

# ***I-Logix' Rhapsody Brings Change in Process, and Productivity Improvements to The Trane Company***

A \$3 billion developer of heating, ventilation, and air conditioning (HVAC) systems, The Trane Company is known worldwide for developing modern, efficient indoor comfort systems for residential, commercial, industrial and process applications. The company's commercial systems division, Trane Worldwide Applied Systems Group, has established itself as an innovative and environmentally conscious developer of HVAC systems for hospitals and healthcare institutions; large office buildings; industrial and manufacturing plants; hotels, hospitality and recreational facilities; and schools.

## **A Rare Opportunity**

A recent project for a new high-efficiency water chiller brought Pat Wilson, manager of software engineering for Unit Controls Engineering in Trane's Worldwide Applied Systems Group, face-to-face with a unique opportunity: to implement a development environment that would help to significantly improve his team's design process. It was a chance for the team to use the latest development technologies and take advantage of next-generation software tools. "This was a rare opportunity for myself and my team of developers and engineers to redesign the entire process—from development to design to testing—using the latest and most advanced tools available," said Wilson.

## **A Common Problem, A Unique Solution**

Like most software developers and engineers, the Unit Controls Engineering team was facing the challenge of how to increase quality and meet rapid time-to-market pressures, and needed a tool that could speed the development process while preserving product quality. "We were looking to solve the classic tools problem in software development: how to speed the process up while maintaining quality. We needed a tool that could do that while meeting other specific project needs, such as providing us with graphical interfaces, better design documentation, hierarchical views of the design model and source code, optimization of existing resources, and increased levels of software re-use for future projects—with fewer bugs. It was definitely a tall order," said Wilson.

In addition, the tool that Wilson sought had to meet an added challenge: he wanted the application written in C++. Unfortunately, the team had little experience in this area. "We wanted to reuse our designs for future projects, so finding a tool that gave us the ability to develop in C++ was very important. But in switching to a new language, we faced a steep

learning curve. The tool we chose needed to play a major role in smoothing out this curve; we couldn't use valuable project time to learn a new language," Wilson said.


A tool selection team was formed, and, after investigating several development tools—including those from ObjecTime and Rational Software—the team found the tool that met the project requirements: I-Logix Rhapsody®, a Visual Programming Environment that provides true "concept-to-code" capability. Based on the Unified Modeling Language™ (UML™), Rhapsody is an object oriented development tool that automatically generates complete production code, including the underlying architecture, behavioral characteristics, and real-time framework. "On a consultant's recommendation, we tried Rhapsody and were immediately impressed by the features it offered. Rhapsody met every one of our requirements and, more importantly, it smoothed out our C++ learning curve," said Wilson.

## **Immediate ROI**

According to Wilson, the team recouped the short training time immediately. "When we began doing the up-front analysis and design, we found that Rhapsody's ability to generate code right from the UML model, including the Statecharts, saved us a lot of time. The link between the code and the diagrams assures that the diagrams are accurate throughout the life of the project, greatly increasing their usefulness compared to those generated by other tools," said Wilson.

Due to Rhapsody's unique model/code associativity, which allows developers to generate and debug source code simultaneously, the Trane team was able to cut 30 percent off of its development process. Rhapsody's ability to validate code on the fly let the Trane team break out of the traditional (but inefficient) design process. Before Rhapsody, the Trane engineers followed a serial development methodolo-





gy: Develop the source code first, then debug the software separately. With Rhapsody, design, implementation, and testing were done in a simultaneous-and linked-process. Trane's engineers were able to generate the code and test it, check its sequence, and identify and fix problems at any time in the design/analysis phase.

"The biggest difference on this project was that, as a UML-based tool, Rhapsody was able to provide us with graphical views of the up-front analysis and design. This allowed us to directly link to the production code, so we could generate and debug the code at the same time, rather than as two separate processes. We were able to take a water chiller from blackboard to test in just three months, which is extremely fast for a project like this," said Wilson.

And Trane's development team did not have to spend valuable time testing and re-testing, because Rhapsody emphasizes and facilitates design iteration-instead of forcing repeated product iterations.

#### **Setting A Precedent for Future Projects**

The initial project was so successful that the team has used Rhapsody for a subsequent project. As a result of Rhapsody's reverse engineering capabilities, the team could, for the first time, reuse previous designs, confident that they would work correctly. Through re-use of previously implemented code and now re-use of design models, Trane's second water chiller project is already in the laboratory-testing phase. "On the first water chiller project, we realized a 30 percent time-savings compared to similar projects we had done with other tools. Now, with this second project, we believe we will see even greater time-savings, leaving us more time for perfecting the chiller in laboratory testing," said Wilson.

Of considerable benefit as well was that-thanks to Rhapsody's code re-use capabilities-Wilson and his team have created standard ways to map out designs for future projects. "Now we won't have to spend valuable cycles at the beginning of the project developing diagrams and designing objects that will be useless at the end-or sometimes during-the project. Graphically planning with Rhapsody makes the development process that much quicker and efficient because the code is directly linked to the diagrams," said Wilson.

Wilson is planning to use Rhapsody for Unit Controls Engineering's next project: applying

embedded controls to an entirely new product line. "We will definitely be at an advantage for this next project, and expect to continue realizing time and resource savings. Rhapsody met every one of our goals for this project, and provided added benefits we didn't anticipate," said Wilson.

#### **About I-Logix**

Founded in 1987, I-Logix is a venture backed software company that provides enterprise solutions for real-time embedded applications development in the growing pervasive computing market. I-Logix solutions significantly compress systems and software development cycles while improving product quality. These products allow engineers to graphically model the behavior and functionality of their embedded systems, analyze and validate the system and automatically generate production quality code in a variety of languages. I-Logix uniquely integrates and associates the entire design flow from concept to code across an enterprise using both conventional and collaborative Web-enabled technology.

I-Logix is a member of the Object Management Group™ (OMG™), the Bluetooth SIG, the International Council of Systems Engineers (INCOSE), a founding member of the Embedded Linux Consortium and a co-author of the Unified Modeling Language™ (UML™). The company is headquartered in Andover, Mass., and has sales offices and distributors throughout the USA, Europe and the Far East. I-Logix can be found on the Internet at [www.ilogix.com](http://www.ilogix.com)

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