

## What is analytics?

Analytics is an encompassing and multidimensional field that uses mathematics, statistics, predictive modeling and machine-learning techniques to find meaningful patterns and knowledge in recorded data.

Today, we add powerful computers to the mix for storing increasing amounts of data and running sophisticated software algorithms – producing the fast insights needed to make fact-based decisions. By putting the science of numbers, data and analytical discovery to work, we can find out if what we think or believe is really true. And produce answers to questions we never thought to ask. That's the power of analytics.

## Why is analytics important?

From the first known population data collection project by the Swedish government in 1749, to Florence Nightingale recording and analyzing mortality data in the 1850s, to British scholar Richard Doll's tobacco and lung cancer study in the 1950s, the analysis of data has fueled knowledge discovery for hundreds of years.

Each of the above scenarios required an answer to a heretofore unanswerable question. In the 1700s, the Swedes wanted to know the geographical distribution of their population to learn the best way to sustain an appropriate military force. Nightingale wanted to know the role that hygiene and nursing care played in mortality rates. Doll wanted to know if people who smoked were more likely to suffer from lung cancer.

Each of these pioneers knew that instinct wasn't good enough. Analysis of data can uncover correlations and patterns. There's less need to rely on guesses or intuition. And it can help answer the following types of questions:

- What happened?
- How or why did it happen?
- What's happening now?
- What is likely to happen next?

With faster and more powerful computers, opportunity abounds for the use of analytics and big data. Whether it's determining credit risk, developing new medicines, finding more efficient ways to deliver products and services, preventing fraud, uncovering cyber threats or retaining the most valuable customers, analytics can help you understand your organization – and the world around it.

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“Fact-based decisions have become our competitive strength. Whether or not to utilize analytics was no longer an option.”

Dan Ingle

Vice President of Analytic Technology at Kelley Blue Book

## Popular analytic methods

There are three predominant flavors of analytics in use today.

- **Descriptive statistics.** Descriptive statistics have been around the longest. Remember the Swedes in 1749? Tabulating population counts was an early foray into descriptive analysis – the summary of collected data points. These are the models that will help you understand what happened and why. There are still plenty of descriptive analytics in use today – everything from how many clicks a page receives to how many units are produced vs. how many are sold.
- **Predictive analytics.** Predictive analytics has surged in popularity. The desire to predict customer behavior has been a main driver. Increased computing power with the ability to run hundreds or thousands of models quickly – and widespread adoption of predictive techniques like support vector machines, neural networks and random forests – are bringing predictive analysis to the forefront of many organizations. These models use past data and predictive algorithms to help you determine the probability of what will happen next.
- **Prescriptive analytics.** Prescriptive analytics is the newest kid on the block. Knowing what will happen and knowing what to do are two different things. Prescriptive analytics answers the question of what to do by providing information on optimal decisions based on the predicted future scenarios. The key to prescriptive analytics is being able to use big data, contextual data and lots of computing power to produce answers in real time.

## How to get the most value from analytics

Analytics is a widely used term. How do you figure out which analytics is right for your organization? Just like most trips, an analytics destination is a good place to start. Even if it's the most basic. You have to know where you want to go and what you want to see. And gather what's needed to get you there.

In today's analytics journey, you've got data. You've got computers. What do you do next? The first step is figuring out what problem you are trying to solve or what answers you are seeking. What part of your organization needs improving? What decisions need to be made? What is the goal of your analytics journey? More specifically, you may want to answer questions like these:

- How much should we charge for a particular item?
- Where should we locate a new manufacturing plant?
- Who gets the latest catalog or brochure?
- What interest rate should each customer receive?
- Why are we losing customers in a particular region?

With the right data and the appropriate analytical models, you'll be able to answer those questions and more. The opportunity to produce knowledge and insights has never been greater.

## How to get started using analytics

Most likely, your analytical journey will involve a multidepartmental team effort. The analytical life cycle is iterative and interactive. Staff members with different backgrounds and skills should be involved at various

stages of the process. For best results, organizations need to put people with the right skills in place and enable them to work together.

- A business manager identifies an issue or problem that requires analytics-driven insights, makes the business decision based on the analyses and monitors the returns from the decision.
- A business analyst conducts data exploration and visualization and works to identify key variables that influence outcomes.
- The IT and data management teams help facilitate data preparation, model deployment and monitoring.
- A data scientist or data miner performs more complex exploratory analysis, descriptive segmentation and predictive modeling.
- Some organizations are even creating roles for chief analytics officers and hiring more data scientists to support the increased desire for analytically based answers and insights.

## Center your journey around an iterative life cycle

At SAS, we break the analytics journey down into more detailed, iterative steps, which we call the analytical life cycle.

- Identify the problem. Business units specify the need, scope, market conditions and goal related to the business question they want to solve, which will lead to the selection of one or more modeling techniques.
- Prepare data for analysis. Depending on the business question and proposed analysis methods, this step involves using specialized techniques to locate, access, clean and prepare the data for optimal results. In our multifaceted data world, that could mean data from transactional systems, unstructured text files and data warehouses.
- Explore data. Now it's time to explore the data in an interactive and visual fashion to quickly identify relevant variables, trends and relationships. (The shape of the data when variables are plotted out is called distribution of data. You can use shapes to identify the patterns.)
- Transform data and create models. A skilled analyst or modeler builds the model using statistical, data mining or text mining software, including the critical capability of transforming and selecting key variables. Models need to be built rapidly so modelers can use trial and error to find the model that produces the best results.
- Test and validate models. Once built, the model is registered, tested (or validated), approved and declared ready for use against your data. With a centralized model repository, you can store extensive documentation about the model, scoring code and associated metadata (data about the data) for collaborative sharing and version control necessary for auditing purposes.
- Deploy models. When approved for production use, the model is applied to new data to generate predictive insights.
- Monitor and assess models. The predictive performance of the model is monitored to ensure it is up to date and delivering valid results. If the model performance degrades, it's time to make changes. When it no longer works or serves a business need, it is retired.



The analytical life cycle guides you through the steps needed to produce fact-based insights that ultimately lead to competitive advantage.