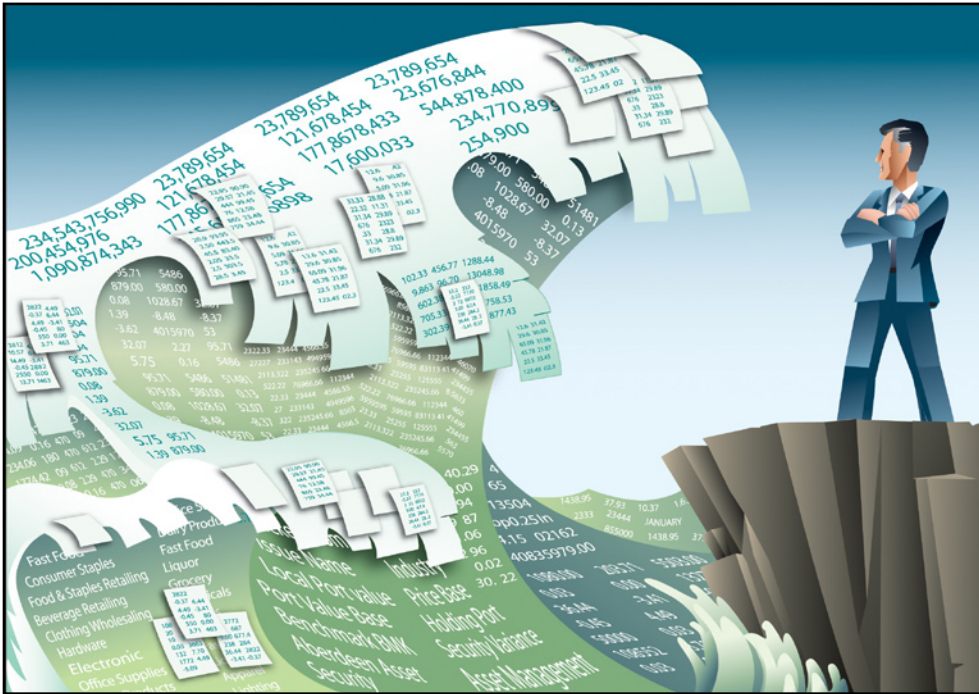


Monitor Trading Activity and Enterprise Risk With Visual Business Intelligence Tools



Identifying when specific offices, desks or books have come close to or breached risk limits within large trading firms is a complex task. They must review their risk based on a number of factors. Traditional reports provide the data but interpreting the data is very time-consuming. Visual Business Intelligence tools provide managers with much more efficient ways to evaluate risk across the entire enterprise.

This paper explains how Panopticon's Risk Analytics solution works and how software companies and client organizations can integrate these Visual Business Intelligence tools into their own systems.

All trading firms must monitor their market risk and they have all implemented regulated methods for doing so using a variety of specific tools. The most common enterprise risk systems produce tabular risk reports that show detailed information in page after page of tables and summaries. They do provide the required information, but making sense of the data, highlighting trends, spotting outliers, and correlating risk levels across the enterprise is difficult. Although the data is all present and available, the traditional methods of display are highly inefficient and prone to misinterpretation. By the time the risk manager has managed to understand the data, the market has moved on, and the firm's positions have deteriorated further.

Panopticon's solution is to use its Visual Business Intelligence tools to provide a highly graphical, interactive view of the same set of data. The primary visualizations used are the Treemap and Barseries, which support both static and time series views, making it easy to compare risk levels between offices, desks, sectors, industries, and so on. These visualizations make use of the innate capabilities of the human perception system, so that managers will identify problems quickly. For example, a manager can quickly discover desks where a poor performing book is cancelling out a well performing book.

This paper examines a specific use case for Panopticon Visual Business Intelligence software: Risk Analytics.

View Risk Exposures Across the Entire Enterprise

Trading firms must be able to monitor and analyze risk across their entire enterprise, including all of their regions, offices, desks, and books. In addition, they must be able to look at risk levels based on sectors and industries, as well as by specific instruments that may be held in a number of books. This level of complexity is not well suited to numerical reports, since the specific set of information that a manager needs to see will be determined by the issues of interest at any particular time. What is needed is a much more flexible method that allows the manager to quickly build a view that is well suited to the problems at hand. They must be able to see

risk levels for all levels in the hierarchy on a single screen, and they must be able to manipulate the display so that they can spot issues that require further investigation.

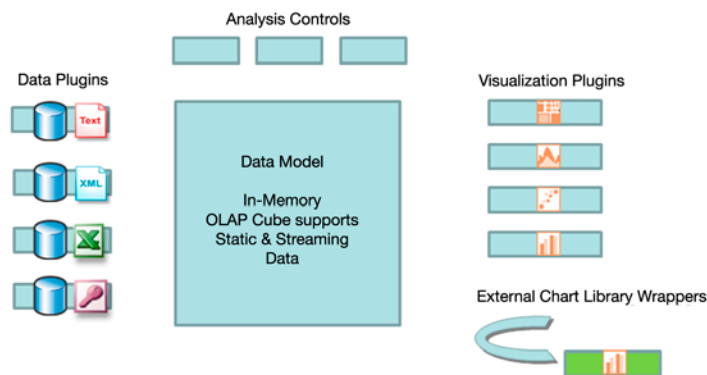
The primary tool for accomplishing this is the Panopticon Treemap. This very powerful visualization makes it easy for managers to look at risk at any level in their entire organization. They can drill down for details on demand, aggregate the data as needed, and filter out less valuable data so that they can better concentrate on the most relevant information. The Treemap makes all this possible on a single screen.

Panopticon's StreamCube™ Technology Makes It Possible

Panopticon's Treemaps and Barseries visualizations are actually only the most visible part of the complete Panopticon Visual Business Intelligence platform. This system was developed specifically to meet the challenges of managing financial data.

At the heart of the system is our StreamCube™ — a high performance, in-memory OLAP cube that supports access to data from multiple sources (relational databases, proprietary systems, OLAP-servers, and even streaming data feeds). This data model provides the fast analysis, aggregation and calculation functions needed to make Treemaps and Barseries truly useful in a fast-paced financial services environment. The Panopticon data model allows for continuous updates — it is specifically designed to handle true real-time streaming updates with very high levels of performance. It supports fast analysis, re-grouping and filtering since the system does not require a rebuild of the entire OLAP cube every time the data changes. When events in the data stream occur, or when the user interface interactively queries the data, the data model performs the calculations necessary to display the information on the fly.

The StreamCube™ data model provides fast analytical and monitoring functionality and is a central component in our Visual Business Intelligence system. It provides the analysis, aggregation and calculation of values based on your data. In addition, the data model allows for continuous updates — it is specifically designed to handle true real-time streaming updates with very high levels of performance. The StreamCube™ does not require a rebuild of the entire OLAP cube every time the data changes. When new events occur in the data stream, or when the user queries the data in a new way, the StreamCube™ performs the calculations necessary to display the information on the fly.



The Panopticon StreamCube™ is a high performance, in-memory OLAP cube that allows extensive analysis of static and streaming data. It is also capable of connecting to virtually any data source, including relational databases and streaming feeds. Interactive visualizations allow users to analyze risk data at any level in the organization's hierarchy.

The Right Tool Makes It Easy to Analyze Risk within Complex Hierarchical Structures

Firms often use the following metrics to gauge risk:

- Risk Exposure, including Value, Limit, and Limit Utilization
- 1 Day Value at Risk (VaR) — used primarily to manage in day to day market risk
- 10 Day Value at Risk (VaR) — used primarily in calculating capital adequacy based on Basel 2 requirements
- Limits and Limit Utilization for the 1 day and 10 day VaR

It's important to note that for Value at Risk, $VaR(a) + VaR(b)$ is not equal to $VaR(a+b)$. This is due to correlations between instruments reducing the risk of groups of instruments. These correlations are determined through a covariance matrix, which is why it is so important to see all the levels in the hierarchy at the same time.

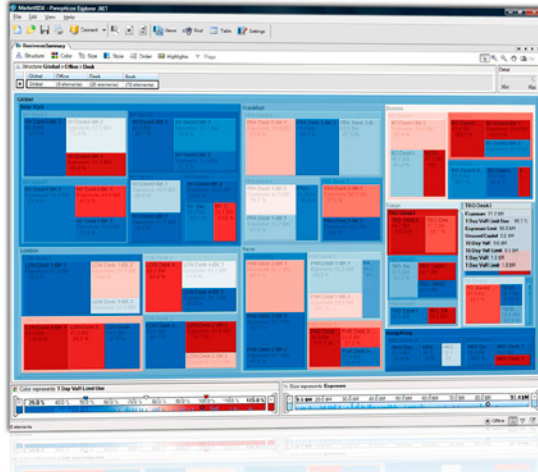
A typical business structure might include the following levels:

- Enterprise
- Region
- Country
- Office
- Desk
- Book
- Trader
- Instrument

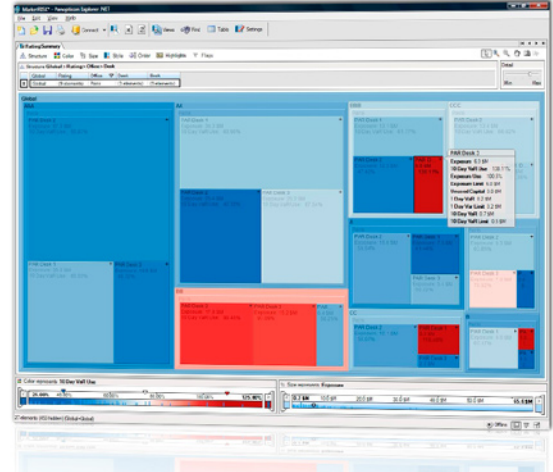
The firm will generally define risk limits for each level in the hierarchy down to the Book level. The company may also define additional separate risk limits are defined for instruments in a particular sector or industry, and/or instruments with a specific debt rating.

This is a relatively simple example, since firms may also impose additional limits on different groupings. For example, there could be risk limits set by country, investment style, asset class, and so on.

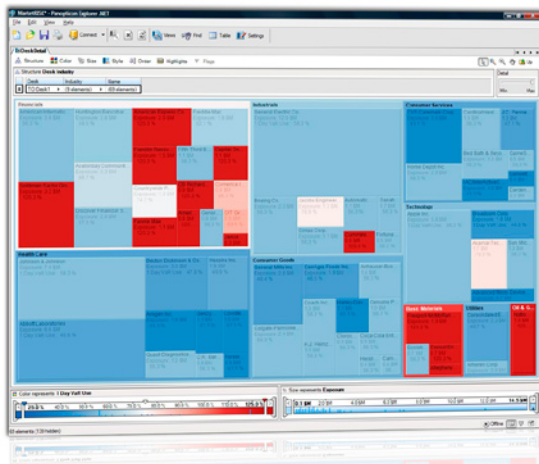
The combination of visualization techniques, filtering capability, and OLAP analysis supported by the Panopticon Visual Business Intelligence system makes it possible for managers to identify problems, see outliers and find correlations — based on current information as well as over time. There is simply no comparison with numerical reports in terms of efficiency and ease of use.



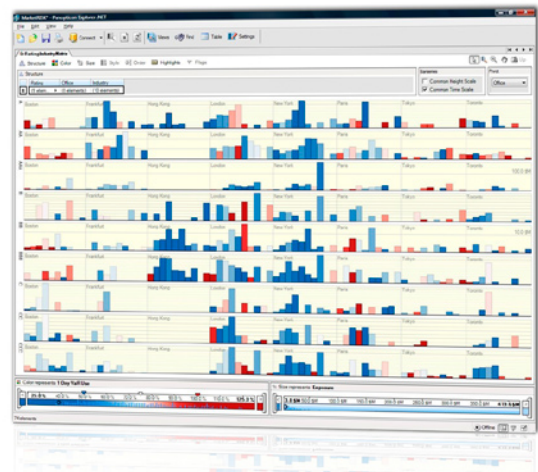
This view shows the entire organization in a single screen. Each book, desk and office is visible, including the limit utilization at every point in the hierarchy. The user can toggle between risk metrics, see problem areas as intense red, hover at any level to see risk measures, and drill down from this view to option more detail about the composition of the risk exposure.



Viewing the enterprise's exposure to debt ratings, highlights problem areas, such as Paris Desk 3 above, which has breached multiple risk limits, and how risk aggregates up the enterprise, as shown by the Paris exposure above to 'BB'.



The user can drill into a particular desk and see the current positions down to the individual instruments. Different hierarchies can be applied to confirm correlations across sector, book, trader, etc. Different risk metrics can be associated with color, and the ranges can be configured to match internal monitoring procedures.



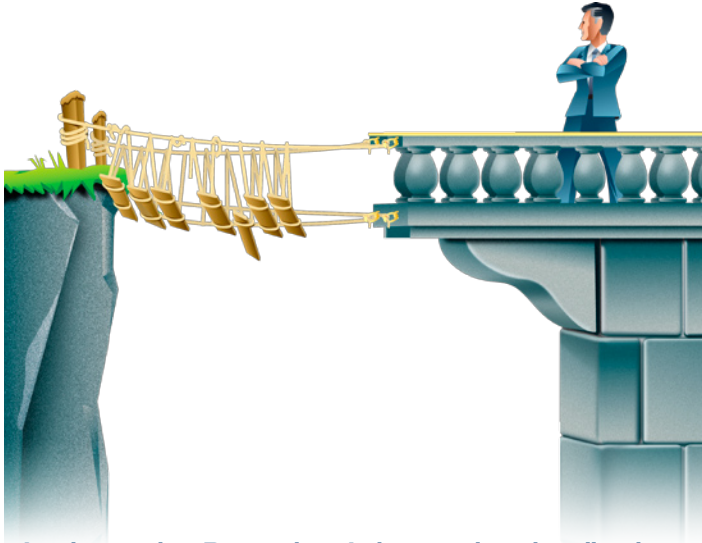
This view shows the exposure of each office across type structures: Debt Rating and Industry in a single screen. The offices distribution of exposure across industries is shown trellised into separated debt ratings. Overall exposure and limit utilization can be viewed by selecting a common height scale, or alternatively correlations between offices can be determined.

“In the past we used a static tool that gave us various statistics, but to analyze the vast amount of output required substantial time and effort. Panopticon's solution allows us to analyze a massive amount of data extremely quickly. We can more efficiently manipulate, analyze and interpret the data.”

Ian Cadby
CEO & CIO
Liberty Ermitage

**Low Risk Strategy:
Fast Implementation Using Comprehensive SDK**

Panopticon's comprehensive SDK makes it easy to embed interactive visualizations into existing applications to enhance their usability and effectiveness. These visualizations are a great fit with Order Management Systems, Portfolio & Position Systems and Tick Engines. Adding Panopticon visualizations to legacy applications can greatly improve utilization by making the applications easier and more fun to use – as well as reducing training time and improving productivity.



Implementing Panopticon's interactive visualizations carries substantially less risk than developing proprietary one-off solutions.

Panopticon Software

Panopticon's Visual Business Intelligence technology and products help financial institutions, retailers, telecoms companies, and other organizations dramatically increase the value of their process support systems. Our software provides monitoring and analytical functions that help users make timely, insightful and informed decisions. The Panopticon VBI platform combines innovations in three areas:

- World class, academically validated information visualizations
- Business Intelligence capabilities
- Ability to connect to virtually any data source, including streaming feeds, relational databases, OLAP servers, and proprietary data formats

The Panopticon VBI platform is available as an SDK that enables software companies and corporations to embed these capabilities into their own applications. Panopticon also offers enterprise and desktop versions of its VBI tools that companies can deploy quickly.

We work closely with OEM partners who use our information visualization tools to make their applications easier to sell and to differentiate their products from competitors. Our partners include **Tbricks** (algorithmic trading platforms), **Deltek** (project management), **Polystar** (telecommunications), **Thomson Reuters** (financial services), **Advent Software** (enterprise software for financial institutions).

“The ability to see all of our risk levels on a single screen and to make quick correlations between them saves us enormous amounts of time. We now spend more time digging into problem areas and much less time trying to sort out where the problems are.”

Chief Investment Officer
Multi-Office Asset Management Firm

Panopticon software is available in Microsoft .NET and Java implementations.



“By integrating the Panopticon products with real-time data the firm can react in minutes. Given the current state of the market, it is a competitive advantage.”

Dirk-Emma Baestaens
Manager in the Cross-Assets Derivatives & Structured Products Division
Fortis

More Information

For more information about how you can embed Panopticon Visual Business Intelligence tools into your own applications, contact:

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Risk Analytics Application Note

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