

Projects TelDIS and MEDIA@Komm-Transfer: GIS Technologies and Training for Use in E-Government

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SUMMARY

The City of Würzburg in Bavaria, Germany has utilized GIS as part of its government operation for more than 15 years. Originally designed and used for limited administrative operations of government, GIS has evolved to become a powerful e-government tool used by government employees as well as citizens. An extensive training program for employees, complemented by training tools and user assist tools developed for citizen users of GIS, is in its third phase of development by the City-GIS-Team. By training employees and helping them become stakeholders of the GIS system, it creates higher acceptance and willingness to use the system. In order for a municipality to take advantage of what GIS can do for it, there must be political and administrative support, computer systems capacity that allows for development of the necessary systems infrastructure, and a strong and continuous training program for employees. The main aim of this paper is to demonstrate successful GIS training and education methods targeting e-government users including government employees, GIS administrators, and citizens.

KEYWORDS: *E-government, GIS, education, training, employees, citizens, practical experiences, TelDIS, Media@Komm-Transfer*

PROJECTS IN GIS AND E-GOVERNMENT

The City of Würzburg in Bavaria, Germany, has been using GIS as a tool in its government operations since 1985 (Schmitt, 1990). At that time, the GIS system was a relatively inexpensive one developed on Atari Computers by the author. Today about 300 employees use intranet-based GIS in the City of Würzburg. Since 2000 this project is funded by TelDIS and MEDIA@Komm-Transfer. GIS-enhanced government services are also available for citizens via internet access. The future challenge is to fully integrate GIS in e-government applications to increase their cost effectiveness and improve the efficiency of government. However, full integration depends on the ability to engage employees to work effectively and efficiently with the GIS system. Full integration also depends on the ability of the system to enable citizen users of e-government systems to seek and find answers to questions that can be accessed through GIS.

The public sector, particularly municipalities, are challenged by reduced budgets and staffing. Modern technologies such as GIS via INTRANET and INTERNET access can create e-government solutions to help municipalities deal with reduced budget and staff resources.

Challenges in introducing modern technologies and systems lie in the fact that there is a considerable investment of time in the development of these technologies and it takes time to educate and train the system users. Very often municipalities use the assistance of external consultants to help them develop and integrate new technologies into their operations. Experiences in the City of Würzburg have shown that hiring outside consultants is not always the best practice. Of course, outside consultants and technical specialists may be used periodically. However, the City of

Würzburg contends that it is much more effective in the long run to properly train employees to maintain, update, and develop the modern tools.

TelDIS

Project TelDIS has already proven to be cost-effective for the City of Würzburg. From 2000 to 2004, the Bavarian Ministry of the Interior, financed by the High-Tech-Initiative Bavaria, invested more than 800000€ in the development of GIS and e-government solutions in Würzburg. This paper will share some experiences that illustrate successes and challenges in developing and implementing the TelDIS GIS project for the City of Würzburg. Education and training programs developed in support of the TelDIS GIS project will be highlighted.

Project TelDIS focused in Würzburg on improving the technical infrastructure and on making existing workflows more effective – but it did not change the government organization itself. A future need is to decrease administrative costs while improving service, quality, and efficiency. This is the challenge of a new project that started in 2004.

MEDIA@Komm-Transfer

In order to build up a basis for accelerating the widespread expansion and integration of e-government in all regions of Germany, the Federal Ministry of Economics and Labour (BMWA) has initiated the project MEDIA@Komm-Transfer. In 2004, the City of Würzburg with 19 other German cities was awarded the Media@Komm-Transfer-Prize for achievements on the e-government frontier. The project MEDIA@Komm-Transfer supports these cities by building an extensive base of knowledge about on-line computer applications and services, developing technical and organizational solutions, and designing standards for interchange data. Project Media@Komm-Transfer works with consultants from Capgemini which organize work-groups and meetings, and develop websites for the awarded cities. For almost 40 years, Capgemini has helped companies around the globe address their business and IT issues through its consulting, technology and outsourcing services. The City of Würzburg now networks with more than 10 cities in the development and implementation of GIS, e-government, and e-learning. Partners in GIS are the Cities of Hamburg, Frankfurt, Bad Seegeberg and Freiburg. It also develops the training curriculum for the Media@Komm-Transfer project “knowledge management”.

THE CHALLENGE OF GIS INTEGRATION AND USE

“The Human Factor”

In its early development, one of the greatest challenges of e-government GIS systems is to integrate it into administrative levels of government and everyday life so that its maximum benefits of GIS can be experienced at all levels of government and in the community.

To use GIS effectively at the government and citizen level, is extremely difficult because most government employees and citizens do not have GIS literacy—the level of appropriate training and expertise in what GIS is and how it can be used. Furthermore, most government employees and citizens are not willing to spend much time to learn how to use GIS (Schmitt, 2002a). In order to make the system commercially successful, our team has determined that at least 30% of the citizens and 80-85% of the government employees must use GIS e-government applications. The “human factor,” the acceptance and the ability to use the system as an everyday tool, is the greatest challenge in integrating GIS into government and community. Only 15-20% of the costs of GIS investment are invested in hardware and software while the remaining investment must be made in developing the “human factor” through continuous work with the system, training, monitoring, and support.

The Technical Aspects of GIS Integration

The City of Würzburg uses GIS products from AutoDesk. There are AutoCAD Workstations for designing maps, AutoCAD-Map-Workstations for the production of GIS-Data-Sets and objects combined with SQL2000-Data. For Intranet and Internet interoperability Autodesk Map-Guide is

used. The database is connected via ODBC (Open Database Connectivity). Reports are generated with Microsoft ASP (Active Server Pages). There are Microsoft WIN2000 and WIN2003-Servers. The hardware is provided by HP, a network by Cisco Systems. With Artiso AG, Blaustein, a GIS-Desktop (ArtisoASK) was developed to allow personalized functions and access to databases and reports. ArtisoASK is a basic tool that ensures easy access by citizens--especially those with little or no other experience with GIS.



Figure 1: HTML - GIS – Tutorial (Intranet)

EDUCATION AND TRAINING TOOLS

Web-based tools

On the Intranet GIS websites, the City of Würzburg offers a collection of useful links to topics such as GIS-, HTML-, Java-Script- and xml-tutorials (as illustrated by Figure 1). There are also links to sites and discussion groups moderated and offered by different GIS-companies. Unfortunately, the most helpful websites are offered in English, so German government employees and citizens cannot usually maximize their benefits. This led to the City of Würzburg developing its own e-learning GIS-training courses to train people to use the system in their own working and cultural environment. In addition to the City of Würzburg's e-learning courses, training is also provided by land+system, Bremen.

The so called VirtuS (for: Virtueller Sachbearbeiter - English: Virtual Specialist) was developed. VirtuS is used as a term for all of our online help tools. With a keyword list, VirtuS can analyze online input, forms and inquiries. VirtuS can check incorrect inputs and make suggestions for improvement. VirtuS can also act as an avatar and show how to work with GIS (as illustrated by Figure 2). In the future, VirtuS will provide more advanced level functions such as making decisions concerning user requests. Using technology from Sympalog, Erlangen, the City of Würzburg developed a Speech Recognition Engine that allows the user to speak with VirtuS. The user can ask

questions about locating a government employee with specific responsibilities, seeking an address or asking for a telephone number using the Speech Recognition Engine, a tool that has already proven its reliability and accuracy.

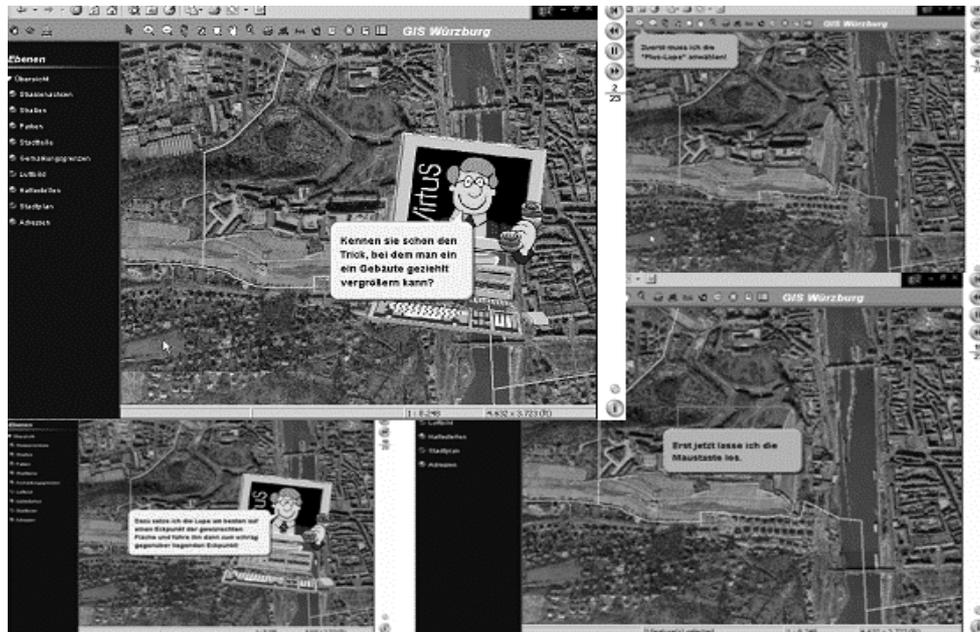


Figure 2: Animated Virtus help (4 of 12 steps) – realized with Viewlet-Builder.

Seminars

Training seminars for municipal employees are offered through the employee training program in the City of Würzburg. In 2004, more than 200 training seminars were offered and attended by more than 2000 employees. More than 200 employees who are general users of GIS and producers of GIS data were educated in this program. In addition to local training seminars, municipal webmasters and GIS administrators were also sent to specialized, three-to-five day training courses (AutoDesk) taught at a local university or the Bavarian School of Administration.

Experiences

Since 1998, more than 300 employees of the City of Würzburg have worked with GIS via the Intranet. The GIS Project Team received numerous useful hints from trainees via email, telephone, and Intranet bulletin board about how to improve the use and effectiveness of GIS. Citizens have been able to access GIS data via the Internet since 2001 and have been providing feedback on how to improve access and understanding since that time. Both citizen and employee feedback was considered in developing each successive revision of the GIS Intranet/Internet. The City of Würzburg is now using the third release of GIS Intranet/Internet. Even after making adjustments that considered valuable user feedback, GIS continues to challenge many users. There is interest in wanting to locate information such as an address, the identity of the owner of a parcel of land, or the average age of children living around a playground – but many do not have the desire to learn to “work” with GIS to find those answers.

In the latest release, the API-function of MapGuide is used. There are now buttons and accessible layers over themes, user-groups and passwords. After the user logs in, GIS shows preselected maps, objects and reports, links, menus and buttons. All of these data are stored in one SQL data base which makes the system much easier to handle by the user while it also is easier for administrator to update (Schmitt, 2002b, Schmitt, 2004).

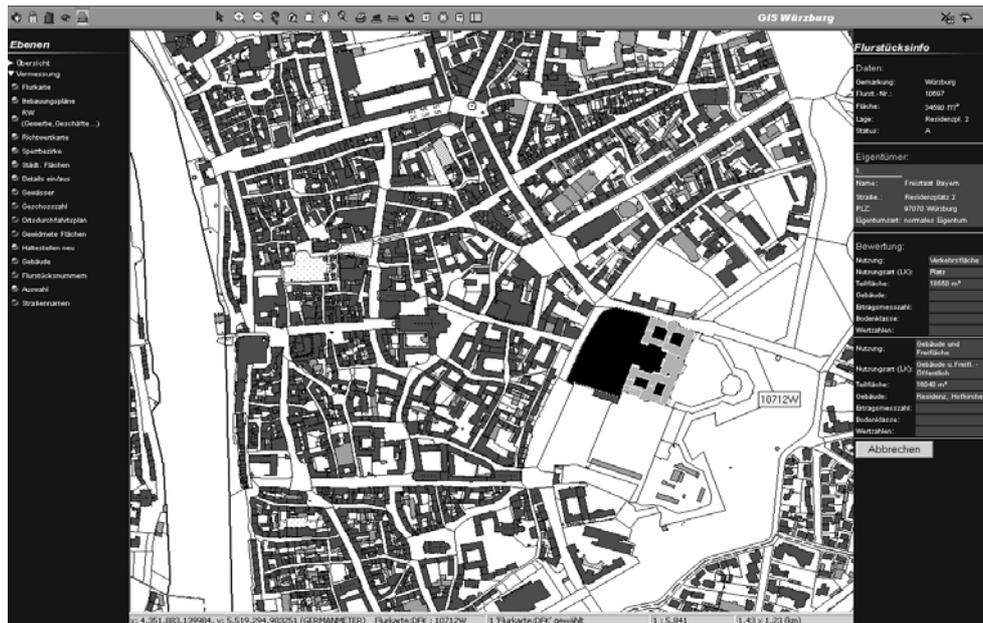


Figure 3: Screenshot of latest release – clicking on a parcel opens the attribute section or start reports.

Some examples of the practical ways that GIS can be used to answer questions are:

- GIS starts land report about a parcel of land after clicking on a parcel (as illustrated by Figure 3).
- Residents can reserve parking spots around their apartments. GIS checks whether or not there are available parking spots for residential parking.
- An owner of a parcel of land may have to pay more for wastewater if their parcel does not allow rainwater to seep into the ground. Using infrared air photos, GIS can calculate the percentage of the parcel that is vegetated to allow rainwater to penetrate (as opposed to covered with concrete or man-made structures). This example is illustrated by Figure 4.
- An owner of a parcel of land can research whether or not his or her property is in the floodplain of a river. Municipal employees can use GIS to quickly access the addresses of owners in the floodplain and send them a letter to communicate on floodplain-related issues.

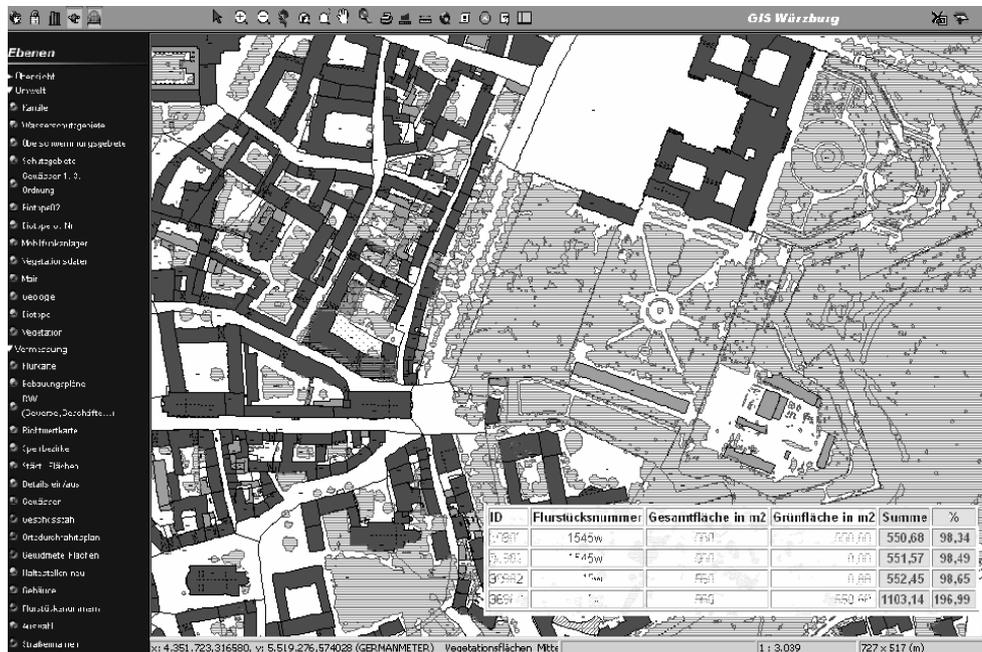


Figure 4: Screenshot: Determining the area of a parcel covered with vegetation rather than concrete.

TRAINING TARGETS USERS

The GIS users can be divided in three different user groups based on the level of knowledge about GIS, experiences with GIS, and tasks to be accomplished with the help of GIS.

E-Government / GIS Users: Those with FAQs

Quick and easy to find. Press the button and know. The first group to be trained is the group with lower GIS literacy and with limited (if any) GIS experience. Citizens and approximately 75% of municipal employees are members of this group. Facilitating use by this group of users requires emphasis on making the GIS experience easy and comfortable for them. GIS has to be very easy to control. For this group, GIS should be user-friendly and require no training; the system must be self-explaining. A VirtUS, the self-contained tutorial, should appear to help and give hints to enable the user to answer common questions about how to use GIS just like common Microsoft Office programs provide help to general computer users. During the GIS installation process and while working with the system, employees and citizens should be rewarded for good ideas, finding mistakes, and introducing new topics. The future installation of a hotline or helpdesk may serve this group well.

E-Government / GIS Users: Those with New Questions

Special problems. Need to compare databases. These users have to find data by comparing two or more databases, thematic maps or forms. They have to know more about the quality of data, and more details about how the data was collected. They have to know about technical details and can even produce some of their own data, visualize spreadsheets, diagrams and create thematic maps. E-learning is the primary training tool used for this group. On-line training tools facilitated by VirtUS provide a means to teach these users to learn from examples to achieve desired results. Only a few Citizens and approximately 15% of municipal employees belong to this group.

E-Government / GIS Users: Those Who Administer GIS Data

Producing and updating GIS-data. Less than 10% of municipal employees are responsible for producing and updating GIS data, and integrating GIS into e-government applications. These specialized employees administer the systems, verify quality control, upgrade the knowledge base, produce and maintain websites, and develop or install the tools needed. These employees fall into the third and final category of GIS users and require a different, much more sophisticated level of GIS training and expertise. From every department one or two persons will typically require training on the use of the CMS (Content Management System). They are the primary liaisons between the government operation and the GIS Team that administers GIS within that municipality. Training courses for this group are intensive two-day courses offered at a centralized training site that culminate in a practical test. The results of these tests (web sites, parts of websites) are published in the Intranet. The goal is to train the administrators to be able to collect data and ideas from their departments and transform that information into useful Intranet or Internet tools.

OUTLOOK

The City of Würzburg's GIS Team has also been called upon to assist other cities in advancing GIS and e-government initiatives. Members of the GIS- and the e-government-Team teach at the Bavarian School of Administration and share their knowledge and experiences with the other Media@Komm-Transfer-Cities. In 2004, the City of Würzburg started a new project with British Telecom to develop and integrate a new e-government system that would provide multi-channel links between citizens and their local government. A web-based program is now being developed to enhance government services and citizen access to those services. There will be future documentation provided by the University of Würzburg on this development. There will also be a training courses and an education conference offered by the University of Würzburg to inform citizens, businesses, community organizations, and other government organizations about the TelDIS model, related e-government services and GIS technologies of the future. Beyond continuous training courses offered, Würzburg's GIS Team is available for consultations, meetings and workshops.

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