Autodesk Geospatial Product Line

White Paper

Autodesk

For many organizations, such as governments, utilities, telecommunication providers, engineering firms, and construction companies, geospatial data is critical to doing business. However, many of these organizations are not able to fully utilize their geospatial data because it is stored in many locations—desktops, file servers, CAD (computer-aided design) servers, GIS (geographic information systems) servers, and web servers. Similar data is managed redundantly by different people and across departments—engineers, GIS specialists, and information technology (IT) personnel; each functional entity using, storing, and managing the same data in a unique way. In this environment, sharing data is a tedious process that often generates errors, reduces productivity, and sometimes leads to costly mistakes.

For example, information used by a GIS team in planning and analysis is frequently recreated by engineers in the design phase. Similarly, GIS professionals find ways to import CAD information into their systems, but often end up with data stripped of much of its valuable engineering detail and attribution—such as text and dimensioning that exist in CAD drawings that isn't typically preserved or read by GIS applications. Because engineers must start designs and rebuild data rather than beginning from a common data source, such as a GIS that may already house project-level designs, organizations lose time by failing to leverage existing and up-to-date data.

Organizations can make huge productivity gains and see cost savings by addressing high levels of redundancy, inaccuracies, data mismatches, currency issues, and versioning problems that result from siloed information. Geospatial CAD and GIS data is often not shared throughout an organization or made accessible to the personnel or applications that can utilize the information. It is also very common for workflows to support analysis of data from multiple sources. For example, on infrastructure projects, many decisions are made during the design process. The earlier a designer can test and modify design iterations to find out which option is less expensive than the other, the better. To do this kind of analysis, the designer needs information such as the amount of private land that will need to be bought and its proximity to sensitive environmental areas or historic buildings—information that is typically stored in both engineering and GIS departments and in both CAD and GIS formats.

This white paper details how organizations can fully harness the power of their geospatial data with Autodesk Geospatial. Autodesk Geospatial bridges CAD and GIS systems and extends the value of geospatial data by leveraging existing resources, reducing redundancy and error propagation, and increasing operational efficiency. Autodesk Geospatial grows with an organization, from enhancing CAD mapping with basic GIS functionality to integrating geospatial information with other enterprise systems such as enterprise resource planning (ERP) and customer relationship management (CRM) applications. With Autodesk Geospatial, organizations can:
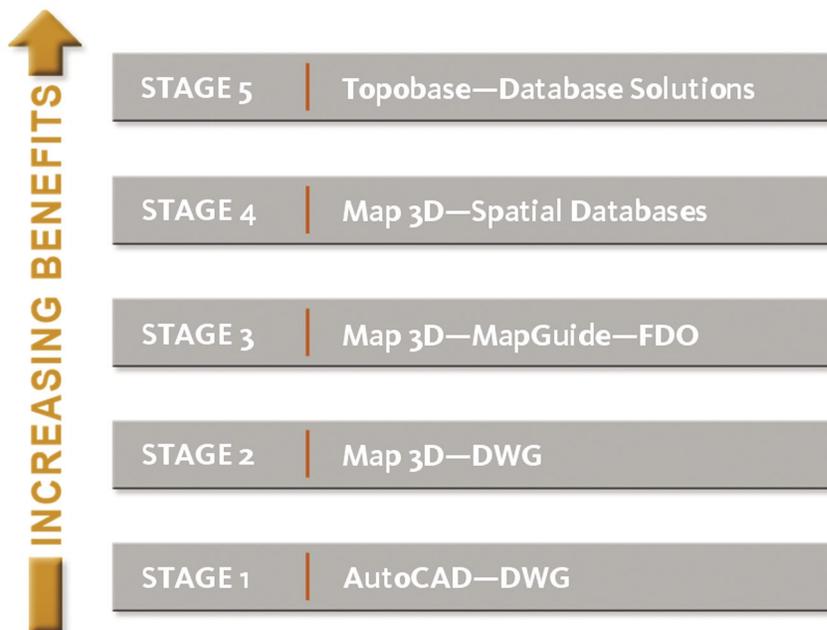
- Work with their existing systems and comply with industry standards.
- Facilitate access to essential information across the organization regardless of the format or location in which it is stored.
- Streamline processes by eliminating disparate systems.
- Create an environment where data stored in a central database or in multiple data stores can be constantly improved through real-time updates from the field.
- Work with proven, easy-to-learn technology that is intuitive to both CAD and GIS trained professionals.

We will first look at the five stages of the Autodesk Geospatial value chain to show how the value of an organization's information increases with each step up the value chain. Then, we will review the entire Autodesk Geospatial ecosystem, illustrating how the components of Autodesk Geospatial work together to break down barriers around geospatial data and enable organizations to design, manage, publish, and integrate spatial data more efficiently.

The Autodesk Geospatial Value Chain

CAD and geospatial technologies are developed and deployed in many different ways across industries and even within a single organization. We have identified the five stages of the Autodesk Geospatial Value Chain that represent how "spatially enabled" organizations typically work with their geospatial information. The Autodesk Geospatial Value Chain provides a useful model to help understand how organizations currently use geospatial technology, and provides a deliberate path for growing and extending their capabilities over time. Some organizations have limited ability to get value out of their data—such as those where infrastructure information is only found on paper-based maps (or Mylar or vellum) or where data is locked up in unstructured CAD files stored across many file systems. Other organizations have more sophisticated, integrated geospatial data systems that enable integration and collaboration organization-wide. The Autodesk Geospatial product line effectively supports an organization at any stage, as well as facilitates easy transition from one stage to the other as the organization's geospatial data needs evolve. By understanding the value chain, organizations have the opportunity to identify what pains they can alleviate and what benefits they can realize by moving up the value chain. Let's take a quick look at each stage in the value chain.

The Five Stages of the Autodesk Geospatial Value Chain

INCREASING BENEFITS

STAGE 5	Topobase—Database Solutions
STAGE 4	Map 3D—Spatial Databases
STAGE 3	Map 3D—MapGuide—FDO
STAGE 2	Map 3D—DWG
STAGE 1	AutoCAD—DWG

Stage 1

At Stage 1, organizations use a CAD product such as AutoCAD® and AutoCAD LT® to design and manage their infrastructure data. These organizations have often migrated from paper-based, Mylar, or vellum files and store their infrastructure data in CAD files—such as DWG™ drawings on the desktop—in a file directory on a server. AutoCAD is a world-leading design tool that is used to create a majority of the world's infrastructure design data. However, it does not support geo-referencing (geographic location in the real world), multi-user editing, or GIS data formats. When an organization using AutoCAD needs to add location intelligence to its data, bring in data from other sources, or allow multiple designers to edit the same data, it has outgrown Stage 1 and may be ready to move to Stage 2 or Stage 3.

Stage 2

Autodesk Geospatial makes it easy for engineers and designers to manage and share mapping-like data—such as regional scale data sets, cadastral information, and utility network data including pipelines, manholes, and valves. At Stage 2, an organization uses CAD files as its primary data source and Autodesk Map 3D to collaborate and share this infrastructure information. With Autodesk Map 3D, multiple people can easily access CAD data and work across tiled CAD drawing files. Because it allows more than one person to work on a drawing at a time, Autodesk Map 3D makes it easier to share data or split the workload. Additionally, teams can import and export data sets from many different CAD and GIS file types—such as ESRI® Shapefiles, MapInfo® TAB files, and MicroStation® DGN—as well as easily bring in GIS and raster data from multiple coordinate systems and combine it with DWG files and have the information overlay properly. Using Autodesk Map 3D, project teams can use their AutoCAD knowledge and training while taking advantage of more traditional GIS tools and functions. When an organization wants to extend its CAD information to more people and leverage additional mapping capabilities—to know, for example, where there are undeveloped parcels or how many manholes are on new roads—they may be ready to move to Stage 3.

Stage 3

In Stage 3, an organization increases the value of its data by applying standards and organizing data using the Autodesk Map 3D platform. By structuring and cleaning up CAD and other data, what is known as "classification," an organization can begin to define data as real-world features with standard allowable attributes. Classification ensures data consistency for all users and increases the value and potential uses of that data. This is where CAD and GIS really start to work together. By classifying data and leveraging FDO Data Access Technology—Autodesk's geospatial data access platform—organizations can enhance the performance of large data sets and use their CAD and geospatial data together to make business decisions; check inventories; or identify specific items, such as the number of manholes, valves, or new roads they must maintain. In Stage 3, organizations are storing feature data in a structured file format such as Autodesk spatial data file (SDF) or SHP. With SDF, organizations benefit from the power of a spatial database without the cost or management overhead. At Stage 3, organizations can easily extend the reach of their information by using Autodesk MapGuide® Enterprise to stylize and publish data to the Internet—making it possible for audiences of all sizes to access maps and data. For more information on FDO Data Access Technology, see page 5 of this white paper.

Stage 4
To extend the use of their information, organizations transition from Stage 3 to Stage 4. They move from a file-based environment using DWG, SHP, or SDF to a spatial database environment using the full functionality of a relational database management system (RDBMS). With an RDBMS, hundreds or even thousands of people can create, edit, and manage the same data. With a full RDBMS, organizations get more scalability, as well as added security and the ability to create more sophisticated data models. Using FDO Data Access Technology, Autodesk Geospatial products work natively with spatial data stored in Oracle®, Microsoft® SQL Server™, and MySQL®, as well as with ESRI's ArcSDE® middleware. As a result, organizations are able to fully leverage the security, scalability, sophisticated data models, and multi-user read/write power of an RDBMS. Autodesk Map 3D 2007 provides a new interface that makes data and schema migration from SDF or SHP files to a full-scale RDBMS easy. While the information in Stage 3 and Stage 4 may be the same, organizations in Stage 4 leverage the added power of an RDBMS to scale the availability and management of their geospatial information.

Stage 5
When an organization moves from Stage 4 to Stage 5 it shares spatial data with other departments and applications, making spatial data a central part of its IT ecosystem. In this stage, GIS data and functionality get woven into other business systems, integrating with assessor databases, permitting systems, ERP systems, and more. The spatial application server supplies geospatial intelligence and data to these other applications. Autodesk, resellers, partners, and system integrators build powerful solutions to meet the organization's specific business goals and processes. Autodesk Topobase provides sophisticated solution modules that make it easy for organizations to establish and manage a Stage 5 deployment.

By moving up the Autodesk Geospatial Value Chain, organizations increasingly leverage their geospatial data for a variety of business functions. By making the transition from Stages 1-3, organizations gain the ability to organize data effectively, implement real-world coordinate systems, and work with larger data sets. Moving from Stages 3-5 delivers increased scalability and security, ability to complete long transactions, and integration with other systems. For more information on this value chain, see the white paper *The Autodesk Geospatial Value Chain* at www.autodesk.com\geospatial.

Now let's look deeper into the Autodesk Geospatial product line to see how organizations can use Autodesk Geospatial to leverage their data across departments and applications.

Autodesk Geospatial Product Line: Breaking Down Barriers

With the Autodesk Geospatial 2007 product line, organizations are no longer hamstrung by the historic division between the CAD and GIS worlds. In the past, CAD provided smart graphics characterized by sophisticated, accurate representations of the world and excellent tools for geometry creation, editing, and dimensioning. However, tools for linking external data tables or creating data attributes in CAD files have not been that robust. GIS provided a very robust connection to databases, but less sophisticated graphics. Autodesk Geospatial 2007 brings together CAD and GIS by combining the powerful, smart graphics of CAD with direct, native access to the world's most common GIS databases and files.

One of the underlying technologies that Autodesk Geospatial uses to break down barriers between data is a common data access platform called FDO Data Access Technology. FDO Data Access Technology supports the creation of data-store-neutral applications and facilitates direct information exchange. To make

What is SDF?

Autodesk Spatial Data File (SDF) is a GIS-oriented alternative to DWG that is optimized for storing large classified data sets. The SDF file is the native file format for FDO Data Access Technology and leverages all of its strengths: open API (application programming interface), high performance, database-like table architecture, and larger data set sizes. By using SDF files, organizations combat the problem of putting too much information into a DWG—such as regional GIS-scale vector data and attributes (in object data tables)—making the file unwieldy, increasing the chances that it may be corrupted, and lowering its performance. People used to working with DWG files will find SDF an easy format to use. Like DWG, it can store multiple features in a single file, it is portable, and it stores arcs. While it is not a database, it does act like a database in that it stores data, both geometry and attributes, in tables. With SDF, organizations get many of the benefits offered by a database without adding database cost or complexity.

it easier for developers to extend the capabilities of FDO Data Access Technology, Autodesk, in partnership with the Open Source Geospatial Foundation™ (OSGeo™), has released FDO Data Access Technology as an open source project. Because this underlying technology is based on open standards, it eliminates many of the difficulties commonly encountered when working with proprietary systems. FDO Data Access Technology:

- Enables organizations to use of best-of-breed software because they are not locked into one vendor's software, data format, or API. In contrast, organizations that adopt proprietary systems such as ArcSDE pay a "toll road" to get to their own data.
- Leverages the Open Source community for rapid product development and evolution. For example, there are new FDO Data Access Technology providers such as the OSGeo FDO Provider for OGR.
- Extends access of an organization's information to other systems. For example, Oracle Spatial provides access from non-spatial applications.
- Reduces training, support, and development costs associated with proprietary systems.

Using FDO Providers, organizations can connect directly to ESRI ArcSDE and SHP, Oracle, Microsoft SQL Server, and MySQL, as well as leverage public data sources via Web Map Services (WMS) and Web Feature Services (WFS). Since FDO Data Access Technology is available in the open source community, other enterprise applications such as ERP or GIS systems can leverage FDO Data Access Technology to access the same data without the additional expense of legacy middleware. The result is a seamless experience for accessing and integrating data from multiple sources, regardless of format or where the data is stored. By standardizing on FDO Data Access Technology as its data access technology for spatial data, an organization can easily add support for new storage formats in a consistent fashion across all Autodesk Geospatial and other business applications.

The benefits of Autodesk Geospatial are numerous. By bringing CAD and GIS together, Autodesk Geospatial enables organizations to leverage their existing CAD-trained design engineers, use existing CAD software and data in its native format, and access existing GIS datasets (DWG, SHP, ArcSDE, Oracle Spatial) in a native format. In addition, by bridging the CAD and GIS worlds, Autodesk Geospatial reduces redundancy and error propagation. No data is lost in translation and there's no duplication of data sets. Organizations contend with fewer silos of information and reduce out-of-date data snapshots. In short, they manage and access the most current information.

Finally, Autodesk Geospatial increases an organization's operational efficiency and enables it to adopt more efficient workflows. Teams no longer undertake time-consuming data conversion routines. Extended teams can use CAD and GIS functionality together in the same workflows without having to move or duplicate data. For example, team members using other applications, such as ArcGIS® or GeoMedia™ software, can access the same information managed using Autodesk Map 3D. With FDO Data Access Technology as its common data access platform, Autodesk Geospatial makes it easy for organizations to share information across

applications, so geospatial information is integrated into workflows wherever it's needed. And, as the Autodesk Geospatial Value Chain illustrates, Autodesk Geospatial easily evolves as an organization grows. As an organization changes and requires additional functionality and resources, it need not purchase new applications. Autodesk applications are flexible and extendable to address an organization's evolving needs.

Autodesk Geospatial Breaks Down Barriers
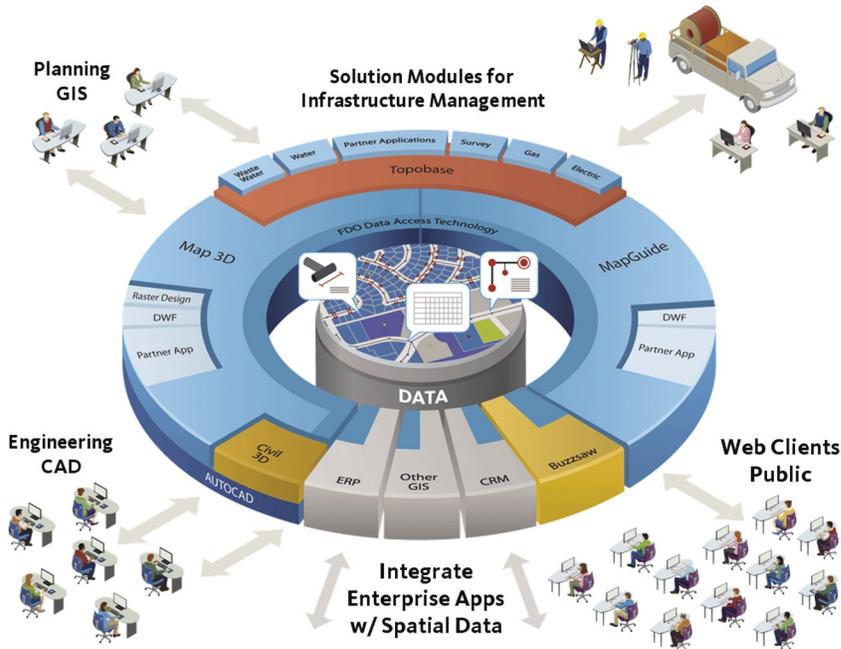
Now let's take a deeper look at the Autodesk Geospatial platform and product line.

Data Layer
The first layer of the platform is the data, one of an organization's most valuable assets. An organization's data outlives the applications and people that manage it. While people change jobs and companies reinvest in software, an organization's data is a permanent fixture. Autodesk does not put data into a proprietary format that locks organizations into using one vendor's applications to access or manage it. Rather, Autodesk provides tools to increase the value of data assets by ensuring that they are maintained, usable, and accessible in an open, scalable, and secure manner.

Desktop Platform
Autodesk Map 3D serves as the desktop-based core of the Autodesk Geospatial platform. Autodesk Map 3D enables organizations to create and edit spatial data on the desktop and bridges the gap between CAD and GIS departments, systems, and people because it's familiar to engineering and CAD users and yet provides functionality needed by planning and GIS

professionals. Because it is based on AutoCAD software, Autodesk Map 3D has all the powerful tools of AutoCAD. In addition, it has geospatial functionality important to both GIS professionals and engineering staff, such as DWG cleanup, coordinate systems, thematic mapping, and database functions. Autodesk Map 3D supports common workflows such as:

- Creating and maintaining maps and geospatial data
- Converting existing CAD drawings into geospatial data
- Cleaning up and improving existing GIS content
- Linking CAD design projects with geospatial asset management work
- Managing utility assets
- Publishing CAD and GIS data to the Internet and to hard copy maps, DWF™ (Design Web Format), GIS data types, and map books

Autodesk Map 3D enables engineers to access data previously locked up in the GIS department, while providing the best CAD tools available to edit native geospatial data. With the FDO Data Access Technology, Autodesk Map 3D 2007 enables team members to work with large GIS-scale data sets and directly access, without translation, advanced geospatial databases such as Oracle, MySQL, and Microsoft SQL Server as well as with ESRI's ArcSDE middleware. This allows organizations to store both spatial and attribute data in one place without expensive and proprietary middleware. Since most organizations have hybrid software environments, Autodesk Map 3D 2007 offers direct read/write capabilities for most popular GIS formats, including Oracle Spatial, MySQL, ESRI Shapefiles, and ArcSDE, helping to ensure information accuracy by eliminating data conversion. Additionally, Autodesk Map 3D 2007 provides read access to raster-based surfaces such as U.S. Geological Survey digital elevation models (DEM), digital terrain elevation data (DTED), ESRI GRID, and GeoTIFF. With web services support, Autodesk Map 3D 2007 also offers access to online geospatial data via Open Geospatial Consortium WMS and WFS services.

Server Platform

The server-based core of the Autodesk Geospatial platform, Autodesk MapGuide enables organizations to author and publish maps and design information quickly and easily for distribution internally or on the web. Because it shares the same access architecture—FDO Data Access Technology—and common code for the stylization of data with Autodesk Map 3D, Autodesk MapGuide Enterprise shares data easily with Autodesk Map 3D. Autodesk MapGuide server-based technology delivers rich, web-based capabilities such as dynamic data visualization, feature selection and attribute display, data query and update, and geometric analysis. Because Autodesk MapGuide can use any web browser, organizations can use it to distribute data and spatial functionality to a huge number of people and applications.

In addition, Autodesk MapGuide provides a platform for building partner or in-house applications using the FDO Data Access Technology. Because Autodesk MapGuide is also an application server, it can directly integrate with other business applications. It effectively spatially enables enterprise systems, such as CRM and ERP, in a "machine-to-machine" manner. For example, a team member can use it to perform a spatial analysis—such as validating a location in a specific zone—prior to accepting a record in a database without needing to generate and view a map. Autodesk MapGuide is also a quick way to deploy web services such as OGC compliant Web Mapping and Web Feature Services.

With Autodesk MapGuide, organizations can easily publish data from AutoCAD, Autodesk Map 3D, Autodesk Civil 3D, and Autodesk Topobase as well as from popular GIS sources such as Oracle, Microsoft SQL Server, and MySQL databases; ESRI ArcSDE, SHP, and Grid sources; popular raster formats; and WMS/WFS web services.

"For us, Autodesk Map 3D is the heart of our complete end-to-end solution. It just seems natural to have GIS and engineering functions connected. Our engineers and designers have instant access to all the information they need, and our Oracle database contains up-to-date information."

J.R. Smith
Senior GIS Analyst for the
Public Works
City of Tacoma

Autodesk, in partnership with OSGeo, has released MapGuide as an open source project called MapGuide Open Source. More information about the open source version can be found at www.osgeo.org.

Infrastructure Design and Management

The Autodesk Geospatial product line includes Topobase, a sophisticated design, management, and analysis framework that extends the power of the Autodesk Map 3D and Autodesk MapGuide platforms. Autodesk Topobase 2007 addresses the challenges faced by organizations that collaborate on infrastructure projects by providing industry-specific data models and workflows and enabling teams to manage and share spatial information across departments. Topobase customers can see the big picture with a more integrated view of all of their enterprise data, as well as improve productivity and bottom-line results by completing projects faster and maintaining assets more efficiently.

Topobase offers modules for managing specific types of infrastructure systems, including water, wastewater, gas, and electric networks. Each module provides a detailed data model that organizations configure to capture exactly the infrastructure asset information they need. Topobase workflows reduce steps when designing new infrastructure, and provide security and consistency as people in separate departments work with and update the database. Finally, Topobase's multiple display models enable each user of the system to view information with the scale, symbols, and formatting most relevant to them.

A unique feature of Topobase is its ability to leverage tools and data from the design and construction phases of an infrastructure asset through its ongoing management. For example, as an engineer designs a water network using familiar Autodesk software, business rules are applied to ensure data quality, and detailed asset data is automatically stored in the central spatial information database. This information is then available for use in operations, customer service, and compliance reporting, and can be accessed securely over the web without requiring special CAD or GIS expertise.

Two other advanced features of Topobase are topology and long transactions. Topobase automatically updates network and area topology relationships as new assets are added to the infrastructure system. By keeping track of which water pipes and valves are connected to each other in a water network, for example, organizations can perform functions such as determining which houses are affected if a particular valve is shut off. Long transactions, also known as jobs or versioning, enable organizations to select an area of their infrastructure that is being built or modified, keep the modifications separate from the base information, and have an approval process for completed jobs. Team members can even set up two jobs for the same project so that they can evaluate design and cost alternatives. Once completed, all jobs are kept in a history status and can be rolled back to provide a view of the infrastructure at any point in time. Long transaction functionality is useful for managing spatial information in multi-user environments.

Since Topobase stores data in native database formats, the spatial information that it creates can be integrated with existing business systems using standard IT tools, without the need for expensive proprietary tools or middleware. With Topobase,

Autodesk Integrates With Enterprise Applications

Autodesk Geospatial products are based on an open data model, work with open standards such as OpenGIS®, and integrate easily with Oracle. By adopting Autodesk's FDO Data Access Technology and open architecture, organizations can spatially enable enterprise applications such as ERP and CRM applications, powering more streamlined, efficient workflows.

For example, organizations such as Industrielle Werke Basel (IWB)—a utility delivering electricity, natural gas, drinking water, heating, and telecommunication services in Basel, Switzerland—depend on Autodesk's platform to integrate geospatial, design, and alphanumeric data. By integrating its Topobase solution directly with its SAP business system, IWB is able to maintain its water and gas documentation in half the time and with two-thirds the resources.

it is easy for a water utility, for example, to view how many pipes, manholes, and hydrants are in its water network and to integrate spatial information with data from CRM or other enterprise systems. Because the Topobase framework is open and flexible, customers, Autodesk Consulting, or certified partners can use the Topobase framework to create custom applications to support an organization's unique data models, processes, and system interfaces.

Additional Autodesk Geospatial Product Line Applications

In addition to the core Autodesk Geospatial platform applications detailed above, there are several applications built on the platform as well as applications that bring additional value to Autodesk customers.

Included within the Autodesk Geospatial platform are Autodesk Civil 3D and Autodesk® Utility Design. Autodesk Civil 3D integrates with Autodesk Map 3D by sharing data directly with it using the SDF data format. As Autodesk's high-end, model-based design tool, Autodesk Civil 3D enables organizations to manipulate drawings associated with engineering projects such as subdivisions, pipeline networks, and road alignments. Designs produced in Autodesk Civil 3D can then be incorporated into an organization's central data store, becoming part of the enterprise data set using Autodesk Map 3D.

Built on Autodesk Map 3D is Autodesk Utility Design, which is completely compatible with the wide range of peripherals and data exchange formats supported by Autodesk Map 3D. Available only in the United States, Autodesk Utility Design software's Project Explorer module and new Workorder Interface lets organizations integrate work order data from SAP® R/3 Enterprise 4.7. With Autodesk Utility Design, organizations more easily and accurately design, engineer, order materials, and estimate costs for residential, commercial, and industrial gas and electric systems. The application provides design tools with true rules-based automation, allowing organizations to configure it using their individual design and construction standards.

Partner applications built on the Autodesk Geospatial platform include the following:

- StellarMap® by StellarRAD Systems—Built on Autodesk Map 3D, this facilities mapping application for the telecommunications industry provides cost estimating, work order management, and reporting functionality. With it, organizations can easily manage and direct cable throws, loop connectivity, continuing property records, work orders, and construction prints.
- Civil and Survey applications by Carlson Software—Carlson Software offers a variety of applications built on Autodesk technology. For example, Carlson GIS 2007 runs on AutoCAD, Autodesk Map 3D, Autodesk® Land Desktop, or Autodesk Civil 3D. Designed for surveyors and engineers, Carlson GIS 2007 provides tools for data capture and linking, data labeling, polygon topology creation and analysis, and more.
- Mobile Resource Management (MRM) solutions by @Road—Built on top of Autodesk MapGuide, @Road's MRM solutions combine Internet services with applications that leverage on-demand global positioning systems (GPS), dispatch software, wireless capabilities, fleet management tools, and transaction processes to help organizations maximize the productivity of their mobile workforces.
- GEOMAP GIS solutions by GEOMAP GIS—Based on Autodesk Map and Autodesk MapGuide, GEOMAP GIS software and web-based solutions enable organizations to edit and create graphic and alphanumeric data via the Internet. Solutions are tailored for facility management, transportation, networks, and municipalities.

Products that extend the value of the Autodesk Geospatial platform include Autodesk Buzzsaw, Autodesk® Design Review, and Autodesk Raster Design. With Buzzsaw, a web-based collaboration environment, organizations gain a project

"Autodesk Civil 3D has already saved us three full days on a small project, and we anticipate even more time savings on our upcoming projects. And with Civil 3D, we can present better, more detailed options in half the time. Plus, we continue to connect our civil engineering and GIS data seamlessly by using Civil 3D with Map 3D."

Shawn McLeod
GIS Manager
District of North Vancouver

management toolset for disseminating and receiving all project documents, including design drawings, bid documents, construction RFIs, submittals, and meeting minutes. Organizations can easily share documents with multiple consultants and team members throughout all phases of a project—from design through bidding, procurement, and construction.

Autodesk® Design Review integrates with all Autodesk 2007 design applications and allows teams to print maps to DWF or taking into the field or sharing with colleagues. When team members need to annotate maps in the field, they can use Autodesk Design Review to track and record markups and redlines. With Autodesk Design Review, organizations keep their map and infrastructure data current while reducing rework and paper-based manual processes.

Autodesk Raster Design works with AutoCAD and AutoCAD-based products such as Autodesk Map 3D, Autodesk Civil 3D, and Autodesk Topobase. Autodesk Raster Design extends these platforms with a complete set of tools for working with raster-based imagery. With tools for raster drawing cleanup, raster to vector conversions, image editing and image processing, Autodesk Raster Design enables organizations to unlock the value of scanned engineering drawings and maps and efficiently turn hardcopy maps into powerful geospatial data.

Autodesk Geospatial in Action

Many organizations use a combination of products in the Autodesk Geospatial product line to drive real, bottom-line benefits: bringing together CAD and GIS data, enabling engineers to update GIS data, distributing previously system-locked data to wide audiences, and streamlining workflows from end-to-end.

Bridging CAD and GIS

Orange County Sanitation District
The Orange County Sanitation District (OCSD) is using Autodesk Geospatial to bring together its CAD and GIS data so that it can reduce the redundant processes involved in maintaining separate geospatial and CAD data, as well as enhance data fidelity and integrity.

Like many large organizations, the OCSD depends on Autodesk software to design infrastructure and ESRI software for traditional GIS functions. With Autodesk Map 3D, the OCSD can work with both data formats efficiently. Autodesk Map 3D translates CAD design data into the OCSD's GIS and from its GIS to CAD in minutes. Notes Doug Rulison, engineering data management specialist for the OCSD, "Autodesk Map 3D enables us to use the applications we prefer for CAD design and GIS analysis and to replicate our CAD data in a single Oracle database. This allows us to maintain our facility and sewer atlases more efficiently and to update our sewer atlas twice as fast."

To update and maintain its scanned record drawings in its document management system, the OCSD also uses Autodesk Raster Design. Jettisoning its old, time-consuming manual process for updating scanned drawings in favor of Autodesk Raster Design, OCSD's designers can now check out the scanned image from the document management system, make changes in CAD, and merge edits directly to the image itself, maintaining existing hyperlinks.

"Autodesk Map 3D enables us to use the applications we prefer for CAD design and GIS analysis and to replicate our CAD data in a single Oracle database. This allows us to maintain our facility and sewer atlases more efficiently and to update our sewer atlas twice as fast."

Doug Rulison
Engineering Data Management Specialist
Orange County Sanitation District

District of North Vancouver
Like the OCSD, the District of North Vancouver (DNV) uses Autodesk Geospatial to integrate its CAD and GIS data. The DNV turned to Autodesk Map 3D because of its easy integration with common spatial data formats, including ESRI Shapefiles. To accelerate its workflow, the DNV adopted Autodesk Civil 3D. "Autodesk Civil 3D has already saved us three full days on a small project, and we anticipate even more time savings on our upcoming projects," says Shawn McLeod, GIS manager for the DNV. "And with Civil 3D, we can present better, more detailed options in half the time. Plus, we continue to connect our civil engineering and GIS data seamlessly by using Civil 3D with Map 3D."

Stadtwerke Augsburg
Stadtwerke Augsburg, an independent public utility that delivers a wide-range of services to the 350,000 residents of Augsburg, Germany, is also using Autodesk Geospatial to integrate its data. Autodesk Topobase provides the data management backbone of Stadtwerke Augsburg's integrated solution, while Oracle Spatial provides rich RDBMS functionality. Prior to Topobase, Stadtwerke Augsburg stored its asset data in multiple systems; engineers wasted time querying multiple systems and reconciling the information when they needed asset data. Now, Stadtwerke Augsburg uses its integrated system to manage all the events that take place in the lifecycle of infrastructure assets, from planning to design to construction.

With Topobase, Stadtwerke Augsburg has been able to save time, ensure the integrity of its asset data, and improve service to customers. "Previously, customer service agents needed over 30 minutes to answer asset location-related questions for customers, but now it takes less than a minute," notes Juergen Biedermann, documentation and data processing manager for Stadtwerke Augsburg. "With Topobase and Oracle Spatial, we no longer have to maintain multiple data sets, and we have reduced the risk of data entry errors. Our system is definitely helping us to deliver higher quality work, faster."

Managing End-to-End Processes

Pacific Consultants
The largest development consulting firm in Japan and the fifth-largest design firm in the world, Pacific Consultants Co., Ltd., needed a solution that could effectively manage the entire process of modeling Japan's coastal areas. The system needed to handle topographic and quantitative data, analysis, mapping, and graphics creation. Pacific Consultants built a system that leverages the Autodesk Geospatial product line: Autodesk Map 3D provides geospatial functionality and Autodesk Civil 3D and Autodesk VIZ offer the 3D simulation capabilities.

Today, when Pacific Consultants engineers need to create a new animated model, their first stop is Autodesk Map 3D, where they build a profile that forms the basis for data accumulation. Combining relevant data—such as slope, land utilization, and population—with surface data created by Autodesk Civil 3D, engineers then generate a 3D topographic model that can be used to conduct numerical analyses of potential tsunamis, tidal surges, or river flooding. The firm then loads results into Autodesk Map 3D for mapping, and uses Autodesk® VIZ to create graphics and animations.

City of Tacoma
The Public Works Department of the City of Tacoma (Tacoma), Washington also uses Autodesk Geospatial, integrating its data creation, collection, and storage processes. The city's designers work within Autodesk's civil engineering software, which is built on Autodesk Map 3D. After projects are complete, the city uses Autodesk Raster Design to capture and digitize as-built information. Then, it collects and manages data using Autodesk Map 3D in Oracle Spatial and publishes that information to web-based applications using Autodesk MapGuide. Notes J.R. Smith, the city's senior GIS analyst for the public works, "For us, Autodesk Map 3D is the heart of our complete end-to-end solution. It just seems natural to have GIS and engineering functions connected. Our engineers and designers have instant access to all the information they need, and our Oracle database contains up-to-date information."

Conclusion

Autodesk Geospatial helps increase productivity and save time and money by combating high levels of redundancy, inaccuracies, data mismatches, currency issues, and versioning problems that result from siloed information that is not shared throughout the organization or accessed by all applications that can utilize geospatial information. Whether an organization is using Mylar and paper-based systems to work with spatial data in siloed departments and has not yet entered Stage 1 of the Geospatial value chain or is at Stage 3, using Autodesk MapGuide to customize and share data with wide audiences, Autodesk Geospatial offers solutions to help it leverage its data more fully and increase productivity and take full advantage of its data assets.

With Autodesk Geospatial, organizations can fully harness the power of their data by bridging the gap between engineering and GIS departments and the rest of the organization. Organizations with Autodesk Geospatial build powerful solutions that easily grow as they evolve and leverage their spatial data more fully. Because it utilizes open standards and open architecture whenever possible, Autodesk Geospatial spatially enables business applications, powering cross-product workflows with accurate, up-to-date information. From planning through design, construction, and maintenance, Autodesk Geospatial delivers powerful data interoperability and a fully integrated platform for managing spatial data assets.

Learn more about how your organization can move up the Autodesk Geospatial value chain and take advantage of the Autodesk Geospatial product line by visiting www.autodesk.com/geospatial.

Autodesk®