

S-PLUS Comprehensive Feature List

STATISTICAL & NUMERICAL TECHNIQUES

Basic Statistics

- Summary statistics
- Crosstabulations
- Correlation and covariance
- Probabilities, quantiles, and densities
- Random number generation from many distributions
- Durbin-Watson statistic

Hypothesis Tests and Confidence Intervals

- One-sample t-test and Wilcoxon
- Two-sample t-test and Wilcoxon
- Paired t
- Correlation: Pearson, Kendall's tau, Spearman's rho
- Goodness-of-Fit: Chi-square, Kolmogorov-Smirnov, Shapiro-Wilk
- Proportions: exact Binomial test, Normal approximation
- Contingency tables and tests for independence: Chi-square, Fisher, Mantel-Haenszel, McNemar

Regression

- Basic linear regression
- Polynomial regression
- Model diagnostics
- Prediction and confidence intervals
- Stepwise selection of models
- Parametric spline models
- Least trimmed squares regression
- Constrained regression
- Logistic regression
- Generalized linear models
- Minimum absolute residual regression
- Robust MM regression

Analysis of Variance

- Flexible specification of variables, interactions, nesting, transformations
- Automatic generation of dummy variables
- Choice of contrasts
- Type III sums of squares
- Rank tests: Kruskal-Wallis, Friedman
- Designed experiments: one-way, two-way, factorial, split-plot, unbalanced
- Variance component estimation
- Multivariate ANOVA
- Multiple comparisons: Fisher, Tukey, Dunnett, Sidak, Bonferroni, Scheffé, simulation-based

Nonlinear Regression and Maximum Likelihood

- Nonlinear regression
- Nonlinear maximum likelihood
- Quasi-likelihood
- Constrained nonlinear regression

Nonparametric Regression

- Generalized additive models (GAMs)
- Local regression (loess)
- Projection Pursuit, ACE, and AVAS

Tree models

- Classification trees
- Regression trees
- Prediction from trees
- Pruning, shrinking, and splitting

Smoothing

- Loess smoother
- Super smoother
- Kernel smoothers
- Spline smoothers
- Linear and spline interpolation

Linear and Nonlinear Mixed-Effects Models

- Longitudinal data analysis
- Repeated measures models
- Advanced graphics for repeated measures data
- Flexible covariance matrix structures
- Built-in nonlinear mixed-effect models for biostatistics (biexponential, first-order compartment, four-parameter logistic)
- Virtually any user-defined model can be easily created

Resampling

- Bootstrap
- Jackknife

Multivariate Analysis

- Canonical correlation
- Discriminant analysis
- Factor analysis
- Multidimensional scaling
- Principal components
- Biplots

Cluster Analysis

- K-means
- Hierarchical clustering
- Monothetic clustering
- Model-based clustering
- Crisp and fuzzy clustering
- Divisive and agglomerative methods

Quality Control

- Shewhart chart
- Cusum chart
- Charts based on \bar{x} , s , np , p , c , u

Power and Sample Size

- Normal mean
- Binomial proportion

Survival Analysis

- Kaplan-Meier curves
- Cox proportional hazards models
- Left, right, and interval censoring
- Time-dependent covariates and strata

- Multiple event models
- Competing risk models
- Frailty models
- Parametric survival
- Expected survival
- Person years analysis

Time Series Analysis

- Autocovariance, autocorrelation and partial autocorrelation
- Smoothed periodograms
- Box-Jenkins ARIMA models
- Classical and robust AR
- "Long memory" models
- Seasonal decompositions
- Fourier transformations
- Classical and robust smoothers and filters

Date, Time, and Calendar Data

- Univariate and multivariate time series
- Subscripting and operators
- Aggregation, alignment, merging, and interpolation
- Times and dates from milliseconds to several millennia
- Time zones with daylight savings rules world-wide
- Holidays and market closures
- Flexible time and date format
- Publication-quality graphics with specialized time series chart types
- Relative time, time sequence, and event objects

Mathematical Computations

- Vector and matrix computations
- Matrix decompositions
- Systems of linear equations
- Locate roots
- Nonlinear optimization
- Constrained optimization
- Ordinary differential equations
- Numerical integration

Robust Methods

- New dialog design; check box for robust analysis in ordinary methods
- New plots for outlier detection and comparing fits
- New multiple model fits and comparisons paradigm

Missing Data Library

- Multiple imputation
- Gaussian, logistic, and conditional Gaussian models

Large Data Set Support

- Memory mapping
- Reference counting
- Control over copies in external calls to C
- Variable selection on import (keep/drop)
- Support for sequential processing

GRAPHICS & VISUALIZATION

Plot Type Highlights

- 2-D plots: barplots, pareto plots, probability plots, boxplots, density plots, dot charts, histograms, pie charts, quantile-quantile plots, scatter plots, strip plots, and more
- Scatterplot extensions: scatterplot matrices, linear fits, smooth fits, vary symbol color and size, text as points
- 3-D plots: point clouds, surface plots, contour plots, color image plots
- Time series plots: high-low-open-close, candlestick, stacked bar
- Quality control charts
- Hexagonal binning for spatial data
- Statistical model summaries and diagnostics

Advanced Data Visualization

- Exclusive Trellis graphics for conditioning data on additional variables in multiple views
- Trellis banking for optimal aspect ratios
- Multiple simultaneous 3-D rotation views
- 2-D projections in 3-D space
- Multiple graphs per page with auto-formatting
- Brush and spin dynamic visualization
- Interactive observation identification on Trellis plots
- Multiple, user-defined color maps
- Graphlets

Customizability and Editing

- Flexible page layout
- Overlay graphs or display side by side
- Variety of lines and symbols
- Control over line style, marker type, colors, labels, tick marks, text, fill pattern
- Multiple, independently scaled x and y axes
- Multiple-line text annotation

Import and Export

- Import SAS, SPSS, Excel, Matlab, and other file formats
- Query Oracle, Sybase, Informix, and ODBC databases
- Export graphics as PDF, postscript, or HPGL

PROGRAMMING & EXTENSIBILITY

Object-Oriented Language

- Uses the object-oriented S programming language
- Over 4200 built-in functions
- Users may modify functions and write new functions
- Rich data structures include vectors, matrices, arrays, and lists

- Variable length argument lists
- Special representation of categoricals, missing values, and infinite quantities
- Validation suite of test cases to confirm accuracy of S-PLUS output
- Interactive browser for debugging

Interconnectivity

- Call C, C++, and Fortran
- Language support for pipes, sockets, and files
- Use as front-end for commercial libraries (NAG, IMSL, ...)
- Spawn subprocesses
- Access to operating system editors
- Call S-PLUS from JAVA/Call Java apps from S-PLUS (Unix)
- Call S-PLUS from C++ programs/Call C++ programs from S-PLUS (Windows)

MS Office Integration (Windows)

- Edit Excel files directly in S-PLUS
- Embed S-PLUS graphics in Word and edit them in place
- Create PowerPoint slides from S-PLUS graphics automatically
- Use Excel and SPSS wizards to create S-PLUS graphs from within Excel or SPSS

User Contributed Code

- Libraries associated with the book *Modern Applied Statistics with S-PLUS* by Venables and Ripley
- Hmisc and design libraries for biostatistical and epidemiologic modeling by Harrell

Help and Documentation

- Extensive documentation
- Command line recall and editing
- Telephone and e-mail helpline
- Self-documenting objects

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Intelligence from data

1700 Westlake Avenue North Suite 500
Seattle, WA 98109
Tel: 206.283.8802 • 800.569.0123
Fax: 206.283.6310
email: info@insightful.com
www.insightful.com

International Division

Knightway House, Park Street
Bagshot, Surrey GU19 5AQ, UK
Tel: +44 1276 450111
Fax: +44 1276 451224
email: info@uk.insightful.com
www.insightful.com

Designed for



Make Better Decisions Faster



- Statistics
- Data Mining
- Predictive Analysis
- Business Intelligence

Discover Why S-PLUS is the Premier

For more than ten years, *Insightful Corporation* has been a leading supplier of data analysis solutions that drive better decisions faster by revealing patterns, trends, and relationships.

Critical business decisions depend on precise analysis of data. Industry-leading professionals from Fortune 1000 companies such as AT&T, Merrill Lynch, Merck Pharmaceutical and The Pillsbury Company rely on S-PLUS because it offers a flexible, interactive environment for analyzing, visualizing and presenting data.

S-PLUS, our flagship product, is one of the most powerful data analysis packages on the market. With S-PLUS you can streamline your data analysis process from accessing your data to sharing your results with colleagues or other decision-makers. From understanding your customers to ensuring product quality, S-PLUS gives you the tools to make better decisions today.

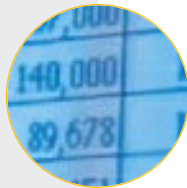
Award-winning S Language.

S-PLUS 6 is based on S version 4, an award-winning, object-oriented language developed at Lucent Technologies' Bell Labs specifically for data visualization, exploration and programming with data. The S System has been recognized with the prestigious Association for Computing Machinery Software Systems Award, (other recipients include UNIX, TCP/IP and Mosaic). With more than 4,200 statistical, graphical and programming functions built in, you can create applications in S in a fraction of the time it would take using lower-level languages like C or Visual Basic. The S language is platform-independent, so your applications will run on either Windows or Unix.

Access

Accessing your data easily and effectively is essential in your analysis. S-PLUS has a smooth, intuitive user interface and comprehensive import/export capabilities, enabling instant access to your data—wherever it is, whatever format it's in.

- **Data insight at your fingertips.**
S-PLUS's intuitive graphical user interface offers the look-and-feel of Microsoft Office, applications making it easy for you to access and analyze data. Embed graphs into Word or PowerPoint presentations with point-and-click ease and share your results with key decision-makers.
- **Microsoft Excel integration improves data import and transfer capabilities.**
You can open Excel worksheets within S-PLUS, perform analyses and create graphics directly from your data. Since your data stays in Excel, you won't spend time transferring results back and forth between Excel and S-PLUS.
- **Easily import and export data from Oracle, SAS, SPSS and other standard formats.**
S-PLUS makes it easy to access data from virtually any source including Excel, SAS, SPSS and data bases including Oracle, Sybase and SQL Server. S-PLUS offers extensive import and export capabilities to help you move data from one file format to another.



Easily import and export data from the following formats

- SAS
- SPSS
- Excel
- Text (ASCII)
- Quattro Pro
- Paradox
- Lotus 1-2-3
- dBase
- Sigma Plot
- Systat
- STATA
- Gauss
- Access
- MATLAB
- LIM
- Bloomberg
- FAME
- Minitab
- FoxPro
- Epi Info
- Informix
- Oracle
- Sybase
- SQL Server
- ODBC

Export graphics in the following formats

- Windows Bitmap (.BMP)
- Encapsulated PostScript (.EPS)
- CompuServe (.GIF)
- GEM Bitmap (.IMG)
- JPEG (.JEG)
- Adobe Photoshop (.PSD)
- Adobe PDF (.PDF)
- HP Printer Control Language (.PCL)
- PaintBrush (.PCX)
- Tagged Image Format (.TIF)
- True Vision Targa (.TGA)
- Windows Metafile (.WMF)
- Portable Network Graphics (.PNG)

"The S System has forever altered the way people analyze, visualize and manipulate data"
Association for Computing Machinery (ACM)

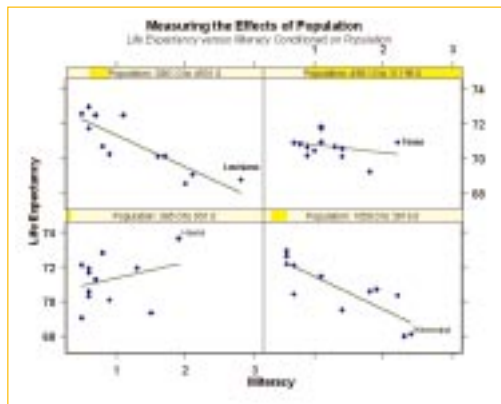
Solution for Data Analysis

Visualize

Powerful graphics play a critical role in discovering key features of your data and communicating the results of your analysis. As you dig deeper into your data, hidden trends and relationships can get lost in summary statistics and text output. With S-PLUS's exploratory graphing techniques, you can visualize and reveal patterns in your data and make discoveries you never thought possible.

- **Share your discoveries using interactive graphics.**

S-PLUS graphics are object-oriented so you can customize every level of detail to create the perfect graphic for your presentation. S-PLUS lets you interact with your data and identify unusual values or select relevant subsets. And S-PLUS's new Graphlets™ technology allows you to publish your graphics on the Web and give your readers the opportunity to interact with your data in real time.



- **Visualize multi-dimensional data using Trellis graphics.**

S-PLUS is the only data analysis package to offer Trellis graphics, a revolutionary way to visualize relationships in multi-dimensional data. Developed by researchers at Bell Labs, Trellis graphics help you discover hidden relationships in your data by computing graphical views sliced on one or more conditioning variables. No other graphing technique has as much power and flexibility.

- **Select from more publication-quality graphics and formats.**

S-PLUS offers an extensive selection of 2D and 3D graph types. From histograms to bar charts to scatterplots, the graphics library in S-PLUS is truly comprehensive. Easily customize your graphs including line weights, colors and fonts for publication-quality graphics.

S-PLUS Graphlets™ offer real-time Web-based interactive graphics.

Introducing a new graphics format that allows you to add interactivity directly into graphics published on the Web. S-PLUS Graphlets offer the flexibility of the S-PLUS graphics engine to create exactly the graph you want, and then make it dynamic by allowing the viewer to drill-down into your data or create hyperlinks from your data points to other information or graphics located elsewhere on the Web. Examples of S-PLUS Graphlets can be found at www.insightful.com/graphlets.

NEW! S-PLUS Graphlets

Now you can create interactive graphics where viewers can drill-down into the graphic to view information or linked Web pages.



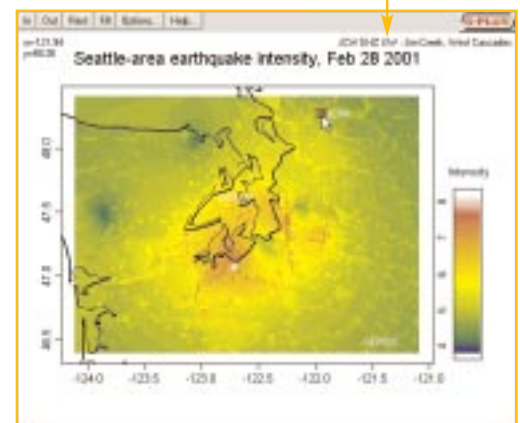
"We selected S-PLUS software after an extensive review of competitive products because it was the best decision support tool available. S-PLUS provided us with a powerful data analysis tool for sophisticated and precise analysis of manufacturing data to reduce our production risks, improve chip yields and enhance profitability."

Andy Black
Intersil Corporation



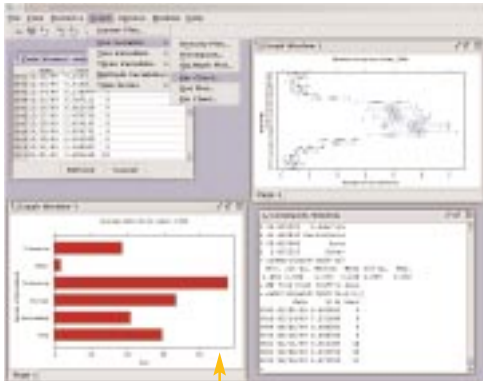
"The S-PLUS graphics are truly impressive. I racked my brains to come up with a display or permutation they had missed—and I failed."

Wall Street and Technology



Visualize Your Data With S-PLUS

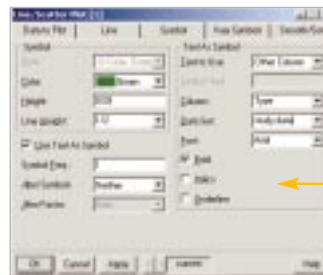
NEW! Excel Link. Now you can open Excel worksheets from within S-PLUS. Perform analyses and create publication-quality graphics easily.

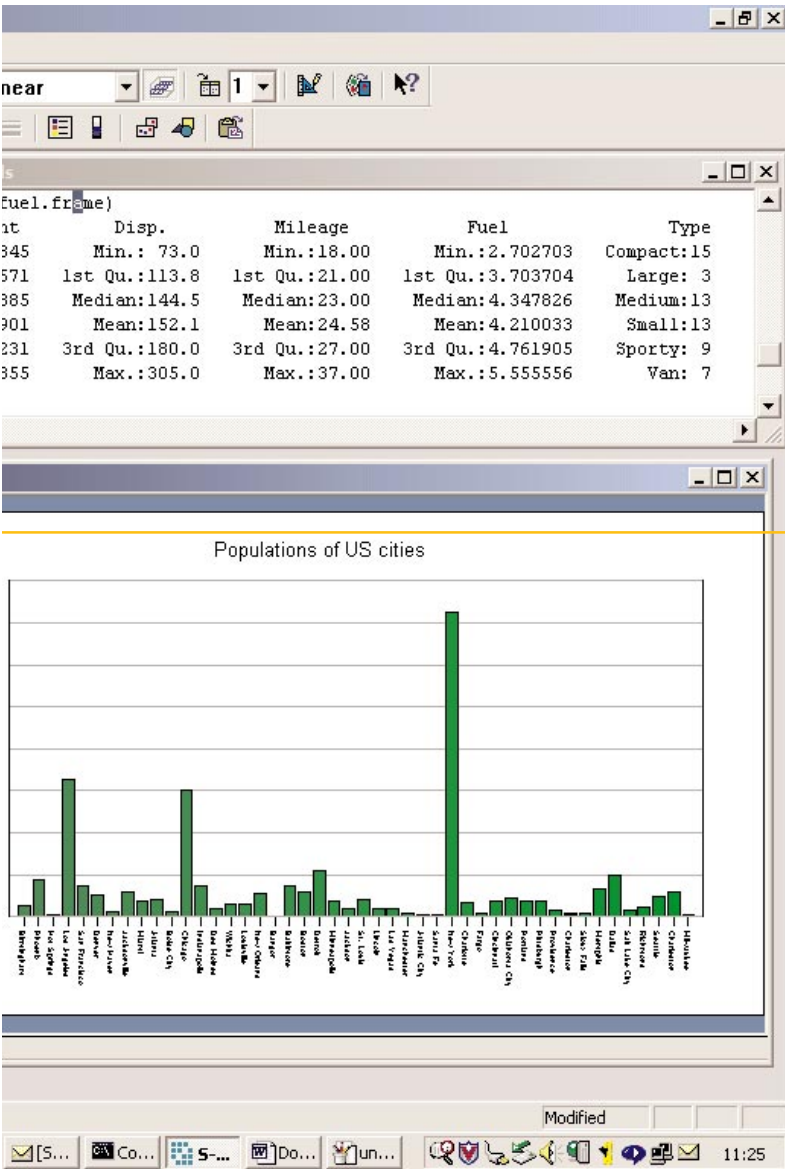


On Unix and Linux platforms, you can now access the powerful statistical and graphing techniques of S-PLUS through a graphical user interface. Easily import and export your data, run statistical analyses, and create revealing graphs, all through convenient menus and dialogs like those available on Windows. For programming, an interactive commands window gives you access to all the power and flexibility of the S language.

| | B | C | D | E | F |
|----|---------------|-------|------------|---------|--------|
| 1 | AreaName | State | Population | PopDens | Pct.wh |
| 2 | Birmingham | AL | 277510 | 2781 | 43. |
| 3 | Phoenix | AZ | 894070 | 2384 | 84. |
| 4 | Hot Springs | AR | 36930 | 1578 | 8. |
| 5 | Los Angeles | CA | 3259340 | 6996 | 61. |
| 6 | San Francisco | CA | 749000 | 16142 | 58. |
| 7 | Denver | CO | 505000 | 4728 | 74. |
| 8 | New Haven | CT | 123450 | 6532 | 62. |
| 9 | Jacksonville | FL | 609860 | 803 | 72. |
| 10 | Miami | FL | 373940 | 10902 | 6. |
| 11 | Atlanta | GA | 421910 | 3216 | 32. |
| 12 | Boise City | ID | 108390 | 2562 | 96. |
| 13 | Chicago | IL | 3009530 | 13194 | 49. |
| 14 | Indianapolis | IN | | | |

Change the Details of Your Graph With Ease Point-and-click control over every detail of your graphs makes it easy to produce stunning, publication-quality output. Change line weights, axes, colors, labels, fonts, symbol types and more with ease.



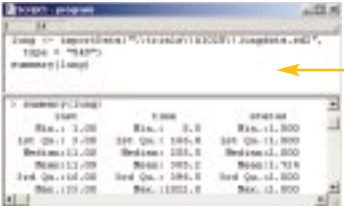
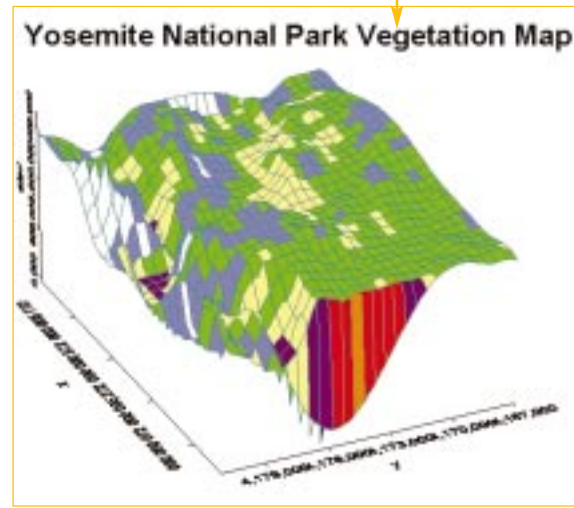


"Our bank needed a powerful data analysis software package for managing risk. We selected S-PLUS for Windows for its powerful statistical capabilities and interactive graphics. S-PLUS has led to important insights that would not have been made using other, less flexible credit risk software packages."

Eileen Lee
Royal Bank

Completely Customize the User Interface
Change toolbars, menus and dialogs to suit your working style. Add and delete options with ease.

Produce Publication-Quality Output
Analyze, visualize and present your data using over 80 2D and 3D graph types.



Automate Repetitive Tasks With Powerful Scripting Capabilities
All S-PLUS operations are recorded in scripts which can be saved and executed to automate repetitive tasks. Drag-and-drop objects into a script window to instantly generate S-PLUS interface commands, and create your own buttons by dragging your scripts onto the toolbar. Share your work with your colleagues by giving them your toolbar and script files.

Analyze

S-PLUS offers you powerful analytics and cutting-edge methods for statistics, data mining and predictive analytics so you can gain insight from your data. Better insight leads to more informed decision-making, a critical strategic advantage in today's competitive climate.

S-PLUS starts where your spreadsheet leaves off.

Spreadsheets are great for entering and organizing data, but if you're also trying to analyze your data with a spreadsheet you're potentially missing valuable insights by limiting yourself to inadequate methods. With S-PLUS 6 you get the best of both worlds—just open your Excel worksheet from within S-PLUS, select a region of data you wish to analyze, and instantly gain access to all of S-PLUS's advanced statistical and graphical functionality applied to your Excel data.

"...none has approached S-PLUS in terms of accuracy."
DM Review



- **Perform analysis using the most comprehensive solution available today.**

S-PLUS offers over 4,200 built-in data analysis functions including modern and classical techniques. Convenient menus, toolbars and dialogs let you access and analyze your data easily.

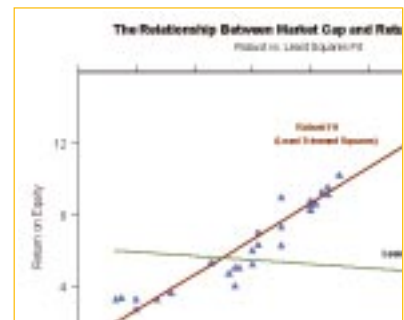


- **Choose from the most comprehensive set of modern and robust methods available.**

Tap into the power of linear and nonlinear regression, generalized linear models, generalized additive models, tree models, smoothing splines, survival analysis, time series, cluster analysis, robust methods, analysis of data with missing values, multiple comparisons and much, much more.

- **The S language gives you control over your data.**

Precise, in-depth analysis may require extensive data manipulation and cleansing. With the S language at the core of S-PLUS you can easily prepare your data for analysis and graphing. From data transformations to data cleansing and validating data integrity, the S language provides the tools to get the job done efficiently, leaving you with a script file of transformations made to validate your actions.



- **Select the model that can provide you with the best results easily.**

With the object-oriented S-PLUS environment, all functions, data and fitted models are handled as objects. This allows you to fit alternative models using both classical and modern methods so you can be confident the model you have selected will deliver the best results.

- **Create or extend analysis methods to meet your specific needs.**

S-PLUS offers a powerful programming language allowing you to create or extend analyses. As your analyses become more complex, S-PLUS can be extended to meet the challenge. Tap into the power, flexibility and extensibility of S-PLUS to take your analyses to the next level.

- **Cutting-edge methods available as Web downloads.**

S-PLUS is the environment of choice for researchers world-wide developing advanced statistical methods for new problems in the world of data analysis. New S-PLUS functions and programs are available for download from third-party websites or from our own S-PLUS Community forum.

Present & Deploy

The data analysis process doesn't end when the results are returned and the graphics created. Whether you are presenting to company executives, preparing a research paper or sharing your discoveries with colleagues, you'll want your work to look professional and be accessible to your audience.

- **Create Powerpoint presentation slides with a click of a mouse.**

S-PLUS graphics can be embedded in standard Microsoft Office products from PowerPoint slides to Word documents. Translate your results into professional-looking reports using S-PLUS's unique graphic capabilities.

- **Total control over your results.**

With S-PLUS you're not limited to pre-defined templates for your results. The S language gives you the freedom to present your results in any way you need: graphically, as free-form text, or as Web-ready HTML tables.

- **Export your graphs into versatile formats for Web or print presentations.**

Export publication-quality S-PLUS graphs to popular graphical formats including PostScript, GIF, PDF, and Windows MetaFile. Create interactive graphics on your web pages using Java-based S-PLUS Graphlets™.



S-PLUS: Power where you need it

S-PLUS has a completely open interface, allowing it to be integrated into virtually any system. Regular analyses can be automated using S-PLUS's batch processing system, employing the flexibility of the S command language. On Unix systems, S-PLUS's CONNECT/Java Interface allows S-PLUS to be integrated with any Java application. On Windows, the CONNECT/C++ Interface allows you to access S-PLUS's complete range of analytic methods from C++ applications you develop. And S-PLUS's DDE and OLE Automation interfaces allow you to integrate S-PLUS with other Windows applications, allowing you to access S-PLUS functionality within Excel or from Visual Basic applications.

Business Benefit

- **Leverage Statistical Expertise**
- **Deploy Analyses Quickly and Easily**
- **Access Analyses Through the Web**

"By launching a Web browser, employees can crunch data that analysts at headquarters once had to do"
Business Week

Distribute Analytics Enterprise-wide

Today's decision-makers need access to real-time analysis of business data to anticipate risk, predict customer behavior and capitalize on emerging market opportunities. Insightful's client/server products can provide decision makers with up-to-the-minute results on their desktop, based on analytic or graphical methods using S-PLUS. With a custom-created application designed expressly for the problem at hand, decision makers gain insight from their data sooner, allowing them to make actionable decisions and providing them with a strategic advantage over the competition. www.insightful.com/enterprise.