



DecisionSite: A Teamware Tool for Clinical Analysis

When consultants from Innovative Analytics help pharmaceutical companies track down the cause of unexpected clinical trial results, they use Spotfire® DecisionSite™ to quickly focus attention on critical data points.

Business Profile

Innovative Analytics is a statistical data management consulting group in Kalamazoo, Michigan, that provides data analysis and knowledge building services for the life sciences industry.

Application Profile

Spotfire DecisionSite is used as the central analytic tool for exploring clinical trial study data and identifying the sources of unexpected results or unanticipated relationships.

Challenge

- Analysis of unexpected clinical trial results using SAS alone was time consuming.
- Identification of problems and communication between experts was limited by delays and paper interface.
- SAS's limited reporting capabilities made it harder to convince regulatory agencies that a new study was not required.

Solution

- Spotfire DecisionSite used as group analysis tool to assist statisticians in determining what kinds of analyses need to be run.
- Analysts use DecisionSite to identify outliers and relationships in data and quickly determine reasons for unexpected results.

Results

- Much faster turnaround in analysis process.
- Easier to identify problems and explore alternatives to repeating a study.
- Improves documentation and reporting features for negotiation with regulatory agencies.
- Improved automated process reduces paperwork.

“Most of our clients are familiar with Spotfire on the research side, but not many are familiar with its benefits on the clinical side. We’re showing them that it can be a competitive advantage.”

– Dr. Patricia Ruppel,
President,
Innovative Analytics

With her many years of experience at Upjohn and Pharmacia, Dr. Patricia Ruppel knows the challenges facing clinicians and data analysts when interpreting results from clinical trials. She also realizes that pharmaceutical companies are looking to speed time to market and avoid catastrophic recalls and lawsuits by improving the speed and accuracy of clinical analysis. So in 2003 when she founded dKb Technologies and in 2004 Innovative Analytics, a statistical data management consulting group in Kalamazoo, Michigan, one of Ruppel’s first decisions was to place Spotfire DecisionSite front and center in the clinical trials analysis process.

In previous years Ruppel had seen how Spotfire’s dynamic business analytics software was transforming life sciences data analysis in the area of drug discovery. She had already experimented with applying DecisionSite’s sophisticated graphics visualization environment to the next step in the pharmaceutical development chain: clinical trials analysis. Now, as President of Innovative Analytics, she could fully pursue the use of DecisionSite as a group data analysis tool that would speed clinical trials analysis, increase the power to explore complex data relationships, and save her clients money.

The Business Challenge

As a consultant, Ruppel frequently assists clients in discovering why a clinical study failed to produce the desired results. “In any clinical study you design it with preconceptions,” she says. “That’s all well and good if the results support those preconceptions, but more often than we would like, they don’t. Either the study fails to meet the efficacy response, or a safety issue crops up. So you get clinicians, scientists, and statisticians together around a table and you discuss what went wrong.”

In pharmaceutical companies where DecisionSite is not in use, the statistical analysts typically make note of the participants’ recommendations and then go off to crunch the clinical data in the SAS statistical package. “A few weeks later they’d come back to the group with a pile of tables,” says Ruppel. “Everybody would look

through them together and make comments, and then they would go off and generate more tables. It’s a time-consuming cyclical process.”

Aside from being slow, the problem with static SAS reports is that it’s often difficult to see the big picture and track all the variables that might be affecting the data. “With paper reports, you can only take it one level of branches at a time,” says Ruppel.

With pharmaceutical management focusing on speeding the clinical trial process, Ruppel saw that analysis of unintended trial results was one bottleneck that could be fixed. An inherent challenge with these analyses is that more than one source of expertise is required. The clinicians can’t do the job without a statistician, but the statistician can’t do the job alone either. That’s why meetings are so essential. Ruppel knew there must be a way to bring analytic software to the meeting, so participants could work through the information together in a graphical environment.

With SAS sitting at the nexus of the process, however, achieving this goal seemed impossible. Although SAS offers sophisticated statistical capabilities, it’s not realistic to expect all the decision-makers involved to master it. What’s more, SAS and other high-end statistical packages lack an ad hoc data exploration and visualization environment.

The Spotfire Solution

What was needed, decided Ruppel, was an application that would provide an easy-to-use visualization environment that was accessible to everyone. It would need to accomplish the most common analytic tasks in real-time, but also interact well with SAS to permit the hand-off of trickier statistical problems. She soon discovered that Spotfire DecisionSite met all those criteria while being easily adaptable to the wide variety of clinical trials issues.

“Spotfire really helped to revamp the whole process,” says Ruppel. Typically, she says, they use DecisionSite to perform “triage” on the data, then follow up with SAS. “Now clinicians can work with the analyst to prepare an exploratory dataset that can be fed into Spotfire,” says Ruppel. A wide selection of data is made available for analysis, including clinical assessment, vital signs, and blood pressure or genetic biomarker data. To accurately interpret this data and broaden the perspective, the meetings often include clinical pharmacology representatives, and regulatory officials often sit in as well.

“DecisionSite allows you to sit down together with other interpreters and do the slicing and dicing,” says Ruppel. “You can go through the data in a very intuitive way instead of waiting for SAS reports. It lets you break out of the table generation cycle.”

If no overall efficacy response is evident and those who were treated with the drug didn’t respond any differently from placebo, analysts can run a variety of analyses to subset the data to see who did or did not respond. Using DecisionSite Guides – workflow templates that can be populated with custom data – the analyst can examine the interrelations between a variety of datasets to look for flaws and outliers (see *Figures 1 and 2*). They can correlate identifiable problems with clinical endpoints and look for investigator aberrations and effective subgroups. Using column relationships, for example, they can look at multiple correlations and quickly spot outliers (see *Figure 3*). Through this

iterative process, the analysts might discover, for example, that it was primarily older women who were not responding to the drug. They could then look and see if there was an over-preponderance of that demographic in their study.

“DecisionSite lets you follow your nose through the data,” says Ruppel. “It’s helpful in exploring multivariate responses to see how different endpoints correlate.” If the analysis widens to incorporate more laboratory data and “omics” data, such as genetic biomarkers, she adds, Spotfire’s flexible data integration environment can bring these multiple disciplines to bear at once.

After the analysis is completed, DecisionSite continues to add value by providing an authoritative back-up source that can convince regulatory agencies to approve a certain plan of action. With DecisionSite, analysts can pick the precise reports and graphics that the regulator requires. “DecisionSite saves us weeks in the regulatory approvals process,” says Ruppel.

“We use Spotfire for issue resolution,” says Ruppel. “It helps in preparing for discussions with a regulatory agency or an advisory committee review.” For example, if the DecisionSite analysis indicates that a study failed because of unusual site operations, analysts can prove that by showing a presentation of DecisionSite visualizations or even stepping regulators through the analysis itself. “If you can show them why you failed, you may have room for negotiation in how the study results can be used,” says Ruppel.

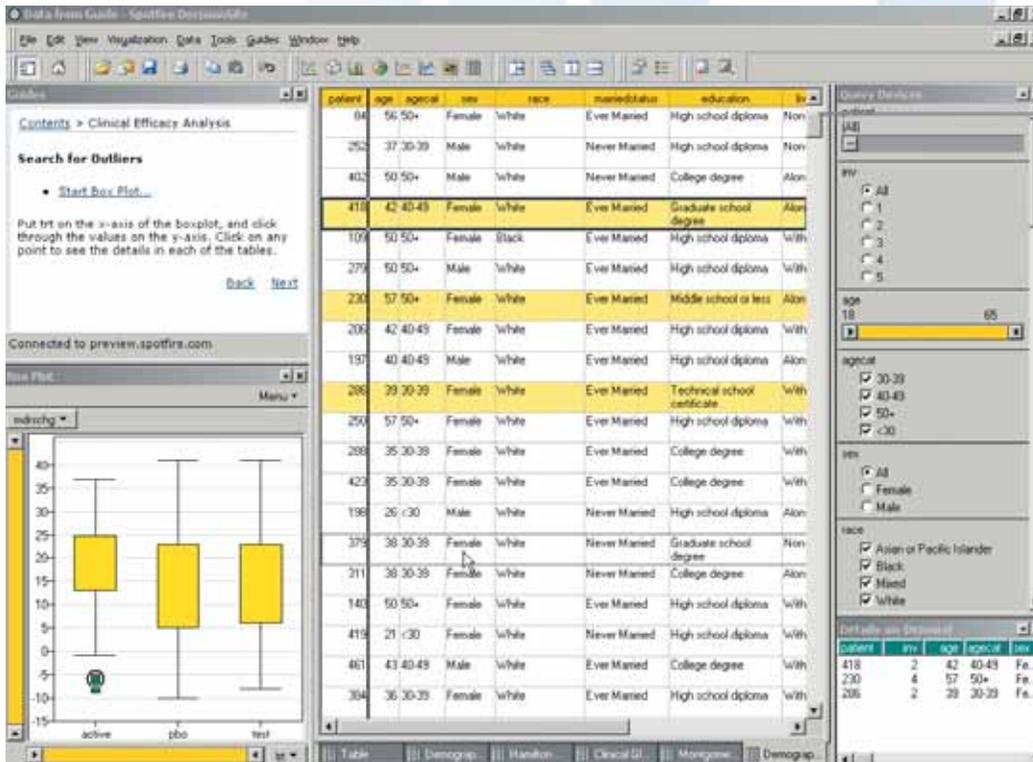


Figure 1: Patient demographic data can be sorted and presented automatically using guided analysis at specific points in a workflow. Specific demographic data is displayed, and an interactive box plot analysis tool provides a summary of lab results for data selected in the visualizations.

Results

During its first year in business, Innovative Analytics has earned rich rewards for employing Spotfire DecisionSite as a central analytic tool for clinical trials analysis. “Most of our clients are familiar with Spotfire on the research side, but not many are familiar with its benefits on the clinical side,” says Ruppel. “We’re showing them that it can be a competitive advantage.”

Innovative Analytics’s clients are discovering what Ruppel has seen proven for several years: that DecisionSite’s open-ended visualization interface makes it an ideal launch-pad for complex data exploration in a group context. When analyzing unexpected study results to identify causes, DecisionSite allows users from different disciplines to work the data together in real-time rather than wait weeks for intervening SAS table

generation steps. Problems are identified and potential solutions are presented much faster, cutting many weeks from the timetable of each study.

Too often, drug companies spend time and money repeating clinical trials because they are unable to convince regulators that they’ve isolated the problem and can correct for it in the next stage. With DecisionSite, however, they have a persuasive presentation tool that speeds the process of data review, deliberation and negotiation, enabling analysts to respond quickly to requests for new information. As a result, it makes it easier to convince internal decision-makers and regulatory representatives that the analysts have identified all the study’s problems.

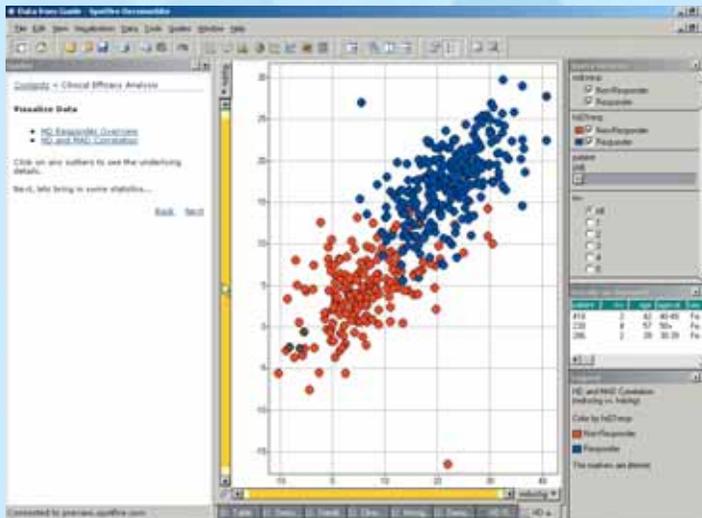


Figure 2: Guided workflows can drive efficacy studies by assessing responders and non-responders in the context of measured clinical tests to better understand correlations and outliers.

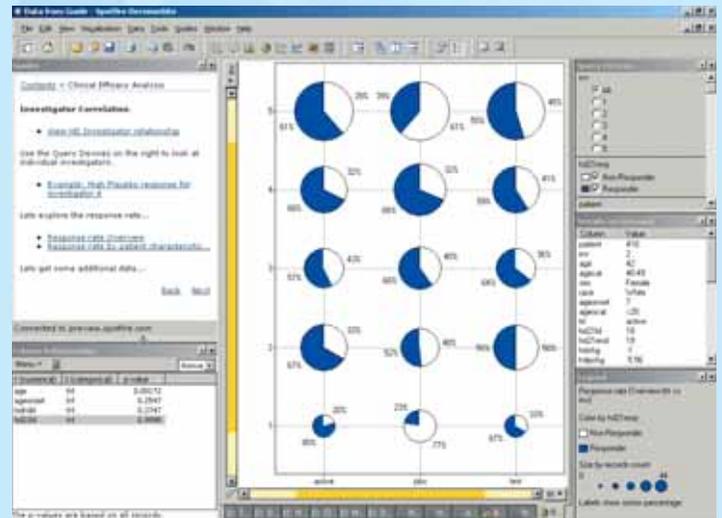


Figure 3: Clinical response trends within investigator groups are investigated through combined guided workflow and interactive pie-chart visualizations. A Column Relationships tool provides measures of significance between clinical tests and demographic data and can be used to quickly explore relationships in the data. Analysts can select any columns and data points for comparison by filtering on-the-fly using the query devices shown on the right.

Even if the regulators insist on running another study, says Ruppel, the professional effort revealed by the DecisionSite analysis session pays off by improving the company’s reputation.

“Any time you can demonstrate that you understand why your study didn’t work, it builds integrity in your company,” says Ruppel. “It shows that you’re willing to do due diligence.”

In the end, says Ruppel, DecisionSite’s greatest benefit is that it frees clinical trials data analysis from being a solitary pursuit in which an analyst

is often guessing at what clinicians might want. Instead, participants from a broad range of disciplines can share their expertise in a common setting.

“We look at DecisionSite as being *teamware*,” says Ruppel. “It coalesces the team and brings them to the same knowledge level.”

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

About Spotfire, Inc.

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.