The use of GIS (Geographic Information Systems) for creating digital maps, conducting spatial analysis and analyzing geospatial profiles within enterprise data is an $8 billion market.

The growth of that market has been driven by the recognition that mapping plays a significant role in making natural and enterprise data more accessible – and useful - to decision makers in both civilian and military organizations.

Even though 3D visualization generally delivers a quantum increase in value, today’s GIS users are mostly limited to the display of their data in 2D representations. This is not due to a lack of 3D data --3D attributes are commonly found in GIS databases, and other forms of 3D data are readily available in both the public and private domain. Rather, the problem lies in the tools.

Today’s GIS tools do not provide users with a simple method to create and interact with 3D GIS. Most require a high-level of technical ability and a strong grasp of 3D concepts. As a result, using GIS data to create 3D views has proven difficult, expensive, of low visual quality and interactivity and out of reach for most users. SiteBuilder 3D™ changes all of that.

SiteBuilder 3D is an extension to ArcView GIS that enables users to rapidly create a correlated realtime 3D scene directly from their map. Once the 3D database is created, ArcView users can quickly conduct virtual fly-throughs while tracking their position simultaneously in 2D.

3D visualization projects that historically have taken hours and sometimes days to create can now be done in minutes by relatively unskilled users – from inside ArcView. This White Paper explores the new 3D power that is now available to ArcView users.
THE HISTORY OF SITEBUILDER 3D™

MultiGen-Paradigm has been a leading provider of realtime 3D tools since 1986. Our Creator and Vega products and the OpenFlight file format are regarded as industry leaders in the creation and realtime rendering of 3D data. For clients whose applications require the development and use of highly customized or original 3D models, these remain the products of choice in the 3D world.

And yet, there has been a growing need for a way to take the voluminous amount of 2D GIS data currently in use and make it more readily available in a 3D form, especially within the context of existing 2D tools.

To meet that need, MultiGen-Paradigm has created a unique new system called SiteBuilder 3D™. Building on the core facilities from our existing 3D products, it combines elements of both scene generation and 3D rendering into a single product that runs as an extension (plug-in) to ESRI’s ArcView GIS system.

SiteBuilder 3D™ thus brings a powerful, easy to learn, easy to use 3D capability to the more than 500,000 ArcView users who have huge investments in both training and data for their ArcView systems. SiteBuilder 3D™ offers these users a stunningly simple method for converting their 2D data to 3D without leaving the ArcView platform.

HOW SITEBUILDER™ 3D WORKS

SiteBuilder™ is accessible from a set of pulldown menus within the ArcView system, and works directly on existing data, which is stored as ArcView themes or layers.

Using 3D information that is either already imbedded in the ArcView data, or is pulled from contour maps, digital elevation models, USGS data, etc., SiteBuilder creates the underlying 3D geometry representing the terrain and then “drapes” an image of map over the terrain contours, thereby creating a new 3D scene.

Then, using SiteBuilder’s 3D Features Libraries, the user can select and specify 3D details for roads, buildings, trees, lakes and rivers, etc. These features are then automatically placed into the 3D scene.

SiteBuilder’s 3D Legend editor lets users choose exactly how they would like a 2D feature to appear in the 3D scene.
Once the user has populated their 3D terrain with feature data, the SiteBuilder scene is viewable either in full screen mode, or tiled alongside its ArcView counterpart.

Both are interactively linked by a field of view avatar in the ArcView scene. The avatar tracks the eyepoint movement from the 3D scene.

Users can easily perform mouse-controlled “fly-throughs” at a variety of speeds and motion models from varying vantage points and elevations.

SiteBuilder uses a virtual texture technique to achieve high-resolution detail for terrain imagery without sacrificing rendering speed, and it incorporates user-selected environmental effects (fog, clouds, time of day) to provide variety and greater realism.

**SITEBUILDER 3D DETAILS**

- **Images** - Users have the option of either using an image theme (i.e. aerial/satellite photograph) for a terrain texture, or the active ArcView map display (i.e. screenshot). In each case, SiteBuilder 3D automatically converts the image, or map display into a virtual texture and drapes it over the base terrain. Because these images have been processed for realtime 3D rendering, the use of high-resolution imagery is possible greatly increasing scene realism.
Symbol Mapping – SiteBuilder employs a “3D Legend Editor” to facilitate assignment of 3D symbols (colors, textures, models, etc.) to the 2D features. For example, users have the ability to choose various textures, colors and 3D models that best represent how the feature is to look in the 3D scene.

Dynamic Database Interface - The dynamic database interface is a layer that sits between the realtime 3D viewer and ArcView GIS. This interface will be used by Site Builder to maintain synchronized 2D and 3D views.

HOW ARCVIEW USERS BENEFIT

1. No Data Prep - All of the source data needed to build a 3D scene, with the exception of prebuilt openflight 3D models (stored in SiteBuilder's model library), is stored in ArcView GIS as themes or layers. There is no need to preprocess any source data before using SiteBuilder 3D.

2. Runs in ArcView GIS - SiteBuilder runs as an extension to ArcView. All 3D generation and interaction is done from ArcView – there is no need to export source data and use in a separate application to achieve 3D results.

3. ArcView Look and Feel - Data conversion to 3D is designed to look and feel like the process of assigning map symbols to 2D maps in ArcView, a task commonly done by ArcView users.

4. Ease of Use – SiteBuilder is very easy to use. A user does not have to be a 3D modeler to achieve successful results.

5. Realistic-Looking Scenes - The 3D scene produced by SiteBuilder is highly realistic. SiteBuilder’s use of Vega’s virtual texture for high-resolution ground imagery and photo-textures on buildings, for example, are very compelling.

6. Data Accuracy - SiteBuilder 3D builds a correlated 3D scene from your map and maintains the accuracy of your GIS data. What you see in 2D can only be viewed in 3D.
REQUIREMENTS

- Windows 2000 professional or Windows NT 4.0
- ArcView GIS v3.2 or above
- ArcView 3D Analyst or Spatial Analyst extension (recommended)
- Pentium III processor
- 256mb RAM
- OpenGL compliant graphics cards with at least 32mb of texture memory
- Three-button mouse

WHO SHOULD USE SITEBUILDER™ 3D

The target end user for SB3D is an ArcView GIS user who wants to easily and rapidly visualize their existing GIS data in highly realistic and fully interactive 3D environment.

Prime users would include Urban/land Planners, Military Mission Planners, Architects, Civil Engineers, Natural Resource Planners, Real Estate Developers, and others who would benefit from a rapid, easy to use, 3D solution that is integrated into their existing tool.

For more information on SiteBuilder 3D™, or our GIS/GeoSpatial strategies, please contact:

Jonathan Zucker
Product Manager
MultiGen-Paradigm
408-261-4100
JON.ZUCKER@ca.com
www.sitebuilder3D.com
www.multigen.com

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