3D Geo GmbH Potsdam

A spin-off from the renowned Hasso Plattner Institute for Software Systems Technology, 3D Geo GmbH develops and sells solutions for 3D visualisation of cities and the management thereof. Its main product is LandXplorer-Studio, which provides support for estate agents, architects, urban planners, local government and service providers.<P>

To reach the office building of 3D Geo GmbH one has to pass under the arched gateway to Studio Babelsberg, the oldest large-scale film studio in the world. Here, in 1930, Marlene Dietrich made Der Blaue Engel (The Blue Angel) , the film that won her international acclaim for her role in this screen adaptation of Heinrich Mann's 1905 novel Professor Unrat . Over the twelve years or so following the fall of the Berlin Wall some €500 million was spent on modernising the infrastructure of the studio in the former DDR. It was no wasted investment; Studio Babelsberg has risen like a phoenix to become one of the leading centres of European film and television production.

Hasso Plattner
Babelsberg lies east of the centre of Potsdam, a historic city fifteen minutes drive south-west of Berlin. Until 1918 Babelsberg was the residence of the Prussian kings, and for two centuries it has been an important German scientific centre. Today Potsdam has three public colleges and more than thirty research institutes. One of these is the Hasso Plattner Institute (HPI), which offers bright students free courses in software systems engineering; no tuition fees are asked. Such an exceptional arrangement is made possible by private funding through the founder of the institute, Hasso Plattner. Born in Berlin in 1944, Plattner holds a Masters degree in Communications Engineering from Karlsruhe University; founded in 1825 and the oldest technical university in Germany. He began his career with IBM in 1968, leaving in 1972 to form SAP with four other IBM engineers. The business is now a world leader, with $12 billion in sales. In 2008 Hasso Plattner was ranked number 189 on Forbes' list of world billionaires, with a net worth of $5.4 billion. In 2002 he was awarded an honorary doctorate and in 2004 an honorary chair by the University of Potsdam. Plattner is the most important private supporter of science in Germany. In an interview given to German radio on 17th May 2007 he said: "Universities eat away enormous amounts of money and therefore I think it necessary that not only national or local government should plead for them, but also private persons who are moneyed". So it is that this former CEO and main shareholder in SAP has contributed more than €200 million over twenty years to further promote courses in software systems engineering. He also supports HassoPlattnerVentures, which incubates promising IT technology companies. 3D-Geo is not financed by venture capital; it is a cashflow financed company. There is no connection to the Hasso Plattner Ventures.

Spin-off
"Hasso Plattner's initiative in establishing a research institute at the University of Potsdam has proven very successful," Marc Hildebrandt, managing director of 3D Geo tells me. "Today at HPI around four hundred students are pursuing their Bachelors and Masters degrees in Software Systems Engineering, and there are about eight professors with their faculties. One of HPI's major goals is to become an elite, world-class education facility, and the institute co-operates very closely with the industry; 3D Geo GmbH is a successful spin-off from HPI." Founded in 2003, 3D Geo GmbH now employs more than twenty people, but the number working in research and development activities directed by Prof. Dr Döllner is substantially higher. This is due to the close co-operation with HPI, in particular the Computer Graphics Systems group. This HPI department was founded in 2001 and is headed by Prof. Dr. Jürgen Döllner. Research projects, which are often carried out in co-operation with 3D Geo GmbH, include:
-Advanced CityGML Viewer
-Geotainment/ Smart City Systems virtual worlds based on geo-data?-A special research program of the national ministry for R&D
http://cgs.hpi.uni-potsdam.de/3dgi/.

Lamination
Making movies actually means creating virtual worlds using imagery and sound. And for some time now their creation has no longer depended on the temporary creation of real worlds subsequently recorded on celluloid. Rather, today 3D virtual worlds can be represented in bits and bytes. So why wonder that 3D Geo GmbH, specialised in developing software tools for creating photo-realistic 3D-city models from memory-intensive geo-information, is situated next to a film studio? "3D is the present trend, but the main barrier to developing virtual 3D-city models concerns time and cost," continues Marc Hildebrandt. "Manual modelling is only feasible for small-scale models; it fails for detailed models of large urban areas. Advances in the fields of surveying and remote sensing resulted in automatic and semiautomatic geo-data acquisition techniques; just think of airborne Lidar, digital (true) orthophotos and oblique aerial images. In terms of creating 3D-city models, uniform block models are 'yesterday', primitive representations of the 3D world at Level of Detail (LoD) 1. This technology is increasingly rivalled by realistic façade impressions projected onto detailed geometric representations of buildings. But photo-realism has its price: outsourcing to service providers in India or eastern Europe involves costs varying from $1,500 to $3,200, depending on the complexity of the building configuration, to laminate 1km2 with photo-realistic textures from oblique images. For Berlin, which covers an urban area of around 850km2, this would mean nearly $2 million." The new model of Berlin with detailed roof structures and real facades for each specific building for the area of the former eastern Berlin will go online during the next 4 months.

Berlin
It soon becomes clear why Marc Hildebrandt mentions Berlin as an example; 3D Geo has been creating a realistic, large-scale 3D-model of the city. The model not only supports good governance of German's capital; since March 2007 internet users can also explore it online (3d-stadtmodell-berlin.de) through Google Earth. covers the central part of Berlin and contains 44,000 buildings, shown at LoD 1, that is, rudimentary representation of buildings as blocks; 550 buildings have been enhanced by laminating the facades with photo texture. LoD 2 augments LoD1 by adding detailed shapes of roofs, including roof elements. Since buildings in the centre mostly have a near-flat roof, detailing their geometry would not bring significant improvement over enhanced LOD-1. Another fifty buildings are at LoD 3, and, aside

from facades, pillars, house fronts and other object details have also been rendered. Five buildings may be virtually 'visited' and viewed from the inside (LoD 4): Reichstag, Hauptbahnhof (central station), DZ Bank (formerly DG Bank), the Sony Centre and the Olympic Stadium. The model was produced using LandXplorer technology. "Geodata used for creating the Berlin 3D-city model includes building footprints extracted from the cadastral database, which also provided the boundaries of land parcels and information on ownership and address," explains Marc Hildebrandt. "A digital elevation model and aerial photographs were also used. The height of buildings and other 3D-geomatic details were captured from laser-scan and photogrammetry. Apart from this data, the model can be enhanced by 2D-geo-referenced data such as raster 2D maps and transportation networks in vector format."

Enthusiastic Laymen

Exploration of the 3D-model in Google Earth is made possible through the LandXplorer 3D Geo Creator tool, featuring automatic processing of city models and data security. Basic geodata can be kept on the own server, while Google Earth is used as a platform for presentation of data to the general public. In the meantime, LandXplorer has become a software product family for managing, presenting and distributing large volumes of 2D and 3D geoinformation; it runs on desktop computers and servers. "The recently released LandXplorer 3DCity Factory enables automatic augmentation of LoD2 3D models with textures stemming from geo-referenced oblique images and other raster sources," Marc Hildebrandt continues. "This is not only more precise and cost-effective, but also faster than the manual process; cost savings are up to 80%." And in the case of Berlin it implied cutting costs by $1.5 million. This proved a threshold low enough not only for Berlin, but also Leipzig and other cities across Central Europe; all have ordered LandXplorer-generated 3D-models of their cities.

But the technology also enables service providers to enhance their portfolio. Producers of airborne and satellite geo-data, including Blom and Cowi, use LandXplorer 3DCity Factory services to improve their services and capacity. This is necessitated by the fact that among the millions of usersof Google Earth and MS Virtual Earth there will be a few government officers who, inspired and fascinated by the opportunities of earth-view technology, want to explore ways of enriching and enhancing their own work processes using geo-data. But, after some months of enthusiastic trials, they undoubtedly come up against insurmountable problems, discovering that the use and processing of geo-data is a discipline and science in its own right, and that expert help is required to extract the relevant from the mass of geo-data.

"We see that more and more local authorities want to present their geo-data including images in 3D, either to better inform the public or to optimise planning processes," says Hildebrandt. "Therefore in February this year we started co-operating with AED-SICAD, a software house for cadastral, municipal and supply solutions based on the ArcGIS product family from ESRI. Furthermore, 3D Geo is working on a connection of the LandXplorer Server to other standard third party systems, for example to the Autodesk Geospatial Product. This co-operation ensures a sustainable geo-dataflow, right from the initial recording of surveying and cadastral data, updating, and all the way to the creation of 3D-city models. I agree that the bottleneck in creating virtual 3D-city models is caused not only by lack of time and money; timely maintenance of data is also crucial. However, updating is often not seamlessly integrated in administrative workflows. Without seamless integration, virtual 3D-city models remain isolated and may rapidly become obsolete artefacts."

Geo-data Infrastructure

At five years old, 3D Geo GmbH is still a young firm, and as a consequence of its rapid growth employees are working in three buildings. In the HPI research and development institute, I meet Dr Henrik Buchholz, head of Research Group 3D Geoinformation. Like most of his colleagues, Dr Bucholz' research interests include visualisation of city models, geo-visualisation, navigating virtual environments, and real-time rendering. "In recent years most virtual 3D-city models have been created purely for presentation purposes," he says. "The ultimate goal was photorealistic visualisation. That means the visual appearance of the 3D-city model should come as close as possible to reality. However, thematic queries, analysis or spatial-data mining require semantic and topological aspects. If these are neglected the models are suited only for visualisation. But in the fields of telecommunication, disaster management, homeland security, facility management, real-estate portals and logistics, 3D-city models are increasingly incorporated as essential system components providing specific functionality on top of the virtual 3D-city. For example, the PegaPlan-3D network-planning system from T-Mobile Germany visualises and manipulates the configuration of radio network servers and antennae systems. Therefore virtual 3D-city models should be understood as the '3D components' of general-purpose, geo-data infrastructures. The official 3D city model of Berlin contributes to these goals."

Final Remarks

As would be the wish of any software developer, 3D Geo GmbH aims to further develop LandXplorer 3DCity Factory Service. The company catalogue of goals lists automatic evaluation of data errors and detection of gaps in laminated facades. Also included is automatic extraction of vector data from photorealistic facades, important in cost saving. And low memory demands will make incorporation of 3D-city models a realistic option for car navigation systems.

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