GRASS GIS, Star Trek and old Video Tape

GRASS GIS, Star Trek and old Video Tape

by Peter Heinz Löwe[1], Janna Neumann[1], Margret Plank[1], Frauke Ziedorn[1], Robert Lozar[2], James Westervelt[2] and Roger Inman[3]

[1]*National Library of Science and Technology (Germany),* [2]*ERDC-RDE-CERL (USA),* [3]*Movingpictures TV (USA).* peter.loewe@tib.uni-hannover.de

Abstract

This paper discusses the need for the preservation of audiovisual content in the OSGeo communities beyond the established software repositories. Audiovisual content related to OSGeo projects such as training videos can be preserved by multimedia archiving and retrieval services which are currently developed by the library community. This is demonstrated by the reference case of a newly discovered version of the GRASS GIS 1987 promotional video which is being included into the AV-portal of the German National Library of Science and Technology (TIB). Access to the video will be provided upon the release of the web-based portal, allowing for extended search capabilities based on enhanced metadata derived by automated video analysis. This is a reference case for future preservation activities regarding semantic-enhanced Web2.0 content from OSGeo projects.

Keywords: GRASS GIS, OSGeo, digital preservation, educational material, audio visual media, Youtube, GRASS 1987 promotional video, Digital Object Identifiers, audiovisual history, screen casts, Web 2.0, Multimedia retrieval.

1 Knowledge Preservation in the OSGeo Communities

1.1 The Role of OSGeo

Since its launch in 2006, the Open Source Geospatial Foundation (OSGeo) has distinguished itself as an umbrella organisation, incubation tank and software license clearinghouse for a large and growing number of geospatial Free and Open Source (FOSS) software projects (OSGeo 2014).

Work in these projects is done by international communities of volunteers. It is centered, but not limited to the development of software tools. Tasks like software testing, the creation of reference data, technical writing for user-and developer-manuals, multi-language translation and the creation of tutorials/educational material augment the core software development activities. Without these tasks, the access to the software would be seriously hampered for the majority of users.

1.2 Use of Repositories and Web 2.0 use in OSGeo projects

While the software of the OSGeo projects is maintained in repository systems such as CVS, SVN and Git, most of the audiovisual educational material is currently provided via virtual Web 2.0 communities, including Slideshare and YouTube. References to the content are made by links and free classification (Folksonomy/Tagging). For the licensing of this intellectual property are often Creative Commons licenses used.

The content which is shared on the Web2.0 channels consists of experience gained with specific software instances for geospatial analysis or processing tasks. This is an important source of practical know-how for Geo–informatics practitioners.

1.3 The Challenge of Audiovisual Content Preservation

The audiovisual content provided through the Web 2.0 channels continues to grow for all OSGeo projects. With the ubiquity of screen capture software and video recording, this approach has distinguished itself as a fast and affordable alternative to preserve the underlying knowledge in text documents. Collaborative tagging is used to provide searchable keywords regarding the actual content. While this is sufficient to search for the names of specific OSGeo software projects, it is an ineffective means to query specific software versions or the description of complex or specialized workflows. Until now, there are no explicit community rules or best practices how long such geospatial-themed audiovisual content will be kept available. It may be eventually removed by its creator without previous notice, but might also go offline once the Web 2.0 portal is retired.

The discussion of long term preservation of audiovisual content and effective search access for audiovisual content within the scope of OSGeo has just begun. Most content providers still consider the Web 2.0 portals as ubiquitous untrustworthy providers of

persistent storage space. However, this assumption remains to be verified.

Both from the perspective of the OSGeo communities and research libraries, it is imperative that the knowledge and scientific expertise provided through this audiovisual content is preserved, made fully searchable and citable for future reference. For this reference cases and best practices are needed.

2 Geographic Resource Analysis Support Software (GRASS) GIS

2.1 GRASS GIS Development Overview

GRASS GIS, the Geographic Resource Analysis Support Software, is one of the oldest Free and Open Source Geographic Information System (GIS) projects (GRASS GIS 2014). The acronym was introduced to adhere to the common use of plant names in earlier Geographic Information Systems (GIS), such as SAGE and MOSS (Mapping Overlay Statistical System) (Westervelt 2004). While being a founding project of OSGeo, it predates the organization by several decades, having been under continuous development since 1982.

From its launch in 1982 until 1997, GRASS GIS was hosted at U.S. Army, Corps of Engineers Research Laboratory (USA CERL). Baylor University, Texas, maintained the software from 1997 to 1999. Beginning in 1998 GRASS GIS was hosted at University of Hannover, Germany until 2001, when ITC-irst in Trento, Italy took over. In 2006, GRASS GIS became one of the first projects to join the OSGeo Foundation. Since then its main repository is hosted by the OSGeo in the USA.

Since the beginning of the project, the GRASS user base has continuously grown. From 1982 to 1991 the dropping prices for computer equipment were the driving factor. In this decade before the advent of the WWW, the user base of GRASS was measured in "sites" installations. See table 1 for details.

Year	GRASS Installations (Sites)	GRASS Version
1982	1	-
1983	3	-
1984	5	-
1985	20	GRASS 1.0
1987	100+	GRASS 3.0
1988	1000+	GRASS 3.0
1989	1000+	GRASS3.1 (public domain)
1991	1000+	GRASS 4.0 (ftp: 128.174.5.50)

Table 1: Growth of GRASS installations from 1982 – 1991 (Westervelt 1991).

In 1989, the software was placed in the Public Domain and was made available on the Internet via anonymous FTP starting in 1991. The licensing under the General Public License (GPL), beginning with GRASS5.0 in 1999 has resulted in a strong growth of the developer community, leading to new features which grew the user base further worldwide. The license model remains unchanged for the current GRASS6.0 versions and the upcoming GRASS7.0.

During its long development, GRASS has attracted multiple generations of users and developers. While development began in 1982 on Z-80 8-bit CPUs with 64 KB address space, the software was soon ported to improved hardware platforms and operating systems like UNIX. Since 2005, 64bit CPUs are natively supported. Currently GRASS GIS is available for a wide range of computing environments, spanning from Android-based palmtops over desktop PCs to High Performance Computing Clusters (Neteler 2013, Löwe et al. 2012).

A side effect of the GRASS development effort was creation of the modern Open Geospatial Consortium (OGC). It was originally founded in 1987 under the name Open GRASS Foundation (OGF), taking the project lead from the U.S. Army Corps of Engineers Construction Engineering Research Laboratory (USA CERL) (Westervelt 2004).

2.2 "GRASS -the adventure begins" – the 1987 Video Commercial

In 1987 a video commercial was produced by the U.S. Army Natural Resources Management Program to promote the use of GRASS GIS. By that time, the user base had grown to over hundred installation sites, using GRASS 2.0 on hardware which required an investment of 40,000 USD.

2.2.1 Filming and Production

Production took six months and was managed by Robert Lozar as the Principal Investigator. Filming and special effects were carried out by Moving Pictures Productions Champaign Illinois. For audio, a soundtrack was composed by Scott Wyatt and the audio script was narrated by the professional actor William Shatner.

2.2.2 Legacy

Following its commercial use, the promotional video remained unavailable to the growing worldwide GRASS GIS community until 2004. A digitized copy of a remaining analog VHS tape was shown at the FOSS/GRASS Users Conference 2004 in Bangkok. Subsequently, this digitized version was made available for download from the GRASS project website and is currently available from the OSGeo portal (OSGeo: GRASS MOVIE CERL 2014) and several repostings on YouTube (Youtube: GRASS MOVIE CERL 2014).

2.2.3 Content and Significance

The content of the promotional video provides a generic introduction to the basic concepts and potential applications of geographic information systems to land managers in the 1980s, emphasizing the benefits of the use of GRASS GIS. In addition, projections for decreasing hardware costs for GIS installations are given and supported hardware platforms are listed.

The video is a rare piece of documentation from the early days of GIS and Geoinformatics. As the development of GRASS GIS still continues 27 years after the production of the video, it is noteworthy that for many command sequences shown in the video modern counterparts still exist. Also, the video indicates that the Spearfish sample data set (Spearfish Sample Data 2014) still provided for

GRASS GIS can be traced back to 1987. Since its re-release in 2004, the promotional video is used both in GIS education and OSGeo events to emphasize the rapid growth of computer processing power and storage space.

2.2.4 The Citation Problem

Until now, no permanent way to reference the promotional GRASS video and cite its content exists. The WIRED internet magazine addressed this issue in an article explicitly in 2013, stating that the video is not referenced on the International Movie Database or Wikipedia. It is noteworthy that the article provides a YouTube-based link to the video, but not to the main site at the OSGeo portal (Mason 2013).

2.2.5 Star Trek and GRASS GIS

The TV show Star Trek (IMDB: Star Trek 2014) was initially broadcasted between 1966 and 1969. The actor William Shatner, who would provide the voice-over for the GRASS video in 1987, stars in the TV show as the Captain "James Tiberius Kirk" of the fictional starship USS Enterprise. The choice of William Shatner to narrate the promotional video was not accidental, as the actor Leonard Nimoy, who played the alien "Mr. Spock" from the fictional planet Vulcan in the same TV show, would have been the backup for Mr. Shatner. The launch of a sequel to the original Star Trek TV show in 1987, named "Star Trek: The Next Generation", without the original cast, seems to be coincidence (IMDB: Star Trek: The Next Generation 2014). From the early days of GRASS GIS development, user feedback to the developers had been influenced by the concepts of advanced information visualization as foreseen by the Star Trek TV show, thereby indirectly affecting the evolution of the GRASS software (Westervelt 2004). The striking similarities of the tolerance-based behavioral codes among the fan communities devoted to the Star Trek TV shows and the meritocratic values of OSGeo project communities remain to be analysed (Shatner & Kreski 1999, Löwe & Neteler 2014).

3 Reference Case: Preserving and Citation of the GRASS GIS Video

3.1 Non-textual Media at the German National Library of Science and Technology

The German National Library of Science and Technology (TIB) is one of the largest specialized libraries worldwide. TIB is a member of the Leibniz-Association, a German umbrella organisation for 86 institutions conducting research and providing scientific infrastructure. It is jointly financed by the federal government and the federal states of Germany. The TIB's task is to comprehensively acquire and archive literature from around the world pertaining to all areas of engineering as well as architecture, chemistry, information technology, mathematics and physics.

Within TIB, the Competence Centre for non-textual Materials is committed to improve the access and use of non-textual material ranging from audiovisual media, research data to 3D objects. This material is to be systematically collected and preserved as cultural heritage. For this task, an advanced web-based platform for audiovisual media (AV-Portal) is currently being developed by TIB and the Hasso-Plattner Institut for software system technology GmbH (HPI)(Neumann & Plank 2013).

The AV-Portal optimizes access to and the use of scientific videos from the fields of engineering and science in the face of the rapidly growing numbers of scientific film being published on Web 2.0 platforms.

For this, advanced multimedia analysis methods such as scene, speech, text and image recognition are combined in order to enhance the bibliographic metadata to enable extended search capabilities. The results are also connected to new knowledge by linking the data semantically. The aim is to make it as easy for users to locate and use the growing stock of non-textual material as it is for them now to procure textual media.

In addition, films stored in the AV-Portal are assigned with digital object identifiers (DOI) as persistent identifiers to ensure that the non-textual media are accessible long term from difference sources, irrespective of their current location, enabling long term citation and referencing. This enables fine-grained citation using the Media Fragment identifier (MFID) standard to provide a individual citable DOI for each segment of a film.

The AV-Portal will be released by mid 2014, providing acces to scientific films in German and English.

3.2 Discovery of an Alternative Version of the GRASS Promotional Video

Because the problems regarding the citation of the GRASS promotional video were known during the testing phase of the AV-Portal, the original copyright owners of the video were contacted, whether it could become a test case for the AV-Portal media collection. Following an initial positive response, the following steps triggered a search in the archives of the original producing company, Moving Pictures Productions. In this process, a formerly unpublished high resolution version of the GRASS promotional video was discovered. The content of this high resolution video is currently being transcoded by TIB and will undergo subsequent advanced multimedia analysis to receive enhanced, comparatively fine granular metadata which will be also indexed next to the bibliographic metadata. The searchable and citable video will become available online following the release of the TIB AV-Portal.

3.3 Upcoming Research Activities

Visual comparison of the previously known VHS-copy of the GRASS promotionaoe video and newly discovered version show that multiple differences exist. An example is given in Figure 2. At this point it is assumed that the high resolution footage is an earlier edit and predates the VHS-version. An in-depth MFID-based comparative analysis will be conducted once both videos have been published on the AV-Portal.

Figure 1: Example of the improved coloring and video resolution of the newly discovered high resolution version of the GRASS promotional video (right) compared to the VHS-version (left).

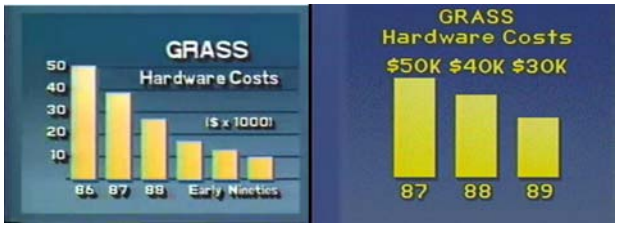

Figure 2: Alternative content in the previously known version of the GRASS promotional video (left) and the newly discovered high-resolution version (right) .

4 The Road Ahead

The preservation of AV-content as described for the GRASS promotional video is a crucial first step, but it is only a part of a larger unified preservation effort for research data on a larger scale: OSGeo Projects are centered on the development of software code, which can in turn become a field of analysis and research, taking advantage of the twin nature of software being perceived as data and vice versa (Graham 1995). For this, visualizations and animations

are already being used and published on Web 2.0 portals, which contain the described limitations regarding citability and long term preservation. Figure 3 provides an example on the current state of the art. However, the tight coupling of multimedia, research data and software repositories enabling reference and citation via DOI remains an active research topic for non-textual information management.

Figure 3: Still frame from a visual analytics animation providing a high level view on the evolving of the GRASS GIS codebase using the Gource software for software version control visualization (Neteler 2013, Grouse 2014). .

5 Conclusion

The integration of the historic GRASS GIS promotional video from 1987 into the upcoming TIB AV-portal is a success story and will serve as reference case for future multimedia preservation activities within the OSGeo communities. The discovery of an unpublished alternative high resolution version of the footage will enable further research using DOI-based citation of the video versions.

While this is a rare and unexpected find from the early days of Geoinformatics, the benefit provided by web portals such as the TIB AV-Portal to the OSGeo project communities lies in preservation, improved access and citability of contemporary multimedia information: The supply, use and significance of non-textual media is continually increasing while only a tiny proportion of these materials can be searched and explored right now.

One response to face these new challenges is the extension of library portals to accommodate non-textual information, develop new tools for indexing, searching, browsing and displaying the data, including software, as well as enrich the data with semantic information. The new search services for library user communities, including the OSGeo project communities, will provide innovative search scenarios and new ways of tapping into knowledge.

References

Graham, P. (1995) ANSI Common Lisp Book, Prentice Hall

GRASS GIS (Last checked 2014), 'The world's leading Free GIS software'. URL: http://grass.osgeo.org/

GROUCE Software (Last checked 2014), URL: https://code.google.com/p/gource/

IMDB: Star Trek (Last checked 2014). URL: http://www.imdb.com/title/tt0060028/

IMDB: Star Trek: The Next Generation (Last checked 2014). URL: http://www.imdb.com/title/tt0092455/

Löwe, P., Klump, J., Thaler, J. 'The FOSS GIS Workbench on the GFZ Load Sharing Facility compute cluster' (Last visited 2014), URL: http://presentations.copernicus.org/EGU2012-4491_presentation.pdf

Löwe, P., Neteler, M. (2014), 'Data Science: History repeated? – The heritage of the Free and Open Source GIS community', Geophysical Research Abstracts, Vol. 16, EGU2014-10027, 2014

Mason, B (2013). 'Video Flashback 1987: Shatner Tells You Where You Can Stick Your Maps' (Last checked 2014). URL: http://archive.wired.com/wiredscience/2013/08/shatner-loves-digital-maps/

Neumann, J., Plank, P. (2013) 'TIBńs Portal for audiovisual media: New ways of indexing and retrieval' URL: http://library.ifla.org/92/1/124-neumann-en.pdf

Neteler, M. 'GRASS GIS 6.4 development visualization from 1999 to 2013 (with soundtrack)' (last checked 2014). URL: https://www.youtube.com/watch?v=MR4_5GSID2A

Neteler, M. 'Scaling up globally: 30 years of FOSS4G development' (Last checked 2014). URL: http://de.slideshare.net/markusN/scaling-up-globally-30-years-of-foss4g-development-keynote-at-foss4gcee-2013-romania

OSGeo (Last checked 2014),'Your Open Source Compass'. URL:https://www.osgeo.org/

OSGeo: GRASS MOVIE CERL (Last checked 2014) URL:http://grass.osgeo.org/grass_movie_CERL_1987

Shatner, W. & Kreski. K. (1999), Get A Life !, Pocket Books, New York, USA 1999

Spearfish Sample Data (Last checked 2014). http://grass.osgeo.org/sampledata/spearfish_docs_1979_p163to171.tar.gz

Westervelt, J. (1991), 'Why does GRASS Exist (Excerpt from "Introduction to GRASS4")' (Last checked 2014) URL: http://grass.osgeo.org/grass41/grass1to4history.html

Westervelt, J. (2004), GRASS Roots, in 'Proceedings of the FOSS/GRASS Users Conference (Bangkok, Thailand, 12-14 September 2004)'.

Youtube: GRASS MOVIE CERL (Last checked 2014) URL:https://www.youtube.com/watch?v=U3Hf0qI4JLc