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EDS Relies on IBM Rational Software Development Platform to Build Comprehensive Social Services System

Overview

■ **The Challenge**

To improve on its strong position in the IT services market, EDS needed to win – and begin to deliver on – a $321 million, 11-year project in the public sector. EDS' success depended on its ability to effectively manage frequently changing requirements to respond to customer needs, while keeping costs down.

■ **The Solution**

The EDS development team adopted a wide range of integrated development tools from the IBM® Software Development Platform to manage and assess the technical and financial impact of change from the RFP process through development.

■ **The Benefit**

Leveraging IBM Rational® tools, EDS beat its competition to win a large, high-profile contract. Throughout development, the company was able to focus on its core development processes and ensure customer satisfaction by efficiently and rapidly responding to over 1,500 change requests on a project with over 13,000 requirements.

With over 130,000 employees and more than 40 years of experience helping thousands of companies worldwide, EDS is recognized as one of the world's largest and most experienced outsourcing services companies. However, when EDS began working on a project for a consortium of 18 counties in California called CalWORKs Information Network (CalWIN), it was an extraordinary undertaking even by EDS standards.

As part of the 11-year, $321 million contract, EDS is designing, developing and implementing a new information solutions system that will streamline service delivery through multiple assistance programs operating within the counties. Designed to replace a 30-year-old legacy system, CalWIN is the largest information solutions system for social service agencies in the U.S. When completed, the system will help the counties deliver public assistance programs like cash assistance, food stamps, and employment services benefits to more than three million people. More than 30,000 users, from clerks to directors, will access CalWIN at over 700 geographically distributed sites throughout California.

Now, more than four years into the effort, the CalWIN project is notable not just for its size, but also for the successes the EDS team has already achieved in responding to changing customer needs while keeping the project on track, in terms of both cost and schedule. The IBM Rational Software Development Platform has played a key role in that success, helping the EDS team manage shifting requirements as well as the tremendous complexity and countless changes inherent in such a large undertaking. Dan Gonos, a Chief Technologist at EDS and technical director on the CalWIN project, explains, "On this project, we are using IBM Rational RequisitePro to manage our requirements. We use IBM Rational Rose to model our objects and our architecture. We use IBM Rational ClearQuest to manage our changes, defects and issues. And we use IBM Rational TestManager to manage our test cases and IBM Rational Robot for regression testing. The Rational tools have helped us succeed in a number of areas. They have allowed us to manage both rapid and gradual change over time. They have enabled us to ensure that we are building the right thing – what our client really asked for. And, they have helped our development team stay focused on the job at hand."

Responding to the RFP

The decision to use IBM Rational RequisitePro® was made very early on, during the Request for Proposal (RFP) process. The 5,000 page offering document of the RFP included approximately 6,000 requirements. Gonos notes, "Prior to even bidding on this project, we knew we needed to manage our requirements effectively. Typically, when you are delivering these types of systems, it is easy for requirements to get out of control and nobody knows what the actual requirements are. Proposals are scored by how well you address each of the requirements, so we needed to be able to extract the requirements out of the offering document and then specifically respond to each of the 6,000 requirements individually. We needed to make sure that we hit every requirement that the client had laid out. So, when the offering document came out, we took all of the requirements that were contained in it and loaded them into Rational RequisitePro."

The proposal team leveraged IBM Rational RequisitePro's ability to combine the familiarity and ease of Microsoft ® Word documents with powerful database capabilities for searching, prioritizing and analyzing requirements. Gonos continues, "We pulled the offering document into Rational RequisitePro and did searches for phrases such as 'must', 'may', 'shall include' and so on. We then mapped our responses to those requirements to make sure that we

had 100 percent coverage. That established the baseline and formed the basis for beginning the project. And, it really impressed the client -- a month later we were informed that we were the only company in the running for the project."

Establishing an Architecture

During the RFP process, the EDS team also used IBM Rational Rose to model the basic architecture of the system, which helped EDS in estimating the cost of the project. Gonos recalls, "After we validated the requirements in the RFP, we established a conceptual architecture in Rational Rose and bid a solution based on that architecture. We used the Rational Rose model as a basis for estimation. Of course at that point, some parts of the model were just shells. But we started out with that enterprise Rational Rose model and then evolved it after the project was started."

Based on the industry-standard Unified Modeling Language (UML), Rational Rose® helps teams visualize, specify, construct and document software artifacts. In addition, Rational Rose and UML facilitate team communication, which is essential on a project that is integrated with as many other systems and leverages as many technologies as CalWIN. "CalWIN interfaces with about 75 other new and legacy systems. Any time you are integrating systems -- especially systems being developed in parallel

– you need the people developing the interfaces to communicate. Rational Rose enables us to have a communication mechanism between the projects," Gonos reports. "Also, I've said that our solution integrates every technology known to man," jokes Gonos. He adds, "We use J2EE, C/C++, Cobol, PowerBuilder, BEA Tuxedo, Oracle, and XML. We use IBM WebSphere Application Server to support inquiry access and document generation in nine languages. We use IBM WebSphere Studio Application Studio as well as Microsoft Visual Studio. For backup management we use IBM Tivoli Storage Manager. And our servers are IBM eServer p690s running AIX."

Gonos notes that Rational Rose provides benefits to not only the approximately 200 analysts and developers on the EDS CalWIN team, but to the client's development team as well. "Today we have more than 50,000 architectural artifacts and about 75 different design patterns contained within Rational Rose. One of the key points is that, we can use Rational Rose to publish the architecture on our project's web page. So all of our developers -- and also our client -- have access to the architecture. They can dig into and mine each of the architectural components to determine their validity. Also, the State of California periodically hires contractors to come in as independent verification teams to assess the business risks and technical risks of the project, and they

use the Rational Rose model to make sure that we don't have any holes or other problems from a technical perspective," says Gonos.

Managing Requirements over Time

Each of the 18 counties involved in the CalWIN project has its own administrative practices. This requires, in effect, 18 different implementations of the system, each with its own tailored set of requirements. However, according to Gonos, neither the sheer number of requirements, nor the multiple implementations posed a challenge as great as coping with a set of requirements that evolves continuously. He explains, "Government agencies are in a constant state of change because State and Federal legislation and the influence of court cases on public policy. We get significant, core changes almost on a weekly basis. We have had over 1,500 change requests since the project started; and we have 500 open change requests currently. Our specifications are in a constant state of flux, and we need to be able to track changes over time. Some organizations use the offering document as the fall back position, but things change over time. Instead of managing changes to a 5,000 page document, we needed to be able to modify requirements and expectations with laser pinpoint accuracy, on an individual basis. Rational RequisitePro enables us to be successful in that area. I don't see how we could have managed all the change that we have gone through without it."

The EDS team was able to rapidly configure Rational RequisitePro to track customized attributes for each requirement, to better respond to customer inquiries. Gonos continues, "During the requirements validation phase, we went from 6,000 requirements to nearly 11,000, and today the system has about 13,000 requirements. With Rational RequisitePro we were able to quickly and on the fly, deal with specific kinds of questions that the client raised. We had started out with certain set of attributes in Rational RequisitePro, but we added custom attributes that helped us better analyze and mine those requirements quickly to respond to our client's questions and issues."

The Value of Enterprise Architecture

As the project progressed from general system design to detailed system design and beyond, Rational Rose played a key role in helping the CalWIN team evolve and elaborate designs and architecture throughout the development effort. "Our architecture establishes the foundation and is used as a benchmark to assess artifacts that are built. We began by modeling the architecture in Rational Rose in six areas including application infrastructure, system and network management, application platform and security. We then evolved those models through general system design and detailed system design and came up with final enterprise architectures on which we based all

of the coding of the specific functions of the application and the system. As we did that, with every iteration our models became more detailed. The last step of that process was to walk-through the system not only from a functional perspective but also from a technical perspective. We did that by looking at the architectural model and our design patterns in Rational Rose with the client to make sure we had everything covered from both perspectives," says Gonos.

The use of Rational Rose and visual modeling on the CalWIN is part of a comprehensive approach to architecture at EDS. Gonos explains, "I believe that all projects of this size need to start with an enterprise architecture. The architecture needs to be driven all the way through the organization and throughout the project, and not just at the front end. The architecture plays an important role in defining the boundaries by which all of the application code is developed. Too often, there are projects where somebody establishes an architecture, hands it off to the development team and that is the last time anyone sees it. At EDS, we take architecture down to the next level. We use it to answer questions throughout development: How do I build my application components? How do I build the service? What methods does that service need to have in order to link with all the other components within the system? How should the information be structured in the database so that it supports the application? How do I manage

the system once I've deployed these objects or deployed these applications? How do I manage quality and service levels? How do I ensure performance? And then finally, how do I secure access to those functions and information? One of the key benefits in using Rational Rose, is that it allows you to not only conceptualize the architectural vision, but allows you to document it and drive the organization. And it's critical to the success of projects of this size.".

Managing Change

Since EDS bid CalWIN as a fixed-price contract, managing change requests and tracking defects in Rational ClearQuest® is essential to keeping costs down and to the overall success of the project for EDS. Gonos explains, "We have our own change management process; and we use Rational ClearQuest to track and manage our changes. A change could be anything – a change to requirements, a new requirement, or there might be changes to deliverables. We have a change control board that meets on a weekly basis. It is a governance board in which EDS and our client consider and discuss the active changes being tracked in Rational ClearQuest. Rational ClearQuest helps us with release planning as well. For example, with Rational ClearQuest we can identify exactly what active changes will be in our next release – we have about 136 changes planned for the release that we are currently working on."

In addition to managing change requests that emerge as a result of public policy changes, the CalWIN team also uses Rational ClearQuest to track defects and other issues that occur during ongoing development. "We really use Rational ClearQuest for managing a variety of activities along with change tracking, including issue tracking and comments. We log an issue when there is a lack of consensus between parties. A comment might be a defect or it might simply be an idea for doing something in a different way. So throughout the lifecycle we use Rational ClearQuest to manage change and to know when we are done and ready to approve a deliverable. It is instrumental in enforcing a discipline to look at, document, and resolve comments. Often on large projects, a client may not approve a deliverable because they thought they heard one thing in a hallway conversation and the development team delivered another. By clearly documenting all issues and comments in Rational ClearQuest, we are able to track and manage them and successfully get the deliverables reviewed, approved and paid for on time," says Gonos.

Traceability and Testing

Integration between tools in the IBM Rational Software Development Platform enabled the CalWIN development team to establish traceability throughout development by linking requirements to test cases, change requests and other artifacts. And, because the client has access

to many of the same Rational tools used by the EDS team, it has better visibility into the project which helps to ensure that EDS delivers exactly what the client expects, with no big surprises when a release is delivered. Gonos notes, "Our client has a team of business analysts, technical analysts and project managers that work onsite, hand-in-hand with us on the project. Rational RequisitePro, Rational ClearQuest, and Rational TestManager are the primary tools that we have in common with our client. They enter changes and issues in Rational ClearQuest. They use RequisitePro to access requirements, and they use Rational TestManager in their user acceptance testing. Because each test case is traced back to a requirement, they can use it to make sure that we have coverage, and that all the requirements can be marked as satisfied. For the most part, every change we track in Rational ClearQuest has visibility or traceability back to requirements in Rational RequisitePro, and they may also have traceability to artifacts. And, we have traceability from our requirements in Rational RequisitePro to the artifacts in our system, and to the test cases in Rational TestManager. So we have dual traceability."

As the final stage before user acceptance testing, the EDS team performs system testing and creates regression tests using IBM Rational Robot. "We use Rational TestManager to ensure that in each of the test cases we are testing the actual CalWIN specifications. Then, when we are

doing the system test of a release, the last step in that is to record our regression scripts in Rational Robot for next time."

**Tools to Support
the Business**

According to Gonos, it is the flexibility and configurability of Rational tools that make them a great fit for CalWIN and so many other EDS projects. "We didn't select tools going into the project. We went in and defined the processes first. We identified our steps, our hand-offs, our inputs and outputs, the attributes that we wanted to track, and we developed the overall process; then we went to look for tools that would support these processes. We selected Rational tools because of their capabilities and because of the support they offered for configuring them to any process that we would possibly implement." He adds that Rational tools helped CalWIN focus their efforts and their training on the business. "It is very easy to train someone to use Rational tools. As a result, our training is much business focused-- it's where the tool meets the business. Often people rely too much on tools to drive their business; we use the Rational tools to support our business and keep everyone focused on what they need to do."

Ultimately, being responsive in the face of continuous change has proven to be one of the most impressive achievements of the CalWIN team. Gonos concludes, "Because we have to respond to change rapidly, we need to be able to quickly assess the impact of change. We need to assess the impact on the overall system not only from a technical perspective but from a financial perspective as well. With the Rational tools we have in place we can quickly identify what requirements are impacted and what artifacts are impacted. And, they enable us to make sure that we hit the mark, so we don't end up having to do rework at our expense."

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