

Trane

FAST FACTS

Company

Trane, the air conditioning systems and services business of American Standard Companies, is a leading global provider of indoor comfort systems and comprehensive facility solutions

Industry

Manufacturing

Geography

US

Challenges

- Eliminate inefficiencies related to manual processes
- Eliminate rework due to missed requirements
- Accommodate growth

Solution

- Borland® CaliberRM™
- Borland® StarTeam®

Results

- Return-on-investment payback in one year
- 15- 50% more efficient
- Improved software quality

EXECUTIVE SUMMARY

Trane is the air conditioning systems and services business of American Standard Companies. The organization sets themselves apart through their unit-level and building unit controls capabilities, which customers use to monitor all of the inputs to maintain space comfort or deliver cold air or cold water to the systems in a building. To improve operational excellence as a result of process efficiency and raise customer satisfaction as a result of quality assurance, the product engineering group within Trane's building automation and unit-level controls division completed an in-depth requirements management assessment. The team determined the company could save approximately \$500,000 per year by eliminating inefficiencies associated with requirements definition, missed requirements and document storage and retrieval. Today, the team relies on the Borland Application Lifecycle Management (ALM) solution, including Borland® CaliberRM™ for requirements definition and management and Borland® StarTeam® for software change management, to help increase efficiencies and the quality of its software delivery.

COMPANY

Trane, the air conditioning systems and services business of American Standard Companies, is a leading global provider of indoor comfort systems and comprehensive facility solutions. Its offerings include energy efficient heating, ventilating and air conditioning systems, service and parts support, advanced building controls and financing solutions. Each Trane system is designed to meet the specific needs of customers who want heating, cooling, dehumidifying and air cleaning systems for residential, commercial, institutional and industrial applications. In 2004, Trane contributed \$5.3 billion to American Standard's total sales of approximately \$9.5B.

CHALLENGES

Effective requirements definition and management can reduce application development costs. For example, rework typically accounts for 40% of a development organization's total spend with most of the effort focused on correcting requirements defects¹. In addition, the cost of correcting an erroneous requirement after a product has been released can be 100 times more expensive than if that same error had been discovered during the requirements development phase.² The product engineering group within Trane's building automation and unit-level controls division believed that establishing a robust process and applying automation to their requirements definition and management process, as well as their software change management process, could help the company to achieve two key objectives:

- **Improve operational excellence as a result of process efficiency**
- **Raise customer satisfaction as a result of quality assurance**

After conducting a comprehensive analysis to reveal areas for improving their requirements definition and management and software change management process, the division determined that they could drive costs out of the process by addressing the following challenges:

¹ Grady, Robert B. 1999. "An Economic Release Decision Model: Insights into Software Project Management." In Proceedings of the Applications of Software Measurement Conference, pp. 227-239. Orange Park, Fla.: Software Quality Engineering.

² Research from James Martin, An Information Systems Manifesto, demonstrates that 82% of rework efforts is focused on correcting requirements defects.

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– Brady Moroney, group manager, Trane

Eliminate inefficiencies related to manual processes

The team identified five primary areas in which they could drive costs out of their application development lifecycle by eliminating inefficiencies associated with the reliance of manual processes. For example, the team determined that they could save approximately \$120,000 annually by eliminating the manual processes associated with authoring product requirements documents and approximately \$20,000 annually by gains associated with compiling requirements that did not make it into a particular project for new projects. On the whole, the team projected that they could save over \$250,000 per year by eliminating these kinds of inefficiencies.

Eliminate rework due to missed requirements

Although the building automation and unit-level controls division product engineering team had a process for eliciting requirements from stakeholders, the team had no centralized repository for storing software requirements. The group instead relied on Microsoft Word documents to manually share, version and interact with requirements. This created inefficiencies related to requirements management primarily related to the inability to reuse requirements from project to project. This led to missed requirements, which could result in delayed planning and increased time to market for product releases. Missed requirements was not only an operational issue, but a customer satisfaction issue as well. By eliminating the impact missed requirements was having on the application lifecycle, Trane estimated it could save over \$200,000 per year.

The building automation and unit-level controls division typically issued service packs on its major products quarterly to correct defects and provide minor enhancements. As part of its building the business case for application development lifecycle automation, the team analyzed its service pack production in an effort to quantify the associated expense. By automating the process associated with service pack production, the team estimated a 39% reduction in service pack releases, equaling a savings of approximately \$136,000 annually.

Accommodate growth

Trane is a growing business. Within the building automation and unit-level controls division, engineering grew approximately 20%, and the product engineering team grew approximately 50%, over the past two years. In an effort to optimize the efficiency of new product engineers, the team wanted to establish unified processes and tools that would help maintain consistency and communication throughout the development lifecycle.

SOLUTION

The product engineering group within Trane’s building automation and unit-level controls division conducted a rigorous requirement definition and management and change management tools selection and evaluation process based on the Six Sigma methodology. The team selected the Borland Application Lifecycle Management (ALM) solution, including Borland® CaliberRM™ and Borland® StarTeam® over competing products to automate its requirements and configuration and change management process and serve as a requirements document repository that could be accessed in a variety of locations throughout the enterprise. The team selected Borland because it achieved the highest overall score against the selection criteria, had the lowest total cost of ownership and delivered the most tool flexibility.

“Borland CaliberRM provided the most flexibility - which we needed to support the way we capture and store software requirements,” explained Brady Moroney, group manager in the product engineering group within Trane’s building automation and unit-level controls division. “It also most effectively supported our team’s requirements to communicate and collaborate with our distributed engineering team. In addition, Borland StarTeam provided the robust change control, document management and defect tracking features we were looking for.”

Prior to installing Borland CaliberRM, the team used Microsoft Word documents to capture and communicate software requirements. The Word document would then go through a series of reviews within both product marketing and engineering. During those reviews, inevitably, requirements would

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change due to costs, schedules or scope, and the Word document would need to be updated. The updated document was then stored and used mostly as historical reference. This manual process was challenging for the team because once changes were made, requirements that were deferred were not well tracked and were sometimes lost.

“We didn’t have a good process for documenting and communicating deferred requirements. If a requirement was deferred from a current project to a future project, that requirement would sometimes fall by the wayside.” said Allyn Salisbury, product engineer at Trane. “Since we were using Word documents or sometimes ad-hoc communications, it was difficult to routinely pull deferred requirements into new projects from prior iterations. With Borland CaliberRM, our team is now able to re-organize, re-tag and re-classify requirements throughout the phases of the development lifecycle, which ensures deferred requirements make it into appropriate future releases.”

Borland StarTeam is used to capture change requests, which then are entered into Borland CaliberRM as requirements. Borland CaliberRM then houses requirements for up to 20 projects at a time, all in different phases of development. For the larger platform projects, Borland CaliberRM manages between 600 and 800 distinct requirements.

“Managing this volume of requirements would have been impossible to do with our old manual approach,” said Moroney. “In Borland CaliberRM, we can prioritize requirements as essential, we can stipulate in which phase of development they belong, we can move them around easily, and we can organize them differently. Another big benefit to us is the ability to defer them to another phase which shows engineering that a requirement is coming, so they can plan their work accordingly.”

The Trane team uses Borland CaliberRM to map functionality driven by industry standards into specific projects. For example, most heating ventilation and air conditioning and companies (HVAC) follow the ASHRAE BACnet standard for transferring data between HVAC systems. The Trane team captures the requirements for compliance with this standard in Borland

CaliberRM, so when a change is made to the standard, it immediately trickles down into mapped requirements in all active and future projects.

The automated requirements system also helps Trane’s product engineering group do a better job of informing the 100+ development engineers about requirements, which benefits all projects. The team has many users accessing the system simultaneously, both locally and remotely. Therefore features such as access control, change control, easily maintaining the tool and back up of the data were important for data integrity.

Discussion tabs are another key feature of Borland CaliberRM that the team is leveraging. Using the discussion tabs, engineers can post questions about specific requirements for the product engineering team, and it is all traceable and auditable which boosts the integrity of the requirement.

“It’s no longer a discussion between two individuals, but rather a vehicle to communicate and track what decisions we’ve made and why,” added Salisbury. “Borland CaliberRM has made it much easier for everyone to see the bigger picture on projects and to have interactions with our engineering group about requirements.”

RESULTS

Using the Borland ALM solution, Trane’s project engineering team has automated its requirements definition and management and change and change management processes to provide greater predictability and visibility across the development lifecycle.

Return-on-investment payback in one year

15- 50% more efficient

Today, Borland CaliberRM serves as a central repository for all software requirements handled by the engineering teams for Trane’s building automation and unit-level controls division. This has helped the team to improve efficiency and overcome a number of communication and collaboration challenges, including finding older documents stored on hard drives. The solution is also expected to provide the team with the ability to reuse requirements. “When we start reusing requirements, we

expect to see a bigger impact in efficiency,” said Moroney. “For a small project with 40-50 requirements, I estimate a 15% gain, while for larger projects with 700-800 requirements, I think we can expect to see about a 50% gain in efficiency.”

Improved software quality

Although most often only accessible to building owners and facilities managers, tenants always know when Trane controls are working—and when they are not. Borland CaliberRM has helped apply a discipline to the team’s requirements process that previously did not exist.

Since implementing the Borland CaliberRM solution, the number of defects that went into the first Service Pack for a major platform release was greatly reduced. “We are definitely seeing the impact,” Moroney explained.

Borland is the leading vendor of Open Application Lifecycle Management (ALM) solutions - open to customers’ processes, tools and platforms - providing the flexibility to manage, measure and improve the software delivery process.