

## Data and Analytics: Defining Business Needs Before Solutions

We are seeing a change in the IT industry that parallels the advent of the Internet: the use of big data and analytics to guide how businesses are run. Our observation is that most Fortune 500 companies are starting to embrace some sort of analytics as part of their core strategies, even those companies that are not traditionally technology companies.

One study showed that well over 90% of these organizations are using business analytics (SAS and Bloomberg Businessweek, 2012). For most information systems, reports represent a small portion of the functionality implemented. However, on business analytics projects, complex reports and the ability to manipulate their contents constitute the core functionality. While there are many software applications commercially available to implement business analytics solutions, there is still a need for strong business analysis skills to ensure the right applications are selected and implemented correctly.

### Setting the Scene: Data Drives Decisions

Picture this: six regional sales vice presidents gather in a conference room for one hour every week. One of them projects raw sales data from the prior week and they all stare at it. Maybe something in that data will strike one of them as useful, or maybe not. After an hour of chit chat, they all disband and go back to their desks, thinking that the meeting was a colossal waste of time.

This might be an exaggeration. Most normal people don't look at data sets just for fun. They study representations of the data to make decisions about what to do, be it a decision to take some specific action or a decision to do nothing at all. In some cases, software systems automate the

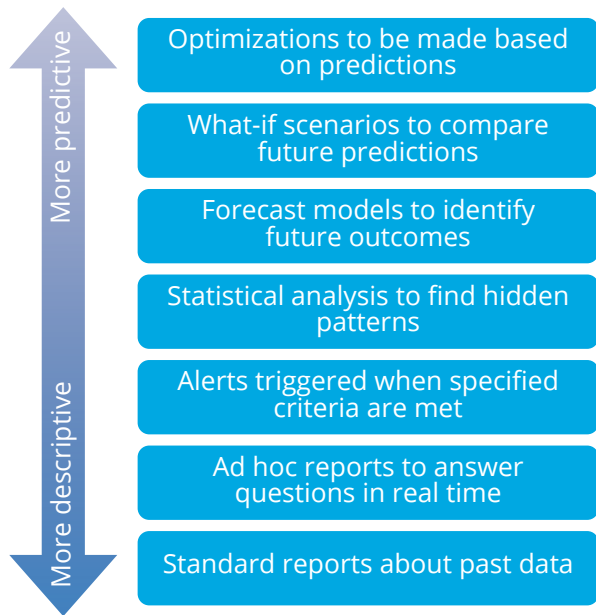
decisionmaking processes by interpreting data and taking actions based on predefined algorithms and rules. People rely on systems to turn large and often highly complex data sets into meaningful information from which decisions can be made. So these days, it's more likely that those six vice presidents will meet for 15 minutes every week to review some dashboard views of the data and make a few key decisions about how to run their business.

The decisions that people make using business analytics systems can be strategic, operational, or tactical. For example, an executive might look at his sales team's global performance dashboard to decide who to promote (tactical), which products need different marketing strategies (operational), or which products to target by markets (strategic). Generally speaking, all software systems that include an analytics component should enable users to make decisions that improve organizational performance in some dimension.



In the past, organizations that deployed analytics projects primarily focused on “descriptive analytics” (International Institute for Analytics, 2013). This includes looking at reports that tell stakeholders what is happening—or has happened—in their organization. Recent trends indicate a shift toward more organizations using “predictive analytics.” Users organize, manipulate, and analyze information to predict what might happen in the

future, as opposed to interpreting the past. *Figure 1* shows where various applications of analytics fit on a spectrum ranging from more descriptive to more predictive.



**FIGURE 1** A spectrum of types of analytics (Patel and Taylor 2010; Davenport 2013).

## The Plot Thickens: Requirements for Analytics Projects

Business analytics projects have multiple layers, all of which might need to have software requirements defined for them. These projects must deal with the data itself, the operations performed on the data, and the formatting and distribution of the data for use.

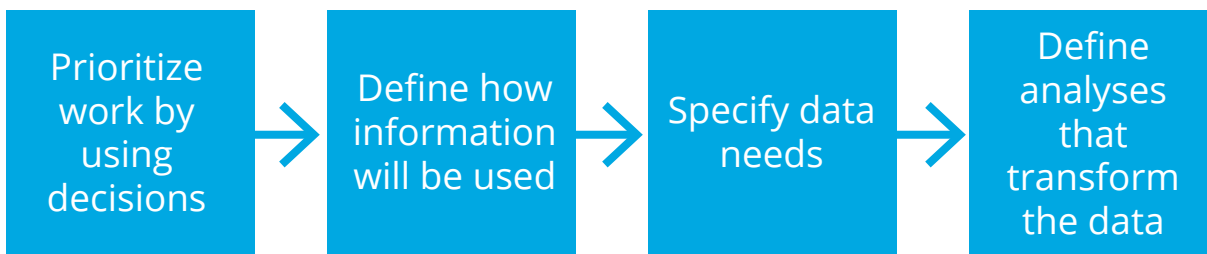
The end products of requirements development for a business analytics project will be similar to those for any other project—a set of business, user, functional, and nonfunctional requirements. Process flows, use cases, and user stories can reveal that someone needs to generate analytics results, and performance requirements describe how quickly they need results, but none of these uncovers the complex knowledge required to implement the system.

*Figure 2* is an overview of the process to specify requirements on an analytics project.

### Step 1: Prioritize Using Decisions

An effective elicitation strategy for business analysts (BAs) is to drive requirements specification based on the decisions that stakeholders need to make to achieve their business objectives. The following thought process is adapted from James Taylor’s “Using Decision Discovery to Manage Analytic Project Requirements” (2013):

1. Describe the business decisions that will be made using outputs of the system.
2. Link those decisions to the project’s business objectives.
3. Decompose the decisions to discover the questions that need to be answered, the hierarchy of precursor questions that need to be answered to feed the main questions, and what role the analytics information plays in producing the answers to those questions.
4. Determine how analytics could be applied to assist in making these decisions.



**FIGURE 2** The process to define requirements for business analytics projects

Using these steps to think about the most important decisions is the foundation for requirements development on analytics projects. The development work should be completed based on which decisions are most important to resolve.

Decisions should be stated as unambiguously as requirements. An example of a good decision statement is, "The vice president of marketing needs to decide each quarter how much marketing budget to allocate to each region based on current and targeted sales by region." As with requirements elicitation on other software projects, it's important to understand the underlying stakeholder need instead of just focusing on a presented solution. If stakeholders request certain data or reports, ask questions such as "Why do you need that information?" and "How will the recipient use that report?" Then work backward to identify their decisions and objectives.

### Step 2: Define Information Usage

After you understand the decisions users will need to make with the outputs of the analytics system, you can determine the best ways to deliver the information to them. The business analyst will need to consider the following three aspects of information delivery:

<b>DELIVERY MECHANISM</b>	<i>How is information physically made available to the end user? What tools can the user employ to view it: email applications, portals, mobile devices, others?</i>
<b>FORMAT</b>	<i>In what format is the information delivered: reports, dashboards, raw data, other?</i>
<b>FLEXIBILITY</b>	<i>To what extent must the user be able to manipulate the information following delivery?</i>

It's important to note that the information from analytics projects might be used directly within software systems instead of being delivered to human users. The analytics might be embedded in the application as part of its daily operations. In these situations, the information delivery mechanism and format might be specified through external interface requirements. However, it is still important to understand how the information will be used so that the correct data is transformed as needed and delivered to the interfacing system in a usable form.

### Step 3: Specify Data Needs

Analytics projects often aim to discover new strategies for companies. These projects might involve identifying new data sources to analyze. It's important to fully understand the data requirements so technical teams can design the often complex infrastructures needed to support analytics. For example, architects might have to completely redesign an existing data storage solution to meet your project's needs.

Most big data is generated by automated systems and usually represents a new data source for an organization, which means that it will take more work to determine the data requirements (Franks, 2012). You can derive many data requirements from the decision-management criteria that you elicit from appropriate stakeholders. For example, decisions that need to be made hourly will likely have different underlying data needs from those that are made just once per calendar quarter. They might differ in terms of how frequently the source data is refreshed, when the data is extracted from the source, and how long the data must be retained.



### Step 3: Define Data Transformation Analyses

One challenging aspect of many business analytics projects is that the decision maker might not know just what he's looking for in the data. He might want to have certain data objects and attributes exposed in tools that allow him to explore, running different queries to ask what-if questions about the data. He literally doesn't know what he doesn't know, but he's hoping that by studying the data he'll glean something useful to act on. This is why it's important to start by understanding what decisions the stakeholders are trying to make. Even if he doesn't know exactly what he's looking for yet, a stakeholder should be able to define the type of problem he's trying to solve. Defining the necessary data analysis involves big-picture thinking (Davenport, Harris, and Morrison, 2010). A BA with good creative-thinking skills can work with stakeholders to determine what new ideas might be explored with the analysis results.

As Figure 1 showed, analytics results lead to decision-making capabilities ranging from descriptive to predictive. To elicit data analysis requirements, you might ask questions such as the following (Davenport, Harris, and Morrison 2010):

- What time frame are you trying to analyze: past, present, or future?
- If past, what kinds of insights about the past are you looking for?
- If present, what do you need to understand about the current situation so that you can take immediate actions?
- If future, what kinds of predictions or decisions do you want to make?

These questions will help you define functional requirements that specify the analyses the system must perform. Because analytics is a completely new capability for many organizations, you might do some research to discover how other organizations are using similar data to improve

decision making. A business analyst has the opportunity—perhaps even the responsibility—to help the stakeholders learn how analytics could be used in ways they hadn't previously envisioned.

One of the most valuable aspects of business analytics systems is that they can enable futurestate strategic analysis, such as exploring "what-if" scenarios. Consider questions such as, "If we offered our product on a new platform, what would we expect our future sales numbers to be?" or "If we offered our customers products targeted to their gender, how much more would they buy?" The system can run models and algorithms to enable these types of data extrapolations or predictions. Those models and algorithms need to be specified in the software requirements. If they are highly complex, a BA might enlist the help of data experts, statisticians, and mathematical modelers to help define them.

The analyses might require statistical or other computations to transform the data prior to it being presented to the user or delivered to a system for action. Either business rules in the organization or other industry standards could define these calculations. For instance, if analysis includes reporting gross profit margins by region, you need to specify exactly how that margin is calculated in your organization.



## Big Data Requirement

The term big data commonly refers to sets of data characterized by volume (how much data exists), velocity (how rapidly it flows into an organization), and variety (how diverse the data is) (Franks, 2012). Managing big data entails discovering, collecting, storing, and processing large quantities of data quickly and effectively. Jill Dyché (2012) provides a summary of what big data entails from the perspective of management and governance.

Unstructured data, exemplified by voice mails and text messages, doesn't lend itself to representation in traditional rows and columns. With unstructured data is that you have no idea where or how to begin looking for the information you seek (Davenport, Harris, and Morrison, 2010). For instance, software operated by a security-related government agency might scan Internet traffic for instances of a word such as "bomb," but they need to see it in context to know the meaning of the word of interest. "Bomb" could indicate a terrorist threat, refer to an article on aerial combat in World War II, or describe a bad play's opening night.

The good news is that most data does possess some structure in the form of accompanying metadata, or data about the data (Franks, 2012). Semi-structured data sources include email messages, image files, and video files. Because semi-structured data has associated metadata that provides some information about the data's structure and contents, you might be able to create entity-relationship diagrams and data dictionaries to represent what you do know about the data.

## So Now What?

If you're a BA on a business analytics project, you need to work with the project's stakeholders to understand their decision processes. Use those decisions to elicit the requirements that will access the necessary data, specify the analyses to be performed, and define the data presentation. You should understand what results stakeholders expect from an analytics solution, the decisions they hope the data will help them make, and how they want to dynamically modify the analyses or their presentation. Look for opportunities to help users be more successful by envisioning solutions that they might not have imagined were even possible.



## About the Authors

Joy Beatty is a Vice President at Seilevel, [www.seilevel.com](http://www.seilevel.com). Karl Wieggers is Principal Consultant at Process Impact, [www.processimpact.com](http://www.processimpact.com). Karl and Joy are co-authors of the book *Software Requirements*, 3rd Edition (Microsoft Press, 2013), from which this white paper is adapted.

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