II. 산업계 제품 및 기술

인터그래프의 OpenGIS 개발 전략

2

1998. 7. 2

한 성 용
인터그래프코리아

INTERGRAPH

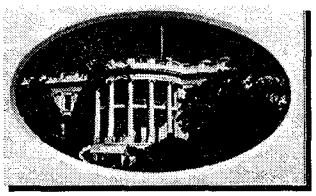
SOFTWARE SOLUTIONS

Intergraph Strategy toward OpenGIS

Trends in Infrastructure

"Geographic information is critical to promote economic development, improve our stewardship of natural resources, and protect the environment. Modern technology now permits improved acquisition, distribution, and utilization of geographic (or geospatial) data and mapping."

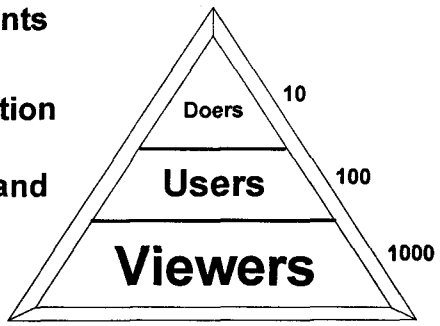
William J. Clinton, President of the United States
Executive Order -- "Coordinating Geographic Data Acquisition and Access: The National Spatial Data Infrastructure", April 11, 1994



INTERGRAPH
SOFTWARE SOLUTIONS

Trends in Infrastructure - 사용자

- Doer - Mature product set on Windows
- Productivity enhancements are needed
- Begun to focus on the "users" and "viewers"
- Decision support on every desktop
- Productivity enhancements are needed
- Communicating information in a geographic context
- Spatial data availability and the world-wide Web
  - Less data ownership



INTERGRAPH
SOFTWARE SOLUTIONS

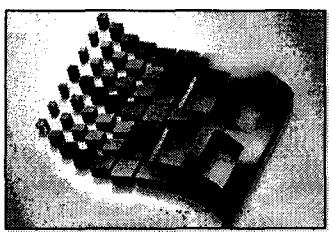
Revolutionizing GIS on Windows

Complete adoption of Windows standards

- Object model (COM)
- Integration model (OLE, OLE4GIS)
- Development model (OLE Automation)
- Internet and the Web (Internet Services)
- User interface (Windows)
- Data access (ODBC)
- Display (OpenGL, GDI)
- Mail interfaces (MAPI)

Logo requirements

- Office
- BackOffice



INTERGRAPH
SOFTWARE SOLUTIONS

Trends in Infrastructure - Architecture

Monolithic GIS- Barrier to interoperability

Custom implementation
Spatially enabled technology -- Buffer zones, Spatial query, Map presentation, etc.
Data access -- Remote, multi-user access
Data -- Data store containing spatial records

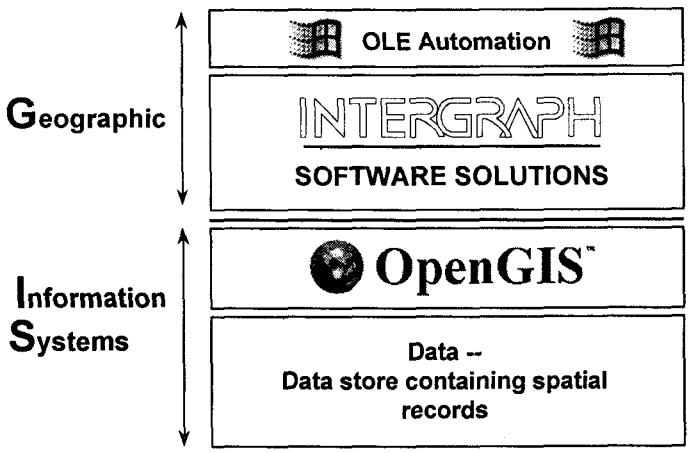
INTERGRAPH SOFTWARE SOLUTIONS

Trends in Infrastructure - Architecture

Geographic	Custom implementation
	Spatially enabled technology -- Buffer zones, Spatial query, Map presentation, etc.
Information Systems	Data access -- Remote, multi-user access
	Data -- Data store containing spatial records

INTERGRAPH SOFTWARE SOLUTIONS

Data Servers and OLE for GIS



INTERGRAPH
SOFTWARE SOLUTIONS

OGC Mission

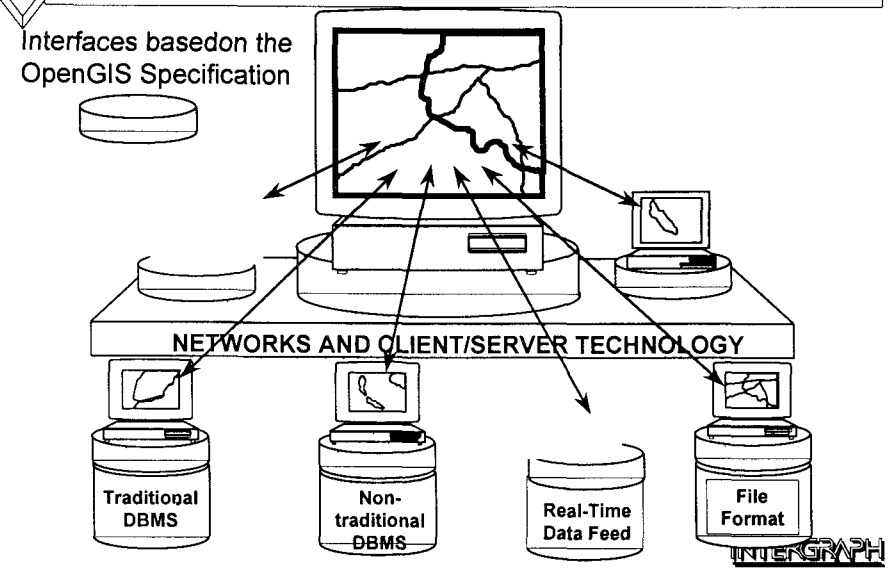
The Mission of the Open GIS Consortium is to:

- **Promote the delivery of certifiably interoperable products**
- **Synchronize geoprocessing technology with emerging information technology standards**
- **Promote distributed geoprocessing to a wide range of user communities**
- **Promote cooperative business development initiatives related to distributed geoprocessing**

INTERGRAPH
SOFTWARE SOLUTIONS

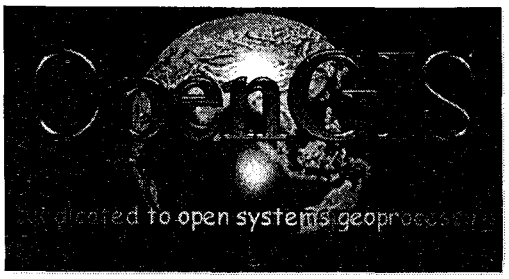
Source: OpenGIS Abstract Specification

OGIS Enables Transparent Access to Heterogeneous Geodata



INTERGRAPH
SOFTWARE SOLUTIONS

The OGIS Project's Goal

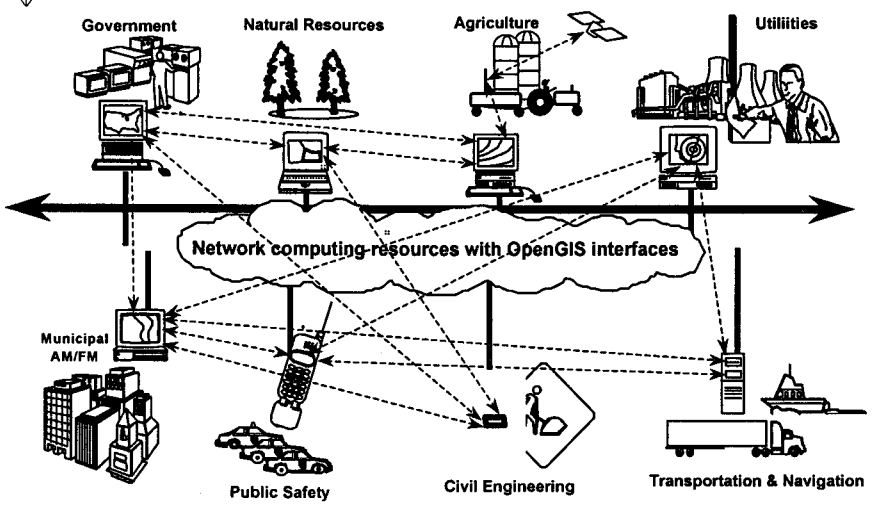


Specify technology that will enable an application developer to use any geodata and any geoprocessing function or process available on The net within a single environment and a single workflow.

From *The OpenGIS™ Guide*

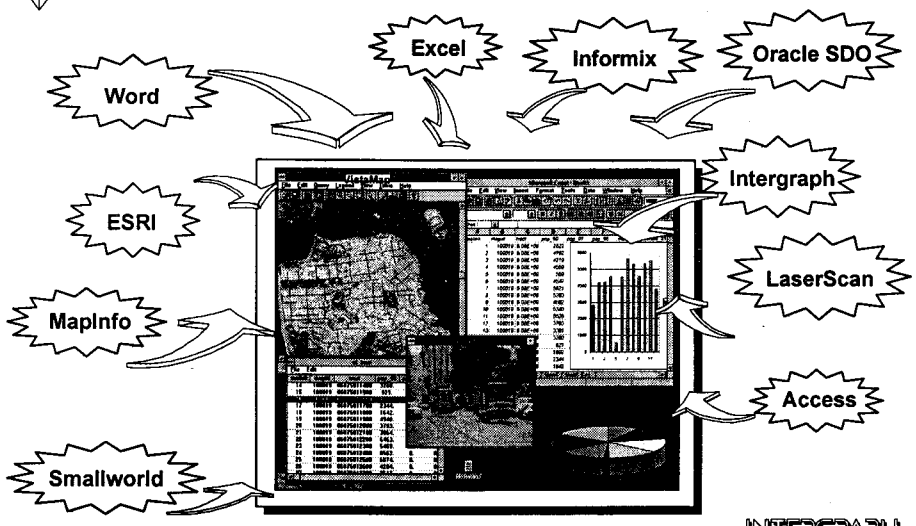
INTERGRAPH
SOFTWARE SOLUTIONS

Sharing Geodata within and between Information Communities



INTERGRAPH
SOFTWARE SOLUTIONS

Realization of the Goal

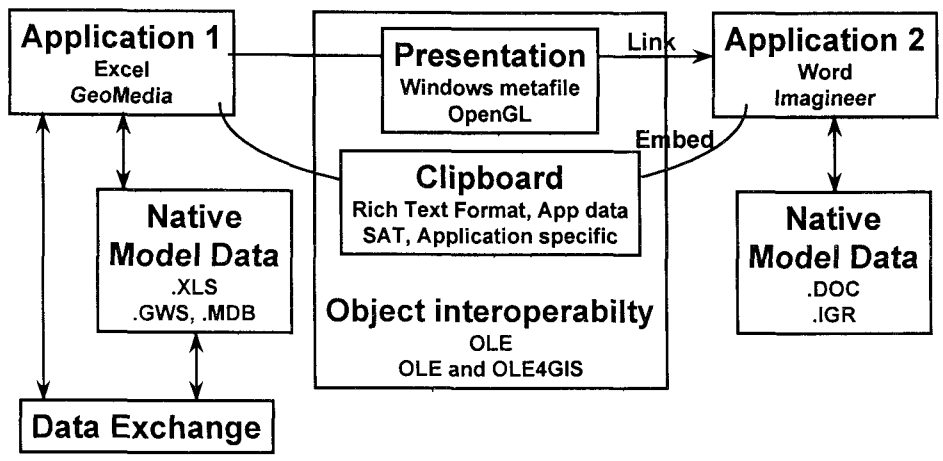


INTERGRAPH
SOFTWARE SOLUTIONS

Intergraph and Open GIS Standards For OLEDB and ADO

INTERGRAPH
SOFTWARE SOLUTIONS

OLE



Key:
Non-technical application
Technical application

INTERGRAPH
SOFTWARE SOLUTIONS

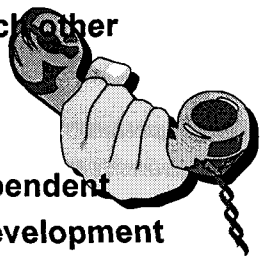
What is COM?

A common way for objects to talk to each other
- Supported by Windows

Open to all developers
- Not application-specific
- A binary standard -- language independent

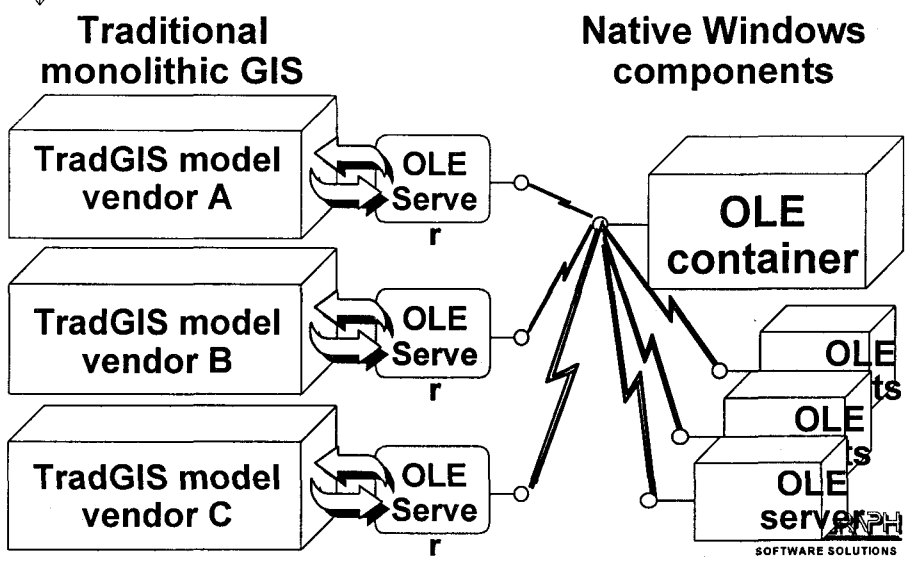
The basis of Microsoft future system development

The basis of Intergraph future development



Component Object Model

Native Windows with many servers



Interoperable object framework

Application extensions
eg find utility equipment, locate map feature

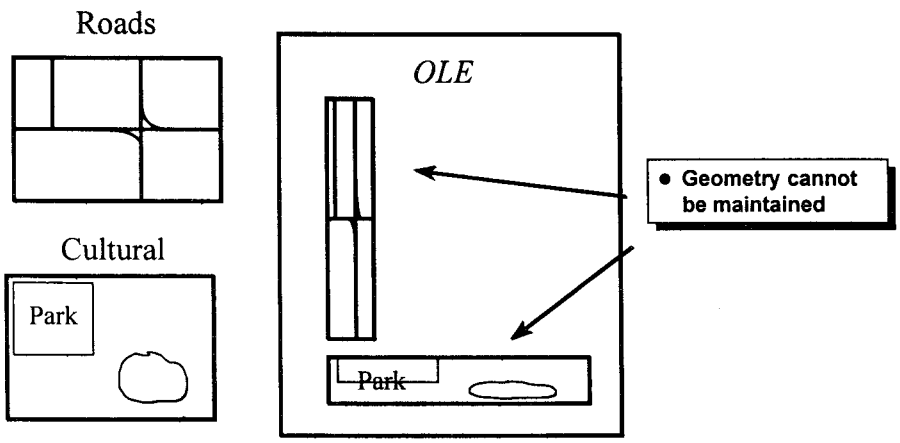
Microsoft Industry Solutions
OLE for GIS
. 2D and 3D physical geometry
. Display
. Locate (snap)
. Transparent objects

Windows OLE2.0
Office functionality/Framework
. Compound document
. In-place activation
. Cut and paste
. Drag and drop
. Automation

Component Object Model (COM)
Defines object communication
Operating system support

INTERGRAPH
SOFTWARE SOLUTIONS

OLE 2.0

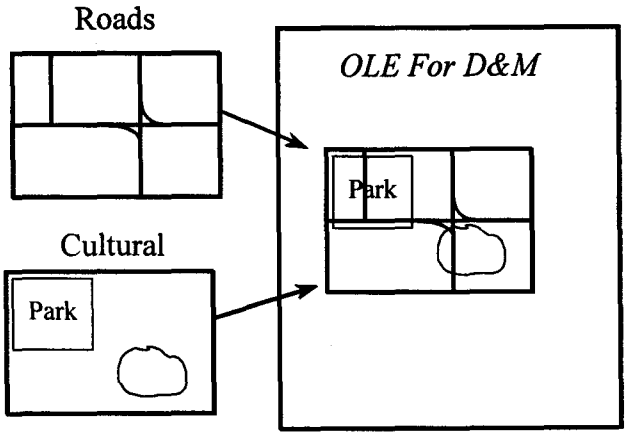


- Geometry cannot be maintained

INTERGRAPH
SOFTWARE SOLUTIONS

19

OLE for Design and Modeling

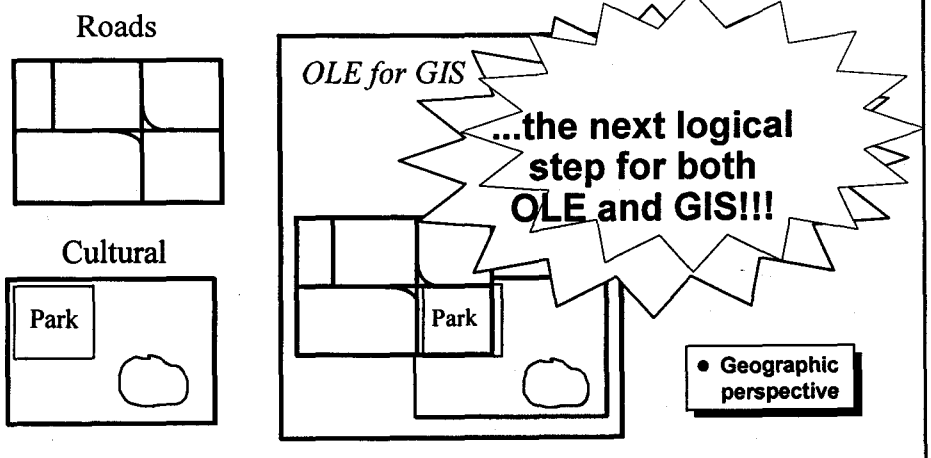


- Geometry maintained
- Translucency and transparency

INTERGRAPH
SOFTWARE SOLUTIONS

20

OLE for GIS...



- Geographic perspective

INTERGRAPH
SOFTWARE SOLUTIONS

OLEDB

Set of OLE interfaces that provide uniform access to data.

OLE DB is the fundamental Component Object Model (COM) building block for storing and retrieving records

Freely published specification

Multiple Servers/Sources - One API

INTERGRAPH
SOFTWARE SOLUTIONS

ADO

OLEDB Data Consumer

Provides standard automation interface to OLEDB Data Providers

Multiple Servers/Sources - One API

INTERGRAPH
SOFTWARE SOLUTIONS

OLEDB Data Access

Data Source Objects
- Properties, Initialization, Session Creation.

Session
- Schema, Tables, Transactions, Command Creation.

Command
- SQL with parameters

Rowset
- Traversal, Bind to Columns, Schema Metadata

INTERGRAPH
SOFTWARE SOLUTIONS

ADO Data Access

Connection
- Source Connection, Schema, Transactions

Command
- SQL with parameters

Recordset
- Traversal, Properties

Field
- Properties, Values

INTERGRAPH
SOFTWARE SOLUTIONS

OGIS Standards

OGIS Data Provider Registry Entries

GIS Metadata

- Tables containing Queryable GIS Features
- Spatial References of the Data Source
- Geometry Columns
- Spatial Operators

IColumnsRowset

Geometry Access

Spatial Reference Access

Spatial Filtering

INTERGRAPH SOFTWARE SOLUTIONS

OGIS Standards (Continued)

Additive

- OGIS OLEDB Data Provider must be able to function as normal OLEDB Data Provider.
  - Thus, a normal OLEDB Data Consumer can utilize an OGIS OLEDB Data Provider and simply not leverage the GIS information.

Optional

- OGIS OLEDB Data Consumer can utilize a normal OLEDB Data Provider.
  - It would simply not be able to perform GIS operations on that provider's data.
  - It could perform traditional IS operations, if desired.

INTERGRAPH SOFTWARE SOLUTIONS

OGIS Standards (Continued)

DBSCHEMA_OGIS_FEATURE_TABLES Rowset

Column_Name	Type_Indicator	Description
FEATURE_TABLE_ALIAS	DBTYPE_WSTR	User Friendly Feature Name - may be NULL.
TABLE_CATALOG	DBTYPE_WSTR	Catalog name in which the table is defined. NULL if the provider does not support catalogs.
TABLE_SCHEMA	DBTYPE_WSTR	Schema name in which the Feature Table is defined, NULL if the provider does not support schemas.
TABLE_NAME	DBTYPE_WSTR	Feature Table Name
ID_COLUMN_NAME	DBTYPE_WSTR	Preferred column name to reference rows. OGIS requires this column to have a name.
DG_COLUMN_NAME	DBTYPE_WSTR	Default Geometry column name. OGIS requires this column to have a name.

INTERGRAPH
SOFTWARE SOLUTIONS

OGIS Standards (Continued)

DBSCHEMA_OGIS_GEOMETRY_COLUMNS Rowset

Column_Name	Type_Indicator	Description
TABLE_CATALOG	DBTYPE_WSTR	Catalog name in which the Feature's Table is defined. NULL if the provider does not support catalogs.
TABLE_SCHEMA	DBTYPE_WSTR	Schema name in which the Feature's Table is defined, NULL if the provider does not support schemas
TABLE_NAME	DBTYPE_WSTR	The Feature Table Name
COLUMN_NAME	DBTYPE_WSTR	Name of Column Containing Geometry
GEOM_TYPE	DBTYPE_UI4	Type of geometry column. Values taken from the OGIS_Geometry Enumerated Type.
SPATIAL_REF_SYSTEM_ID	DBTYPE_I4	Foreign Key - this is ID of the Spatial Reference System of the geometry column. This ID can be used to find the Spatial Reference in the DBSCHEMA_OGIS_SpatialReferenceSystems Rowset.

INTERGRAPH
SOFTWARE SOLUTIONS

OGIS Standards (Continued)

DBSCHEMA_OGIS_SPATIAL_REF _SYSTEMS Rowset

Column_Name	Type_Indicator	Description
SPATIAL_REF_SYSTEM_ID	DBTYPE_I4	ID of the Spatial Reference System. May be Null only if SPATIAL_REF_SYSTEM_WKT is NULL.
AUTHORITY_NAME	DBTYPE_WSTR	Defining Authority for this Spatial Reference System, eg "POSC", "USGS". May be Null.
AUTHORITY_ID	DBTYPE_I4	Authority specific identifier. This is a well known id assigned to the spatial reference system by the authority. May be Null.
SPATIAL_REF_SYSTEM_WKT	DBTYPE_BSTR	The Well Known Text Representation of the Spatial Reference System. May be Null.

INTERGRAPH
SOFTWARE SOLUTIONS

OGIS Standards (Continued)

OGIS Property Set

Property ID	Type_Indicator	Description
DBPROP_OGIS_TOUCHES	VT_BOOL	All points in the intersection of geometries of Data Source and the Spatial Filter lie on a geometry boundary and the interiors of the geometries of the Data Source and the Spatial Filter do not intersect
DBPROP_OGIS_WITHIN	VT_BOOL	Geometries of the Data Source are wholly contained by the Spatial Filter
DBPROP_OGIS_CONTAINS	VT_BOOL	The Spatial Filter is wholly contained by geometries of the Data Source
DBPROP_OGIS_CROSSES	VT_BOOL	Geometries of the Data Source and the Spatial Filter intersect, but do not wholly contain each other, and the dimension of the intersection of their interiors is one less than the maximum dimension of their interiors.
DBPROP_OGIS_OVERLAPS	VT_BOOL	Geometries of the Data Source and the Spatial Filter intersect and the dimension of the intersection is the same as that of the input geometries but the intersection is different than the input geometries.

INTERGRAPH
SOFTWARE SOLUTIONS

OGIS Standards (Continued)

OGIS Property Set (Continued)

Property ID	Type_Indicator	Description
DBPROP_OGIS_DISJOINT	VT_BOOL	Intersection of geometries of the Data Source and the Spatial Filter is the empty set.
DBPROP_OGIS_INTERSECT	VT_BOOL	Intersection of geometries of the Data Source and the Spatial Filter is not the empty set.
DBPROP_OGIS_ENVELOPE_INTERSECTS	VT_BOOL	Intersection of the envelope of geometries of the Data Source and the envelope of the Spatial Filter is not the empty set.
DBPROP_OGIS_INDEX_INTERSECTS		Intersection of the spatial index entries of the geometries of the Data Source and the geometry of the Spatial Filter is not the empty set.

INTERGRAPH
SOFTWARE SOLUTIONS

OGIS Standards (Continued)

IColumnsRowset::GetColumnsRowset

The consumer can get specific information about a Rowset via IColumnsRowset::GetColumnsRowset without reverting to the Session

- **The standard columns in the IColumnsRowset are as defined by the OLEDB specification.**
- **OGIS Rowset consumer requires more columns for geometry**
  - **GEOM_TYPE**
  - **SPATIAL_REF_SYSTEM_ID**
  - **SPATIAL_REF_SYSTEM_WKT (optional)**

ADO users will find geometry in Fields whose GEOM_TYPE Property is non-Null.

INTERGRAPH
SOFTWARE SOLUTIONS

OGIS Standards (Continued)

Geometry Access (C++)

OLEDB Accessor

DBBINDING Structure specifying wType

- DBTYPE_BYTES or
- DBTYPE_BYTES | DBTYPE_BYREF

IRowset::GetData

- accesses the Well Known Binary Representation of Geometry (WKBGeometry).

INTERGRAPH SOFTWARE SOLUTIONS

OGIS Standards (Continued)

Geometry Access (ADO)

dim a variable myGeom as Variant

- myGeom = Field.GetChunk
  - ADO binds as DBTYPE_IUNKNOWN, requests the IStream interface, and reads the data with this interface to produce a Variant of type VT_ARRAY|VT_UI1.
- myGeom = Field.Value
  - ADO binds as DBTYPE_BYTES and reads the data to build a Variant of type VT_ARRAY|VT_UI1

myGeom then contains the Well Known Binary Representation of Geometry (WKBGeometry)

INTERGRAPH SOFTWARE SOLUTIONS

OGIS Standards (Continued)

Spatial Reference Access (C++)

OLEDB Accessor

DBBINDING Structure specifying wType

- **DBTYPE_BSTR**

IRowset::GetData

- **accesses the Well Known Text Representation of SpatialReference (WKTSpatialReference).**

INTERGRAPH
SOFTWARE SOLUTIONS

OGIS Standards (Continued)

Spatial Reference Access (ADO)

dim a variable mySpatialReference as String or Variant

- **mySpatialReference = Field.Value**
  - **ADO binds to the geometry column as DBTYPE_BSTR.**

mySpatialReference then contains the Well Known Text Representation of SpatialReference (WKTSpatialReference)

INTERGRAPH
SOFTWARE SOLUTIONS

OGIS Standards (Continued)

Spatial Filtering

- Command Parameters are independent of the SQL string, but follow any normal SQL parameters.

Parameter Name	Type	Description

INTERGRAPH
SOFTWARE SOLUTIONS

Summary

OGIS Standards allow the client to:

Determine GIS capabilities of an OLEDB Data Provider via metadata

Get and Put GIS Geometry

Get Spatial Reference System Information

Geographically Constrain Queries via Spatial Filter

INTERGRAPH
SOFTWARE SOLUTIONS

Intergraph and Data Access Components

Custom implementation

Spatially enabled technology --
Buffer zones,
Spatial query,
Map presentation, etc.

OpenGIS™

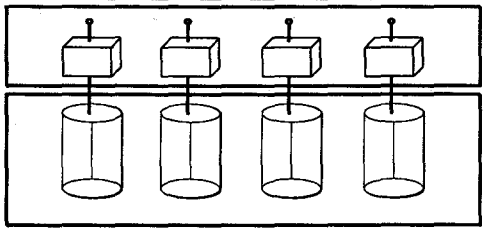
Data --
Data store containing spatial records

INTERGRAPH
SOFTWARE SOLUTIONS

Data Access Components

Custom implementation

Spatially enabled technology --
Buffer zones,
Spatial query,
Map presentation, etc.



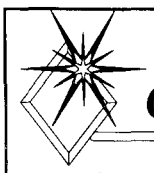
INTERGRAPH
SOFTWARE SOLUTIONS

41

Geographic Data Objects (GDO)

- GIS/*Geographic Data Objects.*
- Provides access to data from different sources in a predictable manner.
- Modeled closely after Microsoft's Data Access Objects (DAO).
- Automation model for GIS data servers.

INTERGRAPH
SOFTWARE SOLUTIONS



42

GDO

Standard, Public API to Access GIS data.

- Not rocket science
- Not reinventing database technology

Database oriented *or* view into a database.

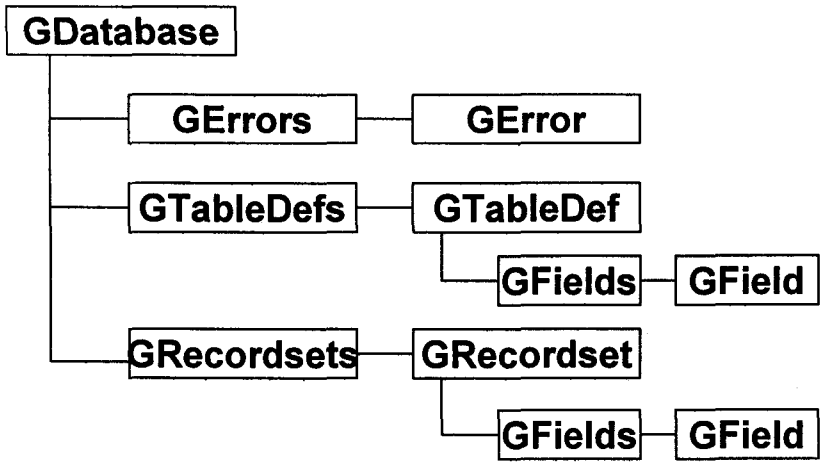
Modeled after DAO & RDO and ADO.

- OLE Automation
- Well established and well known

Multiple data sources, single access mechanism

INTERGRAPH
SOFTWARE SOLUTIONS

GDO Automation Overview



INTERGRAPH
SOFTWARE SOLUTIONS

GDO Benefits

- MetaData
- Geometry
- Spatial filters
- Coordinate systems
- Modification tracking
- GDO base classes

INTERGRAPH
SOFTWARE SOLUTIONS

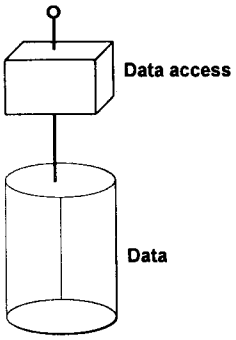
45

Data Access Components

Standard, open interface
OpenGIS compliant / certified
Standard 뱇anguage?for geographic data integration

Data Server
Data format knowledgeable
Shields 및?technology from data format(s)

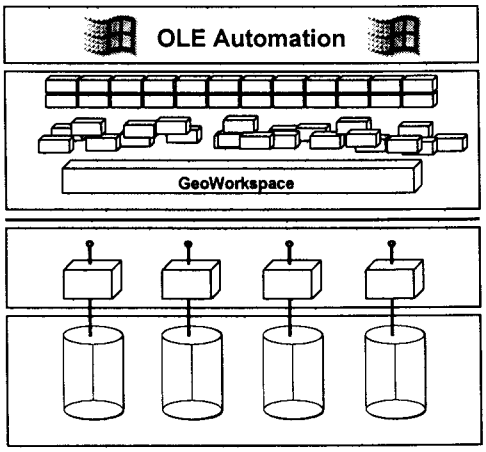
Data store
Corporate geographic information



INTERGRAPH
SOFTWARE SOLUTIONS

46

Intergraph's Geographic Technology



INTERGRAPH
SOFTWARE SOLUTIONS

Enabling Geographic Technology

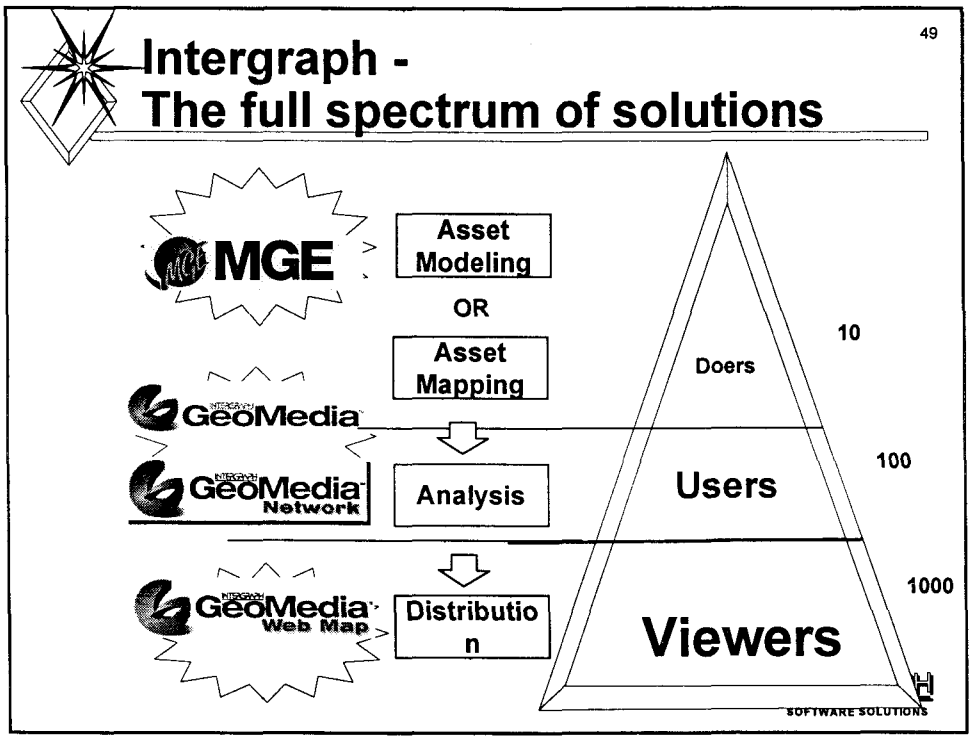
- Intergraph's added value in the component world
  - Best of class geographic tools
  - Jupiter productivity
  - Beginnings of "smart" geographic objects
- Examples
  - Coordinate system services
  - Spatial analysis services
  - Buffer zone services
  - Digitizing commands
  - Presentation and output commands

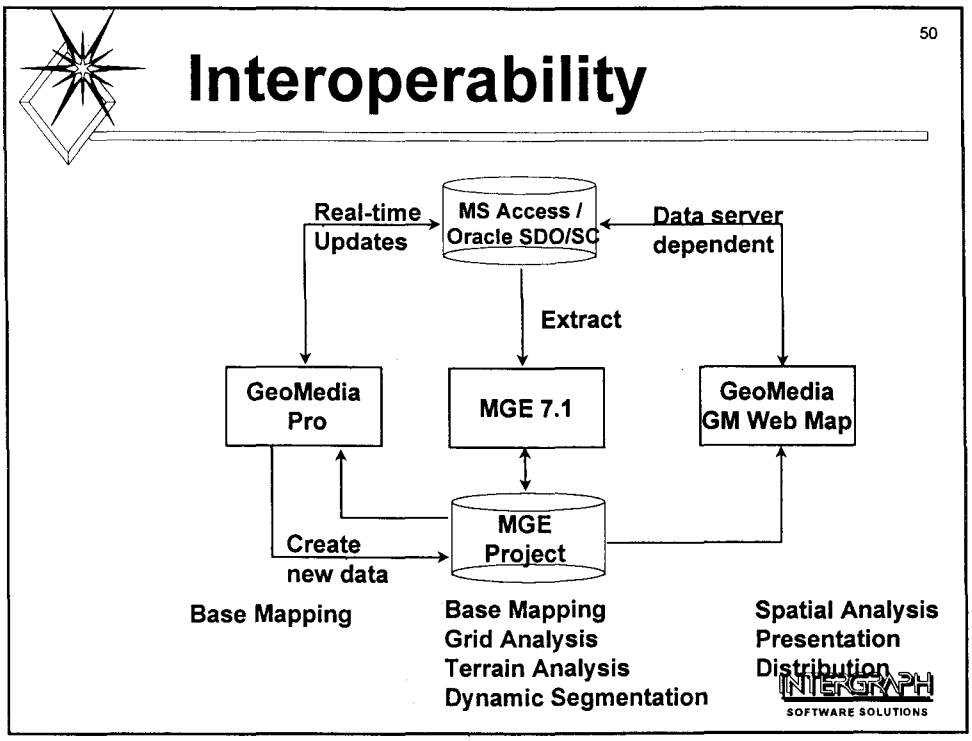
INTERGRAPH
SOFTWARE SOLUTIONS

Trends and Intergraph's GIS

- Enterprise systems require spatial data
- Spatial data becoming mainstream
- Access to native data warehouses
- GIS interoperability - OpenGIS
- Increasing availability of raster data
- The Internet for publishing maps
- Scalability, extensibility and plug&play systems

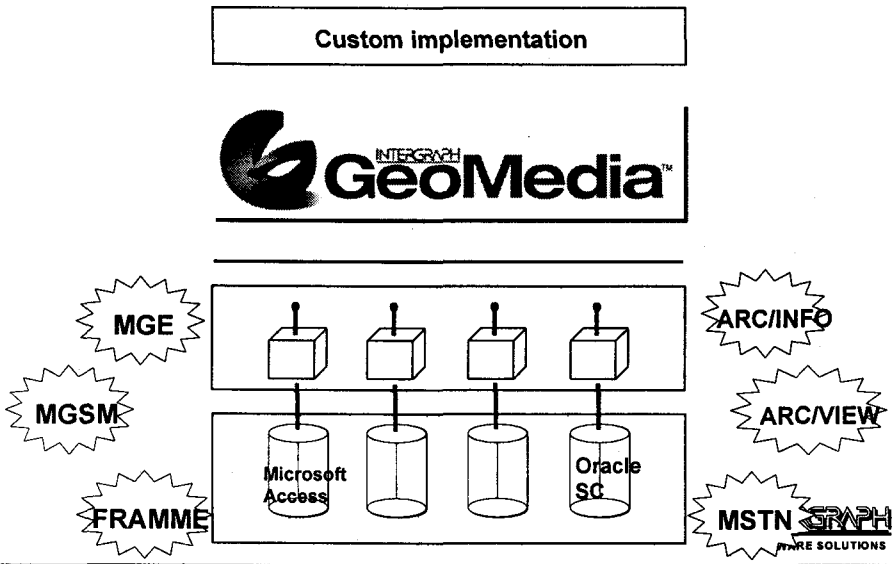
INTERGRAPH
SOFTWARE SOLUTIONS


49
Intergraph -
The full spectrum of solutions
MGE
Asset Modeling
OR
Asset Mapping
GeoMedia
GeoMedia Network
Analysis
GeoMedia Web Map
Distributio n
Doers
10
Users
100
Viewers
1000
SOFTWARE SOLUTIONS


50
Interoperability
Real-time Updates
MS Access / Oracle SDO/SC
Data server dependent
Extract
GeoMedia Pro
MGE 7.1
GeoMedia GM Web Map
MGE Project
Create new data
Base Mapping
Base Mapping
Grid Analysis
Terrain Analysis
Dynamic Segmentation
Spatial Analysis
Presentation
Distribution
INTERGRAPH
SOFTWARE SOLUTIONS

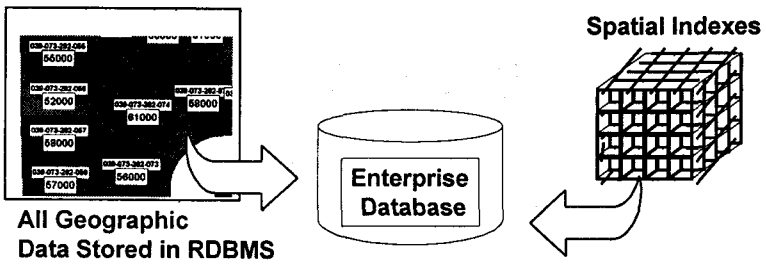
Enterprise Data Access With GeoMedia

51



52

What is open spatial data?



Open means more choices using an RDBMS

INTERGRAPH SOFTWARE SOLUTIONS

The Intergraph Enterprise Solution

53

- Distributed data management with department controls
- Standard, commercial databases
- Clients without proprietary middleware
  - ✓ We let the databases work
  - ✓ GeoMedia is a true enterprise tool
- Handling Legacy Databases
- GIS integrates into mainstream IT
- OPEN
- COMPLETE
- UNIQUE

INTERGRAPH
SOFTWARE SOLUTIONS

54

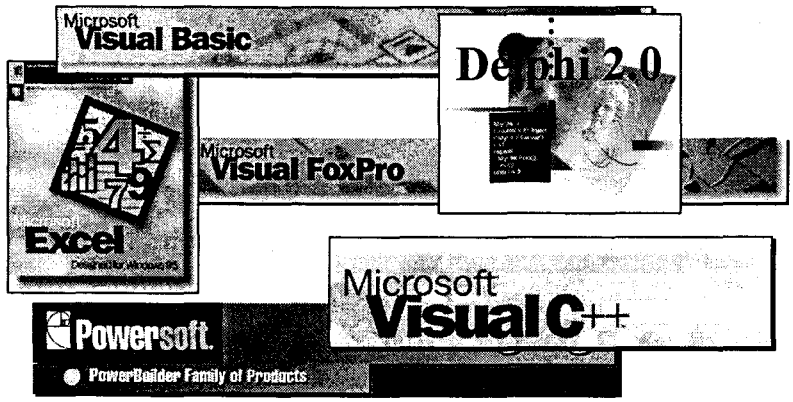
Customization

Overview

- Custom implementation of Intergraph's "G" product
  - Specific to an industry or user workflow
- Custom applications are built through OLE Automation
  - Third parties
  - Customers
  - Intergraph
- "Product" is a prerequisite for a customized application

INTERGRAPH
SOFTWARE SOLUTIONS

Open Customization



Open means... "maximum choice for user investment dollar"

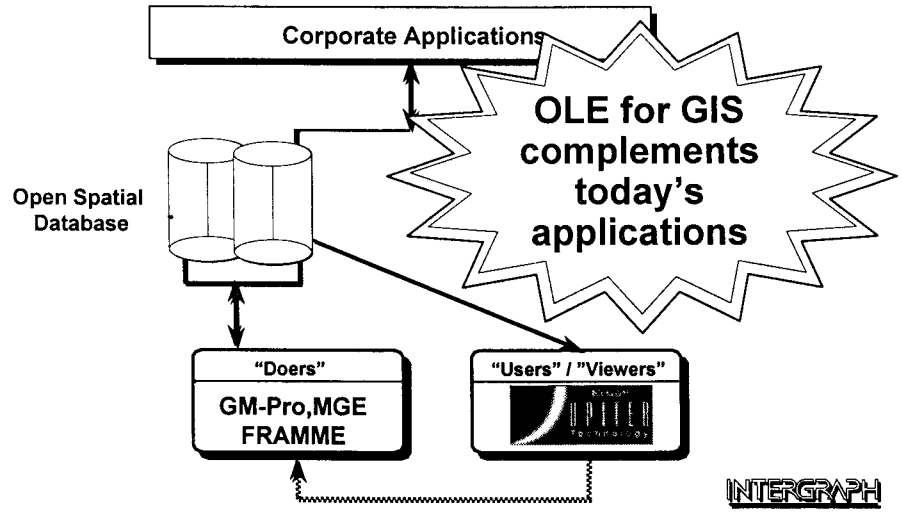
INTERGRAPH
SOFTWARE SOLUTIONS

The road to the future

To Success	Exit Only
Intel/Windows	Proprietary systems
Component Object Model (COM)	Traditional, proprietary object frameworks
OLE (OLE4GIS), ODBC	Proprietary integration tools
OLE Automation (VB, VC++)	Proprietary development tools
OpenGL	Proprietary graphics

INTERGRAPH
SOFTWARE SOLUTIONS

Extending Today's Environment



INTERGRAPH
SOFTWARE SOLUTIONS

For More Information...

Visit Our WebSite

http://www.intergraph.com/

Call to Intergraph Korea

(02)3489-0359

INTERGRAPH
SOFTWARE SOLUTIONS