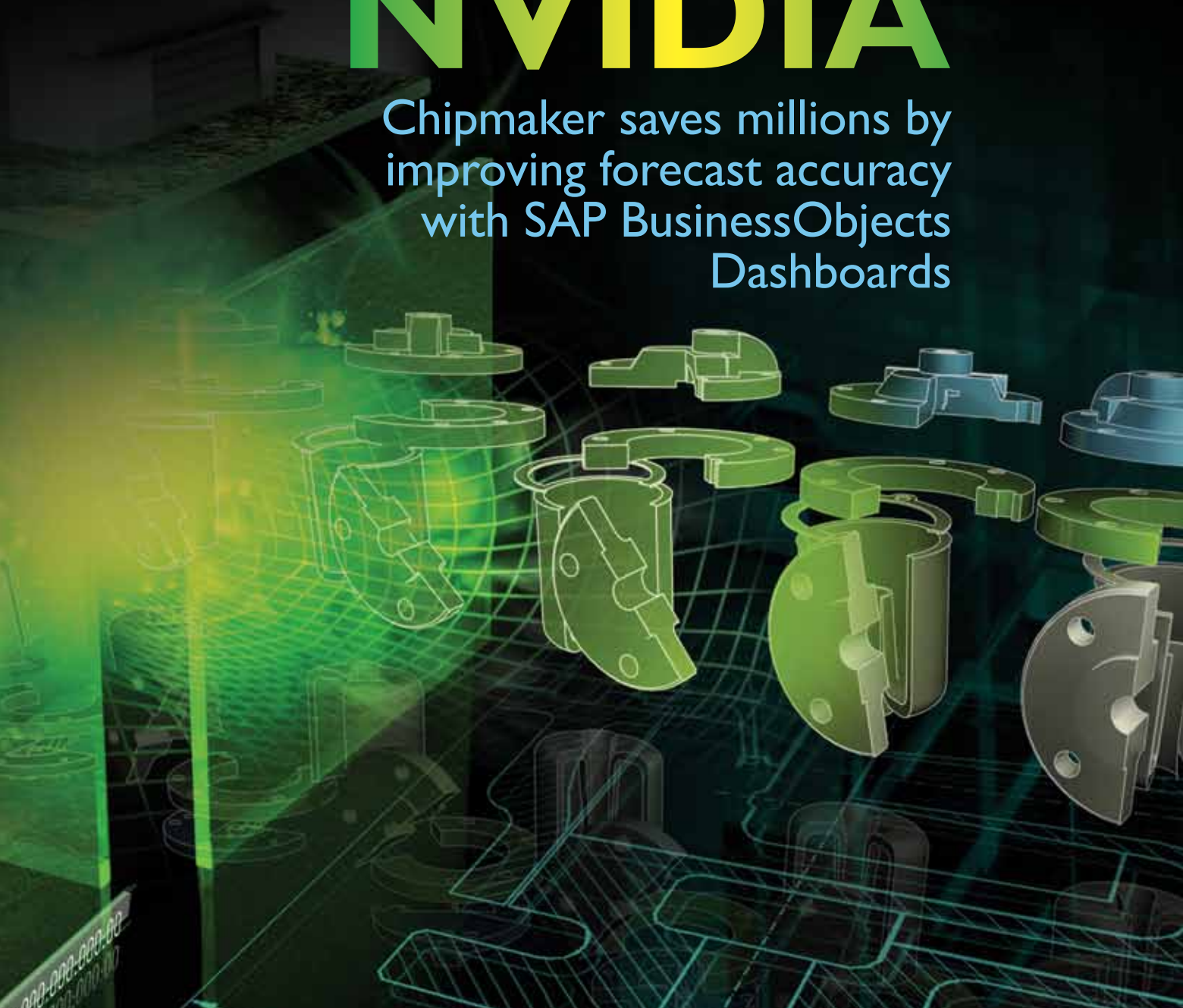


Inventory Forecasting at **NVIDIA**

Chipmaker saves millions by
improving forecast accuracy
with SAP BusinessObjects
Dashboards



by **David Hannon**, Features Editor

As a supplier to the consumer electronics industry, one of chipmaker NVIDIA's biggest business challenges was appropriately forecasting customer demand and positioning its inventory levels accurately to meet that demand. Consumer trends, after all, are less predictable than industrial demands, and without a standard IT platform, the challenge becomes even more difficult.

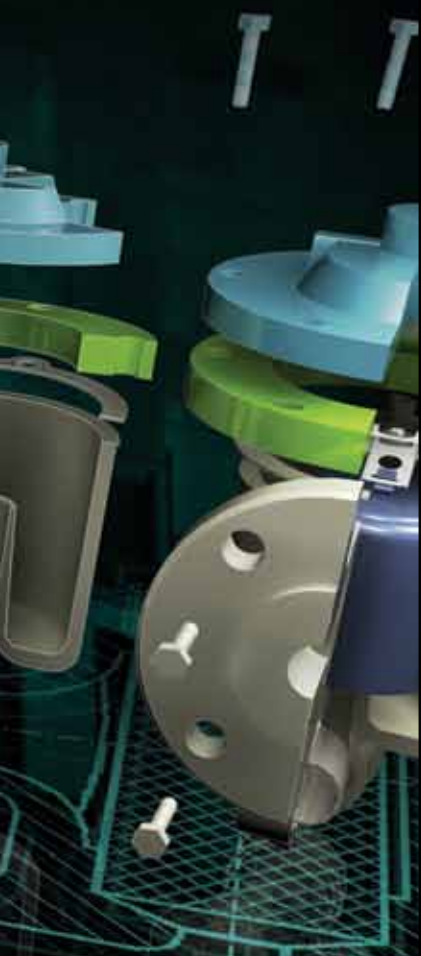
But the combination of a new inventory forecasting solution and executive dashboards based on SAP BusinessObjects technology provides NVIDIA not only with a granular view of six months' worth of actual inventory, but also with a forecast of inventory levels for the next four quarters based on anticipated demand. Business executives visualize chip fabrication planned for 12 months down the line. These changes have produced a 2% reduction in forecast inaccuracy, saving millions of dollars in potential inventory write-offs.

"The improved forecast also shows what areas of inventory are a concern so we can work with the business unit on clarifying decisions," says Carole Edwards, Director of Production Control at NVIDIA. "And by providing executives with new supply and demand dashboards, they can make more strategic material buying and manufacturing decisions based on existing inventory."

The success of both projects is a shining example of how IT can improve business operations by fully understanding the business's goals and objectives.

Defining the Need

NVIDIA's business success depends on balancing supply and demand effectively. The company's groundbreaking graphics processing units (GPUs) can be found in everything from tablet devices and video game consoles to car infotainment systems and supercomputers. As demand for its customers' consumer products ebbs and flows, so does the demand for NVIDIA's chips. If demand for a customer's product dropped unexpectedly, NVIDIA could be sitting on a pile of excess inventory that could equate to millions of lost dollars.





NVIDIA's Inventory Forecasting Transformation

Before:

- Forecasted inventory with spreadsheets
- Did not share inventory data with executives
- Took more than 140 hours to build forecasts
- 5% forecast inaccuracy rate



After:

- Forecasts inventory with SAP BusinessObjects Dashboards
- Shares data with executives via SAP BusinessObjects Web Intelligence
- Builds forecasts in 30 hours
- 3% forecast inaccuracy rate



Accurate forecasting is crucial because NVIDIA can't turn its production volumes up or down every time consumer tastes change. Like many of its competitors, NVIDIA's chips are built at foundries (mostly in Asia), so the company provides production plans far in advance. When customers give an estimate of how many NVIDIA products they will need, planners must work backward and buy enough material (silicon wafers being the principal material) and schedule enough capacity at its foundries to meet that demand. In a perfect world, customer forecasts would be completely accurate and NVIDIA could buy the exact amount of material and capacity based on their requests. But instead, NVIDIA has to make its own estimates of how much material and capacity it will need to meet customer demand — without producing so much excess that it negatively affects the company's bottom line.

"Previously, forecasting inventory involved business units doing a high-level estimate of what they expected to sell, and then they met with finance to discuss it," says Edwards. "Those of us in chip operations only saw what inventory was physically there. We never received forecasts. And we needed to give the foundries a clear picture of what we expect to build relative to inventory so they understand what's required in terms of capacity."

NVIDIA had been using SAP software since 2000 in other areas of its business, including finance, human resources, logistics, and sales and distribution. But the information required to create inventory reports was housed in various systems, so the production department used spreadsheets to build rough inventory forecasts. Of course, those spreadsheets did not provide any drill-down capabilities to sort data by product family, compare costed and not-costed inventory, or view data by business segment.

"We were using a very simple model to compare our build plans with actual demand," says Edwards. "Because we were within 5% of actuals, we only shared the information with chip operations and the business unit. Sharing it with marketing or finance would have likely improved the accuracy based on their input, but we just weren't confident enough on the accuracy."

Moving from Spreadsheet-Based Forecasting

The event that prompted NVIDIA to review its inventory and demand planning technologies was the company's move to a 40-nanometer manufacturing process. During the transition period, NVIDIA made 40-nanometer chips, but also carried inventory for other sizes to cover customers that were not yet prepared to move. The transition raised more concerns about the balance between supply and demand. How much of the new product would NVIDIA's customers want, and how much of the existing sizes should the company continue to make? And how long would it take its customers to fully transition?

"We had a ton of inventory," recalls Edwards. "And when we suddenly started cutting back on certain products to rectify that, it caught our own suppliers off-guard."

In the wake of the move, NVIDIA created a supply chain steering committee to review the company's supply chain processes from various viewpoints including operations, finance, marketing, and IT. One of the steering committee's recommendations was for the business to update its inventory forecasting process from its current spreadsheet-based process.

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At a Glance

NVIDIA

Headquarters: Santa Clara, California

Industry: Electronic components

Revenue: \$3.5 billion (NASDAQ: NVDA)

Employees: 7,000

Company details:

- Founded in 1993
- Employees in 20 countries
- Holds more than 2,100 issued patents worldwide
- Invented the graphics processor unit in 1999 and has shipped more than 1 billion since

SAP solutions:

- SAP APO
- SAP NetWeaver BW
- SAP BusinessObjects solutions (including SAP BusinessObjects Web Intelligence and SAP BusinessObjects Dashboards)

With its orders in hand, NVIDIA's project team initially set its sights on building a solution to improve the inventory forecasting process. The first task was requirements gathering to find out what information the operations group would need in its inventory forecasts. To determine the requirements, members of the IT organization shadowed their peers in the operations group to see what data they used and how they used it.

"After several sessions of uncovering what the operations team was looking for, we recommended building the solution with SAP software because most of the data was in SAP Advanced Planning & Optimization (SAP APO), with the exception of some data that wasn't in the system," says Anthony Noguera, Senior Manager, Sales and Planning Systems at NVIDIA. "We suggested building some SAP NetWeaver Business Warehouse infocubes within SAP APO to accommodate the data not in the system. But we modularized those infocubes so we can reuse parts of them in other areas as needed."

NVIDIA invested in SAP BusinessObjects solutions about seven years ago, so it chose to build a customized interface on top of SAP APO for the new inventory forecasting solution, using SAP BusinessObjects Web Intelligence. The

result has been improved forecast accuracy, thanks to broader input on the forecasts. Historically, the spreadsheet-based forecast was at 5% error. When a company has \$500 million in inventory, that error adds up to \$25 million. With the new solution, the forecast error has been cut to 3% or less.

Benefits of Inventory Forecast Dashboards

The second project — building a supply and demand dashboard for executives to easily access high-level inventory data — leveraged some of the work that had already been done for the inventory forecasting solution. "I showed the executive team what I had and asked what else they wanted to see in their dashboards," says Edwards.

In addition to actuals, executives wanted to drill down into product level details. They also wanted to calculate that data looking forward or backward, with inventory reserves or without. And the information had to be presented in user-friendly charts and tables, not standard reports.

"Once executives provided their requirements, we asked IT to put the information in a dashboard," says Edwards. "And that's when IT started looking into SAP BusinessObjects solutions for the most user-friendly

interface." SAP BusinessObjects Dashboards give executives the flexibility to look at certain KPIs, without the assistance of a third party or an IT professional.

In addition to improved forecast accuracy, the new solutions have dramatically reduced the amount of time required to build forecasts. With the manual solution, it would take 140 hours to prepare the quarterly forecast. This included time from both IT and operations teams. "After the new system went live, we did process improvements and system tweaks to reduce that to 30 hours," says Noguera.

"And lastly, with the new inventory forecasting solution, we finally have one source for chip inventory forecasting instead of multiple models, so we can make better decisions and have a consistent method for forecasting," says Edwards. "The executives trust the outcome and focus on the decisions needed, rather than questioning data. Suddenly, our SAP BusinessObjects team has become extremely busy with different groups asking to do the same thing. This project blazed the trail for that. It goes to show that if there's a real business problem with a strong business driver, and you combine business and IT, you can create a successful solution." ■