

No matter what industry you're in, the Internet of Things (IoT) is top of mind today. Just a cursory look at the numbers shows that IoT will be big. By 2019, Business Insider forecasts that the Internet will connect 35 billion "things" – and most will be objects formerly not connected, such as thermostats, watches, vending machines, cars, robots, servers and heavy machinery. By 2020, over 40,000 exabytes of machine-generated data will be generated through sensors built into physical objects connected to the Internet.¹ That's over 90% of the data being generated today around the world.²

The Internet of Things (IoT) is essentially a network of physical objects that is connected to and accessed through the Internet. Connected objects contain embedded technology, such as sensors, that enable objects to sense and communicate. This ability is what will change how and where decisions are made, who makes them, and how quickly they are made.

IoT in a Nutshell

The IoT is a complex network of things and people that are seamlessly connected through the Internet. Literally anything that can be connected will be connected and communicating using wireless sensors and RFID tags. And once connected, these connected "things" can send data and interact with other things and people – all in real time. Sensors alone can generate massive volumes of data – unstructured data that can be classified, organized, analyzed and harnessed as part of a super-fast feedback loop to support accurate, automated decisions and actions. This feedback loop also allows you to see, monitor and control things remotely through the Internet, as well as continuously improve operations. It also ensures you're no longer in the dark about what's really going. With real-time alerts and insights, you can take intelligent, instant action to address issues and achieve goals.

But what does the IoT mean for your business? What kinds of new opportunities does it create? How are your competitors using it to innovate their business processes, run smarter and leaner, and deliver new value to their customers?

Data-driven companies are already using machine-generated data from the IoT to enhance customer service, generate more revenue from new products and services, optimize operations, and feed more data into existing analytics efforts. They are also using it to:

- Move from selling products to selling end-to-end services
- Build new and innovative products
- Reduce system downtime and identify and resolve network bottlenecks
- Improve customer experience
- Increase the productivity of existing operations and infrastructure
- Make smarter decisions regarding future infrastructure investments
- Predict and improve mean time-to-failure for machinery and other capital-intensive assets

With the IoT, the possibilities are endless. Some of the hottest areas of application, according to Goldman Sachs, are in connected homes (for example, smart thermostats and security), wearables (like fitness bands), the industrial Internet (think real-time analytics and automation), connected cities (for instance, smart meters), and connected cars (for instance, for fleet management).³

¹ <http://uk.businessinsider.com/internet-of-everything-2015-bi-2014-12>

² <http://www.sciencedaily.com/releases/2013/05/130522085217.htm>

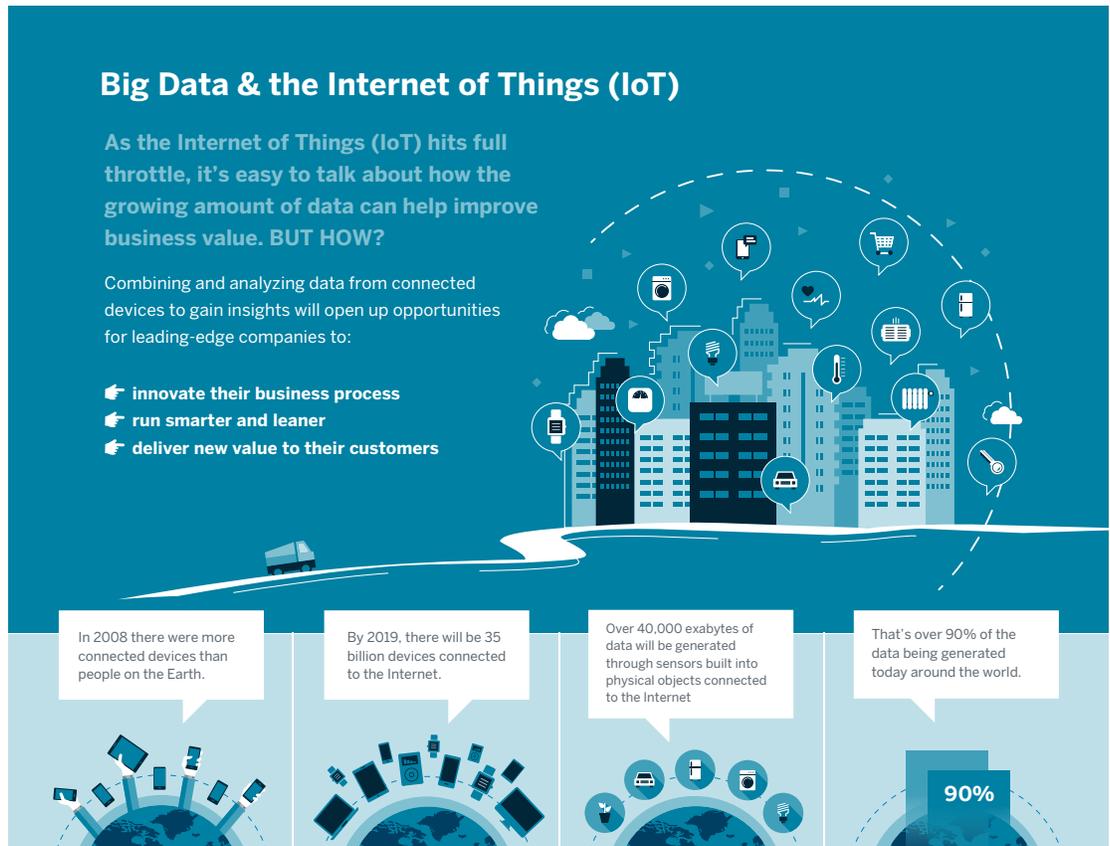
³ Goldman Sachs infographic

Big Data & the Internet of Things (IoT)

As the Internet of Things (IoT) hits full throttle, it's easy to talk about how the growing amount of data can help improve business value. BUT HOW?

Combining and analyzing data from connected devices to gain insights will open up opportunities for leading-edge companies to:

- ☛ innovate their business process
- ☛ run smarter and leaner
- ☛ deliver new value to their customers



It's All About The Data

But collecting, preparing and analyzing all of this streaming, fragmented data is no small task. The data volumes can double every few months, and the data itself is complex – often in hundreds of different semi-structured and unstructured formats. And most importantly, to gain the big insights from streaming sensor data, you need to be able to manage and analyze all of your structured and unstructured data together, all at once. If you can't, the potential insights you can generate are significantly limited.

This means moving beyond the limitations of traditional enterprise data warehouses (EDWs) and business intelligence (BI) software. EDWs can't handle unstructured data, so IT has to try to force structure upon unstructured data before business users can analyze it. The problem is, this takes too much time – and any attempt to structure unstructured data in tables limits its potential value as a source of insight.

This is where big data analytics comes into play. It allows you to:

- Combine, integrate, and analyze all of your data at once – structured, semi-structured, and unstructured – regardless of source, type, size, or format
- Quickly and affordably scale to huge volumes of data and analyze them for insights.

Datameer Delivers Insights from Big Data Analytics Faster

Datameer is a big data analytics solution that helps you turn massive volumes of machine-generated sensor data into valuable, timely insights by delivering big data analytics that are powerful and yet simple for anyone to use. And it runs natively on Hadoop, which is where you can aggregate all types of data in one place, regardless of its size.

As shown in FIGURE 1, we provide a one-stop-shop for getting all your data types into Hadoop using wizard-based data integration; quickly analyzing that data with a robust set of point-and-click analytics, and then visualizing results using drag-and-drop visualizations.

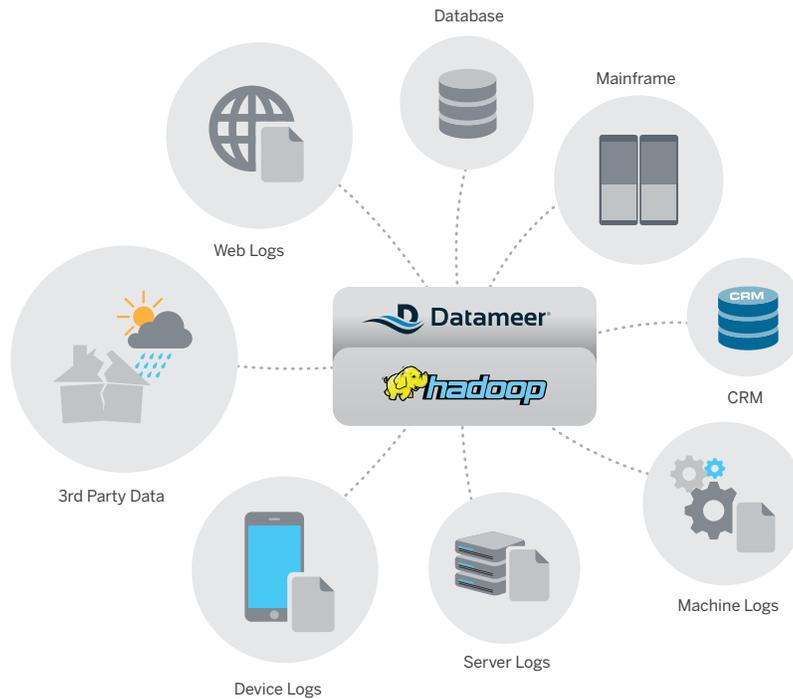


FIGURE 1: Datameer makes it easy to combine all data types.

Datameer gives you everything you need to integrate, prepare, analyze, and visualize all your data quickly and cost effectively. We support every step in the analytics process, empowering you with:

- 60+ out-of-the-box connectors and a file parser to integrate any data
- 270+ pre-packaged data algorithms in a simple-to-use spreadsheet interface
- Join, transform and enrichment functions
- Tools for visual data wrangling
- 30+ visual widgets plus a free-form infographic designer for stunning visualizations
- Automated clustering, decision tree and recommendation functions to segment customers
- Behavior and time series analytics

Now you can ingest, cleanse, prepare, analyze and visualize streaming sensor and RFID data in hours or days, not months.

Exploring Customer Successes

So what are companies actually doing with the IoT today? What's real – and what's still a vision for the future? And how is Datameer being used by companies to make their IoT solutions a reality?

The following sections share the stories of innovative companies – many of which are leaders in their industry – that are using Datameer to harness big data as part of IoT solutions. And as you'll see, they are realizing significant competitive advantage.



NetApp: Building a Premium Support Service to Maximize Product Uptime for Customers

NetApp, a leader in enterprise storage and data management, was generating customer and asset data so quickly that volumes were doubling every 15 months. Making it even more difficult, the data streamed in from diverse sources and was stored in different semi-structured and unstructured log formats. This variability – combined with the exploding data volumes – made it extremely difficult to aggregate all of their data in one place, standardize it, and analyze it to achieve the company's larger business goal: to improve and enhance customer support services. They needed a way to combine customer purchase data, product support logs, and server logs, and then analyze this data quickly enough to predict events (such as when a server might run out of storage or memory capacity or a failure may occur).

Analysts tried to meet this need by writing ad hoc Perl code to parse a subset of the log files and store data locally. But it was a slow and costly process with limited success. So management chose to deploy Datameer and Hadoop to efficiently aggregate and analyze their data. Datameer's prebuilt connectors eliminated the need to build custom connectors to bring various data into NetApp's Hadoop cluster. In addition, through an opt-in program, the company continuously collects data from customers about the status of their products; when customers enroll, their devices and components automatically send log messages that indicate status, device failures, application failures and utilization. All of this data is stored in Hadoop.

With Datameer, NetApp can now analyze all of this data without having to first normalize it or apply pre-defined schemas. Using the software's intuitive, spreadsheet interface, business analysts and non-technical users can quickly analyze data and do big data discovery with ease, all while leveraging the full processing capabilities of the Hadoop cluster through MapReduce jobs.

This mix of streaming data is centrally stored in Hadoop and analyzed in Datameer, resulting in valuable insights for virtually every business area, including Support, Product Development, Marketing, and Services. For example, NetApp used its new, data-driven intelligence to create a "Premium Support" service as a new source of revenue for the business. Through this service, NetApp can analyze real-time sensor data received from customers' network-connected hardware, use it to predict issues and potential server failures, and send out replacement parts before an at-risk component actually fails. This new service reduces customer downtime, increases customer satisfaction, and creates a new source of revenue for NetApp.

Additionally, sales is using it to understand customer usage patterns and identify customers that need additional products or licenses. They can identify possible up-sell or cross-sell opportunities much more quickly, as well as look at usage patterns to improve forecasting and prepare for extension or renewal negotiations. And the development team is using device and application failure data aggregated by Datameer to improve applications and devices, identify upcoming features, and compare how a product performed in production versus how it performed in QA.



Vivint: Harnessing the Internet of Things for Home Automation Services

Vivint, the largest home automation company in North America, is leading the charge in the data-driven, connected home movement. Serving more than 800,000 homes, Vivint's touchscreen panel, the hub through which all of their other products communicate, creates a streamlined network that connects all of the home's smart systems, including security, HVAC, lighting, small appliances, video, and other devices. By harnessing their big data, Vivint's solutions enable homes to be smarter, safer, and more energy efficient for its customers. Intelligence is the center of the smart home, and Vivint is using Datameer to shorten the time it takes to go from raw data to actionable intelligence needed to enhance each customer's home experience.

After investing in Hadoop, Vivint found that their team was spending too much time on mundane, technical tasks preparing and integrating the data rather than doing actual, value-added analysis. Vivint was looking for a solution that could make their staff more efficient and seamlessly integrate with their Hadoop platform (rather than a solution that was just retrofitted to work with Hadoop). Vivint also wanted a solution that could integrate and analyze not just row data but also streaming data, which is a key component to their smart home analytics solution.

After reviewing a number of technology options, Vivint selected Datameer as their big data analytics solution. Datameer is used to join and analyze terabytes worth of data collected from its Internet of Things solution and various in-home automation, security, and energy management devices (such as thermostats, smoke alarms, automatic locks, and door and window sensors) to better understand usage patterns and improve services. This would be a daunting task with traditional systems, but with Datameer, Vivint analysts can parse, join and sessionize various complex data streams to determine occupancy and vacancy patterns in order to minimize false alarms and improve the overall efficiency of their devices.

Unlike most traditional business intelligence and data analytics tools that sit on top of traditional databases and require data modeling, Datameer uses Hadoop as its underlying storage and compute platform. This allows Vivint's analysts to work with raw structured, semi-structured, and unstructured data sources fluidly. Because Vivint-connected devices produce unstructured stream data, their analysts are relying on Datameer to quickly and easily integrate data streams into Hadoop. They can then join and analyze the data streams using Datameer's easy-to-use spreadsheet interface in minutes.

The future in home automation is in data-driven products that improve the overall homeowner experience by helping people manage home safety and energy use. Vivint continues to remain a leader in the industry. And together with Datameer, Vivint is defining the new status quo in the connected home movement.

A Major Global Telecommunications Company: Value-Based Network Capacity Planning

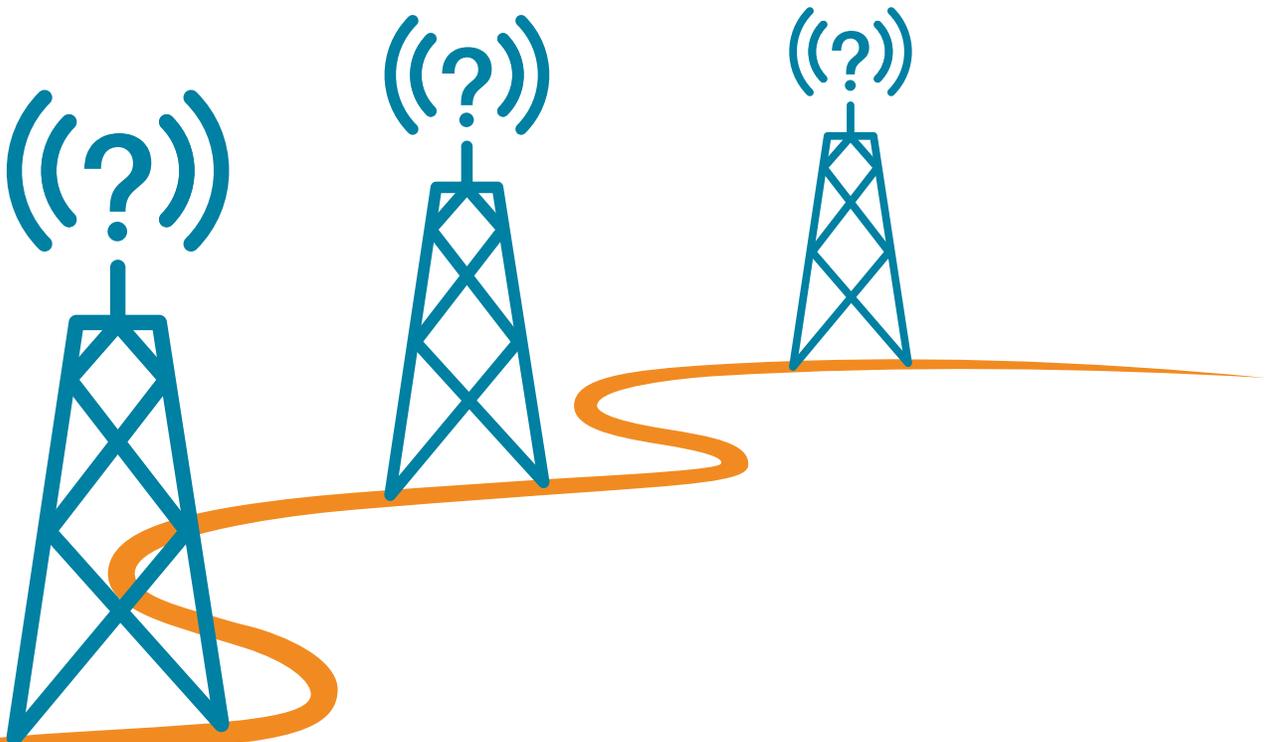
A leading global telecommunications service provider wanted to optimize its network capacity to meet growing voice and data demand. Whenever demand exceeded capacity, calls were dropped and the speed of downloads decreased, causing a decline in customer satisfaction and customer churn. Management's goal was to have enough capacity to meet existing and forecasted demand, but not excess capacity, which would inflate capital expenditures.

Traditionally, network capacity forecasting is based on voice data demand only – not mobile broadband data. Yet it is broadband data volumes that have increased dramatically due to the growing number of subscribers thanks to smart phones and the popularity of new data services. So the company's voice data-based planning was no longer accurate.

To optimize network capacity and reduce network costs, management needed an advanced forecasting methodology to correlate subscriber, network, and location data. In addition, to improve forecast accuracy, they wanted to compare forecasted network traffic against actual traffic in order to forecast which cell towers would require additional data capacity. Finally, management wanted a user interface that supported easy-to-use reporting, interactive "what-if" scenarios, and visualizations such as clustering and geographic heat maps.

To meet these needs, the company deployed Datameer to bring together disparate data sets and analyze them. For example, they used it to:

- Integrate subscriber data such as demographic, device, access technology (2G/3G/4G), and application behavior data
- Correlate subscriber data usage with network performance data and network capabilities such as 3G capacity and Long-Term Evolution [LTE] network availability
- Correlate subscriber and network data with specific physical location data (such as pedestrian areas, public entrances, events, office parks, and tourist attractions) to perform cluster analyses



Decision makers use Datameer to generate network traffic heat maps from this data, which helps them visualize highly congested network areas and areas with excess network capacity. Now they can see where demand is very near to capacity – and thus where LTE rollouts should be prioritized and marketing efforts should be scaled back. Inversely, they can also identify geographic areas where excess capacity exists and marketing activities should be ramped up. Datameer is also used to:

- Monitor actual versus forecasted network traffic; differences are used to improve the accuracy of forecasting models
- Support a what-if model that analyzes how different revenue growth percentages and increases in specific access technology usage will impact capital expenditures
- Analyze new over-the-top (OTT) services, understand the network impact, and build the best business strategy to accommodate these new services

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Oil and Gas Company: Optimizing Wells for Oil Production to Drive Incremental Revenue

For years, a Fortune 500 oil and natural gas exploration and production company with approximately 10,000 wells onshore had site managers collecting large volumes of granular sensor data about well depth, gamma readings, and more. They did their best to join it with information about the type of each well, the equipment used, related geospatial data, historical well performance, and more. But because well data was fragmented across site locations and spreadsheets, the company's Enterprise Data Management & Analytics team couldn't provide business users with an easy way to explore all of this data. Management wanted a tool to help them aggregate data, compare well designs and methods to stimulate well production, and determine which completion practices will yield the best results across different geographical areas.

To achieve this goal, the company needed a way to aggregate all of its well sensor data, historical productivity data, and geospatial data, as well as publicly available data on the productivity of competitor wells, and analyze it for insights into completions. They ultimately chose to deploy Datameer Big Data Analytics. The entire solution was fully implemented in just three days.

As shown in FIGURE 3, Datameer used multiple integration methods to collect and aggregate internal well data and publicly available data. Well data was enriched with geospatial data to identify the geographic location and characteristics of natural or constructed features and boundaries of the land for proposed wells. Data was then exported to the company's analytics suite – which includes Datameer software – for

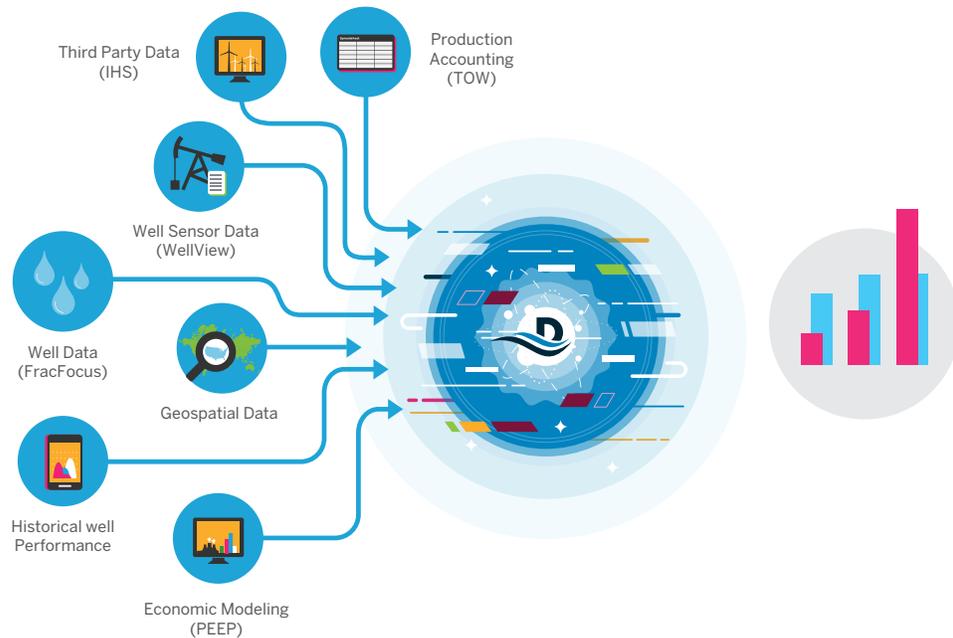


FIGURE 3: Datameer simplifies data collection and aggregation from diverse sources.

With Datameer, the company's business users can access and explore datasets that previously were not possible to create. And as a result, production engineers can arrive at better production decisions faster – decisions that will increase profitability by lowering well costs and increasing well performance.

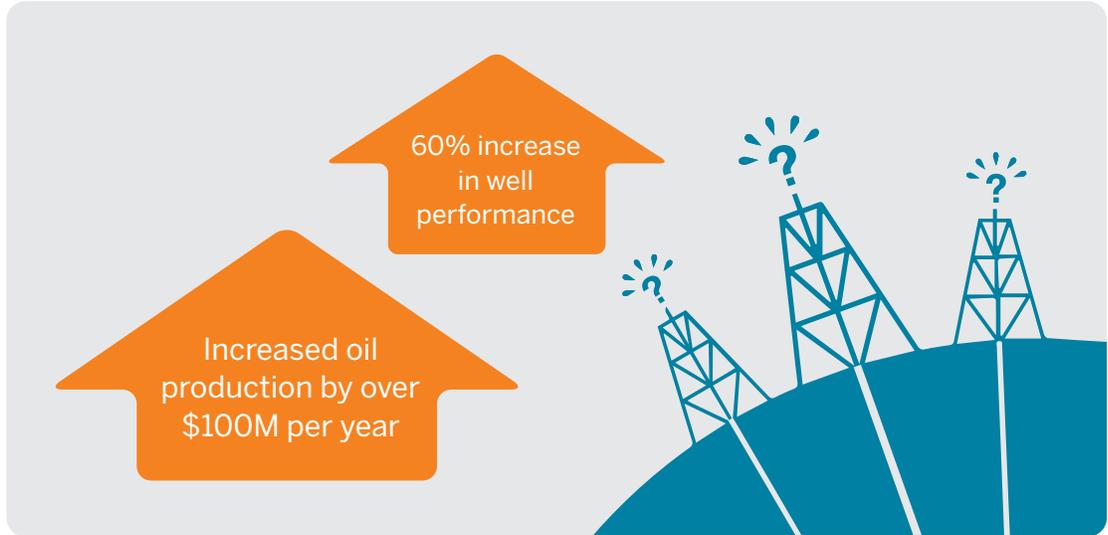


FIGURE 4: The new well design (developed based on insights from Datameer) has increased well performance 60% compared to the old design.

For example, as shown in FIGURE 4, business analysts were able to identify the highest performing wells, as well as what made them perform optimally. Using these insights, the production team developed a new and enhanced well design. Already implemented across multiple wells, the new design is contributing to a 60% increase in well performance, increasing annual production by over \$100M per year.

A Global Broadcasting and Cable Company: Network Capacity Planning

A global broadcasting and cable company wanted to better predict and forecast future network capacity for increasing video player usage. This would require analyzing terabytes of IPCDN session log data across a vast carrier network and performing predictive trend analysis of customer video viewing behavior patterns – no small task. But with the right solution, they could identify concurrency in player sessions and peak usage times and dates, and then cluster that customer-level information by usage patterns to forecast for future growth and network demands. Based on insights gained, management could then determine where to invest in new networks. This was critical, as it costs billions of dollars and takes years to build out networks.

To meet this need, the company deployed Datameer to import the session data, expand them into 1-minute sessions, and analyze them to identify concurrency and peaks in sessions across the user base. The result is deeper insights into actual user behavior – insights that can be extrapolated to better predict future network demand and capacity requirements across locations.

Leveraging these insights, the company was able to save money by avoiding unnecessary capital expenditures and planning effectively for future demand. In addition, they were able to quickly analyze a far greater number of datasets for more accurate predictive planning. In addition, Datameer provided this company with a whole new level of insight into information that for years had been too complex and time consuming to aggregate and analyze.

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LEARN MORE

Learn More

These customer stories illustrate how companies across a wide range of industries are already harnessing the IoT to transform decision making, customer experiences, operations, and more. And Datameer is at the heart of their IoT strategies, as it allows them to bring together and analyze massive volumes of streaming data from connected devices at lightning-fast speeds.

To learn more about how you can use Datameer to innovate around the IoT, visit:

www.datameer.com/solutions/use-cases/operational-analytics.html
or call us at **1.800.874.0569**.



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