

IBM Rational Unified Process and IBM Rational Tools Help a Large Systems Integrator Improve Predictability, Productivity and Quality

Overview

■ **The Challenge**

Following the acquisition of several companies, the development at a large systems integrator wanted to re-certify at CMMI Level 3 and establish a foundation for pursuing Level 4. However, the team was using a range of disparate tools and a homegrown development process, which led to inefficiencies, systemic defects, and a competitive disadvantage.

■ **The Solution**

The group adopted IBM® Rational Unified Process®, or RUP® and IBM Rational® tools for requirements management, model-driven development, and software configuration management. IBM Rational Services provided training and consulting to assist in the deployment of a consistent process supported by integrated tools.

■ **The Benefit**

The development teams have seen significant improvements in efficiency and productivity. The group has been re-certified at CMMI Level 3 and is well positioned for gaining a further competitive edge by attaining CMMI Level 4. In addition, defects are found and repaired earlier, resulting in the delivery of higher-quality software.

Following a series of acquisitions, the defense systems team of a large systems integrator faced a challenge. Although the group had been previously certified at CMM Level 3 (the Software Engineering Institute's Capability Maturity Model for Software), the addition of new development teams would require re-certification. The team recognized that this effort, as well as future initiatives to achieve Capability Maturity Model Integration (CMMI) Level 4 certification, would be hampered because the development team was using a range of disparate development tools and a development process developed in-house. There was no formalized link between process and tools, so there was no easy way to ensure that new developers would be able to apply

the tools correctly in the context of the process. This in turn, raised concerns about the ability to properly absorb the new development teams into the established environment.

Because the team views certification as a competitive necessity and a potential differentiator, addressing the challenge was a key to the system integrator's continued success. A software process engineer that is also serving as project manager for the team explains, "We are a leader in technology integration of military and homeland defense solutions for a safer world. Many defense companies share this vision and we compete on that level. Typically, to be a Prime Contractor on a government awarded contract, you have to be at Level 3. Levels 4 and 5 make good business sense, and provide a competitive edge. In fact, other sectors and lines of businesses within our company are already certified at Level 5."

IBM Rational Solution Combines Development Tools and Process

While CMM re-certification provided an impetus for change, the group's leadership also recognized an opportunity to improve individual program performance in terms of

cost, schedules, resource allocation and reducing systemic defects. To address these challenges, the decision was made to use a single set of integrated tools across the development lifecycle, and to apply those tools in the context of a well-established, consistent and quantifiable development process. The group selected IBM Rational tools based on their support for the Unified Modeling Language (UML), their broad industry acceptance, and their ability to provide an integrated solution across multiple phases of development. The group also adopted Rational Unified Process (RUP) – a configurable software development process platform that provides the team with a consistent methodology, proven best practices and practical guidance on applying IBM Rational tools.

Initial Steps

After selecting IBM Rational tools and RUP, the development team committed to deploying them rapidly for use on all new development initiatives. The team planned a simultaneous roll-out of RUP along with:

- IBM Rational RequisitePro® for requirements management
- IBM Rational Rose® XDE® Developer for model-driven development, and
- IBM Rational ClearQuest® and IBM Rational ClearCase® for software configuration management.

To help implement this plan, they enlisted the support of IBM Rational services for on-site training and consulting. The project manager recalls, “IBM Rational would run training on the different workflows – for example a morning session for configuration and change management workflow, and the afternoon session for requirements management. The people who held those roles, and were responsible for the artifacts in those workflows would attend. The training was effective and the feedback was always very positive.”

In her dual roles as Software Process Engineer and Senior Project Manager, this engineer has been instrumental in implementing RUP on the projects she is responsible for -- and for providing guidance to other project managers within the group. She reports that RUP provides a framework for managing the various roles, activities, and artifacts on each project. “We’ve been able to promote reusability of the process across the board -- not only for my projects but for my peers’ as well.”

RUP Promotes Clear Communication

Since adopting the IBM Rational Unified Process, the project manager has benefited from improved communication with her team and with management. “RUP promotes clearer communication with the various team members, including systems engineers, program managers, hardware engineers, software

engineers, software quality assurance (SQA) engineers, organizational process owners, and senior managers. RUP has provided me with the process to exercise due diligence in making prudent judgment calls as a process engineer reporting to project and senior management. And with RUP, I am able to quantify the process, so I can now communicate process status in a way that meets business objectives,” she reports.

Applying Tools to Drive the Process

Because many of the group’s projects are military applications, requirements tend to be relatively stable once they are defined. They are not static however, and they do evolve over the life of any project. The team uses IBM Rational RequisitePro to establish requirements at project inception and to track and manage them throughout each project. “IBM Rational RequisitePro is a key tool for us. It does very well, and the engineers really prefer it over our previous tool,” notes the project manager. She adds, “It also plays a role in the RFP process. For example, if a customer likes what we did on a previous project, we can use Rational RequisitePro to carry those requirements over to the new project.”

Once requirements are defined, the team begins use case realizations and develops the system architecture using IBM Rational Rose XDE Developer. With industry standard UML support, Rational Rose XDE Developer contributed to the decision

to select IBM Rational tools. “Many of our requirement specifiers and principal engineers were proponents of UML,” explains the project manager. “I find it much easier to use than the modeling tool we were using. And that’s important because I’m in there using Rational Rose and the other tools. As a result, I can really understand what the other engineers are looking at and talk their language.”

Managing Change

To effectively manage change throughout development, the team is using a comprehensive software configuration management solution that comprises IBM Rational ClearCase for software asset management and IBM Rational ClearQuest for activity-based defect and change tracking. Together, Rational ClearCase and Rational ClearQuest support Unified Change Management (UCM) an out-of-the-box workflow that makes it easy for the team to relate change requests directly to changes in code and enforce a consistent process for submitting, assigning, resolving and verifying changes across the development lifecycle. “In UCM, I use Rational ClearQuest to assign RUP activities. And the engineers use both tools to see the activities assigned to them and to address defects. It is a well-integrated system -- check-in and check-out is tied to the change request. It is clear, it is powerful and it is easy to use,” says the project manager.

From requirements management to visual modeling and change management, she explains, IBM Rational tools provide more value than a similar set of non-integrated tools. “Before, our tools weren’t tied into the process. Now, because everyone is using the tools, and they are integrated, we can bring projects right on board very quickly. People start coming to the monthly status meetings, and can accurately report the status that’s related to a particular requirement. As a project manager, I just run standard queries, get the numbers back and then report that as required by the organizational standard process. Or if they want, the organizational side of the business can use IBM Rational ProjectConsole™ to assess project status. ”

Addressing Systemic Defects

According to the project manager, one of the key benefits of RUP is the ability to address “systemic defects” – inconsistencies in the team’s processes that lead to defects in the software being built. The ability to configure the process based on business context, the size of the software development effort, the degree of novelty or innovation required, and the type of application help the project manager address these issues. “By using RUP, I can define the systemic defect, find its root cause and then follow the respective guidelines. IBM’s mapping of RUP activities and artifacts to the CMM Levels 2 and 3 allow to me to produce quantitative and textual summary

reports to address these issues. We have found systemic defects early and corrected them; the savings of time and money is obvious. We’re definitely able to predict potential problems faster. Because we find more on the inside, fewer product defects make it to the customer.”

Quantifying the Process

The group has been re-certified at CMM Level 3, and is now moving towards CMMI Level 4 certification with confidence. The project manager notes that the ability to quantify RUP in terms of activities, artifacts and roles is a huge advantage in this initiative. “With RUP I can go into a team meeting and know that I’ve got the right people there based on all the artifacts that are in play and the roles that own those artifacts. I’ll have a list of checkpoints for those artifacts —sometimes we take care of 35 steps or more in those meetings and the team doesn’t even realize it. Then I just summarize that in meeting minutes, and when a CMM assessor comes in I have it to show them.”

She adds, “It’s hard to quantify a homegrown process. In fact, my job would be extremely difficult without RUP. Numbers get action and CMMI Level 4 is about the numbers. RUP provides the defined process by which I can quantify results. Without RUP, I would have nothing to easily and readily quantify to use for assessing the impact or driving the need of process changes. RUP makes it easier to satisfy CMMI Level 4 key

practices, because it is easier to quantify, navigate and maintain. With RUP, I can efficiently and effectively address the process in accordance with the CMMI key practices. As a Software Process Engineer, I use this information to ensure quality is built into the software development process through right people performing the right tasks in the right sequence.”

The result, she says, provides the group with a competitive advantage. “When potential customers come in, they see a higher level of process maturity. If they see we have Level 4 behaviors, and our competition has Level 3, then they have more confidence in us,” she says.

Increased Efficiency

In addition to improved software quality and process maturity, IBM Rational tools and RUP have contributed to increased efficiency and productivity for the development team. The project manager notes that the increase in efficiency – which she estimates at 30 percent or more – goes hand-in-hand with improvements in predictability and scheduling. Instead of long days spent working right up to a deadline, engineers can work a standard schedule and frequently have time to conduct extra testing before a release. She explains, “We like to take advantage of as much testing as possible; so when we find we have more time, we run through more tests. Now, because of improved process

efficiency and improved predictability we don’t have to stay late into the evening. With RUP, I know everything that is going to have to happen to get a deployment unit out the door. I can quantify it. And, I can schedule such that the necessary steps happen early enough that we still reach our milestones but we don’t put in days that last until midnight.”



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