IBM

Merck KGaA fosters research collaboration with WebSphere software from IBM.

Overview

- **Challenge**
  Transform paperbound chemical analysis processes into an efficient online workflow and data sharing system

- **Solution: Integrating Stage**
  Q-DIS/R, a custom-developed laboratory information management system

- **Why IBM**
  Support for Java™ technologies in IBM WebSphere® Application Server; scalability and extensibility across multiple platforms; experience of IBM Business Partner

- **Key Business Benefits**
  Easier data sharing and collaboration; reduction of duplicate analyses; 25% reduction in turnaround time for order analysis; €5,000 annual reduction in costs of paperwork, paper and archiving per lab; more efficient workflow and billing

- **Business Partner**
  Creon•Lab•Control

With more than 34,000 employees in 55 countries, the Merck Group generated sales of 7.5 billion euros (US$7.3 billion) in 2001.

Researchers at Darmstadt, Germany-based Merck KGaA (Merck) are at the epicenter of some of the most exciting developments in the pharmaceutical industry—from elucidating the structure of a protein that plays a major role in the control of cancer to developing a medication that more effectively reduces the risk of heart attacks and death from coronary heart disease. No doubt, one of the reasons Merck has achieved and continues to achieve these breakthroughs is because it gives its researchers the freedom to pursue their ideas, as well as the resources and technologies to bring those ideas to life.

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–Dr. Jan Hauss, Manager, Nuclear Magnetic Resonance Lab, Merck KGaA

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Key Components

Software

- IBM WebSphere Application Server, Advanced Edition
- IBM WebSphere Studio Application Developer (formerly IBM VisualAge® for Java)

Servers

- IBM RS/6000® SP™

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—Hans-Joachim Küstner, CEO, Creon•Lab•Control

Merck's 2,000 researchers rely on as many as 30 testing labs, which analyze the chemical compounds that Merck develops or purchases. Structural chemical analysis assists researchers in the discovery of promising new products for medical and industrial applications, while impurity profiling helps Merck assure the quality of its products.

The labs operate as service centers. They accept samples for analysis from researchers and quality assurance technicians, routing the samples through tests in one or more labs. Then, they return the samples, together with the analysis reports, to the requesters.

Until recently, however, the entire analysis process was paper-based. "Each lab stored the analysis data it gathered—collectively amassing some 600 kilograms of paper for the 20,000 analyses completed each year," explains Dr. Jan Hauss, manager of Merck's Nuclear Magnetic Resonance Lab. "Clearly, we wanted to eliminate the paper and archiving costs as well as the environmental waste. But we also wanted to enable the labs to combine their results into a data warehouse so we could provide value-added research services. And we wanted the researchers to be able to readily benefit from the analysis data that their colleagues had requested, which would lead to greater collaboration and fewer duplicate analyses."

Faced with a dearth of off-the-shelf software to meet its needs, Merck sent out a request for proposals for a custom-developed lab information management system (LIMS). Envisioning that the system would ultimately be used daily by thousands of people, the company wanted it to be fault-tolerant and highly scalable. And due to the plethora of client and server platforms in use at Merck, the ideal solution would be based on Java technology and run on multiple server operating systems.

When the proposals came in, only a joint solution from IBM Business Partners CREON Software and Lab Control (now Creon•Lab•Control) met all of Merck's technical requirements. The solution was based on WebSphere software from IBM, which Creon•Lab•Control and Merck chose for several reasons. Hauss explains, "IBM WebSphere Application Server is based on open standards such as Java technology, Enterprise JavaBeans and SQL. It can run on a broad range of servers, from a small Intel-based system to clustered Linux®, UNIX® or mainframe platforms. This scalability and flexibility made the WebSphere software solution technically and economically superior to the others. Backed by IBM support, it was also a low-risk option. Furthermore, by using IBM WebSphere Studio Application Developer [formerly IBM VisualAge for Java] as our development environment, we saw that we could complete the project quickly and cost-efficiently and keep our application maintenance expenses low."

Recently deployed to serve three of Merck KGaA's labs, the new LIMS, called Q-DIS/R, is currently used by more than 400 researchers and 40 lab technicians. Already, Q-DIS/R has reduced turnaround time for analysis orders by 25 percent. Ultimately, Q-DIS/R is expected to process as many as 20,000 analysis orders a year and store 50,000 result sets. In doing so, the system will enable Merck to dispense with its paper-based archives, at a savings of €5,000 (US$4,896) per lab, while promoting information sharing and collaboration among researchers across the company. By integrating analysis reporting with workflow and billing processes, Q-DIS/R is also helping to improve productivity within the labs while reducing errors.

"This breakthrough is immense," Hauss asserts. "With the expertise of both IBM and Creon•Lab•Control, we are transforming a dead resource into a front-line research and workflow tool, while opening up our analytical lab to the rest of the organization."

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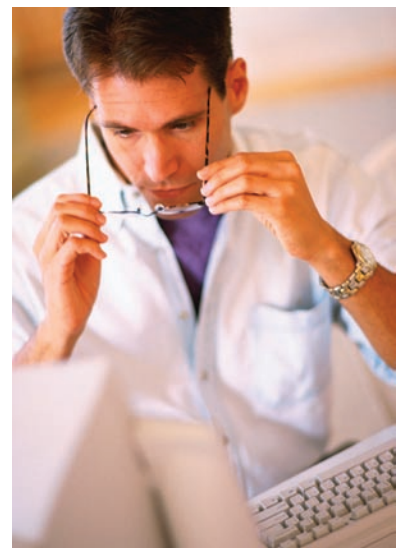
Q-DIS/R is helping Merck comply with FDA regulation 21 CFR Part 11, which requires pharmaceutical and chemical companies to fully document their lab workflow procedures through valid digital records and signatures.

Q-DIS/R works equally well with people and lab instruments

As the focal point for all analysis performed within its three participating labs, Q-DIS/R integrates with several existing systems. To minimize user training and promote acceptance of the new LIMS, Creon•Lab•Control developed an interface between Q-DIS/R and ELAB, Merck's standard virtual-lab workbench software. The interface allows researchers to place orders for analysis and access the results. WebSphere Application Server receives the order requests from the ELAB system, triggering Enterprise JavaBeans that deliver the requests to the lab technicians.

Creon•Lab•Control also integrated Q-DIS/R with the testing equipment in the labs and with SA/7, another LIMS. SA/7 receives notification of incoming orders, tracks the test performed and routes the information to Merck's SAP system to efficiently generate the billing for each order.

"From our point of view, WebSphere software from IBM is the best fit for developing e-business solutions," says Creon•Lab•Control CEO Hans-Joachim Küstner. "Its hardware and database independence, object-oriented design and support for Internet standards and standard application programming interfaces enabled us to create a solution that is perfect for Merck and easily customizable for a broader market." Creon•Lab•Control now markets the Q-DIS/R application commercially.

The system has been purchased by Bristol Myers-Squibb, Roche, Schering, Boehringer Ingelheim KG and Ortho Clinical Diagnostics (Johnson&Johnson).

As Q-DIS/R improves day-to-day productivity in the labs, it is also building up a database of analysis results, running on an IBM RS/6000 SP server. The database, which Hauss estimates is growing by three gigabytes every month, will serve as the basis for collaboration among researchers. "This data warehouse will grow into the petabyte range some day," Hauss predicts. "We have no doubt that the IBM server will meet this challenge."

Continuing a proud tradition

In the spring of 2003, Merck intends to deploy the Q-DIS/R at five more labs. From there, plans are to extend the system to R&D departments in other Merck Group companies. Ultimately, the mood of the pharmaceutical industry and corporate priorities will determine the pace of the application's deployment and evolution. But Hauss says Merck's strong relationship with Creon•Lab•Control and the support from IBM are providing strong impetus to proceed. "Merck KGaA has led the field of pharmaceutical research for over 300 years," Hauss says. "This new solution from IBM and Creon•Lab•Control is laying the foundation for a new era of discovery based on researcher empowerment and global collaboration."

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