THE EVOLUTION OF THE GEOPORTAL

ATS has developed GeoPortals since the nineties
OVERVIEW

- GeoPortals provide automated workflows that enable website users to create, modify, search, and view GIS data, documents, web pages, and plain database tables located on local and remote servers.

- A GeoPortal can be securely hosted on an Intranet (Private / Internal Only) and / or the Internet.
A Modern GeoPortal provides GIS workflows that integrate

- Mobile Apps
- ESRI ArcGIS Server
- Web Content Management System (DNN and/or SharePoint)
- Document Management System
- Global Search Engine
THE LATE NINETIES

- These screenshots show a Web Portal developed by ATS staff way back in the 90s which inspired the ATS GeoPortal concept of today.
- It provided secured access over the web to the USAF Safety Automated System (SAS) at military bases world-wide.
- It served over 2000 active military personnel users in the year 2000.
- Data was created and maintained by users world-wide, but kept in a single, central database at the USAF Safety Center Headquarters at Kirtland AFB, USA.
- It vastly improved the data quality and efficiency of the US Air Force Safety offices.
SAS achieved efficiency and data quality through an automated electronic workflow.

The SAS workflow featured QA approval gates (approve / reject, etc) with automated notifications.

Like SAS, the modern GeoPortal maintains the same emphasis on data quality and workflow efficiency.
These screenshots show the next phase of the evolution which began the “Geo” part of the Portal.

This was developed before ArcGIS Server and the associated web GIS APIs existed.

It provided a GUI for users to edit feature classes in an Oracle ArcSDE geodatabase from web pages.

It was developed with Visual Basic, HTML, Javascript, ArcObjects and Oracle SQL stored procedures.

Notice how the portal prompted the user for the ArcSDE version before they were allowed to edit features in the geodatabase.
The next evolutionary phase of the GeoPortal was built with ASP.NET, ESRI ArcIMS 4.0 and an MSSQL Server ArcSDE Geodatabase.

This GeoPortal provided secured access to over 500 layers belonging to multiple oil and gas companies.

For this project we used Safe Software’s FME to transform hundreds of AutoDesk MapGuide layers to ESRI ArcSDE Feature Classes.

There were hundreds of layers available from this viewer, and just one with poor performance could slow down the entire viewer. So, we developed scripts which constantly queried the layers and compared current performance to past performance.

The layer performance scripts sent alerts to administrators if there was a significant change in performance.
This GeoPortal was developed with ASP.NET and ESRI ArcIMS and a DB2 ArcSDE Geodatabase for a world-wide shipping company.

The shipping company relied on this HTML / Javascript GIS Viewer 24X7 to perform dispatch operations and make management decisions.

The GIS Viewer was integrated into an existing ASP.NET Intranet as to leverage the enterprise security framework.
A HUGE SPATIAL DATA WAREHOUSE

- The shipping company GeoPortal also provided secured access to a spatially enabled data warehouse
- World-wide shipping records were rendered by dozens of layers as routes, segments, origins, destinations and stops
- These feature classes contained millions of records
- Due to the huge volume of data in the spatial data warehouse, sophisticated “sdegroup” layers had to be developed to speed up the map viewer
- It was then that ATS staff discovered that ArcSDE ran faster on servers with Intel CPUs because they had math-coprocessors which were better for spatial queries
- As a result, a separate spatial data warehouse was developed on Windows servers in MSSQL Server and the feature classes were transformed into more of a business intelligence like data structure, vastly reducing their size and speeding up performance of the layers
This image, created by ATS Staff, shows an overview of the architecture of the shipping company GeoPortal.

The backend of the trucking company GeoPortal was integrated into the existing AS400 & DB2 data warehouse data flow.

Spatial transformations were accomplished in near real time as the location of over 9000 mobile assets automatically flowed from Qualcomm, to the internal AS400 system and then to the spatially enabled DB2 Data Warehouse every 15 minutes.

On regular intervals, batch jobs scanned through millions of rows of the data warehouse tables and built new geometry for the feature classes whenever a new record or a modified record was found.

Spatial transformations relied a combination of C# ArcObjects and DB2 SQL Spatial Extensions code, and later MSSQL SQL Spatial Extensions.

A sophisticated geocoder module, developed with C# and ArcObjects, automatically normalized street address text and then used eleven different methods to geocode over 90% of the street addresses in the data warehouse.

A GIS middle tier, built with ASP.NET SOAP web services, served spatial data and map images throughout the enterprise to a variety of client applications written in ASP.NET, HTML, Java, Cold Fusion and C++.
2007-2009

- The next phase of evolution added the DNN Content Management System
- This shows the first DNN CMS GeoPortal built for the BIA
- It featured an embedded Google Map HTML / Javascript API Viewer in the home page linked to a popup advanced viewer
Here is another web page in the BIA GeoPortal featuring a simple, built-in ESRI HTML/Javascript API viewer with mouse-over pop-up info-boxes.

Several of these simple viewers were embedded and designed to be in context with specific sections of the Intranet.

The simple viewers did not scare off the non-technical users, and the advanced viewer satisfied the power users.
Starting with a Content Management System (CMS) saves clients time and money because they did not pay to develop common necessary features such as skins (basic layout, colors, fonts, etc.), user account management, password management, permission management, HTML content management, document management, etc.

The custom functionality ATS builds extends the built-in functionality provided out-of-the-box by the Content Management System.

Users with the admin permission have control over much of the GeoPortal content through simple, plug-in modules that often mimic well known Microsoft Office features.

Plug-in modules are found on plug-in module stores (much like mobile app stores), or custom developed using popular frameworks such as Microsoft .NET, HTML and Javascript.
This ESRI WebADF viewer was developed for the BIA by ATS staff.

- It exemplifies the GeoPortal design pattern still used today.
- The design pattern employs several smaller, no training required, viewers embedded into the DNN CMMS with links from them to a stand-alone advanced viewer, like this one, to satisfy the power users.
This advanced viewer provided asynchronously executed geoprocessing tasks for searching, routing, printing dynamic maps to PDFs and more.

Several base maps, some from ArcGIS Online and some from the local ArcGIS Server, were provided.

ATS staff built several large national ArcGIS Server map caches for the BIA.
PDF MAP PRINTING EXAMPLE

- One of the advanced viewer PDF maps
- It featured a route map on the top and driving directions below
• The advanced viewer also provided tools to create and edit features, from the web
The BIA Advanced Map Viewer was linked to several regional cadastral map viewers also developed by ATS staff.

One of these viewers shows the parcel geometry created by an Auto-Parcel Generator.

ATS Staff developed the Auto-Parcel Generator using ArcObjects and .NET.

The Auto-Parcel Generator cross-referenced text land title descriptions with the geometry of the BLM GCDB to produce over 47,000 parcels automatically.
2009 – TODAY – THE RIA ERA

- The GeoPortal evolved to feature Rich Internet Application (RIA) Viewers based on the Flex and Silverlight ArcGIS Sever APIs

- This Silverlight viewer featured cluster layers and editable feature classes with custom floating data forms
This custom Flex Viewer was developed with FlashBuilder and .NET as a plug-in module to a DNN Content Management System GeoPortal.

This viewer was so simple to use that no training was required.

The embedded Flex Viewer featured:
- A base map with over 200 Gigabytes of Aerial imagery served from Mosaic Datasets by ArcGIS Server 10.1.
- A slider bar which queried the aerial images by year.
- A simple Text Box Search.
- A simple Spatial Search Tool.
- Overlaid Facility Layers Derived from CAD drawings.
- Popup info boxes with photos.
- A responsive data grid.
- Direct tie-in to the data edit / creation workflow interfaces.
One of the Flex Viewers ATS staff contributed to won an ESRI Special Achievement GIS Award in 2011.
Recently ATS integrated the GeoPortal with Sharepoint to provide a Full-Text Search Engine and a Document Management System with the GIS.

From a single text box, located at the top of every page in the GeoPortal Website, a search of the entire GeoPortal can be performed.

The Global Search Engine simultaneously searches the GIS, Backend Databases, Document Repository and the Web Pages.
This image, from a GeoPortal developed by ATS staff in 2011-2013 for the NATO Training Mission Afghanistan (NTMA), exemplifies a Global Search Engine Result Page.

From a single text box search, the Search Engine Results Page provides results found in the GIS, Document Management System, Backend Database and Web Pages.

The GeoPortal Search Engine shown here performed full-text searches of over 400 Gibabytes of data and documents in less than 10 seconds.
Here are screenshots of another GeoPortal with an embedded Flex Viewer.

The Flex Viewer module featured a Business Intelligence Layer with Graduated Symbols and a text Search Results Window.
Here are screenshots from another GeoPortal with an embedded flex viewer developed for a county government agency.

This GeoPortal featured an Announcements Module and Calendar Module on the same page as an embedded Flex Viewer and a full text search engine over the GIS, Document Repository and Website.
Here is a screenshot of another Flex Viewer ATS staff contributed to for a Canadian Government Federal Agency.
This is a screen shot of a Flex Viewer ATS staff developed for a County Tax Assessors Office.

It featured powerful widgets to query for parcels and drill down to the tax records database records.
ATS staff have extended the GeoPortal and business intelligence concepts to ArcGIS Explorer as well.

This application, developed for a federal health care agency, featured stacked bar charts and graduated symbol layers.
GEOPORTALS OF THE FUTURE

- GeoPortals integrated with Mobile Workflows
- More business intelligence
- DATA-EASY, Earthmine, CityWorks, etc.