AFRICAN GIS TO 3D GIS IN THE CLOUD

Turnkey GIS Solutions in the Cloud

For the past fifteen years Sivan Design, a privately held GIS solutions provider from Israel, has concentrated on developing an approach which combines GIS, CAD and 3D technologies to produce software and services. The company quickly realised that this approach, combined with the knowhow it has accumulated in the process, allowed it to offer turnkey GIS solutions encompassing the entire range of GIS needs required by any country on a national scale.

Sivan Design is now releasing its newest version of a coming trend in 3D GIS software: 3D-GIS in the Cloud. In 1999 the company released its first professional solution suite for civil engineers, CivilCAD. The software offers tools for road planning and design, as well as surveying, mapping, underground infrastructure and earthworks calculations. In 2000 came CivilCAD 2000, establishing the company's name in the civil-engineering software market. The release of CivilCAD 2006 offered extensive true 3D simulation capabilities based on new cutting-edge 3D technologies. These technologies provided the foundations for the 'simulation-in-a-click' software called Civil Simulate, released in June 2009.

In 2001 the first entry into the GIS world came with the introduction of LAPS, a GIS-based land-and-properties resources management system. The software offered easy customisation and adaptation to existing workflows, a feature that was not considered trivial at that time and appealed to initial clients. Over the years the software has gradually evolved to include management capabilities for other resources, such as roads and infrastructure, both above and underground.

During 2005 various GIS software was grouped into an inclusive solution named GeoERP: the first GIS-ERP integrated solution for the management of land, properties, roads and underground infrastructure such as water, gas/oil, electricity, cables, etc. The software includes a powerful GIS environment where each spatial object, from water pipe to land and highways, can be located on a map or a satellite image and have its data presented upon the click of a mouse.

Nigerian Project
The first accredited project based on the GeoERP system was a nationwide project in Nigeria called FELIS (Federal Land Information System) which covered the entire country and included mapping and registration of the entire Federal land. FELIS architecture included the ability to serve hundreds of remote users throughout Nigeria, and was intended to be used by government officials from various states of the federation as well as by the general public.

FELIS is a long-term multi-phase turnkey project. Its initial phases included manual arrangement and sorting of old paper title files, scanning, uploading, processing and binding of relevant data. Today the system allows every Nigerian to retrieve basic geospatial information online from the FELIS website free of charge. Information on plots was digitised, geo-referenced and uploaded to the system. Title records were then linked to these. During this time-consuming process, procedures followed by each data insertion team were monitored by a quality assurance (QA) person conducting data validity and quality checks and assuring data integrity.

The next phase was to establish a completely new service centre and offices. The new setting required wiring infrastructure, hardware, peripherals, software, reliable internet connection, furnishing and accessories. Everything, right down to printer paper, was supplied to meet client needs.

Custom Training
The most comprehensive system is useless if its users lack the knowhow and skills to allow them to benefit from it. In this case the company, in close collaboration with ministry personnel, carefully studied the needs and was able to design business processes to meet land regulations.

Following system assembly, ministry users were thoroughly trained in skills ranging from computer to GIS capabilities, and in use of the services and information provided specifically by the FELIS system. Today, land officers from various remote sites use and update the system with both alphanumeric and spatial data on a daily basis. These land officers were all provider-trained and now have the knowhow to independently operate the system.

State by State
Since the successful commissioning of FELIS, similar projects have been implemented in various Nigerian states. These systems include state-level information and are used for handling the entire cadastre land-registration process. In some states the system has been extended to include other resources and infrastructure, such as water, electricity, gas, oil, etc.

The commissioning of Plateau State GIS (PLAGIS) was honoured by the personal participation of the Executive President of Nigeria, Dr Goodluck Ebele Jonathan, and many other respected deputy governors and guests. President Goodluck has stated that modern information systems will allow the government to better manage its resources and that therefore such systems should be installed in every state of the federation. The president watched a live demonstration of the system, culminating with issue of the first land Certificate of Occupancy (CofO) to the president by the state government.

And in print
In January 2010 the Office of the Surveyor General of Nigeria (OSGOF) awarded Sivan Design a contract for development of the official federal maps printing facility. The advanced facility, which has extensive capabilities, will produce printable materials such as atlases, large-format maps, flyers, banners etc. The contract included responsibility for designing, developing and implementing the immense data storage used by this facility. The Federal GIS (FEGIS) is an ultimate GIS that holds all of Nigeria's resources, including boundaries, roads, water, electricity, oil, gas and agriculture, in a single system. Federal GIS is a geographic system designed to serve the daily activity of the Office of the Surveyor General of the Federation (OSGOF), and hosts Surveyor General Geo-Spatial information, including both vector and raster data. The first-phase objectives were to provide the system with the ability to capture and manage cadastral layers and their sub-layers. Federal GIS handles no fewer than a hundred simultaneous connections, as it is the main portal for GIS data of the OSGOF's nearly 1,400 employees. The system allows its users to work with object-oriented relational databases as well as raster and vector graphics, including orthophotos and digital terrain models (DTM).

In order to put all this information into print the office has been supplied with an 18-metres long, large-format printing machine which was custom-built to meet the office needs. Along with physical supply of the printer, the contract included integrating it with FEGIS, providing its personnel with the required training, and routine maintenance of the facility.

The Future
There are two buzzwords in GIS-speak today: 3D and cloud computing. Sivan Design has recently released a software version which combines and implements these technologies into GIS, called '3D-GIS in the Cloud'. The approach behind the architecture design is based on the view that the 3D environment is created on the server, leaving the client free of heavy calculations and the need for extensive computing resources. 3D-GIS is a web application which runs on a any standard web browser and requires no installation of third-party components. Another unique feature implemented in the application takes account of the 3D environment including information on spatial objects both above and below ground. Originating from a professional GIS application, the 3D-GIS provides data-management capabilities with a series of 3D querying, analysis and visualisation tools.

Concluding Remarks
Building on its vast hands-on experience, the company whose work is described here develops and implements technologically advanced, innovative GIS and GeoERP solutions.