Descriptive, predictive, prescriptive: Transforming asset and facilities management with analytics

Choose the right data analytics solutions to boost service quality, reduce operating costs and build ROI

Contents

Introduction

In Melbourne, Australia, public transit operator Yarra Trams uses analytics on data from 91,000 trams and related pieces of equipment for insight into disruptions, performance, locations and passenger use to better maintain its trams and increase service reliability in excess of 99 percent.

Across North America, clothing retailer Gap Inc. uses analytics to forecast the financial impact of real estate decisions such as whether to consolidate existing locations, remodel, renew in place or open new stores.

As these organizations have learned, data analytics represents an opportunity for real estate, facilities and asset managers to transform their operations. But many organizations have yet to adopt the analytics approach. Many, in fact, still rely on manual tools such as spreadsheets for creating reports on their assets—and on intuitive management from individuals to draw conclusions from data and act to improve operations.

For organizations that want greater insight into their real estate, facilities and enterprise asset performance, along with a better way to use information for improvement, knowing how to utilize data more effectively in decision making can present a challenge. This white paper describes a key first step in adopting an analytics approach: understanding the different types of analytics—descriptive, predictive and prescriptive—the management role each can play and the value each can deliver.

Giving data meaning—despite its growing volume, variety and velocity

As facilities and assets become more IT-like—instrumented, intelligent and interconnected—the convergence of physical and digital infrastructures makes their management increasingly complex. And in a physical world outfitted with millions of networked sensors, vast amounts of facilities- and asset-generated data make extracting meaning increasingly difficult.

Business leaders recognize the potential these changes in technology hold. In fact, an IBM survey of 1,700 CEOs and public sector leaders identified technology change as the most critical external factor impacting organizations.[1] To take advantage of the opportunity to transform facilities and asset management, however, organizations need analytics capabilities that can identify operating anomalies in real time, predict outcomes and deliver optimization models.

Organizations need analytics solutions that can extract meaning from huge volumes of data to help improve decision making, handle wide varieties of data and data sources from within and outside the enterprise, and keep up with the rapid velocity of data in motion. They need capabilities for analyzing historical and real-time data, as well as forecasting the future, to distill what's valuable, detect patterns and reveal insights they may not even have thought to ask about. With such solutions, they can achieve benefits ranging from increased revenue to lowered operating expenses, enhanced service availability and reduced risk.

Understanding the differences between three key analytics types

The goal of any analytics solution is to provide the organization with actionable insights for smarter decisions and better business outcomes. Different types of analytics, however, provide different types of insights. So it is important for managers to understand what each analytics type delivers and to match analytics functions to the organization's operational capabilities across its real estate, facilities and asset management functions.

Analytics solutions are of three principal types:

- **Descriptive**, which uses business intelligence and data mining to ask: "What has happened?"
- **Predictive**, which uses statistical models and forecasts to ask: "What could happen?"
- **Prescriptive**, which uses optimization and simulation to ask: "What should we do?"

The three types build on one another, with descriptive analytics being the most common and prescriptive analytics the most advanced. Yet they share goals for improving real estate, facilities and asset operations with capabilities that help provide an understanding for an event or action, uncover relationships in data, develop what-if scenarios and simplify business decisions.

Descriptive analytics
Asking "What has happened?", descriptive analytics mines data to provide trending information on past or current events that can give real estate, facilities and asset managers the context they need for future actions.

Characterized by the use of key performance indicators, descriptive analytics drills down into data to uncover details such as the frequency of events, the cost of operations and the root cause of failures. The most common type of analytics used by organizations, it typically displays information within a report or dashboard view. Solutions can be automated to issue alerts when potential problems arise that fit data patterns the solution has discovered.

Benefitting from analytics: Increased asset utilization

The Dow Chemical Company sought to increase facility utilization across its office and lab space while improving capital planning, real estate lease management, operations, facility maintenance and energy consumption on a global basis. Using descriptive analytics, Dow was able to produce reliable data for decisions that helped the company identify under-utilized space, achieve a 20 percent increase in facility use and generate a savings of approximately USD4 million annually via space consolidation.

By examining key metrics and key performance indicators of energy use or vehicle maintenance, for example, descriptive analytics can produce indicators such as cost per square foot, kilowatt hours per person or mean time between failures for specific asset issues. By combining information from different, often disconnected sources and then comparing and contrasting data, descriptive analytics can provide a comprehensive view and context for what has happened, as well as current asset status.

Predictive analytics
Asking "What could happen?", predictive analytics provides answers that move beyond using historical data as the principal basis for decisions. Instead, it helps managers anticipate likely scenarios—so they can plan ahead, rather than reacting to what has already happened.

Benefitting from analytics: Improved insight into hazards

Nippon Kaji Kyokai, a Japanese organization that inspects and recycles ships, implemented a new ship recycling management system to help monitor hazardous materials and chemicals so they could be properly recycled and/or disposed of. Using predictive analytics, it was better able to gain precise information about where and when ships containing which materials are built and dismantled.

Understanding analytics

Definitions, sample applications and opportunities, and underlying technologies

	Descriptive	Predictive	Prescriptive
	What HAS happened?	**What COULD happen?**	**What SHOULD happen?**
What the user needs to DO	• **Increase** asset reliability • **Reduce** labor and inventory costs	• **Predict** infrastructure failures • **Forecast** facilities space demands	• **Increase** asset utilization • **Optimize** resource schedules
What the user needs to KNOW	• The **number and types** of asset failures • Why **maintenance costs** are high • The value of the **materials inventory**	• How to **anticipate failures** for specific asset types • When to **consolidate underutilized** facilities • How to **determine costs** to improve service levels	• How to **increase** asset production • Where to **optimally route** service technicians • Which strategic facilities plan provides the **highest long-term utilization**
How analytics gets ANSWERS	• **Standard reporting** - What happened? • **Query/drill down** - Where exactly is the problem? • **Ad hoc reporting** - How many, how often, where?	• **Predictive modeling** - What will happen next? • **Forecasting** - What if these trends continue? • **Simulation** - What could happen? • **Alerts** - What actions are needed?	• **Optimization** - What is the best possible outcome? • **Random variable optimization** - What is the best outcome given the variability in specified areas?
What makes this analysis POSSIBLE	• Alerts, reports, dashboards, **business intelligence**	• Predictive **models**, forecasts, statistical **analysis**, scoring	• Business rules, organization **models**, comparisons, **optimization**

Business value →

Using descriptive data accumulated over time, predictive analytics utilizes models for predicting events. It does not, however, recommend actions. Predictive capabilities such as forecasting and simulation provide enhanced insight that managers can use to make more informed decisions.

Characterized by the use of trends of time-series data and correlations to identify patterns, predictive analytics applies advanced statistical analysis and data mining—as well as sophisticated mathematics to validate assumptions and test hypotheses—to provide a solid, data-based foundation that can raise managers' confidence in conclusions. Organizations might use these results

to identify conditions for potential out-of-stock or over-stock in parts inventory. They might also use them to evaluate asset failure and productivity history to anticipate the likelihood of failure in a particular timeframe.

An IBM study shows, in fact, that organizations using analytics to determine why and what they need to be doing are twice as likely to outperform their industry peers.[2] These organizations apply predictive analytics for all types of decisions, from daily operations to major business actions.

Prescriptive analytics

Asking "What should we do?", prescriptive analytics explores a set of possible actions and suggests actions based on descriptive and predictive analyses of complex data. Though the final decision is up to the facilities and asset manager, prescriptive analytics solutions can provide a reliable path to an optimal solution for business needs or resolution of operational problems.

Benefitting from analytics: Reduced energy costs

With thousands of facilities in support of its global operations, IBM Real Estate Site Operations sought ways to manage energy use, lower costs and decrease greenhouse gas emissions; maintain equipment proactively; and lower maintenance and building costs. Implementing prescriptive analytics for its Rochester, Minnesota campus, IBM was able to achieve a five percent year-over-year incremental energy savings, eight percent annual savings in equipment operating costs, improved asset reliability, and streamlined problem diagnosis and resolution.

Characterized by rules, constraints and thresholds, prescriptive analytics makes use of advanced capabilities such as optimization and mathematical models to reveal not only recommended actions but also why they are recommended, along with any implications the actions might have. Organizations might use these results to identify inventory that should be re-ordered now, that should be moved to a different distribution center or that should be disposed of.

Prescriptive analytics takes uncertainty into account and recommends ways to mitigate the risks that can result from it. Its ability to not only examine potential outcomes but also make recommendations helps managers make decisions when the data environment is too large or complex to be understood without the help of technology.

Deploying the right analytics type for your capabilities and needs

From basic to advanced capabilities, analytics can yield dramatic results. One study found that an organization that uses basic automation to expand its reporting capabilities can improve its return on investment (ROI) by 188 percent. But adding additional capabilities such as data management, metadata to ensure uniform data interpretation, and the ability to gather and analyze data from outside the organization, can boost ROI to as high as 1,209 percent.[3]

In many cases, the processes and data needed to support these advanced levels of analytics may not be in place. But that does not mean the organization should wait. An effective strategy is to select a meaningful problem—one that will have impact—and attack it on a scale small enough to deliver rapid results. The organization can then begin expanding its capabilities. What's important at this stage is not a perfect outcome but a path to iterative results.

It is important, therefore, for the organization to match its infrastructure, technologies and processes—its level of analytics maturity—to the stage of analytics it is able to perform and the goals it wishes to accomplish. The organization should begin with solutions that work with existing data to gain immediate insights while it puts into place the technologies and processes to support more complex analytics.

Reaping the business and operational benefits of data analytics

Using analytics, organizations can increase service quality, reduce operating costs and increase return on assets.

Effective facilities and asset management uses data analytics to proactively manage facilities and maintain equipment, optimize utilization, prevent breakdowns, lower occupancy and operational costs, and extend asset life.

Utilizing analytics to monitor energy-intensive equipment across the facilities portfolio, identify operating anomalies in real time, and generate corrective work orders can dramatically reduce energy consumption.

To help mitigate risks of failure in facilities and assets, analytics can detect even minor anomalies and failure patterns. Identifying issues early helps organizations deploy limited maintenance resources more cost-effectively, maximize equipment uptime and improve customer service levels.

For more information
To learn more about IBM analytics solutions for facilities and asset management, please contact your IBM representative or IBM Business Partner, or visit the following websites:

IBM facilities management capabilities:
ibm.com/software/products/us/en/category/SW22A

IBM enterprise asset management capabilities:
ibm.com/software/products/us/en/subcategory/SWK11

IBM business analytics capabilities:
ibm.com/software/products/us/en/category/SWQ00

Additionally, IBM Global Financing can help you acquire the software capabilities that your business needs in the most cost-effective and strategic way possible. We'll partner with credit-qualified clients to customize a financing solution to suit your business and development goals, enable effective cash management, and improve your total cost of ownership. Fund your critical IT investment and propel your business forward with IBM Global Financing. For more information, visit:
ibm.com/financing

[1] IBM Institute for Business Value, "Leading Through Connections: Insights from the Global Chief Executive Officer Study," *IBM Corp.*, 2012.

[2] Steve LaValle, Michael Hopkins, Eric Lesser, Rebecca Shockley and Nina Kruschwitz, "Analytics: The new path to value," *IBM Institute of Business Value and MIT Sloan Management Review*, IBM Corp., October 2010.

[3] Nucleus Research Inc., "Research Note: The Stages of an Analytic Enterprise," March 2012.

Please Recycle

TIW14162-USEN-00