TITLE: Produce More Oil and Gas via eBusiness Data Sharing

Type Report: FINAL Technical Report

Reporting Period Start Date: October 1, 2004

Reporting Period End Date: March 31, 2005

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Date Report Issued: July 22, 2005

Grant Instrument No.: DE-FC26-03NT15428

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Abstract* / **Executive Summary**

GWPC, DOGGR, and other state agencies propose to build eBusiness applications based on a .NET front-end user interface for the DOE's Energy 100 Award-winning Risk Based Data Management System (RBDMS) data source and XML Web services. This project will slash the costs of regulatory compliance by automating routine regulatory reporting and permit notice review and by making it easier to exchange data with the oil and gas industry—especially small, independent operators. Such operators, who often do not have sophisticated in-house databases, will be able to use a subset of the same RBDMS tools available to the agencies on the desktop to file permit notices and production reports online. Once the data passes automated quality control checks, the application will upload the data into the agency's RBDMS data source. The operators also will have access to state agency datasets to focus exploration efforts and to perform production forecasting, economic evaluations, and risk assessments. With the ability to identify economically feasible oil and gas prospects, including unconventional plays, over the Internet, operators will minimize travel and other costs. Because GWPC will coordinate these data sharing efforts with the Bureau of Land Management (BLM), this project will improve access to public lands and make strides towards reducing the duplicative reporting to which industry is now subject for leases that cross jurisdictions. The resulting regulatory streamlining and improved access to agency data will make more domestic oil and gas available to the American public while continuing to safeguard environmental assets.

Results and Discussion

Phase 1. Re-design RBDMS in the .NET Platform and Install and Test in California.

Task 1-1. Build the project framework.

In Task 1-1, the team will design the infrastructure components that will be fundamental to the application on a programming level. Use cases and class diagrams to document business processes will be prepared to guide the module coding. The base problem domain object and base objects governing navigation, security, menu control, form, and report behavior will be built through a collaborative team approach. Other base class objects in RBDMS (e.g., Well, Inspection, Permit, Violation, etc.) also will be re-designed for the .NET environment. Design tools suitable for the programming required for reports, forms, and the help system will be evaluated.

Accomplishments:
April 28, 2004: The business use case functional requirement specifications and business rules for Iteration 1 are completed. The use cases are available for review at:
http://calwims.consrv.ca.gov/Login.aspx?ReturnUrl=%2fDefault.aspx. The use cases include a complete re-evaluation of the oil and gas regulatory program in California. Changes to the regulatory program will be made where necessary. Business use cases completed include:
Well permitting (including electronic permitting)
Bonding
Construction site review
Environmental inspection
Idle well program
Operator maintenance
Orphan well program
Pipeline management
Production audit
Reporting
UIC project
Well file access
Well information maintenance
Well mapping
The business rules are the business practices or the Department of Conservation's (DOC) Division of Oil, Gas, and Geothermal Resources (DOGGR) with regard to the RBDMS.Net project. The business rules are organized into groups based on the business processes defined in the Target Organization Assessment:
Deserted Well Abandonment
Idle Well Management
Information Access to Customers
Operator Compliance
Permitting

Production Tracking
Well Record Maintenance
Each group may contain subgroups of business rules where such organization proves helpful and are listed alphabetically.
The business rules, in part, define how the system will be developed to support a more efficient Notice-To-Permit turnaround time and access to well information.
The project team is now working on the system use cases that will define data flow in RBDMS.net. System use cases that have been completed include:
Well Permitting (including electronic permitting)
Bonding
Construction site review
Environmental inspection
Idle well program
Operator maintenance
Orphan well program
Pipeline management
Reporting
UIC project
Well information maintenance

Advertisement for development team was posted on February 2 and Construction Iteration 1 is scheduled to begin on February 23. The construction development team and its effort are funded by the state's matching contribution to this project.

December 30, 2004: The business use case functional requirement specifications and business rules for Iteration 1-7 have been completed. The use cases are available for review at: http://calwims.consrv.ca.gov/Login.aspx?ReturnUrl=%2fDefault.aspx. Construction of iterations 1 –3 are complete and are being beta tested. Construction of iteration 4 is nearing completion and should be ready for beta testing late January early February. Iterations 1 –4 form a complete life-cycle of a permit, including record checking.

The electronic permitting function, including the XML schema for the BLM interface will be completed along with iteration 4.

Following internal beta testing, the system will be released to three operators in Kern County to use and test the electronic permitting module. After three months of operator testing, the system will be released statewide.

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Of the planned 7 iterations, iterations 1 – 4 and were completed, including the batch XML schema for permit submission. Iterations *1 – 4* represent those features to complete the permitting life-cycle for a well.

The DOGGR has received approval for $1,146,000 in one-time spending authority ($750K 2005/06 and $396K 2006/07) to replace the oil and gas production tracking and assessment system (WellStat) and incorporate the following programs and functions into its .Net N-Tier data

management system. Development will incorporate the remaining Phase 1 iterations (5 – 7) and the following elements:

- *California Environmental Quality Act Tracking System*

- *Orphan Well Program*

- *Well Casing Diagram function*

- *Penalty Process and Enforcement Tracking*

- *Inspection Report Submission*

- *Assessment Program tracking*

- *UIC Project Permits and Project Maintenance Tracking*

- *Construction Site Review Program.*

The current WellStat system was developed 6 years ago utilizing Delphi 3.5 and Microsoft SQL Server Software 6.5. Neither of these software programs is currently supported and requires a full time programmer to keep the system operating. In the foreseeable future, the sustainability of this application will be technically and economically unfeasible.

The current WellStat system has Internet functionality that allows online production data to be accessed by the industry to help develop new oil and gas prospects; local agencies for determining local property taxes; and public access for private individuals. However, if WellStat fails, this functionality will no longer be available.

Interface between CalWIMS and WellStat is necessary to reduce the need for duplicate data to be entered and to replace functions are that are currently hand written or manually entered into *various other databases.*

Upon completion of Phase II, DOGGR will share all systems and documentation available to any organizations or state.

Task 1-2. Build the user interface.
Base class development work done in Task 1-1 will become the foundation for extending the work for proof of concept. A form from the application will be chosen for full development. Once the result has been thoroughly reviewed and generally accepted, this form will become a template for the remaining forms and reports in the DOGGR implementation of RBDMS. The project team will use this template to develop the user interface for the application. Base class objects developed in Task 1-1 also will be extended in this task to include subclass objects that correlate to the various types of inspections, permits, and violations.

Accomplishments
April 28, 2004. A comparative analysis of the California use cases against the RBDMS Core is

currently being preformed. A draft user interface has been completed and will be presented to RBDMS states at a meeting in California May 5, 2004.

December 30, 2004: The electronic permitting XML schema interface is 90 percent complete. The remaining portion of this effort will be completed with California state funds within the next 3 months. This final schema will be made available for implementation by other RBDMS states once complete. The data dictionary analysis for the XML and XSD documents is complete and out for review to POSC.

Task 1-3. Integrate ePermit.

The project team will add the data tables necessary to support ePermit to the RBDMS back end. The tables will be updated and synchronized with ePermit tables on DOGGR's DMZ SQL Server. This step may not be necessary if, upon security review, the project team determines that a copy of the ePermit data does not need to reside in a separate SQL database in the DMZ.

Accomplishments
April 28, 2004: Electronic permitting has been chosen by the development team to be the first module to test in California RBDMS.net. Operator login use cases have been completed and development has begun.

December 30, 2004: The electronic permitting is scheduled for release by February, 2005. As mentioned above, the e-Permit module will be released to three operators in Kern County to use and test for three months before release to all users.

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Of the planned 7 iterations, iterations 1 – 4 and were completed, including the batch XML schema for permit submission. Iterations 1 – 4 represent those features to complete the permitting life-cycle for a well.

Task 1-4. Integrate eInspect.
The project team will add the eInspect intermediate tables to the RBDMS database and add the ability to synchronize RBDMS data with SQL Server CE. The synchronization procedures that will then be added will allow well header information to be selected for download to CE and new information to be uploaded from CE to the intermediate tables. This task will include developing data validation procedures and adding tables and fields to RBDMS to store the blowout prevention equipment (BOPE), Plugging and Abandonment, Injection Well Survey, and Environmental Inspection forms. The project team also will create forms and reports to support these functions within RBDMS.NET.

Accomplishments
April 28, 2004: Work has not yet begun on this module

December 30, 2004: No change. This module is scheduled for Phase II that is scheduled to begin

Task 1-5. Develop front-end forms and reports to replace Access and Paradox databases in District offices.

The project team will develop .NET forms and reports to replace the current Paradox and Access systems in all DOGGR District offices. These forms and reports, which are used to manage, permit and inspection data will be integrated into RBDMS.NET as CA-specific objects.

Accomplishments
December 30, 2004: All permitting forms have been developed and are currently being beta tested. Other forms and reports will be developed in Phase II.

Task 1-6. Prepare documentation.

Documentation of the RBDMS.NET system will take multiple forms over the course of all project phases. For Phase 1, use cases will be compiled into a draft and, pending review, final design document. Form objects will be documented as they are developed, both within the application itself and in a developer's manual. Three draft manuals will be prepared to describe the functionality of the RBDMS.NET application from users', administrators', and developers' points of view. After review comments are incorporated, the manuals will be released in final form. Then, a series of desktop videos will be prepared in .avi format. These desktop videos will demonstrate the system functionality and will be used as training aids.

Accomplishments
April 28, 2004: Documentation is ongoing and is developed iteratively.

December 30, 2004: Documentation is ongoing; however, a bid to hire a Technical Writer is currently being advertised to assist in the development of a User Manual.

Task 1-7. Test and train.

A group of testers who work throughout DOGGR's six District offices will work directly with the developers in Phase 1. DOGGR's assigned state database administrator will take the lead in coordinating feedback from this group. In testing the user interface and back-end database, the reviewers will document any errors detected by detailing the steps taken to produce the problem and describing the error that occurred. For this project, software testing will be iterative through the stages of completion for each programming component. DOGGR's testers will participate in the following levels of tests:

Method/property testing, which generally assesses the following questions: What should this programming object do? What is needed to make trigger this object's activity? How should it interact with other objects? Does it work?

Integration testing, which occurs when objects are linked. At this level of testing, review focuses on the question of whether the objects work correctly together.

Alpha testing, in which the prototype components are integrated and test data imported. This early release will be reviewed from the standpoints of overall application functionality and database integrity to ensure that the early development work is fulfilling the intent of the decisions made in earlier design phases.

Beta testing, which focuses on the debugged alpha version. Comments during this review should

focus on refining the user interface; preparing or refining the reporting functions of the application, as appropriate; resolving final aesthetic considerations, and help system completeness.

Acceptance testing, which is also referred to as fatal flaw testing. Fatal flaws are defined as defects in the programming that would render the program unacceptably difficult to run or unusable for its intended purpose as defined in the earlier phases of work. With the collaborative development method and rigorous testing proposed, acceptance tests are expected to proceed smoothly, offering no surprises.

Accomplishments
December 30, 2004: Internal beta testing is occurring. External beta testing is scheduled to begin late January 2005.

Task 1-8. Deploy RBDMS.NET.

Upon completion of the acceptance testing, GWPC will install the RBDMS.NET front-end application and enable the ePermit interface on the Web server in DOGGR's Sacramento office. The beta version will be tested, de-bugged, and released for DOGGR's internal use.

Phase 2. Build/Deploy XML Web Services to CA Industry Operators.

Task 2-1. Design XML Web service application for DOGGR server.
The team will design and develop a server application to implement data delivery to industry users. This application will be installed on the Web server in the DOGGR DMZ.

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Complete. The XML schema will be deployed in mid-August.

Task 2-2. Develop .NET Web interface and .NET WinForms client.
The team will develop XML Web services within an ASP.NET Web application on DOGGR's Web server. A downloadable WinForms .NET client application will be developed for industry to use to receive and to re-send the data transmitted through the Web service. This .NET client application will make a subset of the RBDMS.NET functionality available to industry users.

Task 2-3. Develop datasets.
The team will provide the programming necessary to produce the datasets unique to each operator. This will consist of a series of stored procedures that will build selection criteria for appropriate data delivery to the operators.

Task 2-4. Prepare documentation and release alpha.
In this task, desktop videos that industry can use as online tutorials and online help manuals will be developed. The alpha version will then be released for testing.

Task 2-5. Identify industry testing group, set strategies, and transfer technology.
A small group of industry representatives and representatives of BLM will be recruited to serve as alpha testers. Strategies to transfer the technology will be developed, and a training session

will be conducted to demonstrate the technology to the testers, prepare them for the upcoming alpha test, and answer questions.

This same group of testers will be included in a larger sampling of industry representatives for beta testing. Again, a workshop is envisioned to demonstrate the changes to the application to the alpha testers and to bring the newcomers to the testing group up to speed. The DOGGR team will provide help desk support through the training and testing periods.

Accomplishments
April 28, 2004: The California development team and representatives of RBDMS states meet with the BLM in Sacramento on February 19-20, 2004 to coordinate California RBDMS.Net e permitting and the BLM system. Follow up conference call meetings have taken place and BLM is working with California and several other states to develop XML schema for e-Permit. The California development team met with the GWPC Technical Review Committee to discuss recent work completed and scheduled development. In addition, the California development team is met the State of Alaska to review its RBDMS to leverage and incorporate as much as possible into the California effort. The development team met in Anchorage with the AOGCC and will meet with the State of New Mexico at the annual RBDMS training on May 5, 2004, to accomplish similar tasks.

Complete. The XML schema will be deployed in mid-August.

December 30, 2004: The SML schema for e-Permit is under review by POSC and will be compared against Alaska's database. The California development team met with the GWPC and RBDMS states in Denver at the November Produced Water Conference to present the development status and receive pier comment.

Task 2-6. Release beta version for testing.
Feedback from the alpha test will be incorporated into the beta version, which will be released to a larger group of industry operators for beta testing.

Accomplishments
December 30, 2004: Internal beta testing is occurring. External beta testing is scheduled to begin late January 2005.

Task 2-7. Deploy final XML Web services.
The team will incorporate feedback from the beta test and deploy the final application.

Phase 3. Prepare for Future Roll Out Nationwide.

Accomplishments
April 28, 2004: The RBDMS Steering Committee and Technical Review Group met with the California development team in Sacramento on February 18 and 19, 2004 to develop the migration plan and to ensure nationwide applications are developed. California is meeting with this group again on May 6, 2004 to for further discussions.

December 30, 2004: The electronic permitting is scheduled for release by February, 2005. As

mentioned above, the e-Permit module will be released to three operators in Kern County to use and test for three months before release to all users.

Task 3-1. Conduct advanced testing.

The GWPC contractors will prepare a series of SQL Server scripts that will be used to create the software objects necessary to accommodate the RBDMS.NET front-end application. A candidate core RBDMS installation other than California's, such as Utah's, will be selected for this advanced testing of the scripts. Once the RBDMS.NET front end is connected to the Utah back-end, the user interface will be tested to ensure that it works correctly with the Utah data set.

Task 3-2. Develop generic migration plans.

To conclude the California pilot project of RBDMS.NET, GWPC will develop two generic migration plans: one for replacing legacy systems and the other for upgrading components of or entire existing RBDMS installations. In the case of legacy system users, the migration plans will take into account any data conversions, state-mandated customizations, and RBDMS component phase-in that might be necessary. In the case of existing RBDMS users, the migration plan will provide guidance as to how existing customizations of RBDMS will be ported to .NET and how to prepare for launching XML Web services. A plan for managing the development of custom .NET software components for future installations also will be included, as will guidelines for assessing future requesting agencies' business practices to determine which RBDMS.NET objects will be of the most value to those agencies and their industry client base.

D. Deliverables

Periodic, topical, and final reports will be submitted in accordance with the Federal Assistance Reporting Checklist and include the required form DOE F241.3 when necessary. Progress reporting and the estimated duration for each task are shown in the table on page **Error! Bookmark not defined.**.

E. Technical Presentations

GWPC will present detailed briefings to the Contracting Officer's Representative (COR) at the COR's facility in Tulsa, OK. The GWPC team will give a briefing that explains the plans, progress, and results of the technical effort. At a minimum, the GWPC team will have a project kickoff briefing and a final project review briefing. For costing purposes, the GWPC assumes that these briefings will be held at NETL's Tulsa, OK office site, NPTO.

Experimental

This research project does not involve the use of experimental methodology.

References*/Bibliography

Project web site: http://calwims.consrv.ca.gov/Login.aspx?ReturnUrl=%2fDefault.aspx