# LAND IN A NEW SPACE

## ROBERT WIDZ EXPLORES THE IMPACT TECHNOLOGY IS NOW HAVING ON THE HISTORIC WORLD OF CADASTRE OR LAND MANAGEMENT.

In most countries land information accounts for 80% of government activity. Clearly, securing private land property rights and establishing ownership, as well as the need to 'map the nation' and to manage land owned by the state renders this area of strategic importance.

### European examples

Poland clearly thought so when, prompted in part by its new EU membership, it took the decision to integrate its own cadastral system – the objective being to replace 400 information centres spread amongst its district governments with a modern, consistent systems infrastructure.

A Dutch Government cadastre initiative, the MATRA project had indicated how this objective could be achieved. The major challenge was to integrate the historically separate geospatial, location-based cadastre data with its related ownership, land parcel history and other descriptive data: the two had always been held separately.

Their integration has only become possible thanks to a new generation of systems that are capable of integrating geospatial and descriptive data – and can be constructed using web technology, making it possible to access and update cadastral information remotely.

### Cadastral system

The cadastre system can then be integrated at province or regional government level, with each (lower level) district assigned its own private workspace in the central database, using regional servers – and all updates being made remotely using a thin client application. In this scenario district-level users typically work in a local area network and intranet environment, adding and modifying descriptive and geospatial data.

Importantly those changes have legal status, in other words the data that this created and modified, when produced in the form of documents such as notary deeds, planning decisions or to confirm the distribution of an estate – are legal documents, recognised in a court of law.

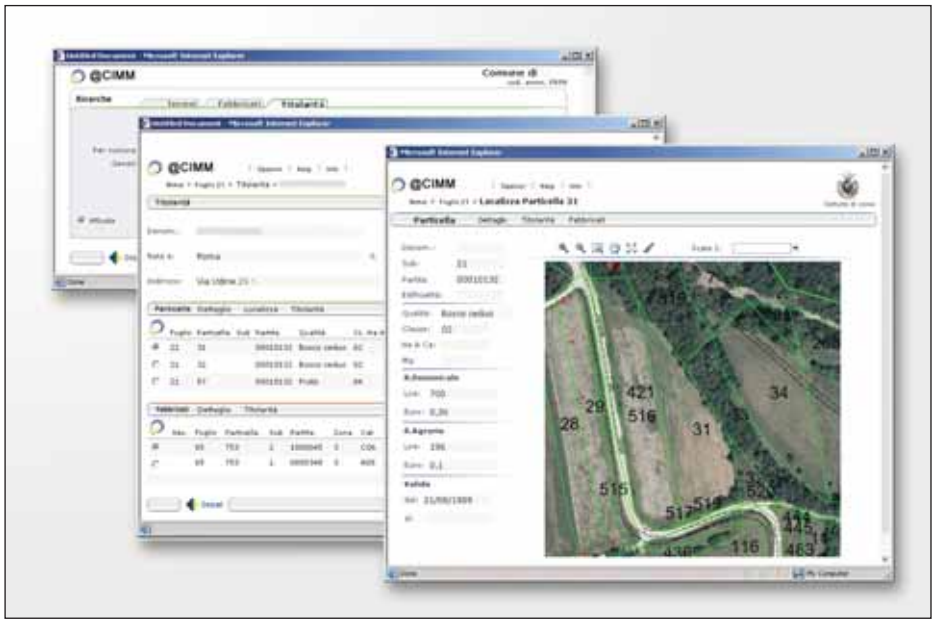
The advantage of such a solution is that because data can be modified online, the database is always up-to-date and consistent: also common use of a database and GIS web-based tools by several district governments cuts costs and improves the level of service.

### Cadastre in action: Italy

Founded in 1982, Trieste-based, 650-employee GIS solutions specialist Insiel began working with the Italian region Regione Friuli Venezia Giulia in 1989. The company became an Intergraph Partner in 1995 and since 1998 has been implementing Intergraph's Geomedia based software solutions. Insiel develops IT solutions for local administration and has over 1,500 users including government regions, provinces, municipalities, health companies and hospitals.

The challenge for Insiel was to make upgraded cadastral data available for use by local administrations - integrating cadastral information into the geographic territory management systems (mostly situated in the municipalities) in order to provide more accurate information for taxes and urban planning.

Understanding the difference between cadastral data and



Cadastre images Italy - Immagini Applicazioni

cartographic data would be key to the success of the project, whose objectives included upgrading cadastral data at source; delivering upgraded data to local authority territory management systems every 3 months, at minimal cost; building an exchange data flow between local authorities and the cadastre agency to improve data accuracy; and developing a suite of software that would display and analyse cadastral information - integrated with all other territory data inside the municipalities.

In practice, Insiel developed web applications using Microsoft Visual Studio .NET, with Intergraph's GeoMedia WebMap as the GIS engine.

The company built tools to import cadastral (geometric and alphanumeric) data from the cadastre agency into the municipalities' databases, and developed a suite of web (Intranet) applications that would allow their offices to view, query and report information, linked to territory, as well as being able to publish urban planning and other data over the Internet. A system was also developed to improve data flow and usability between the web applications. The benefits of the project include the wider, simple but effective distribution of geo-information and the minimisation of software and related costs for the municipalities.

Cadastral alphanumeric data is stored in four Oracle database servers, all of which are located in the local authority centre supplying data access to the municipalities. Cadastral geometric data is stored in Oracle Spatial format inside the same servers, but in GeoMedia SmartStore format to achieve better performance.

Some three or four departments inside every municipality in the region use the system, with access exclusively via the web.

Pilots took place in April 2006, involving 10 municipalities. Phase 2 will involve 40 municipalities, eventually rising to 219 – the entire region - by the end of 2008.

**Cadastre in action: Poland**

Poland's Piaseczno district – a typical example - consists of six parishes and four municipalities. Significantly, it has 342 cadastral districts with 113,000 parcels of land.

The district needed to build an information system that would be used (predominantly) for land, buildings and flats registration. Data held on the system would also have to be kept up to date for the issue of cadastral documents - for example land registry and property/planning maps – which are legal documents in their own right

Other application requirements included the facility to register surveyors and to maintain an up-to-date listing of prices and real estate values. Powerful cadastral data and geospatial analysis facilities would be needed.

The quality of data had first to be verified, including the legal status of specific land parcels, buildings and flats. Any discrepancies between geometrical (mapped) and descriptive cadastral information had to be identified, as both types of data would now be held on one system.

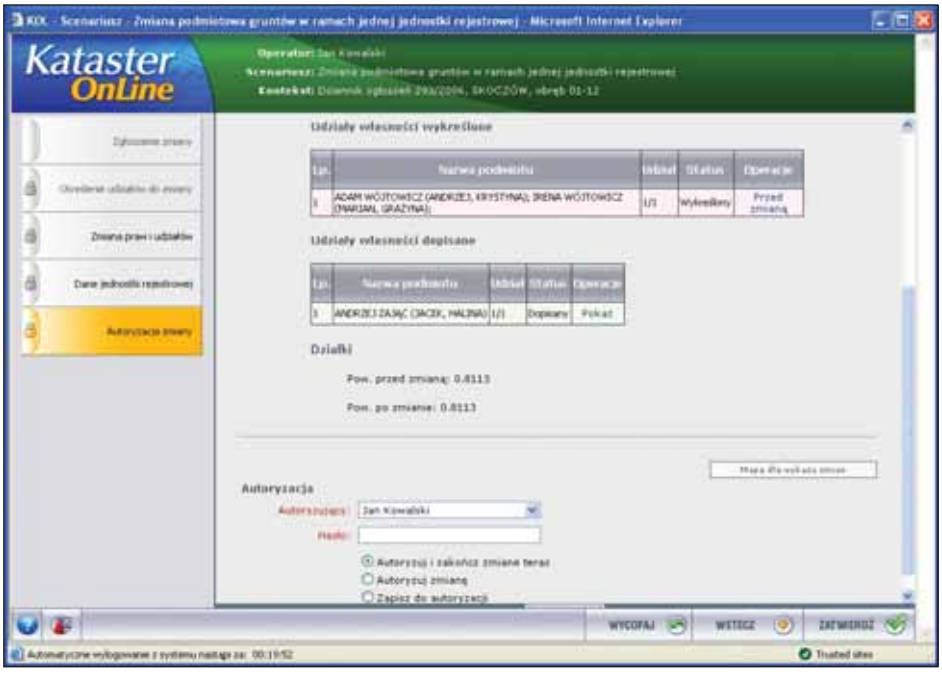
System implementation and training took place in the Spring of 2005 – and by Autumn 2005 information for 181 cadastral districts was already held in the new all-digital environment, driven by Intergraph geospatial technology.

Today, Piaseczno has a fully functioning, still-expanding land information system, with both geospatial and asset information held in a unified system environment. The IT infrastructure is maintained by Mazowieckie Region Survey Office – and the same infrastructure can be used by any other district in mazowieckie region.

**Robert Widz** *is employed at Intergraph. More information: Inseil - www.insiel.it*

## EXAMPLES OF TECHNOLOGY USED FOR GIS AND CADASTRAL DEPLOYMENT INCLUDE:

**GeoMedia Professional** – a desktop geometry editing and viewing engine.
**GeoMedia WebMap Professional** – a web geometry editing and viewing engine.
**MATRA system** – a complete system solution developed for Polish Cadastre. This is a centralised solution for a complex environment - national cadastral data management. Many of its functions are applicable to other countries.
**Oracle Spatial** – Native Oracle data format, which importantly, is supplier-independent: used for storage of both geometry and descriptive attributes in a single database.
**WebServices** – technology used for cooperation between system components.
**SAP NetWeaver** – uses include workflow management.

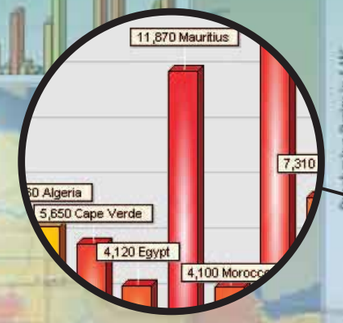



Polish Kadaster Online

Deliver GIS capabilities to large numbers of users over networks with server-based GIS.

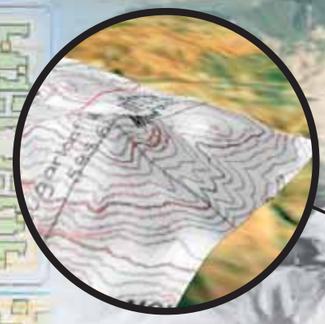
Efficiently manage, process, and distribute imagery.


Automate tasks and perform the complete cartographic production process within the GIS.




Get better answers with superior data analysis and visualization capabilities.


Create and share complete or partial replicates of your database for better collaboration within your organization or on the Web.



Take advantage of standards-based technology that is open and interoperable.

# **ArcGIS® 9.2** Makes It Easier for You to Author, Serve, and Use Geographic Data.

ESRI® ArcGIS® 9.2 introduces a new workflow that allows you to be more productive. As a complete geographic information system (GIS), ArcGIS 9.2 lets you easily author data, maps, globes, and models on the desktop; serve them to a GIS server; and use them through Web, desktop, and mobile clients.

## Server-Based GIS

With ArcGIS Server, it's easy to publish your geographic information and user-focused geospatial applications. Serve models and applications authored with ArcGIS Desktop as GIS services that can be consumed by browser-based, desktop, and mobile clients. Out-of-the-box capabilities and templates let you get started creating services with no programming. ArcGIS Server also includes the new ArcGIS Explorer client, which supports a wide variety of 3D mapping services as well as geoprocessing services for spatial analysis.

## Cartography

The cartographic representations in ArcGIS 9.2 let you fully control the appearance of features separately from the underlying geometry of the data. Refinements you make to individual features are stored as overrides, allowing you to consistently apply and reuse your cartographic designs. ArcGIS 9.2 also includes a suite of advanced drawing and symbolization tools that let you create professional-looking finished maps from your GIS.

## Image Processing

ArcGIS Image Server provides fast access to large imagery collections by reducing the time between imagery acquisition and use. It processes imagery on the fly and serves it on demand to GIS, CAD, imaging, and Web clients. ArcGIS Image Server also performs advanced image processing such as image enhancement, orthorectification, pan sharpening, and complex image mosaicking, further extending the uses of imagery and allowing organizations to get the most out of their investment in imagery.

## Visualization and Analysis

ArcGIS 9.2 lets you make better decisions through improved visualization and analysis of your data. It provides new tools that allow you to create, play back, and export time-based animations and graphs of how processes evolve, thereby revealing patterns and trends. ArcGIS is already recognized as the world's most advanced system for true topological and raster analyses, and ArcGIS 9.2 provides new modeling and analysis tools for advanced exploration of your spatial data.

## Data Management

ArcGIS 9.2 offers high-precision coordinate storage and greater flexibility in distributing your enterprise GIS data, allowing you to expand the use of large GIS systems within your organization or on the Web. You can create and share complete or partial database replicates (copies), synchronize and reconcile edits and changes, and create archives of transaction histories to achieve better collaboration and data sharing between departments, organizations, and field staff.

## Interoperability

For more than 30 years, ESRI has built open and interoperable commercial off-the-shelf software products. ArcGIS 9.2 expands ESRI's support for a number of industry standards including IT and Web services; the Open Geospatial Consortium, Inc. (OGC); the International Organization for Standardization (ISO); and DXF and KML. ArcGIS 9.2 also includes better support for many transformation procedures (extract, transform, and load), FGDC standards, and metadata (ISO 19139 standard).

"Database replication, the new help system, simple data management, and cartographic representations are just a few of the new features and enhancements in ArcGIS 9.2 that will prove to be of great value to the GIS professional as well as those new to GIS."

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To view online demos, visit www.esri.com/completegis.

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