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New York State Office of Real Property Services Improves Key Property Assessment System Using Rational Unified Process® Supported by Rational Tools

Overview

■ **Challenge**

The New York State Office of Real Property Services needed a more disciplined approach for developing quality software, and wanted to adopt a proven, consistent process and tools to support it.

■ **Solution**

Rational ClearCase, Rational ClearQuest, Rational Developer Network, Rational RequisitePro, Rational Robot, Rational Suite Enterprise, Rational Test Manager, Rational Unified Process, Rational University, Rational Services

■ **Results**

Adopted a more disciplined development approach on a key, ongoing project by implementing a proven, iterative development process and development tools that support and enforce it

Managed change and scope creep with effective tools for change management

Traced requirements and enhancement requests throughout development and testing

Through consulting relationships with local and county governments, The New York State Office of Real Property Services (ORPS) provides a wide range of services designed to ensure that taxpayers pay no more or less than their fair share of property taxes. ORPS is committed to supporting local governments in their pursuit of real property tax equity for the citizens of New York. That support comprises a number of software systems developed and maintained by the ORPS development team, including the Real Property System: Version 4 (RPS V4). This Windows-based client/server application is a collection of assessment, physical inventory and valuation programs for the assessing community. Built using PowerBuilder and a Sybase Adaptive Server Anywhere (ASA) database engine, RPS V4 enables assessors to keep their assessment and inventory information current and produce reports required by ORPS Rules and Regulations and by the New York State Real Property Tax Law.

Although RPS V4 was designed and built for strict compliance with New York State laws, policies and regulations, the development process used to create it was, in contrast, less structured. Bill Shanahan, the agency's Manager of Data Processing explains, "I've been trying to bring a more disciplined approach to software development into our agency for quite a few years. People just don't seem to have the time to try to implement a disciplined process. With budget cuts and with people leaving, most of the units seem to have their heads down, coding as fast as they can. You know the old saying — there's never time to do it right, but always time to fix it."

Michael Call, Associate Computer Programmer Analyst for ORPS, notes that in addition to the need for a formal, proven development process, the team lacked effective tools for managing change and automated testing. "We found we really needed to improve in two areas. First, the amount of testing and re-testing that we had to do was a real problem, so we needed to be able to test more efficiently and more effectively. The other problem area was being able to track defects that were submitted to us. At one point, we were just tracking them very informally on paper, with print screens. It was beginning to overwhelm us."

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Faced with these challenges, ORPS adopted the Rational Unified Process®, or RUP®, best practices, and a broad array of tools in Rational Suite® Enterprise, including solutions for effective requirements management, software configuration management, and automated testing. RUP is a flexible software development process platform that provides teams with customizable and consistent process guidance based on an iterative development approach and other best practices of software development. With training and support from Rational Services and Rational partners, the ORPS development team began using RUP and Rational tools on their largest and most important project — RPS V4. Although the project was well underway before the team adopted Rational tools and RUP, Call reports that Rational's solutions have had a remarkable, positive impact on the project and on the team's ability to successfully build software that meets user needs. "Rational's solution is really helping us focus on handling our challenges. With Rational, we have formalized our change management process and incorporated a change control board to help manage scope creep. We are better able to manage

and trace requirements all the way from feature requests through to test cases. We can identify and mitigate project risk earlier. And we have established a quality verification process in which testing begins when a change request is submitted."

A Logical Approach

During the time ORPS was still looking for ways to establish a more predictable development process, Shanahan and Call attended two Rational University training courses, Rational Unified Process Fundamentals and Principles of Managing Iterative Development. According to Call, it was at these courses that he realized that the Rational Unified Process was exactly what ORPS needed. "Bill and I attended both classes. It was after Principles of Managing Iterative Development that we talked and said, 'this just makes so much sense. This is really logical.' It is really the way we felt the team should go, and the way that all development should be done within ORPS." Shanahan adds, "We had fumbled around with Project Management classes here before. But, once we got into the Principles of Managing Iterative Development and we started talking about the mitigation of risks, that really struck a chord with us."

Call continues, "As we started to get a better understanding of RUP, and we began to evaluate how to use it, we naturally wanted to use the tools to support that process. At that point we brought in a Rational technical representative, and he took what I thought was a real honest, fresh, and positive approach. He said 'don't really worry about the tools right now. Get a better understanding of your process and RUP, understand what you want to do, and then get the tools to support that.'"

According to Shanahan, any process, by itself, would not have been a complete solution. He notes that Call was instrumental in implementing RUP as a well-documented, proven methodology supported by tools and training. "We've struggled with more disciplined approaches in the past. But, it didn't work well until we dedicated a resource to drive it. That is Mike's job here – to make this happen. That made all of the difference in the world to us in rolling out the Rational Unified Process here."

Addressing The Biggest Challenge First

Most teams adopting a new process choose to implement it for the first time on a non-crucial pilot project. On the RPS V4 project, however, the needs were so pressing, that the ORPS team decided to use it as the pilot project. "Our first step was actually a little against one of the principles of the Rational Unified Process. RUP says to start out with a small project that is not very critical. We chose probably the largest, most high-risk project in the agency to begin with. That was only because they were facing some severe gaps — problems that a project of that size often has, like managing change and scope creep. And we have found that the Rational process and the tools are solving those problems," says Call.

Once the team decided to follow the RUP methodology on RPS V4, they began by addressing the area of development that was causing them the most difficulty and contributing the most risk to the project: change management. Michael Griffen, Project Leader for RPS V4, recalls, "Prior to using Rational tools, we occasionally had what I called 'renegade development' going on. Change requests wouldn't always come through the manager.

Sometimes they went directly to the developer. In some cases, he or she decided to put the change right in, without getting proper authorization. Now, with Rational® ClearQuest®, we manage and monitor changes to see what's going on. We make sure that we have a change request in place before any action takes place."

Rational ClearQuest is a flexible defect tracking tool that the ORPS team uses to efficiently capture, track, and manage change throughout development. Griffen reports that he also finds Rational ClearQuest invaluable as a tool for monitoring project progress and estimating the level of effort needed to complete enhancements. "We've modified ClearQuest to fit our needs. For example, for each change request we added a number of ratings to record what impact the change will have on the code or other aspects of the system. We also added attributes to include time estimates from the analysts, the development and the testing teams. Once they've completed each of those steps, they can specify the actual time they spent on each one. I've developed reports that enable me to keep track of all of these things, and to more accurately estimate how much of our time would be required for new features."

Establishing a Change Control Board

To help manage scope creep, and ensure that user requests were prioritized and submitted to the development team in an organized, systematic way, ORPS also established a Change Management Team (CMT) and a Change Control Board (CCB). Call explains, "The concept of the change management team is right there in the Rational Unified Process and part of the Principles of Managing Iterative Development. We actually have established two teams. We have a project change management team, which is an internal team that is made up of the lead analyst and developers, and the project manager for RPS. We also have a change control board, which includes representatives from the agency itself and regional staff liaisons — representatives who deal very closely with assessors and county directors — as well as assessors and county directors, our ultimate end users."

He continues, "During the course of a year, we get scores — up to hundreds — of change requests, including defect reports and requests for enhancements and new features. As much as we would like to, we cannot address everything. So, prior to the start of every life cycle, the CMT determines what the scope of the application will be. We go through all the change requests that have been submitted, categorize them, and try to determine what we can do and what is most important to our users. At that point, we set a project scope and the CCB reviews and approves the scope of what our project team intends to put into the next release of the application. The CMT works during the life cycle to really manage the project, and the CCB may get involved again if new agency initiatives arise that may cause the scope of the project to change. Everything is really controlled through Rational ClearQuest. We require all changes to be submitted through ClearQuest using the desktop or the Web interfaces, which our regional staff uses."

After the Change Control Board approves the change requests for a new release, the team uses Rational ClearQuest to assign and communicate them to the development team. "All of that is really managed through Rational ClearQuest," Call says. "One of our early gaps was in change control and ClearQuest really did fill that gap."

Comprehensive Software Configuration Management

Rational ClearQuest, combined with Rational® ClearCase®, provides the RPS V4 project team with a comprehensive software configuration management solution. RPS V4 developers use Rational ClearCase to control changes to their source code and other software artifacts. Through an integration of Rational ClearCase and Rational ClearQuest, the development team is leveraging Unified Change Management (UCM), a powerful, out-of-the-box workflow for automating change across the software lifecycle. As a project leader, Griffen values the control that UCM provides. "Following UCM, together ClearQuest and ClearCase enforce a clear process, so that developers must have a change request before a coding change takes place. Also, with UCM, I can see for any given change request exactly what was changed and which objects were affected, and that is important as well." Call adds, "We have really improved in the area of change management and change control. With ClearCase and ClearQuest we can simply develop better software because we manage change better," Griffen says.

Traceability from Requirements to Test Cases

For the RPS V4, testing each new enhancement or feature approved by the Change Control Board is essential to the success of the release. To ensure that no enhancement slips by untested, the team takes advantage of the traceability between requirements in Rational® RequisitePro® and test cases in Rational® TestManager. Like Rational ClearQuest and RUP, these tools are part of the Team Unifying Platform that forms the foundation of Rational Suite. The RPS V4 team uses RequisitePro to manage requirements and use cases; and the team's five testers use Rational TestManager to document, control and monitor the testing effort. Call explains, "We want to have test cases for all of the change requests that come in. We felt the best way to document and to track all of the test cases and associated automated scripts would be to control all of it through RequisitePro. So, in RequisitePro we set up a series of requirement types that trace to use cases, flows, and ultimately a test case. Now, when a change request is submitted to us, we associate that change request to a use case and then create a test case that will test it. For those test cases, we create automated Rational Robot scripts. We don't have a script for each test case yet, but that's our goal — to have one for every test case."

Because Rational® Robot enables the RPS V4 testers to record scripts for automated functional and regression testing, they are able to create scripts rapidly, and use them repeatedly to test and verify use cases. Rational Robot and Rational TestManager are helping the team improve the quality of their testing process and of the application itself. Call continues, "Before we started using Rational tools, we were doing a lot of ad hoc testing. So one of our most important needs was to create a better testing methodology — and we focused it on Robot scripts."

Not In It Alone

The RPS V4 project team was not alone as they rolled out the Rational Unified Process methodology and began using Rational tools. They had the full support of Rational Services including Rational University training courses, on-site consulting, and access to the Rational Developer Network℠ — an online resource dedicated to the needs of the Rational development community. Call reports that his team frequently visits the Rational Developer Network to find quick answers to questions and to participate in discussion forums. "The people in my unit refer to it quite a bit. I know of several times that they have found it very useful in answering questions. They use it as an early resource, along with the forums."

Call adds that the quality of the training and the instructors exceeded expectations as well. "I can't overemphasize how important the Principles of Managing Iterative Development class was for us. It was partly the material, but it was also the instructor. The instructor was so knowledgeable and experienced. I can't overstate her helpfulness either; she was so good in that class, that when we decided to have RUP training in-house for our teams within the agency we asked for her specifically. She came in and established a great rapport and bond with us. She's just excellent."

Complementing the support and training provided by Rational Services, the ORPS team also benefited from training and consulting offered by Rational Business Alliance Program members and independent industry consultants with expertise in developing software using Rational tools and RUP. "We've had one of Rational's partners, RTTS, come in for some consulting in the areas of automated testing and test process. Also, a private consultant provides some of our initial training on-site, and does some consulting for us too," Call notes.

Looking Ahead

With all the success the RPS V4 team has had to date, ORPS is looking to leverage more Rational solutions in the near future, including Rational Rose® for model-driven development and Rational® ProjectConsole for monitoring and assessing project progress. Griffen notes, "We've had discussions around moving to a Web-based system, but for now have a pretty significant future left with RPS Version 4 and I see Rational being right there with us. I certainly see a great future with Rational tools." Call adds that the team has not yet realized the full potential of RUP and the Rational tools that they are already

using. "We feel like we have a way to go before the project team really begins to reap the rewards of this process. We are thoroughly convinced that RUP is the best approach and we are headed in the right direction. We haven't arrived yet, but we are well on our way."

For Call, the biggest advantages realized by ORPS have come from adopting the consistent RUP methodology. He concludes, "All the tools aren't going to really help if you don't have a good process. The biggest benefit for us is really the shift from a casual and informal process to a more formalized one. Some people think of formalization as something negative, but really, formalizing a process, and then being accountable to that process is very important. With Rational we are able to solve our challenges in a logical process — identify current needs, design a process that will work for us, and then use Rational tools to support that process. We're just getting started; we're just going to get better from here."

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