by/with JGrass team: dedicated to hydro - geomorphology)
- 05. **SAGA**
- 06. **MapWindow**
- 07. Thuban : GIS viewer
- 08. Kalypso
- 09. **gvSIG**
- 10. Kosmo
- 11. OpenMap : GIS ToolKit
- 12. **ILWIS**
- 13. mezoGIS : GIS viewer
- 14. Fmaps : (dead)
- 15. OrbisGIS : under development
- 16. Puzzle GIS : under development
- 17. iGeoDesktop : under development

not open source, but free-of-cost: Spatial Commander, Forestry GIS, Google Earth, ArcExplorer, TNTlite, TatukGIS Viewer, ...



Geographic Resource Analysis Support System

GRASS

user level:

experienced ... research

application focus:

vector & raster analysis

users:

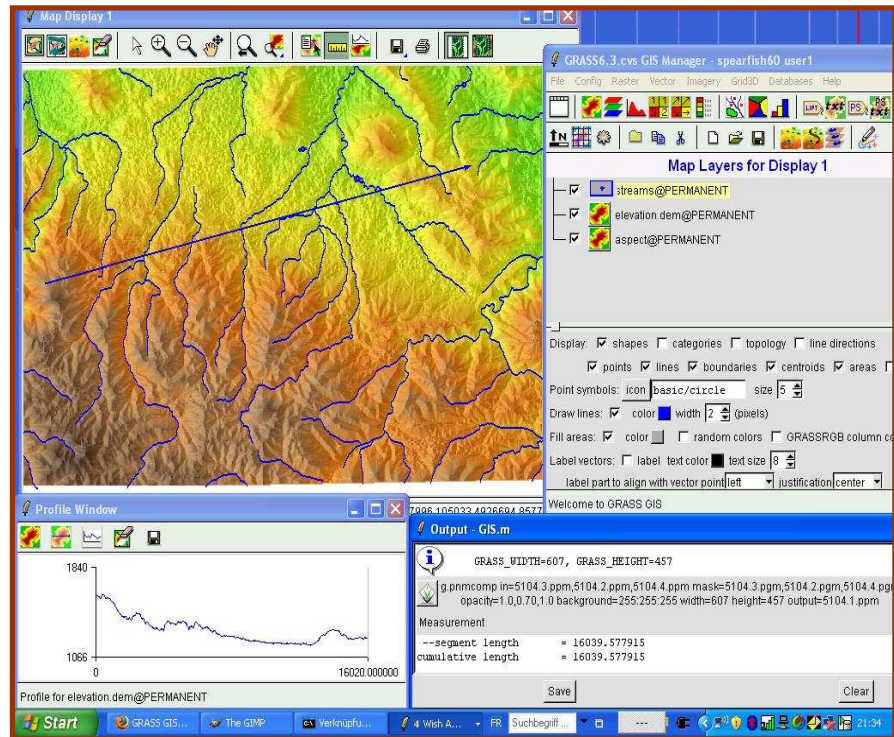
worldwide, large community

developers:

mainly from universities

notes:

oldest FOS GIS, ArcInfo functionality



GRASS GIS Image: M. Lennert (http://pinus.chinju.ac.kr/grass/grass63/screenshots/images/native_wingrass63.jpg)

Integrated Land and Water Information System

user level:

novice ... research

application focus:

vector & raster analysis

users:

several, research (teaching)

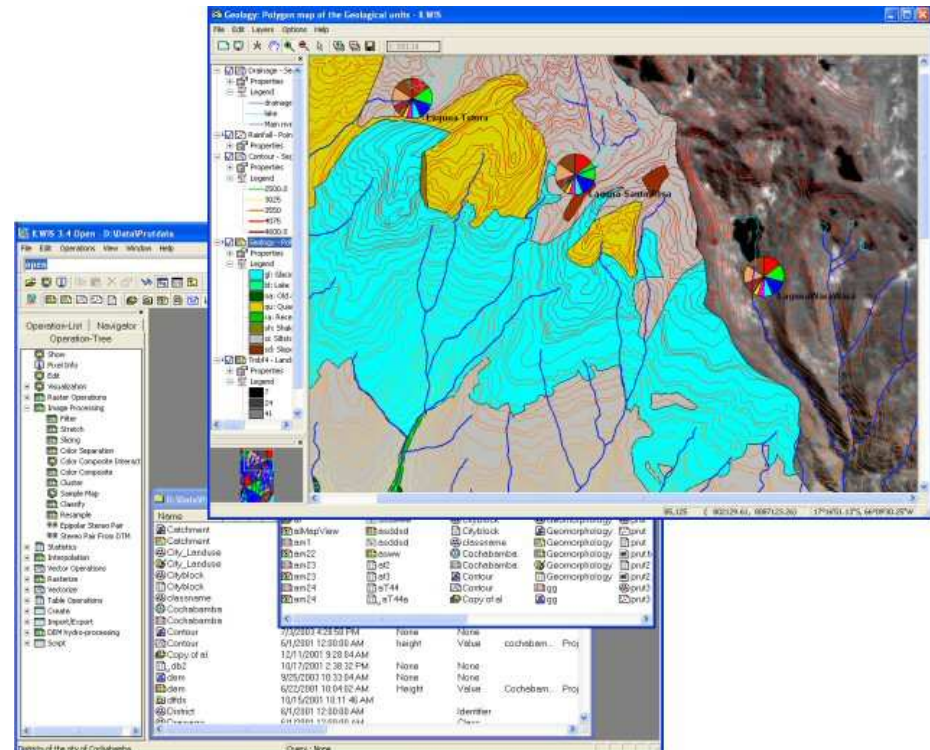
developers:

ITC Enschede (NL), 52° Nord

notes:

*1985, Win-based (Visual C++)

ILWIS



Map Window GIS

MapWindow GIS: <http://en.wikipedia.org/>

user level:

novice ... research

application focus:

GIS core/ vector & raster analysis

users:

worldwide, large

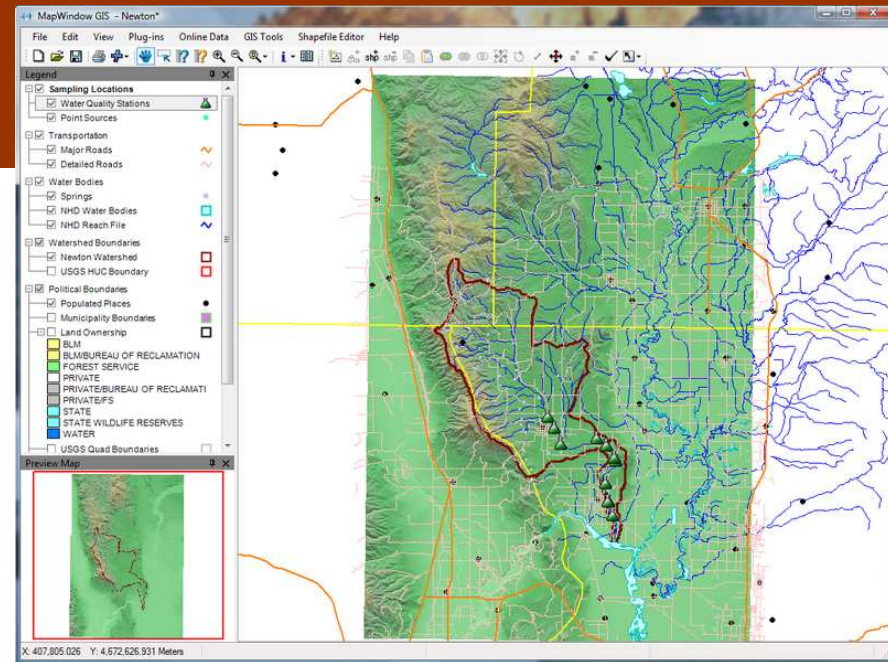
developers:

lead: Idaho State Univ., worldwide

notes:

Windows only, .NET

used by US Env. Protect. Agency



— MapWindow

System for Automated Geo-Scientific Analysis

user level:

novice...research

application focus:

raster analysis (geomorph./hydro.)

users:

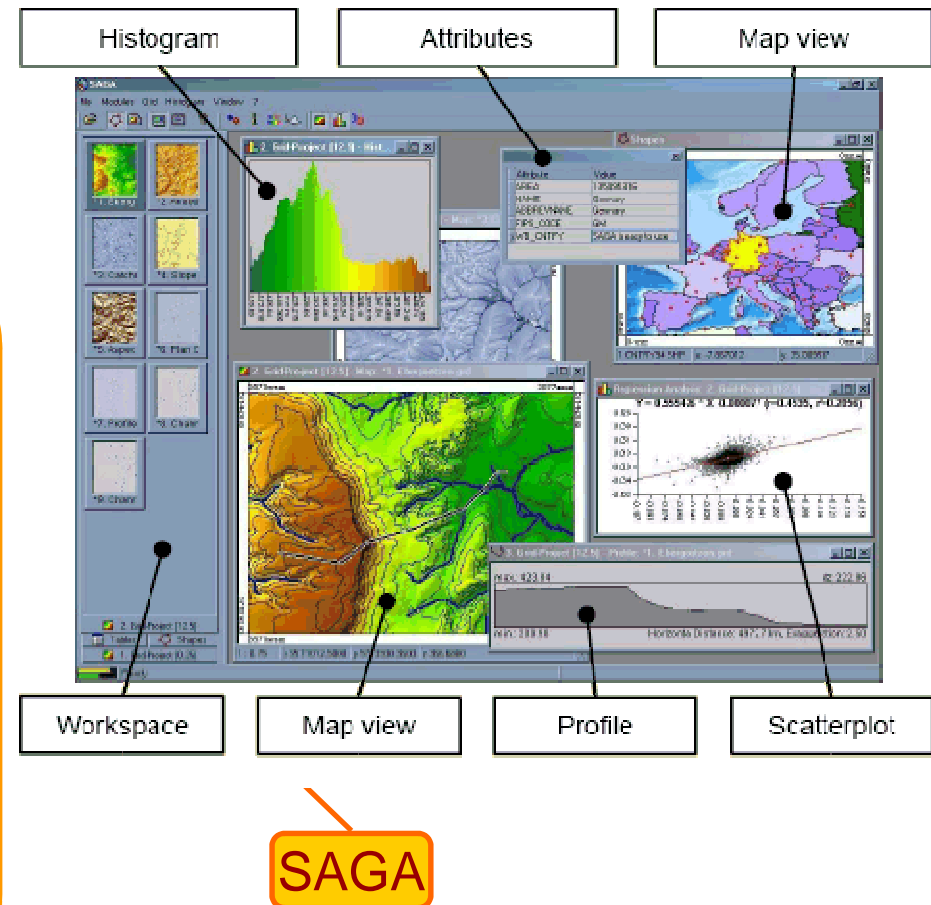
with particular interests

developers:

original: Univ. Göttingen (GER), now
U. of Hamburg, others

notes:

MS Visual C++, but Linux too



SAGA GIS: <http://www.saga-gis.uni-goettingen.de/html/images/bild8.gif>

Quantum GIS

user level:

novice ... research

application focus:

data viewer & editor, interface to GRASS, tendency to full GIS

users:

huge community worldwide

developers:

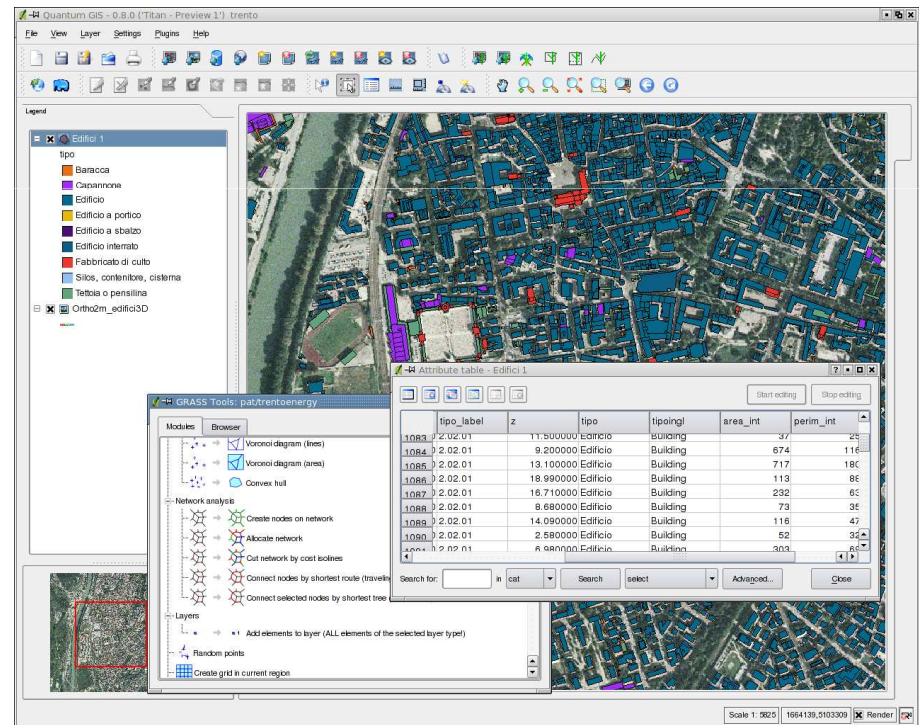
worldwide, volunteers

notes:

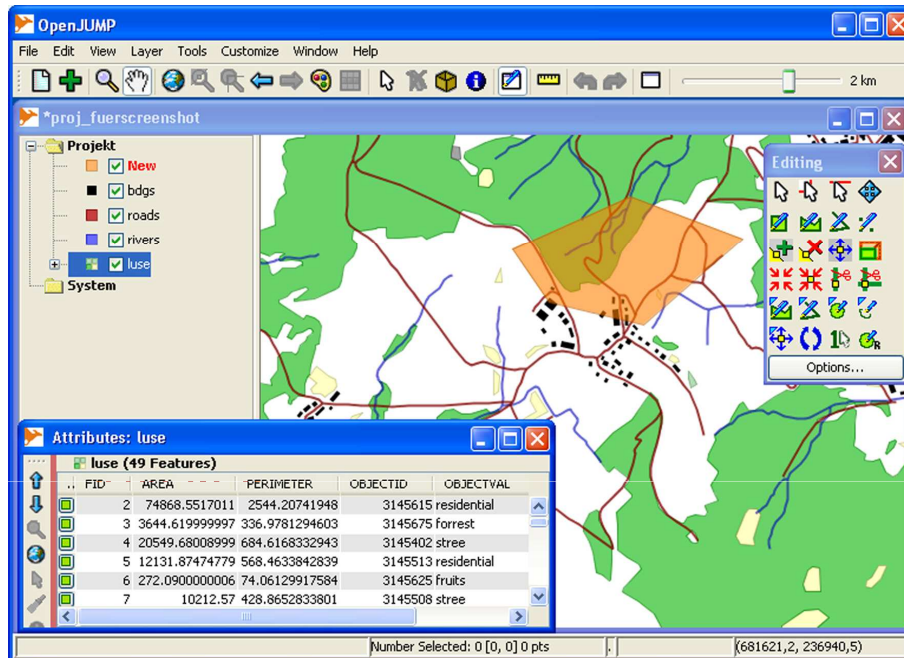
best marketing ☺

QGIS

Quantum GIS Image: M. Neteler (pinus.chinju.ac.kr)



Open Java Unified Mapping Platform



OpenJUMP

user level:

novice ... research

application focus:

vector data editing, conflation, analys.

users:

worldwide, public. admin.

developers:

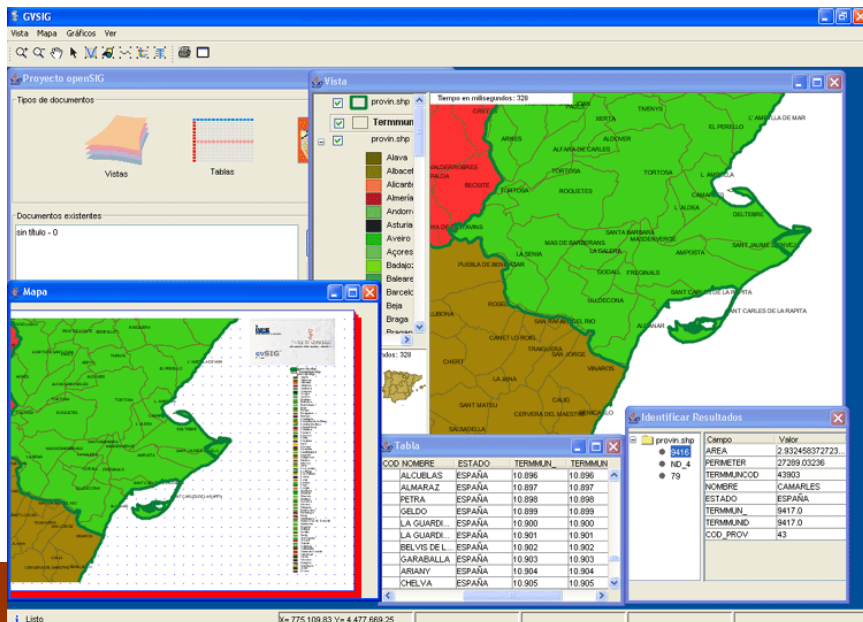
orig. JUMP: VividSolutions Inc. (CA),
now: volunteers worldwide

notes:

versions: deeJUMP, SkyJUMP, ...

Generalitat Valencia Sistema d'Informacio Geografica

gvSIG



user level:

novice ... research

application focus:

ArcView++

users:

public administration (ES), research

developers:

IVER Technologies (ES), univers.

notes:

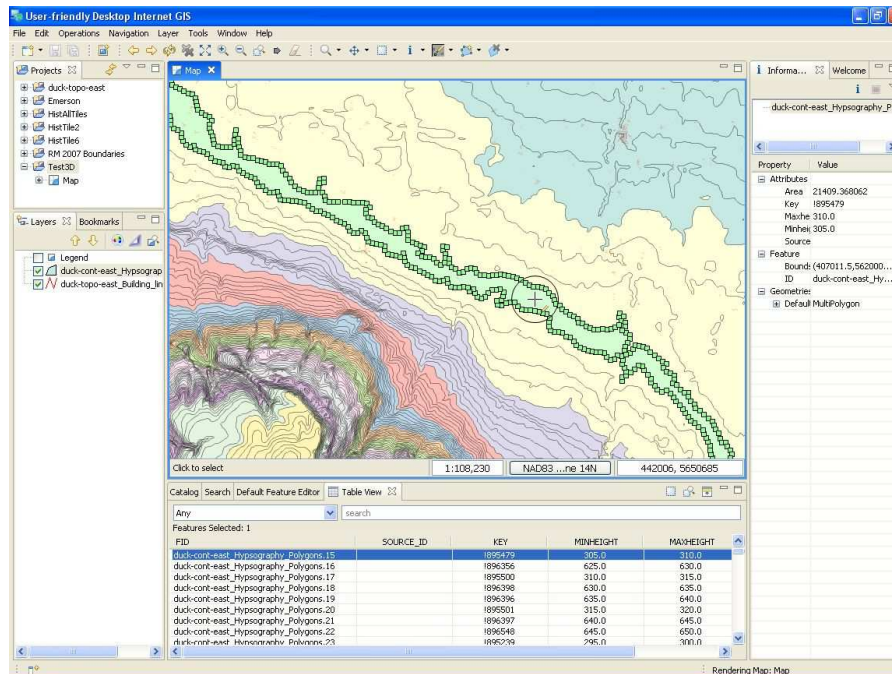
strong financial support by governm.

non Spanish user base is growing

gvSIG Image: <http://www.gvsig.gva.es>

user friendly Desktop Internet GIS

uDig



user level:

novice ... research

application focus:

viewing, editing, analysis (web/data)

users:

growing comm., worldwide

developers:

Refractions R. Inc. (CA), Axios (ES),
volunteers

notes:

uDig Image: <http://udig.refractions.net/confluence/display/UDIG/Screenshots>

III. Comparing FOS vs. Proprietary (Desktop) GIS



VS.



Comparing functionality

Task	GRASS	QGIS	ILWIS	uDig	SAGA	Open-JUMP	Map Window	gvSIG	ArcView 9.3
viewing	•	•	•	•	•	•	•	•	•
creation	•	•	•	•	•	•	•	•	•
editing	•	•	•	•	•	•	•	•	•
integration	•	-	-	•	-	0	-	-	-
Presentation									
- maps	•	•	•	•	•	•	•	•	•
- charts	•	•	•	-	•	0	-	-	•
- tables	•	•	•	•	•	•	•	•	•
Overlay Analysis									
- raster	•	Via Grass	•	Via JGrass	•	Via Sextante	•	Via Sextante	-
- vector	•	•	•	•	•	•	0	•	partly
customization	Python, Perl	Python	ILWIS scripts	Groovy	Python	Jython	.Net	Jython	several

functionality • : available, 0 : available via plugins, - : not available

Comparing Development & Support

Free GIS projects vs. Proprietary GIS Vendors (1):

I - Development Drivers



- . GIS Projects: companies (commercial), authorities, research and individuals
- . Prop. GIS: companies (commercial), (very) big customers

II – User Focus



- . GIS Projects: focus towards particular user groups and tasks
- . Prop. GIS: focus towards particular businesses & wide appl. field

III – Development & Shipping models

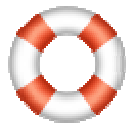


- . GIS Projects: (a) all functions out of the box (GRASS, ILWIS, SAGA)
(b) core & 3rd-party plugins (QGIS, OpenJUMP, gvSIG)
- . Prop. GIS: rather (a) but (b) GIS “extensions” exist too

Comparing Development & Support

Free GIS projects vs. Proprietary GIS Vendors (2):

IV - Support



- . GIS Projects: by companies*, free email, free user forums, wikis
- . Prop. GIS: by companies (paid), forums (paid + free)

*FOS GIS support: see also http://www.osgeo.org/search_profile

V - Miscellaneous:

FOS GIS Projects



- 1) not yet ready to create “nice” maps (req. post-processing)
- 2) documentation is sometimes incomplete, but you can talk to the developers in forums and user email lists
- 3) information needs to be found by user (no marketing)
- 4) difficult to estimate how projects continue (not market driven)

Comparing Licenses

Non GIS – specific differences of FOS and Proprietary Software

Proprietary Software (e.g. Microsoft Office, ArcGIS)	OpenSource / Free Software (e.g. OpenOffice, GRASS GIS)
<ul style="list-style-type: none">+ warranty* of developing company on product :holds for every company+ components should work together+ usually well documented software	<ul style="list-style-type: none">+ no license fees+ unrestricted use (e.g. # installations)+ no update enforcement+ support of open standards+ customization at API level
<ul style="list-style-type: none">- price & maintenance fees- customized development is difficult- support as long as company exists	<ul style="list-style-type: none">- installation knowhow necessary- training costs**

*) BUT: license agreements often exclude warranty

Based on a comparison by Martin Weis (2005)

**) BUT: user choice to invest in own resources or to buy

IV. Management challenges - for volunteer projects -

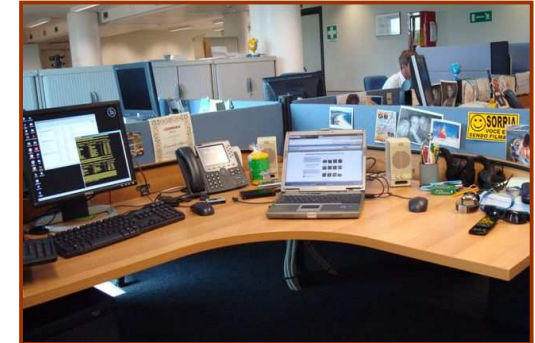
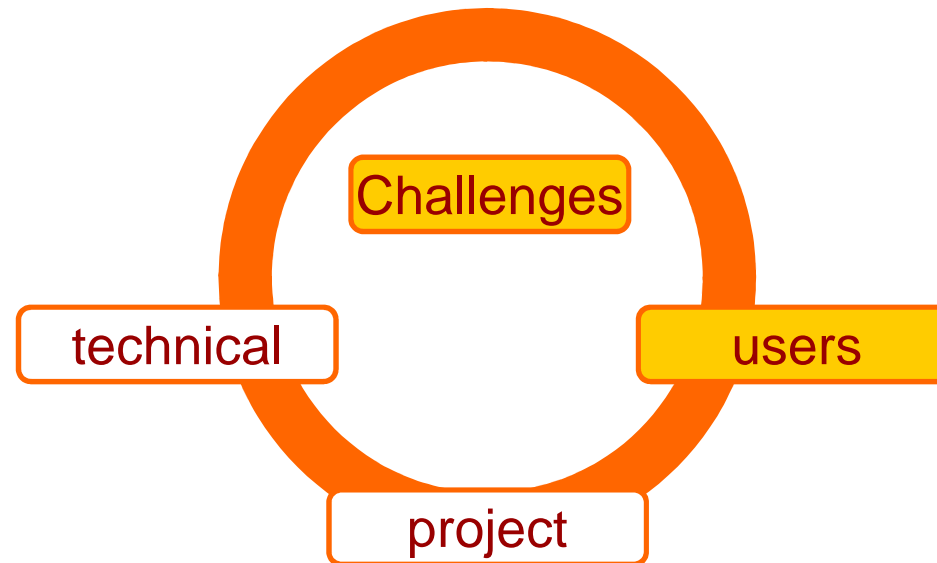
Challenges (I)

Situation description

- OpenJUMP is a “volunteer” project
 - + supporting companies Lat/Lon, Intevation, ISA Inc.
- ca. 4-5 developers + ca. 3-5 contributing users
- ca. 1000 downloads/month
- 80 vs. 90 email list users (developers vs. users)



Challenges - Users



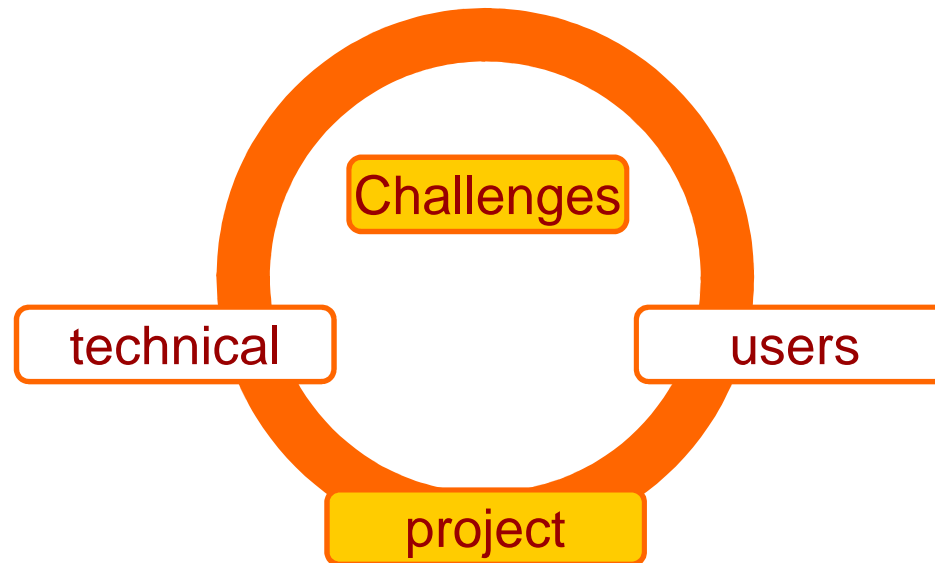
Challenge I – Who are the users?

- ⇒ What are their needs?
- ⇒ What language do they speak?
- ⇒ How to develop a roadmap?

Challenge II – diversity of users

- ⇒ roadmap: explore new areas or concentrate on strengths?
- ⇒ shipping: all-in-one or plug-in/extension system

Challenges - Project



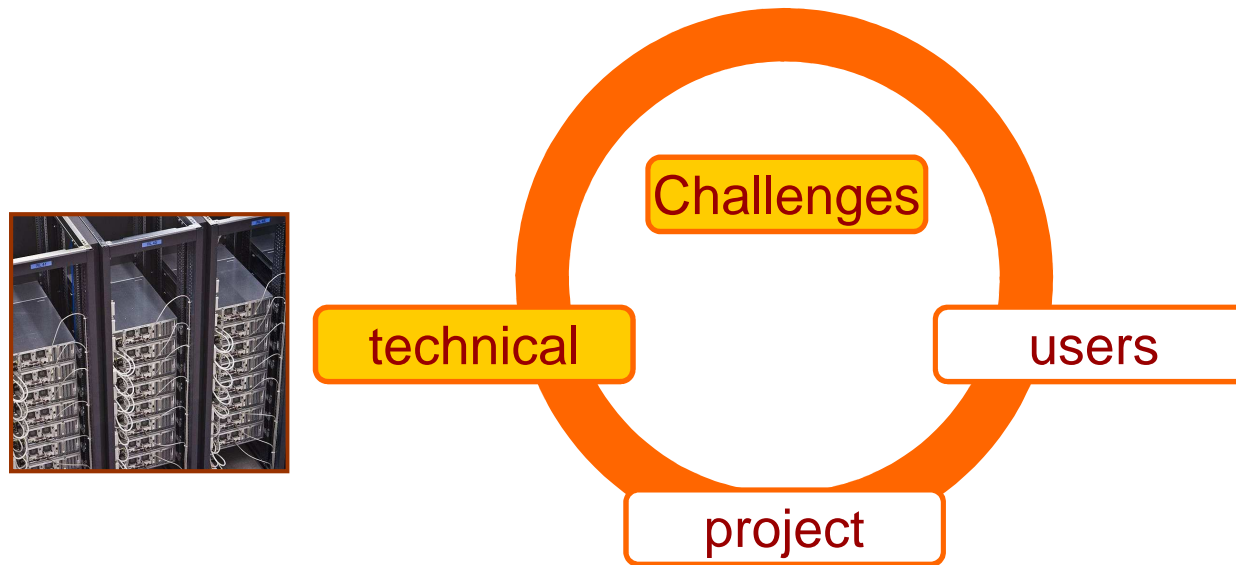
Challenge III – Participation is based on goodwill

⇒ Who will do what *and* who has time for: maintenance of functions, bug fixing, webpage, developing new functions, integrate existing, translate, documentation : RMap?

Challenge VI – few contributors

⇒ no 1000 eyeballs: bugs may be undiscovered for a long time
⇒ documentation is delayed
⇒ function wish list is long
⇒ “open” wiki’s

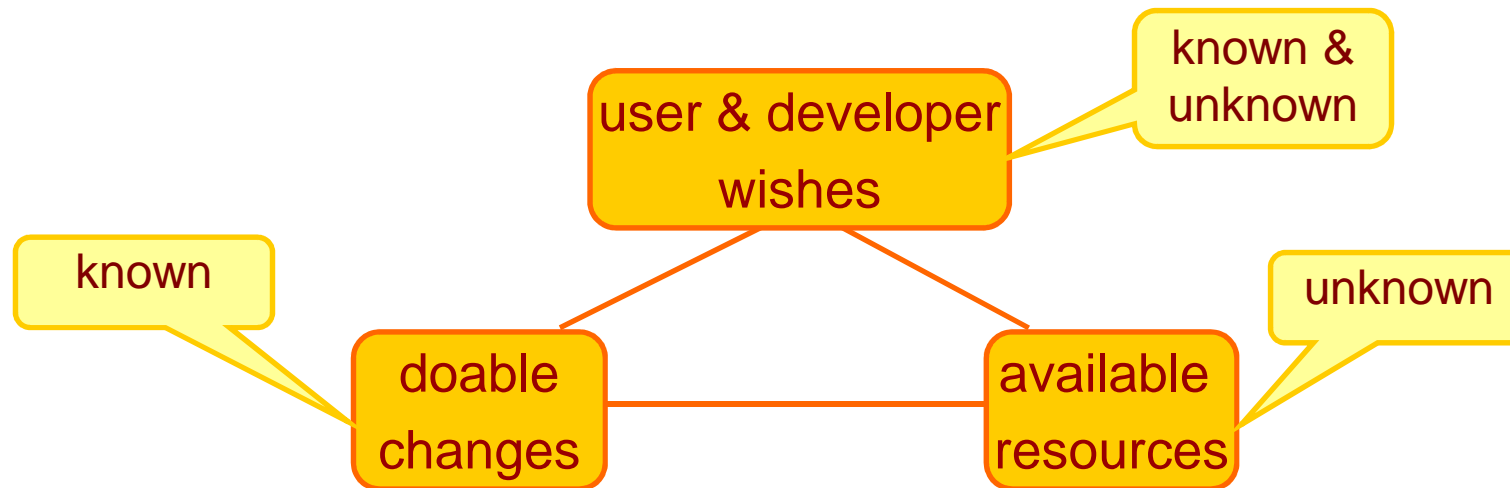
Challenges - hosting



Challenge V – Hosting & Distribution

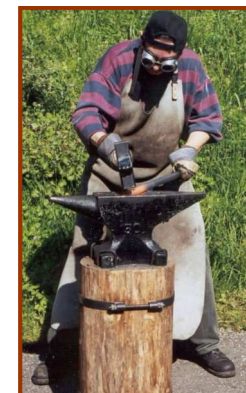
- ⇒ Who hosts and manages the source code repository?
- ⇒ Who builds the nightly build?
- ⇒ Who “pays” for the massive download traffic?
- ⇒ Who hosts wiki and webpage and downloads?

navigating in a triangle...



Solutions for small projects: Efficiency

- ⇒ use available infrastructures (SourceForge, OSOR Forge);
- ⇒ plug-in system with small core vs. all-in one distribution
- ⇒ re-use documentation for web & pdf;
- ⇒ make user contributions as easy as possible (wiki)
- ⇒ ???



What you can do...

Or users that pay for the functionality they wish, i.e. are hiring a programmer

We need **Feedback & Participation!**

Already 1h/week can make the difference!

V. So what?

- Ready for the Desktop? -
- Become FOS Desktop GIS a success story? -



Ready for the *Enterprise* Desktop?

FOS Desktop GIS are ready for the (enterprise) desktop!

- functionality – ArcView™ level and beyond (Editor) has been achieved
- support - free: email & forums, commercial: companies
- several users in public authorities (ESP, GER, CAN, FIN, IT, ...)

Issues

- Finding a/the suitable software with respect to functionality and license restrictions (see thesis by Atle. F. Sveen on FOS GIS selection)
- There are switching costs! (i.e.: no free lunch)

Benefits

- provider independence
- cost savings with respect to scale (10+ installations)
- easy to add customized functionality



Ready for the *Research* Desktop?

FOS Desktop GIS are ready for the (research) desktop!

But avoid it if...

- ... you want to re-invent the wheel
- ... want to spent money for licenses
- ... you just work on your own PC (no scaling needed)
- ... you like black boxes
- ... you love the „one size fits all principle“ (what's adaptation?)
- ... you never need what you have done if you move on

AND:

You are *scared* that somebody exploits your developments!
(..but remember, you could use what others accomplished...)

A success story?

YES, FOS Desktop GIS...

... had a good start so far

... and can continue to be successful if:

- more people start using it
- more “people” contribute
- management issues can be resolved



Thank you!

icons from: <http://www.iconspedia.com>

more info:

- www.spatialserver.net/osgis/ (⇒ 2 articles)
- www.osgeo.org
- Gary E. Sherman: „*Desktop GIS: Mapping the Planet with Open Source Tools*“ (2008)