

# Tapping into Unleashed Business Potential through Advanced Analytics

How can we exploit the power of advanced analytics to strengthen our competitive differentiation?

## Executive Summary

Every business is seeking new ways to achieve sustainable competitive advantage, and the most challenging business problems can quickly shift from customer loyalty issues to supply chain inefficiencies. Just when the competitive strategy is in place, the marketplace can swing wildly due to global economics and you may need to go back to the drawing board. How can a business possibly plan for every contingency and challenge? More and more businesses are seeking ways to do just that by making more informed decisions utilizing all of the data available to them.

Historically, organizations have turned to standard business intelligence (BI) technology for analytics to guide their strategies and operations. While traditional BI technologies are adequate for solving business problems by reviewing historical information, they are proving inadequate for creating models to anticipate future problems and opportunities. Models and predictions are falling short of their potential due to a myriad of reasons, including: long cycle time data transfers, exploding data volumes, processing constraints and the increasing complexity of operations.

With the challenging business problems organizations increasingly face comes a need for better analytics tools that can handle the unprecedented speed and volume of problems that businesses deal with every day. Organizations need tools that:

- Don't overwhelm with details, but instead provide clarity, focus and foresight into the right business issues quickly
- Take experience and knowledge as input to produce breakthrough results—consistently and repeatedly
- Can regularly enable actions that can drive incomparable business performance and results

The TwinFin i-Class™ advanced analytic appliance enables enterprises to move from being reactive to being proactive, bridging the gap between reporting on historical trends and predicting future outcomes based on predictive analytics and optimization. Proactive enterprises that want to seek out, exploit and capitalize on opportunities ahead of their competitors can leverage Netezza i-Class advanced analytics to underpin their business strategies. This powerful, high-performance, scalable, simple-to-use advanced analytics technology from Netezza delivers on the promise of tapping into unleashed business potential in your business to deliver sustainable competitive differentiation.

### Suggested Reading

Competing on Analytics, by Thomas Davenport and  
Jeanne Harris Super Crunchers, by Ian Ayres

Smart Enough Systems. How to Deliver Competitive Advantage  
by Automating Hidden Decisions by Neil Raden and James Taylor

# What are advanced analytics?

Advanced analytics help companies use their data and knowledge assets to gain foresight and take appropriate actions. This allows an enterprise to quickly take the most effective actions by:

- Predicting future outcomes based on past performance and changing conditions
- Optimizing operations by determining the best alternative given competing business objectives and real-world constraints

The technologies and techniques used in advanced analytics include data mining, predictive analytics, simulation and optimization. Both predictive analytics and simulation are methods for creating a model, which is a logical representation of a problem or a process. When data is available, predictive analytics techniques are used to create the model. When there is little-to-no-data or the data is unreliable, simulation can be used to create the model using business rules.

Once a model is created, optimization can be applied to deliver the best solution (or a set of best solutions) from millions of possible choices. The optimization is typically constrained based on real-world issues or limits in available resources.

**Advanced Analytics Terms and Definitions**

**Data mining:** A technique for discovering hidden relationships in data

**Predictive analytics:** A technique for using discoveries from data mining to predict future outcomes.

**Simulation:** Methods and processes that imitate a system or environment in order to model its behavior.

**Optimization:** A mathematical technique used to find the best course of action based on a model.

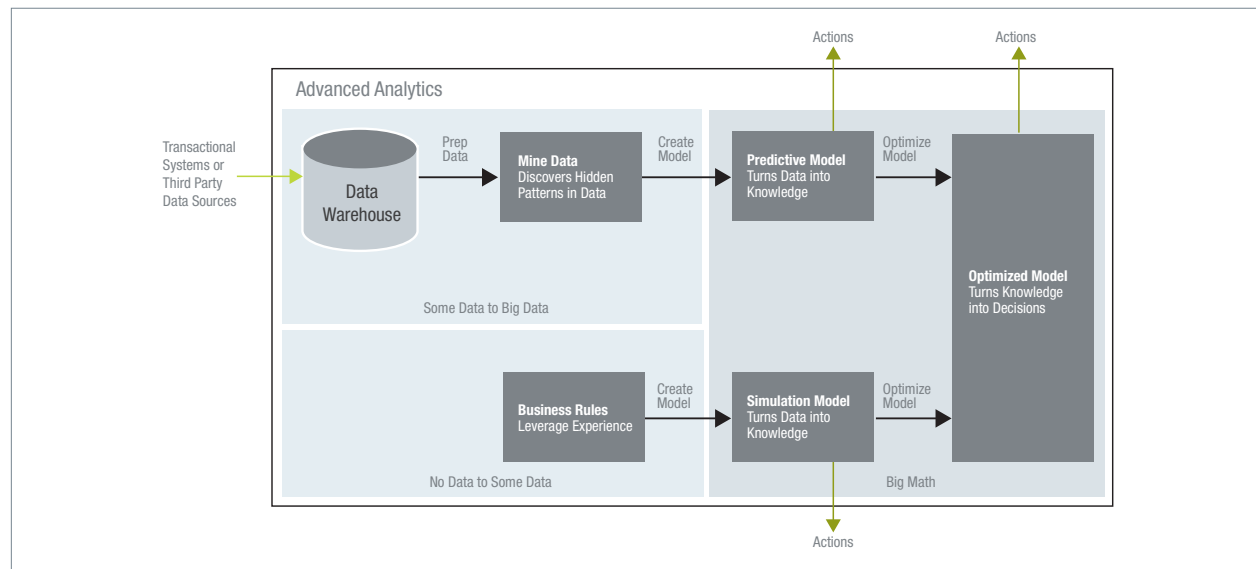


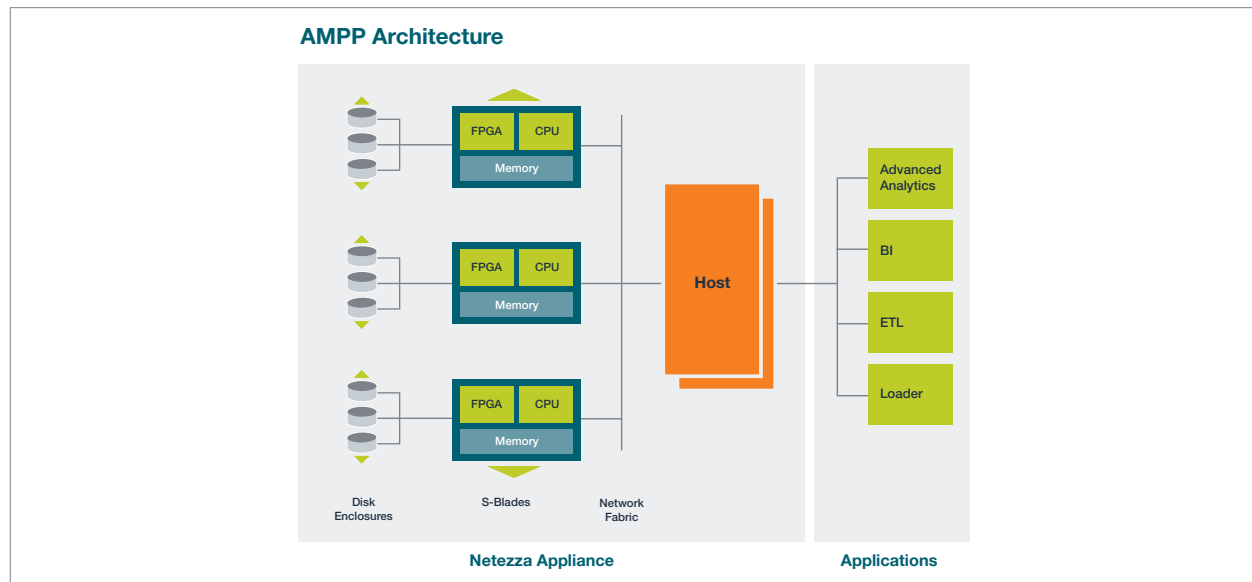
Figure 1: Scope of Netezza advanced analytics

## High-performance advanced analytics with appliance simplicity

Netezza has transformed advanced analytics—just as we did with data warehousing—by moving the processing close to the data. This allows Netezza to process high-performance analytics on massive data volumes, oftentimes facilitating the analytics processing of data for the first time. The Netezza appliance is a purpose built appliance that fuses data warehousing and advanced analytics to deliver industry leading price performance with the simplicity of an appliance.

It's a new frontier in advanced analytics, with the ability to carry out monumental data volume and processing challenges with blazing speed, without barriers or compromises. For users and their organizations, it means the best intelligence to all who need it—from front-line workers using operational systems to executives using strategic analytics for competitive advantage.

The Netezza appliance has a revolutionary design based on core architectural principles. As a purpose-built system for high-speed analytics, the Netezza's power comes not from the most powerful and expensive components but from how the right components are assembled and work together to maximize performance in its Asymmetric Massively Parallel Processing™ (AMPP™) architecture. MPP streams combine multi-core CPUs with Netezza's unique FPGA Accelerated Streaming Technology (FAST™) engines to deliver performance that much more expensive systems cannot match or even approach. For further information about the innovative Netezza appliance architecture, visit [www.Netezza.com](http://www.Netezza.com).

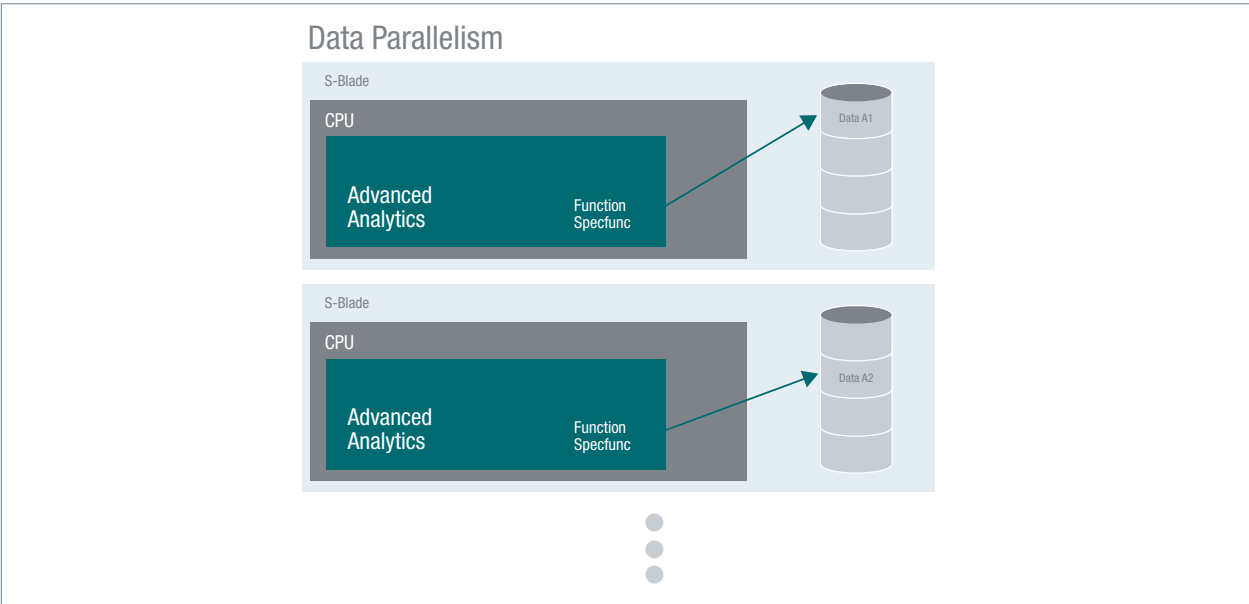


**Figure 2: The Netezza appliance delivers unparalleled price/performance advantages with simplicity and easy of use.**

The principles of MPP and data processing close to the source are critical to advanced analytics on large data sets. Netezza allows complex non-SQL algorithms to be easily embedded in the processing elements of its MPP streams without the typical intricacies of parallel or grid programming. The ability to run analytics of any complexity "on stream" against huge data volumes eliminates the delays and costs of moving data to separate hardware. It also accelerates performance, making the Netezza an ideal platform for the convergence of data warehousing and advanced analytics. Companies can run advanced analytics directly on the Netezza appliance at phenomenal speed to quickly benefit from more powerful ways to unlock the intelligence in enterprise data.

## What's so special about Netezza's advanced analytics?

The fusing of a data warehouse and advanced analytics into a single, open and flexible purpose-built appliance is a major breakthrough. By deeply embedding advanced analytics within the Netezza appliance, we deliver blazing performance that allows us to address data and computationally intensive applications in near real-time. Lightning fast, fact-based decision-making enables not only strategic applications—such as earnings risk and portfolio analysis—but also tactical operational applications—such as fraud detection and network optimization.



**Figure 3: Netezza i-Class supports high-performance advanced analytics with data parallelism.**

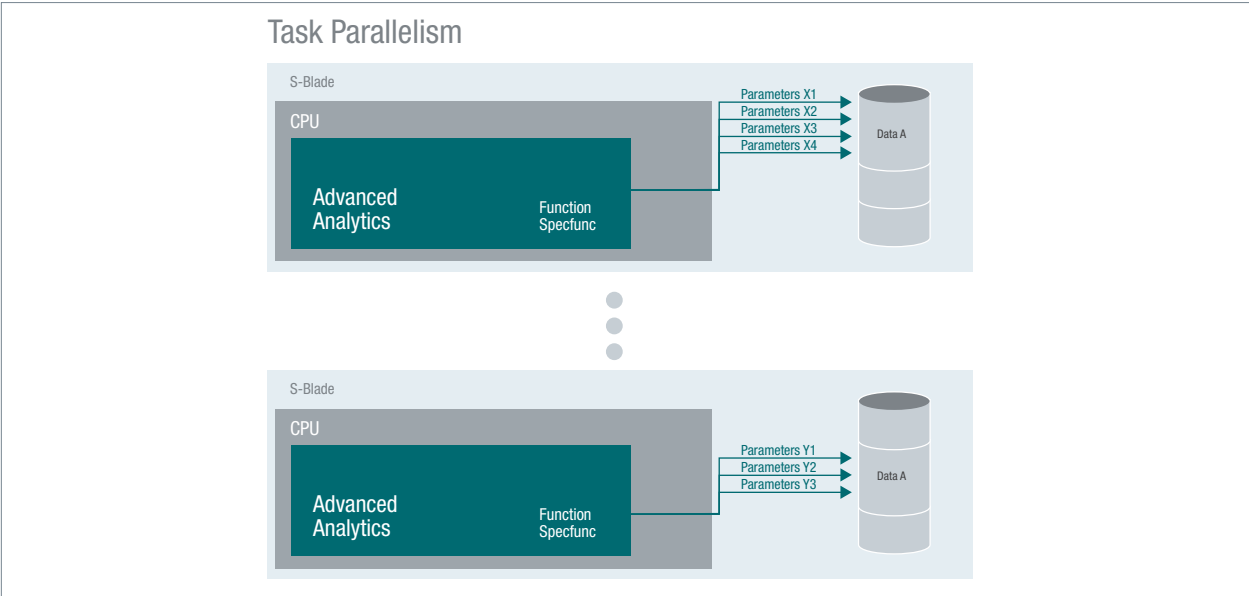
Netezza TwinFin i-Class fully exploits the Netezza streaming architecture to process massive data sets extremely efficiently and economically. Deep parallelism tightly integrates advanced analytics with the Netezza parallel architecture using data, task and hybrid data/task parallelism to continually keep all the S-Blades busy in order to fully harness the massive computing power of the appliance.

**Parallelism Terms and Definitions**

**Data parallelism:** In data parallelism, the algorithm works on slices of the data that have been distributed over the CPUs

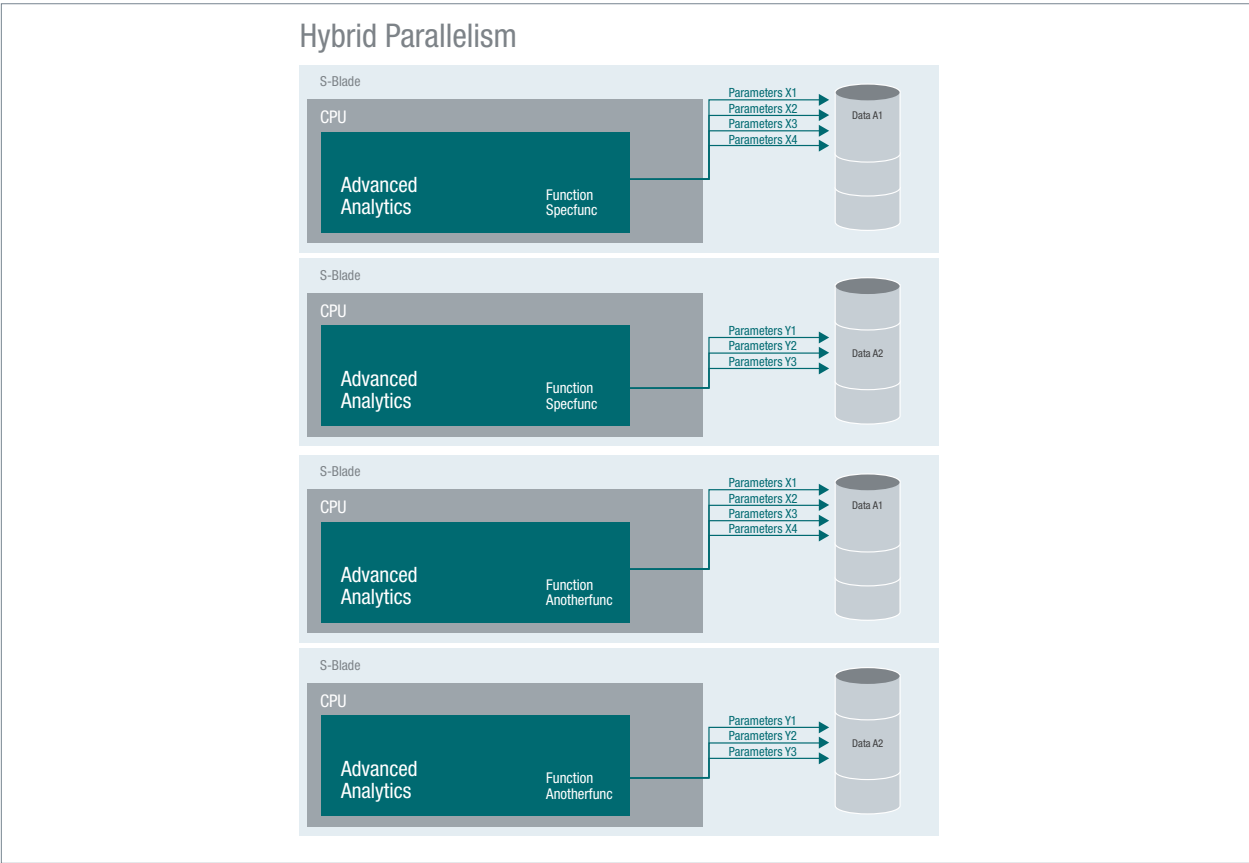
**Task parallelism:** In task parallelism, the algorithm duplicates the data across the CPUs and runs different algorithms over each set of data

**Hybrid parallelism:** A combination of both data and task parallelism



**Figure 4: TwinFin i-Class supports task parallelism to dramatically improve performance.**

Deep parallelism powers the Netezza advanced analytics, resulting in extremely fast and powerful data mining, predictive analytics, simulation and optimization on very large data sets. With the high-performance, deeply parallel embedded analytics in i-Class advanced analytics, you can address problems that were simply too computationally intensive to handle in the past—giving you the ability to discover new opportunities and unleash their untapped business potential.



**Figure 5: Blending data and task parallelism concurrently enables hybrid parallelism, which derives maximum throughput from the innovative Netezza appliance architecture.**

The price-performance of this immense analytic computing capability is unrivaled in the marketplace. This means that you now have the computing power to cost-effectively drive business analytic applications once only reserved for the world’s largest supercomputers. Now you can apply that supercomputing capability to your business problems—dig through the data and use all the data—to give your business a giant leap forward in the marketplace.

The embedded analytics that Netezza delivers out-of-the-box simplifies your deployment of advanced analytics. The ability of TwinFin i-Class to stream and process large volumes of data with advanced analytics virtually eliminates all the latency in deploying actionable, intelligent applications. This combination provides enterprises with the flexibility and adaptability to make timely strategic and operational decisions that the fast-paced world demands. Continually capitalizing on the best opportunities—given all the real-world constraints in a dynamic, ever-changing market—sets an enterprise on the path to long-term, sustainable competitive differentiation.

Netezza’s advanced analytics are accessed through a variety of industry-standard languages, including SQL, C, C++, Java, MapReduce, Hadoop, Python, R, and Fortran an emerging language for advanced analytics. The open and flexible i-Class advanced analytics enables you to quickly prototype and deploy high-performance advanced analytics with a variety of Netezza-supplied as well as leading third-party tools.

TwinFin i-Class is extremely flexible and allows you to extend out-of-the-box advanced analytics or embed your own advanced analytics into the appliance. This means that you can leverage the computing power and throughput of Netezza i-Class advanced analytics for:

- Your own proprietary analytics
- Open source analytics
- Third-party analytics

With TwinFin i-Class, your enterprise can continually anticipate and capitalize on emerging business opportunities at near real-time speed. Netezza delivers high-performance, simplicity and incomparable price/performance to power your move into the new era of advanced analytics.

# What are some examples of leveraging advanced analytics?

Advanced analytics can be used to improve existing applications or can be deployed in new applications. Let's take a look at just a few example applications across different industry verticals and how they help companies realize sustainable competitive advantage.

## **Thank You for Recognizing It's Me!**

### **Personalizing promotion strategies drives up customer loyalty**

Increased customer loyalty is exactly what a convenience store retailer continues to realize by combining customer segmentation and behavior analysis—powered by advanced analytics. Data mining techniques are used on past purchases to segment customers, and predictive analytics are used to forecast when and to which new segment the customer will shift over time. The prediction of customer behavior allowed the retailer to tailor individual promotional and reward strategies that have increased customer loyalty. As added benefits, this retailer can mine data of purchasing transactions to identify any employee fraud and make sure that the marketing budget is spent on highly effective and impactful activities that result in increased sales and continuously drive profitable customer retention.

## **Understanding R**

R is a 4GL programming language and software development environment used at most universities and colleges by the next generation of analysts, statisticians, engineers and scientists.

## **It's All About the Bottom Line**

### **Squeezing out production inefficiencies in a complex supply chain to drive up profitability**

Production planning is a difficult process and seems almost impossible when you've got to balance a complex supply chain, quickly changing customer demand, fluctuating commodity pricing and even highly unpredictable events such as weather. Using advanced analytics, a leading energy company has repeatedly driven out production inefficiencies without negatively impacting the existing operational systems. Using the existing plant production schedules, maintenance plans, projected energy prices, weather forecasts, client demand and desired inventory levels, the production optimizer creates an adaptive, enterprise-wide production schedule that allows operations to meet each plant's production requirements while driving out millions of dollars of costs annually.

## **Cash is King**

### **Using predictive modeling and optimization to conserve cash without hampering growth**

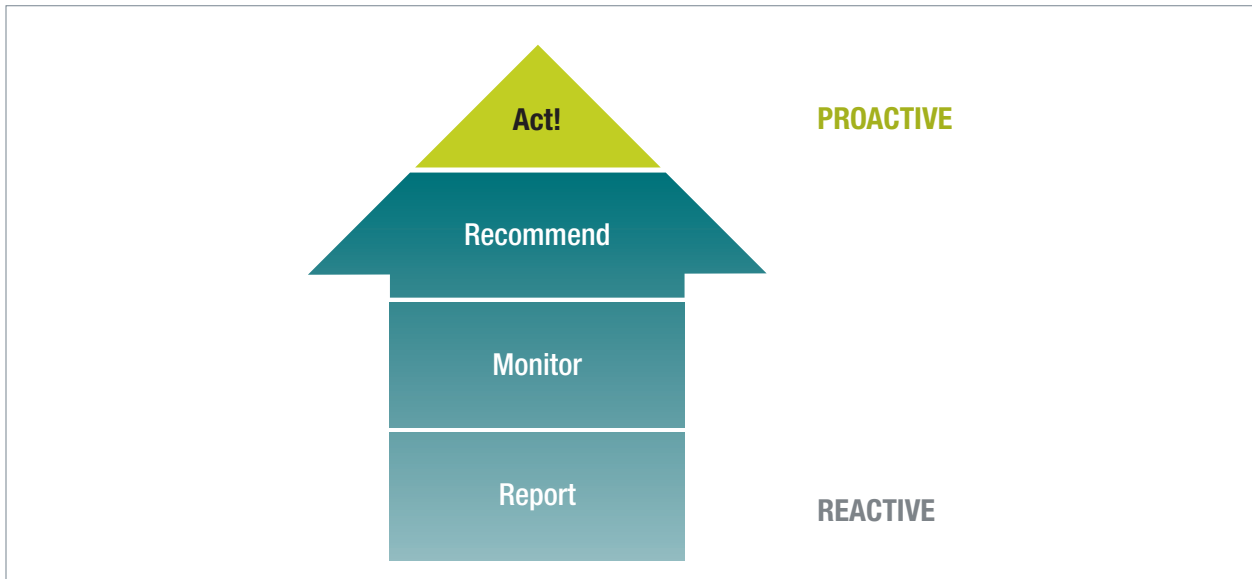
Today more than ever, conserving cash is critical. Yet without appropriate strategic investments you may limit your growth, especially during hyper-growth periods. Using predictive analytics, companies can forecast their uncertain, shifting demand and evaluate the optimal time to deploy capital reserves for strategic investments. Take network investments in the telecommunications industry as an example. Predictive analytics can use current system loads and system capacity to predict demand based on customer churn, market growth and project lead times, and optimization of the model can take into account multiple conflicting objectives such as risk aversion, profit maximization and minimization of capital outlay.

## **The Sky is the Limit**

### **Using predictive analytics to maximize revenue under uncertainty**

Accurately predicting demand is tough, and accurately predicting demand in a challenging economy is daunting. Ensuring that you'll achieve your target yield is especially difficult when the pricing in your industry is demand-driven, and demand is highly uncertain. Companies that are seeking revenue assurance are turning to predictive analytics for their demand forecasting and price planning. Predictive models can holistically model factors such as customer behavior, purchasing history, changing economic conditions and competitive intelligence to more accurately forecast demand and plan pricing strategies. While accurately striking the balance between supply and demand can require a large number of predictive models to be evaluated, the increase in price maximization and yield can be substantial.

Businesses today demand measurable returns on their investments, and organizations that deploy advanced analytics expect returns far beyond those delivered by traditional automation projects. Netezza TwinFin i-Class helps customers achieve their goals for improving operations through advanced analytics.




**Figure 6: Organizations can become more proactive by moving beyond reporting to monitoring, recommending and acting based on timely and relevant analytics.**

## Conclusion

High-performance advanced analytics is an approach for releasing pent-up business value in your company. Inserting advanced analytics into your operational systems is the way to infuse your enterprise with actionable intelligence—driving repeatable, scalable and ever-increasing business performance.

The Netezza appliance uniquely implements massively parallel processing as close to the source of data as possible, and it allows customers to benefit from an open and flexible appliance ready to handle increasing volumes of data. A balanced architecture is key to achieving the best possible price/performance for advanced analytics, and every component of the Netezza architecture is carefully selected and optimized to service data as fast as the physics of the disk allows.

By combining a lightning-fast data warehouse with high-performance embedded analytics into a single platform, Netezza has dramatically reduced the need for data movement and enabled advanced analytics on large data sets. With Netezza TwinFin i-Class, your time to deploy and realize potentially extraordinary benefits with advanced analytics improves dramatically. 

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**About Netezza**

Netezza (NYSE: NZ) is the global leader in data warehouse and analytic appliances that dramatically simplify high-performance analytics across an extended enterprise. Netezza's technology enables organizations to process enormous amounts of captured data at exceptional speed, providing a significant competitive and operational advantage in today's data-intensive industries including digital media, energy, financial services, government, health and life sciences, retail and telecommunications. Netezza is headquartered in Marlborough, Massachusetts and has offices in North America, Europe and the Asia Pacific region. **For more information about Netezza, please visit [www.netezza.com](http://www.netezza.com).**