

## MERCK DEPLOYS WEB-BASED VISUALIZATION AND DATA ANALYSIS SOLUTION ENHANCING DRUG DISCOVERY EFFORTS

### Business Challenge

Merck Research Laboratories (MRL), in Rahway, New Jersey, is the foundation of discovery and development on which Merck & Co., Inc. (NYSE:MRK) continues to build innovative drugs to treat a wide variety of diseases including high blood pressure, osteoporosis, asthma, HIV/AIDS, and osteoarthritis. The company also makes vaccines ranging from chicken pox to hepatitis.

MRL is recognized for its contribution as a global provider of beneficial pharmaceutical products developed in its laboratories and for the wealth of knowledge that its scientists has uncovered and shared throughout the scientific and technical world. Creative spirit, dedicated effort, and application of new technology form the basis for innovation that the pharmaceutical industry requires for success in today's biomedical research environment.

Discovering and producing drugs and vaccines across such a wide spectrum of diseases is expensive and requires major research efforts to keep up with revolutionary developments in modern biology and medicine. To this end, Merck maintains several state-of-the-art research facilities in North America, Europe, and Japan.

Industry analysts estimate that it costs on average \$500 million to develop a new drug. Further, the drug development process may take an average of ten years or more. Technology that can accelerate identification of promising new drugs is providing leading pharmaceutical companies with a significant competitive advantage.

As in many other disciplines, advances in automation and miniaturization have enabled researchers at these labs to vastly increase the rate and scale of their work. New technology, such as High Throughput Screening (HTS), is allowing researchers to test hundreds of thousands of samples from Merck's chemical and natural product "libraries" to determine how they affect disease processes. Traditionally, researchers tested a few hundred samples per day. With technological advances, researchers are now able to test tens of thousands of samples per day, creating difficult challenges for monitoring and maintaining the quality and efficiency of these highly automated, high volume HTS processes.

Dr. Bill Pikounis, Associate Director, and his colleagues at MRL are responsible for building and deploying data analysis solutions using StatServer® technology that helps scientists with limited statistical knowledge produce a short list of promising chemical samples or entities. The software tools are constructed by working closely with HTS scientists. An important goal is to drive down rates of "false positives" — avoiding apparent potency in entities when there is none — and "false negatives" — missing really potent compounds due to process variability.

### Business Solution

"We were interested in a solution that could provide powerful analytical tools and deliver the solution to the desktops of our leading scientists. Further, the technology needed to be

useful, scalable, easy-to-use, and reliable," says Pikounis. "We selected StatServer technology because it offered the analytical and visualization tools we needed to develop a solution that could be deployed enterprise wide using a familiar standard Web browser." StatServer's Web-based architecture allowed the team to make changes or additions to the scientists' analytical toolbox quickly in response to their scientific customer's needs.

StatServer provides a reliable, effective, intelligent solution for accessing, analyzing, and visualizing information for entity selection. Merck statisticians use S-PLUS® from their desktops to develop the data analysis and statistical functionality necessary to evaluate data from new chemical samples. Then, the code is programmed and connected to a familiar Web browser where scientists can access reliable, powerful tools, allowing them to do valid, sensitive, and productive data analyses themselves. "We had to find a way to deploy the solution to our HTS researchers throughout the world," Pikounis says. "Putting software on individual desktops wasn't really an option, because we anticipate continuing development and improvement to keep up with the rapidly changing technology. Maintaining an installed base of software over our geographically dispersed user base would have been impossible. That's why we turned to StatServer."

By working closely with HTS scientists, the Merck team was able to define critical data-driven issues and, working within the S-PLUS environment, prototype solutions easily, test them on real data, and then demonstrate the technology to scientists for feedback. The Merck team embarked on an ongoing cycle of development and customer feedback to refine the technology solution.

S-PLUS's extensive built-in data analysis and graphics capabilities, as well as its easy-to-program object-oriented S language, allowed researchers to make changes and incorporate new ideas easily. "In fact, I doubt that we could have done it without S-PLUS," says Pikounis.

"StatServer has become a cornerstone part of our department operations and has revolutionized how we work with our scientific colleagues," says Pikounis. Traditionally, the pre-clinical research environment in pharmaceutical companies has only permitted one-to-one type consulting models between statisticians and scientists. "Our HTS data analysis solution using StatServer technology has allowed us to leverage our services by providing our scientists with the tools they need to create a 'short list' of prospective chemical entities. We are empowering our colleagues and using our resources more effectively.

Communicating research results is essential for effective drug discovery and development. "We selected StatServer technology because it offers superior data graph capabilities. Informative and relevant visualization tools ensure effective study, interpretation, and communication of results amongst colleagues," says Pikounis.

The technology can be deployed enterprise wide, so researchers can access the information on a global basis. "The flexible, powerful data analysis solution allows us to handle requests from Merck researchers internationally from Spain to San Diego (U.S.A.) across nine different time zones," says Pikounis. This foundation has provided more challenges and opportunities. Evolving HTS tools and exploding data analysis needs in areas such as genomics and pharmacology have led to other areas where Merck's solution can be leveraged. The success of StatServer for HTS has provided a model to meet these needs.

"We think StatServer really changes the way we work," Pikounis commented. "Revolutionary technology has brought large and/or complex data sets to many more areas of drug discovery, research, and development. There is just no way that a small group of

statisticians can adequately serve all these needs by working exclusively in a traditional one-to-one consulting mode. Focusing on critical areas and working with our colleagues to develop and deploy analytical tools to scientists with S-PLUS and StatServer allows us to leverage our effectiveness and expand our impact."

### **Benefits**

- Centralized data and analysis capabilities
- Improved productivity
- Desktop delivery in a familiar environment
- Seamless integration with Microsoft Office and other business tools

### **Business Tools**

- StatServer
- S-PLUS

*Source: Insightful Corp., 2007*