



3D TERRITORY MODELLING RACE HAS BEGUN

THE CANTON OF GENEVA INTRODUCES 3D MODELLING TO AID IN A NUMBER OF TERRITORIAL MANAGEMENT FUNCTIONS

The most recent European 3D exhibition - IMAGINA 2009 – proved the emergence of a genuine 3D market, with solutions developing to suit a range of needs - from communications to exploring new projects and calculating urban indicators.

All local authorities are aware that ever-changing new technologies are a particularly important issue in managing cities and large administrative areas. 3D territory information systems will be invaluable assets in the future.

With the gradual implementation of a basic programme that includes the main features involved in modelling a territory in 3D (e.g. buildings, communications infrastructures, plants and trees, street furniture, territory models and works of art), we can safely say that the Canton of Geneva has now entered the 3D era!

Why is the Canton of Geneva investing in this area?

Without doubt, 3D is a major innovation as a public policy tool, not only for day-to-day territory management but also in helping to understand development projects, encouraging local authorities, elected officials and residents to work together and, above all, in helping decision making.

A wide range of requirements and expectations for the different groups working in each territory

Apart from its traditional uses in visualising urban areas and buildings (as images, real-time mock-ups or pre-calculated animations), 3D will allow a wide variety of needs and expectations to be met through the use of numerical data (indicators), simulation (hypothesis testing) and

3D spatial analysis (visibility maps).

In essence, what is usually termed '3D' should facilitate people's understanding of projects, aiming for a better level of cooperation with citizens and elected officials. These are vital measures, especially as they are a way of avoiding appeals, which are a constant threat and take up a great deal of time.

They also allow territory development decision making to be improved with regard to construction, mobility and environmental protection, for example. 3D is especially useful as a means of presenting and explaining the different development projects involving trans-border agglomerations that are currently taking place across the territory of Geneva.

3D is an invaluable means of simulation in managing our surroundings and our lives. 3D data will enable digital mock-ups to be three-dimensional, with the data transmitter guaranteeing a set level of realism and precision in measurements.

Finally, 3D can facilitate administrative analyses, in noise and energy management, for example. Knowing the 3D structure of a building, for instance, means that its required heating levels can be calculated. It is now possible to analyse roofing and its orientation with great precision so that this information can be used when installing solar panels.

3D GIS – not a 3D mock-up

With these aims, 3D GIS is an unrivalled tool. A simple representative model is essentially unable to meet the demands of the different areas linked to a territory (as regards interaction and integration) and is even



Pont de la Jonction, SITG

less effective as a diagnostic tool in complex situations that require numerical data or 3D spatial analysis. Besides, the many benefits of GIS in 2D should be able to be used directly in 3D territories. Ultimately, a model that is strictly based on data from 3D objects and allows the different features of each object (properties, proportions, texture, type, etc.) to be included ensures that it will be reliable, comprehensive and durable when used.

Given these prerequisites, it is now possible to define and put into place 'crossover' tools that bring DAO software, 3D modelling programmes and simulation software closer together.

Currently acquiring a '3D base'

In total, after two years of complex processing and testing, around 80,000 buildings have been surveyed. At a cost of approximately eight euros (including tax) for each building digitally processed, the total expenses incurred for this two-year operation come to around €600,000.

A number of works of art captured in 3D

In producing mock-ups of a range of infrastructure, transport and development projects, it was also necessary to include additional three-dimensional objects, such as bridges, tunnels and some street furniture. Over 20 works of art, such as the main bridges that cross the Rhône and the Arve, as well as others that run over the motorway network, have been rendered in 3D. They can be seen 'as real'; precise enough to be used in cadastral documentation. Works of art will be modelled according to requirements.

Plants and trees...

In addition to the buildings, works of art and communication channels that make up the man-made areas of the Canton of Geneva, the '3D base' includes plants and trees – more information that needs to be digitised.

3D on the Internet

In order to visualise our territory using the 3D data that is currently available, a '3D Window' has been made available online. An updated form of Geographic Information System for Geneva, also known by its technical acronym

'SITG', it has, until now, offered a traditional, two-dimensional view of all data available for our territory (<http://etat.geneve.ch/geoportail/geo3d>).

The risks that local authorities face

You will appreciate the enormous potential in using 3D data in implementing a wide range of public policy measures. This data must still be reliable, however, and users must be fully confident in the 3D scenes and images available.

For local authorities, using communications or consultation tools that only partially correspond to the reality of their site and their use in highway infrastructure, urban construction and the local landscape is not an option.

Institutional general contractors such as the State of Geneva, as well as any individuals involved, should be able to work with this technology in a sustainable fashion. As a result, a frame of reference is needed – a 'user manual' that has long-term relevance.

To respond to these basic issues, consultation to determine the scope of any initiative, its aims and the criteria for its use and representation took place. This was felt to be a vitally important step, and gradually took the form of a project for drawing up an ethical charter.

A number of major points ought to be included in the future charter, including:
Creating non-manipulated images
Using accurate data of a sufficient quality
An obligation to cite the sources of data used.

The charter project has become the focus of a truly participatory initiative, begun by Geneva at IMAGINA, the European 3D exhibition, when it was held in Monaco in February 2008. It has already been the topic of an intermediate presentation, itself reasonably comprehensive, at IMAGINA 2009.

The charter will be signed in Monaco during the IMAGINA 2010 event

A definitive document will be finalised this autumn. The different parties involved will be invited to sign the charter at the next IMAGINA event in February 2010.

In bringing these groups together and ensuring their commitment to it, the charter will be a common point of reference that outlines established shared principles. In this

way, three-dimensional representations will benefit from a long-term guarantee of quality and undeniable legitimacy.

3D's relevance in a cadastral context

Paying particular attention to cadastres, and taking the notion of land and property ownership from the text, Article 667 of the *Swiss Code Civil* states that 'land and property ownership extends above and below ground, as high and deep as the exercise of ownership requires'. From this quotation, it follows that property is a volume and not only a surface. However, all current technical and judicial representations of official measurements and the land register are exclusively conceived two-dimensionally.

When properties are arranged on top of one another, as with multi-storey buildings and underground parking areas, including a 3D component can do nothing but help in ensuring a reasonable degree of rights management and respect for legal restrictions and obligations, while helping in planning underground areas.

Sooner or later, 2D judicial cadastres will make the move to 3D – watch this space...

Conclusion

The Canton of Geneva has chosen to complete its GIS in stages, using high-quality and geometrically accurate 3D data. This strategy may seem lengthy and burdensome, and not quick in delivering spectacular results that feature highly realistic 3D scenes.

But this is just a matter of time. In the medium term, a gage of the success of and interaction achieved by not only the SITG, but also the many current and future uses of 3D lies in ensuring a basic level of rigorously modelled, reliable and contemporary data that all other applications can go on to use.

Eventually, we hope to possess a real-time visualisation and urban simulation platform, aiming for complete and adequate management of the territory's 3D information.

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