

# All mapped out

Bentley Map V8i focuses on interoperability with the release of the V8i generation of technology - explains David Chadwick

The basic philosophy behind Bentley's geospatial suite of software tools is to make it easy to access GIS data. It's been a while coming, but, as we see with the vision behind the launch of Bentley's new V8i generation of technology, and its emphasis on interoperability, all of the features are now in place.

Bentley has always had a very strong GIS solution, but now all the tools are in place to present geospatial data seamlessly within CAD and BIM workflows, thus providing a single access point to GIS data stored in ESRI's ArcGIS, Oracle Spatial and MS SQL databases.

The single entry point will support geospatial workflows, control access and make available engineering documents with spatial content. And, in an interesting transfer of technology from Bentley's more specialized geospatial products to Bentley's platform products, MicroStation now has intrinsic geo-coordination built in. All design files can now be linked to almost any co-ordinate system to ensure that the project is located accurately geospatially.

As more and more projects take on a geospatial flavour (such as publishing designs to Google Earth and Microsoft Virtual Earth for review) this becomes a very useful capability. Bentley's product for team collaboration, ProjectWise Integration Server, is now also spatially enabled. This means that users can browse and search for engineering documentation through a map-based interface.

The majority of Bentley's larger users have adopted ProjectWise, so this will bring Bentley's geospatial technology into the mainstream for many organizations. For those who get hooked on the map-based interface and then want to access advanced spatial search and query capabilities, Bentley has for some time offered an enhanced version of ProjectWise

called ProjectWise Geospatial Management.

## BENTLEY MAP V8i

Where do we start to pull it all together? The obvious point, I suppose, is that Bentley Map V8i - an advanced desktop GIS for mapping and engineering infrastructure - is used by mapmakers and engineers/designers to plan, design, build, and operate infrastructure.

And, in tune with Bentley's now established theme of 'advancing GIS for infrastructure' this is not just another generic GIS tool for creating attractive maps, but a specially constructed GIS platform that is perfectly adapted to the needs of those in the infrastructure world, since it fuses the expected GIS mapping and analysis tools with the CAD accuracy of MicroStation (on which it is based).

Bentley Map has also become the platform on which specialized desktop GIS applications for utilities - such as electric, gas, water and wastewater - have been written. These industry-specific GIS tools avoid the usual pitfall of 'black box' data models. In the spirit of Bentley's commitment to openness and customization, these data models, while pre-built, are fully documented and extensible. This is what the majority of users want, because utility data models vary around the world, and even from company to company. The proprietary or semi-proprietary nature of much legacy GIS technology has long frustrated customers in the utility world.

Similarly, the data that each of these GIS products possesses is capable of being exchanged with other Bentley applications. This means that data in WaterGEMS can be used to populate facilities data in Bentley Map or Bentley Water, or Bentley Map data can be used for modelling and

analysis in WaterGEMS. Data is able to flow between them both for use in different workflows.

## WHAT IS BENTLEY MAP?

Bentley Map is used by GIS and engineering professionals to compile and edit terrain and infrastructure data, and from them create and publish accurate maps. Bentley Map conforms to standard business and topological rules to allow efficient administration and the sharing of map data, and it is a platform for building intelligent facility models.

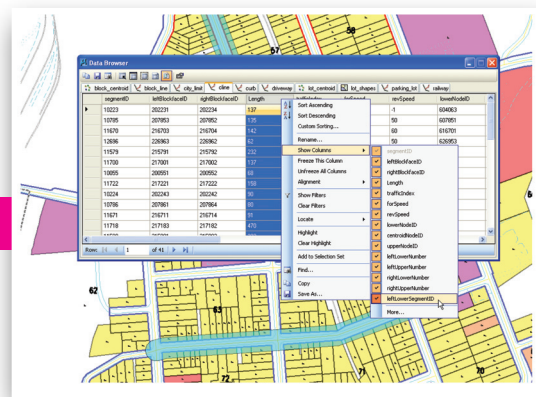
Bentley Map harnesses all of the power of MicroStation V8i and is compatible with Bentley's other AEC applications. It provides a host of useful tools for drawing, editing and analysis of GIS features, raster management, dimensioning, display tools, including transparency, full 3D modelling - and even visualisation and animation.

Maps come in all kinds of formats - depending upon their sources and users - so, in order to take advantage of this, Bentley Map allows multiple map definitions to be displayed, seamless mapping, and the integration of all types of data formats. It allows layers to be dragged and dropped on to the display to show different themes, symbols to be overridden to customise data presentation and - most importantly - scales to be handled intelligently. Having brought all of the different maps together, users can select the most appropriate theme for presentation - or for publication.

Interoperability, or the sharing of data, governs the creation and handling of map features - and the choice of data storage. Bentley Map uses XML Feature Modelling to create and manage features, ensuring that they use the correct symbology and annotation, and that they comply with relationship, placement and editing rules.



Print preparation screen capture



Data browser screen capture

There is also a geospatial administrator that sets up co-ordinate systems and customised user interfaces, creating MicroStation workspaces and map metadata files so that projects can be set up that relate to each industry.

Data is stored in any of the common relational database utilities - with full Oracle Spatial compliance using a two-tier connection enabling users to query, capture, edit and post Oracle spatial data - or a three-tier connection (via Bentley Geospatial Server) for large-scale, multi-user access to Oracle. The three-tier system supports long transactions, and optimistic and pessimistic transactions - a necessity in utility infrastructure design workflows.

A similar connection is available to ArcGIS, or users can opt to store data as 'XFM' DGN files, or through any RDBMS/DGN supported by Bentley. With the recent announcement about interoperability between Autodesk and Bentley, I presume that means DWG too.

**MAP TOPOLOGY**

Bentley Map introduces the concept of persistent topology, which is fully compatible with the Oracle 10g topology model - this governs the way in which it handles primitives (nodes, edges and faces) and how they are associated with map features and used for analysis. It also governs how the maps are used for spatial analysis and how they are presented - spatial analysis can include the ability to buffer selected areas, single spatial queries, results symbolisation and reporting, and the overlaying of feature classes, whereas thematic displays include ramps, ranges, unique values, auto

generated legends, and so on.

The combination of these tools enables data to be presented in a simple, standard format, enabling them to be found and collated through quick search tools and to create map-based reports that can be used to share the data between different applications and disciplines.

I suggest, by the way, that the next task for Bentley is to produce a jargon translator between GIS and CAD, as amongst the numerous supporting features of the software, hidden in the data clean-up and integrity tools (designed to ensure that the maps are produced accurately) there is a section that enables users to find and repair dangles, gaps, slivers, overshoots and so on.

No doubt a GIS professional would be similarly confused with references to some of the more obscure CAD commands. A piffing point? Not really as, having spent energy ensuring that the software applications can talk to each other, it would be a shame if humans couldn't!

**BENTLEY MAP APPLICATIONS**

As stated earlier, Bentley Map sits at the heart of a number of industry-specific GIS applications. Of those already considered, Bentley Electric and Bentley Gas were launched between 5 and 7 months ago. Bentley Water and other water modelling and analysis applications (WaterGEMS etc.) have already been reviewed in CAD User.

Although you can design directly in the Bentley Map-based GIS tools, Bentley offers another design environment which sits on top of the Bentley Map-based products - this product is called Bentley Expert Designer and it comes in versions

specifically targeted at different types of utility - just like Bentley Map.

Bentley Expert Designer is targeted solely at the engineer - not the GIS or mapping expert. It uses facilities and GIS data transparently as a basis for new designs, and offers a high productivity design environment where different designs are easily compared and viewed in 2D or 3D representations.

Bentley Expert Designer enforces business rules, designs intelligently, and uses industry compatible units, approved equipment and so on, with embedded properties that enable ancillary reports to be produced that provide not only material costs, but also labour and storage costs, and a means of defining trenches, what soil type they are being dug in - and how long it will take to dig them! In a further nod to interoperability, Bentley Expert Designer Electric works not only with MicroStation but also GE's Smallworld utility GIS.

A lot of municipalities, especially in North America and European countries like Finland and the Netherlands, use the outputs of Bentley Map through Bentley's Web publishing tool - Bentley Geo Web Publisher. It gives browser-based access to spatial and non-spatial data for non-technical users, empowering customer services teams, management teams, and the public when they want access to plans for new developments for instance.

So here we have another example of Bentley bringing together all of the different strands of associated industries, ensuring that they have the tools that will allow them to work together and share the same data - if we can get the CAD versus GIS communication problems sorted out!

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