Title of Paper:

"Spatializing" the Enterprise: GIS Web Portals for major Oil and Gas Company's

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Abstract:

Massive efforts have been expended over the last several years in streamlining and integrating exploration and production data. The problem has now turned into how to serve that streamlined data back to the user community in an easy-to-understand, user-friendly, low-maintenance, high accessibility, collaborative, and enterprise-wide deployment. An easily deployable thin client web portal with a GIS interface can greatly help visualize complex data sets and spatially enable the enterprise. Intelligent application launches from a map can bring real collaborative benefits to data management.

The current paper addresses the constituents and components of a successful ArcIMS based GIS web portal that helps make critical business decisions and saves money for a major Oil and Gas companies. Strategies on how to evaluate and make a decision on GIS web portals for an Oil and Gas Company will be discussed as well.

Paper Body:

I. Introduction:

There is a definite trend of mergers and acquisitions amongst oil and gas exploration and production companies throughout the world as whole and the United States in specific.

Mergers bring consolidation of facilities, offices, resources, computing environments, software and most importantly data.

From a data manager's perspective, a merger brings the responsibility of making sure that spatial and tabular data; that our industry so heavily relies on for conducting its business; is cohesive and can

correlate and cross-reference with each other. Most of the data managers are adept at doing this. The problem they face is the means to effectively and efficiently serve the data back to the user base.

Managing land resources – leases, contracts and division orders, have never been more critical. Decision makers need to integrate land, exploration, production and financial information into a single interface. All these factors require a universal approach to serving data to the users achieved by a GIS Web Portal that integrates tabular and spatial data in a user friendly interface and serves as a central point to launch into other Land and G&G applications.

The following sections of this paper address the concept of a GIS Web Portal, and provide strategies on how to evaluate and make a decision on GIS Web Portals in the oil and gas industry.

II. The Data Delivery Challenges:

Even after years of consolidation efforts and merging of databases and critical applications, most major Oil and Gas company's users still struggle with the issues of data retrieval. Some of the classic issues are described in the following paragraphs.

All I do is search for data!

Users are not able to find the data they are looking for. According to a study users spend 70 percent of their time looking for data and only 30 percent actually using and analyzing data to make business decisions.

Where is the data I need?

In a typical company, geographic and business data resides everywhere and anywhere. There are multiple servers, number of shared drives on the network, tapes, CDs, multiple Web sites and a collection of databases. All of these datasets are well organized in their own silos. The problem is accessing the data from a single mapping/GIS interface.

Do we have the data?

With multitudes of data, but no efficient means to deliver the data, users sometimes don't even know if there is data available. This on

occasion results in companies buying duplicate copies of data, in turn resulting in lost time, money and energy.

Which database/ArcSDE instance do I hit?

In an oil and gas exploration and production house, business data is stored in several instances of databases. Users are lost trying to remember which database contains which database table or which spatial layer.

I'm lost in databases. Can I look at a picture instead?

A picture is worth a thousand words. Some users find themselves lost when looking at row after row of data that they can't relate to. Most of the E&P data has a spatial component -- well related, lease related, field related, etc. The absence of a map interface can greatly impact a user's productivity and understanding of the data.

I need reports for my geographic area

Writing reports against business data is easy and there are dozens of tools in the market that let users create and publish those reports. A GIS Web Portal can run the same business report, but only for the selected geographical record or view extent.

Is the data I see updated and most current?

Much of the data in the Oil and Gas Upstream industry changes very frequently. Well production data changes every second. Users want to be able to get up to the second, most current data from a map. GIS data creation processes typically take some time. How do I get the most current data?

Are we still using old technology?

Many of the companies in our industry are still using old technologies to deliver data to the users. In the meanwhile the world has moved on to new software and systems that are not only faster and more efficient, but also give users many more ways and means to view, update and analyze their data.

I don't have time for training!

Today's industry is faster and leaner than what it used to be years ago. Fewer numbers of employees are doing the work of previously larger staffs. The users' schedules are very busy, and most don't have time to sit through months of training and many more months on the learning curve. Data delivery mechanisms, therefore, need be very intuitive, requiring minimal to no training.

I can't see the other Departments data?

Huge economic benefits can be achieved by sharing data and information across departmental boundaries. G&G wants to be able to see lease information for them to be able to do their jobs better. Land wants to see where the wells are being drilled and what the status of the wells is. Departments within the oil and gas industry have a complex interdependent relationship. Data sharing between data creators, data consumers and data maintainers should be a part of a good data management strategy.

Is the data secured?

Security provisions are an important part of a data delivery strategy. The ability to create security rules based on the business and workflow needs for a participant is critical for an E&P organization. Certain users need to have administrative rights to make changes to what other users see. The rest of the users need view-only privileges.

III. GIS Web Portals:

What is a GIS Web Portal? :

A GIS Web portal is a Website that is a major starting point for users to perform their daily business. A map is the common starting point for a GIS Web portal. A user navigates from the map to geographic areas of interest collecting and analyzing business and geographic information and data on the way. A GIS Web Portal integrates disparate technologies to seamlessly serve the user.

Components of a GIS Web Portal:

There are five basic components of a GIS Web Portal. They are discussed in details in the following paragraphs.

1. Visualization:
Visualization is the process of understanding and assimilating data. It enables users to analyze and understand vast amounts of data to make better and faster business decisions. A GIS Web Portal is a map based visualization tool that enables analysis of complex spatial and tabular data from a user friendly and intuitive web interface.

2. Data Access:
A GIS Web Portal should provide access to both spatial and tabular business data.

Spatial data can include a wide range of mapping and graphics formats, images, CAD files, databases, and many other sources. Data can be obtained from public sources like the U.S. Census Bureau or from commercial vendors like Tobin, other GIS software users, and the users own organization.

Business or tabular data can come from subscription data sources like IHSE P2000 Production database or from internal and external databases including Tobin Land Suite ™ for lease and contract data.

A GIS Web Portal should have the capability to map data that does not have spatial data built for it, but can be linked to a spatial entity indirectly. For example the engineering organization in an E&P setting should be able to see well bore data from a database, although there might not be spatial created for well locations from the engineering database. The common spatial entity in this case is the well location that comes from a well spatial layer linked by an API number.

3. Customization and Collaboration:
All users have unique workflows, tastes and practices. A GIS Portal should be customizable to a user's specific needs.

There should be user and group level security so data and information can be protected from misuse. Collaborative tools should be built into a GIS Web Portal, so information can be shared between employees in an easy-to-use manner. Easy and effective information sharing between users is a required prerequisite for a GIS Web Portal.

4. Intelligent Application Launches:
A GIS Web Portal serves as an entry point to other E&P applications. A context-sensitive intelligent application launch from a spatial selection inside a GIS Web Portal provides great benefits to users. Selecting a group of wells from the GIS Web Portal and then launching a well

production application like P2000 with the selected wells open in that application can be a powerful tool for E&P professionals.
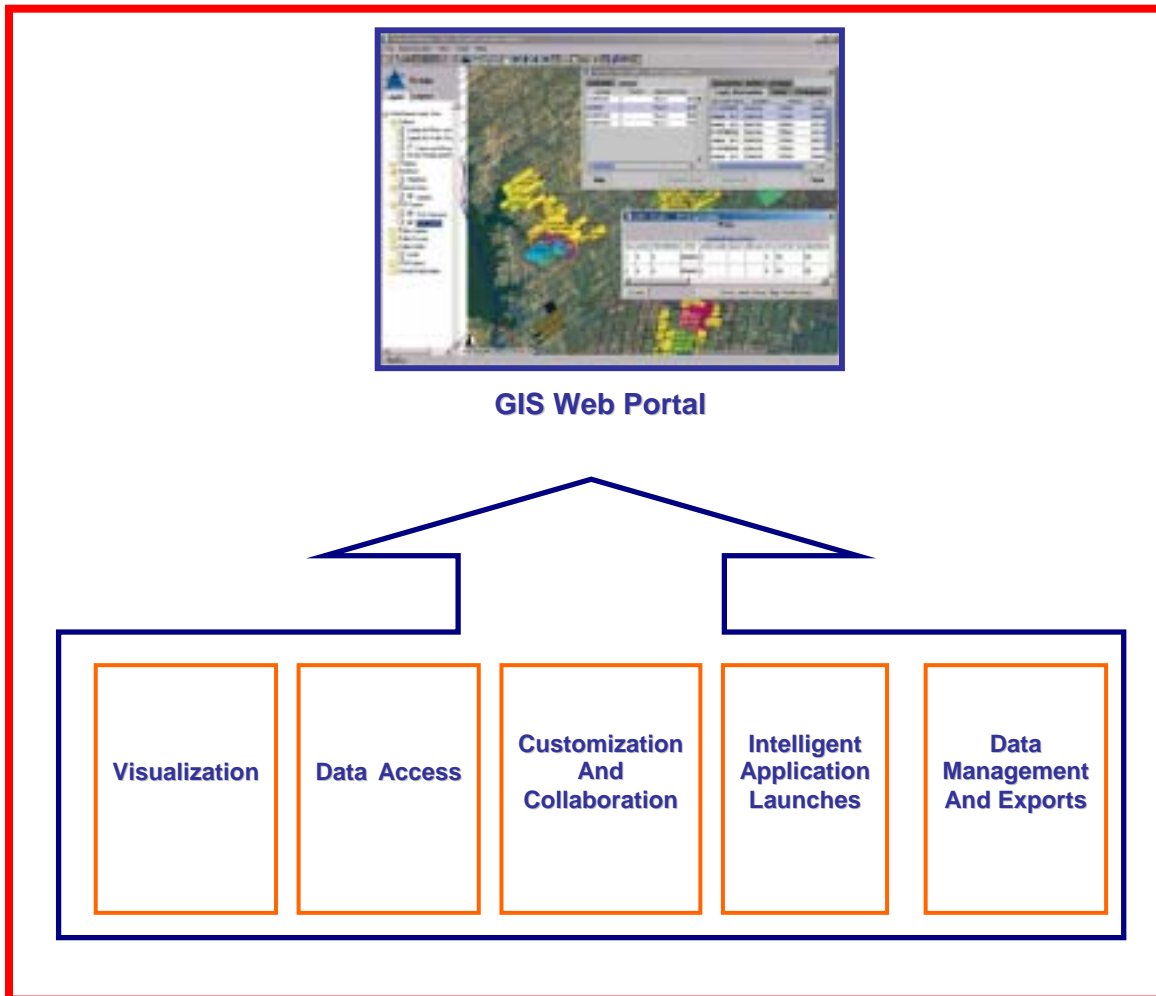

GIS Web Portal

| Visualization | Data Access | Customization And Collaboration | Intelligent Application Launches | Data Management And Exports |

Figure 1: Components of a GIS Web Portal

Running business reports from tabular databases from a spatial selection is a powerful component of a GIS Web Portal. This functionally, once again exhibits "spatializing" the enterprise capability of a GIS Web Portal.

5. Data Management and Exports:
A GIS Web Portal would not be able to serve data without a Spatial Data Management System. All data that gets served to the enterprise users should be stored in commercial spatial database for ease of management and greater performance benefits. The GIS Web Portal configuration parameters (user IDs, passwords, etc.) should be stored in a commercial database as well. This ensures security and performance and scalability of the Web Portal.

An enterprise user, based on his security and privilege should be allowed to download data served up through the GIS Web Portal for records, detailed analysis or use in another application.

Benefits of a GIS Web Portal:

A GIS Web Portal integrates the spatial information and data layers with business and tabular information stored in commercial databases and repositories. A GIS Web Portal can enhance the workflows of an E&P organization and can reduce the cost of operations. Some of the benefits of a GIS Web Portal are discussed below.

A Picture is worth a thousand words:
A map can be a great benefit to end-users and analysts. The visual nature of a map not only makes it easy to for users to understand data, but can also be a great retention tool. A map on the office wall can be a quick source that can be frequently referred to for confirming information.

One-stop shop for all data and mapping needs:
A GIS Web Portal serves as a single point of touch for all spatial and business needs. The users can easily search spatial data, use it, and create maps or reports out of it. All this is accomplished from a single application without having to look for information in multiple sources and putting it all together.

"Spatialize" tabular databases:
A GIS Web Portal "spatializes" tabular or business information and map-enables it. This can be a great benefit for data analysts who want to understand the spatial aspects of a business database.

Quick and easy application launching:
Context-sensitive intelligent application launches can greatly enhance workflows of the E&P processional. The ability to get to data in an application that does not have a spatial front-end, from a GIS Web Portal is of immense benefit to the user community.

Spatial reporting:

A GIS Web Portal saves end-users' time by allowing them to run graphs, charts and fancy reports on tabular data sources from a GIS interface.

Overlay analysis:
Overlay or layer-on-layer analyses can help the end-users understand the complex spatial relationship within spatial entities. Questions like, give me the production report of all the wells that fall under a specific lease polygon which expires in the next 30 days, can be run with the click of a button. In a world without a GIS Web Portal this report would take a few resources and perhaps hours of work to create.

Work from anywhere in the world:
One of the benefits of a Web based application is the ability to work from another city, hotel or the comfort of your bed without having to install any applications.

Fastest and easiest way to publish maps:
A GIS Web Portal, being web based and an amalgamation of multiple spatial and tabular data sources provides for the easiest and fastest way to create and publish maps -- all from an internet browser.

Real-time cross- disciplinary user collaboration:

Information sharing between users in and across departmental and jurisdictional boundaries is a benefit of a GIS Web Portal. Geologists, Landmen, Engineers, Finance Managers and Administrators all look at the same information and pass information back and forth thereby creating operational efficiencies.

Savings:

The most important benefit of a GIS Web Portal is that it saves money by reducing licensing costs. Many of the light users of GIS and mapping applications can use a GIS Web Portal instead of desktop GIS tools, thereby reducing licensing costs for the company.

Reduced IT cost and low maintenance:

Since a GIS Web Portal is internet browser based, there is no maintenance or installation required on the end-user machines. This results in cost and time savings for the IT group. Whenever there is an

upgrade, it is pushed on to the server; no reinstallations are required on the end-user machines.

IV. Evaluating GIS Web Portals:

The market is full of GIS Web Portal tools. Some are big, others are small. Some are expensive, other are cheap. Some are fast, other are slow. It's easy for a company looking for a GIS Web Portal to serve its needs, to get overwhelmed with the details of these systems.

Based on the experience of the authors of this paper, it is recommended that a GIS Web Portal evaluation be carried out starting with a pilot implementation for a small geographical area with limited scope. This not only gives the evaluation team an idea of what to expect, but also prepares them for the challenges that lie ahead during the enterprise implementation. A team of cross-disciplinary users should be chosen from different facets of the E&P organization to assess the pilot.

Once the pilot has been implemented and the users have had ample time to do a hands-on evaluation of the software, they should then be asked to fill out a gap analysis questionnaire evaluating the portal for the following functional categories.

1. Usability
2. Security
3. User collaboration
4. Standardization
5. Outputs (printing, plotting, reporting and exports)
6. Workflows
7. Training
8. Other requirements
9. Gaps

The questionnaire should have specific questions and the response ratings should be clearly marked on the form. The importance of each criterion to the work of a user should be ascertained from the

evaluator as well. There should be ample space in the questionnaire for issues that are not covered and for user comments.

Requirements	Example/Explanation	User Ranking[1]	Importance to the User[2]	User Comments [3]
Usability and Workflow				
Security				
User Collaboration				
Standardization				
Outputs (Printing, Plotting and Reporting)				
Workflow				
Other Requirements				
Gaps				
Support and Training				

Figure 2: GIS Web Portal évaluation questionnaire

Once the user feedback is tabulated, the GIS Web Portal should be awarded points on the following evaluation criterion.

Usability:

The ease of use of the software, the need for advanced training and intuitiveness of the tool is ascertained and evaluated and points are awarded for the usability criteria.

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[1] User Rankings
   4. Exceeds current capabilities
   3. Meets current requirements
   2. Meets current requirements but needs improvement
   1. Does not meet requirements
[2] Importance to the User
   3. Must have
   2. Important
   1. Nice to have
[3] User Comments
   Please attach screen shots, examples and attachments

Workflows:

Does the GIS Web Portal improve your current workflows? Is this something that can be used in the organization right away without making substantial changed or altering current workflows and practices?

If the answers to these questions are no, the GIS Web Portal gets higher overall points in the evaluation.

Application Rationalization:

Will acquiring a GIS Web Portal reduce current licensing costs? Will the company be able to reduce the number of licenses for other products currently in use? Many organizations are spending a lot of money towards license fees and maintenance of software, application servers and databases which has much more than the required crunching power to run the day-to-day business needs. These organizations can achieve reduced costs by scaling down to more appropriate applications and technologies.

Software Strategy:

Does acquiring the GIS Web Portal fit the overall strategy of the company as a whole? If the company strategy is open source then having Linux based Apache/Tomcat applications will score higher points.

Software Stability/Maturity:

Is the GIS Web Portal software stable and mature? Does the vendor have enough references to call? How many versions of the GIS Web Portal has the vendor released? What is the plan for future releases? Is the underlying technology the software is based on stable enough? Is the vendor financially stable?

Answers to these questions will determine the software stability and maturity score for a GIS Web Portal.

Support:

What kind of support staff does the vendor have? Is support a part of the software or is it covered under maintenance? Is there an extra fee for support? What is the turn-around time on a support issue? Does the vendor have a Website with logged support issues for quick referral? Does the vendor have processes built around intelligence

gathered from support calls? Does the vendor use support incidents to make the software better?

Answers to these questions will determine the support score for a GIS Web Portal.

Value Proposition:

What's the value proposition of the software? Will the payout be within three years? Will this save money or improve work processes and efficiencies in the organization? Can the company scale down on other software and save licensing costs?

Points awarded to a GIS Web Portal vendor under the above seven categories and the tabulation of the user questionnaire make up the final score that a vendor gets for its GIS Web Portal software. Based on this score the evaluation team sends its recommendation to the higher evaluation board which approves or disapproves the procurement of a GIS Web Portal from a specific vendor.

Apart from the things mentioned in the paragraphs above, multiple meetings with the vendor's development and management staff should be scheduled by the company, so they can understand the future plans and release schedules of GIS Web Portal software. If there are critical issues identified as gaps during the pilot, the company should consider engaging the vendor to convince them to make the desired functionality a part of one of the future release.

V. Conclusion:

A lot of thought and planning goes into selecting what is a good GIS Web Portal tool for a company. The science of GIS Web Portal evaluation is more than just buying a piece of software.

With the increased use of and demand of GIS Web Portals, U.S. and International Oil and Gas companies will need to consider and evaluate a GIS Web Portal, now or sometime on the future. We hope our experiences working, developing and implementing GIS Web Portals in the oil and gas industry will help businesses make better and informed decisions regarding GIS Web Portals.

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