Rational software

Holland Railconsult Powers Ahead with Rational Rose and Rational Unified Process

A century and a half ago, managing railway infrastructure required a pen, paper and meticulous attention to detail. Today, it requires the same keen focus, but the pen and paper have been replaced with sophisticated computer-aided design tools. As a leading consulting engineering firm for public transport and railway infrastructure, Holland Railconsult develops advanced design automation tools for the railway industry. With origins that date back to the pen-and-paper days, Holland Railconsult can draw on 150 years of railway engineering know-how and experience, acquired on one of the most intensively traveled railway networks in the world.

Over the years, the amount of electronic design data increased dramatically, and the need for comprehensive Computer Aided Railway Engineering (CARE) tools increased as well. As Holland Railconsult's solutions expanded to meet these new demands, they found that their classic waterfall approach to software development — in which a project proceeds sequentially through design, coding and testing — was unsuitable. The team also noticed that the maintenance phase of their development projects was becoming an issue. Recognizing these needs, the Holland Railconsult team switched from the waterfall approach to the Rational Unified Process®, or RUP®, and began following its iterative development process. The team also began using the industry-leading tool for model-driven development, Rational Rose®, to communicate effectively, manage complexity, and document their systems more accurately.

The results have been exceptional. According to Jaap van Sprakelaar, Software Engineer and Team Leader at Holland Railconsult, "One of our most important goals is to build a product that meets the needs of our customers. With Rational Rose and the Rational Unified Process we are able to be much more precise and really give them what they want. Also, because they are used in engineering safety systems, our products have to be of very high quality. With Rational we have a higher level of confidence in the quality of our products, and we are better able to predict exactly what new features will be in each release."

The Way It Used to Be

To provide a better understanding of the challenges that Holland Railconsult faced, Van Sprakelaar starts at the beginning. "Our history dates back to the time when people were using paper and pen for the design for rail traffic. When we started looking for a better way, we looked at the computer aided engineering tools used in the electronics industry. We thought there was an opportunity for us to use those tools as well, because a railway, with its lines and signals, is like a network." He continues, "We used a software development process, but it was a huge process that used the waterfall method. As our system grew bigger and bigger, it was clear that this standard was less suitable for our relatively small design automation development projects."

In addition to the need for a more predictable and practical development process, Holland Railconsult recognized other opportunities for improvement. "We were facing more and more problems in the maintenance phase," Van Sprakelaar remembers. "There was no standardized documentation set which the software engineers could use. As a result, if someone developed a tool, they were more or less coupled to the tool as long as they worked within Holland Railconsult. If there were questions, that person had to answer them; and they had to implement any new requirements. We wanted to be able to bring a product to the market and then give it to the

service desk to maintain and support. This was very important to us, because the lifetime of a product is typically 7 or 8 years — quite long. Also, when software engineers changed jobs, it was difficult for someone else to maintain the tool that they had worked on. We needed to be more flexible. We wanted our team to be able to switch more easily, and we determined we needed to standardize."

Tackling the Most Important Issues First

With their needs clearly defined, the Holland Railconsult team started by addressing the areas that presented the most difficulties. That strategy, Van Sprakelaar discovered, is advocated by the iterative development process in RUP — tackle the areas of highest risk as early as possible. He explains, "We looked at where the biggest problems were, and it was in going from analysis and design to implementation. We asked ourselves, 'What do we need?' And the answer was clear — a standardized process and modeling tools." Several engineers on the Holland Railconsult team had used Rational Rose in their work for other companies and felt that it would be an excellent solution for Holland Railconsult's needs. After getting an introduction to Rational tools and process from a Rational Professional Services consultant, Van Sprakelaar was convinced too.

He remembers, "We decided not to start with the entire Rational tool set and process; but instead focus on our biggest problems first. Later on we found out that this is one of the principles of iterative development and the Rational Unified Process: Start with areas of highest risk. And, it is nice to know that when we address those difficulties, and other issues arise, Rational offers solutions for those areas as well."

"The waterfall process didn't fit the way we develop design automation software. It is much better to have an incremental and iterative process, to reflect the product to the customer during design and development. We can show them what we have built, and see if they are satisfied. It makes it much easier for us to go through the design process," Van Sprakelaar says.

He adds that Philippe Kruchten's article "From Waterfall to Iterative Development", which he found while browsing the Rational Developer NetworkSM, really helped him understand the benefits and value of adopting an iterative development process at Holland Railconsult. "Our software architect uses the Rational Developer Network as well — especially now that he is working with design templates and design patterns to increase software reuse and productivity."

Getting Started

To ensure a swift and seamless adoption of the Rational Unified Process and Rational Rose, the development team attended Rational University Training courses on-site at Holland Railconsult, including Rational Unified Process Fundamentals, Fundamentals of Rational Rose, and Object-Oriented Analysis and Design with UML. Their Rational Technical Representative, Peter van der Heijde, tailored the course content to Holland Railconsult's specific needs. In addition, van der Heijde also developed an implementation plan, which included the installation of RUP and Rational Rose.

"Peter not only helped us implement the plan, he also delivered the tools and provided the customized training. The training was on the fundamentals, but it was focused on our specific issues. It was very good. That was a year and a half ago and we are getting more and more enthusiastic about the Rational Unified Process and Rational Rose. We think of Rational as a partner — a partner that is always keeping us up-to-date," Van Sprakelaar says.

"We Are All Talking the Same Language"

Like most developers, the software engineers at Holland Railconsult are eager to implement enhancements and, when needed, fixes to their software. In the past they often headed directly for the source code. In the long run, this practice was not always the best approach according to Van Sprakelaar. "Developers want to start solving the problem immediately, and they often forget to update the documentation when they are done. Now with Rational Rose, we can use round-trip engineering, so when we made modifications to the source code, we could update our

model." Rational Rose enables the Holland Railconsult team to generate source code for Java, Visual Basic and C++ from their visual models. Similarly, if changes are made to the source code, the developers can reverse-engineer the models from the source. This round-trip engineering ensures that the models and the underlying source code remain synchronized throughout development and throughout the life of the software.

Now that Holland Railconsult is modeling its software using the Unified Modeling Language (UML) in Rational Rose, it is much easier for the entire team to communicate and understand every component of the system — not just the ones they regularly work on. As Van Sprakelaar explains, "We are much more flexible; and we can add people into projects easily. Anybody can work on any part of the product because we have standardized. We are all talking the same language in software engineering, which is not always easy."

Holland Railconsult also uses Rational Rose to model their Oracle databases. "When we design and develop our applications that access a database — for example a test book generator which receives information from the database in XML format — we need a model of the database. So we use Rational Rose to model our database in UML as well. It really helps to have it right there in Rational Rose along with our application model."

Process Made Practical

The Rational Unified Process also helped the development team "speak the same language" by providing a standardized, yet custom-tailored process that everyone could easily follow. "We tailored RUP to our needs," notes Van Sprakelaar. "We created vision documents, gathered stakeholders requests, defined software requirements specifications, developed use cases using Rational Rose, and then started the implementation. The Rational Unified Process is a kind of knowledge base that you can tailor to suit your requirements — you do not have to implement every part of it."

He continues, "RUP is very practical. For example, we need to specify a new design system in UML so we can implement it. Just recently, I was reading the Rational Unified

Process and it suggested ways of tackling the problem. We started a discussion, and we decided to address one part of the problem and then use the same method for the rest. This makes my job easier."

More Satisfied Customers, Higher Quality Products

Understanding and then fulfilling stakeholder needs is a principle goal of Holland Railconsult and every successful software development organization. Additionally, in the railway industry, safety regulations demand that the applications produced by Holland Railconsult be of exceptionally high quality. According to Van Sprakelaar, Rational Rose and the Rational Unified Process have helped Holland Railconsult in both of these key areas, while simultaneously saving time and reducing costs. "From a software engineering point of view, one of our biggest advantages is our improved interaction with the stakeholders. One of our most important objectives is to fulfill stakeholder and customer needs by building the right product. In the past, we'd build a product with little input from the end-users. Now, our stakeholders play an important role in creating the vision document, developing use cases and providing feedback on early releases. Plus, since we started using the Rational Unified Process and Rational Rose we know exactly what problems will be fixed and what use cases will be implemented in each release. In the past, with the waterfall process, we were not able to accurately predict what would be in a release." Software Architect Fokko van Dijk notes ironically, "Since we started using RUP we have cancelled three projects." He explains that with the added insight into stakeholder requirements, Holland Railconsult has realized that some planned projects were not actually needed — and canceling them has saved the company significant time and cost.

Although Holland Railconsult has been using Rational Rose and RUP for little more than a year — not a long time compared to the lifetime of its products — Van Sprakelaar has already noticed an increase in productivity accompanied by reduced costs. "In the first year, we estimated a five percent reduction in costs. It may not seem like a lot, but there are 20 people on our team, and we have saved

the cost of one person — that is a lot of money. And that is only the start. The product has just been released and we are coming to the maintenance and service phase where we will really see the advantages of having standardized models in Rational Rose. We expect we will save 20 percent or more in the maintenance phase."

Holland Railconsult has realized a number of significant benefits from the use of RUP and Rational Rose, including added flexibility, improved consistency through round-trip engineering, and increased productivity. But, for Van Sprakelaar the most important benefits are centered squarely on meeting stakeholder needs with high quality software. He concludes, "With Rational, we are now much better able to fulfill customer needs, right from the start of the project and during its whole lifecycle. And certainly the quality of our products has increased as a direct result of Rational Rose and the Rational Unified Process."

About Rational

Rational provides a software development platform that improves the speed, quality, and predictability of software projects. This integrated, full life-cycle solution combines software engineering best practices, market-leading tools, and professional services. Ninety-six of the Fortune 100 rely on Rational tools and services to build better software, faster. This open platform is extended by partners who provide more than 500 complementary products and services.

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