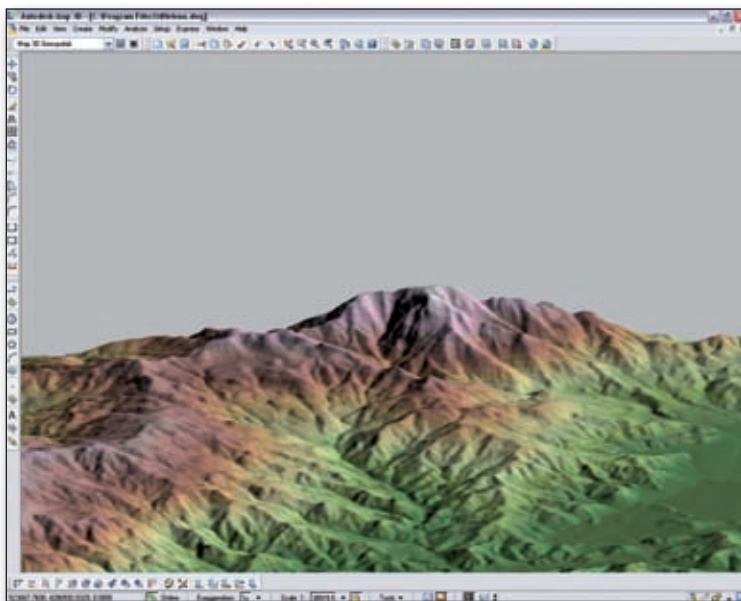


The Benefits of Working Together to Share Data

CAD and GIS Different as Oil and W

It has been said that CAD and GIS are as 'different as oil and water'. It means being asked for a totally current map of the local area when you are busy and knowing that this simple-sounding and perfectly reasonable task could take hours or even days of your time as you will need to sift through a backlog of updates on new infrastructure such as buildings and roads.

By Dominic Jukes



Saint Helena, Raster based surfaces can be edited using thematic mapping and hill-shading.

The CAD department may well have the information, but you will have to convert this data from one format to another and may even need to do some customised programming. Most likely the GIS team is in one room, the CAD team in another. It's both literal and metaphorical. Even if you do work in the same office, it is as if there's the Berlin Wall between you.

Destined to Meet

How did this happen? The emergence of CAD in the early 1980s revolutionised design, replacing pens, paper, slide rules and drawing boards with the computer. This progressed further when applications moved from main-frame computers to the desktop. Today everybody connected with design uses CAD and most infrastructure asset information begins life as a CAD drawing. The first GIS software applications hit the market around the same time. These offered powerful spatial manipulation and mapping tools making it faster and

easier to perform spatial analyses and render maps containing several types of spatial information. For years, software vendors have worked to blend GIS and CAD but organisations have resorted to investing in both systems. Consequently, each group has established different workflows, standards and data, even though this data is similar. GIS is still a niche subject with sophisticated software and highly-qualified experts. As a result, it has become a closed shop to engineers. But, on the other hand, CAD users believe the GIS department lacks the precision needed by engineers and when they need information for the GIS experts, it always seems a complex, drawn-out process.

A Wall Between

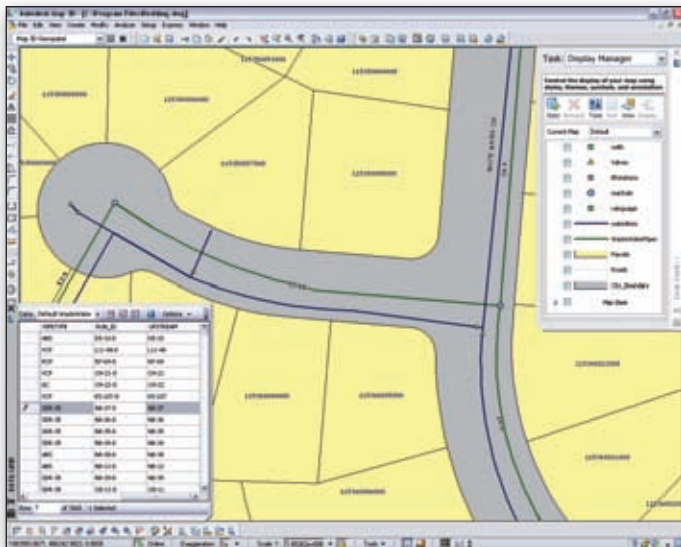
There's also still a wall between the technologies they use. The development in CAD systems has been dramatic. Engineers have intelligent, powerful graphical tools at their fingertips. In the opposite camp, GIS has

become robust and refined too. Users can take advantage of powerful spatial databases, perform complex spatial analysis and generate compelling, intelligent maps. But suppose a civil engineer needs spatial information before they begin designing a bridge. The engineer asks the GIS department for data which is then compiled, converted and perhaps digitised, a convoluted process that can easily introduce mistakes. The data also loses valuable precision. Are GIS and CAD experts forever destined to wave at each other across the great divide?

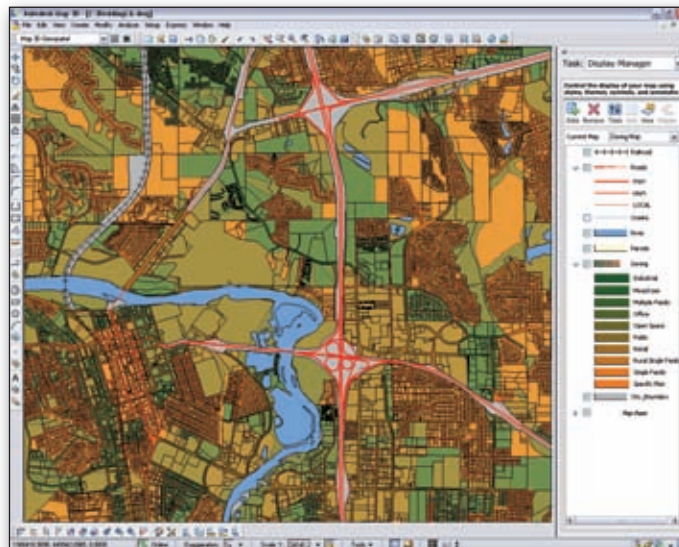
Can this Happen?

The key is to develop software that bridges the disciplines without asking either of them to give up the tools they have been using. GIS and mapping functionality must be brought into the precision data capture and creation tools in a CAD environment. And GIS must be able to access and work with object-based design information stored in CAD files such as DGN and DWG, without losing precision through data conversion. Some software vendors are helping drive this move by making it easier to work seamlessly with CAD and GIS data together in a single application or share the same data across applications. Autodesk Map 3D is an example. The software is an extension to AutoCAD which enables you to directly access spatial databases such as Oracle Spatial and ArcSDE, plus GIS data, and work with them in a hybrid CAD and GIS environment. This enables organisations to improve data accuracy and streamline workflow. Integrating the two means you can work with high precision data in a map-based environment. For example, you can search seamlessly for a parcel and also pinpoint the precise location of utility connections and access detailed design information related to structures on the property. These benefits are clear when dealing with Ordnance Survey background mapping. Unlike OS Landline, MasterMap is not so CAD-friendly because of its large volumes of data. The most efficient way of storing MasterMap data is within a central repository, for example, on a spatial database. Autodesk Map 3D enables users to access the data directly regardless of whether it is held in an Oracle database, a Shp file or ESRI ArcSDE. When Map 3D is connected to a central store of MasterMap data, accurate

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ParcelMap, create, edit and maintain CAD and GIS data using CAD editing tools.



Coloured polygons show land use for the city of Redding, California.

mapping is available across an entire enterprise whether they are CAD or GIS users or both. These applications bring together CAD design and the GIS data stored in many leading formats such as ESRI, Intergraph, MapInfo, MySQL and Oracle Spatial. Further, Autodesk has recently provided the code for many of its FDO providers as open source and free for anyone to download (see at the bottom of this article).

Broken down Barrier

So once this great barrier between disciplines has been broken down, what benefits can an organisation expect? First, a streamlined workflow. Users can create and edit using CAD and store the information in a central database for other departments or applications including GIS to access. Projects can be completed faster when an engineer can easily pre-populate a new design with current base map data, such as property lines, curb information and other associated data, from a central GIS. GIS specialists can use the powerful precision editor tools from a CAD system to more easily edit and maintain GIS data. The two disciplines are now recognising the benefits of working together to share data, processes and personnel. It's not unusual for a large engineering department to have over 50 engineers, but only two or three GIS professionals. Because there are not so many trained GIS professionals, they are sometimes under pressure to keep up with the constant stream of work. Combining CAD and GIS will open

doors for GIS experts who can support the expanding role of spatial information. It will also take away the need to retrain both disciplines to use the others technology. GIS teams can use the pool of CAD-trained engineers to help maintain data and provide a detailed understanding of specific workflows and data relationships. Similarly, CAD departments can leverage GIS databases to store and share valuable infrastructure information.

Can't See the Join

Utilities are among the organisations well-placed to benefit from these developments. The roll-out of United Utilities' (UU) electricity GIS programme is now finished, completing a five year strategy to implement GIS across all areas of the business. This system is helping the organisation meet its regulatory targets and pass on practical benefits such as a faster and more efficient service to the customer. Now the entire lifecycle of both water and electricity assets is managed by geospatial solutions from Autodesk, based on a central Oracle database. These geospatial solutions and their object knowledge base ensure that data is captured productively and to a consistent quality. Workflows lead operators through the data maintenance processes and ensure standards are followed. Any user in the business is able to see live and up-to-date views of UU's assets via an Autodesk MapGuide browser which connects directly to the Oracle asset repository. As a result, data can be created and maintained in high-prec-

sion CAD providing the ability to include accurate measurements and scale. In fact, the two environments are integrated so seamlessly that users don't see the information as two different entities. The database also manages associated documents, CAD drawings such as cross sections can be included. Altogether the system holds around 70,000 CAD documents. One advantage is that UU can more easily identify risk areas and so prioritise budget. For example, using a 3D CAD model, combined with rainfall data and OS MasterMap information on ground types it can calculate how quickly rain will seep through the ground and identify risk areas for flooding on the sewerage network.

Centralised Model

This centralised repository model maximises the investment in technology as there is no loss of valuable information when data translates from one format to another. Using native data means it retains integrity. As a result, there's no need to search for the most current information and decisions can be made safe in the knowledge that the best information has been available. So, now the technology to work within a single environment is available, there's no reason why either group of professionals should hide behind their own high wall.

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