### From Big Data to Actionable Business Intelligence

An Executive Brief by



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## Executive Summary.

Big data is getting bigger, resulting in big trouble for companies that don't know how to manage it. It's an issue that's causing more than a few headaches for organizations sitting on a mountain of information, but still trying to figure out how to use it to their competitive advantage. Recognizing the benefit of effectively managing and analyzing all this data is an important step for a company to gain a competitive edge. The second critical step is to build efficiencies into the way companies collect and analyze the data through Business Intelligence (BI) tools. The goal of this white paper is to help you do that.

How do you take mountains of raw data, determine what data is needed, and turn it into useful business intelligence without legions of staff and thousands of spreadsheets? Equally important is how do you make sure the data is accurate and available when necessary? In the next few pages, we'll further define the problem and outline reasonable steps to take you from data to actionable information. We'll share some common terminology, show a bit of the progression over time, and also share what we believe to be the direction of growth moving forward. Companies produce vast amounts of data, a combination of complex technical and qualitative data. Much of it is unstructured and growing at an exponential rate.

If you are not effectively using BI technology you may not be optimizing the value of all that data, and the foundation of your decision-making process will be weak. Automation and integration of the data is critical. It will save you time and money. The right data needs to be available at the right time and placed in the hands of the people who can make appropriate decisions to move your business forward.

Sounds logical ... What's the Problem?



The problem is that we have a lot of data in a lot of systems. We also have a lot of people spending a lot of time pulling, integrating and organizing data. They grapple with finding it, making sure it is accurate and timely, and then getting it into a format that makes sense for the organization. That's a lot of time getting to the source and it often leaves the data analyst with little time to analyze the data.

Every industry is buried in data. The key factor that will determine corporate success, no matter the industry, is not simply acquiring more and more raw data, but performing analysis on that data – turning collections of numbers and characters into actionable information.

In this context, data resembles a commodity, such as coffee or cotton. Its only real value is when it's transformed into something greater than itself. A coffee bean is

valuable when it becomes a Starbuck's latte just as cotton has worth once it becomes a Ralph Lauren Polo shirt. Following this model, raw data is only meaningful when it transforms into the actionable information upon which business leaders base their decisions.

According to IDC, the amount of data that companies are wrestling with is growing at 50 percent per year -- or more than doubling every two years. Many organizations are rich in raw data, but dirt-poor in actionable information.

So, we have a lot of data. Now what? Before we dive into solutions, let's start with a few definitions to set the stage. To keep this simple, we used Wikipedia definitions that provide a basic understanding.

## Definitions.

**Unstructured Data** (or unstructured information) refers to information that either does not have a pre-defined data model or is not organized in a pre-defined manner. Unstructured information is typically text-heavy, but may contain data such as dates, numbers, and facts as well. This results in irregularities and ambiguities that make it difficult to understand using traditional programs as compared to data stored in fielded form in databases or annotated (semantically tagged) in documents. IDC and EMC project that data will grow to 40 zettabytes by 2020, resulting in a 50-fold growth from the beginning of 2010. Computer World states that unstructured information might account for more than 70%–80% of all data in organizations. (Source: Wikipedia)

**QPM Thoughts:** Data like this lives in a variety of places ranging from shared folders to individual desktops to physical hard copy. It may live in a specific system or application, it may reside in SharePoint or another sharing solution (hopefully with some meta-data or tagging but not always). The common element here is that there is no overall structure to make this data easy to search or use without manual intervention.

**Big data** is a broad term for data sets so large or complex that traditional data processing applications are inadequate. Challenges include analysis, capture, data curation, search, sharing, storage, transfer, visualization, and information privacy. The term often refers simply to the use of predictive analytics or other certain advanced methods to extract value from data, and seldom to a particular size of data set. Accuracy in big data may lead to more confident decision making and better decisions can mean greater operational efficiency, cost reduction and reduced risk. (Source: Wikipedia)

**QPM Thoughts:** Management of enormous amounts of data requires specialized approaches. Techniques and solutions built to manage Big Data include Hadoop and many others. If you are interested in learning more, try this source for an introduction. If your interest is in finding data, regardless of its source for day-to-day tactical business intelligence, read on.

**Business intelligence (BI)** is the set of techniques and tools for the transformation of raw data into meaningful and useful information for business analysis purposes. BI technologies are capable of handling large amounts of unstructured data to help identify, develop and otherwise create new strategic business opportunities. The goal of BI is to allow for the easy interpretation of these large volumes of data. Identifying new opportunities and implementing an effective strategy based on insights can provide businesses with a competitive market advantage and long-term stability.

BI technologies provide historical, current and predictive views of business operations. "Common functions of business intelligence technologies are reporting, online analytical processing, analytics, data mining, process mining, complex event processing, business performance management, benchmarking, text mining, predictive analytics and prescriptive analytics." (Source: Wikipedia)

A **data warehouse** (DW or DWH), also known as an enterprise data warehouse (EDW), is a system used for reporting and data analysis. DWs are central repositories of integrated data from one or more disparate sources. They store current and historical data and are used for creating analytical reports for knowledge workers throughout the enterprise. Examples of reports could range from annual and quarterly comparisons and trends to detailed daily sales analyses. (Source: Wikipedia).

A **data mart** is the access layer of the data warehouse environment that is used to get data out to the users. The data mart is a subset of the data warehouse that is usually oriented to a specific business line or team. Data marts are small slices of the data warehouse. Whereas data warehouses have an enterprise-wide depth, the information in data marts pertains to a single department. In some deployments, each department or business unit is considered the owner of its data mart including all the hardware, software and data. This enables each department to use, manipulate and develop their data any way they see fit; without altering information inside other data marts or the data warehouse. In other deployments where conformed dimensions are used, this business unit ownership will not hold true for shared dimensions like customer, product, etc. (Source: Wikipedia)

**QPM Thoughts:** When thinking about BI, there are many considerations to determine your best approach. Data warehouses, data marts, transactional solutions, integration solutions, reporting solutions are all possibilities. Each of these solutions has values and limitations so knowledge of which is the right answer for your organization requires research into the needs of the organization (short-term and long-term) as well as the capabilities of the solutions.

## Data with No Analysis Has No Value.

As more information is generated, the need for effective data management solutions grows. Without this, decision-makers are often flying blind. According to the Business Analytics and Optimization for the Intelligent Enterprise report by IBM, one in three business leaders say they frequently make critical decisions without the information they need.

Raw data isn't useful until it becomes information. But how does raw data make that transformation? To make that happen, it requires that an organization do the following:

- Use business rules to manage timing, source, and destination of your data.
- Automate data integration whenever possible.
- Retrieve the data from the source. (Data needs to come from the right source at the right time to ensure accuracy.)
- Involve the correct resources for timely data updates.
- Engage data analysts to perform analysis not prepare reports. (Skip the spreadsheet, automate the process.)



Let's examine each of these five concepts. When you choose a software solution for BI, do the research to determine how many of these items the solution can handle.

### BUSINESSRULES

Business rules provide the logic for what data your organization needs to capture, pull or update, when (and how often) it needs to be done, where to send the data, and what format is needed by the target destination. The more that these rules can be automated in a business rules engine, the better. Your data will be available when needed and will also be more accurate because you have defined the requirements, structure, frequency and formats so your data is transformed on your terms. If you utilize a rules-based engine, you dictate what systems to integrate, what data analysis is needed and what results you want.

For example, an organization needs to create invoices and also pay employees (salaries and commissions) based on the work that has been completed in the previous period. The organization will need business rules to determine:

- When to perform validation on data entry (Is everything submitted? Is it accurate? Is it approved?)
- When to pull data for invoicing (Monthly, at contract end, biweekly, at milestone events, etc.)
- When does time need to be submitted for vacation approval?
- How do you know if you have all the data?
- What about data errors?

If you can automate these rules, data can be pushed to the appropriate organizations with little to no manual intervention.



### 2 AUTOMATEDNTEGRATION

Overall, the biggest challenge facing organizations wanting to analyze data (and not wade through it) is the quality, accuracy and timeliness of the information available to them. To complicate matters, the data is usually resident in various business software platforms and these systems do not talk to each other. Extracting data from spreadsheets or other report forms manually is at best an error prone process with multiple points where simple mistakes can occur. Moving forward with the errors in place exacerbates the problem and throws data accuracy into the wind. Sound familiar? The only real way to alleviate this problem is to directly access and extract information from the source of record without manual intervention. There are platforms that can accomplish this but not all of them have the ability to pull the data at specific time intervals, combine the data with other information, and maintain it according to your needs.

#### "I created a spreadsheet for that..."

The ubiquitous spreadsheet is a mainstay in today's business world. The origin of electronic spreadsheets can be traced back to 1978, but it wasn't until 1982 when Microsoft jumped into the arena of electronic spreadsheets with a product known as MultiPlan. MultiPlan was Microsoft's first electronic spreadsheet program. It was introduced in 1982 as a competitor for VisiCalc (the first ever electronic spreadsheet program). The first Windows compatible Excel program was introduced in 1987, and the business world has been married to the beloved spreadsheet ever since.

Spreadsheets are a valuable tool, but the honeymoon may be over when it comes to using it as a business intelligence tool. Extracting data from multiple spreadsheets to gain insight into your business operations can be fraught with problems. Most spreadsheet information is manually retrieved and then input, again manually, into some form of reporting format that has been developed by the organization. No need to be a rocket scientist to determine the numerous error/failure points in these manual processes.

When choosing BI systems, look for the ability to pull data from a variety of sources (including spreadsheets if they are the "system of record") automatically. The least amount of manual intervention used will minimize the potential for data corruption.





### **3RECEIVE DAT** Mom SOURCE

This recommendation can be controversial, especially if you are already using some type of Data Warehouse, so let's talk through it a bit. What we are saying is that the data you use should come from the correct source for that data without being modified and translated via a spreadsheet, combined with other items, or changed in some way before you use it for BI purposes. The closer to the source you are, the more timely and accurate the information will be.

Data should be pulled from its various sources and normalized (organized for proper access, appropriate keys set for search, and optimized) into a cohesive set of data for the purpose at hand. This is critically important when data resides in disparate systems and formats to ensure that you are always working with the most current and most accurate information. Automated data integration using your business rules will prevent you from the need to wade through multiple business systems fishing for data.

Automation does not necessarily imply a large data warehouse with tons of data. Rather, use the automation to pull just the data you need when you need it.

For example, many project management organizations need to create project status reports on a weekly or monthly basis. In many organizations, this means that each project manager (PM) is spending quite a bit of time putting data into systems and then pulling data out into a presentation format. The presentations are often compiled into an overall report for the entire program or portfolio after submitted by the PMs. Instead of this, why not put the data directly into the systems (scheduling, finance, etc.) using standard templates and then pull automated reports with the required data. Data is entered once, in only one location (the source of record for the data type) and pulled out as appropriate in a variety of formats (Word, Excel, PowerPoint, etc.) This will leave your PM staff with more time to manage their projects instead of formatting their reports.

### **4 RESOURCEDATA INPUT**

This is one of the most critical pieces of an effective system. There is a great deal of information that is needed for business processes that is only available from the people who are performing the work. Your challenge is to get that data from the source (the end user) in a timely fashion with as much accuracy as possible without impeding their ability to do their work. People are being paid to perform assignments. Yes, they need to provide status on those assignments but you do not want status reporting to take more time or energy than is absolutely necessary. You need to make it simple and unfortunately, that can be very difficult to do.

Status reports mentioned in the previous section is one example. Another is the ever popular topic of entering time for weekly tracking of projects, paid time off (PTO), administrative categories, and so forth. Unless payroll is directly tied to accurate time reporting, it seems to always be a struggle to get time reported. There are lots of reasons for this and many of the reasons are perfectly valid but the bottom line is that organizations need to track this information.

The challenge is to make the entry of data as accurate and timely as possible, without involving supervisors, administrators, project managers, etc. in the process of chasing people down or sending email messages to everyone in the organization to remind them of the weekly process. Once again, automation is a great way to get the data you need and also ensure that it is entered with the least amount of effort possible. You can set up notification processes based on who has/has not entered data, you can set up validation rules for accuracy of the data entry, and general oversight of the compliance process.

If you need the data, automate the process to make it as easy as possible. Spend your time doing analysis instead of chasing data.



## 5 DATANALYTICS

Finally, you have the data you need and it was pulled from the right source at the right time. Now what? Our best advice is to skip the spreadsheet and automate the process. There is a very simple reason for this. You want your highly skilled resources (data scientists, data analysts, business team leaders) analyzing data and determining strategy/tactics not pulling together reports.

Analytics play an increasingly critical role when working to solve business problems, develop new products and services or optimize business processes. Insights produced by analysis of organizational data allow for decision makers to derive a greater competitive edge in the market, however without confidence in the data outputs, analytics will be a question mark.

BI tools, techniques and technologies cannot be leveraged for corporate gain without human intervention. It takes complex algorithms, powerful computing and, perhaps most important of all, human analysts to exploit the promise of business intelligence.

In the book, Doing Data Science, the authors describe the data scientist's duties this way:

"A data scientist is someone who knows how to extract meaning from and interpret data, which requires both tools and methods from statistics and machine learning, as well as being human. She spends a lot of time in the process of collecting, cleaning, and munging data, because data is never clean. This process requires persistence, statistics, and software engineering skills—skills that are also necessary for understanding biases in the data. Once she gets the data into shape, a crucial part is exploratory data analysis, which combines visualization and data sense. She'll find patterns, build models, and algorithms—some with the intention of understanding product usage and the overall health of the product, and others to serve as prototypes that ultimately get baked back into the product. She is a critical part of data-driven decision-making. She'll communicate with team members, engineers, and leadership in clear language and with data visualizations so that even if her colleagues are not immersed in the data themselves, they will understand the implications."



That's a tall order, and demand for the required skill-set far outstrips supply. Let's break down the requisite skills a bit further. Data scientists require knowledge of math and statistics. A natural curiosity is also important, as is creative and critical thinking. What can you do with all the data? What undiscovered opportunities lie hidden within? They must have a knack for connecting the dots and a desire to search out the answers to questions that have not yet been asked if they are to realize the data's full potential.

Regardless of the titles that are used, it is easy to see that the value of the role is in the analysis of data not in the formatting of reports. You need to figure out ways to provide them with the data they need in the formats that are most useful. Again, automation is key to ensure their time is spent doing the job they were hired to do.

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## Making Informed Decisions.

With the right tools and processes, leaders can know significantly more about their business and quickly make decisions that can be measured and acted upon more precisely than ever before. Analytics performed on relevant data by data experts can help the organization address more effective interventions and make better predictions and overall smarter decisions. With the right analytics platform, confidence in the data is increased dramatically.

Making the right decision is hard. You can go to the Internet and find 5, 7, 10 or more steps and advice on effective decision making. There are many different perspectives and excellent tips. But the foundation of decision making lies in a leader's ability to gather complete, accurate and timely information on which to base his/her decisions. The fastest way to tank your organization is to base your decisions on instinct or gut and not take the time and effort to understand the situation, analyze the data, and make an informed decision.



To make informed decisions quickly in constantly changing market conditions, you need clearly defined business goals and objectives and a reliable way to measure them. And you absolutely need accurate data to measure results. Data analytics turn raw data into a valuable company asset that an organization can use to make informed business decisions to impact their financial bottom line.

## Conclusion.

Automatically pulling source data from numerous resources and not being limited by the manual processes associated with spreadsheets or other forms of reporting, is the direction organizations must take to truly succeed in today's business environment. By extracting essential information from key systems (on premise and cloud sources), and combining that data with other applications, actionable insights are created.

Said another way, it's the data analysis component of BI that makes big data relevant. For example, getting the right message to the right customer at the right time is the promise of relevant, real-time marketing. It's the powerful analysis and flexible reporting tools inherent in BI, not the big data itself that make this happen.

Lest we forget, BI tools, techniques and technologies cannot be leveraged for corporate gain without human intervention. Those who become experts in the science behind business intelligence and big-data analysis are well-positioned to become the next superstar within their organization.

Additionally, the analytics platform selected for your business intelligence needs should provide a means to continually improve your organizational processes. By identifying problem areas and then feeding that information back into the organization, opportunities to evolve and facilitate change will occur making your organization more efficient.

When considering a business intelligence platform, make sure it can help you:

- Save time and money
- Reduce human data errors by automating processes
- Merge information from multiple systems over time to provide trending data
- Generate robust reports using actual data from multiple sources-ofrecord
- Create and deliver reports in numerous formats (PPT, Excel, Word, etc.)
- · Automatically send notifications to computers or mobile devices
- · Generate BI output that is predicated on your specific business rules

Using actionable and accurate data creates a nimble organization that is able to respond to an ever-changing market place and increase its bottom line. QPM has spent a lot of time digging into this field and has created a solution that we believe solves most tactical business intelligence needs.

If you are interested in learning more about QPM's BIAdvantage Solution, click here.

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