How to Improve Your Business by Making Analytics Operational in The Big Data Era

the analytics revolution

Bill Franks

WILEY

Praise for The Analytics Revolution

"Realizing significant, sustainable benefit from data and analytics is becoming more of an organizational change management initiative than a technology project. In *The Analytics Revolution*, Bill Franks uses his experiences as a practitioner in the trenches and a consultant in the C-suites to help leaders gracefully move their organizations to a game-changing level of analytic value."
—**Kathy Koontz,** Associate Vice President, Customer Insights and Analytics, Nationwide

"If you are an executive, you need this book. While the standard fare of most books on analytics is—understandably—a technical 'geek out' session, the enterprise leader must instead gain view of the full landscape of analytics value, strategy, and process, as well as a map of pitfalls and how they're best avoided. *The Analytics Revolution* brings this landscape into clear view."
—**Eric Siegel,** founder of Predictive Analytics World and author of *Predictive Analytics: The Power to Predict Who Will Click, Buy, Lie, or Die*

"This book is a must-have for professionals who want to effectively use big data to free companies to innovate. Bill precisely captures the most imperative incoming wave of the big data revolution, which is operationalizing decision making processes by using data in a massive scale, but not making data-driven decisions only at the strategic level. This is great news for business!"
—**Simon Zhang,** Senior Director, Business Analytics, LinkedIn Corp

"Data and analytics don't create value until they change how something is done. Operational analytics is that change—on a scalable and repeatable basis—and Franks provides a roadmap for how to succeed with it."
—**Blake Johnson,** Consulting Professor, Department of Management Science and Engineering, Stanford University

"Organizations are understanding that Big Data and Analytics can provide a competitive advantage and are clamoring for information on making this promise a reality. In *The Analytics Revolution*, Bill Franks provides a practical guide for making analytics operational and a cornerstone of organizational decision making. Bill's expertise and passion for the topic shines as he explains this revolution, steps for implementation, and pitfalls to avoid. Business leaders will appreciate Bill's ability to demystify this important yet misunderstood topic."
—**Jack Levis,** Senior Director of Process Management, UPS

"I thoroughly enjoyed Bill's latest book. In *The Analytics Revolution,* Bill once again demonstrates his rare ability to take a complex, technical topic, and convey what is truly essential to every senior business manager. As Bill so effectively articulates, the analytics revolution is underway and promises to fundamentally change how business operates. This is not an IT practitioner's guide—rather, it is a primer for the seasoned business manager. It cuts through the hype and informs the manager of what he or she must know to operationalize analytics within the company's business processes."
—**Mark A. Van Sumeren,** Senior Vice President, Strategy & Business Development, Owens & Minor, Inc.

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Contents

Foreword

If you have followed the topics of business intelligence, analytics, and big data over the last decade or two, you may have wondered what is coming next. After all, the initial flurry of excitement about big data is beginning to subside, and analytics of all kinds have become an important part of business, but a familiar one by now.

What's next is in this book. Bill Franks refers to it as "operational analytics," but it could also be called such terms as "production analytics," "real-time analytics," or "decision automation." As these terms suggest, the nature of how analytics are performed is changing rapidly. It's not the analytics themselves that are changing so much. As Franks notes, operational analytics are mostly the same analytics we've done for decades, even centuries. What has changed is the context in which they are carried out.

You can read the details in the book, and you should. I will say here that instead of the back-office, slow, batch analytics of the past, operational analytics are being done much more rapidly and continuously. They are being integrated with business processes and systems, rather than being done separately. I've called this trend "Analytics 3.0," as you will read in his first chapter, but Bill's term "operational analytics" is certainly more descriptive. And he gives a lot more detail about how this world works than I ever did.

This movement is long overdue, after 50 years of separation between analytics and the operations of businesses. The separation created a number of problems. Decision-makers often requested analytics and data to support their decisions, but didn't actually use them. They probably wanted to appear more rational and analytical than they actually were. Quantitative analysts, who should have been at the front and center of business decisions and actions, were generally at significant remove from them (as Franks notes from his own

experience in Chapter 8). Everything with analytics took far longer than it needed to. Analytics were still useful in this context, but not nearly as useful as they might have been.

Given all these problems with traditional analytics, it is perhaps testimony to the power of the field that organizations still plan to embed and institutionalize them in their business activities, rather than leaving them optional and tacked-on. The work on operational analytics suggests that analytics can no longer be marginalized because of the way they are undertaken. Analytics need to inform decisions both strategic and tactical, and they need to be done at the pace, time, and location of business operations. As the pace of data flow has quickened within companies, so must the pace of analytics and decision-making be accelerated.

If you weren't wondering what's coming next, you're probably wondering whether this book is yet another one on big data. The answer is no—in part because Franks already wrote an excellent one on that topic, *Taming the Big Data Tidal Wave*. It's not a big data book in another sense, because it addresses the use of all sizes and types of data. In fact, this book might be described as the first *post*-big data book. Franks takes for granted that organizations will use their small, structured data assets as well as their large, less-structured data assets. Why would anyone do otherwise? It seems obvious that data can be useful no matter what its size or structure. Unfortunately, since small data came before big data, few if any other books have had "all data" as their focus, and have few have counseled that your technology environment and analytical activities should be tailored to the various types of data you will be managing and analyzing.

This is also one of the first books that focuses on the "analytics of things" topic. There are many books now on the "Internet of Things" (IoT); a quick search on Amazon today yielded more than a dozen, even though that term is relatively new. But much less has been said about the way to produce value from sensor data, which is to analyze it and mine it for insights and anomalies. Many of Franks' examples of operational analytics involve the IoT, and he discusses how analytics can be used to deal with the vast streams of data those sensors produce.

Despite the fact that Bill is the Chief Analytics Officer for Teradata, he is quite neutral about technologies and vendors. Chapter 5 in this book, for example, includes a very even-handed discussion about the relative merits of Hadoop and enterprise data warehouses based on

relational technology. I think Bill is correct in that the vast majority of organizations will employ a variety of technologies to store and analyze data. Nothing ever seems to go away; new technologies augment the old ones, and the amount of data grows at a sufficient pace to require them all.

The book addresses a wide range of topics, from technology to privacy to people topics. It's all here in highly useful and digestible form. It's not Franks' style to make wild-eyed predictions or pronouncements; instead you get calm, straightforward discourse about the way things are with operational analytics in 2014.

The word "revolution" in the title is apt. This move to operational analytics is revolutionary in a variety of ways that are covered in the book. Embedded, real-time analytics raise a lot of questions about how organizations will work in the future. When computers are making most of the decisions, what happens to the people who were previously making them? How can humans monitor and improve the approach to decision-making when it is essentially invisible? Franks points out that when decisions are made in real time with little or no human intervention, it has to be a really good set of analytics and decision rules, or you can lose a lot of money very quickly. As luck would have it, I am working on a book myself that will delve deeply into the human aspects of operational analytics!

So jump into this book and into a previously unknown world where many important decisions are made through operational analytics. You have nothing to lose but your indecision and your office in the back!

Thomas H. Davenport, President's Distinguished
Professor of IT and Management, Babson College;
Co-Founder and Research Director, The International
Institute for Analytics

Preface

Like manufacturing in the 1800s, the field of analytics needs to go through its own industrial revolution. Analytics processes today are usually created in an artisanal fashion with a lot of care and customization. That's okay in many cases, and the artisanal approach often still is appropriate. However, we must also push analytics forward to another level of scale and impact. The industrial revolution took manufacturing processes from an artisanal practice to a modern technological marvel that is able to manufacture quality items at massive scale. The same type of revolution must happen with analytics.

Centuries ago, if a bowl was needed, then a visit to a potter was necessary. A potter can make a custom bowl to fit any need. The problem is that such an approach isn't scalable. The limited pool of potters can create only so many bowls in a day. Today most bowls are created on a large scale in manufacturing plants. Although it is still possible to purchase a custom bowl from a potter, it isn't cost effective to use that approach except for special situations. Besides cost considerations, people today also often prefer the consistency of a mass-manufactured product. However, even in today's world, bowls don't magically appear. Someone still has to come up with a design, build initial prototypes, create a mold, and validate that the mold will produce the right bowl time and time again. Only then is an assembly line turned on to manufacture the bowl at scale.

A similar process is required for operational analytics. Framing and designing each new analysis is still necessary. Building a prototype of the analysis and testing multiple iterations of it to make sure everything works correctly is still necessary. Only at that point can the analytics process be promoted to an operational process, turned on, and executed in an automated fashion. After being turned on,

the performance of the analytics process must be monitored constantly just like a real assembly line is monitored.

Making analytics operational doesn't remove any of the steps historically required to build an analytics process. Rather, it takes the process further. Operational analytics deploys analytics at industrial scale just like traditional manufacturing processes enable bowls to be produced at scale.

Operational analytics is about embedding analytics within business processes and automating decisions so that thousands or millions of decisions every day are made by analytics processes without any human intervention. Whether those decisions directly touch customers or simply optimize an organization's actions behind the scenes, the impact can be substantial.

If an organization doesn't begin to move toward operational analytics, it will struggle as its competitors drive analytics deeper into their business processes. The myriad operational analytics opportunities available to businesses today are driven by increased data availability, increased analytics processing horsepower, and increased accessibility of robust analytics techniques.

Whether we realize it or not, operational analytics is already at work around us every day and impacting our lives. In many cases, these analytics are no longer hidden behind the scenes. Consumers today are often both aware of the analytics that are occurring and even expect it. Let's briefly look at some ways that operational analytics is now impacting our daily routine to set the stage for what is to come in the book:

- Airlines automatically reroute customers when a flight is delayed in order to limit travel disruption and raise customer satisfaction. The analytics take into account a lot of facts about each customer, other passengers, and the status of alternative flight options.
- When people visit their favorite websites, the sites make recommendations as to what else they might like based on what they've viewed, what search terms they use, and what details seem most important to them based on the patterns of their behavior. Often this includes taking into account every action up to the last click.
- When a customer service agent is contacted to help with an issue, the agent often understands the caller's history and is

guided by analytics to the best actions to resolve the issue. The recommended actions account for many factors about the customer and the product or service the customer is discussing.
- Social media sites are able to identify, and connect people with, long-lost friends or colleagues through analysis of extended social networks. Within seconds of linking to a friend, more recommendations are found.
- People can go into a store and instantly obtain credit based on an assessment of the current state of their creditworthiness, as determined by analysis of a wide range of historical credit history data.
- Banks and credit card issuers constantly use analysis to protect us from fraud. Behind the scenes, banks are constantly reviewing accounts for behavioral anomalies that indicate fraud and are able to quickly freeze an account until the purchases are verified with the customer.

These are just a few examples of where operational analytics impacts us daily, where we determine the analytics to be valuable, and where we have come to expect even more. Later, we also discuss a variety of examples where people are largely unaware of the analytics occurring around them.

Many of the technologies and architectures that supported traditional methods of developing and deploying analytics processes won't work for today's complex requirements. The classic systems and architectures, as well as historical analytics methods, have started to groan under the weight of the requirements of operational analytics. Companies must adapt and change the way they store and analyze data as well as how they deploy the results. That's going to necessitate changing not only infrastructure and analytics methodologies but corporate policies as well. If an organization tries to squeeze rapid, high-volume operational analytics into systems and processes that were created and architected to support only batch requirements, it will have a very difficult time.

We can expect to see continued disruption of business models and competitive environments as the analytics arms race continues. Twenty years ago, many organizations used little or no analytics. Today, most organizations use a fair amount of analytics. Having data that was weeks old and analytics processes that were executed infrequently in a batch environment used to be good enough. That is

no longer true as the leaders in the analytics realm make analytics operational.

Five to ten years from now, virtually no business will remain untouched by this trend. Resistance is futile. Your organization needs to implement operational analytics, and this book will help you get started. Watch for the continuing transformation of businesses in the coming years as analytics continue to become truly a critical, operational component of a business rather than simply a nice add-on. This book focuses on how this evolution has come to pass and what is required to understand and implement operational analytics in your organization.

Sit back, get comfortable, and let's go!

Who Should Read This Book?

This book is intended to provide readers with a working knowledge of what operational analytics is, what an organization needs to know, and how an organization must act in order to succeed with operational analytics. The book comes from a strategic and conceptual level, not a technical and tactical level.

Although this book is accessible to anyone regardless of background, those who will find it most interesting are the executives and managers whose roles will touch operational analytics. Professionals involved in creating operational analytics processes will also find the book to be valuable.

If you read my book *Taming the Big Data Tidal Wave* (John Wiley & Sons, 2012) and you liked it, you'll like this one too. Although the subject matter is different, I have followed the same general tone and structure. While most of the focus is on totally new topics, sometimes this book builds on the themes from my earlier book. At the same time, the content of this book can stand alone, and familiarity with *Taming the Big Data Tidal Wave* is not a prerequisite.

Who Should *Not* Read This Book?

This book is a business book; it is not a technical book. Readers looking for deep technical details, mathematical formulas, or examples of code will not find what they are looking for and should consider a different book.

This book avoids specific product, service, and platform recommendations. Instead, it focuses on product classes and general

architectures so that readers will know what to look for when they search for products and services. Readers looking for specific recommendations that include company and product names won't find those here.

Last, this book does presume some working knowledge of the analytics space. Those looking for a review of fundamental analytics concepts won't find it here. Instead of taking time to define every term, I assume that common terms and approaches are already understood.

What's in This Book?

This book consists of nine chapters divided into three parts. The first part of the book sets the stage by describing the market trends driving operational analytics, defining the topic, and providing examples to illustrate the concepts being discussed. The second part of the book covers how an organization can prepare for operational analytics by outlining how to make the business case, what infrastructure to consider, and how to govern operational analytics processes. The last part of the book discusses the analytics required, the people and teams that create and support the analytics, and the culture required to be successful. Each part and chapter is described in more detail next.

Part One: The Revolution Has Begun

Part One focuses on the trends that are leading us toward operational analytics and provides examples of how operational analytics is already a part of our lives. It covers high-level themes that set the stage for the more detailed discussions that follow later in the book.

First, we define operational analytics and discuss how analytics approaches, methods, and processes have evolved to the point that they can support operational analytics. Next, we discuss how to cut through the hype around big data and focus on what is truly important for businesses to know as they incorporate big data into operational analytics. Last, we walk through a range of illustrative examples that showcase operational analytics in action.

Chapter 1: Understanding Operational Analytics

Operational analytics can sometimes entail upgrading a batch analysis process to run in an embedded, automated, real-time fashion.

Often, however, operational analytics involves different types of analytics being applied in a different way. Increasingly, with the advent of big data, different sources of data are also utilized. The reason for the differences is in large part because operational decisions are different from many of the traditional decisions addressed through analytics. This necessitates changing how analytics processes are built, what methods are used, and how analytics professionals do their jobs.

This chapter defines what operational analytics is and how it is different from analytics of the past. How the development of analytics processes has evolved to enable support of operational analytics is also explained. Some perspectives on how analytics is changing the way companies do business are also provided.

Chapter 2: More Data . . . More Data . . . Big Data!

It is hard to recall a topic that received so much hype as broadly and as quickly as big data. While barely known just a few years ago, big data is one of the most discussed topics in business today. As might be expected with such a meteoric rise, confusion and misinformation about big data are rampant today. This is leading many organizations to start down paths that they should not start down. The failures that result from these misguided actions will be painful and costly. Luckily, with a little work and some education, the average company is perfectly capable of avoiding the most egregious hype points and starting down sensible paths that make economic sense.

This chapter discusses many of the hype points and misunderstandings about big data. It not only points out the flaws in the common interpretations but provides some alternative views and approaches that are more realistic and rational. Big data will play a large role in operational analytics so it is important to understand how it fits.

Chapter 3: Operational Analytics in Action

The concept of making analytics operational isn't new. However, it was rarely achieved in practice in the past. The fact is that companies could get away with less, and so they did. As technology has advanced and businesses have become more sophisticated, however, operational analytics is becoming an inevitable requirement. It just won't be possible to compete in the future without analytics being at the heart of a wide range of daily decisions and actions.

This chapter presents a variety of real-world examples of operational analytics. It illustrates how operational analytics can support decisions of many types and also shows how operational analytics can range from very simple to incredibly complex.

Part Two: Laying the Foundation

Part Two helps readers understand how to put in place a foundation that can support operational analytics. A solid foundation is a critical prerequisite to success.

First, we discuss how to make the business case for investment in operational analytics. Nothing of substance can happen until the decision to invest is made. Next, we discuss how to create and utilize the right analytics infrastructure. The landscape today is more complex and more difficult to navigate than ever before. Last, we discuss governance and privacy issues that need to be addressed. When analytics is embedded and automated to the extent that operational analytics is, strong governance in place from the start is required.

Chapter 4: Want Budget? Build the Business Case!

An early step in the pursuit of operational analytics is justifying the expense and effort that will be required to be successful. There are new tools, new data sources, and new skills required, and big data has only made the situation more complex. Many organizations won't be comfortable with the fact that there are more unknowns than usual and more perceived risk as well. Persuading an organization to take action will require significant effort and solid justification.

This chapter explores the factors that must be accounted for as a case for investment is built. The factors to be considered include technologies, services to implement and maintain the technologies, the work to create the analytics processes, and the effort to embed the analytics processes and make them operational. Only by accounting for the entire range of costs can the best investment decisions be made. Focusing on just a few line items will lead organizations astray.

Chapter 5: Creating an Analytic Platform

As the use of analytics has exploded, the market has been flooded with products intended to facilitate the analytics. Although this is a good thing, it also leads to confusion and makes it necessary to weed through myriad options in order to choose what is right for any

given organization's problems. Some technologies will be applicable almost universally, while others will be applicable only when circumstances are just right. Every organization will need to find the right mix of technologies for its needs.

This chapter discusses the technology landscape as of early 2014. The most important technologies are discussed, as well as when to apply them. Focus is on how to use a mix of technologies to create an analytics platform that will provide the required performance. Most important, guidelines on how to connect the different technologies together into a single, cohesive, unified analytics environment are provided.

Chapter 6: Governance and Privacy

Operational analytics directly take action without human intervention. Care must be taken to ensure that appropriate governance is in place to minimize the risk of an unexpected problem causing serious damage. Different types of governance are required for the discovery and development process than are required for the deployment process. Special care also needs to be taken with privacy, given the sensitive nature of much of the data utilized today.

This chapter discusses the governance concepts required for both the discovery and deployment processes. It outlines how to effectively enable innovation and experimentation while still allowing for a safe and secure deployment. Specific attention also is given to privacy issues.

Part Three: Making Analytics Operational

Part Three focuses on what it takes to put operational analytics into action. Once the foundation discussed in Part Two is in place, that foundation must be utilized effectively in order to realize its potential.

In Part Three, we cover important concepts related to the analytics approaches required to successfully evolve into operational analytics. We also cover how to staff and organize analytics teams for success. Last, we address the cultural issues that must be considered as an organization readies itself for the changes operational analytics will force. One of the hardest parts of making analytics operational is overcoming fear of change and getting people to embrace new approaches.

Chapter 7: The Analytics

The centerpiece of operational analytics is, of course, the analytics themselves. But what do they look like? Although operational analytics have many similarities to traditional analytics, there are also differences between the two. Succeeding in the world of operational analytics and big data requires some new approaches. There is the need to leverage new techniques and new data, there are new types of problems to address, and there are new requirements for measuring success.

This chapter delves into the analytics requirements behind operational analytics. It discusses some of the techniques and methodologies that will be required and how some of the classic lessons from the past still apply. Last, the chapter covers how to effectively measure the success of an operational analytics process and monitor its performance.

Chapter 8: The Analytics Organization

No matter the strategy chosen for analytics, somebody has to make it happen. Thus, an important part of making analytics operational is to have the right team in place. Having the right team is more than just hiring smart people with the skills to cover all aspects of operational analytics. The team must be structured and organized effectively as well. Also critical is putting in place effective incentives and empowering the team to do what is needed by giving it the authority, responsibility, and mind-set to succeed.

This chapter outlines how to charter and empower an organization that will succeed in driving operational analytics with big data. It outlines how to structure an analytics organization and who should be on the team. It discusses what the team's approach should look like and what type of incentives should be in place. It also suggests some behaviors and attitudes that will help the team to be as productive as possible.

Chapter 9: The Analytics Culture

One of the most difficult challenges in moving toward operational analytics is the process of changing corporate culture. Unfortunately, this effort is often underestimated. Different attitudes and policies are required when a company becomes driven by analytics at the operational level. Analytics must be trusted, embraced, and demanded by everyone at every level of the organization. The

cultural transformation can take longer and be more frustrating than the technological and analytics process transformations. When dealing with human emotions and personalities rather than facts and figures, things can get messy.

This chapter covers important changes to mind-set that must occur within an organization to succeed with operational analytics. It also discusses ways to utilize people's emotions and personalities to advantage as new analytics processes are deployed. Finally, it discusses how an organization can facilitate success while handling the inevitable failures that occur from time to time.

Conclusion: Join the Revolution!

This final chapter is a short recap of the key messages from the book along with calls to action.