HEXAGON
GEOSPATIAL

THE GEOMEDIA® ARCHITECTURE ADVANTAGE

White Paper
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1. Introduction

Geographic Information Systems (GIS) are mainly about data. Big data. GIS data needs to be independent of the software that created it in order to allow the free flow of data through and between organizations. In today's connected world, data exchange is growing at a torrid pace. More GIS-related businesses are exchanging data than ever before. In addition, there are a wave of new businesses finding that adding location awareness to their products and services can dramatically increase the value that they provide. All this is greatly inhibited if the data is too closely tied, even interconnected, with the applications that create it.

GIS data should be created, stored, maintained, accessed, processed and distributed using tools that do not leave any tethers on the data. No data specific specialization should be required of the application, nor should the data contain information that couples it to the application. In consideration of this, GeoMedia software, since its inception, has been based on open-architecture, deploys open standards, and is data independent.

2. GeoMedia Overview

GeoMedia is a powerful GIS management package that enables users to realize the maximum value of geospatial resources, integrating them to present clear, actionable information. It provides simultaneous access to geospatial data in almost any form, uniting it in a single map view for efficient processing, analysis, presentation, and sharing. GeoMedia's intuitive, dynamic analysis functionality enables sophisticated concatenation of analysis processes so the results of one operation can be fed directly into the next process, with dynamic updating of results in response to data changes. As an analysis tool, GeoMedia combines geographic data from different sources, in different formats, and with different map projections, all into a single consolidated view.

3. The GeoMedia Architecture Advantage

The GeoMedia architecture advantage is real. It offers cost savings and system efficiency throughout an organization. By deploying GeoMedia technology, an organization benefits from the easy integration of data independent technology into their existing environment, allowing them to leverage existing IT skills, tools, and processes.

Integration with other applications is an area where GeoMedia excels. GeoMedia's open architecture is ideally suited for integration with commonly used business applications such as permitting, asset management, Deeds/Title applications, and many others.

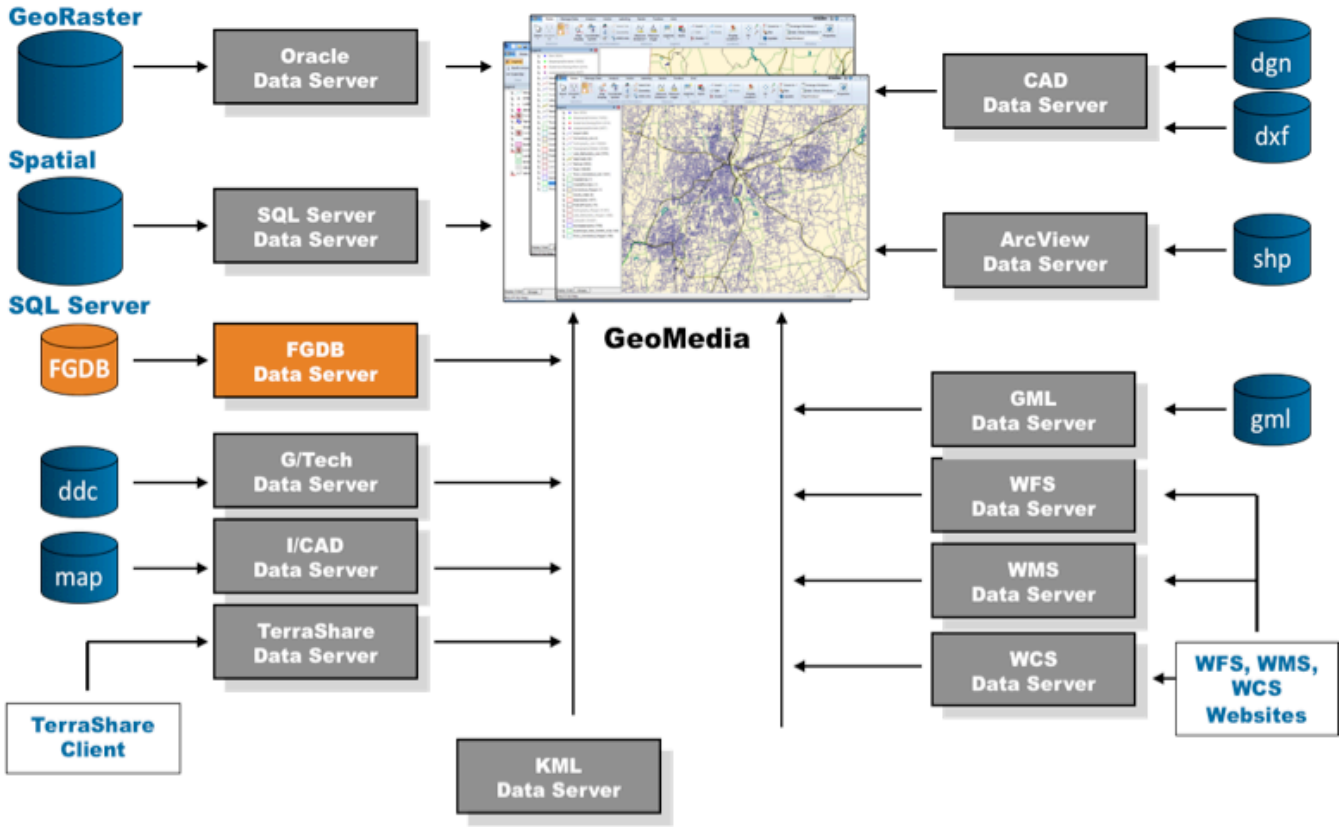
GeoMedia® Objects provides feature-rich access to GeoMedia functionality for custom command creation, custom application development, or cross-application development. GeoMedia 2014 maintains the consistency of the product line by still supporting the same API interface as previous versions, enabling existing custom applications to continue to function without having to re-write them.

Additionally, since GeoMedia is able to work openly with most commercial database management applications, GeoMedia-based solutions can run optimally in a number of database environments utilizing the same database management systems in place without having to translate or replicate the data. By not being wed to a particular database or format, GeoMedia is able to capitalize on the advancements made in database management. Location awareness is growing fast enough that Microsoft and Oracle have created spatial versions of their database software. GeoMedia is able to take advantage of the benefits of those database management systems – and so can our customers who would like to deploy them.

The strength of GeoMedia is its solid foundation in open standards and robust out-of-the-box functionality. GeoMedia was one of the first GIS solutions to make its way onto the Windows® development platform and enjoys a long and successful history in delivering fully Windows® compliant software passing Microsoft certified testing.

3.1 GeoMedia Data Servers

GeoMedia provides a robust environment for accessing a wide range of datasets to enable users to work seamlessly with data from multiple sources through data server technology. GeoMedia data servers provide the necessary connectivity to the feature data warehouses that are needed for the execution of a GIS project.



GeoMedia supports a wide range of data servers and that has recently been expanded. GeoMedia 2014 incorporates a File Geodatabase data server providing access to Esri FGDB[1] files. The FGDB data server is similar to the other data servers available in GeoMedia. It is implemented as a transactional data server, providing the ability to read and write existing feature sets conforming to the existing schema. Attribute fields and geometry can be edited and records can be created or deleted through the GeoMedia FGDB dataserver.

Supported data servers:

- Access®
- Oracle® Server
- SQLServer®

[1] Created by ArcGIS version 10 or later.

[2] Current supported version at the time this document was published

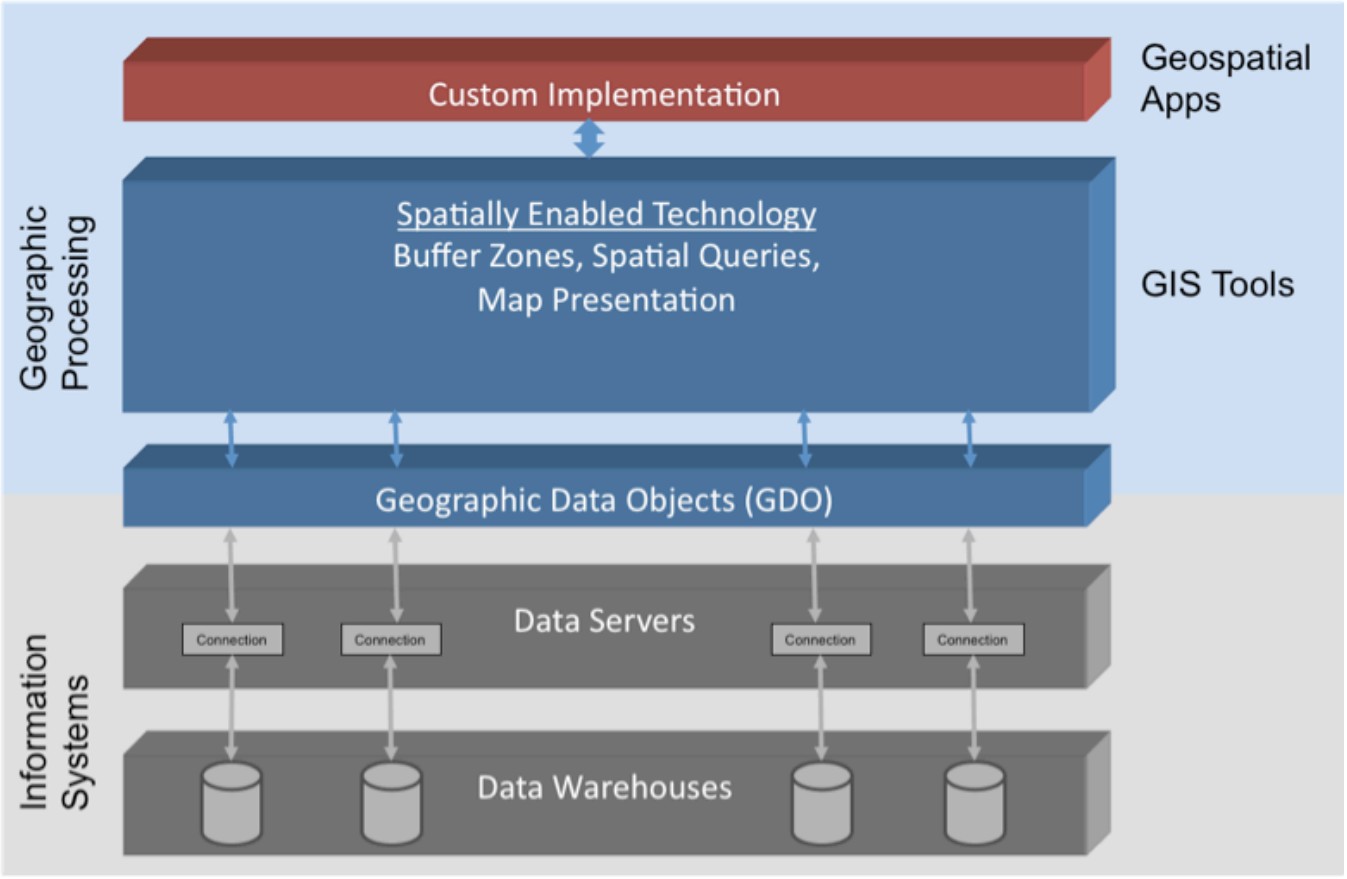
- KML (Keyhole Markup Language)
- GML (Geographic Markup Language)
- PostGIS
- WMS (OGC Web Map Services)
- WFS (OGC Web Feature Services)
- WCS (OGC Web Coverage Services)
- CAD (Computer Aided Design)
- G/Tech
- I/CAD (Intergraph Computer Aided Dispatch)
- TerraShare (Content Management)
- Esri File Geodatabase (FGDB)
- Esri Arcview (Shapefiles)

GeoMedia connects to commercial database management systems without any middleware in between to translate data. This approach provides better performance, more flexibility, and data independence.

GeoMedia separates the IT component from the geographic functionality. This means no restrictions on where the data can be used.

There's no GeoMedia format. GeoMedia works simultaneously with multiple formats. It achieves this through through the unique Geographic Data Object (GDO) technology upon which the data servers are built. GeoMedia is a universal data integrator in the workflow. Data server technology allows GeoMedia to deal directly with various commercial database software products. The data can be effectively displayed, queried, and analyzed easily across disparate systems. Time and money in the form of overhead is eliminated by directly using data in existing formats regardless of whether they originated in GIS or CAD systems or commercial databases

Integration of GeoMedia into an existing environment is non-disruptive, allowing implementers to leverage 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/commercial database model. This is a true integration of GIS data into mainstream information technology (IT).



GeoMedia is built on Microsoft technology. A typical development environment consists of Visual Studio® 2010[2] and a .Net® environment.

3.2 Geographic Data Objects

GeoMedia's unique open data access technology, upon which the data servers are built, is called Geographic Data Objects (GDO). GDO provides access to all major CAD and GIS formats through standard interfaces. The GIS data is accessed in a standard manner regardless of the format of the data or the underlying data store. In addition to connecting to a range of geographic data sets, GeoMedia can perform on-the-fly coordinate system transformations. GeoMedia users can leverage their expertise to focus on the geospatial problem they are trying to solve without having to worry about the data or disrupt their current environment. GeoMedia is format friendly.

GeoMedia technology excels when it comes to data exchange. As more GIS organizations become connected, data exchange is growing. The goal is seamless exchange of data. Anything else becomes an impediment. GIS data is big data but it is still Information Technology as in IT. GIS data doesn't need to be kept in a separate room off the main corridor where mad-scientists hack away at it forever doing translations and copies. It belongs on the open network, with the rest of the data that is flowing through an organization. It's time for GIS data to be handled just like any other data finding its way through an organization.

[2] Current supported version at the time this document was published

3.4 Geographic Data Independence

GIS data has, for a long time, been burdened by a proliferation of proprietary data formats (Shapefiles, Arc Coverage, DWG files, DGN files, and MapInfo files). In having to deal with all these different and incompatible formats, GIS users are continuously faced with complex and awkward translations and calculations. This is especially frustrating when the data is tied to the application ensuring that, as you exchange data, that you will have to reverse the calculations, or run them again with adjusted variables. And of course, you have to duplicate the data and perhaps do it twice in case something goes wrong with the calculations. This is costly, error prone, and ultimately presents a formidable barrier to the data finding its way into other business applications without another round of calculations and duplication.

By design GeoMedia does not have its own data format. Architecturally, data is separate from functionality. Data created in GeoMedia can be stored in a variety of commercial database formats such as Microsoft Access®, SQLServer®, SQLServer Spatial, Oracle®, Oracle Spatial, PostGIS, enabling the data to be used across the corporate domain.

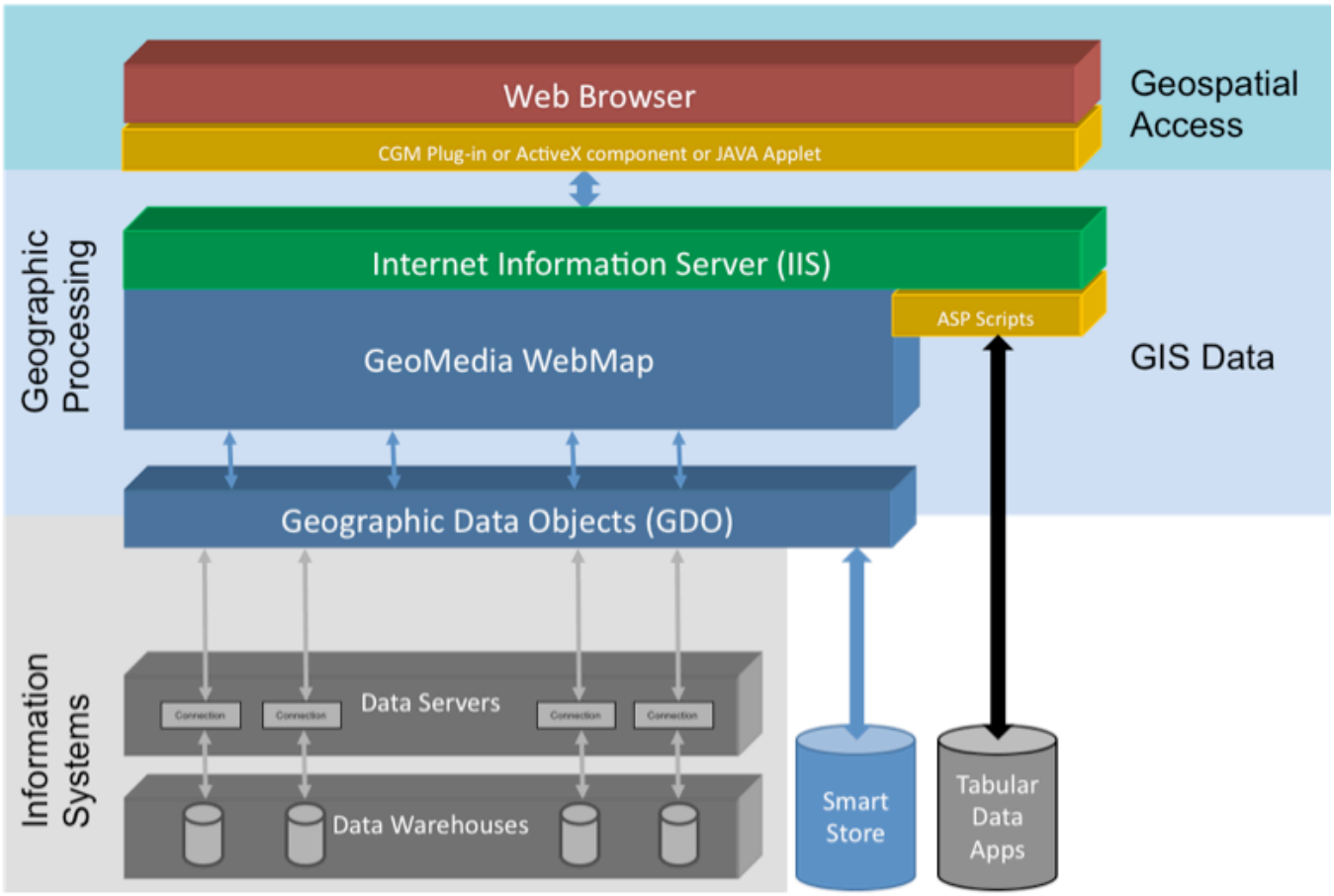
GeoMedia takes a universal approach to data. A key part of the product philosophy is to integrate and use existing data from other platforms as it is. GeoMedia can co-exist in a mixed vendor environment. There's no need to translate GIS data. GeoMedia is able to connect to multiple existing geographic data warehouses within an organization and use those disparate data sets seamlessly in GeoMedia – without translation. This is significant, for it means that GeoMedia can be introduced into an existing GIS environment with minimal disruption. GeoMedia clients can continue to use existing GIS software and warehouses. They can avoid data translations along with the subsequent problems that translation creates. In addition, GeoMedia connections are live, in that changes to the source data will dynamically be reflected in GeoMedia and in any active queries or analysis results.

GeoMedia takes a minimalist approach when it comes to data preparation. We want to use data as it is. This reduces the overhead on organizations who want to use relevant, available data and furthermore, doesn't then inhibit them from distributing their data results across the organization because it was converted for the purpose of doing the analysis.

4. GeoMedia® WebMap

GeoMedia WebMap is based on the same technology foundation as GeoMedia desktop.

GeoMedia desktop and GeoMedia WebMap share a common architecture.GeoMedia and GeoMedia WebMap are built to integrate with Microsoft IIS. GeoMedia operates with standard database products such as Microsoft Access, SQLServer, SQLServer Spatial, Oracle, and Oracle Spatial. GeoMedia can also connect to any ODBC Accessible database. GeoMedia is also able to leverage server load balancing, replication and fail over servers for scalability, performance and fault tolerance.



GeoMedia WebMap supports a broad range of users needing to visualize and examine geographic data online. From easily creating web services and interactive web mapping applications, to providing sophisticated, web-based visualization and analysis of an enterprise's valuable geographic information, GeoMedia WebMap enables users to build powerful geospatial web applications that securely share an organization's geospatial data.

GeoMedia WebMap enables direct development of interactive web maps using the configuration and application creation tools provided in GeoMedia itself. You can configure the layout of your web interface, as well as user-defined queries and other components, and provide direct, real-time access to your geospatial data. Users can simultaneously access multiple geospatial formats and view, query, and analyze geospatial data with no pre-publishing or translation required.

As an extension of the GeoMedia Architecture, GeoMedia WebMap offers similar benefits to organizations implementing web-based geospatial solutions.

- Maintains the separation of GIS data and the application (IT component). This enables easy integration of available business data with location-based information.
- Data Server technology to access multiple warehouses in multiple data formats. GeoMedia technology can easily consolidate all available GIS data sources into one comprehensive solution.
- Seamless Universal data access means that you can use available enterprise data as it is without having to consider middleware or conversion processes to stage the data.

- The universal data philosophy of GeoMedia enables non-disruptive integration into existing environments and readily accepts new data that becomes available, whether it is geospatial or non-geospatial.
- Optimized Smart Store when additional performance is required.
- Utilizes the same software objects as GeoMedia for consistency. Custom software objectsdeveloped on the desktop don't have to stay on the desktop if they have value in your web-based service offerings
- GeoMedia WebMap technology can be customized through open development platforms such as Active Server Pages, Microsoft .Net®, and MS Front Page to name a few.

Open GIS Consortium (OGC)

As a founding member of the Open GIS Consortium (OGC) we closely track the latest developments in web-based applications such as the Geographic Markup Language (GML), Web Map Service (WMS), Web Feature Service (WFS), and Web Coverage Service (WCS). GeoMedia technology has built-in support for OGC standards.

5. Consolidation of GeoMedia Extension Products

The extensibility of the GeoMedia environment has given rise to a number of additional product extensions over the years. These extensions have been developed to address what were, originally, very specialized needs such as edge matching, conflation, and sophisticated (grid-based) raster analysis, for example. Over time, these extensions saw a consequent increase in demand from the general user community as what was once considered the realm of specialists became the norm for geospatial processing . Recognizing that these specialized solutions are now very appealing to a wide audience, as the evolution of geospatial technology continues, they have been consolidated into the GeoMedia core product.

Simply put GeoMedia today delivers much more functionality than any other version in its history with the consolidation of a number of the extension products into the base offering. Following are some examples of the added capabilities that now come standard.

Sophisticated Raster Analysis. Combining the strengths of vector geographic information systems (GIS) with the power of grid analysis tools, GeoMedia enables you to seamlessly apply grid analysis workflows from within GeoMedia. Perform complex spatial analysis such as locating the best site based on defined metrics and raster analytics, or corridor plan the best path to take between multiple locations,
or create hot spots to aid in detecting trends or for aiding in predictive analysis. These are just a few examples of the types of powerful analyses that can now be done with the base GeoMedia product.

Data Integration and Validation tools let you create, integrate and maintain collections of geospatial feature data. Because geospatial data is collected using varying criteria, methods and sources, organizations are challenged with incoming data that varies in content, resolution, quality and alignment. GeoMedia data integration and validation tools improve your ability to collect or exchange data and manage it effectively.

Edge Matching can facilitate joining feature data that shares a common boundary. This is especially prevalent when working in a multi-organizational collaboration effort such as during an emergency reponse.

Conflation spatially identifies and links common geometry, enabling the update of existing data with newer, fresher, more accurate data all done while maintaining the intellectual investment that has been made in defining the related information about the geometry in the main database.

Parcel Management. Supports modern land management methodologies by delivering configurable and customizable functionality for parcel and boundary maintenance. Along with long-term transaction management provides a complete history of all parcel changes

Public Works Project functionality manages all aspects of public works projects including hierarchical feature definition and management. Facilitate analyzing and solving specific operational problems in flow systems, with an advanced capability for visualizing water flow in a network. You will be able to better manage hierarchical features such as airports, rail stations, and hydrography networks.

Transaction Management enables long term transaction management. managing the change cycle of geospatial data in a multi-user environment. Creates a controlled environment for quality control when updating the enterprise database. Change history enables temporal analysis.

6. Summary

Benefits of the GeoMedia architecture:

- Data Independence
  - Separation of Information Technology/processing components and GIS data.
- Seamless Universal Data Access
  - Open, standards based approach
  - Simultaneous access to multiple warehouse types with multiple data formats
  - Developers can leverage universal access and focus on their solution and not the data integration, thereby freeing their time to focus on display, analysis and processing of GIS data.
- Standard development tools
  - Visual Studio® 2010[3] / Visual Basic®
  - .Net environment
  - C++, C#
- No Limits
  - Develop GIS applications intended for open corporate-wide distribution of data (i.e. spatial data along with non-spatial corporate data).
  - GeoMedia is ready for the location-based awareness expansion that is upon us. No worries about the data being tied down to the application.
- More Power
  - The 2014 release brought together many of the add-on products into the base GeoMedia software. This is a bonus to developers giving them even more access to GIS functionality than was previously available in the base product offering.

GeoMedia provides a cost effective platform for location based solutions that is not disruptive to existing environments. GeoMedia puts into practice the concept of GIS data independence, enabling GIS data to be shared commercially and socially in an increasingly connected world. GeoMedia unlocks the power of GIS data and prepares it for widespread use within and between corporations and organizations that are location aware in their business practices.

[3] Current supported version at the time this document was published

The GeoMedia approach is to access information seamlessly from available data sources in a non-disruptive way. It's not going to hold your data prisoner. As a GIS information integrator GeoMedia enables cooperation between organizational groups, who may focus on different aspects of the data, allowing them to work together more effectively.

Maintaining the value of past investments, the GeoMedia architecture offers an unbridled opportunity for future development and expansion in an increasingly inter-connected world. Data independence frees business up to participate in the data explosion both commercially and socially. Unlock your data.

For more information about GeoMedia, contact your local Hexagon Geospatial or Intergraph SG&I sales representative or visit our web site at www.hexagongeospatial.com

About Hexagon Geospatial

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