Autodesk® Topobase™

Efficient Cadastral Map Data Management

The Budapest District Land Office uses Autodesk Topobase to help it manage and maintain cadastral data. As a result, the organization is updating cadastral maps and data 50% faster.

Charged with managing and maintaining all land registry information, such as deeds, cadastral maps, and ownership records, the Budapest District Land Office plays a vital role in the economic life of one of Europe's most beautiful cities. The residents and businesses of Budapest count on the Budapest District Land Office to maintain accurate land and home information while providing fast access to official documents and maps when needed.

The Budapest District Land Office takes excelling at its mission seriously. It depends on a legal and financial database to store alphanumeric information about property and parcels. To maintain spatial information, such as cadastral mapping data, the Budapest District Land Office has used sophisticated cadastral technology to create and edit cadastral maps since 1996. When the technology became too old, the Budapest District Land Office turned to the successor solution Autodesk® Topobase™ for a new cadastral data management solution. Less expensive to run and faster than the old technology, Autodesk Topobase is helping the organization to carry out its mission more efficiently and cost-effectively.

Challenge: Maintain cadastral data for a city of 2 million people more efficiently and at a lower cost.

Solution: Autodesk Topobase to create and manage maps and parcel data within Oracle Spatial 10g.

Benefits: Editing data as much as 50% percent faster and serving customers 75% faster.

The Budapest District Land Office: Background

The Budapest District Land Office maintains the official cadastral map of Budapest and handles the legal registry of all property within the City of Budapest. A part of the Unified Land Registry of Hungary, the Budapest District Land Office provides legal documentation when property changes hands as well as ensures that property is associated with its legal owner and that all changes to parcels are accurately reflected in the official maps. These cadastral maps also contain official street and building information as well as major infrastructure features.

When citizens need maps or copies of property-related documents, they can visit one of the Budapest District Land Office's two locations and get the information they need. In addition, local utilities and district municipalities buy mapping data from the Budapest District Land Office and incorporate it into their system maps. This enables the organizations to have accurate parcel information without expending time and money

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collecting it themselves. Other organizations, such as developers and engineering firms, can also buy map data and incorporate it into projects.

Keeping Maps Current and Accurate
Budapest is a city of approximately two million people. It occupies 52,000 hectares and is divided into 23 administrative districts. There are 230,000 separate land parcels registered in the city. Additionally, there are 750,000 other types of properties, such as condominiums, for which the Budapest District Land Office maintains data and legal registry information. Maintained at a scale of 1/1000, the official cadastral map of Budapest is highly detailed, and the Budapest District Land Office makes accuracy one of its top priorities. However, with so much information, it can be a challenge to keep all data up-to-date.

If a pending land transaction impact parcels, licensed surveyors can submit new survey information in a digital format to the office. For instance, if a parcel is being divided into two, the surveyor submits data detailing the new specifications of the property. The Budapest District Land Office's survey department then prepares the data for entry into the system that holds the official cadastral map. A similar process is used to update the map information when Budapest's public works department plans and makes changes to the city's infrastructure.

Efficiency Essential
Originally, the Budapest District Land Office, like the other 120 land offices in Hungary, was supported by the national government through tax revenues. As part of an effort to promote efficiency and cost-effectiveness in government services, the Unified Land Registry of Hungary became entirely self-supporting in January of 2006. Today, it supports itself on the fees it charges for maps, office documents, and the sale of mapping data. With budgets tight and income variable, the Budapest District Land Office tries to operate as efficiently as possible while ensuring that citizens get good value for their fees. Unfortunately, the Budapest District Land Office's digital mapping technology was not as efficient or cost effective as it needed to be, and this inspired the agency to explore other technology options.

The Business Challenge

Prior to 1996, the Budapest District Land Office used paper maps to record all the spatial information that impacted the 230,000 parcels within the city. When changes needed to be made, the survey department would draw in the new information by hand on the maps. Making copies of the information was time consuming. The Budapest District Land Office had trouble keeping pace with the demand for updates and official documentation. At the same time, advanced digital cadastral mapping technology was becoming available. To help speed up its processes, the Budapest District Land Office decided to implement cadastral mapping technology made by a leading Swiss company as well as digitize its paper maps.

The effort was a tremendous success. With all of its cadastral maps in digital format, the Budapest District Land Office was able to update information far more quickly. For example, when the city built a new street, it could simply deliver the information in

digital form. The surveyors at the Budapest District Land Office then prepared the data to match their standards and uploaded it into the cadastral database. In addition, employees who worked at the organization's help desk were able to quickly print maps for citizens using street addresses or parcel numbers.

High Costs and Incompatible Data
Through the years, the system continued to support the Budapest District Land Office's need for accurate cadastral information in a digital form. However, other issues surfaced and became increasingly pressing. The system required expensive specialized hardware to operate, and the Budapest District Land Office would have preferred to use more standard—and less expensive—PC hardware. Support and maintenance costs for the aging system were much higher than those associated with newer systems on the market. Moreover, after the Budapest District Land Office adopted cadastral mapping technology, Hungary adopted a different data standard for the country as a whole, making it more difficult to share data with organizations outside Budapest.

Compounding these issues, the Swiss company that made the Budapest District Land Office's solution stopped production on the system. There would be no additional upgrades, modifications, or complementary technology produced for the system—ever again. The system could only use Oracle 7.3, which did not include the sophisticated spatial functionality featured in more current database technology from Oracle. As other cities took advantage of new capabilities, faster technology, and better databases, the Budapest District Land Office found it difficult to enhance its systems and processes.

Issues with the Budapest District Land Office's old solution included:

- No upgrades from the original developer
- Relatively High maintenance and support costs
- Dependence on expensive, non-standard hardware
- Data incompatible with the format used throughout Hungary

According to András Osskó, deputy director of the Budapest District Land Office, "The inefficiencies in our old system hindered our ability to control costs and improve processes as our organization became self-sufficient. We recognized that it was time to consider moving to a new technology."

Why Topobase

The Budapest District Land Office explored current cadastral and GIS technology in collaboration with trusted vendors. Autodesk Topobase, which brings together CAD and GIS data management tools and an enterprise database, attracted the Budapest District Land Office's attention. Topobase stood out for a number of reasons:

- **Flexible data environment**—Topobase is an open system that allows users to work with data in a number of data formats, including Hungary's new data standard for cadastral information.

- **Standard hardware**—The Topobase desktop client runs on standard personal computers, which cost up to one-quarter less than the old system's specialized hardware. The Topobase administrative functions can also be carried out on standard hardware.

- **Superior data storage**—Oracle Spatial 10g serves as the solution's database. It is the leading database for geospatial functions and stores data in a vendor-neutral environment. When organizations use Oracle Spatial and Topobase together, they access a single source of data for all design and GIS functions, which helps to ensure the integrity of data.

- **Familiar interface**—The Topobase desktop client's user interface is based on AutoCAD®, the world's most widely-used CAD application. Because Topobase's AutoCAD-based data editing functions are both familiar and efficient, the Budapest District Land Office saw an opportunity to get users started in a short timeframe and to edit data more quickly in the future.

- **Easy data administration**—The Topobase data administration module allows users without advanced Oracle knowledge to manage data and customize the system. This capability offered the Budapest District Land Office the ability to continually enhance the system without incurring high consulting fees.

The Budapest District Land Office was impressed with Topobase. However, the organization was reluctant to undertake the cost of a full-scale implementation without first ensuring that the solution would deliver significant benefits. It also wanted to be certain it could move its old system's data into Topobase without compromising the data's integrity.

"Implementing a GIS is a major investment," says Osskó. "We wanted to make sure Topobase met our needs in operation not just on paper."

The organization decided to migrate cadastral data for three districts within Budapest into Topobase. Densely populated, the three districts include numerous parcels of varying size along with a significant number of roads and other features. Citizens within the districts generate a large number of requests for maps and legal data, and the Budapest District Land Office had already decided to open a new office, which will be referred to as the Lehel Ter office, dedicated to serving the area. For these reasons, the three districts were chosen to test whether or not Topobase was the right solution for the organization.

The Implementation

The Budapest District Land Office's Autodesk Topobase implementation at the Lehel Ter office began in late 2005 with an implementation team that included Autodesk Consulting and ITV Geomatik, a Swiss-based professional services provider that used local experts familiar with the new Hungarian standard for cadastral data. According to Osskó, "The implementation was scheduled to take about one year. Autodesk Consulting handled the software development, and ITV Geomatik drove local

development and managed the project. Our organization developed the requirements and helped to thoroughly test the system."

Early in the process, the team began to address the problem of migrating the cadastral mapping data. The challenge was to find a way to convert and migrate the data without altering its accuracy. In data migration efforts, data is often extracted from one source, manipulated, and then uploaded to the new data storage location. However, this can be inefficient when moving large amounts of data, and it can cause data quality to deteriorate. Additionally, the implementation team needed to develop an environment that presented all editing and data administration capabilities in Hungarian and supported Hungarian legal requirements. Moreover, the data model was completely different than the old one. This proved to be a significant hurdle, but in the end, the team completed this task successfully. Currently, Topobase is the only system that fully supports the new Hungarian data model, which is called DAT.

Working in collaboration, the team developed a data migration tool. The Budapest District Land Office's data migration tool extracts data directly from the old solution and imports it into the new database. The data quality is not compromised. As a part of the extraction and uploading process, the tool converts the data into the new format. It took several months and significant effort to develop, but once completed, the tool was able to move data into Topobase very quickly and without negatively impacting data quality.

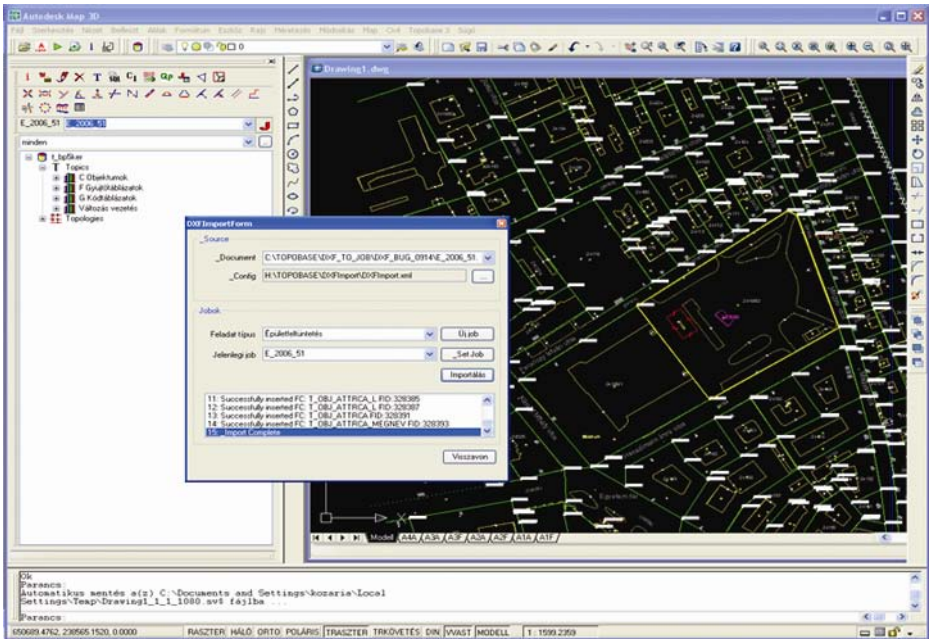

Figure 1: A map displayed in Autodesk Topobase along with the data import tool.

After an extensive and successful testing period, the Budapest District Land Office began to train employees to use Topobase. "We trained two groups of employees to use the system," explains Osskó. "First, we ensured that our IT staff could use the Topobase Administrator to support, manage, and customize the system. Then we trained our survey department to create and edit cadastral information. Because they were all familiar with AutoCAD, the training progressed very quickly."

The Solution

Autodesk Topobase went live at the Budapest District Land Office's Lehel Ter office in January 2007. Today, the Lehel Ter office uses Topobase to store, maintain, and manage information for districts 5, 6, and 13 in central Budapest. The three districts contain 7,000 parcels and 15,000 buildings. Cadastral maps of the districts include more than 400,000 lines and symbols, 50,000 other attributes, and more than 300,000 points. The Lehel Ter survey department can edit all of that data on standard PC hardware using the Topobase interface, and IT staff administer the solution through the Topobase Administrator module.

Now, when residents want maps or legal documents relating to the three districts being served by Topobase, they go to the new office. The Budapest District Land Office's help desk staff at Lehel Ter access the information citizens request on an ease-to-use web interface that the organization developed for Topobase. Developed quickly and for a very low cost in-house, the interface leverages Topobase's open data structure. The help desk staff print the information and charge citizens the relevant fee. For citizens and help desk staff, the process is virtually identical to the one used before Topobase—only faster. In the back office, Budapest District Land Office's surveyors and IT staff noticed a number of striking advantages with Topobase in only the first few weeks of use, including faster editing, more efficient long transactions, and streamlined administration.

Faster Editing and Efficient Long Transactions
The surveyors responsible for keeping the Budapest District Land Office's cadastral data up-to-date have found that Topobase is much faster than the old system. The Topobase client's user interface connects the surveyors directly to the data in Oracle Spatial, eliminating the need to upload data as a separate editing step. Other tasks are streamlined as well. Specialized symbols within Topobase represent different object types, such as points, surfaces, and attributes. The surveyors select relevant object types with their mouse and edit data in a dialog-style interface. Because the Budapest District Land Office at Lehel Ter has used the Topobase Administrator application to customize the dialogs, the surveyors adhere to the Hungarian data standards with a minimum of effort. Additionally, the Lehel Tel office created custom workflows to consolidate common multi-step processes, which is further accelerating the pace of editing.

The survey department is particularly impressed with the long transactions functionality in Topobase. With long transactions, the survey department can manage different levels of data validation while still using a single source of data within Oracle Spatial. This has many uses, but it is especially valuable when complex changes to parcels or infrastructure are proposed and pending approval. By entering potential changes as a long transaction, the Budapest District Land Office can maintain both the as-is maps and the proposed alterations. When the changes are approved or completed, the surveyors can make the new information live. Topobase not only preserves a history of all long transactions, it can also maintain successor changes, which are edits to not yet approved changes.

"Topobase offers us all the functionality we need to maintain cadastral data efficiently," says Osskó. "Also, the Hungarian DAT format is no problem for Topobase. The layout

and representation of the maps were set up exactly according to Hungarian standards. Now it is easy for us to exchange data with other organizations."

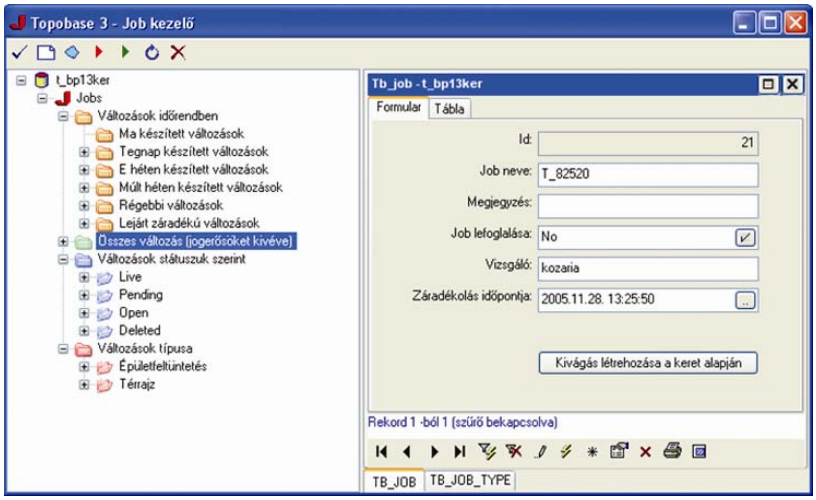

Figure 2: Topobase provides easy-to-use long transactions functionality.

Streamlined Administration

In addition to user administration, the IT department at the Budapest District Land Office at Lehel Ter uses the Topobase Administrator module to set up, configure, and manage data within Oracle Spatial. Because Topobase hides the complexity of the Oracle Spatial database, the Lehel Ter office does not need to call on full-fledged database administrators to manage the system. Through the administrator interface, the organization can perform many types of system changes in-house. For example, the IT department can add or edit data structures and rules, modify dialog boxes, and regulate access to the database without calling on outside help. The department can also generate new workflows, rules, and attribute dialogs through the administration tools.

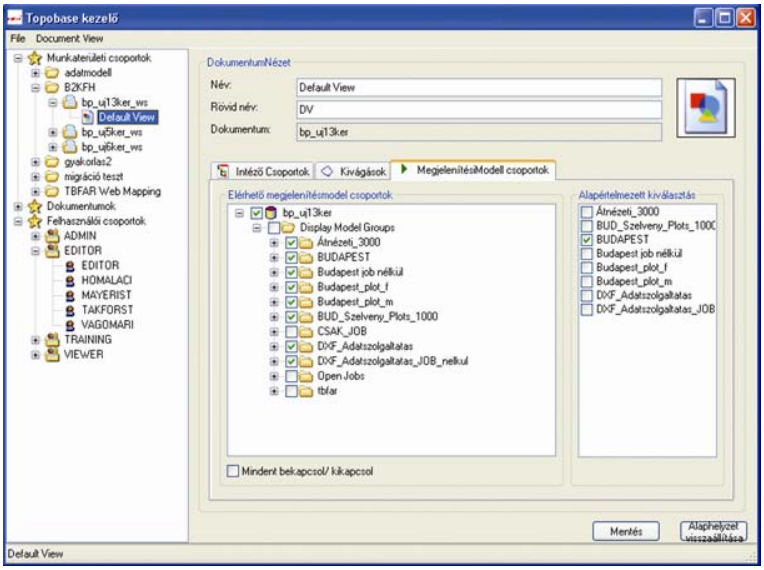

Figure 3: The Topobase Administrator module streamlines data management tasks.

“If we have new ideas or need to make changes to our processes, we can perform the necessary changes ourselves,” explains Osskó. “The system is open and easy to maintain. We do not have to involve Autodesk Consulting or other outside consultants for most changes. That saves us time and money.”

The Benefits

Within the first few weeks of using Topobase, the Budapest District Land Office at Lehel Ter measured some impressive time savings, especially for users in the survey department. Activities where time savings have been identified include:

- Routine data maintenance activities that once took as long as 60 minutes now take five minutes or less
- Data preparation for a parcel job that once took as long as 60 minutes with the old system can now be completed in less than five minutes
- Updating data for a building job is being completed in half the time
- Providing mapping data in the DXF form for an entire district to another organization used to take 150 minutes but with Topobase the process takes five minutes
- Accessing and printing maps for citizens once took four minutes, but with Topobase, the entire process takes only one minute

Because the Budapest District Land Office at Lehel Ter has only used Topobase for a short time, it is difficult for the organization to quantify time savings as cost savings. However, it has already benefited from being able to purchase standard hardware for its new office. The new workstations were purchased for one-quarter of the price of the hardware required by the old system. Moreover, the Budapest District Land Office anticipates significantly lower systems maintenance costs over the long term thanks to the streamlined administration capabilities of Topobase.

According to Osskó, “Topobase is a good fit with our need to operate more efficiently and to be self-sufficient. Overall, we are editing and maintaining data 50% faster. Most importantly, we are saving time and money while keeping our important cadastral information accurate and secure for the people of Budapest.”