

The GeoMedia Architecture Advantage

White Paper

April 2002

BRINGING—
—IT TOGETHER.

Introduction

What is wrong with GIS? GIS is primarily about data – not software. Data should be independent of the software that was used to create and maintain it. “GIS data” should not be considered to be a “special” type of data – it should just be data. GIS data should be created, stored, maintained, accessed and distributed using the same types of software tools that are used for all other data. GIS software should not require proprietary, eclectic “GIS” programming languages. It should be customisable using industry standard development tools. After all, GIS is not the centre of the Universe – it is not even near it. GIS is simply a branch of information technology that desperately needs to be fully integrated with mainstream information technology. The legacy of GIS – software entangled with data, proprietary data formats, weird development tools and an almost cult-like, “irrationally exuberant” opinion of itself has prevented GIS technology from achieving its true potential in the field of Information Technology. This is what is wrong with GIS and this is why Intergraph developed GeoMedia.

What others have been striving for, Intergraph Mapping and GIS Solutions is delivering. Five years ago when Intergraph introduced GeoMedia, we had already taken the step of moving our applications to the Microsoft Windows platform. We knew at that time that by moving to a Microsoft API/COM environment, the overall cost of ownership would be minimized, and ease of use for our customers would be maximized. Today, we see some of the competition almost reluctantly starting to make similar moves toward open architecture and a non-proprietary mentality. However, while GeoMedia is at V5.0, they are just at their first versions and their customers are experiencing the pains associated with new software. Pains such as reduced performance, application and data incompatibility, re-development of existing applications rendered obsolete by new software, and upgrade costs. Serious scrutiny from project financiers has people looking at GeoMedia, and the time to consider your options has never been better.

The GeoMedia Architecture Advantage is real. It offers cost savings and system efficiency throughout the organization. For instance, by utilizing GeoMedia technology, an organization is no longer hostage to a GIS vendor’s proprietary development language for customisation work. The number of individuals available to undertake GeoMedia customisation work (if required) using the standard development languages means that most organizations already have these skills in their IT department, and if not hiring to fill positions becomes easier. Not only that, but since all the members of the GeoMedia suite of products are built using the same software objects, any custom software component developed for one application, is immediately deployable and reusable in any other application using GeoMedia technology – from desktop to Web to wireless.

Integration with third party business applications is another area where GIS technology also provides real value. GeoMedia’s open architecture is ideally suited for integration with commonly used third party business applications such as Permitting, Computer Assisted Mass Appraisal, Deeds/Title, Asset Management and many others. As new versions of GeoMedia are released, it is not necessary to re-write custom software or interfaces with these third party software applications. Additionally, since GeoMedia is able to work openly with most commercial database management applications, GeoMedia can function effectively, in an integrated manner with third party business systems using these same database applications – without translating or replicating data.

GeoMedia is a family of spatial software products that all share a common architecture. This white paper will explain in detail the architecture of GeoMedia and why it is an obvious choice for organizations

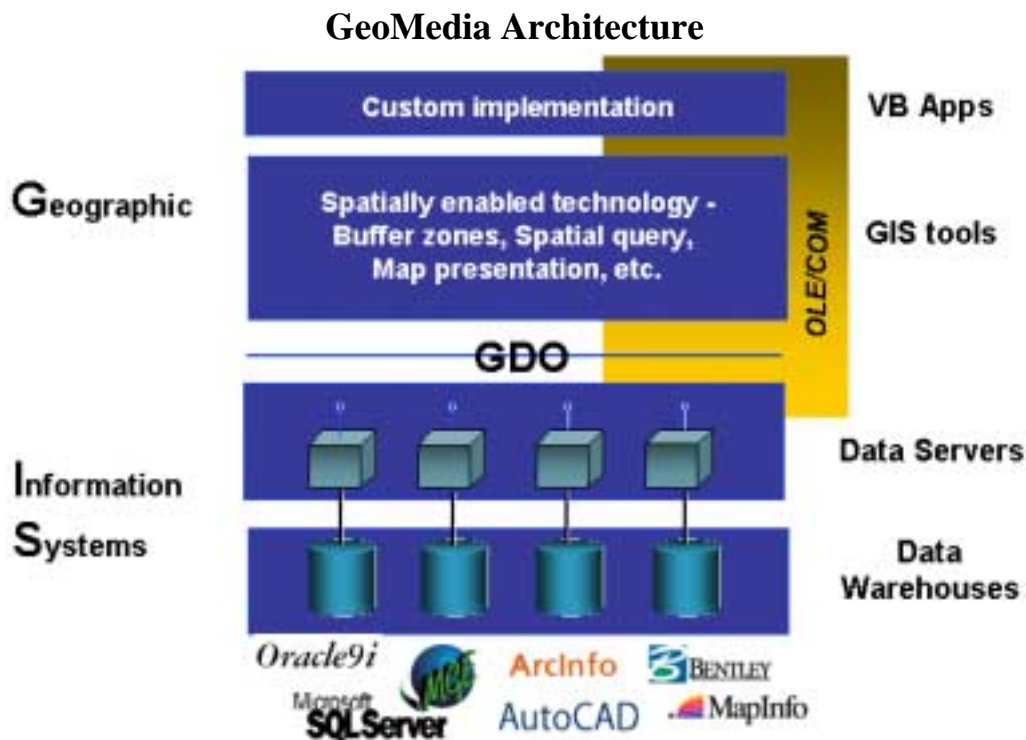
looking to maximize the benefits of GIS technology by treating GIS as just another mainstream information technology tool.

The GeoMedia Architecture Advantage

The strength of GeoMedia is its solid foundation in open standards and robust out-of-the-box functionality. Intergraph was the first GIS software vendor to recognize the potential of the Windows platform – moving all of its applications to Windows in 1993. In 1997, GeoMedia was introduced and was the first commercially available, fully compliant Microsoft OLE/COM GIS application. It provides a Windows-standard user interface and a totally open customization environment.

With respect to the desktop, GeoMedia, GeoMedia Professional, GeoMedia Objects and all of the GeoMedia Industry Solutions are Microsoft Windows compliant applications. These products are built on the Microsoft Win32API and COM models. GeoMedia WebMap and GeoMedia WebMap Professional are built to integrate with Microsoft IIS. GeoMedia operates with standard commercial database products like Microsoft Access, SQL Server and Oracle. GeoMedia can also connect to additional data stored in any ODBC accessible database. Since it is built upon Microsoft’s Component Object Model (COM), GeoMedia complies with all Microsoft industry standards for integration. Furthermore, due to compliance with these standards, GeoMedia technology is fully able to leverage such technologies as Server Load Balancing, Replication and Fail Over servers to provide scalability, performance and fault tolerance.

With GeoMedia and its open architecture, Intergraph is actively pursuing and promoting an end to proprietary GIS systems. The following diagram illustrates the architecture of Intergraph’s GeoMedia technology:



What does this unique and open architecture mean for GeoMedia users? Here are just some of the benefits:

- GeoMedia separates the “Information Systems” component from the “Geographic” functionality. This means that GeoMedia is not the only application that can make use of valuable data.
- GeoMedia has no proprietary data format – simultaneous access to “data warehouses” in a multitude of formats is achieved in a standard and seamless manner through Intergraph’s unique “Geographic Data Object” (GDO) or, “Data Server” technology. This allows GeoMedia to be positioned above proprietary CAD and GIS technologies – complementing these technologies by acting as a “Universal Geographic Integrator” of these technologies. Data Server technology also allows GeoMedia to deal directly with various commercial database software products. GeoMedia allows the effective integration of user’s data so that display, query and analysis functionality is easily performed across the currently disparate systems. This means that GeoMedia users save time and money by making effective use of data in existing formats whether they be proprietary GIS and CAD or commercial database formats.
- GeoMedia comprises a suite of fully integrated GeoMedia Core Products and specific GeoMedia Industry Solutions with powerful out-of-the box functionality. This means that GeoMedia users can assemble the cost effective solutions they require by selecting the combination of fully integrated GeoMedia products that suit their specific business requirements.
- GeoMedia has a totally open customization environment with no proprietary “GIS languages”. Users may select from any one of a number of standard customization tools including Visual Basic, C++, Power Builder, Delphi and others. This means that custom development is as cost-effective as possible.
- GeoMedia’s architecture is unique in that it can be introduced into existing environments in a non-disruptive manner allowing clients to leverage their existing spatial and non-spatial software and data investments. At the same time, GeoMedia provides an efficient migration path towards a totally open, corporate wide, unified spatial/non-spatial database model – a true integration of GIS into mainstream information technology. This means that GeoMedia users save time and money immediately and in the long term – the best of both worlds.

Geographic Data Objects – A Completely Unique Capability

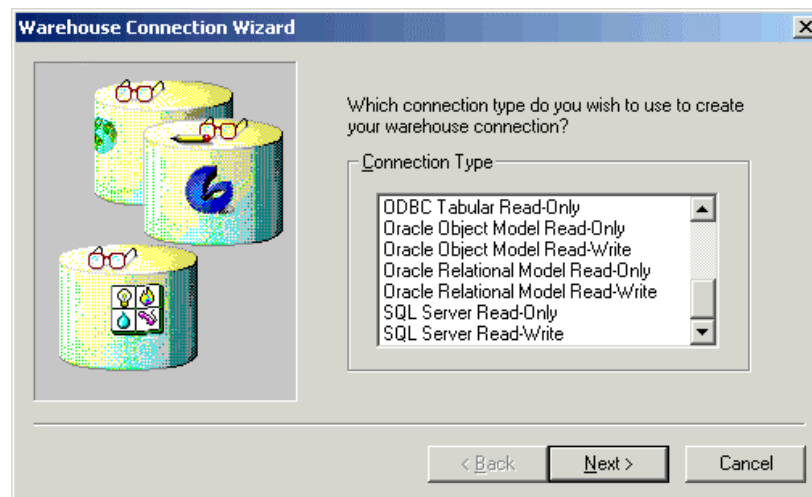
Since it’s beginning, the GIS industry has been burdened with a proliferation of proprietary and restrictive data formats (Shape files, Arc Coverages, DWG files, DGN files, MapInfo files, etc.). In trying to deal with data in all these different and incompatible formats, GIS practitioners are continuously faced with complex and awkward data translations. Often, the architecture of some GIS platforms has failed to separate the geographic data from the geographic functionality. This situation has resulted in costly duplication of data sets as well as a formidable barrier to “geographically enabling” other business applications (where significant benefits of GIS technology are realized). This situation also results in clients becoming trapped with one GIS vendor as the costs of moving away from that vendor continually climb. This unacceptable situation continues to this day with some types of GIS software.

By design, GeoMedia does not have its own data format. In GeoMedia’s architecture, all data is separated from functionality. Data created in GeoMedia is stored in a variety of commercial database products such as Microsoft Access, SQL Server and Oracle (Spatial or Locator) – making this data available to other corporate applications.

GeoMedia is often referred to as the “Universal GIS Integrator”. A key part of GeoMedia’s architecture and philosophy is to integrate and use existing geographic data from other platforms. Intergraph does not force its clients to throw out their existing ESRI, AutoCAD, MapInfo, Microstation or other geographic software products. Nor, does Intergraph force its clients to translate geographic data from these existing software formats.



GeoMedia is able to simultaneously “connect” to multiple existing geographic data “warehouses” within an organization and use these often disparate data sets seamlessly in GeoMedia GIS activities – without translation. This is significant, and it means that Intergraph technology can be introduced into an existing client environment with minimal disruption. These clients can continue to use their existing geographic software and data stores. They can avoid data translations and all of the problems associated therewith and for the first time, they can efficiently integrate their various spatial and non-spatial data sets for effective analysis and usage. Since these connections can be “live”, changes in the source data sets will automatically be reflected in GeoMedia and, in any active GeoMedia queries working on these data sets. In this way, GeoMedia allows users to achieve more benefit out of their existing CAD and GIS technologies and data investments. GeoMedia enables other areas of the organization to benefit by making better business decisions, by being able to graphically view data relevant to their area of business, using maps.

Intergraph uses its unique open data access layer called “Geographic Data Objects” (“GDO’s”) for its entire GeoMedia family of products. GDO’s provide access to all major CAD and GIS formats through standard COM interfaces. The geographic data is accessed in a standard manner regardless of the format of the underlying data store. In addition to serving up disparate geographic data sets, GeoMedia can perform on-the-fly coordinate system transformations. All of these benefits allow GeoMedia users to continue to leverage their investment in existing tools, data, and workflows by not disrupting the current environments for as long as it makes sense to do so. The following diagram illustrates the GeoMedia Connections Wizzard which can be used to establish simultaneous connections with a wide array of spatial and non-spatial data sources:



Since the GeoMedia architecture utilizes the GDO layer to read and write data, new projects can begin at any time. Using GeoMedia, users can read data from existing spatial and non-spatial sources and also write data into commercial data base management systems such as Oracle, SQL Server, Access and DB2.

Therefore, if they choose, customers are able to use GeoMedia to migrate towards the goal of seamlessly integrating their GIS technology with the rest of their Information Technology and thereby, leveraging all of the benefits of mainstream Information Technology. The following table illustrates some of the data warehouses that can be accessed with GeoMedia:

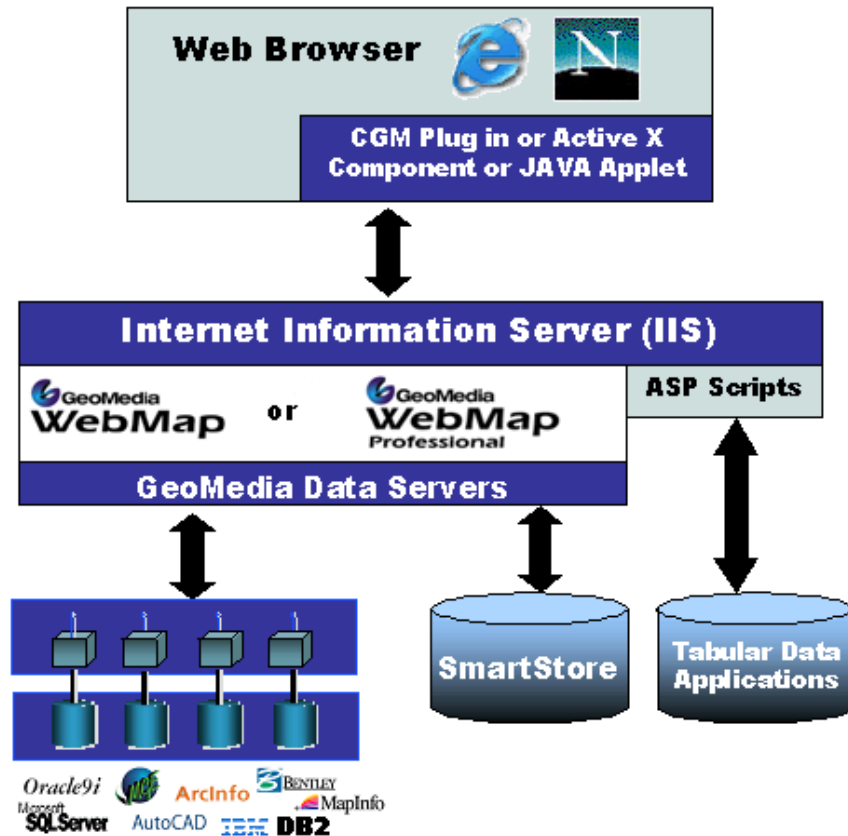
		 GeoMedia	 Professional
Source Data Format	Version	Read/write	Read/write
MS Access	97, 2000, XP	Read-write	Read-write
Arc/Info Coverage	7	Read-only	Read-only
ArcView Shapefile	2, 3	Read-only	Read-only
AutoCAD	2000	Read-only	Read-only
FRAMME	4	Read-only	Read-only
MicroStation	95, SE, J	Read-only	Read-only
MapInfo	6.0	Read-only	Read-only
MGE	8.0	Read-only	Read-only
ODBC	current	Read-only	Read-only
Oracle Relational Model	7, 8	Read-only	Read-write
Oracle Object Model	8i, 9i	Read-only	Read-write
SQL Server	7, 2000	Read-only	Read-write
DB2 (Q2, 2002)	current	Read-only	Read-write

Intergraph continually adds new GeoMedia Data Servers to its list. In general, Intergraph supports the latest software version at the time of release and up to 2 previous releases for its GeoMedia Data Servers.

GeoMedia connects to commercial database management systems directly without the use of any proprietary spatial database middleware. This means more effective performance and more flexibility for users to pick and chose the applications and processes that best suit their needs – no GIS vendor lock-in!

GeoMedia on the Web

Intergraph's server-based web technologies are totally integrated with the GeoMedia architecture. The following diagram illustrates the architecture of GeoMedia WebMap.



What does this unique and open architecture mean for GeoMedia WebMap users? Here are some of the benefits:

- Again, GeoMedia separates the “Information Systems” component from the “Geographic” functionality. This means that GeoMedia is not the only application that can make use of valuable data.
- Again, using Intergraph's Data Server technology, GeoMedia Web Map can access “data warehouses” in a multitude of formats. It is common, for example, to see GeoMedia Web Map installed in a site where all of the spatial data being used is in ESRI format. Again, this allows GeoMedia Web Map to be positioned above proprietary CAD and GIS technologies – complementing these technologies by acting as a “Universal Geographic Integrator” of these technologies. Data Server technology also allows GeoMedia Web Map to deal directly with various commercial database software products. GeoMedia Web Map is commonly used to bring together spatial data generated by various CAD or GIS software products with tabular data from various third party business applications, bundle that data and deliver it along with meaningful functionality over the Web. This is truly a powerful way to “geographically enable” existing

business applications and deliver valuable results to an entire organization in a very cost-effective manner.

- GeoMedia Web Map and Web Map Professional’s architecture is leveraged by a host of beneficial functionality including the use of true, intelligent vectors, read/write capabilities to major commercial data base management systems, dynamic segmentation, optional direct access to source data or optimized SmartStore (where additional performance is required) and, the ability to export to a variety of data formats including MapInfo Interchange Format, Oracle Object, SQL Server, AutoCAD (DXF, DWG), DGN, and ESRI Shapefile.
- GeoMedia WebMap is fully integrated with all other GeoMedia products – built using the same software objects. Custom software objects developed for use in GeoMedia will also work with GeoMedia WebMap. GeoMedia web technology is customized through open development platforms such as Active Server Pages, MS Front Page, Microsoft .Net and others. No special data translations are required to serve data. This means that a change in one of the source data warehouses can immediately be reflected through a GeoMedia WebMap application
- Again, GeoMedia WebMap’s architecture is unique in that it can be introduced into existing environments in a non-disruptive manner allowing clients to leverage off of their existing spatial and non-spatial software and data investments. This means improved use of existing data resources at reduced costs.

GeoMedia and the Open GIS Consortium

As a founding member of the Open GIS Consortium (OGC), Intergraph is working closely with key industry players to expand the potential of web-based applications through the use of OGC standards such as Geographic Markup Language (GML – based upon XML), Web Map Server (WMS), Web Feature Server (WFS) and the Web Feature Server Filter Specification. Although none of these specifications have been finalized, Intergraph has already incorporated them into GeoMedia WebMap and GeoMedia Professional for testing purposes and is testing all of them in its GeoMedia OGC test bed.

GeoMedia Core Products Industry Solutions

GeoMedia’s industry-leading architecture is leveraged through a number of Core Products and Industry Solutions. With this approach, Intergraph customers can save money by selecting the combination of GeoMedia Core Products and specific Industry Solutions that best suit their specific business requirements. All GeoMedia Core Products and Industry Solutions are fully integrated. The following list provides a brief description of GeoMedia Core Products and Industry Solutions:

GeoMedia Core Products:

- GeoMedia - is the universal information integrator, serving as a visualization and analysis tool and as an open platform for custom GIS solutions.
- GeoMedia Professional - is the first product specifically designed to collect and manage spatial data using standard databases
- GeoMedia WebMap - is the only Web-based map visualization tool with real-time links to one or more GIS data warehouses.
- GeoMedia WebMap Professional - creates dynamic, custom web-mapping applications that can analyze and manipulate geographic data.

GeoMedia Industry Solutions:

- GeoMedia Parcel Manager - supports modern land management methodologies by delivering configurable and customizable functionality for parcel and boundary maintenance.
- GeoMedia Public Works - is an industry specific product that helps manage all aspects of a complex public works project - from modeling to analyzing water and wastewater systems.
- GeoMedia Transportation Manager - is a transportation industry-specific product that supports the creation and maintenance of a linear network.
- GeoMedia Transportation Analyst - is a transportation industry-specific product that enables users to perform dynamic segmentation and linear analysis on a network.
- GeoMedia Transaction Manager - introduces the functionality for long transaction management, versioning and temporal data management for the GeoMedia Professional and Oracle 9i environment.
- GeoMedia Terrain - is a GeoMedia-based product that provides terrain analysis and visualization to the desktop user.
- IntelliWhere OnDemand – based on GeoMedia technology, OnDemand is a low cost, off-the-shelf software product for personal digital assistants (PDAs) that provides instant access to intelligent maps, asset information and diagrams from the corporate geographic information system (GIS) to mobile workforces.
- IntelliWhere LocationServer – based on GeoMedia technology, LocationServer is a software platform that enables the development of a wide range of Location Based Services applications.

Conclusion

With GeoMedia, Intergraph Mapping and GIS Solutions is not offering GIS software – it is providing **cost-effective solutions to business problems**. GeoMedia saves its users money. GeoMedia is known as the “Information Integrator” because of the seamless way in it allows the utilization of all enterprise data, as well as integration and cooperation between organizational departments. In this way, GeoMedia is “Bringing it Together” by allowing systems, people, and departments to work together more effectively. The thinking that goes into the development of GeoMedia products has always looked at the business reasons and advantages for enabling clients and addressing the actual business issues they face in their day-to-day work. Maintaining the value of past investments in data acquisition, process development, and workflow familiarity, while at the same time creating an environment of unbridled opportunity for future development and expansion, is what separates GeoMedia technology from the competition.

For more information about GeoMedia technology and how you can benefit from it, contact your local Intergraph Mapping and GIS Solutions representative. To find the contact information for the representative nearest you, visit <http://www.intergraph.com/gis/contacts/>.

BRINGING
IT TOGETHER.