

Market risk management grows up with “sense and respond” technology

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Risk management has evolved in the last 10 years from an activity that was performed perfunctorily by traders on their trading desks into an activity that is now viewed by most large companies as a critical enterprise-wide requirement for many reasons, including satisfaction of regulatory requirements, gaining increased market valuation, better use of assets, and higher returns on risk capital.

Hardware, software and mathematical modeling technologies have also flourished. Today, the combination of powerful hardware, sophisticated software, highly refined mathematical processes, and the Web, have enabled risk managers to manage risk on extremely large trading books consisting of a wide variety of financial instruments from the simple to the complex.

However, despite the growth of various technologies, power industry risk managers continue to face significant challenges, such as:

- the inability to calculate enterprise market and credit risk exposures in real-time, and
- the related inability to recognize, in real-time, threats to the enterprise caused by constantly changing market and environmental conditions and to take immediate appropriate action based on that recognition.

As software vendors began bringing enterprise market risk and credit risk applications to market in the 1980s and 1990s, the statistical methods employed to calculate market risk and credit risk exposures were crude by today's standards.

Value at Risk (VaR) is probably the most well-known measure of risk. The first widely accepted version was Parametric VaR, introduced by JP Morgan in the 1980s. While

fast, it proved rather inaccurate for options.

Next came Historical Monte Carlo VaR. While slower to calculate than Parametric VaR, it was more accurate for options. The drawback was that it assumed that future price movements would behave like past price movements, a rather heroic assumption.

Today, the Monte Carlo Simulation VaR, for both market risk and credit risk, is the method of choice offered by the most sophisticated enterprise risk software vendors. It is, however, extremely slow in comparison to earlier methods.



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Today, the job of risk managers in the energy industry is more difficult, mainly due to the complexity of inputs that must be correlated. These external conditions include: purchasing and delivering fuel to

generation plants; optimizing the use of those plants; and selling and scheduling the power that is produced. The number of inputs required to make purchasing, generating, trading and scheduling decisions is significantly larger than other physical markets. The difficulty lies in efficiently gathering, digesting, and making decisions based upon such a vast amount of rapidly changing data.

Next generation “sense and respond” technology allows power industry risk managers to define specific risk thresholds (sometimes called “events”) they wish to monitor as well as the necessary actions to take, should the thresholds be met. More importantly, this

technology can detect these changes and fire off necessary application processes in real-time.

These thresholds can involve complex combinations of conditions that might occur across multiple data sources. For example, a risk manager concerned about his company's ability to procure natural gas for a Phoenix plant, should a spike in electricity demand in the Southwest occur, might define a threshold as follows:

- If:
- “The forecasted temperature in the Southwest is 5 degrees higher than last week's actual temperature; and
 - The percentage increase of the price of natural gas increases by more than 150 percent of the increase in the 1-day forward price of electricity in that area; and
 - The total notional amount of the unsettled electricity trades which mature in one month or later is greater than 1,000,000 kWh....
 - Then, run Monte Carlo Market VaR for the electricity book; and if the resulting VaR is greater than \$10,000,000, alert me; and send email to the electricity trading manager advising to call me because he has breached his Market VaR limit.”

Recent innovations in hardware and software technology, as well as improvements in mathematical modeling techniques, allow risk managers to approach the Nirvana of real-time risk management. **ELP**

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