



Spotfire Takes Center Stage at Fournier Pharma

Pharmaceutical firm places DecisionSite® at the core of its microarray gene expression analysis platform.

Business Profile

Fournier Pharma is a Europe-based multinational pharmaceutical company with a particular expertise in the treatment of metabolic diseases and the prevention of cardiovascular risk.

Application Profile

Fournier Pharma's main R&D Center in Dijon (France) uses Spotfire DecisionSite for Functional Genomics and Spotfire DecisionSite for Lead Discovery as central analysis programs at the core of their drug discovery process.

Challenges

- Data overload from multiple databases related to microarray data and gene annotations was slowing decision-making.
- Needed an application that could correlate microarray- and annotation data within a single interface.

Solutions

- Spotfire DecisionSite offered the scalability to handle immense data sets.
- Spotfire's data integration capabilities let it fit in easily among multiple databases and other software tools.

Results

- DecisionSite reduces time spent on data retrieval. For some common tasks, durations have dropped from one week to five minutes.
- Homogenous interface and interactive visualizations improve quality and complexity of analysis.
- Increased speed and reliability of new lead compound characterization.

DecisionSite has shown signs of further, more global improvements in overall quality of analysis, thanks primarily to the ability to provide a common UI for heterogeneous data. For the first time, the researchers are able to bridge the worlds of microarray data and biological annotations, while also integrating supplemental information.

“The ROI also comes from quality of analysis. With DecisionSite and the other processes and tools we now have in place, we have been able to identify potentially very interesting pathways and genes that have extended our therapeutic field.”

– Paul Delmar
Information Technology/
Bioinformatics
Fournier Pharma

Fournier Pharma is a Europe-based multinational pharmaceutical company with a particular expertise in the treatment of metabolic diseases and the prevention of cardiovascular risk. With a total of 3400 employees, Fournier Pharma is directly established in 30 countries today and earns three-quarters of its turnover outside France. Its total sales reached 596 million euros in 2004, a 7% increase compared to 2003.

Challenges

In a strong position thanks to its 30-year experience in the study of lipid disorders and cardiovascular diseases, Fournier Pharma centers its activities around the treatment of metabolic diseases and the prevention of cardiovascular risk and has a promising portfolio in this field. Its R&D facilities focus on research into the competitive field of metabolic disorders such as dyslipidemia, diabetes and obesity. In particular, Fournier Pharma specializes in the study of fenofibrate for treatment of metabolic disorders and coronary heart disease.

In 2001, Fournier Pharma began reorganizing its R&D efforts to further focus on metabolic disorders in relation to nuclear receptors, transcription factors, and gene expression. The goal was to characterize the gene expression profile of new drugs, discover new targets in new therapeutic fields and develop new assays via the process of gene identification. Further goals were to accelerate new lead compound characterization while increasing reliability, as well as to increase the speed and complexity of functional genomics analysis.

With its growing focus on genomics studies, Fournier Pharma made a substantial investment in microarray technology in order to assess gene expression data. Agilent's BioAnalyser microarray system drives a drug-discovery process that starts with functional genomics and target selection, moves on to high-throughput screening (HTS), then proceeds to the investigation of in vitro leads with Structure-Activity Relationship (SAR) analysis and finishes with ADME (absorption, distribution, metabolism, and excretion) for preclinical toxicology metabolism.

Two customized Oracle® databases were put in place to serve the early stages of this process. The first, which Fournier Pharma calls TelaGene, consolidates gene functional annotations from different data sources. The second, TargetGene, stores in silico experiment results that identify transcription factor target genes. During development, two problems became clear: there was too much information to easily process, and no single application from which to gain a unifying perspective of data from different sources.

“The introduction of HTS technology in recent years has resulted in an overload of information,” says Paul Delmar, Information Technology/Bioinformatics at Fournier Pharma. The problem wasn't limited to microarray data, says Delmar, but also gene annotation data and scattered heterogeneous annotation data. “It created a bottleneck that limited the time and resources available for QC and analysis,” he says.

Because Fournier Pharma had decided not to dedicate resources for software development, Delmar and his colleagues began looking for commercial solutions to their problems. The first choice was to replace an older system based on Excel files and macros that Fournier Pharma used to store microarray data. In its place, it adopted the advanced industry leader, Rosetta Luminator®. Luminator includes its own built-in analysis package, but Delmar realized they would be well-served by adding a more flexible analytical tool that would also accept data from TelaGene, TargetGene, and other sources. What was needed was a universal analysis tool that would be comprehensive, user-friendly, easy to maintain, and compliant with IT standards.

Solutions

By the time Fournier Pharma began its search in 2003, such an analysis solution was already widely used in the pharmaceutical industry: Spotfire DecisionSite. In addition to being relatively easy to learn and its highly interactive visualizations, DecisionSite excelled at integrating data from multiple sources within a single visualization environment. What's more, DecisionSite can integrate with a wide variety of software used in drug discovery. Particularly useful was its tight integration with Rosetta Luminator via templates. DecisionSite was also available in two custom versions targeted at drug discovery, one for Functional Genomics, which included a pathway viewer, and one for Lead Discovery, which offered a structure viewer.

With Spotfire's help, Fournier Pharma had both versions of DecisionSite up and running quickly, placing the software squarely in the middle of its triad of databases. DecisionSite was also used to integrate data from Jubilant PathArt, Iobion PathwayAssist, GO (Gene Ontology), an internal knowledge management application and several open source programs (see Figure 1).

Today, DecisionSite enables scientists to gather and integrate information from these multiple sources via advanced database query capabilities, then analyze and visualize the expression data. Users access Luminator data via templates, and TelaGene data by way of

Web links. Thanks to Spotfire DecisionSite, the integration between these software packages is quite tight. The Spotfire template stored in the Luminator Database adds information on gene functions from the TelaGene Database to the Luminator microarray data. The join between Luminator data sets and the gene functional annotations is made with a specific TelaGene table containing the Agilent probe IDs.

The results of these joins are analyzed on a global scale that evaluates all affected biological processes, as well as permitting investigation on a gene-by-gene basis. To explore details, researchers can dig in at any point with DSFG's Pathway Viewer module or the customized Web links to the TelaGene Web interface. In the first stage of analysis, the biologists typically use DecisionSite histograms along with the GO browser to identify pathways of biological functions that have been significantly altered in the experiment. When a pathway of interest or a set of genes are identified, DSFG's Pathway Viewer and other tools like Jubilant's PathArt System are used to take the analysis even further. The researchers can easily flip back and forth between fine- and coarse-grained views to get a better overall picture.

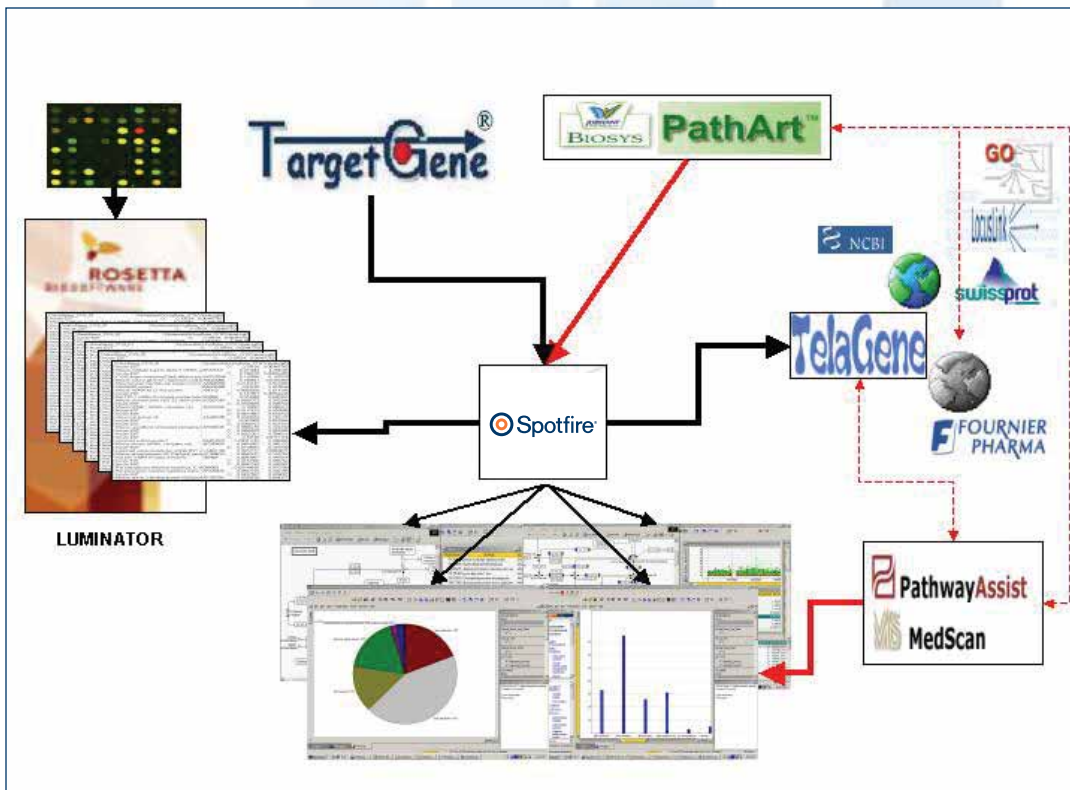


Figure 1: Fournier Pharma's Schema of its system for microarray data analysis. Spotfire DecisionSite plays a crucial role in integrating data from multiple applications.

Results

In the year since Spotfire DecisionSite was adopted as the centerpiece of Fournier Pharma's microarray analysis system, the researchers have been highly pleased with the software. This is especially true with tasks such as post-HTS and SAR analysis, which were extremely cumbersome using other applications. "We are now able to leverage information from the microarray plate form, which was virtually impossible before," says Delmar. "An analysis that used to take weeks now takes a few mouse clicks."

This power of acceleration is already showing return on investment in terms of reduced time that researchers spend on data retrieval. This, in turn, gives biologists more time for more thorough QC analysis and "reduces the time between experiment and decision," says Delmar.

In addition, DecisionSite has shown signs of further, more global improvements in overall quality of analysis, thanks primarily to the ability to provide a common UI for heterogeneous data. For the first time, the researchers are able to bridge the worlds of microarray data and biological annotations, while also integrating supplemental information.

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Without a universal analytic tool such as Spotfire DecisionSite, it would be highly difficult to keep pace with all the data—and data sources—that permeate today’s drug-discovery environment.

“Creating knowledge from the overwhelming mass of public and in-house data is one of the most challenging issues facing R&D groups in the pharma industry,” says Delmar. “By providing a homogenous interface and presentation of information, Spotfire DecisionSite has increased the quality and complexity of our analysis.”

Spotfire® DecisionSite®

Spotfire, Inc.

212 Elm Street
Somerville, MA 02144 U.S.A.
Telephone +1.617.702.1600
Fax +1.617.702.1700
Toll-Free +1.800.245.4211

Spotfire AB

(European Headquarters)
Första Långgatan 26
SE-413 28 Göteborg, Sweden
Telephone +46.31.704.1500
Fax +46.31.704.1501

Spotfire Japan KK

(Japanese Headquarters)
Kinokuniya Bldg. 7F, 13-5,
Hatchobori 4-chome
Chuo-Ku, Tokyo 104-0032 Japan
Telephone +81.3.5540.7321
Fax +81.3.3552.3166

www.spotfire.com

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Spotfire, Inc. provides interactive, visual data analytics applications and services that empower enterprises and their end-users to improve operational performance and gain an information advantage over the competition. Over 25,000 users in close to 1,000 organizations around the world use Spotfire DecisionSite to drive confident decision making by quickly and easily spotting trends, outliers and unanticipated relationships in critical business data. The company maintains U.S. headquarters in Somerville, Mass., and European headquarters in Göteborg, Sweden. Additional information can be found at www.spotfire.com.