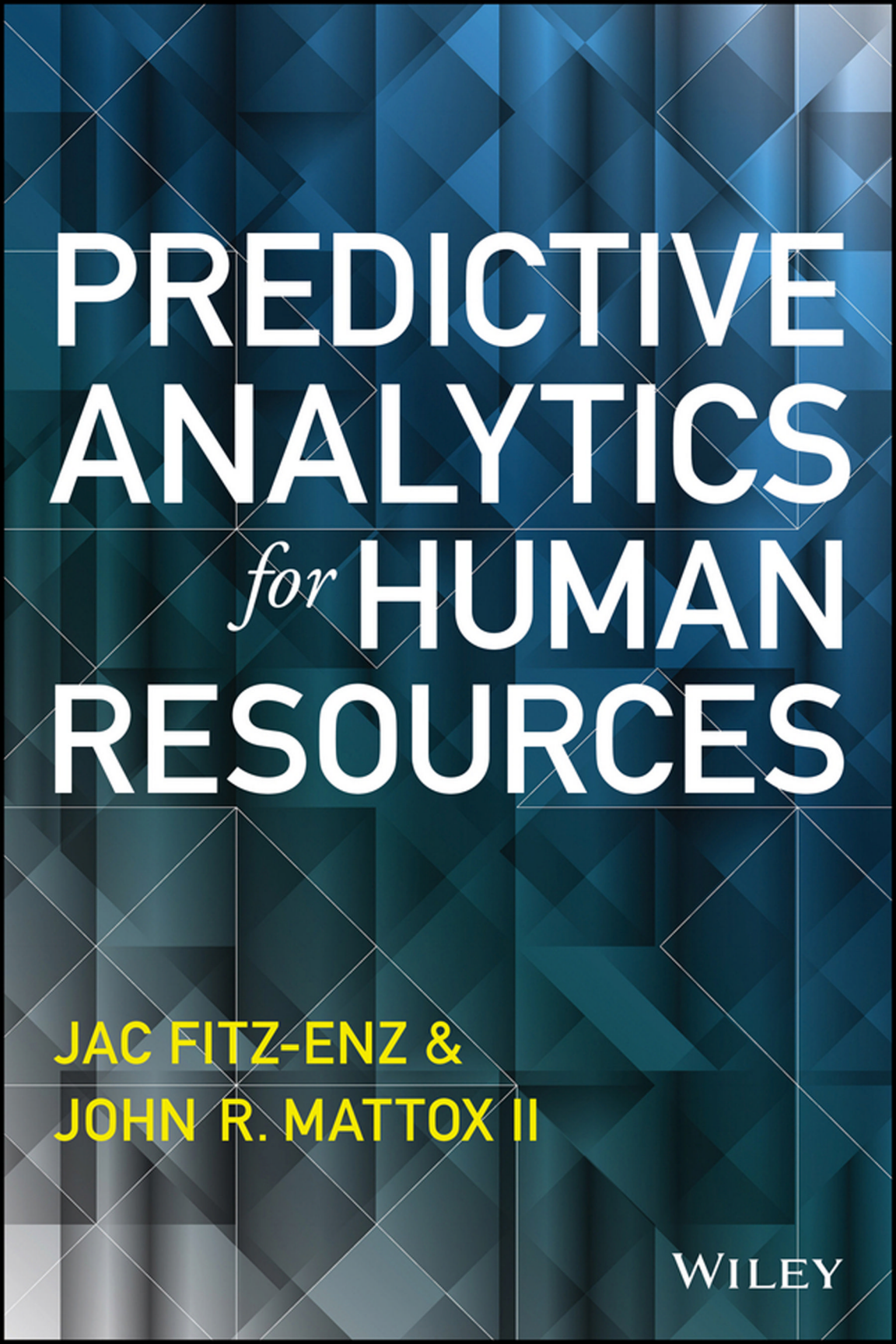
PREDICTIVE
ANALYTICS
for HUMAN
RESOURCES
JAC FITZ-ENZ &
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Predictive Analytics for Human Resources

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Predictive Analytics for Human Resources

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To Laura, my wife, partner, and love.
—Jac Fitz-enz
To my personal and professional family,
thank you for all of your support.
—John Mattox

Contents

Foreword

This remarkable book, written by two of the top thought leaders in the human capital industry, provides the roadmap on how to win the war on talent. By applying the principles laid out in this book, organizations can gain a huge competitive advantage.

Allow me to help put this in perspective. This is a trillion-dollar opportunity to create shareholder value. The evidence to support this claim is overwhelming. In the United States alone, corporations spend well over $6 trillion in labor expense per year. Every organization makes bad hires, conducts training programs that don't generate sufficient returns, and has unqualified employees, weak leaders, disengaged employees, and a suboptimal workforce.

My company, KnowledgeAdvisors, provides predictive analytic solutions through its software, Metrics that Matter. Our data shows that organizations that effectively deploy an automated talent analytics solution embedding predictive analytics will see at least a 4 percent productivity improvement. A 4 percent increase in productivity on a labor spend of more than $6 trillion is approximately $250 billion in bottom-line improvement per year. Most companies trade well above a four times price per earnings multiple, resulting in a trillion-dollar opportunity in shareholder value. This analysis does not include other global economies, which makes the opportunity even larger.

Business leaders and human resource (HR) executives who do not deploy a predictive analytics solution for their talent investments are doing their shareholders a disservice. Government leaders should also take note. Research shows that at least half of every dollar spent on training is wasted. The U.S. federal government spends approximately $30 billion per year on training. That means approximately $15 billion per year is wasted. To be fair, some federal agencies are now deploying automated analytic solutions and are starting to see

dramatic reductions in waste and significant improvements in productivity. Given the ongoing deficit battle, U.S. citizens should be more demanding for improvements in this area.

Many leading corporations have deployed this solution and are already reaping the benefits. It is time for the rest of the market to catch up. The old ways of running HR without good data will quickly become the exception and not the rule. What chief executive wants to continue making more bad hires than competitors or having a higher percentage of ineffective leaders? Why should shareholders not expect their companies to deploy a quality control system for their onboarding programs or their corporate universities? The technology and ecosystem to cost-effectively deploy a cloud-based talent analytics solution exists today. The time is right for business, HR, talent, and learning professionals to step up and take their organizations to new heights.

This book provides a practical, how-to guide for starting and managing an analytics function.

—Kent D. Barnett
Founder and CEO
KnowledgeAdvisors, Inc.

Preface

Technology is helping us generate data at a rate so fast that we have to continually invent words to describe the scale. For example, a zettabyte (ZB) is ten bytes to the 21st power (10^{21}). To give you a sense of the magnitude if that number, consider this:

If a byte were the size of a postage stamp, approximately one square inch, and the surface of the planet Earth is 12,476,143,744,000 square inches (12 trillion), a zettabyte of stamps would cover the Earth 6 trillion times, +/−.

Don't even try to figure out how deep the layer of stamps would be.

In 2012, the world database held 2 zetabytes. We are generating 2 trillion gigabytes every day and will double the world database in 1.2 years. Then it will accelerate compounding every year or faster. Eighty percent of the data is unstructured. This is the biggest technology revolution since the movable type printing press 500 years ago. In every revolution, there are opportunities: opportunities that will be seized by those armed with new tools and a new way of thinking.

The point is that the amount of data being generated daily is unimaginable. The good news is we don't have to deal with all that, because we can't. The vast majority of data spinning out daily will never be used. On the other side, each of those bytes has potential value if collected, organized, related to other data, modeled, and applied to predicting the outcome of some investment decision. Clearly, we are standing amid the greatest accumulation of data ever in existence, and it is growing exponentially while you read this. The imperative is to turn data into information and then into intelligence.

MEASUREMENT AND ANALYTICS

Analytics needs measurement standards as a basic language, a calculus if you will, on which to carry out descriptive, predictive, and prescriptive projects. Over the past three decades, I (Jac) have laid the foundation of measurement and analytics through a series of books: *How to Measure Human Resources Management* (McGraw-Hill, 1984, 1995, 2002); *The ROI of Human Capital* (Amacom, 2000, 2009); *The New HR Analytics* (Amacom, 2010); and *Human Capital Analytics* (Wiley, 2012). These books presented concepts, models, spreadsheets, and cases of measurement and analytics. In 1999 to 2001, I worked with SAS Institute, the premiere analytics company, sharing ideas around human capital measurement and analytics. All these previous ideas have gone into this book to provide a solid foundation and guide you through a step-by-step implementation of a human capital analytics project or program.

The term "analytics" is derived from the Greek word *analysis*, meaning a breaking up, from *ana-*, "up, throughout," and *lysis*, "a loosening." In practice, analysis is the isolation and identification of the variables in a situation for the purpose of better understanding the phenomenon under consideration. Although analytics is relatively new to human capital measurement, it has been in the business world since the 1960 launching of American Airlines Sabre reservation system. For the state of technology at the time, it was an amazing accomplishment. Eventually it linked 350,000 travel agents and 400 airlines around the world with flight data and reservations. A little later, the ascendance of Walmart was largely attributed to its inventory management database. Then came Amazon, which rewrote retailing through the Internet. Google and Facebook are pure data plays. Google can not only answer search requests in three-tenths of a second, its search system can predict a query before it is fully typed based on aggregating the billions of searches it processes every day.

In just the past few years, predictability has appeared on the horizon of human capital management. In 2007, I formed the Predictive Initiative, a consortium of a dozen major companies and several thought leaders. We found a method for analyzing and predicting the outcome of various human resources (HR) investments. The result

was *The New HR Analytics* (Amacom, 2010), in which I laid out the first model for predicting the economic value of human capital investments. Since then, early adopters of HR metrics have begun to migrate to analytics as the next evolutionary step in the management of the HR function and of the organization's human capital.

Field observations have disclosed a dichotomy. On one side there is now and will continue to be for a long period a shortage of qualified technological and analytic professionals. This is totally predictable due to the pace at which business, technology, and social networking are progressing. Yet, on the other side, publications and presentations at conferences are of a much higher quality today than they were just two years ago. The program I run for The Conference Board each fall is attracting outstanding work from business and government. More people and more organizations are seriously involved in what I would describe as advanced measurement and predictive analytic projects. As the momentum builds, I expect a wave of analytic conferences and products reaching the market.

ANALYTICS AND THE NEW WORK MODEL

There has been a great deal of interest in the past few years on workforce planning, competencies, and change management. Analytics has a key role to play in this arena. Too much attention is being paid to workforce planning as an industrial-era, gap analysis process that is unsuited for a new work model. The concept of a defined job is dead. Jobs are fixed routines that do not at all resemble technical and professional work in the twenty-first century. Constant market changes driving frequent organizational transformations make building a lexicon of competencies linked to obsolete jobs a fool's errand. New knowledge and old processes are a dysfunctional concoction. The best analytic outputs are useless if we can't change the organization to take advantage of them. Salesmanship and change management are imperative skills for analytic units. This book provides a practical model for selling analytics and changing the organization.

Technology has provided us with networking tools and accesses to information, while shifting social norms have driven the demand for greater connectivity. In concert, these forces are transforming the

power structure of organizations. I spoke at a chief information officer meeting recently where the audience readily admitted that because of social networking tools, they no longer control information flow in their organizations. Instead, they are risk managers. In such a fluid environment, analytic methodology is an essential tool.

VALUATION

Some thinkers are concerned about how to put a price tag on organizational databases. Like old workforce planning, this too is nineteenth-century thinking. Just as people are regarded as an expense in accounting, so too is data. At one level that is correct. It costs a lot of money to acquire, deploy, develop, and retain human capital. The same is true for data accumulation. But in both cases we don't want to value inert bytes of data or the number of people in the company unless we are facing bankruptcy and hoping to sell either or both "assets."

From an operating standpoint, we want to analyze the activity of people and their utilization of resources for the good of the organization. In short, we don't measure the value of people. We measure the efficiency, effectiveness, and outcomes of their processes. We need to know what a process costs, how long it took, how much output we obtained from a given input, what is the quality of the output, and how people feel about it. Analytics helps us parse a process and compare outputs from various investments. Chapter 3 presents an example of how this is done.

Descriptive analytics tells us what happened up to the present. This is the province of accounting and everything it counts. Although we might see trends, we cannot necessarily extrapolate them into the volatile future. Predictive analytic applications give us clues as to likely future outcomes, given past data plus knowledge of changing market demands. Prescriptive analytics suggest the best way to optimize the future. It is the action step wherein management makes its investment bets.

BOOK STRUCTURE: HOW TO DO IT

With the excitement surrounding analytics, many people have asked the questions "Where do I start?" and "What tools are available?" This

book is designed to answer those concerns. Where to start depends on where you are, where you want to go, how difficult the path to the future is, and how you expect to get there. Too often, this initial scanning and assessment of all forces and factors is ignored, given too little attention, or is a replay of the past. As a result, future outcomes are, at best, suboptimized or, worst, embarrassing and costly failures that can even take someone's job.

That is why the book opens in Chapter 1 with a question regarding the goal. Will analytics be a one-off project or the beginning of a more permanent organizational entity? The steps you take to run a project are the same as when you aspire to build an analytics function or even develop an analytics culture. It is just a simpler problem. Following this in Chapter 2 are the issues related to useful models and structures. More than 60 years ago, social psychologist Kurt Lewin claimed that there was nothing more practical than a good theory. Theories and their subsequent models serve as guidelines around which to plan and act. Chapter 3 discusses the support and technology that you probably will need to get the program off the ground and sustain it. It is highly likely that you will need support somewhere in the course of your endeavor. Suggestions around who and what are listed along with rationales provided for each case. Chapter 4 describes a typical case of building an analytics project. When people first speak of analytics, they immediately ask what to measure. But analytics starts with logical questions. Statistics come later. Often overlooked are persuasive skills and change management, mentioned earlier. Chapter 5 gets down to the nature of data with issues of sources, ownership, and quality, the grist for the analytic mill. You will see how to deal with where is it, who owns it, whether it is valid and reliable, and what forms it comes in. In Chapter 6 we go deeper into analytics with examples of regression, correlation, and structural equation modeling. Finally, we conclude with Chapter 7, speculating on the future of analytics. The epilogue is a short message cautioning readers to be wary of so-called expert predictors. It concludes with an entirely new way to look at the world and predict outcomes.

The appendix contains example measures of efficiency effectiveness and outcomes from the Center for Talent Reporting's Standard Metrics Definitions.

CHAPTER 1

Where's the Value?

Our only security is our ability to change.

—John Lilly

In a famous 1984 TV commercial, 82-year-old actress Clara Peller looks at a huge hamburger bun overwhelming a tiny meat patty and mutters the now-iconic phrase in her raspy voice, "Where's the beef?" It is the same question asked today by nonstatisticians. In our new world of Big Data and outrageously fast computers, many of us feel overwhelmed. When the numerati speak effusively about the power of analytics, laypeople roll their eyes. Without a graduate degree in statistical analysis, and especially in predictive analytics, the average person feels woefully ignorant, powerless, blind, and lost. Paradoxically, analytics is logical and understandable. It is simply a method for letting computers apply their power of manipulation to expose valuable insights. This book will take you step by step from the desire to analyze data to a comprehensible, actionable result and on to a view of the future of human resource analytics. In the end, you will find the beef.

SOME BASICS

There are at least two ways of solving problems. The most common one is simply to attack it head on and hope for the best. This is similar to dealing with a pesky mosquito. You feel it on your arm and you

swat it. This is a simple, highly effective reaction. The only apparent consequence is perhaps a little blood spot. But if there is more than one mosquito, you have to do it over and over. More important, mosquitoes often carry diseases, such as West Nile virus and malaria. More than 600,000 people die every year from malaria. If you were going to be in an area where mosquitoes are a menace, you would want to do something more than swat them when they land on you, right? This brings us to the second method for solving problems: analysis and prevention. If mosquitoes are more than a nuisance, you would prepare for them by protecting yourself with repellent and covering most exposed skin, wouldn't you?

So it is with organizational management. If your modus operandi is to continually swat problems as they appear, you waste time and resources by repeatedly dealing with the same problem. You seldom make progress. There is another alternative that will avoid costly, redundant investment of scarce resources. The better way is to invest a little time in analyzing the problem before you act. If you gather data on what has happened (descriptive analysis), analyze it in terms of why it happened and what will likely continue if untreated (predictive analysis), and then design a treatment for fixing it, most likely you will eliminate a recurrence of the problem (prescriptive analysis). This is the efficient way to manage. It also frees you to concentrate on being effective—that is, doing something that advances the organization. With this approach, you will have time to focus on building a better future rather than endlessly repeating the past.

WHAT IS ANALYTICS?

Arguably the most practical tool and greatest potential for organizational management is the emergence of predictive analytics. Analytics is a meeting of art and science. The arts teach us how to look at the world. The sciences teach us how to do something. When you say "analytics," people immediately think of statistics. That is incorrect. Statistics play a major role, but only after we understand something about the interactions, the relationships, of the problem's elements. Analytics is first a mental framework, a logistical progression, and second a set of statistical operations.

Human resources (HR) or human capital analytics is primarily a communications device. It brings together data from disparate sources, such as surveys, records, and operations, to paint a cohesive, actionable picture of current conditions and likely futures. This is an evidence-based approach to making better decisions. This popular term is simply the gathering of primarily objective facts and secondarily related subjective data. Analytics is divided into three levels:

1. **Descriptive**. Traditional HR metrics are largely efficiency metrics (turnover rate, time to fill, cost of hire, number hired and trained, etc.). The primary focus here is on cost reduction and process improvement. Descriptive HR analytics reveal and describe *relationships* and *current and historical data patterns*. This is the foundation of your analytics effort. It includes, for example, dashboards and scorecards; workforce segmentation; data mining for basic patterns; and periodic reports.
2. **Predictive**. Predictive analysis covers a variety of techniques (statistics, modeling, data mining) that use current and historical facts to make predictions about the future. It's about probabilities and potential impact. It involves, for example, models used for increasing the probability of selecting the right people to hire, train, and promote.
3. **Prescriptive**. Prescriptive analytics goes beyond predictions and outlines decision options and workforce optimization. It is used to analyze complex data to predict outcomes, provide decision options, and show alternative business impacts. It involves, for example, models used for understanding how alternative learning investments impact the bottom line (rare in HR).

The process starts with the simple reporting of HR metrics and goes all the way up to prescriptive modeling of business practices. Although financial capital (cash) and economic capital (intangible assets) are the lifeblood of a business, it is human capital (people) that apply cash and leverage intangible assets to drive business performance. As you move from descriptive to prescriptive, the value add grows exponentially.

The fundamental management question is: How do we manage talent more effectively? Human behavior is much more complex and less predictable than tangible assets. This volatility and capriciousness

has diverted many managers to focus on more stable assets. Yet physical assets like equipment are inert and inherently incapable of adding value. Only when a human being works with the tools does value flow. In the market of the twenty-first century, people simply cannot be relegated to anecdotal methodologies. Thomas Edison borrowed a phrase from Sir Joshua Reynolds that put the problem rather directly:

> There is no expedient to which a man will not go to avoid the labor of thinking.

TWO VALUES

The purpose of analytics is to find the best path through a mass of data to uncover hidden value. Value comes in two forms: financial and economic. There is a distinct difference between these forms initially, yet they eventually coalesce. Economic data includes practical, noncash significant items or processes affecting material resources. Examples include market reputation, customer satisfaction, best companies to work for, and community relations. These are often referred to as off–balance sheet assets. Each of them eventually should turn into financial value as stockholders invest in company stock, customers purchase products or services, high-performing personnel seek employment with the organization, and favorable community support ensues. Financial value examples are cash and other liquid resources such as stock and bonds. These are recorded on the income statement and balance sheet, the building blocks of accounting.

ANALYTIC CAPABILITIES

Data can be viewed two ways: structured and unstructured. Structured data is similar to financial data, and unstructured data typically is economic or less tangible data. Analytics and data intersect, as seen in Exhibit 1.1. Since the arrival of the industrial revolution 200 years ago, we have focused on structured data: costs, process time cycles, and quantities. Yet, according to IBM, at least 80% of the data currently being produced is unstructured, nonnumeric images, text, and audio.

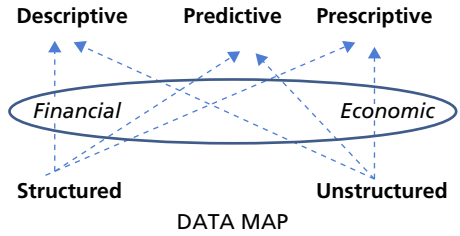

Exhibit 1.1 Analytic Paths

As social networking continues its explosive growth, the percentage of unstructured data will necessarily expand. In practice, structured and unstructured data can be merged into a mixture, amalgam, or fusion. In short, it will be what some now call hybrid data. While hybrid data will be essential for future analysis, it will also make the process much more complicated.

This is precisely why analysis is essential. When a situation is a complex mixture of objective facts and subjective beliefs, there is no way other than through logical inquiry and statistical treatment for us to comprehend what is not readily apparent.

Excuse the effort for making this point again, but analysis has its genesis in descriptive data that tells us what has happened up to the present. But prediction and prescription are concerned with what can or preferably could happen and how to make it happen. All three levels are necessary. Throughout the twentieth century, we took descriptive data and mentally extrapolated it into the future through presumed trends. This was somewhat acceptable when the market was stable. However, today and tomorrow the market is anything but stable. Therefore, prediction is vitally necessary for any company that desires to sustain or grow market share and profitability in the new millennium. Not-for-profit organizations need it even more, because so much of their "business" involves subjective data such as a humanistic mission and the satisfaction of its constituency.

In the HR or human capital realm, change is just as constant as it is in financial, production, or marketing arenas. Labor availability and costs, skill development, leadership, engagement, and retention issues constantly evolve as business needs and market dynamics change.

Last year's recruitment program can be rendered ineffective overnight by market dynamics, competitors' actions, new technology, and capricious customers. In the first decade of the twenty-first century, the dot-com crash and the liquidity crisis totally disrupted the labor model. Yesterday's skill requirements are made obsolete by continuing advances in technology as well as new customer demands or changes in government regulations. As the economy improves, acquisition and retention of mission-critical skills become a problem. These and other human capital management dynamics demand that we apply analytics to reconfigure our labor scenario and predict our next best move. If we wait to see what the competition is doing, we lose competitive advantage and market share. Our motto is:

Manage tomorrow today.

ANALYTIC VALUE CHAIN

Economic and financial values are the rewards gained from a series of linked activities. In practice, the activities are like alternating current. They flow back and forth between strategic plans and operational executions. The elements are seen in Exhibit 1.2. Strategic chain management starts with top executives building their strategic business plan by asking this basic question: How do we make money? The answer is generically applicable to all profit-making enterprises, yet unique in practice to each company. For not-for-profits, the question is: How do we service our constituents? Companies that are successful over time prosper by assessing the market before investing resources. That includes customers, competitors, technology, governmental policies, the economy and labor market, and other macro forces that collectively reveal problems as well as opportunities.

Management also looks inward at the enterprise's capabilities. These include the enterprise's vision, leadership, brand, culture, financial strength, and employee capabilities. From this dual assessment, plans are made to produce, sell, and service the company's offerings. This scenario leads to presumed and/or tested customer responses. The next step down the chain is operations, where line managers plan,

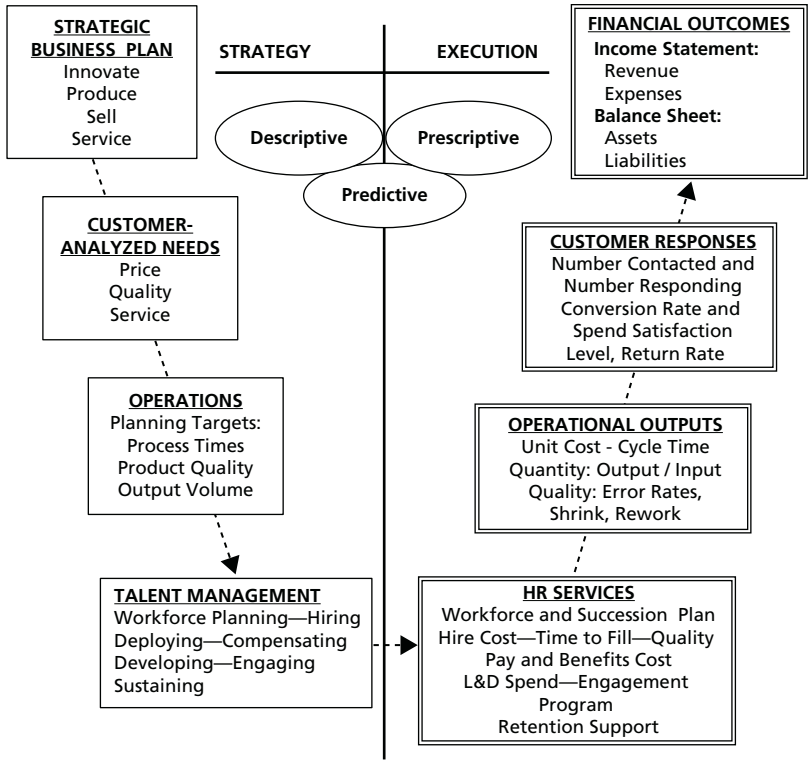

Exhibit 1.2 How Your Company Makes Money © J. Fitz-enz, 2012

design, and manage production systems that presumably will serve and support those customer responses. Operations, in turn, are dependent on human talent.

Now the value chain transforms from the planning side to the execution side. The plan is useless without people capable of executing it. This is what is normally referred to as leverage. At this base point, human capital analytics is applied to uncover the most effective way to manage the workforce to optimize performance and retain talent. The HR function is responsible to play a supporting role with operating managers in hiring, deploying, paying, developing, engaging, and sustaining a strong workforce. HR designs the people systems to facilitate operations. The workforce is the active ingredient driving operations, turning out products that will excite customers, who in

turn will increase spending with the company and ultimately generate economic and financial values.

An enterprise suboptimizes itself if management jumps into the chain at midpoints without due consideration of the preceding natural connections. Often the connections are ignored by investors, who acquire a company with the primary objective of quickly turning it around and selling it at a nice profit. This has become such a common practice that we have coined a word for it: flipping. While flippers often achieve their short-term financial goal, they also leave a vulnerable company whose inherent problems have not been fully solved. The initial financial performance is sometimes not sustainable because there is an immature, incomplete strategy, management team, or operating system left in place. Simply selling assets and laying off employees usually does not solve underlying weaknesses. The investors might have applied analytics to a small number of quick fix issues and stopped there. As a result, the obvious blemishes are treated, but the central flaws remain hidden. This is analogous to giving athletes painkillers to get them back in the game while ignoring their wrenched knee, cracked ribs, or signs of concussion. The team might win the immediate game, but lose the players needed to sustain a winning streak.

Fundamentally, analytics is a management tool that can be used to identify opportunities, solve current problems, and predict future returns on investments. Like any instrument, it can be used incorrectly, but that does not mean it is a bad tool. In a recent conversation with the chief HR officer of a Fortune 100 company, he kept avoiding how analytics could be used to improve a performance management system by recounting errors of the past. If someone doesn't want to solve a problem, no tool can be held responsible. As we have so often observed in talking to managers who really didn't want to change something, the problem is not the process or tool. It is the person behind it. As Pogo Possum said, "We have met the enemy, and he is us."[1]

ANALYTIC MODEL

There is a structure to analytics that is more than simply running a statistical analysis. That would be akin to starting your car and driving off without a travel plan in mind. The chances of arriving at your

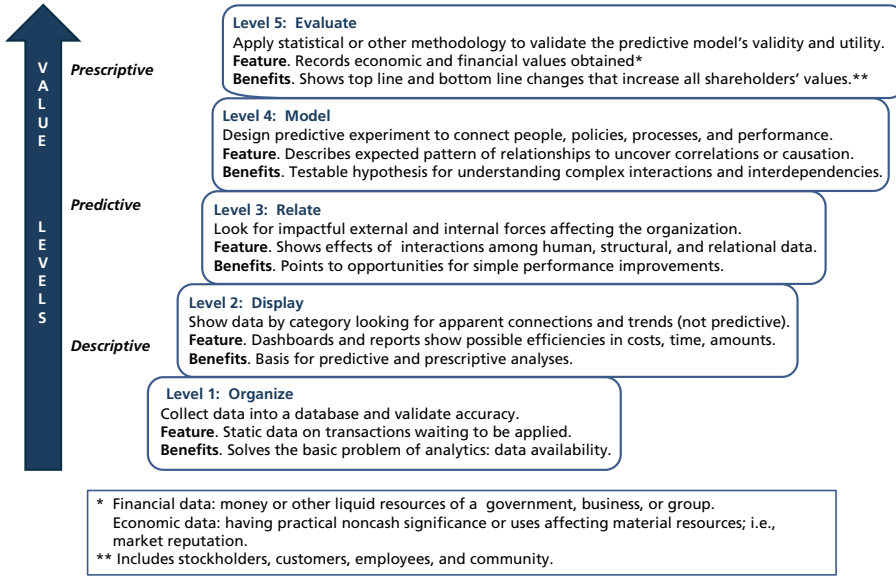

Exhibit 1.3 Data Analysis Levels © J. Fitz-enz, 2012

preferred destination would be slim. The first step in analyzing any problem is to ask questions. This was mentioned in Exhibit 1.2. Now we are about to dig deeper as we turn the corner in Exhibit 1.3 and consider a specific analytic opportunity. It is important to ask questions that proceed logically from your current state to your preferred destination—namely identifying the true problem and uncovering the essential conditions surrounding and driving it. Good questioning clears the field, so to speak. It rejects beliefs stemming from obsolete experiences, irrelevancies, and biases. On the positive side, it gradually brings a group together around what is essential and structures a clear goal for the project. Sometimes the solution develops from the questions, and there is no need to go through a statistical exercise.

We like to refer to Socrates' debate with Thrasymachus, described in Plato's *Republic*, as an example of enlightened questioning. They start discussing the nature of justice and who is to define it. Thrasymachus forcefully states that justice is nothing more than whatever is advantageous to the stronger, and it is the powerful that define it.[2] Rather than confront him, Socrates proceeds with a line of logical, relevant questions. As Thrasymachus answers one after another, he comes to Socrates' view that justice is defined by the rulers who, rather than being self-centered, have the best interests of their subjects in mind. I have seen this questioning technique work when unimportant issues are pushed aside and, for the first time, the group clearly understands the problem or opportunity and comes to a reasonable solution.

Organizing

The second part of analytics, the one most often thought about, is predictive modeling using statistical procedures. This routine is laid out in a five-step process shown in Exhibit 1.3. The steps start with collecting and organizing human capital data, which is often a major problem. Most corporate databases were designed principally for accounting. Later, applications were developed for research and development, production, and sales/marketing/advertising functions. The HR department worked principally with employee records in the beginning. The first HR information systems hit the market around 1970. In time, applicant tracking systems and compensation and benefits programs

came along, and eventually training and development applications, but seldom were these isolated programs connected. Most of the packages were record keepers only that counted volume and costs. Almost none had any predictive capabilities. That is why today it is so expensive and time consuming to install a new program.

As a case in point, we talked with a Fortune 20 client who is struggling with a project designed to provide actionable management data. The problem is the database was never designed for analytics. The company has spent almost two years trying to work with a product of the major vendor that supposedly can provide such data. Now the company is at a point where it needs to go back to internal clients and renegotiate a limited Version 1.0 product.

Displaying

After collecting basic data, many companies have developed dashboards that format data for various internal customers. The dashboards are capable of reporting degrees of performance that are color coded red, yellow, and green. This is an extension of descriptive data. It shows the current state and trends up to this point. Like accounting, it is the basis for reporting the past. It does not speak to the future except through vague, unsubstantiated inferences. The trends are not extendable because underlying conditions and future assumptions are not included. The primary value of dashboards is that perceptive and creative users can see possibilities for attempting hoped for improvements.

Relating

At the relating level, the focus turns outward from the data that has been tracked to its relationship to other data or phenomena. The most common practice today is to benchmark your data to that of other companies. The caution with benchmarking is to be certain that the companies to which you compare yourself are truly similar to you. This is not easy unless you are in direct contact with them and can compare item definitions. The old chicken-and-egg question is appropriate here. If one company is showing superior results in employee development, are the results due to quality hires, commitment to

development, or extraordinary financial investment? The only way to answer that is by speaking directly to the benchmarked firm. Survey data that compares outcomes across many companies can be meaningless and often can lead to false assumptions.

Another factor in data analysis is the recognition that there are three forms of capital within an organization: human, structural, and relational. Human capital is obviously the employees. Structural capital includes the things owned, such as facilities, equipment, software programs, patents, and copyrights. Relational capital is the personal connections between people within the company and between company personnel and external entities. Those can be local community leaders or governmental personnel. Samples of these are shown in Exhibit 1.4. In practice, a change in one of the capital asset categories often affects something in the other categories. It is these connections that make questioning at the macro and micro levels so important.

Modeling

At this point you are clearly moving from the descriptive to the predictive level. The descriptive-level data has revealed what has happened to this point. But since we need to manage for tomorrow, now we have to build a model of what we want to change. Let's say that there is an agreement that you need to develop, and you need to do it as quickly as possible. You may have invested in a formal leadership assessment program by engaging one of the several assessment vendors. This gives you a clear idea of the current capabilities of your potential leaders. Now the question becomes: Potential to lead what? You don't want to make the mistake of many firms that do not study what the future market will demand. Peter Drucker put it succinctly when we heard him ask, "Leadership for what purpose?" This is the beginning of building a leadership model for the future. It is an example of the confluence of human, structural, and relational capital. Once you have defined a possible leadership model, you are ready to test it through analytics. Your initial questions from Exhibit 1.2 should have helped you define the model for tomorrow's leadership.

DRIVERS	ORGANIZATIONAL CAPITAL RESPONSES		
EXTERNAL FORCES	**HUMAN** ⟷	**STRUCTURAL** ⟷	**RELATIONAL**
Slow Economy	Reduce workforce	Sell off real estate	Retain customers
Tech Labor Shortage	New skills needed	Shift management style	Find new applicant sources
Technology Advances	Increase training	Invest in new equipment	Rebuild vendor relations
Customer Complaints	Focus on service	Remodel stores	Improve retention
New Competitor Products	Inform employees	Accelerate R&D	Increase speed to market
Government Acts	New benefits regulations	Go green	Lobby legislature
INTERNAL FACTORS			
New Company Vision	Explain to employees	New signage/log	Advertise
Leadership Gap	Accelerate development	Larger span of control	Conduct assessments
Culture	Begin transformation	Redesign work spaces	Promote service culture
Brand	Define for employees	Improve service	New supplier relations
Finances	Wage freeze	Control costs	Reduce travel

Exhibit 1.4 Capital Interactions

Evaluating

Prediction gave you your desired model or outcome for the future. Now what is the best way to attain it? You need a prescription. Predictive and prescriptive analytics interact just as a doctor's diagnosis and prescription. The doctor tells you that if you take this medicine or follow a certain regimen, you will be cured. That is her prediction. When you read the prescription, it tells you what is necessary to validate the prediction. You see what the medicine is and under what conditions you should apply it. In business, the model you developed will probably connect people, policies, products, and processes to achieve some improvement in performance. The model predicted certain patterns or relationships that interact to obtain the desired outcome. When you complete the experiment, you can monitor or measure the amount or degree of change attained. In addition, the model gives you a new routine that should sustain or continue to improve outcomes. Chapter 5 shows several analytic procedures that you can apply and evaluate.

TYPICAL APPLICATION

One of the most common uses of analytics is the study of turnover or attrition. The reason is that analytically, it is an easy application, and most of the information needed is already in the HR database. The employee records contain raw data on date of hire, performance reviews, any status changes (e.g., promotions, salary increases, or various jobs held), and date of departure. There is a rich research database on turnover that yields theories on reasons for staying and leaving. However, as yet, very few attempts have been made to connect turnover or retention changes with business outcomes.

The usual way to start an analysis is by looking for patterns within job groups. You may be interested in a technical or professional group, people with long tenure, or even operators if the market is tight for jobs such as assemblers, warehouse pickers, or truck drivers. Data is sorted by any of the following:

- Reason
- Tenure

- Position
- Supervisor

An example of turnover linked to performance and applicant source is shown in Chapter 3.

Leigh Branham has made a career out of retention research. He has uncovered 67 reasons why employees disengage, as he calls it.[3] Some reasons cannot be prevented due to personal decisions, such as going back to school or the family moving. Yet from the total list, Branham classifies 57 as preventable reasons. Within that group, he states that employees begin to disengage when one of four fundamental human needs are not being met. These are needs for trust, hope, sense of worth, or feeling competent. Branham continued his analysis until he uncovered seven reasons that were identifiable and separable from one another. These are shown in Exhibit 1.5.

You might launch your analysis by selecting a job group or groups and looking at the reasons employees claimed to have left, assuming you had a valid exit interview process. Then you could apply statistical analysis to uncover combinations of reason and tenure or reason and position. Let's assume your analysis revealed a connection between tenure and position. You might find, as we have, that in some cases, a manager can stay too long in one job. This can correlate with high employee disengagement or other operating problems, such as reduction of quality, productivity, or service within the unit. You can begin to realize that there are many possible links across an organization for any phenomenon, whether it is attrition, performance, sales revenue, customer retention, or even market share. Organizations are highly complex. The only way to begin to truly know what is happening (descriptive analytics), why it is happening and where it is likely to lead (predictive analytics), and what to do about it (prescriptive analytics) is to use objective analysis in lieu of biased, out-of-date speculation.

TRAINING VALUE MEASUREMENT MODEL

The goal of analytics is to reveal how talent changes affect business results. Training is ahead in this quest, since increasingly its return on

1. Job and workplace was not what was expected
2. Mismatch between job and person
3. Too little coaching or feedback
4. Too few growth and advancement opportunities
5. Not feeling valued or recognized
6. Stress from overwork and work/life balance
7. Loss of trust and confidence in senior leaders

Exhibit 1.5 Preventable Reasons Why Employees Disengage

investment has been demonstrated. By logical extension, it is assumed that skill-based training yields measureable results. Yet, in practice, this is not always the case. Training outcomes are a function of the material, the trainer, and the student's perception of the value of the experience.

Exhibit 1.6 is an example from research conducted by Nick Bontis. Applying statistical analysis, he was able to show that trainees' perception of the applicability of the material to their job was the strongest influence on the applied value of the experience. You can see this by following the model from worthwhile investment (as judged by the trainee) to individual learning to perceived future job impact.

INSIDE THE DATA

We want to close this introductory chapter with two fundamental points about data: the need for standard definitions and the importance of intangibles.

Standards

In Chapter 5 we deal in depth with data standards, but let us set the stage here. Accounting has developed standard definitions for financial data out of necessity. It would not be possible to prepare and report internal or external financial changes without standard definitions. The

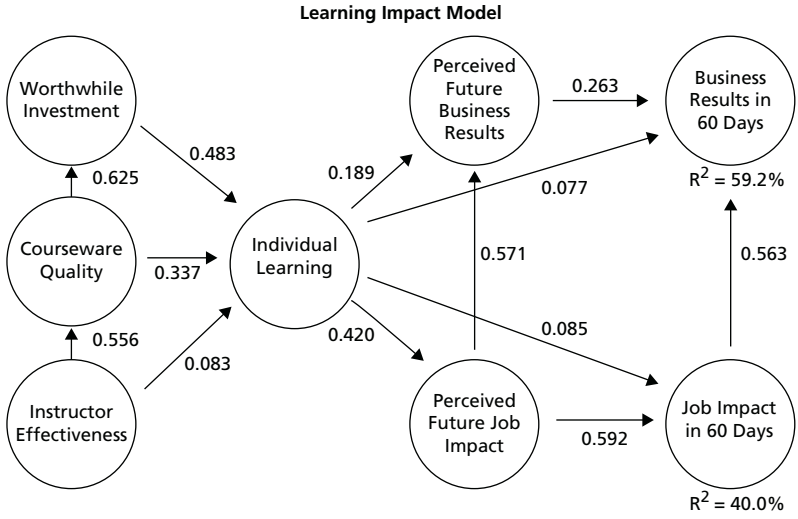

Exhibit 1.6 Finding Training Value *Source:* Dr. Nick Bontis, Institute for Intellectual Capital Research, nick@bontis.com, www.NickBontis.com. Used with permission.

Financial Accounting Standards Board (FASB) has been recognized by everyone in the business world for decades. Then, with the rise of globalization, the International Accounting Standards Committee (IASC) and FASB worked together to establish International Financial Reporting Standards (IFRS). There is only one market now, and it is the world. The goal is that eventually all nations will use a single accounting and reporting system. This will greatly improve international accounting and investor confidence.

HR has not had a standard set of definitions, even though from 1985 through 2000, the Saratoga Institute published annual data on over 50 metrics for about 500 companies. In 2011, KnowledgeAdvisors launched a project to generate standards that eventually led to the establishment of the Center for Talent Reporting (CTR; www.centerfortalentreporting.org). As of this date, no professional association, such as the Society for Human Resources Management, has officially endorsed these standards. That notwithstanding, the formulas from CTR are rapidly becoming the de facto standard.

Intangibles

As industry in America has shifted from manufacturing toward services, intangible metrics have come to the fore. At this point in time, intangible data outweighs tangible data on corporate balance sheets by a 5-to-1 ratio. Baruch Lev provided a definition of intangibles in his 2001 book of that title:[4]

> An intangible asset is a claim to future benefits that does not have a physical or financial (a stock or a bond) embodiment.

When we met with Lev in his office at New York University, he acknowledged that terms such as intellectual capital and knowledge assets are increasingly found in management publications. Typical examples of intangibles around HR and human capital publications are:

- Leadership
- Readiness
- Engagement
- Culture
- Commitment
- Loyalty
- Employer brand

Since the mid-1980s, the HR function has reported costs of services such as hiring and training. Also, it has reported the number of people hired and trained, salary action and record-keeping volume, budget expenditures, and other internal processes. What it needs to do more is focus on the intangibles. Top management cannot make business decisions based on HR process volumes except to cut staff when business slows. The number hired, paid, or trained is a record of *expenditures*, not value added. Changes in leadership capability, critical position readiness, engagement, and culture are valuable leading indicators. When reporting volumes or changes in direction of turnover, engagement scores, or readiness levels, the important point is not the number but the *predictability* of those phenomena. When we explore analytic methods in Chapter 6, you will see how this can be accomplished.

NOTES

1. Walt Kelly, *We Have Met the Enemy and He is Us* (New York: Simon and Schuster, 1972).
2. Leigh Branham, *The 7 Hidden Reasons Employees Leave* (New York: AMACOM, 2012, p. 5).
3. Ibid.
4. Baruch Lev, *Intangibles* (Washington, DC: Brookings Institution Press, 2001, p. 5).

CHAPTER 2

Getting Started

Unless the distant goals of meaning, greatness and destiny are addressed we cannot make an intelligent decision about what to do tomorrow morning—much less set strategy for a company.

—Peter Koestenbaum

The foundation of every company is composed of three fundamental elements: (1) vision, (2) brand, and (3) culture (VBC). Without clarity and consensus on VBC, there is no basis on which to make strategic plans or decisions, much less apply analytics. If you don't know your company's VBC, the obvious analytic question is: *Analyze for what purpose*?

Peter Koestenbaum, philosopher, educator, and executive coach, went further in talking about the essentials of an organization. VBC are operational examples of Koestenbaum's distant goals. Some companies simply go from problem to problem without being clear about their vision, brand, or culture. Those firms gain minimal market share and suffer from mediocre earnings. They are what Tom Peters once called "the living dead."[1] In time they will be bought or driven out.

If you are thinking of analyzing and improving any human capital issue, you would be well served to have clarity on your company's VBC. If you cannot readily see the impact of VBC on a company, consider the example of four well-known retailers and how they are different: Neiman Marcus, Macy's, Walmart and Costco.

GO-TO-MARKET MODELS

If you study the market position of these four retailers along five basic strategies, you can see the differences. Consider how they go to market in terms of prices, quality, service, operations, and innovation. This becomes abundantly clear when you do a competitive analysis, as displayed in Exhibit 2.1. Look at the three levels under each of those variables.

Wouldn't you agree that Neiman Marcus positions itself at the top level across the five variables? You might also agree that Macy's takes the second level. Walmart and Costco are primarily along the bottom level with some minor exceptions. Those differentiating positions did not just appear by themselves. They are being driven by their respective VBCs.

The VBCs set the strategy for the market positions, which then require certain required leadership traits and skills. Clearly, leading in a company like Neiman Marcus is different from leading at Walmart. The end goal is the same: to improve operations and customer service. But in order to be successful, the type of leadership must reflect the type of customers and the type of employees attracted to different retailers. This is an important point for people who are developing leadership systems. Buying off-the-shelf packages and installing them without regard to the VBCs and go-to-market strategies is frankly a waste of time and money.

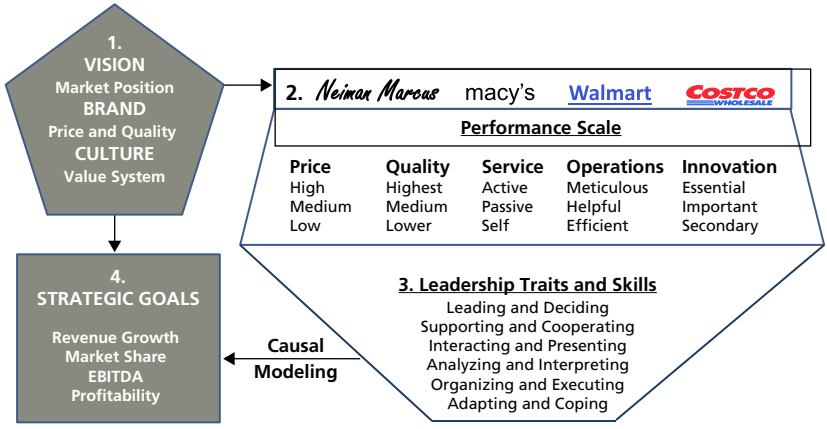

Exhibit 2.1 Go-to-Market Models

Analytics comes into play when you attempt to link your leadership model to the organization's strategic goals. Exhibit 2.1 implies that leadership traits and skills are derived from the go-to-market model of the company. Causal modeling connects the appropriate leadership skills with the goals around issues such as revenue, market share, profitability, and earnings before interest, taxes, depreciation, and amortization. It will show you how different traits and skills need to be developed and supported given the specific and unique financial goals of the company.

ASSESSMENT

Organizations often engage assessment vendors to identify the desired leadership factors. This is where some assessors stop. They show you the problem but do not offer specific solutions.

That is only the lesser half of the problem. More important, the company has to develop the desired leadership factors through various methods. Exhibit 2.2 is an example of how various developmental methods could be applied to a given set of leadership skill needs.

DEVELOPMENTAL EXPERIENCES

In your development tool kit, you have a number of methods for helping people learn and grow. Developmental tools are the resources you apply to the individual skill and knowledge gaps that assessments have exposed. On the left side of Exhibit 2.2 are various developmental

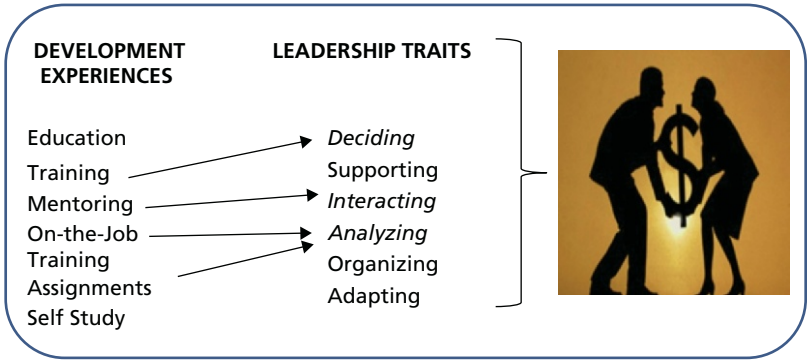

Exhibit 2.2 Leadership Development

experiences. To the right you see the assessment scores. Italics signify skill deficiencies. The arrows depict the application of various experiences to assessment results.

For example, if there are deficiencies around decision making, you might give those people a model to study or a course to attend. Interaction deficiencies might be dealt with through mentoring. Analysis and creativity could be improved through some focused on-the-job training and through special assignments. The point is to match your development resources with the assessed deficiencies. One-type-fits-all leadership models are a terrible misuse of time and resources.

Current research is showing that quite often development blankets are thrown over everyone, regardless of their various levels of need. Conversely, analytic work, such as the Nick Bontis model in Chapter 1, has shown that the strongest correlate of effective training is the recipients' feeling of their need to know. Absent that, the training investment is almost totally wasted, as is the productivity lost when people leave their jobs to attend the class.

FINANCIAL CONNECTIONS

Exhibit 2.3 is a human capital income statement (HCI$) developed by Jeff Higgins at Human Capital Management Institute. This is a sample of the broad monetizing of leadership. The Talent Management Impact side connects with the financial metrics on the Workforce Productivity Impact side. The HCI$ is receiving significant support from the financial community through publications and presentations by *CFO* magazine. We've highlighted just one section that shows relationships between leadership and revenue, profits, human capital productivity, and total cost of workforce (TCOW). This system will show how your leadership programs are positively affecting business outcomes.

The typical client's initial reaction to the HCI$ is: "We could never collect that data." The second is: "We wouldn't know what to do with it if we had it." It reminds us of the story of an elderly lady who went to a doctor to cure her backache. After a thorough examination, he

Workforce Productivity Impact

Revenue	Prior Year	Current Year
Net Operating Revenue (Current Annual)	$1,400,000,000	$1,540,000,000
Total Headcount (FTE)	15,000	16,400
Revenue per FTE	$93,333	$93,902
Costs		
Total Expenses	$1,170,000,000	$1,285,000,000
Total Operating Expense	$725,000,000	$795,000,000
Total Cost of Workforce (TCOW)	$779,950,000	$861,000,000
TCOW Percent of Revenue	55.7%	55.9%
TCOW Percent of Expenses	66.7%	67.0%
TCOW Percent of Operating Expenses	107.6%	108.3%
Profit		
EBITDA	$310,000,000	$340,000,000
Net Operating Profit	$143,750,000	$159,375,000
Profit per FTE	$9,583	$9,718
Productivity and ROI of Human Capital		
Total Market Capitalization[1]	$2,156,250,000	$2,390,625,000
Average Market Capitalization Value per FTE	$143,750	$145,770
Human Capital ROI Ratio	1.29	1.30
Return on Human Capital Investment	18.4%	18.5%
Lagging Workforce Productivity Impact	**$4,219,281**	**$8,169,200**
Projected (Mkt) Workforce Productivity Value	**$30,350,719**	**$33,125,000**
TOTAL WORKFORCE PRODUCTIVITY IMPACT:	**$34,570,000**	**$41,294,200**

Total Cost of Workforce

Compensation and Benefits Costs	Prior Year	Current Year
- Total Workforce Salary Cost	$530,000,000	$587,000,000
- Total Bonus and Incentives Cost	$65,000,000	$68,000,000
- Total Benefits Cost	$120,000,000	$135,000,000
- Total Contingent Workforce Cost	$13,000,000	$14,000,000
- Total Other Compensation	$3,000,000	$3,000,000
Total Workforce Compensation and Benefits Cost:	**$731,000,000**	**$807,000,000**
HR Costs		
- Total Training & Development Cost	$27,800,000	$31,250,000
- Total Recruiting and Onboarding Cost	$8,000,000	$9,000,000
- Total Employee Relations and Risk Mitigation Cost	$5,000,000	$5,100,000
- Total HR Transaction & Administration Cost	$7,150,000	$7,650,000
- Total Management Cost*	$2,000,000	$2,100,000
- Total Benefits Program Cost*	$2,000,000	$2,200,000
- Total Payroll Cost*	$1,500,000	$1,600,000
- Total Internal Mobility Cost*	$650,000	$700,000
- Total Other HR Cost*	$1,000,000	$1,050,000
Total HR Expenses:	**$47,950,000**	**$53,000,000**

Talent Management Impact

Recruiting and Hiring	Prior Year	Current Year
Quality of Hire Index (Adjustment Factor)	*68%*	*70%*
Change in Average Days to Start[2]	–5	–5
Total Open Positions (Critical Revenue Producing)	200	250
Total Internal Hires	500	675
Average Lost Revenue or Production per Day per Position	–$1,000	–$1,200
Average Internal vs. External Cost per Hire Differential	$2,500	$4,500
Change in Open Position Lost Revenue & Production	$1,000,000	$1,500,000
Internal vs. External Cost per Hire Differential	$1,250,000	$3,037,500
Total Recruiting and Hiring Impact:	**$2,295,000**	**$4,660,721**
Mobility		
Career Path Ratio	*0.35*	*0.36*
Internal vs. External Hire Compensation Differential	$1,000	$1,000
Internal vs. External Hire Compensation Cost Impact:	$500,000	$675,000
Total Mobility Impact:	**$510,000**	**$665,182**
Leadership and Management		
Talent Management Index	*55%*	*63%*
Managerial Bench Strength	*53%*	*54%*
Total Management Headcount	1,250	1,300
Management Span of Control	12.0	12.6
Span of Control Cost Impact:	$3,000,000	$10,066,665
Total Leadership and Management Impact:	**$3,244,500**	**$11,837,808**
Training		
Training Effectiveness Index	*55.0%*	*53%*
Total Employees with Training Productivity Gains	3,000	5,000
Average Training Performance Differential per Employee	$1,500	$2,000
Training Performance Differential Impact:	$4,500,000	$10,000,000
Training Impact:	**$4,950,000**	**$9,684,477**
Performance and Engagement		
Employee Engagement Index or Score	*47.0%*	*51.7%*
Employee Engagement Revenue Linkage Impact	*0.5%*	*0.5%*
High Performer Productivity Differential	10.0%	10.0%
Total End of Period High Performers	1,500	1,650
Employee Engagement Productivity Impact:	$1,500,000	$7,720,975
High Performer Productivity Impact:	$14,000,000	$15,443,249
Performance and Engagement Impact:	**$15,500,000**	**$23,164,225**
Turnover and Retention		
Total Applicable Replacement Hires	300	390
Total Terminations	700	800
Average Replacement Hire Compensation Cost Differential	–$2,000	–$7,359
Average Cost of Turnover	–$3,000	–$9,959
Compensation Cost of Replacement Hires Impact:	–$600,000	–$2,870,010
Cost of Turnover Impact:	–$2,100,000	–$7,966,990
Turnover and Retention Impact:	**–$2,700,000**	**–$10,837,000**
TOTAL TALENT MANAGEMENT IMPACT:	**$23,799,500**	**$39,175,412**

Exhibit 2.3 Human Capital Income Statement (HCI$) *Source:* Used with permission. Jeff Higgins, CEO, Human Capital Management Institute.

told her she had two herniated disks. His prescription alternative was to have surgery, to which she said emphatically, "NO." "Okay," he replied, "you can have an epidural shot." Again she said, "NO." He sat back, took a deep breath, and asked, "Well then, why are you here?" When people don't want a solution, why do they ask for one?

In the case just mentioned, someone within the group invariably challenges the first objection by pointing out that actually their human resources (HR) services already produce most of the raw data, but they simply have not organized them this way. Even if some is initially missing, you can go a long way toward monetizing development programs with this model. We handle the second concern through a couple of days of training. It is not rocket science. The base is accounting logic. This leading-edge model just requires a commitment to monetize the human capital side. If you do a very good job of front-end analysis, you may be able to carry the process through to causal relationships, which is the ultimate objective.

SAMPLE CASE

We've been engaged with another major retailer that is attempting a radical transformation of its VBCs. Top management believes it is necessary in order to meet what it sees as changing customer expectations. This is a change in the fundamentals of the company. Management has decided what has to change and in what new direction it wants to take the company. This is now leading to a change process that includes a communications program for employees. This program is essential if the company wants the people to engage and become a part of the transformation rather than a hindrance. Transformations of a large company can take three years or more. Predictive analysis can greatly improve the efficiency of the change initiatives, because it identifies the most effective paths to change.

FOCUSING ON THE PURPOSE

Your organization may not be planning a system-wide transformation. Assume for the sake of example that you want to tackle that attrition issue we mentioned in Chapter 1. The question is: For what

purpose? It is obvious that reducing unwanted attrition is a good idea. But there is more to it than that. We started by using Branham's seven reasons for employee disengagement. Let's assume that we were able to answer at least some of the seven reasons:

- What is the total attrition rate?
- Which types of people are leaving?
- When in their career are they leaving?
- Why are they leaving?

Once we have the answers, what else do we need to know? Of course, we want to uncover the effects of attrition. We need to know how we can influence attrition and for what purpose? It is not just to cut the percentage loss down. In short, what is the business value of knowing? Herein lies the purpose of analytics: generating knowledge to add value. Knowing that some percentage or ratio has changed does not necessarily add value. Reducing the attrition rate by 2% or increasing the engagement score by 4% means nothing until we apply those improvements to improving operations, reducing costs, or increasing revenue.

We cannot emphasize strongly enough how important front-end questioning is. Chapter 1 made that pointedly clear, we hope. Unless you are certain about the nature of the issue you want to tackle, the odds of your contributing value are extremely low. We recommend that you spend much of your time at the beginning of any project cutting through obfuscations, bias, ignorance, recalcitrance, and all those other wonderful human traits to locate verifiable, testable connections. The payoff will be well worth your time.

Quite often important organizational issues are complicated and multifaceted. There is more going on than one can see on the surface. This is why analytics is important: It can unravel the hidden connections. People, processes, resources, customer demands, new laws and regulations, even weather and geography can be part of the cause. When problems are simple, usually they can be solved within the unit by supervisors or managers. It is only when problems have multiple causes that analytics come into the picture. Once more from the top: Spend time on questioning before you ever start firing solutions at the

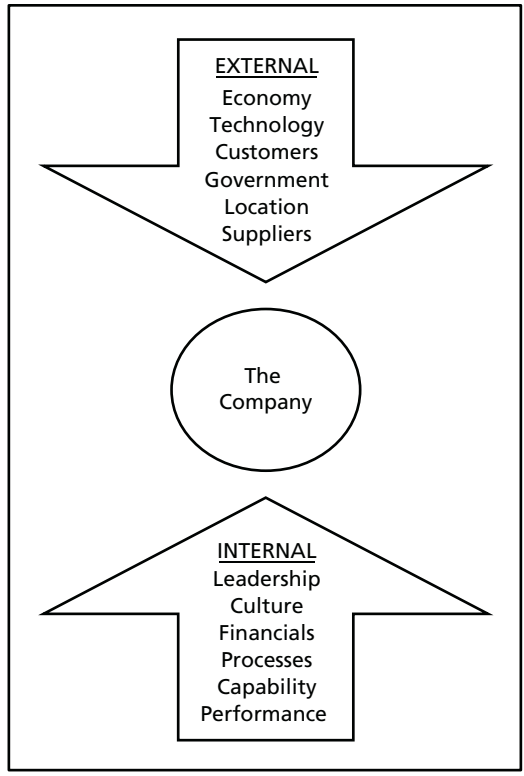

Exhibit 2.4 Force Analysis

issue. What are the principal drivers internally and externally in your company? (See Exhibit 2.4.)

PRESENT-DAY NEEDS

Where is your organization today on the analytics path? The path proceeds along several stepping-stones from simple and familiar to complex and, for most people, alien and untried. In Chapter 1 we described the process of analytics from the simple to the complex, from anecdotes to optimization, to wit:

- Anecdotal accounts and reminiscences
- Dashboards and scorecards
- Comparisons and benchmarks

- Coincidences and correlations
- Causational data
- Predictive analyses
- Optimization

Things to think about before you start are:

- Where is your organization today along this path?
- More importantly, where do you want to go?
- How fast can you afford to travel?
- Do you have the resources at hand to start or continue the trip?
- If not, what will it take to obtain them?

These may seem daunting at present, but you will have a lot of company if you start. According to an Institute for Corporate Productivity (i4cp) 2012 survey, 81% of companies queried claimed that analytics will be important activities for them within five years.[2] This book will support you along the path and provide the how-to if you are willing to attempt the trip.

HOW HUMAN CAPITAL ANALYTICS IS BEING USED

There are several uses for analytics from simple gathering of facts to effective adaptations to market changes. Davenport, Harris, and Shapiro listed six ways that human capital analytics are currently being applied.[3]

1. Selecting and monitoring key indicators of organizational health
2. Identifying which units or individuals need attention
3. Determining which actions have the greatest impact on the bottom line
4. Forecasting workforce levels
5. Learning why people choose to stay or leave the organization
6. How to adapt the workforce to changes in the business environment

The bottom line is that management needs tools and analytic skills to solve new, complex business problems more rapidly than in

the past. The intensity of competition is increasing. The need to react quickly is imperative. Human capital analytics supplies the demand for better investment decisions.

TURNING DATA INTO INFORMATION

Practitioners claim that their biggest challenge is gathering the data necessary to do analysis. Closely following that is how to turn their human capital data into practical, actionable information and eventually intelligence. The primary reason for these hurdles is that probably 75% of HR departments don't even have truly useful, basic metrics regarding their operation. Since they don't have a history of data collection, standard definitions and ongoing monitoring, it is a giant leap to analytics. However, we have a solution for that. It is called learning as you go. In Chapters 4 through 6, you will learn about metrics and statistical applications. Between here and there, we will show you how to build an infrastructure into which the numbers can be placed. So, let's start.

THREE VALUE PATHS

Analytics can be applied to any of three value objectives. They are:

1. **Solve a problem**. Pick some low-hanging fruit to improve some aspect of operations. Getting a quick hit can be useful for several reasons.
   a. You are adding some degree of value.
   b. You are building credibility.
   c. It is giving you a first step along the path to greater value, such as identifying high-performance variables that set up a training program curriculum.
2. **Form an analytics unit**. You, or top management, may decide that the organization could benefit from the intelligence that an analytics function could generate. You could research how and learn from this book what to do to organize a predictive analytics function. You can learn what skills and characteristics are useful for staffing an analytics function by talking to others who have gone before or by reading on in this tome.

3. **Develop an analytics culture**. Transforming an organization's decision-making culture is not an easy task. To be truthful, it may not be possible in your present state. You would need the full support of the C-level team members who practice analytics among themselves, as well as insist that subordinates do likewise. We suggest that, initially, you focus on the first two value paths described above rather than take on this challenge. In time, given the support required and the evidence of value added from your work, you might be able to begin a shift toward an analytics culture.

SOLVING A PROBLEM

The first and most conventional option is simply to solve a given problem. The solution is usually the result of someone in the upper echelons asking or demanding a solution to something that bothers him or her. As we mentioned, the most common topic is attrition. Workforce planning follows close behind. Recently we asked an audience how many people had applied predictive analytics to attrition problems. About 20% raised their hands. Then we asked how many had applied predictive analytics to other topics. Only a few hands went up, and most of those later stated that they were working on some aspect of planning. The reason for this concentration is that attrition and planning are much easier to attack than something as complex as the performance management system.

ESSENTIAL STEP

No matter which path you take, even the easiest, it is very important to enlist support before you start a project. There are many ways to spend your time and resources, and you don't want to waste them attempting something that will not be supported. Your direct boss may have no objection to spending resources on analytics. However, due to lack of organizational power or expertise, he or she might not be your prime advocate. You may need to find strong support from an executive outside of your organization. If questions or objections arise, you want to have a person with power on your side. Having support can be very useful when reporting later to a senior group and you run into skepticism and resistance. When an executive from within the

peer group supports you, it no longer is an HR project; instead, it is an organizational problem you plan to solve. We'll address this in more detail in Chapter 3.

PRIME QUESTION

Probably the first question you want to ask yourself or your group is: What is the most important organizational problem/opportunity that we currently are capable of attacking? Sometimes analysts go after issues that are of interest to them but find later that no one else cares. We all have favorite topics that stimulate us intellectually or vex us more than others. But it can be that in the eyes of management, those topics are not as interesting or as important as something else.

So, put yourself in the place of someone you want to impress or with whom you want to improve your relationship. What interests them and, as important, do other senior people agree with them? How do you learn the answer to those questions? People talk or write about issues that are most important to them. Who is your target person/group? What do you see or hear them discussing? Do they seem to be very concerned about costs, customers, revenue growth, market share, process efficiency, or acquiring and retaining certain types of talent? Can you find out what is driving that? Problems don't just happen. Something causes them. You need to know or to find out through analysis what the causes are. In the end, you may not have the power to solve the problem, but through analysis, you may be able to prove to them the root cause of their discomfort. Then, through prescriptive analysis, you might be able to show them the path to the solution.

CASE IN POINT

Here is an example of how to get to the root cause of an organizational problem that had to do with talent but was not an HR problem. We were called in to help a large technology organization learn why it was consistently unable to deliver major products on time and on budget. Through surveying and interviewing, it became clear that sourcing and developing program managers were at the heart of the dilemma. We hypothesized that effective program management correlated with time

to market. Although the company's records were incomplete at best, we were able to apply statistical modeling to identify three key variables that connected with project success. The data showed links among leadership, integrity, and decisiveness, and effective project management. The problem was not HR's inability to provide the needed talent. There was a historic organizational policy regarding where and how the company would source talent. Clearly, this policy was not producing the skills needed. Once management had unequivocal data at hand, it had no recourse other than to free HR to do its job properly.

Sometimes you set out to solve a problem and your analysis takes you in another direction. That is a major side benefit of analytics. It identifies hidden organizational problems that can otherwise plague an enterprise and suboptimize attempts to improve performance. It is more than aspirin that temporarily reduces the fever.

PREPARING FOR AN ANALYTICS UNIT

The formation of analytics units today is driven about 65% of the time by senior management and 35% of the time by the chief human resources officer (CHRO). The basis for this statement is simple observation. While many CHROs are jumping into this new swimming pool, in many other cases they are being pushed into it by someone at the top of the organization. It doesn't matter where the impetus comes from, but it does have an effect on the allocation of resources.

If the idea comes from within HR, the CHRO has to come up with the resources. When it comes from the top, a commitment of resources normally comes with it. Assuming that there is a budget to support the design of the unit, the build-out is rather straightforward.

Let's take the easy one first. That would be when top management decides it needs an analytic unit. In that case, you don't have to sell the concept. But you do have to deliver what management has in mind. One of the best examples of this is the case from a major financial institution wherein the C level was dissatisfied with the reports of the HR function. HR had a so-called analytics unit of about 15 people. In practice, it was more of a reactive report-generating function that scrambled to respond to line manager needs for data. In addition, HR focused on reported things such as:

- Number of employees
- Number of people hired
- Number of people trained
- Turnover rates
- Compensation and benefits costs
- HR department expenses
- HR department staff

Management's complaint was that this was not actionable data except for the consideration of possibly cutting back on the HR department's staff and budget.

The solution was to bring in a financial person from one of the divisions and give her the mandate to study important talent-based operating issues. Within a year, the unit was reduced from 15 to 10 people, and everyone was put through statistical analysis training at SAS. During that reorganization, it was recognized that some people did not have the aptitude for this new work, and they were reassigned elsewhere in the company.

The plan for the reorganization included ten steps as shown in Exhibit 2.5.

1. HR'S Vision and Goals
2. Standard Definitions
3. Reporting Design
4. Database Architecture
5. Technology Tools/Apps
6. Project Design
7. Data Collection/Organization
8. Analysis and Test
9. Report
10. Implement and Monitor

Exhibit 2.5 Analytics Unit Development

TEN STEPS FOR AN ANALYTICS UNIT

Here are ten steps taken to reorganize the analytics unit within an HR department to make its output more useful to business leaders:

1. Although management had provided a mandate, the details of organization were left up to the new director of analytics. As a former operating and financial person, she came at the job from a company rather than an HR department perspective. Reflecting on management's mandate, she formulated a vision for the new analytics unit and set some short- and long-term goals.
2. She realized that to promote clarity and consistency, the unit and the company needed to operate from a set of standard terms and metrics. It took several months internally and externally to reach a quasi-consensus on terminology.
3. The company had been using an unexamined set of regular reports for many years. The rationale for their format and content needed updating. Again, this took a good bit of negotiating. Whether formats and reporting schedules are useful or not, people become accustomed to them. In time, a testable set of reports was designed and cleared with their readers.
4. Once it became clear what data would be needed, the HR database architecture had to be established. Clearly, if operating issues were going to be addressed, the analytics unit would have to access data from finance, marketing, and other functions. Systems analysts and coders were put to work to develop a flexible, mutually beneficial architecture.
5. Future manipulation of operating and talent data depended on some new technology tools and applications. Money had to be committed to acquire the analytic tools. This was part of the operating budget that the director developed and passed by top management.
6. After this new infrastructure was put in place, the unit was able to swing into full production. Agreement was reached with the C level as to what and when the regular reports would start to emerge. Remember that quite new information was going to

appear. This demanded more than a little design work. Along with regular reports, new analytics projects were launched.

7. At this point, the unit was in nearly full operation, albeit still working out the new processes and products. Trial and error gradually settled on a new organizational format and data collection methodology.
8. The first products appeared and underwent analysis and tests, both internally and with the external users.
9. At this point, a new and unanticipated problem appeared. Line managers had been accustomed to simply putting in requests for reports and waiting for delivery. The new director wanted to change the analytics unit from a continually reporting mill to an operational intelligence resource. This took a lot of selling. A year later, some stubborn managers still were not convinced that times had changed. The analytics unit offered continuous analytics and report training to the line managers so that they could become independent. At last check, this too was still a tough sell to some stubborn users.
10. Two years after inception, the analytics unit was fully functioning and is currently providing the C level with actionable operating data. The unit is investigating the utility and efficiency of various systems, such as sourcing strategies, performance management, and leadership development. In addition, it continues to monitor ongoing reporting for improvement opportunities and the value of new report formats and data.

STRUCTURE AND TEAM BUILDING

The structure of the analytic team needs to fit with the culture and structure of your organization. It is important to position the function within the organization in a way that allows you to hire, train, grow, and retain the talent you need. There are several ways to structure and position a function. It can be centralized, decentralized, or some variation thereof that suits the vision, brand, and culture of the organization.

But before you fret about structure, you need to concentrate on the people and the activities. Without the right people, structure will

not matter. The number one issue is getting the kind of people who not only can handle statistics but also have the interest and intuitive skills to go beyond the analysis. It is very important that the task excite them. You need people who can look at data and see patterns. Not many can do that.

DEVELOPING AN ANALYTICS CULTURE

If you want a career project, developing an analytics culture undoubtedly is it. Established routines and cultural mores are embedded in concrete. I (Jac) remember a conversation in 1980 with Bob Galvin, son of the founder of Motorola and then the largest stockholder as well as current chief executive officer and chairman of the board.

Galvin was one of the finest gentlemen and best executives it was ever my privilege to know. Despite all his power and the respect he garnered from his employees, he told me that changing the culture of the company was the most difficult challenge he had ever faced. He said it had already taken him nearly six years to move the company from paternalism to participation. One must understand that within corporate cultures, there are deeply entrenched power bases, unquestioned systems and processes, taboos, and rituals often going back decades. Cultural change is a true test for transformation.

Very few organizations make decisions based on thoroughly considered objective deliberations and unbiased facts. Books have been written about corporate cultures and how rigid they usually become. If you want to tackle this challenge, call us, and we will spend a good portion of the rest of our time introducing predictive analytics into your corporate culture.

NOTES

1. Tom Peters, *Innovate or Die: The Innovation 121 A Menu of [Essential] Innovation Tactics* (Britten & Associates, LLC: 1/13/2009). www.brittenassociates.com/documents_articles/Tom%20Peters%20Innovate%20or%20Die.pdf
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CHAPTER 3

What You Will Need

Informational support is the provision of advice, guidance, suggestions, or useful information to help others solve their problems.

—V. P. Tilden

As with any significant initiative, you need support from the top of the organization to achieve success. Don't be naïve. Clearly, organizational life is a power game. Success depends not only on what you know and can do but also on your relationships with the people above and around you. From your peers and immediate supervisor to the C level, you need support to do anything beyond your assigned tasks.

Relationships are built on trust, common interests, personal compatibility, and shared goals. Why do you think executives play golf together? Those elements are different with each of your contacts. We are not suggesting that you become a sycophant. Quite the contrary. No one, other than egomaniacs, respects or wants to spend time with weak, misdirected, acquiescent individuals. The Bible may say that the meek shall inherit the earth, but in our experience, the powerful won't leave much behind to inherit. You need to have a clear image of yourself and your goals before you can build constructive relationships with anyone.

Once, we were talking to the head of human resources (HR) at a medium-size hospital in southern California. As we reviewed her department, it became clear that it was woefully understaffed. We pointed this out to her, and her reply was "I know, but we don't mind." Goodbye. Admittedly, she held a low-level, powerless position and didn't have what it took to work effectively with other managers, much less the hospital's C-level executives.

So, what does it take to convince the C level in your enterprise to invest in human capital analytics?

DEALING WITH THE C LEVEL

What is top of mind with the C level in your organization? A couple years ago, we recruited a chief executive officer (CEO) to be the keynote speaker at the Human Capital Analytics Conference I manage for the Conference Board. He started his presentation with this statement:

> "The most important issue for me is revenue growth."

He went on to say that, of course, he needed to pay attention to profitability, market share, and other financial indicators, but revenue growth was his target. It is possible, even probable, that in time, his most important issue will change. But the point is this: Revenue growth was top of mind with him at that point. It turned out that two years later, he had grown revenue at a rate and to a point that another group paid a premium to acquire his firm.

It is common sense to realize that if you want to capture someone's attention, let alone their support, you need to know what matters most to them. Analytics is not another HR program. It is a tool used to uncover opportunities to improve the operations and finances of your company or not-for-profit organization. In the intense global market of the twenty-first century, executives are besieged by a multitude of problems and opportunities. These are constantly emerging and receding as conditions change. Competition, customers, technology, regulations, and a host of other variables compete for the attention of the C level. If you want to get into the executive's line of sight

to gain attention and support, you have to find a path through that constantly shifting labyrinth.

BREAKING THROUGH

The axiom that anything worth doing is worth doing well fits here. Not only is the path to C-level attention crowded and constantly moving, by its very nature, it is not easy to find. Barring exceptions, C-level people don't always publish what is most important to them. For many reasons they talk about many issues, but within that maze their major concern is frequently hidden. Some executives believe they cannot share their real worries or trepidations for fear of showing weakness. Sometimes they don't know what the essential issue is at that moment. Leaders are human. They are in a learning and adjusting mode most of their careers. The board of directors and the financial analysts might be pulling them in opposite directions, and they are struggling to respond to both. A good board is focused on the fundamentals for the long term. Market analysts are more interested in the short-term stock movement. We could go on and on with examples, but eventually it will come down to this: Everything considered, you need to heighten your perceptive senses to ferret out the top-of-mind issue(s) before you make an attempt to gain support. Focusing on top-of-mind issues applies also to any connection you wish to make with another person.

RESEARCH

No matter how obvious the C-level top of mind might be, it is useful to do a bit of digging before you present your support request. Look at what is being published by the C level in the way of information, advice, directions, demands, or requests. Where do you see the Cs focusing their time and energy? When the 2008 liquidity crisis hit and the federal government dove into the mess to try to solve it, clearly everyone at the top was looking toward Washington, D.C. In time, as the bailout was settled, attention shifted to matters of expense control, layoffs, and customer retention. As we are writing this, management is moving back toward growth. Within that continuum, your company

can be anywhere. That is the point. What is truly at top of mind? If we asked you directly, what would you say?

RECRUITING A SPONSOR OR CHAMPION

In Chapter 2, we mentioned the value of having someone on your side planning and guiding you as you prepare your proposal. Quite often, your support campaign can have two phases: find a mentor and enlist a sponsor. First, you might need someone to provide some guidance before you even try to recruit a sponsor or champion. Along this line, one of the most valuable assets you can have is a mentor or coach who can give sage advice. New ideas such as analytics can benefit from the advice of a person who knows what is really at top of mind as well as how things work in your organization.

Just yesterday we were talking with a man who is trying to upsell analytics in his company. He is two levels down from the CEO, whom he happens to know well and with whom he has good rapport. In discussing his strategy with us, he noted wisely that he can't just go directly to the CEO because analytics is not supported by some others in the C group. He believes the CEO would back a new analytics program, but unless he works through the intermediate level, someone is certain to sabotage his later effort.

As a result of his knowledge of the intermediate C-group personalities, he will have to spend some time strategizing with a mentor. Fortunately, he is friends with a woman who is well versed in statistical validation techniques and has a keen sense of the C-level culture. She will be a good coach but not initially a good sponsor, because she does not have sufficient position power. Later, during the final decision process, she might be called on for an opinion. In the meantime, the two will work out a plan for recruiting a champion from within the group who has the necessary power. The mentor can help select the sponsor as well.

The second phase is to enlist the sponsor, someone who has power within the C-level peer group. It is also someone who will guide you in preparing your pitch, who will provide intelligence on how key people might respond, and who probably will be present when you make your presentation. If not present at the time of the

pitch, the sponsor will at least offer supporting data to the decision maker later. The sponsor or champion can be extremely valuable if there is resistance to your proposal from within the peer group. As a peer, he or she can speak at the same level and exercise similar power in a reinforcing counterargument. The decision maker welcomes a champion, because he or she does not have to overcome the resistance without an ally.

Why does someone take on the role of sponsor? There are several reasons for supporting your idea. The simplest is that the person likes you and generally respects your work. Another is that he or she agrees with your premise regarding why you want to launch your project. Third, the person sees your idea as a vehicle for shaking up a C group that might have become out of touch with some aspect of the business or the market. The sponsor may recognize that your project will forward his or her agenda. In that case, your idea is simply a tool to a different goal. There may be other reasons in the potential sponsor's mind. It is good to know why a person is interested in sponsoring so that you work together rather than at cross purposes. We worked with a chief operating officer once who was famous within the company for picking up ideas that couldn't get support and rewriting them in such a way that eventually they were adopted. Then he took the credit. So, beware of welcoming arms. Know your sponsor before you commit your idea to him or her.

MAKING THE SALE

Because I (Jac) started my career in sales and marketing, I tend to look at most situations as a sales opportunity. That puts me on a track that usually helps me convince someone to think my way and, if I am lucky, do what I want them to do. Usually we don't need to sell a mentor or maybe even a sponsor as much as the final decision maker. Although a mentor, coach, or sponsor is normally a person who thinks you are worth their time to listen to, discuss, and argue with and guide toward a useful goal, when it comes to crunch time, the responsibility falls back on you to make the sale.

Selling or influencing or persuading has two aspects: internal and external. Internal is what you know. External is your ability to express

yourself, to communicate effectively with others. The process starts with the internal aspect, which includes:

- Clear and complete knowledge of your product (concept)
- Awareness of competing factors in the marketplace
- Knowledge of the interests and values of the persons to whom you are selling
- Ability to show the value of your product over the competitors or even over the absence of a competing product

Before you can describe, much less sell, your idea, you have to live it. For example, you might be able to describe a bicycle, but until you have ridden one, it will be nearly impossible to answer all the prospective buyer's questions about bicycles. You certainly can't speak knowledgeably about riding on different surfaces under varying conditions until you have personally experienced it.

Assuming you have the appropriate internal traits, the next requirement is to be a good communicator. Effective sales communications consists of a number of essential abilities, including the ability to:

- Attract attention
- Generate interest
- Create a need
- Close the sale

SELLING EXAMPLE

Assume you are sitting at the C-level table, about to make a proposal to the C group for funding of a predictive analytics project aimed at uncovering the quickest, most cost-effective way to accelerate leadership development in your company. It is an expensive venture. You have to make a compelling argument because this will be your only opportunity to make the sale. You need an attention getter. Think carefully. How are you going to start? What attention-getting statement can you make?

We recommend you open with a sentence like this: *"Effective leadership drives productivity, operating revenue, cost management, and*

profitability." No one will disagree with that. You've landed the first punch.

The second sentence goes something like this*: "It is imperative that a leadership development program's outputs make a connection with those financial outcomes."* Everyone at the table will love to hear you say that. Now you have their attention. They are waiting to hear what you have in mind to connect leadership to making money. This is the moment of truth. They want to learn how you are going to make that happen.

This is the generating interest step. There will be skeptics who agree with your premise but can't see how you are going to turn it into reality. You are not the first person who has asked for money for a development program. Your answer is that you have conducted a pilot project in one area that tested a leadership model. Obviously, it achieved the results you are promising. You can quote Peter Drucker, who posed the most basic question about leadership. He asked, "Leadership for what purpose?" You continue by describing how you will monetize leadership in their enterprise. Your model that has already proven positive results looks like this:

$$L = M + O + I$$

Where
L = leadership
M = market
O = organization
I = individual

(Also see Exhibit 2.1 in Chapter 2.)

By now you have at least a modicum of interest. You explain that revenue-generating leadership is a function of analyzing **m**arket forces, plus your **o**rganization's culture and your desired **i**ndividual (leader) behaviors. Then statistics will connect the desired behaviors with heightened performance, leading to improved financials. In the pilot project last year, you proved that through predictive modeling, you connected the human and the financial sides of your business. Now you bring on the graphic statistical evidence.

The penultimate step is to create a need. You do this by citing some deficiency within the company that led you to take up the pilot

project. It could be about turnover, productivity loss, lack of innovation or poor customer support. Your graphic data clearly shows the financial value gained.

Now close the deal by telling what it will cost and how long it will take before they see results.

You can see that selling is neither a mystery nor an inborn gift of gab. It is a clear, direct, disarmingly simple process. The essential step is preparation.

WORKING WITH CONSULTANTS AND COACHES

Consultants as coaches can be very helpful, provided you two can work effectively together. People with opposing values and viewpoints can partner if they are open-minded and positive. Differing views help to test each other. You don't want a yes person or a smooth talker who will let you go down a slippery slope alone.

When picking a consultant or coach, you have to respect the person enough to be able to argue constructively with him or her. It helps a great deal if the person has relevant content knowledge. Here is where the four levels of competence come in. Think about how these apply to selecting a consultant to help you with your predictive analytics project.

The four levels of competence are:

1. **Unconscious incompetent**. Many people are unaware of how little they know about a given topic, such as analytics. The state of the art of analytics is such today that even among so-called consultants (often a consultant is someone who is just out of a job), the knowledge level is quite low. Typically such individuals are storytellers. These people regale you with jokes, take you to lunch, and assure you that their organization can support your project, even though they don't understand the issue. The unconscious incompetent might be able to drive a car in Florida. Then one December day, he flies into Cleveland, rents a car, and skids it into the first snowbank outside the airport.
2. **Conscious incompetent**. Here consultants recognize their level of incompetence and try to ignore it. These are the salespeople

who keep the conversation within their limited range of knowledge. Their gift of gab carries them through the incompetent region by directing you repeatedly back to what they do know. Politicians survive through this skill. For your needs, you have to be very pointed with your questions, insisting on direct answers and evidence of knowledge and performance.

3. **Conscious competent**. At last you are nearing your goal of finding competent guidance. Conscious competents have basic knowledge of your topic. Through experience or observation, they grasp the fundamentals. Basically, they can do the job, possibly with support from others in their organization. You may also have to take on some responsibility. This is typical of many consultants in this new field of analytics. They've read the books, obtained some training or experience, and are fundamentally competent for your project. This is the lowest level of competence that you should accept.
4. **Unconscious competent**. Here is what you want and hope to find. Unconscious competents are true consultants who are up to date with the state of the art of predictive analytics. They might even have published an article or book on the topic. They have the added capability of training your staff to be self-sufficient after they are gone. They can do the job for you swiftly, no matter the obstacles, without struggling. As of this writing, probably only 10% of the consultants in the field qualify as fully competent.

Coaches

Coaches often are people from inside the organization who help on the details of a project. They don't work it or direct it. They act as a checkpoint or sounding board. The most important assets of coaches are fundamental intelligence, logic, and insight. These qualities are essential to being able to take a new idea, lay it out alongside a set of circumstances, and work it over until the solution makes sense. Think about Peter Drucker. He was so successful because he had a classical European education that taught him how to *think*. This is not

necessarily how American education works. An M.B.A. degree supposedly teaches the student how to use various decision tools to solve problems. But the study of philosophy, literature, psychology, and the arts lays a foundation that grows beyond the data into insight. Until a person has a number of years of experience in a variety of situations, backed by a solid education and the ability to see data patterns from many angles simultaneously, he or she probably won't be insightful.

DESIGNING AND DELIVERING REPORTS

In some quarters, there seems to be a belief that a report on recent activity is equivalent to analysis. Even a batch of periodic reports is not analysis.

We were in the HR department of a very large company some time back. The human resources information systems (HRIS) manager showed me a table full of charts, graphics, and tables covering recent activity of the enterprise. He wanted our opinion on what it all meant. We had to tell him it meant he had spent a lot of resources to achieve little value. All he had was a fragmented description of the past. It was only after a struggle that we could begin to see some relationships. We are certain that no line manager would commit the time and effort we did to understand this small mountain of disconnected reports. Later we asked the chief accounting officer what the return on investment in HR was. He told me the company spends nearly a $500 million a year on HR services, and he had no idea of their value.

Reports

There is a plethora of report formats. You see them in any book you read. The format is important because, as Marshall McLuhan said: "The medium is the message."[1]

By that he meant that a message in a memo, an e-mail, an announcement, or a graphic carries a different emotional undertone. Consider this: If you telephoned your mother, handwrote her a letter, or sent her an e-mail, do you think her reaction would be the same? When designing reports, remember that the way you present information and the timing and format is often as important, sometimes even more important, than the content of the report.

Reports are important and can show change if they cover several periods. A single report is like a photograph of one side of a building. Standing alone, it doesn't reveal much. You can derive value from reports if you lay out several and organize them in some fashion wherein you can see linkages and trends. If you point out what you see in each of them and describe how they relate to each other, you have performed a mini-analysis. There is a caution here. What has happened in the past is not a guarantee of the future. Conditions change; a past trend may not extend into the future. Remember, data without insight and interpretation is nearly useless.

Another misconception about reports is that they constitute business intelligence. You can produce hundreds of reports covering all aspects of HR services and employee behaviors. But until you pull the data together and show not only the past (descriptive) but a likely future (predictive), you are simply loading line managers and the C level with documents that can cause more confusion and frustration than not giving them any data. Reports should identify change, trends, and relationships. They should be as simple as possible and answer some business question.

Analysis

Analysis can be defined as:

- Providing answers to specific questions asked by the reader
- A flexible process that can be constructed to meet reader needs
- An organized process that takes all steps needed to provide answers
- An interactive process between the provider and the reader

Bill Franks offers a basic table that differentiates reports from analyses. (See Exhibit 3.1).

Keep in mind once again that analytics goes beyond what happened, when it happened, and what difference it made to some aspect of the enterprise. That is descriptive analytics. Predictive analytics points out why it happened and what is likely to happen in the future. Prescriptive analytics describes what to do to make the future what you would like it to be.

Reporting . . .	Analysis . . .
Provides data	Provides answers
Provides what is asked for	Provides what is needed
Is typically standardized	Is typically customized
Does not involve the reader	Involves the reader
Is fairly inflexible	Is extremely flexible

Exhibit 3.1. Reporting versus Analysis *Source:* Bill Franks, *Taming the Big Data Tidal Wave* (Hoboken, NJ: John Wiley & Sons, 2012).

We've pointed out previously how important it is to study the context in which your problem lies. Subsequent analysis runs the risk of being irrelevant if the issues are not clearly understood. The last point is that business intelligence is more important than statistical significance. For hundreds of years we have been running businesses without the benefit of statistical analysis. Although we are happy to have statistics, the primary goal is business growth.

MAKING AN IMPACT

Carl Schleyer, director of analytics at Sears and later Home Depot, laid out a somewhat whimsical yet very practical recipe for maximizing analytic value. (See Exhibit 3.2.) It shows the several issues involved in generating value through analytics.[2]

PROCESS MANAGEMENT

Everything that happens is the result of a process. Getting up in the morning, getting dressed, traveling to work, and performing on the job are all processes that can be sorted into their component parts and analyzed. Analytics is about understanding the interrelationships and interdependencies of the parts of a process. These are the causal forces within a given situation.

If you are an analyst, you may be in a position where all you have to do is analyze a process or system and report your findings. If you

Recipe For Maximum Analytic Value

Ingredients	Instructions
30% Data	Gather, clean and connect disparate data. Use the freshest data you can afford. Partner with Finance or Operations to share work burden and create early partnership. Outliers can teach you much about data quality. You'll often work with those teams on your pursuit of righteousness.
5% Stakeholdering	Collect key hypotheses from executives. This is a great way to sift lumps out of your research questions. Keep the conversations brief so they don't taint your ability to treat the data with an open mind. Remember to create memorable flavor by sprinkling a pinch of spicy myth busting. Caution: Too much can spoil productive collaboration.
15% Analysis	A few HR professionals need to get good at advanced math. Or you can in-source resources from your customer, marketing, or strategy teams. (They are surprisingly willing to help the folks who manage career opportunities.) Go as deep as you need to behind the scenes, but remember the savory flavor of regression T-tests and P-values is an acquired taste for most.
20% Storytelling	Reduce the research data to one memorable slide. Explain what the insights mean and how to take them into action. Shake financial acumen liberally into the story, as no proposal is worthy of a leader's time unless it expresses itself in financial outcomes. This helps create interest and urgency from line management and your HR community.
20% Implementation	Taking insights into action separates consultants from business partners. Here is where homemade flavor really stands out! Resistance of obstacles encountered likely point to shortcuts in analysis. Additionally, involving HR analysts in the implementation allows them to gain learning that shapes future projects in actionable ways.
10% Embedment	Define accountabilities, embedding purposeful reporting, and transfer operational ownership. Celebrate short-term wins. Set a specific date to monitor outcomes. Remain flexible and modify the change plan, if necessary.

Exhibit 3.2 Cooking Up an Analytic Meal

have a management position, however, you probably will have to study the report, make recommendations to management, and play a part in improving the process.

Processes have three stages: inputs, throughputs, and outputs. With this in mind, you can look into a process and learn where in the

inputs and the throughputs you can intervene to improve the outputs. Exhibit 3.3 is an all-in-one example of the hiring process, performance ratings, and turnover rates.

In this case we selected a job group to analyze the effectiveness of hiring from various sources and the application of selection methods at the output stage. We linked it with performance and potential rating data and viewed the retention rate of persons in the group.

At first glance, we were able to determine that, if all other things were equal, newspaper hires produced mixed results. For example, Didi came through a newspaper and all of her ratings were good, plus she was still with us. Ken and Leo were also newspaper hires, but were below average on all scales and had left the company. What was the differentiating factor(s)?

Didi went through testing, assessment and the onboarding program. Ken and Leo were tested, but that was all. Perhaps assessing and onboarding had something to do with performance, potential ratings, and retention. Further analysis can confirm this or suggest that something else was impactful.

Earl is another interesting sidelight. Look at his record. His scores are low across the board, yet he is still in the company. How come? How many other Earls are there in your company?

You can see that even in simple, eyeball analyses of the effects of different treatments, you can learn something of value that is actionable. Obviously, if you had a large population you would have to apply statistical tests to learn the same thing, because the amount of data would be too much to understand by itself.

This book is not intended to be a text on process or change management. Those topics have received a plethora of attention over the past few decades. One of the more useful texts that have stood the test of time and market changes is *The Process Edge*, which looks at processes from both the cost and value sides.[3] The second is *The Heart of Change Field Guide*, a handbook on change management.[4]

PREPARATION

The objective of Chapters 1 through 3 was to provide a basis for understanding statistical analysis. You recall the theme of the book is that

JOB GROUP	SOURCES						METHODS					RESULTS			
NAME	N	M	S	E	J	W	I	G	T	A	O	P	C	R	T
Al		M					I		T			2	2	1	1
Bea					J		I	G	T	A	O	2	2	2	2
Cee				E			I	G		A	O	3	2	3	2
Didi	*N*						I		T	A	O	2	2	2	**2**
Earl					J		I				I	*1*	*1*	*1*	*2*
Frank					J		I		T			2	1	1	1
Gina						W	I	G		A	O	3	2	1	2
Hal		M							T	A	O	2	3	3	2
Isaac			S				I	G		A	O	3	3	2	2
Jon				E			I	G	T	A	O	3	3	2	2
Ken	*N*						I		T			1	2	2	**1**
Leo	*N*						I		T			1	1	1	**1**

N = Newspaper, M = Prof Magazine, S = Search, E = Referral, J = Job Board, W = Walk-in
I = Personal Interview, G = Group Interview, T = Test, A = Assessment, O = Onboarding
P = Performance, C = Pay Increases, R = Potential Rating Scale: 3 = High 1 = Low
T = Tenure: 1 = gone 2 = stayed

Exhibit 3.3 Staffing Process Analysis

predictive analytics starts with a logical and thorough examination of a situation and the context in which it resides. Once you are clear about the phenomena that you are studying, you can apply the power of statistical analysis.

Chapter 4 is a true-to-life example of how data in simple reports can be expanded and transformed into business intelligence and actionable information. Chapter 5 provides a practical lesson in statistical analysis through a series of illustrations. Chapter 6 shows more applications of statistical analysis. Chapter 7 looks to the future of HR analysis.

In total, you have a complete guide to this new capability called predictive analytics. Our goal was to bring you to a point where you could play a useful role as an analyst or as a manager of an analytics function.

NOTES

1. Marshall McLuhan, *Understanding Media* (Boston: MIT Press, 1964).
2. Carl Schleyer, *HR Analytics, Tips and Tricks*, 2013, p.19.
3. Peter G. W. Keen, *The Process Edge* (Boston: Harvard Business Press, 1997).
4. Dan S. Cohen, *The Heart of Change Field Guide* (Boston: Harvard Business Press, 2005).

CHAPTER 4

Data Issues

If information is the confluence of data tributaries, analytics is one hell of river!

Imagine for a moment that the vice president (VP) of human resources (HR) schedules a meeting with you, the leader of a talent analytics team, to learn about the effectiveness of an HR initiative called Retain & Grow. The initiative began soon after your technology company acquired a smaller, company for its innovative processes, patents, and deeply skilled engineers. The program is also an extension of a failed program that was designed to stanch the loss of highly talented young employees who come to the company for a couple years of experience and depart for more lucrative jobs with better work/life balance.

Your company is facing a talent crisis, and the VP of HR is coming to you for solutions. She wants to know how you can help her identify high and low performers, identify competency gaps, provide technical skills, increase competencies, increase engagement, and reduce turnover. Her supervisors, the business leaders of the company, believe that improvements in these areas will lead to increased product quality, customer loyalty, improved sales, and increased revenue.

A week prior to the meeting, you spend several hours compiling the information you have about every aspect of the initiative. Your organization has invested heavily in HR technology, so you have access to a large variety of data. The results quickly become

overwhelming, so you start to organize the reports to make sense of them and create a meaningful picture for your VP. After spending hours combing through the data and reports, you compile a list of meaningful metrics that you know will be useful (shown below under the heading Efficiency Measures). The measures relate to activities and costs, and you are proud that your HR group accomplishes so much at minimal cost. In combination, these measures define the efficiency of your group.

EFFICIENCY MEASURES

- Number of open positions in the business unit
- Number of positions filled/month
- Average number of days to fill an open requisition
- Average salary of the open position
- Cost to hire

Once you have culled the measures to this list, it doesn't take long to organize your thoughts to create a story about the inputs and outputs of the program over the last quarter. You create a succinct MS PowerPoint presentation with bullet points and graphs that explain your data.

When you finally meet with the VP, you carefully present the information you have compiled. Here is the story you tell:

"Our company has invested heavily, hired new people, administered competency assessments, and deployed onboarding programs, which include classroom training, e-learning, and coaching. People are being hired in reasonable time frames (similar to benchmarks), and new hires are successfully completing training.

"With regard to open positions and the positions filled per month, our numbers are stable throughout the quarter. Exhibit 4.1 shows both metrics by month. The numbers shown, when translated into percentages, indicated that we are filling 75% to 84% of the positions within the first month.

"The second set of metrics shows our average time to fill a position. External benchmarks are shown as well. Exhibit 4.2 shows our time-to-fill metrics. On average, we are filling the positions 25% faster

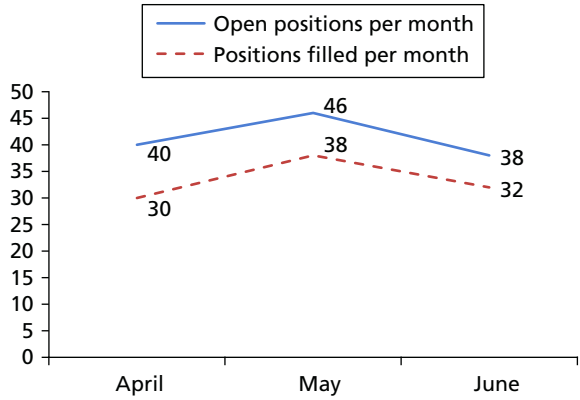


Exhibit 4.1 Open Positions and Positions Filled per Month

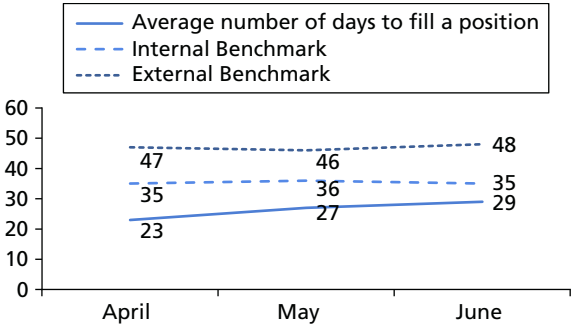


Exhibit 4.2 Time to Fill Compared to Benchmarks

compared to internal benchmarks and 44% faster compared to external benchmarks.

"The third set of measures compares salary costs to external benchmarks and total cost to hire against external benchmarks. Exhibit 4.3 shows these metrics for each month. Our salary costs are 23% lower than the industry benchmark, and the total cost to hire is 15% lower than the benchmark."

The VP is very thankful for the results and appreciates the time and care you have taken to compile the information. She says, "You have provided good information about our HR activities, but I feel like there is more that needs to be reported." As you let the message sink in, "You missed something," the VP stands up to draw on a whiteboard in the room. Then she asks, "Will you brainstorm with me for a moment?"

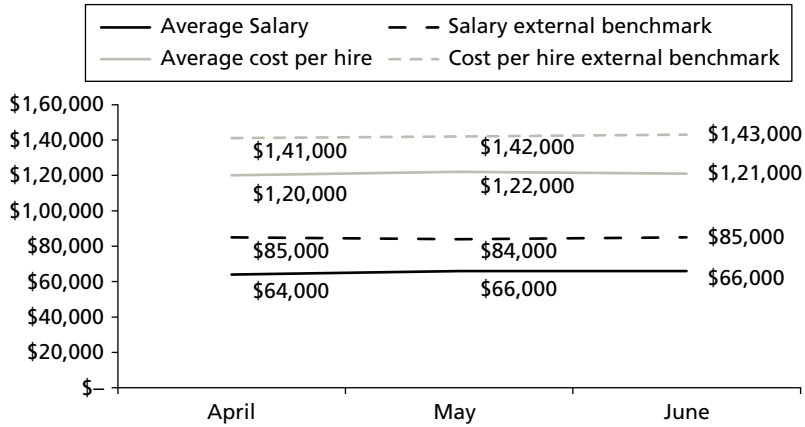


Exhibit 4.3 Salary Costs and Total Cost to Hire Compared to Benchmarks

Exhibit 4.4 Logic Model *Source:* KnowledgeAdvisors, W. K. Kellogg Foundation Logic Model Development Guide, January 2004, www.smartgivers.org/uploads/logicmodelguidepdf.pdf

"Of course," you agree. Then she draws a picture with an arrow and rectangles on the whiteboard like the model in Exhibit 4.4. She calls it a logic model.

Then she continues, "I've used this in the past to help simplify the cause-and-effect relationships within the organization. Let's look at the onboarding and retention of new hires first, that's our situation. Based on your data and understanding of what we are doing now, what are our inputs?"

You share a whole list of things, like the time and effort of your recruiters, the technology that supports your processes, the salaries offered to new employees, and the benefits package. The VP lists these below the inputs box. Then you move to activities and outputs. All of the data you have provided fits nicely into these buckets. Then the VP says, "How do we know if we are hiring good people?"

After thinking for a moment and referencing the data, you respond frankly, "We don't know." You are somewhat embarrassed and concerned that you should have such a measure in your scorecard. You are not even sure what measures you currently collect about the quality of your new hires. The VP senses your concern and says, "It's fine. We'll have to begin collecting a new hire quality metric. My real concern is turnover. Our campus hires are likely to leave after two years—at least 30% voluntarily depart, which is higher than the industry benchmark." She lists "30% turnover campus hires" below Outcomes. "This is one of the key business measures that we need to monitor and reduce. I notice you do not have it listed among you metrics."

"I do now," you say.

"Good. The next step is to consider why. Why are 30% of our new hires leaving?"

Together, you brainstorm some more with the VP, and you come up with a short list of ideas:

- New hires gain valuable skills through training that are marketable beyond our company.
- They find jobs with better work/life balance.
- They feel that they are not valued and do not contribute substantially to the overall mission of the company.
- They are underpaid.

"What other information can you get regarding attitudes? Why are people leaving?" the VP asks.

"We could look at engagement scores for employees the year before they left," you offer.

"Great idea! And what about exit surveys? Do you have access to that information?"

"Yes, I completely forgot about those."

"Well, it's on the table now. Can you get the data?"

"It might be a struggle with IT."

"Keep me informed. I'll sponsor you on this. Use my name if necessary, and I'll clear any roadblocks that come up." She continues, "What measures do we have with regards to turnover and revenue?"

Deflated, you respond, "I'm not certain. I'll have to look into that." Seeing that she has worn you thin, she reassures and encourages you, "This is a journey. Often a long one. Stick with me, and we'll get there."

She returns to the logic model and fills out the remaining sections based on the information you provided. "This is what we have." She points to the inputs, activities, and outputs on the logic model. "And this is what we need." She points to the results and outcomes on the logic chain. The final model looks something like the image in Exhibit 4.5.

Your 30-minute meeting has extended to 90. You are exhausted but also exhilarated. The VP is thankful for the information you brought to the table, essentially the inputs, activities, and outputs, but she also clarified that she needs measures for results and outcomes. The only unfortunate part is that she has scheduled a follow-up meeting for the next week. So much to do. So little time.

One week later you head into your meeting with the VP. You are nervous. You have collected much more information, and this time it is substantially different from the first set of metrics. You have gathered data from several disparate systems. Some results have come to you just as you need them. Others came to you in spreadsheets and needed to be cleaned before analysis. Much of the data you had to process manually using MS Excel. You are nervous because your requests took much longer than expected. The data came to you late, and

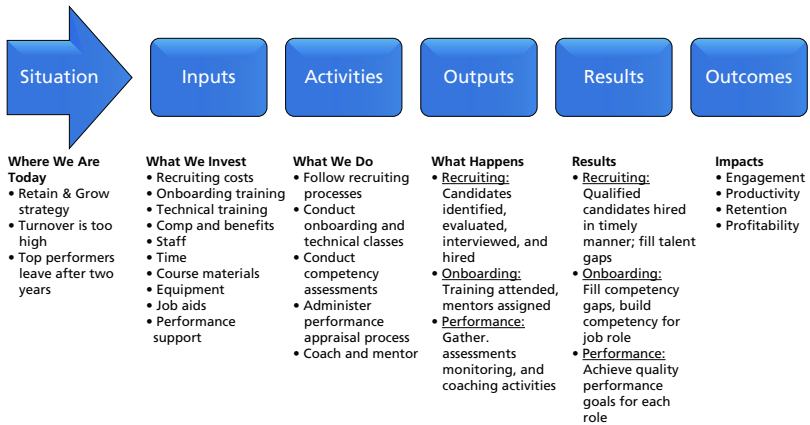


Exhibit 4.5 Completed Logic Model *Source:* KnowledgeAdvisors, W. K. Kellogg Foundation Logic Model Development Guide, January 2004, www.smartgivers.org/uploads/logicmodelguidepdf.pdf

you've been racing to analyze it, let alone understand it. Moreover, the data are unfamiliar to you. You are accustomed to reviewing recruiting metrics. For this report you've gathered competency assessment results, performance ratings, feedback about training, and productivity estimates. When you finally compile a report, you consider the overarching theme of the results. They are clearly focused on competencies, performance, and effectiveness.

EFFECTIVENESS MEASURES

These are the effectiveness measures you compiled:

- Performance ratings of new hires at 90 days; identification of high potentials/low performers
- Competency assessment results—aggregated information about competency strengths and gaps
- Speed to competency
- Opinions from learners about what is most effective about onboarding
- Engagement survey results
- Exit survey data and exit interview comments

Results and Interpretation

During the first 30 minutes of your meeting, you share your results with the VP. She is impressed with the amount of data you were able to compile so quickly. She is patient as you share the graph shown in Exhibit 4.6.

Performance Ratings for New Hires at 90 Days

A 9-box performance rating system is used in your company. The graph shows those results, and they are consistent with your expectations, that the majority will land in the middle of the graph and that results for each month will be similar. Sixty-plus percent of new hires are in the middle tier "capable" 5-box. Only 15% to 21% are rated as high potentials (6-, 8-, or 9-box). Another 12% fall in the low-performer

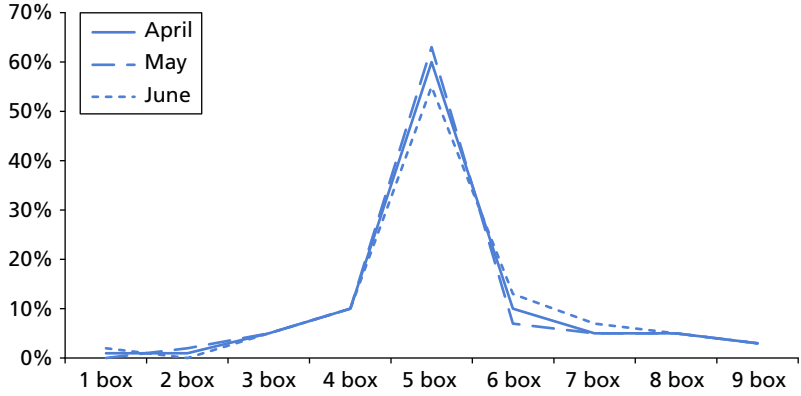


Exhibit 4.6 Quarterly Performance Ratings

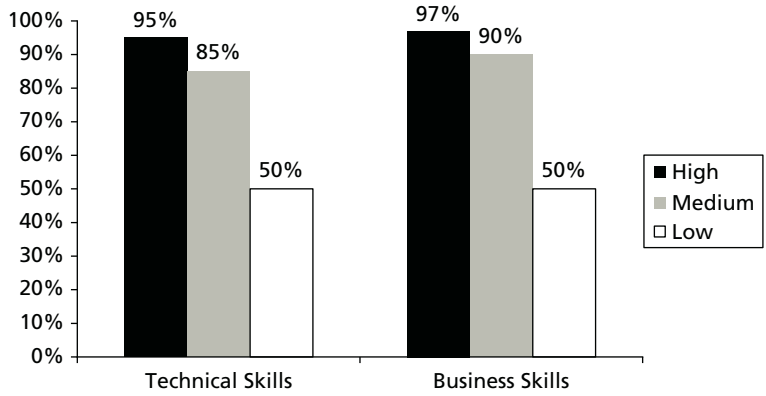


Exhibit 4.7 Competency Results

group (1-, 2-, or 4-box). This high, medium, and low structure provides a meaningful breakdown of the results that carries through Exhibits 4.7 through 4.14.

Competency Assessment

The competency assessment results in Exhibit 4.7 show that high performers have 95% of the technical competencies and 97% of the business competencies for the job. The mid-tier group is capable but not as strong. The low performers only have half of the competencies they need. Results are aggregated across all three months of the quarter.

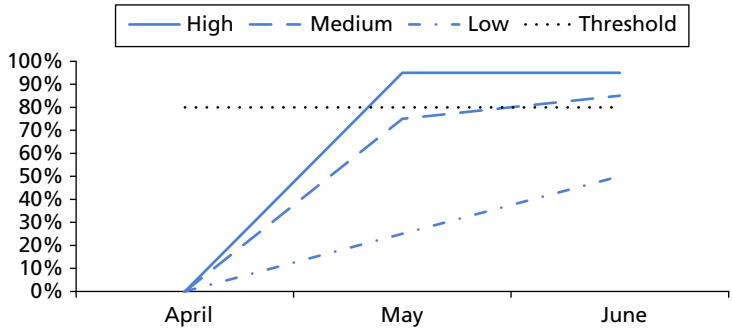


Exhibit 4.8 Speed to Competency

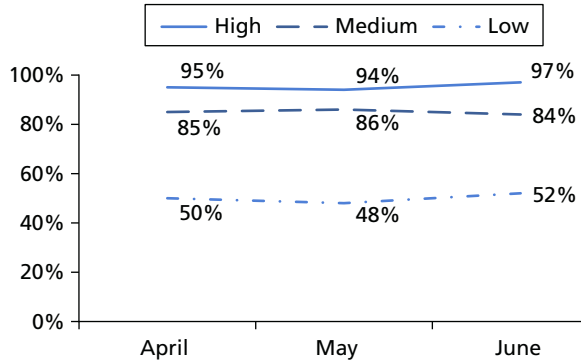


Exhibit 4.9 Test Score—Percentage Passing by Performance Group and Month

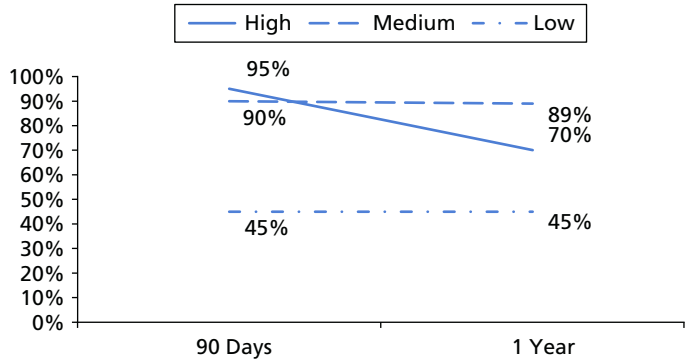


Exhibit 4.10 Employee Engagement by Group at 90 Days and One Year

Speed to Competency

High performers in Exhibit 4.8 are fully productive first at four weeks. The middle tier requires 12 weeks to achieve the minimum performance threshold, and the low-performing group is not competent at 90 days.

Onboarding Feedback (Test and Evaluation)

Based on tests in Exhibit 4.9 and evaluation results (not graphed), the high performers score the highest on the test but gain the least from training. They likely had much of the knowledge and skills necessary for the job prior to joining. However, they do indicate that training is relevant, well designed, and well delivered. The middle group does almost as well as the high-performing group on the test and has similar opinions about the quality of training. The low-performing group does not perform well on the final test, and their feedback about the course is that too much material is covered too quickly.

Engagement Survey

Results were gathered at 90 days and at one year and reflect the percentage responses that fall in the top two boxes for the question "I am thriving at this company." At 90 days, the high potentials feel like they are thriving (See Exhibit 4.10). The middle tier is doing well, but the lower tier is struggling. Engagement for the middle tier and low performers does not change at one year. However, engagement among high potentials has dropped substantially. A deeper dive into the comments reveals that they are bored and not challenged. Additionally, they do not feel they are contributing directly to the success of the company.

Exit Survey

The exit survey results in Exhibit 4.11 show that high potentials leave for more challenging work, higher pay, and more advanced positions. Turnover is highest among this group at 60% by year 2. (See Exhibit 4.12.) The middle tier has the lowest turnover at 15%. They

Top Reasons for Leaving the Company		
High Performers	**Mid-Tier**	**Low Performers**
More challenging work	New industries in a similar role	Family/friends at the company
Higher pay	Better work/life balance	Better work/life balance
Promotion/higher position	Higher pay	Less demanding job

Exhibit 4.11 Exit Survey Results

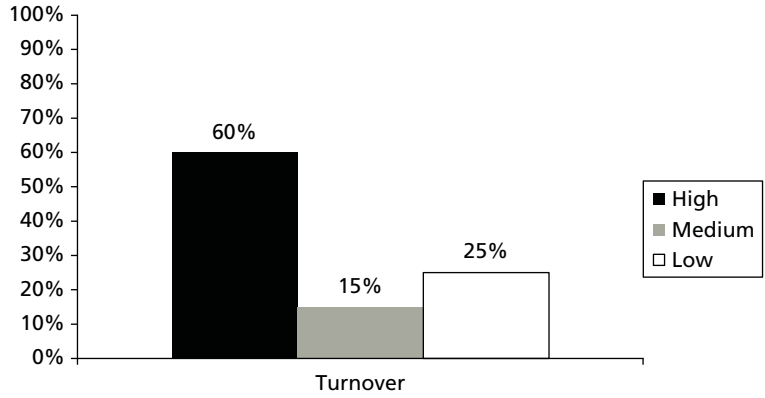


Exhibit 4.12 Turnover by Group at Two Years

are satisfied with their role and enjoy the work but want better work/life balance and better pay. The underperforming group has the second highest turnover rate at 25%. Their exit survey results indicate they struggle with the work, want a less demanding job, and prefer to work with friends and family.

After presenting the results, the VP thanks you for your hard work and insights. Based on the data, she would have drawn the same conclusions you have. Then she says, "There is still more to do, and let me share a model to help guide you. This comes from a book titled *Beyond HR* by Boudreau and Ramstad."[1]

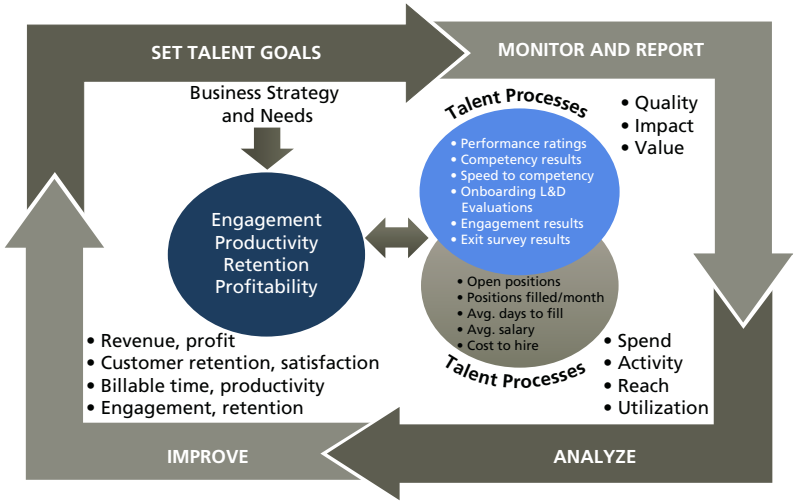


Exhibit 4.13 Optimization Model with Key Performance Metrics

"Based on this model, we should consider the efficiency data, the information you shared last week, with our effectiveness data, the information you just shared. We should view these data sets as related. For example, if we added two or three more recruiters, we could find and hire new candidates faster, improving our time-to-fill measures."

You interrupt her for a moment. "Two to three new recruiters—it will be hard to get budget for more headcount."

"True," she says. "So we'll need to show the predicted return on investment for adding them—better candidates that stay longer. We've only talked about improving our efficiency measures. We also want to improve our effectiveness measures, like the quality of the candidate and the length of their tenure. There is a tangible return on investment (ROI) for adding more people to get better candidates that stay longer. We have to estimate that impact to get the new head count. Then, when they are here and we can improve both efficiency and effectiveness measures, we will show improvement in overall outcomes—quality of candidate, productivity, increased tenure, profitability—for the company. Prediction now—in the absence of data—is just as important as prediction with the actual data."

You look at the model, process what the VP has said, and restate, "So if we hire the right people quickly, we should improve engagement, productivity, retention, and maybe even profitability."

"Exactly!"

"We need more data."

"What do you mean?"

"I've only brought the engagement and retention data. I should be able to get productivity and profitability information. If I can get those, we should be able to test for a link between the quality of the hire and profitability."

"I like the way you're thinking. How much time do you need?" she asks.

You ask for a couple weeks so you can get the data, analyze it, and create a meaningful report. The VP is supportive and looks forward to your next meeting.

Two weeks later, you bring all of the data together to share with the VP. The first thing you share is a set of business outcome metrics displayed in the next section. They seem much simpler in concept than the efficiency and effectiveness measures, but they pose their own challenges for collection and analysis. It is a brief list, but it is well aligned with the needs of the Retain & Grow initiative.

BUSINESS OUTCOME MEASURES

These are the business outcome measures you compiled:

- Engagement
- Productivity measures
- Retention
- Profitability

Next, you share the Boudreau and Ramstad model that you have populated with key measures aligned to the three groups of data: efficiency, effectiveness, and outcomes. The VP agrees with your categorization of the measures. She even notices that you have shifted engagement and turnover from effectiveness to outcomes.

Business Outcomes

Now that you have agreed on the model and metrics, you share with her the results you have compiled related to business outcomes.

Engagement

You shared this during your last meeting but have shifted it to the outcomes section rather than the effectiveness section, because engagement is a viable business outcome for the organization. As mentioned during the last meeting, higher performers are highly engaged at 90 days but are far less engaged at one year. (See Exhibit 4.10.)

Productivity

During the first year, high performers log more billable hours than the other tiers. Eighty percent of their time is billable. They are twice as productive as the middle tier and four times more productive than the lower tier. In different terms, it takes a low performer four days to do the work a top performer can do in one day. Exhibit 4.14 shows the productivity differences by group.

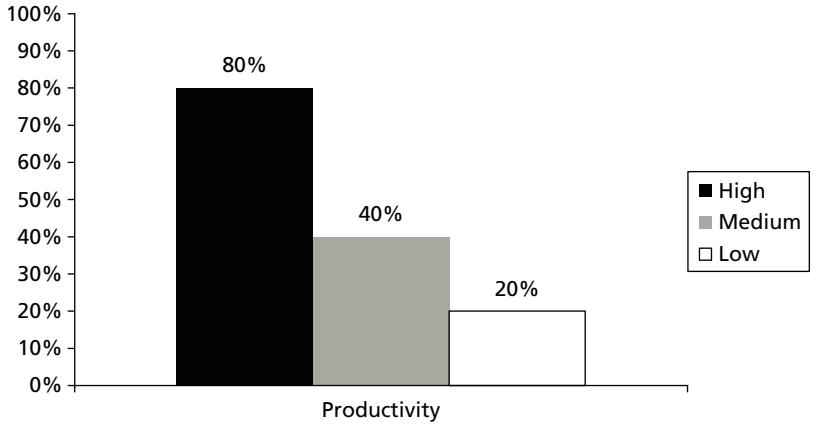


Exhibit 4.14 Productivity among Groups during Year 1

Retention and Turnover Costs

Turnover was shared during your last meeting. Like engagement, you and the VP agree that it belongs in the outcome measures group, so you shifted it to this section. High performers account for 60% of the turnover during the first two years. (See Exhibit 4.11.) The costs associated with turnover are high. When high performers depart, they cost the company 150% of their salary to replace. It costs only 100% of salary to replace a mid-tier or low performer.

Profitability

Because associates charge the same amount per hour, profitability follows productivity. The top tier is twice as profitable as the middle tier and four times as profitable as the low performers. This makes high performers the most profitable employees in the first year.

The VP is very impressed with the information you have compiled. Then she asks for two more things: She wants to see the data you have compiled in a dashboard, so that she and other leaders can monitor the new hires. She also would like your opinion about what the company should do next. What are the action steps?

You quickly promise that the dashboard is easy to produce and can have a draft to her by next week. With regard to the action steps, you lean back in your chair and start to think. The VP looks at the clock and sees it is near the end of the hour. She suggests, "Let's talk about it next week."

NOTE

1. John W. Boudreau and Peter M. Ramstad, *Beyond HR: The New Science of Human Capital* (Boston: Harvard Business Review Press, 2007).

CHAPTER 5

Predictive Statistics Examples

A journey of a thousand miles begins with the right map.

Measurement is a journey. As seen in the example in Chapter 4, the journey takes time, and the value of the information improves with feedback and iterations. The needs of an organization vary by industry, by size, by purpose, and by many other factors. Yet many measures cut across these factors and effectively describe the valuable contributions human resources (HR) makes every day. Not every journey begins with a destination in mind, but expedient, purpose-driven journeys do.

BEGIN WITH THE END IN MIND

One recommended destination comes from the Center for Talent Reporting (www.centerfortalentreporting.org), and it is based on the Talent Development Reporting Principles (TDRP). TDRP is very similar in purpose to the two models that guide the accounting industry: generally accepted accounting principles and generally accepted auditing standards. TDRP is designed for reporting human capital information to

executives. The framework builds on Boudreau and Ramstad's model of performance optimization.[1] An organization that can monitor its efficiency, effectiveness, and outcomes can begin to adjust the inputs and optimize performance.

Reflecting on the example of the various reports shared in Chapter 4, a comprehensive report for the vice president (VP) of HR should include measures of efficiency, effectiveness, and outcomes. The purpose of the TDRP is to develop a tool to communicate the impact of HR interventions to executive leadership in a way that they can grasp quickly. Leaders need information for decision making, but they need it in a way that they can understand quickly. Moreover, the information has to be aligned to the business needs.

The Center for Talent Reporting advocates creating statements, similar to financial statements, for executives. The statements use a very simple structure. One statement is created for each of the three types of measures: efficiency, effectiveness, and outcomes. Within each statement, say, efficiency, the critical measures are listed in the left-hand column; these measures might include open positions and positions filled per month, and so on. Then columns to the right show these metrics: last year's actual values for the metric, this year's goal or plan, year-to-date actual values, and the percentage of the goal achieved. It is not a complex set of information, but it is comprehensive and easy to understand and therefore useful for executives. Exhibits 5.1 through 5.3 show TDRP statements for efficiency, effectiveness, and outcomes.

When sharing the consolidated information with the VP of HR and other executives, there are two recommended best practices. First, share the results in a financial statement format as prescribed by the Center for Talent Reporting. This approach provides the results in a format that executives are familiar with. They can easily see the key metrics in the left-hand column. To the right they can see the actual performance last year, the goal for the current year, and progress according to year-to-date values. In this example, some values have superscripts of + and − to reflect how performance compares to goals. The Center for Talent Reporting also provides benchmarks for selected metrics, and comparisons can be made to benchmarks and goals.

A second valuable approach is sharing results through dashboards. The dashboard platform should accommodate various displays of data,

Measures	Data Type	Last Year Actual	This Year Plan	This Year June YTD	This Year % of Plan
Open requisitions	N count	480	500	250	50%
Positions filled/ month	N count & Percentage	40 or 8.3%	42 or 8.3%	250 or 50%	50%
Time to fill open positions	Number of days	27	27	27	100%
Salary associated with positions	Average salary (SD)	64K (6.4K)	65K (6.5K)	64K (6.4K)	98.5%+
Cost to hire new resource	Average cost (SD)	122K (12K)	124K (13K)	122K (12K)	98.5%+

Exhibit 5.1 TDRP Efficiency Statement

Measures	Data Type	Last Year Actual	This Year Plan	This Year June YTD	This Year % of Plan
Performance ratings at 90 days	Average Likert rating: 1–9	5	5	5 or 100%	100%
Performance ratings at 365 days	Average Likert rating: 1–9	5	5	4 or 80%	80%
ID high potentials	Yes/No indicator	10% Yes	10% Yes	12% Yes	120%+
Assessment results	Avg. assessment score	90%	90%	80%	88%
Speed to competency	Time in months	1.5 months	1.25 months	1.25	100%
Sponsor satisfaction	Aggregate average for all survey responses	4.5	4.5	4.5	100%
Exit survey results	Aggregate average for all survey responses	4	4	3.75	93.75%

Exhibit 5.2 TDRP Effectiveness Statement

Measures	Data Type	Last Year Actual	This Year Plan	This Year June YTD	This Year % of Plan
Engagement survey results	Aggregate average for all survey responses	4.5	4.5	4.25	94%
Productivity	Average number of chargeable hours/week	30	32	30	93.75%
Turnover at 90 days	Percentage	3%	3%	3%	100%
Turnover at 365 days	Percentage	5%	4%	7%	175%–
Profitability	Time in months	1.5 months	1.25 months	1.25	100%

Exhibit 5.3 TDRP Outcomes Statement

such as bar charts, histograms, pie charts, trend lines, and dials. It should also allow users to dig deeper into the results. When building dashboards, cut the data by key organizational demographics, such as business units or region. Both art and science contribute to the final product. An effective dashboard provides critical information in a visually appealing way without overwhelming the screen or page with too much data. The final product is often developed through a trial-and-error process wherein results are displayed and end users provide feedback.

In the end, whether you use statements or dashboards, the goal is not the display. The goal is to use the information to begin a conversation, discuss options, and make decisions.

GO BACK TO THE BEGINNING

Once you have a vision of what you need to produce for executive leaders, the onerous task of executing the vision begins. Often the hardest part of building executive reports is the data collection process.

Thankfully, HR systems are advancing quickly, and information technology (IT) departments can provide data extracts on request. The next step in the journey is requesting the data from the right people in the right way.

WHO OWNS DATA, AND WILL THEY SHARE IT?

In order to populate a report for executives, it is essential to determine where the critical data resides. In most organizations, IT controls the data because IT implements and maintains tools, such as learning management systems, talent management systems, HR information systems, and so on.

Consolidation across the technology industry has improved reporting because various types of data are now resident in one system. Additionally, the industry has been consolidating through acquisition so that disparate systems are often integrated under one service provider. For example, in 2004 PricewaterhouseCoopers started the ball rolling with the acquisition of Saratoga Institute, the first HR quantitative benchmarking company. In 2010 SuccessFactors, a talent management company, purchased InfoHRM, a human capital benchmarking and dashboarding company. Next, SuccessFactors bought Plateau, a learning management system. In late 2011, when customers were thinking that SuccessFactors was one of the biggest talent players in the industry, the company was bought by the enterprise resource planning giant SAP. This one system can report hiring information, training histories, compliance, performance appraisal scores, high potential status, promotion history, compensation and benefits information, and so forth. Yet for many organizations, the valuable HR data that is needed for executive reports is still housed in many different systems. Exhibit 5.4 shows a variety of data sources and aligns the sources with the data types from the TDRP framework.

The measurement maturity of organizations varies substantially. Some organizations collect and use their data daily. Others struggle to identify key performance indicators and gather data. For organizations at the low end of the maturity curve, the journey is longer. The organization must find a way to collect the information before it can be reported.

Identifying the source of the data is a critical step in the analytics process, but more work is still required. Often the owners of the data

Efficiency	Effectiveness	Outcomes
Human Resources Information System (HRIS)	Evaluation System	Performance Appraisal System
Number of open requisitions	Satisfaction with learning	Speed to productivity
Time to fill open positions	Assessment results	Productivity measures (chargeable hours or widgets produced/hour, etc.)
Salary associated with positions	Performance Appraisal System	Quality System
Finance System	Performance Ratings	Error rate/1M units
Cost to hire the new resource	Identification of high potentials	Customer Service/ Relationship Management System
Cost to train new hires (onboarding)	HRIS	Customer loyalty
	Turnover within 90 or 365 days	Sales
	Lost productivity (Salary × time unfilled)	CRM/Finance
		Revenue/trainee

Exhibit 5.4 Data Sources for Executive Reports

are unable or unwilling to share. There is often a good reason why data owners don't share. The system may not be able to export data to a file. More often, certain data is classified as "sensitive" due to government regulations or organizational policy. Private data is protected. This data often includes personal information, such as gender, age (date of birth), ethnicity, and medical history. Performance appraisals, test scores, and responses to engagement surveys are also classified as sensitive by some organizations.

While some data is locked down and unavailable to most analysts, there are ways to gain access. One way is to request the data without unique identifying information (e.g., a personnel ID number or an e-mail

address). This can cause problems when joining data sets for a linkage analysis. Without an ID or an e-mail address, it is impossible to link engagement survey responses with turnover information. A workaround is to enlist the help of the HR analyst or IT specialist who protects the data. Allow this person to join the two files for you and then delete the unique ID. In this way, the data is linked and identities are protected.

Some data sets are unavailable because owners just are unwilling to share. While this does not happen often, it still occurs and can cause substantial frustration when you are trying to serve the greater good of the organization. Direct requests for data are often sufficient to get what is needed. In some organizations, an e-mail request for data is sufficient. In other organizations, a sponsor is needed, and the request has to go through official channels with standard protocols. Be prepared: The effort involved can be substantial, but it is usually not overly burdensome or time consuming.

Sometimes a gatekeeper digs in and refuses to share, and the direct approach does not work. Do not get caught up in determining why. It can be an effort in futility. You can think of it this way: *We can do this the easy way or the hard way*. It is the data keeper's choice. Look for other organizational levers that can provide access. Two avenues often work: Gain permission/approval from the gatekeeper's supervisor or get an executive sponsor to make the request.

When data comes from multiple sources, the request process can be lengthy. Be prepared for a simple request to take several days or even weeks. Sometimes technology teams that are extracting the data ask if the request is a one-time event or if you will be seeking data regularly. Either answer is fine with IT; the department simply wants to know if it should save the code and the process used to extract the data so it can be more efficient if you make future requests.

WHAT WILL YOU DO WITH THE DATA?

There are generally four reasons for gathering data for business purposes: Describe, explain, predict, and optimize performance. Keep these reasons in mind as you report and analyze the data.

1. **Describe**. Using simple statistical terms, such as frequency counts, means, and standard deviations, performance is quantified and

described to provide insight about an organization's current state. Performance appraisal results describe the annual performance of individuals with simple numbers. Using a nine-box model, an employee is rated 1 to 9. That single digit summarizes individual performance. It can also be aggregated to describe the performance of a sample or a population.

2. **Explain**. After describing performance, it is often useful to explain it. This is usually achieved by digging deeper into the data, giving it context, and examining differences or relationships. For example, if we classified all of the professionals into three groups—novice, experienced, and advanced—we might see an underlying relationship that explains the ratings. The small group of top performers in the nine-box example may be the most experienced professionals. Novice professionals receive the lowest ratings, and experienced (but not advanced) professionals fall in the middle. In this way, experience helps explain the pattern in the data.

3. **Predict**. Inferential statistics, such as correlation, regression, analysis of variance (ANOVA) and other techniques, can be used to predict future performance. ANOVA can uncover meaningful differences between groups (e.g., performance among experienced and inexperienced employees). Correlation and regression analysis can uncover relationships among variables—that is, as experience increases, so does performance. It seems reasonable to expect that experience predicts performance, but what if the organization cannot wait for employees to gain experience? Could development programs like coaching or training also improve performance? Of course they can. Moreover, there is likely a dose–response curve for development. As more development is provided, employees improve their performance faster. Given enough cases, it becomes possible to predict performance based on the amount of coaching and training received. Such a model is invaluable because the business can estimate how much to invest in development in order to improve performance.

4. **Optimize**. Once a prediction model is developed, the business can implement programs to improve performance—for example, by providing the optimal amount of coaching and

learning. By monitoring the inputs and actual performance, a feedback loop is created so the organization can optimize its investment in performance improvement. In line with the Boudreau and Ramstad approach, the entire data set (e.g., efficiency, effectiveness, and outcome measures) should be used to optimize organizational performance.

What does the optimization process look like? It can have many variations, but consider for a moment a situation where a training budget has been cut substantially, yet the goals for development remain the same, such as educate X number of people each year and ensure they are proficient within a month. In this case, efficiency will be impacted. The chief learning officer and learning and development (L&D) managers must change the curriculum in line with the available budget. This could mean increasing the ratio of e-learning to instructor-led classes. Or it could mean eliminating certain high-cost courses from the curriculum. Both approaches have consequences. The shift to more e-learning can save money by meeting training volume while eliminating the costs associated with instructor-led training. The consequence might be less employee engagement or less cross-functional networking as a result of less face-to-face interaction during training. Or if key courses are cut from the curriculum, the business may not be able to meet quality standards or produce a product, because new knowledge and skills are not learned.

The executive suite thrives on making data-based decisions. Making decisions without data is a hit-or-miss proposition. By using a framework like TDRP, HR can provide useful information to executives so they can make data-driven decisions.

WHAT FORM IS THE DATA IN?

When requesting data, be careful what you ask for. There are many forms of data today: HTML, XML, HRXML, text, comma delimited, SQL, SPSS, MS Excel, and MS Access, just to name a few. The variety is overwhelming, but that variety also increases the chances that the data you seek will be in a format that you need. The prevalence of Microsoft products helps matters as well. Most HR professionals use

some form of Windows and have access to MS Excel and MS Access. These tools accept a wide variety of file types, such as those just listed. The ability to accept multiple file types is essential, because the business systems that contain the desired data often run on proprietary code, SQL, or other unique languages. Fortunately, those systems often have the capability to export data into standard file types. When working with the IT group to extract data, be sure to specify the file type that you desire. Ask for files to be exported to common formats, such as .txt or .csv, that most programs can open.

Another issue to consider is the data structure. Data systems are set up to store data as efficiently as possible, using relational tables that are extremely long but not wide. These "vertical files" have a few columns of data but millions of rows. While they are efficient and improve processing speed on servers, they can cause problems. Files with more than 1.5 million cases often exceed the limits of MS Excel. MS Access can handle large file sizes, but this program is not as user friendly as MS Excel and requires more advanced analytic skills.

The second way to structure the data is to request a cross-tab export. This format displays one person per row. Every column contains a unique piece of information about that person, such as a demographic or a response to a survey. Compared to a vertical file, this structure is wide with many columns. This format is often used when analyzing data in Excel or a statistical package like SPSS or SAS.

IS THE DATA QUALITY SUFFICIENT?

Having quality data is essential to any analysis. Before analyzing a data set, take the time to examine the data to make sure it contains the measures that it should and that those measures are gathered and stored consistently. Here are a few things that you should inspect when reviewing a data set.

- **Missing data**. Not every data set is complete. Even a simple demographic form for new hires is prone to have missing data. Frequently, people forget to enter information, such as ZIP codes. Or they intentionally skip a question. This is normal. When working with hundreds and thousands of cases, a few

missing pieces will not impact the overall analysis. However, when large amounts of data are missing, say 50% or more, you should consider that variable to be suspect in the analysis. If it is a key metric, investigating why so much data is missing will be worthwhile. Better yet, correct the data collection problem when you find it.

- **Errors in the data**. Errors come from many sources.
  - **Keypunching or data entry errors** are most common. Occasionally all of us mistype the simplest of information, such as our names. Infrequent errors are expected and acceptable, as long as they are minimal. If possible, clean up such errors in the data before doing the analysis. Systematic errors, however, are not acceptable. These errors happen when someone types the right data into the wrong field, such as the answer to question 5 into the field for question 6. When this happens consistently across many cases, it can have a substantial negative influence on the accuracy of the data.
  - **Database errors** happen often and are difficult to find. For example, a data extract for instructor-led course evaluations might incorrectly contain evaluation data from Web-based courses. This error is due to an incorrect query request.
  - **Misaligned data** are easier to detect. Consider the data from instructor-led courses versus Web-based courses. The data may align in rows and columns perfectly, making it difficult to detect the error. More often, the data will not align across the data set because some of the questions differ on the evaluation forms. If data from a Web-based course contains an extra question or one less demographic (e.g., training location), the columns of data will not align. Misalignment is a good indicator that there are errors in the data set.

The best way to ensure the quality of the data before analysis begins is simply to inspect it. Use your basic understanding of the data and explore. If 100 people were hired, why are there 300 people in the

data set? If the rating scale is 1 to 5, why is there a 6 in the data set? Put your professional skepticism to work and see what you find.

In Chapter 6, we roll up our sleeves and examine the data collection and analysis process.

NOTE

1. J. W. Boudreau and P. M. Ramstad, *Beyond HR: The New Science of Human Capital* (Boston: Harvard Business School Press, 2007).

CHAPTER 6

Predictive Analytics in Action

The best way to predict the future is to create it.

—Abraham Lincoln

In Chapter 5, the vice president (VP) of human resources (HR) asked you to produce measures that would help determine the effectiveness of the Retain & Grow initiative. After several iterations and brainstorming sessions, you both agreed on a set of metrics and how to display them for your business leaders.

This chapter focuses on the actions that happened between the meetings—in particular, how you gathered the data and began to analyze it using graphs and dashboards. This chapter also explores how to link different data sets and how to apply predictive analytics to create information for stakeholders.

FIRST STEP: DETERMINE THE KEY PERFORMANCE INDICATORS

The key performance indicators (KPIs) were developed in Chapter 4 through conversations with the VP, and you segmented the data into three types of measures: efficiency, effectiveness and outcomes. Now comes the sometimes onerous task of gathering the data.

Because the process has many measures and many steps, it is useful to create a tracking tool that contains all of the KPIs and various pieces of information about the measures that will help you gather them the first time and in the future. That tool might include this information:

- In which department does the data reside?
- Who is the gatekeeper or owner of the data?
- Is it sensitive information?
- If so, what approvals are necessary to gain access?
- What type of data is it (e.g., nominal, ordinal, interval ratio, qualitative versus qualitative)?
- What is the format of the data (e.g., HTML, text, comma delimited, etc.)?
- Is there a standard process for requesting the data?
- What is the standard turnaround time for a request?

Exhibit 6.1 shows a typical data tracking tool. The KPIs are listed in the left-hand column, and the tracking information is listed in the columns to the right.

Communications

Because other people in the organization own the data, often it is necessary to file a formal request for the data. Do not be surprised if you have to get one or several approvals before gaining access to the data. Sometimes a formal meeting among all of the relevant stakeholders is all that is necessary to get approvals. Other times it may be necessary to write a formal request, provide a rationale for the project, and demonstrate how the data will be used once it is analyzed. Because individual confidentiality is essential to managing risk for an organization, often it is necessary to state that no individual names, or results from individuals, will be reported. Some organizations require that results be reported in groups no smaller than three or five people to help maintain confidentiality.

Key Performance Indicators	Where does the data reside?	Gatekeeper/ Owner	Sensitive info (Y/N)?	What approvals required?	What is the standard process for requesting data?	Turnaround time for requests?	Qualitative or quantitative?	Data type (Nominal, ordinal, interval, ratio)
Efficiency								
Number of open reqs								
Positions filled/month								
Time to fill positions								
Salary associated with positions								
Cost to hire new resource								
Effectiveness								
Performance ratings at 90 days & 365 days								
ID high potentials								
Assessment results								
Speed to competency								
Sponsor satisfaction								
Exit survey results								
Outcomes								
Engagement survey results								
Productivity								
Retention/turnover at 90 & 365 days								
Profitability								

Exhibit 6.1 Data Tracking Tool

Client:	Internal Business Owner:	Client Business Owner:
Extract ID:	Internal Due Date:	Client Due Date:

Please complete all of the fields below.

Any additional detail or examples will be helpful in ensuring that the extract meets the client's needs

Business Case/Use Description of what the data will be used for and how it will be consumed. Use this field for additional notes.	
Frequency—How often this extract will be run (monthly, quarterly, etc.).	
Date Range—The dates over which the report will be run. Specify if this is NOT based on reporting dates.	
Required Columns—Include all columns you wish to appear in the extract as they should be named in the extract. Do not write "same as data download". Provide description if the column name does not clearly define the data it contains.	
Data Rights—Provide the user login or other method of determining what data to include in the report.	
Filters—If the data is limited beyond dates and data rights, list all other filter items.	
Column Delimiter—Provide the character to be used as a delimiter (",","|", etc.).	
File Output Format—Include all formatting information (default is Unicode).	
Output File Name—Name of file, including YYMMDD notation to ensure uniqueness over multiple runs.	
Data Validity Tests—List MTM reports or other data that can be used to test whether extract is correct.	
FTP Folder/Drop—Where the file should be placed or sent when completed.	

Exhibit 6.2 Data Request Template

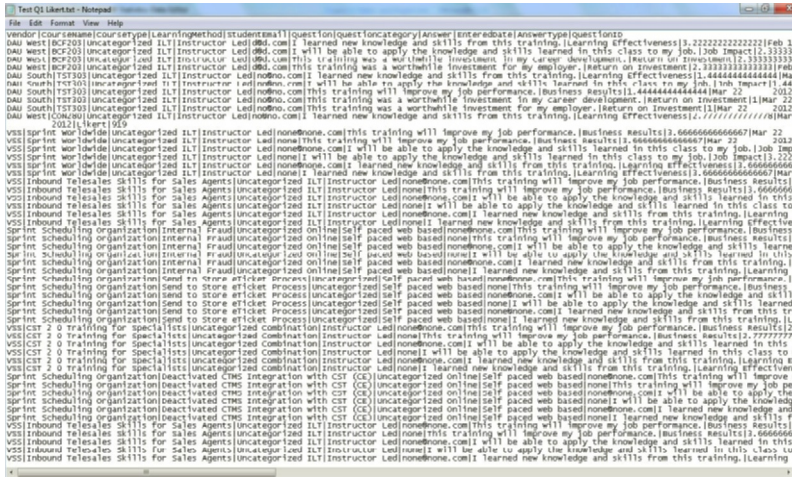


Exhibit 6.3 Delimited Data File

When data requests are common, the information technology (IT) organization often has a process for submitting a request. That request might include such things as sponsor, purpose, and requestor as well as all of the details about the data. Exhibit 6.2 shows an example of a data request.

Formatting the Data for Analysis

Whether the data set is large or small, it often comes in a package that needs a little unwrapping. First, it may be a string of numbers in rows separated by columns, pipes, or some other delimiters that mark the beginning and end of a column. (See Exhibit 6.3.) This file is useless unless it can be separated into rows and columns. MS Excel and MS Access have import features that allow users to open and align such files. Second, the file structure may be a vertical file (see Exhibit 6.4) with only a few columns and many rows or a cross-tab format (see Exhibit 6.5). A vertical file is great for storage and for using a tool like Pivot Tables in MS Excel. For more advanced analytics, a cross-tab structure is needed, wherein each row is a case (e.g., person) and each column is a variable (e.g., question on a survey). A transformation is

Course Type	Learning Method	Student Email	Question	Question Category	Answer	Entered Date	Answer Type
Uncategorized	Instructor Led	pearson1@companya.com	I learned new knowledge and skills from this training	Learning Effectiveness	2.333333333	27-Feb	Likert
Uncategorized	Instructor Led	pearson1@companya.com	I will be able to apply the knowledge and skills learned in this class to my job.	Job Impact	2.333333333	27-Feb	Likert
Uncategorized	Instructor Led	pearson1@companya.com	This training will improve my job performance.	Business Results	2.333333333	27-Feb	Likert
Uncategorized	Instructor Led	pearson1@companya.com	This training was a worthwhile investment in my career development.	Return on Investment	2.333333333	27-Feb	Likert
Uncategorized	Instructor Led	pearson2@companya.com	This training was a worthwhile investment in my career development.	Return on Investment	2.777777778	30-Mar	Likert
Uncategorized	Instructor Led	pearson2@companya.com	I learned new knowledge and skills from this training.	Learning Effectiveness	2.333333333	30-Mar	Likert
Uncategorized	Instructor Led	pearson2@companya.com	This training was a worthwhile investment in my career development.	Return on Investment	2.333333333	18-Apr	Likert
Uncategorized	Instructor Led	pearson2@companya.com	I learned new knowledge and skills from this training.	Learning Effectiveness	2.333333333	18-Apr	Likert
Uncategorized	Instructor Led	pearson3@companya.com	I learned new knowledge and skills from this training.	Learning Effectiveness	2.333333333	20-Mar	Likert
Uncategorized	Instructor Led	pearson3@companya.com	This training was a worthwhile investment in my career development	Return on Investment	2.333333333	20-Mar	Likert

Exhibit 6.4 Vertical Display of a Data Set

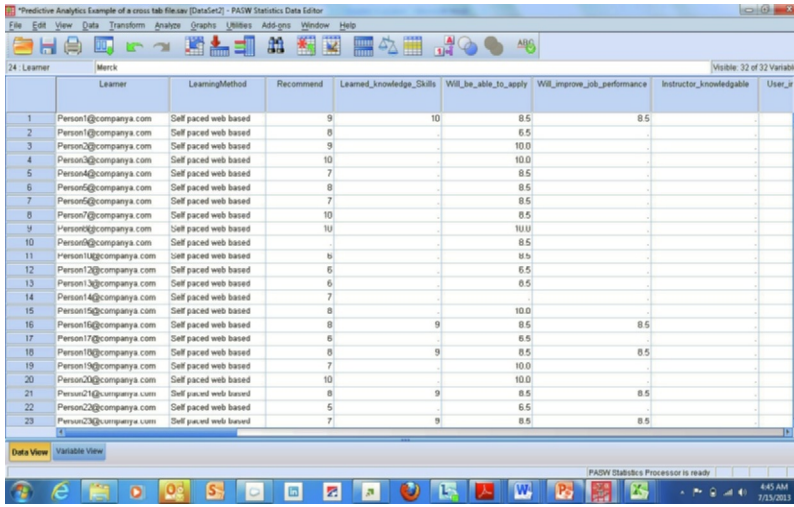


Exhibit 6.5 Cross-Tab Display of a Data Set

required to convert a vertical file into a cross-tab file. MS Access is a capable tool for the conversion.

At this time, it is worth describing the actual data that we have collected for our example. Exhibit 6.6 shows each measure and describes the nature of the data and how it was collected.

SECOND STEP: ANALYZE AND REPORT THE DATA

Once the data set is structured into a usable file format, the process of data analysis begins. Statistical analysis is generally divided into two types: Descriptive and inferential.

- **Descriptive statistics** describe the data by using statistical terms that have become common in day-to-day language, such as the number of responses, the mean or average, the standard deviation, or a frequency distribution. Descriptive analysis is necessary to understand the data.
- **Inferential statistics** search for relationships among variables using techniques like correlation and regression. Inferential statistics also test for differences between groups using *t*-tests and analysis of variance, among other techniques. Based on the

Measures	Data type	How data are collected
Efficiency		
Time to fill open positions	Time in days to hire new hire X	Tracked in the Talent Management System: Recruiting Module
Salary associated with positions	Monetary value: Salary for new hire X	Talent Management System
Cost to hire the new resource	Monetary value: Salary plus administrative costs of hiring	Talent Management System
Number of open requisitions	Not included in this analysis which focuses on the new hires rather than the recruiter	N/A
Positions filled per month	Not included in this analysis which focuses on the new hires rather than the recruiter	N/A
Effectiveness		
Performance Ratings at 90 days & 365 days	Numeric value ranging from 1 to 9 1 = Low potential/low performance 5 = Moderate potential/as expected performance 9 = High potential/high performance	Data are collected at 90 days and during the annual review process via an organizational survey
Identification of high potentials	Yes or No rating	Based on 90-day performance rating

Exhibit 6.6 Definitions of Metrics

Measures	Data type	How data are collected
Assessment results	Numeric value ranging from 1 to 5	Gathered from a competency assessment instrument as the overall level of competence for the technical role of the new hire
Speed to competency	Time in days for new hire to demonstrate competency with job tasks	Determined by the new hire's manager; captured in the Talent Management System
Sponsor satisfaction–leader input	Numeric value ranging from 1 to 5	Business unit leader's rating of the performance quality of the new hire; collected during the annual performance review via organizational survey
Exit survey results	Numeric value ranging from 1 to 5	Response to the question, "Would you recommend this organization to a friend or family?"
Outcomes		
Engagement survey results	Numeric value ranging from 1 to 5	Response to the question, "Overall, I am thriving in my role."
Productivity	Percentage value ranging from 0 to 100%	This value is based on hours of work performed for clients as percentage of total time worked.
Retention/Turnover within 90 or 365 days	Yes or No	Departure from the organization is tracked in the Talent Management System
Profitability	Calculated value	(Productivity % − 50%) × Salary = estimated profitability per person

Exhibit 6.6 (Continued)

Measures	Descriptive	Display: Graphs for Dashboards	Inferential
Efficiency			
Number of open requisitions	N count of open requisition by business unit or level	Line chart by business unit or level	ANOVA: compare across business units or levels
Positions filled per month	N count of filled positions per month by business unit or level	Line chart by business unit or level	ANOVA: compare across business units or levels
Time to fill open positions	Average amount of time in days; also display outliers high and low	Bar chart of average time to fill by business unit or level	ANOVA: compare across business units or levels
Salary associated with positions	Average salary (possibly standard deviation) by business unit and level	Box and whisker chart displaying average salary and standard deviation or quartiles	ANOVA: compare across business units or levels
Cost to hire the new resource	Average cost to hire (possibly standard deviation) by business unit and level	Box and whisker chart displaying average cost and standard deviation or quartiles	ANOVA: compare across business units or levels
Effectiveness			
Performance Ratings at 90 days & 365 days	Percentages within each of the 9 boxes	9-box (3x3) display	ANOVA: compare across business units or levels
Identification of high potentials	Percentage of 6–9 ratings	Bar chart by business unit or level	ANOVA: compare across business units or levels

Exhibit 6.7 Basic Analytics Plan

Measures	Descriptive	Display: Graphs for Dashboards	Inferential
Assessment results	Average of assessment scores by competency; highlight strengths and gaps	Bar chart by business unit or level	ANOVA: compare across business units or levels
Speed to competency	Average amount of time to demonstrate competence	Bar chart by business unit or level	ANOVA: compare across business units or levels
Sponsor satisfaction–leader input	Average response to each survey question	Bar chart by leader	ANOVA: compare across leader
Exit survey results	Average response to each survey question	Bar chart by business unit or level	ANOVA: compare across business units or levels
Outcomes			
Engagement survey results	Average response to each survey question	Bar chart by leader or business unit	ANOVA: compare across leaders or business units
Productivity	Average number of chargable hours (or widgets produced)	Bar chart by leader or business unit	ANOVA: compare across leaders or business units
Retention/Turnover within 90 or 365 days	Average turnover percentage at 90 and 365 days	Bar chart by business unit or level	ANOVA: compare across business units or levels
Profitability	Average Revenue	Bar chart by business unit or level	ANOVA: compare across business units or levels

Exhibit 6.7 (Continued)

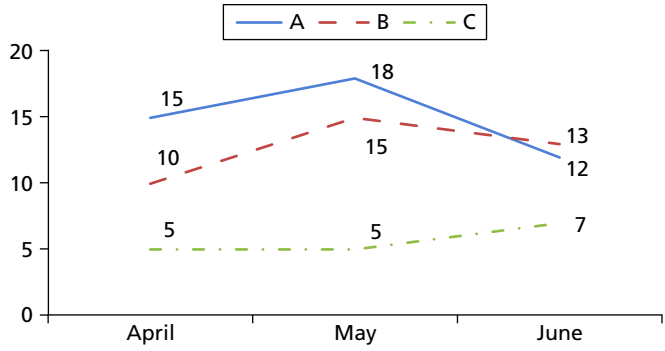


Exhibit 6.8 Open Positions by Business Unit in Quarter

results of the statistical test, the analyst infers that the relationship (or difference) is true for the cases in the sample but also generalizable to the entire population. Predictive analytics is an extension of inferential statistics because inferential techniques are used to predict future values.

Exhibit 6.7 shows a basic analytics plan for each of the measures in our example. The majority of the work outlined in this table focuses on descriptive statistics—computing *N* counts, averages, or 9-box ratings for each business unit or level. These results are necessary to describe the current state of the organization using the KPIs.

Inferential statistics are also noted in Exhibit 6.7. For all cases, the analytic technique is analysis of variance (ANOVA). It is used to compare the averages across groups, such as business units or levels. While statistical tests are not always necessary, they can be useful. When the results are shared with stakeholders, someone will likely ask, "Is that difference among groups statistically significant?" If the ANOVA test has been completed, that question can be answered yes or no with authority. It is also worth noting that practical significance is also important. A statistically significant difference may not be meaningful. For example, the turnover rates among three business units might be 8.6%, 9.1%, and 8.8%. An ANOVA test might find that the differences in turnover among the three business units are significant because the business units are so large. (As samples increase in size, the likelihood of finding a statistically significant difference increases). However,

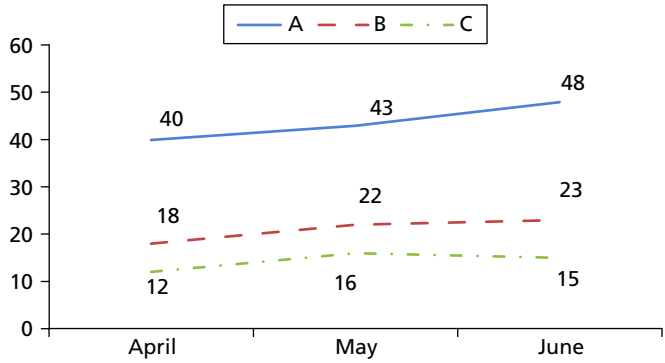


Exhibit 6.9 Average Number of Days to Fill a Position

these rates are relatively low, and they are still close to each other. A "real" or meaningful difference might be 5% or 10%. Stakeholders will help determine those meaningful differences though discussion.

Additional inferential and predictive statistics will be discussed later in the chapter.

For now, look back to Chapter 4 and the exhibits shown there. The results are displayed at the highest level of aggregation. The next step is to build additional graphs for each metric that reflect values for each business unit. Exhibit 4.1 shows the number of open positions and the number of positions filled by month for the quarter. Exhibits 6.8 and 6.9 show these metrics in more detail by business unit. Exhibit 6.10 shows the average cost per hire for each business unit.

In a step-by-step process, the data analysis plan in Exhibit 6.3 can be completed for each measure. Graphs like those in Exhibits 6.8 through 6.10 should be created to display the data visually. After the preferred displays have been selected by stakeholders, the static graphs should be transformed into dashboards that will be available for stakeholders on demand and will automatically update with new information.

To complete the analysis plan, the results should be tested for statistical significance. Several software packages are available, such as Minitab, MS Excel, SPSS, SAS, and R. The statistical analysis can be complex. If you do not have the skills, find a business analyst in your organization who does or hire an external contractor. Although the

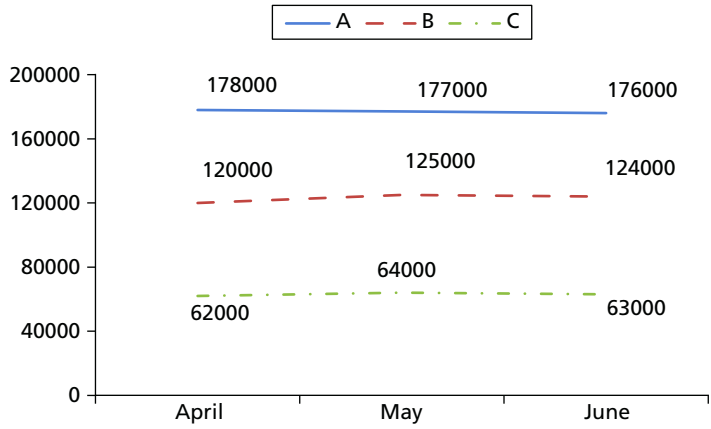


Exhibit 6.10 Average Cost per Hire for Each Business Unit

statistical analysis itself may be complex, displaying the results should not be complicated. If there are statistical differences between groups, simply add an asterisk (*) or some form of color coding to the chart to denote the statistical difference. Add a legend at the base of the graph that clarifies the test, such as "Business unit A is significantly greater than business unit B." Finally, information should lead to action. So, when presenting the results to stakeholders, it is best to highlight meaningful differences that leaders can act on.

RELATIONSHIPS, OPTIMIZATION, AND PREDICTIVE ANALYTICS

The practical value of descriptive statistics is that they provide a good view of the current state. That view often spurs good discussion about the relationships among the data. Moreover, discussions lead to questions. And questions turn into hypotheses that can be tested.

Based on the analysis we have performed in Chapter 4 and Exhibits 6.8 through 6.10, some simple questions arise:

- Why is business unit A hiring more people than units B and C?
- Why is it taking longer to hire people in business unit B?
- Why are salary costs so much higher for business units B and C?

These questions are often easy to answer based on the nature of the business. Business unit A is hiring more people than units B and C because unit A is developing a new product line and needs more engineers. Business unit B is taking longer to hire people because the requisitions are for senior leaders who are scarce and hard to find. For business unit C, salary costs are low because most positions are not highly specialized technical roles.

The data may highlight the differences, but discussions with stakeholders make the results meaningful.

Dashboard results often spur stakeholders to ask a what-if set of questions.

- What if we look outside of our geographic region?
- What if we lowered the standards in the hiring criteria?
- What if we offered higher salaries?
- Would any of these changes lead to improvements in the efficiency measures?
- What is the monetized benefit of reducing time to hire?

These what-if questions are valuable. Leaders ask them so they can manage the business more efficiently. They should also ask similar questions for improving effectiveness measures. This process puts the Boudreau and Ramstad Optimization Model into practice.[1] (See Exhibit 6.12). By adjusting the efficiency and effectiveness measures, stakeholders can optimize the performance of the organization.

PREDICTIVE ANALYTICS

At this point, when current data spur what-if questions, we begin venturing into the realm of predictive analytics. If X (efficiency) and Y (effectiveness) inputs change, what will happen to Z (business outcomes)? This model applies for all aspects of the business, including HR. If Unit B lowers its hiring standards (effectiveness), it will increase its efficiency (time to hire). But there may be unexpected consequences of efficient hiring. In the long run, lower-quality hires might produce less effective outcomes (lower-quality product or less innovative products). The "fast" hire, rather than the "best" or "good

enough" hire, may not have the management skills necessary for promotion, creating a gap that needs to be filled with skill development or a new hire.

Predictive analytics is based on relationships among variables, and its aim is to answer difficult questions, such as: If X and Y inputs change, what will happen to Z? Using currently available data, the future can be predicted—sometimes with great certainty.

Considering the data that is available in Exhibit 6.11, we can use inferential statistics to understand the relationships among efficiency, effectiveness and outcomes. Insights can be gained simply by looking at graphs of the results (e.g., longer hiring cycles for Unit A lead to faster speed to competency and better quality), but there are several benefits of predictive analytics. The analysis:

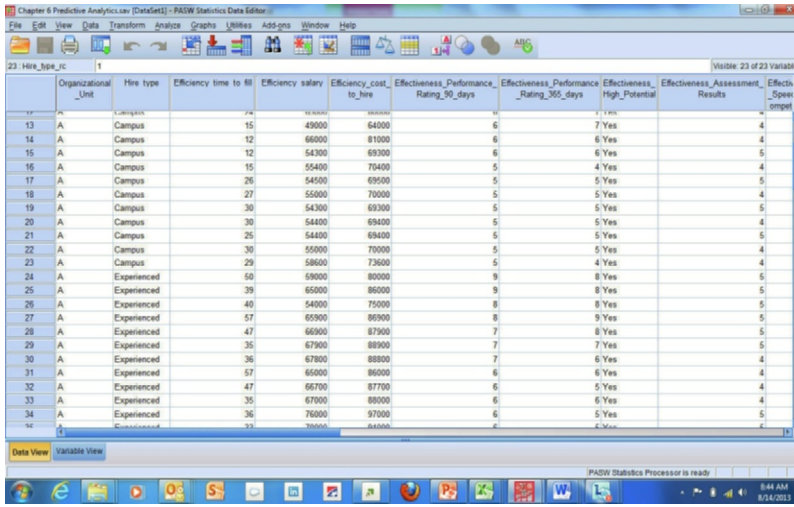
- Isolates the best predictors and eliminates those that have no influence
- Quantifies the influence of predictors—determines how much the predictor makes the outcome measure rise or fall
- Provides a mathematical model to describe the current state
- Predicts future values

Exhibit 6.11 is the data set for the predictive analysis performed in the rest of the chapter.

Data analysis begins with a plan. In this case, the plan is to examine the relationships among efficiency, effectiveness, and outcome variables. The plan starts at the highest level by including all cases in the analysis and then moves toward analyzing subgroups, such as business units A, B, and C or campus hires (e.g., new graduates) versus experienced hires (e.g., candidate with job experience). Three analytic techniques are recommended:

1. Correlation
2. Regression
3. Structural equation modeling

Correlation is the simplest of the three techniques. It examines the relationship between two variables. It answers the question: If X increases in value, what happens to Y? If X increases by 1 and Y



	Organizational_Unit	Hire type	Efficiency time to fill	Efficiency salary	Efficiency_cost_to_hire	Effectiveness_Performance_Rating_90_days	Effectiveness_Performance_Rating_365_days	Effectiveness_High_Potential	Effectiveness_Assessment_Results
13	A	Campus	15	49000	64000	6	7	Yes	4
14	A	Campus	12	66000	81000	6	6	Yes	4
15	A	Campus	12	54300	69300	6	6	Yes	5
16	A	Campus	15	55400	70400	5	4	Yes	4
17	A	Campus	26	54500	69500	5	5	Yes	5
18	A	Campus	27	55000	70000	5	5	Yes	4
19	A	Campus	30	54300	69300	5	5	Yes	5
20	A	Campus	30	54400	69400	5	5	Yes	4
21	A	Campus	25	54400	69400	5	5	Yes	5
22	A	Campus	30	55000	70000	5	5	Yes	4
23	A	Campus	29	58600	73600	5	4	Yes	4
24	A	Experienced	50	59000	80000	9	8	Yes	5
25	A	Experienced	39	65000	86000	9	8	Yes	5
26	A	Experienced	40	54000	75000	8	8	Yes	5
27	A	Experienced	57	65900	86900	8	9	Yes	5
28	A	Experienced	47	66900	87900	7	8	Yes	5
29	A	Experienced	35	67900	88900	7	7	Yes	5
30	A	Experienced	36	67800	88800	7	6	Yes	4
31	A	Experienced	57	65000	86000	6	6	Yes	4
32	A	Experienced	47	66700	87700	6	5	Yes	4
33	A	Experienced	35	67000	88000	6	6	Yes	4
34	A	Experienced	36	76000	97000	6	5	Yes	5

Exhibit 6.11 Data Set for Predictive Analytics

increases by 1, there is a perfect positive relationship. A correlation is described by the statistic *r*, which ranges from −1 to + 1. A zero value indicates no relationship. A −1 indicates that Y decreases proportionally as X increases. A +1 indicates that Y increases proportionally as X increases.

Thinking back to high school, the correlation between an individual's grade point average (GPA) and his or her standardized test score (e.g., American College Testing (ACT) score and Scholastic Aptitude Test (SAT)) is high. That is, if students have a high GPA, they are likely to score high on the SAT. There is not a perfect relationship for many reasons: Some high performers in school do not do well on standardized tests; some high school curricula are harder than others; some teachers give higher grades than others. Regardless of the reasons, there is still a strong relationship between the two scores. Similarly, we can expect that there should be a strong relationship between hiring time and hiring quality for a business unit (e.g., more time equals better quality).

Exhibit 6.12 shows the correlations between GPA and ACT/SAT scores for applicants to Auburn University in 2012. This graph is full of information. It shows the scatter plot of ACT/SAT scores and GPA scores. There is clearly a relationship here. Students with lower ACT/SAT

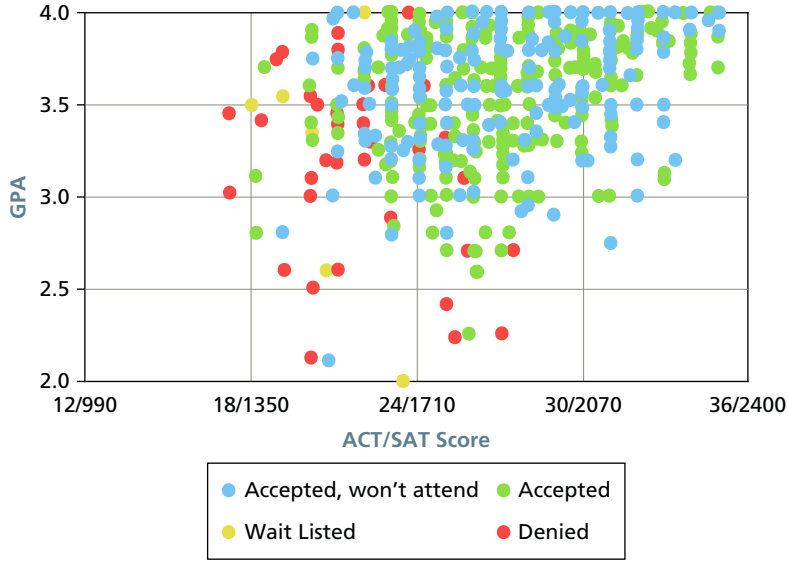


Exhibit 6.12 Correlation Values between GPA and ACT/SAT Scores: Auburn University *Source:* Cappex.com About.com College Admissions. Used with permission.

scores often have lower GPAs; likewise, students with high ACT/SAT scores have high GPAs. Additionally, this graph reflects which students were accepted, denied, wait-listed, and accepted but won't attend. In this graph, the decision (accept/reject) is already displayed.

Interestingly, the graph shows the ACT/SAT scores on the X axis and the GPA scores on the Y axis. This implies that ACT/SAT scores are influencing GPA. Since GPAs are often measured before ACT/SAT scores, they could be graphed on the X axis. This brings up an important point about correlations. They simply quantify the relationship between two variables. While a correlation implies that X causes Y, it may or may not. Think about heart disease for a moment. Age is correlated with heart attacks, but getting older is not the cause. A leading cause is an unhealthy diet and consequential weight gain. Both lead to atherosclerosis (blockage in the arteries of the heart). When the heart receives a limited blood supply and starves for oxygen, it fails. Correlation *implies* causation, but it does not *equal* causation. Exhibit 6.13 represents the correlation between GPA and ACT/SAT score. The two-headed arrow indicates that there is a relationship in

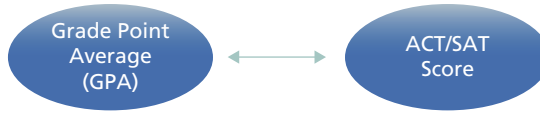


Exhibit 6.13 Correlation Model Showing Factors that Might Predict ACT/SAT Score

both directions. A single-headed arrow indicates causation, as shown in Exhibit 6.14.

Ultimately, we would like to understand causes. What factors lead to quality hires and retention of top talent? In their book, *Big Data: A Revolution That Will Transform How We Live, Work and Think*, Mayer-Schonberger and Cukier argue that correlation helps describe what is happening, not necessarily why it is happening, and that is often enough.[2]

Multiple linear regression is a slightly more advanced statistical technique than correlation, but it is based on the same principles—examining how variables covary. The primary difference is the use of multiple simultaneous predictors. To predict SAT scores, several variables can be used, such as GPA, socioeconomic status, advanced placement courses, extracurricular activities, and so forth. Likewise, several variables can be used to predict new hire quality, including time to hire, degree obtained, university attended, major, job experience, industry experience, tenure in role, and others.

Regression examines the correlations among all variables and selects the variables that have the strongest relationship with the outcome variable (e.g., productivity or profitability). It also removes the overlap among the predictors, so the predictive power of each variable is unique. In this way, regression is superior to correlation because it quantifies and rank orders the best unique predictors of an outcome. The regression model shown in Exhibit 6.14 depicts the drivers of SAT/ACT scores.

Another statistical technique, **structural equation modeling** (SEM), is an excellent way to examine multiple hypotheses at once and determine causal pathways. It is based on confirmatory factor analysis and requires large data sets. It is a much more complicated analysis than regression and requires specialized software, such as Lisrel or AMOS. If the data set is amenable to the analysis, SEM

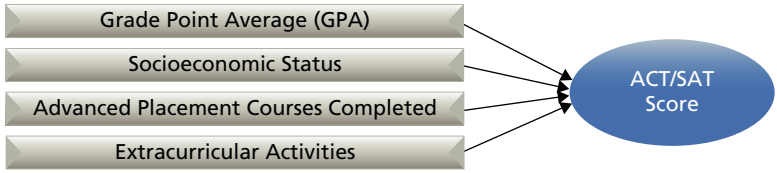


Exhibit 6.14 Regression Model Showing Factors that Might Predict ACT/SAT Scores

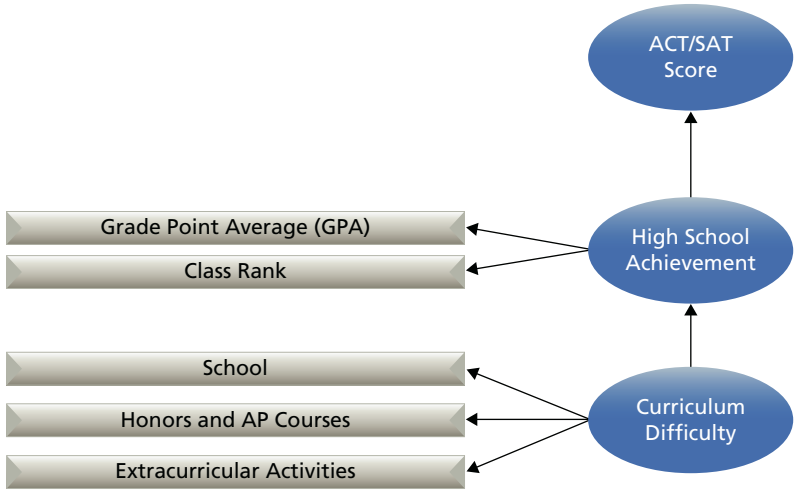


Exhibit 6.15 Hypothetical Structural Equation Model Showing Possible Predictors of ACT/SAT Scores

is a preferred technique because it can create a best-fitting model of the relationships among all the variables and provide reliable insights about the influence of multiple factors on each other and an outcome measure. Exhibit 6.15 shows a hypothetical structural equation model for factors influencing high school achievement and ACT/SAT scores.

INTERPRETING THE RESULTS

Statistical techniques provide valuable results, but they require interpretation before they become useful.

Correlation

Correlational analysis provides good insight into the relationships among the key variables in the data set. Before we examine the relationships, it's important to formulate a hypothesis—at least to establish in our own minds our expectations about relationships among our measures.

We can expect that several metrics will be closely related to each other, such as the performance ratings at 90 and 365 days. Additionally, the new hire's salary and the cost to hire should be related because the salary is a component of the cost to hire. We might also expect that high potential status, the competency assessment score, and speed to competency will be similar. The key concern is this: How do these measures relate to individual productivity and in turn profitability? Exhibit 6.16 shows the relationships among variables using the statistic *r*. The values range from −1.00 to +1.00. The strongest relationships are closest to +1.00 or −1.00.

Italicized values in this figure are significantly correlated. For example, the relationship between cost to hire (third row) and salary (second column) is .999, almost perfect. The correlation between time to fill (first row) and salary (second column) is positive, slight (close to zero) and not significant. Last, the two values that are underlined are nearly significant, close to the .05 significance level.

A diagonal line from the top left to the bottom right of the figure shows a value of 1 at the intersection of each measure with itself. Each measure is perfectly correlated with itself. The triangle of values below this diagonal line of 1s mirrors the triangle of values above the diagonal.

Here is a simple interpretation of the values in the figure.

- **Time to fill** is correlated with all measures except salary, cost to hire, and the engagement survey rating. Notably, it is negatively correlated with speed to competency. As time to fill increases, the speed to competency decreases.
- **Salary** is correlated with only three variables: cost to hire, exit survey rating, and profitability. The cost to hire metric and

KPI	Time to Fill	Salary	Cost to Hire	Performance Rating 90 Days	Performance Rating 365 Days	Assessment Results	Speed to Competency (days)	Sponsor Satisfaction	Exit Survey Rating	Engagement Survey Rating	Productivity	Profitability
Time to fill	1	.052	.065	*.633*	*.556*	*.398*	*−.326*	*.201*	*.587*	.140	*.537*	*.386*
Salary	.052	1	*.999*	−.170	−.046	.105	−.024	.070	*−.568*	.029	−.006	*.514*
Cost to hire	.065	*.999*	1	−.168	−.046	.100	−.022	.062	*−.569*	.024	−.002	*.512*
Performance Rating 90 days	*.633*	−.170	−.168	1	*.915*	.695	*−.746*	*.449*	*.851*	*.341*	*.848*	*.468*
Performance Rating 365 days	*.556*	−.046	−.046	*.915*	1	.714	*−.686*	*.492*	*.838*	*.334*	*.864*	*.548*
Assessment Results	*.398*	.105	.100	*.695*	*.714*	1	*−.749*	*.726*	*.809*	*.492*	*.747*	*.585*
Speed to competency (days)	*−.326*	−.024	−.022	*−.746*	*−.686*	−.749	1	*−.555*	*−.865*	*−.264*	*−.750*	*−.503*
Sponsor Satisfaction	*.201*	.070	.062	*.449*	*.492*	.726	*−.555*	1	*.732*	*.339*	*.572*	*.467*
Exit survey rating	*.587*	*−.568*	−.569	*.851*	*.838*	.809	*−.865*	*.732*	1	.525	*.799*	*.714*
Engagement Survey Rating	.140	.029	.024	*.341*	*.334*	.492	*−.264*	*.339*	.525	1	*.316*	*.207*
Productivity	*.537*	−.006	−.002	*.848*	*.864*	*.747*	*−.750*	*.572*	*.799*	*.316*	1	*.617*
Profitability	*.386*	*.514*	.512	*.468*	*.548*	.585	*−.503*	*.467*	*.714*	*.207*	*.617*	1

Exhibit 6.16 Correlations among Variables

profitability are algebraic variations of salary so we expect these to be related. Surprisingly, salary is negatively correlated with the exit survey rating.

- **Cost to hire** is correlated with only two variables: the exit survey rating (negatively) and profitability. Cost to hire is a function of salary. Logically, it does not have much influence on exit survey ratings. It is related to profitability because costs impact profitability and for this reason cost has a significant correlation. Profitability increases as salary decreases.
- **Performance ratings at 90 days** are related to all variables except salary and cost to hire. Speed to competency is negatively correlated. As speed decreases (fewer days required to demonstrate competency), performance ratings increase.
- **Performance ratings at 365 days** are related to all variables except salary and cost to hire. Speed to competency is negatively correlated. As speed decreases (fewer days required to demonstrate competency), performance ratings increase.
- **Speed to competency** is correlated with all variables except salary and cost to hire; all correlations are negative. That is, faster speed to competency (fewer days required to demonstrate competence) is correlated better performance.
- **Sponsor satisfaction** is correlated with all variables except salary and cost to hire. It correlates negatively with speed to competency.
- The **exit survey rating** is correlated with all ratings except the engagement survey rating. Notably, the correlation value is moderate at .525, which means there is a relationship here. An examination of the significance test shows the p-value to be .054, meaning it missed being included as a statistically significant relationship by four thousandths of a point. Practically, we can consider this a meaningful relationship—positive engagement ratings often yield positive exit survey scores.
- **Engagement survey ratings** are correlated with all items except time to fill, salary, cost to hire, and the exit survey rating.

- **Productivity** is correlated with all other measures except salary and cost to hire. The correlation with speed to competency is negative.
- **Profitability** is correlated with all measures and negatively related to speed to competency.

The correlational analysis describes which measures are related. But it does not always offer clarity. A lot of information is included in the list, and it is not easy to discern which relationships are most important. This is clearly a drawback of correlational analysis, especially when many measures are involved.

The next step is to determine which measures are most strongly related. Rather than looking across all of the variables, let's consider the two most important: productivity and profitability. Exhibit 6.17 shows the correlation between each measure and productivity.

	Productivity
Productivity	1.00
Performance rating 365 days	*.864*
Performance rating 90 days	*.848*
Exit survey rating	*.799*
Speed to competency (days)	*–.750*
Assessment results	*.747*
Profitability	*.617*
Sponsor satisfaction	*.572*
Time to fill	*.537*
Engagement survey rating	*.316*
Salary	–.006
Cost to hire	–.002

Exhibit 6.17 Rank Ordered Correlations for Productivity

KPI	Profitability
Profitability	1.00
Exit survey rating	*.714*
Productivity	*.617*
Assessment results	*.585*
Performance rating 365 days	*.548*
Salary	*.514*
Cost to hire	*.512*
Speed to competency (days)	*–.503*
Performance rating 90 days	*.468*
Sponsor Satisfaction	*.467*
Time to fill	*.386*
Engagement survey rating	*.207*

Exhibit 6.18 Rank Ordered Correlations for Profitability

Exhibit 6.18 shows the correlation between each measure and profitability. The correlations are rank ordered within each figure so the strongest relationships are at the top. Again, statistically significant relationships are italicized.

By rank ordering, it becomes quickly apparent that performance ratings are most highly correlated with productivity. This is a good sign; a manager's opinion about employee performance coincides with actual productivity.

Notably, speed to competency may seem out of place in the exhibit since it is a negative value among positives. However, it is placed among them because of its magnitude, or the strength of the relationship, while ignoring the valence. Similarly, salary has a stronger influence than cost to hire; that is why it is higher in the ranking.

Profitability is significantly related to all of the measures. Profitability is linked to effectiveness and outcomes measures because

they are related to performance. Profitability is also related to the efficiency measures because it is computed based on a mathematical combination of productivity and salary. Positive exit survey scores are most strongly related to profitability. This is likely for two reasons. First, people who enjoy their jobs and have a positive view of the organization upon departure are often productive and contribute to the organization's profitability. Second, those who are not happy or well suited for their jobs and do not like the organization are often not productive and do not contribute to the organization's profitability.

Throughout this analysis, we have focused on all cases across all business units. The same analysis can be repeated within each business unit to determine if relationships are different across units. In this case, the relationships are not substantially different.

From these results, we see that there are moderate to strong relationships among our key metrics. Yet there may also be some redundancies or overlap in our measures. Rank ordering the correlational values gives us some insight into the relationships, but it does not help us determine the overlap or redundancy in the predictive capabilities of our measures. Another statistical technique is required: regression.

Multiple Linear Regression

Regression is similar to correlation in that it examines the relationships among measures, but it also does a much better job of sorting the measures that are the best predictors of an outcome. In this case we will predict profitability.

Using software called the Statistical Package for Social Sciences (SPSS), regression analysis was conducted on the data set to determine which measures in Exhibit 6.1 are the best predictors of profitability. The analysis provides the following mathematical model for predicting profitability.

$$\text{Profitability} = -28248.06 + 692.06\ (\text{Productivity})$$

Exhibit 6.19 provides a graphic representation. The r^2 value for the equation is 38%, indicating that the productivity measure accounts for 38% of the variance in the profitability measure.

Exhibit 6.19 Predictor of Profitability

This equation indicates that there is only one statistically significant predictor of profitability, and it is productivity. From a theoretical and practical perspective, this is what we would expect. Individual productivity leads to profitability. It would be unexpected and less meaningful if sponsor satisfaction or the exit survey rating was the best predictor of profitability.

Using the equation, we can predict profitability using any productivity score.

A productivity score of 10 yields this profit:

$$-28248.06 + (692.06 \times 10) = -\$21{,}327.46$$

A productivity score of 90 yields this profit:

$$-28248.06 + (692.06 \times 90) = \$34{,}037.34$$

Thus, a person with who is billable only 10% of the time costs the organization more than $21,000. The negative valence indicates the person is not generating a profit. A person who is billable 90% of the time generates more than $34,000 in profit. The difference in profitability between the two is substantial: $55,364.80.

From this equation, it is clear that productivity (measured as billable hours) is directly and positively related to profitability.

While it is a relief to know that productivity is the driver of profitability, it also raises another question: What are the drivers of productivity? That question can be answered with regression as well.

When predicting productivity, all of the measures we have mentioned are used to predict this outcome. Two exceptions are worth noting: the exit survey rating and profitability. The exit survey measure only has 14 cases. If this measure was used, it would limit the analysis to just those 14 cases. We want to take advantage of the entire data set of 100+ cases, so we will exclude the exit survey measure. Profitability

Exhibit 6.20 Predictors of Productivity

was dropped because we hypothesize that productivity drives it, not that profitability drives productivity.

Exhibit 6.20 provides a graphic representation. The r^2 value for the equation is 81%, indicating that the four factors that predict productivity account for 81% of the variance in the measure.

The four factors predict productivity in the following way:

$$\text{Productivity} = 34.74 + 5.62\,(\text{Performance rating at 365 days}) - .12\,(\text{Speed to competency}) + 2.64\,(\text{Sponsor satisfaction}) + .149\,(\text{Time to fill})$$

This equation shows us that performance ratings at 365 days are the most important predictor. As ratings increase, productivity increases. The second most important predictor is speed to competency. Faster speed (less time) to competency yields higher productivity. The third predictor is the sponsor's satisfaction. This is probably a redundant measure because it is very similar in nature to the manager's performance rating, but statistically it still adds unique predictive power. Last, as the time to fill measure increases, so does productivity. That is, it is better to wait longer to find a great candidate than to find a good one quickly.

Interpretation/Action

Practically speaking, the annual performance rating is a powerful predictor here. An employee's annual rating should be closely linked to actual productivity. However, the utility of this predictor is limited. There is very little value in waiting a full year to predict someone's expected productivity and, in turn, profitability. A predictor that comes earlier in an employee's tenure would be much more useful for predicting future profitability at one year. Speed to competency is a

very practical measure in this case. According to the data, the average speed to competency is 90 days. Anyone who is declared competent before reaching 90 days on the job is likely to be highly productive and profitable. Anyone requiring more than 90 days is a candidate for performance support or termination.

The sponsor satisfaction rating does not provide additional insight beyond the annual performance rating. It is recommended to stop gathering this measure to save time and effort.

The time-to-fill metric provides good insight. This result indicates that strong candidates often take longer to find. Every additional day spent finding a candidate increases the productivity score by .149. For every additional week of searching the productivity score goes up by 1.0, or 1% of billable time. Spending an additional five weeks to find the best candidate is likely to increase productivity by 5%. This does not mean recruiters should lengthen the recruiting process just to make it longer. It means that it is worth the extra time to search for stronger candidates. Quality comes with time.

PREDICTING THE FUTURE

Assume for a moment that HR wants an early indicator of the quality of the candidates who have been hired. Using what we know from the regression analysis of productivity, we see that two early indicators are useful: speed to competency and time to hire. At 90 days posthire, we will not have the other two measures, performance rating at 365 days and sponsor satisfaction, so we should not consider them as predictors. Let's modify the prediction equation by dropping the performance rating and sponsor satisfaction metrics. When we rebuild the equation, it looks like this:

$$\text{Productivity} = 83.23 - .30\ (\text{Speed to competency}) + .42\ (\text{Time to till})$$

Using the prediction equation and the data we have for five new hires, we can predict their future productivity. Exhibit 6.21 shows the values for five new hires at 90 days posthire.

New hires A to C look promising. In fact, they should be billable 86% of the time or more, based on our prediction. New hires D and E have no predicted score because they have not been declared

New Hire	Speed to Competency	Time to Fill	Predicted Productivity
A	50 days	67 days	96.37
B	45 days	50 days	90.73
C	66 days	55 days	86.53
D	Not declared competent	12 days	No value
E	Not declared competent	28 days	No value

Exhibit 6.21 Predicted Productivity Scores for Five New Hires

New Hire	Speed to Competency	Time to Fill	Predicted Productivity	Predicted Profitability
A	50 days	67 days	96.37	$38,446
B	45 days	50 days	90.73	$34,543
C	66 days	55 days	86.53	$31,636

Exhibit 6.22 Predicted Profitability for Three New Hires

competent at 90 days. This in itself should be a good indicator that these two employees will not be stellar performers during the first year. Their managers should review their performance and provide development opportunities or terminate employment.

Exhibit 6.22 extends our predictive capabilities to show the estimated profitability of the three high-performing candidates.

The predicted profitability for each new hire exceeds $30,000. Since salary and benefits are included in the profitability metric, these values represent revenue that goes directly to the bottom line.

Throughout this analysis, we have focused on all cases across all business units. The same analysis can be repeated within each business unit to determine if relationships are different across units. In this case, the relationships are not substantially different.

You may wonder why you should go through all of this effort to demonstrate something that is generally common knowledge—that

speed to competence is a good indicator of productivity. The value comes from the ability to predict performance and manage employees as soon as possible. New hires D and E may need some performance support from training, coaching, job aids, or other means. Alternatively, they may need to be terminated. Such early intervention can improve performance, increase productivity, save a career, and continue to improve organizational performance.

STRUCTURAL EQUATION MODELING

SEM can provide insights beyond other statistical techniques. Whereas regression incorporates only the statistically significant predictors and removes the nonsignificant predictors from the model, SEM retains all measures in the model. It also examines multiple predictive relationships simultaneously. With regression, we predicted profitability first and productivity second. With SEM, we can create a model to test for causal pathways among all variables all at once. Exhibit 6.23 shows a hypothetical structural equation model for the measures we've examined so far.

Exhibit 6.23 is just an example. The model was not tested on this data set because there were not enough cases for a reliable analysis.

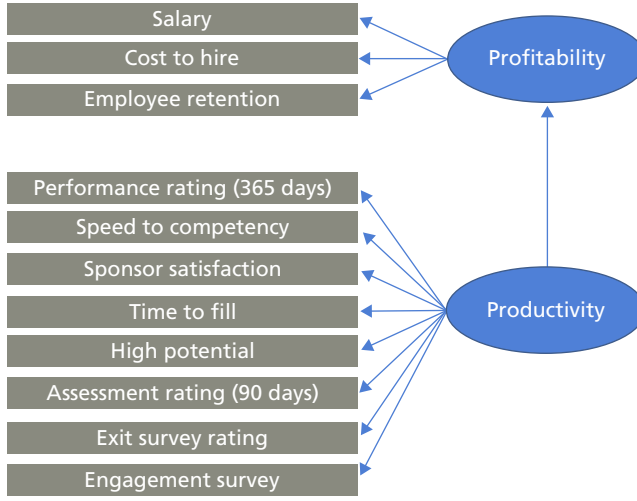


Exhibit 6.23 Hypothetical Structural Equation Model

Yet based on the model shown here, we see that all the measures contribute to predicting profitability. The pathways show that efficiency measures (salary and cost to hire) predict profitability directly, and effectiveness measures predict productivity, which in turn predicts profitability. These results do not substantively change our interpretation of the predictors or what we would do with the results (focus on speed to competency and time to fill). The utility of this model is its simplicity. With one picture we can show the causal pathways and the predictors that lead to profitability.

In order to mine data for information, it is necessary to gather it and structure it for analysis. The data you need probably comes from departments outside your own. So it is essential to follow protocols. When requesting the data, be sure to specify the file type (e.g., .csv, .txt, etc.) and the structure (e.g., vertical or cross-tab). The request process and restructuring of the data set (if you do not receive the preferred structure) are often time-consuming steps in the analysis. If you haven't done this before, build in extra time into your project plan.

Once you receive the data, create a data analysis plan and specify what type of statistical analysis you will apply to answer each question. Most business analysts can perform descriptive statistics. For more complex analytics like correlation, regression, and structural equation modeling, hire a statistician.

Throughout the process, do not lose sight of the end goal: usable information for decision making.

NOTES

1. J. W. Boudreau and P. M. Ramstad, *Beyond HR: The New Science of Human Capital* (Boston: Harvard Business School Press, 2007).
2. V. Mayer-Schonberger and K. Cukier, *Big Data: A Revolution that Will Transform How We Live, Work, and Think* (New York: Houghton-Mifflin Harcourt, 2013).

CHAPTER 7

Predicting the Future of Human Capital Analytics

Big data will alter the landscape across every industry. It is a new way of thinking.

—ICGX Advertisement for Big Data

This chapter adds to Chapter 6, providing additional examples of statistical methods. The goal is not to scare away people who don't have knowledge of statistics. It aims to show the power of this powerful analytics tool and examples of how it can (and we believe will) be used in human resources (HR) management. Once you understand when it is useful to conduct a statistical analysis, you can hire from the outside or borrow the talent from within your company.

The road toward mastering analytics is a long one, and the destination is not the end goal. Being able to survive and thrive along the journey while bringing your team and organization along with you—that's the interim goal. The end goal is to optimize the value that you can add to your organization. We hope that this book has provided insights that will make your trek a little smoother.

This chapter focuses on the future. We aim to provide insights about what you can expect to face—and prepare for—in regard to human capital analytics in the near future.

WHAT DOES THE FUTURE LOOK LIKE?

In order to look toward the future, it is valuable to look toward four other fields of study for insights that will enhance human capital data. They are:

1. Finance: Business standards and valuation of organizations
2. Mathematics: Chaos theory
3. Information Technology: Big Data
4. Automated Processes: Decision support

Finance: Business Standards and Valuation of Organizations

As discussed in previous chapters, organizations can use the Talent Development Reporting Principles (TDRP) framework to gather and report standard measures about HR that business leaders can easily understand and use for decision making. In the near future, more organizations will begin to adopt this framework to help make sense of HR in measureable ways. The framework is simple in concept and broad enough to apply across industries. Moreover, it is a standardized approach that allows for benchmarking and comparison.

For more than a decade, finance and accounting specialists on Wall Street have been pushing for a way to quantify the value of intangibles. Traditional valuation focuses on the bricks and mortar of a company to determine its value. The tangible aspects of a business—buildings, equipment, products, inventory, and pipeline—were given the most weight when determining the value of a company. As the first world has shifted toward a knowledge-based economy, the intangible aspects of a business now represent from 60 to 80 percent of the value of some enterprises. Patents, research and development, brand, and employees are the intangibles that are propelling progress and creating competitive advantage. For accountants, inventory is easy to count and value. It is not so easy to assess the value of intellectual property, especially when it is trapped within the brain trust of the workforce. Organizations like the Human Capital Management Institute are striving to create a taxonomy of human capital measures that aid accountants in determining the financial value of intangibles. In 1992 Gary

Becker won the Nobel Prize for Economics for applying macroeconomics to human behavior like discrimination, educational pursuits and family interactions. At the time, the stock markets valued tangible assets. Exhibit 7.1 shows how company valuation is now more heavily influenced by human capital. The TDRP framework is one possible method to assess the intangible value of human capital. For this reason, as Wall Street and other financial centers assess the market value of companies, TDRP may be used pervasively in the future.

Mathematics: Chaos Theory

In 1987 James Gleick wrote a watershed book on mathematical theory called *Chaos: Making a New Science*.[1] In one volume, he integrated seemingly disparate mathematical ideas of fractal geometry, strange attractors, and the butterfly effect. Michael Crichton, the author of the novel *Jurassic Park*, made these complex mathematical ideas accessible to the general public. Gleick drove home the thesis that there are measurable patterns hidden within seemingly chaotic data sets.

Patterns in chaos. That's almost as ironic as the notion that change is constant. If you saw the 2001 movie *A Beautiful Mind*, you saw Russell Crowe portraying John Forbes Nash, a brilliant mathematician, and you may recall the scene where he is standing in front of a blackboard covered with data. In time he sees a pattern in the data that no one else can see. Unless we can channel John Forbes Nash, we must rely on analytics to find the data patterns.

An example that mixes HR and waterwheels might help.

HR executives face daunting challenges when managing the human capital of an organization. While trying to maintain a productive workforce and addressing a myriad of sociodemographic challenges, leaders have to:

- Capture and share knowledge from an aging or retiring workforce
- Manage the needs of a multigenerational workforce
- Communicate with a multilingual workforce
- Optimize productivity among a dispersed, international, and virtual workforce
- Coordinate operations with offshore/outsourcing partners

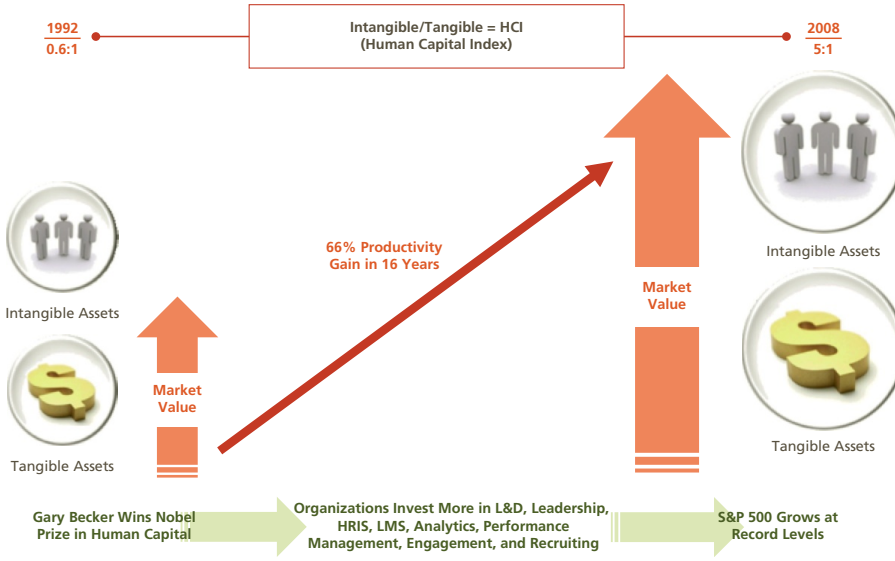


Exhibit 7.1 Change in Human Capital Index from 1992 to 2008 *Source:* 2009 KnowledgeAdvisors Presentation on Building the Business Case in Economic Uncertainty. Used with permission.

Add to these challenges the numerous external factors that influence change—such as the fluctuating economy, the war for talent, and ever-evolving attitudes among Gen X, Gen Y, and Millennials—and plotting the proper course forward becomes even more difficult. It is no wonder the ebb and flow of employees often seems chaotic and uncontrollable.

This is where chaos theory becomes practical.

Take a moment to search the Internet for waterwheels. We suggest using the terms "chaotic Lorenz waterwheel." You will likely find a link to a YouTube video of a simple waterwheel. This is not the standard waterwheel used at a gristmill or a sawmill hundreds of years ago. This mechanism uses buckets that pass below a water source, gaining weight and speed as they fill up. However, the buckets also have holes in their bottoms, so the inflowing water is also released slowly. This combination of inflow and outflow creates a chaotic rhythm on the waterwheel that seems to have no cycle. Watch the wheel for some time. (It's hard not to get hypnotized.) It rolls forward with great speed, then slows and even reverses direction. Exhibit 7.2 shows a static representation of the inflow and outflow that affect the waterwheel.

What does this have to do with HR? Everything. Consider the waterwheel as a metaphor for the revolving door that brings the workforce into a company and escorts them out. There is a stream of incoming new hires and an outflow of retirees, transfers (across business units), and terminations (voluntary and involuntary). The stream is

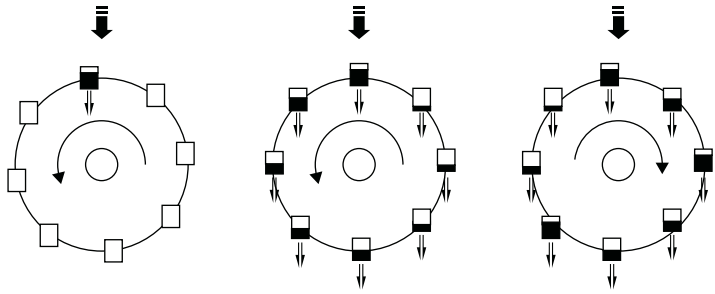


Exhibit 7.2 Representation of the Inflow and Outflow of the Waterwheel *Source:* James Gleick, *Chaos: Making a New Science* (New York: Penguin, 1987), p. 27. Used with permission.

often a deluge of new hires. It can also be a mass involuntary exodus due to downsizing. The important distinction is that the revolving door does not spin at a constant rate. In fact, the variation is seemingly inexplicable.

Modeling is the only way to define the situation accurately.

Gleick states that the goal of mathematics is to reveal "the fine structure hidden within a disorderly stream of data."[2] While the term "chaos" implies that there is infinite complexity that cannot be modeled, the scientific study of seemingly chaotic processes has the end goal of finding and defining the hidden patterns. Once the pattern or structure is defined, it can be explained. This is true for any system including the recruiting cycle within an organization. Then, when the contributing factors are explained, they can be controlled. By controlling the inputs, the outputs can be influenced. The wild and frenzied hiring and firing seasons that lead to over- and understaffing can be attenuated. By controlling the extreme swings in the workforce, organizations control costs and increase efficiency, effectiveness, and profitability.

A case in point is the 1990s trial of a major electronics company that got its staffing and sales curves out of phase: Hiring while sales were falling and vice versa. Over a period of four years, it spent about $1 billion overhiring and laying off. Eventually, it fell behind the curve for its primary product line (where it was number 2 in the world) and had to sell it off at fire-sale prices. The company subsequently fell behind the innovation race in a second key product and never recovered.

How do we go about modeling a waterwheel and, in turn, recruiting? Thankfully, mathematicians have been modeling this system and many others for decades. Edward Lorenz, who is famous for studying weather patterns and proffering the "butterfly effect"—the notion that dynamic systems like weather can change dramatically even when the inputs to the system are very small—is also famous for creating a mathematical model for convection patterns of fluid being heated in a container. The initial patterns when graphed in two-dimensional space showed no pattern at all. However, when Lorenz graphed the equations in three-dimensional space (X, Y, and Z axes), a pattern emerged.

The pattern became a model known as a Lorenz Attractor in his honor. Coincidentally, the man who gave us the butterfly effect also gave us a three-dimensional model that looks like a set of butterfly wings. The model clearly shows a pattern. Another search of the Internet using the terms "Lorenz attractor in motion" will show how the pattern evolves over time. The graphic in motion represents the movement of the waterwheel. It spins slowly, then faster in a small tight loop, and then when it reverses, it crosses over to begin a small tight loop on a different dimension. Until the multiple dimensions are shown together in this video, it is hard to fully understand the complexity of the underlying pattern. Consider how this pattern might affect your attempts to hire, develop, and retain talent.

We hope you have begun to wonder what the hiring pattern looks like within your organization. Is it a butterfly-like Lorenz attractor? It may be. Or it may not be. Regardless, it is worthwhile investigating. Gather the data and create a mathematical model. The underlying pattern might be simple and linear. Or it might have a logarithmic or a dynamic chaotic structure. Regardless of the actual pattern, it certainly wouldn't be boring to investigate, model, and define the inflow and outflow pattern of employees. To say you don't have time to pay attention to these patterns leaves your enterprise behind the market.

Mathematical models help us define and understand our world. Sometimes advanced math, like chaos theory, is required to uncover the underlying structure of our data. Other times the pattern can be uncovered easily through observation or simple analytics. Most important, an investigation into the data patterns, particularly the inflow and outflow of employees, can provide insights and actions that can improve organizational performance, product quality, and efficient staffing processes.

Information Technology: Big Data

In 2012 and 2013, Big Data became the hot topic in business literature. The October 2012 editions of American Management Association's journal *M World* and *Harvard Business Review* are dedicated to the topic.

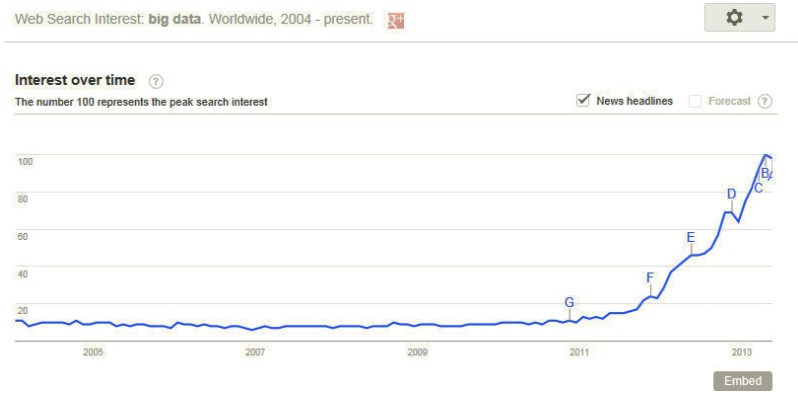


Exhibit 7.3 Google Searches for the Term "Big Data"

(Jac was commissioned to write "Predictive Analytics and Big Data" for *M World*.[3]) The book *Big Data: A Revolution that Will Transform How We Live, Work and Think*,[4] is widely available and explains the issue well with meaningful and readable examples. According to Amazon.com (August 2013), it was the number 2–selling business book about information management and the number 1622–selling book overall. Exhibit 7.3 shows how the term has grown in popularity among Google searches, especially in the last two years.

While the topic is seemingly simple in name, the issue is more complex. The industry standard definition of Big Data consists of three data characteristics:

1. **Volume**. The amount of data being created on a daily basis is overwhelming.
2. **Velocity**. The speed and rate of change at which data is collected and processed is difficult to fathom.
3. **Variety**. The range of data types and sources is expanding, making standard analytics difficult to enact.

Beyond the characteristics of the data, the crux of this topic is the need to extract information to make decisions. Massive data sets provide the opportunity for grand insights. In their book *Big Data*, Mayer-Schonberger and Cukier cite a project by Google. A team at the search

company giant mined the company's own data for search terms related to flu symptoms. It correlated those results with geographic location to predict outbreaks of swine flu. The results were remarkably accurate and two weeks faster than the method used by the Centers for Disease Control.

In the HR area, two things are driving the accumulation of big data sets: the automation of HR practices and the consolidation of HR systems. Information technology (IT) systems have made business processes extremely efficient:

- Learning management systems store courses, serve up e-learning, track compliance, manage registrations, issue certifications, and even administer tests.
- Talent systems manage candidate applications, employee demographics, salary information, performance reviews, promotions, and many other things.

The by-product of these efficient systems is a massive source of data.

The HR software industry has seen multiple changes:

2004: PriceWaterhouseCoopers acquires Saratoga Institute

2010: SuccessFactors acquires InfoHRM and Plateau, a learning management system

201: SAP acquires Success Factors

2012: IBM acquires Kenexa

In the near future, we can expect there will be a verifiable Grand Unified Theory of Human Capital. It will explain the driving factors that lead to hiring, promoting, and retaining the best talent available. More important, the theory will be tested, confirmed and modified by billions of HR records. Big Data will allow analysts to ignore samples and focus on the big picture—the really big picture.

Due to the individual systems and consolidation of data sets through acquisitions, HR data proliferates. Today many HR organizations have an opportunity that existed only in the realms of science fiction for most large companies—an integrated view of HR data from cradle to grave for employees.

Mayer-Schonberger and Cukier argue compellingly that Big Data will allow analysts to uncover what is happening within an organization on a grand scale. Instead of focusing on a segment within an organization or a sample across all of the organization, Big Data affords *N* = *all*. When possible, all available data should be analyzed. Using standard descriptive statistics, analysts will be able to describe the current state and tell leaders what is happening. Mayer-Schonberger and Cukier also advocate using correlation techniques to examine relationships among measures. They recommend joining data sets that were once disparate so analysts can examine new relationships and test new hypotheses. Does increased salary lead to higher engagement? Or is it better to invest in development funds or special projects to increase engagement? Does the source of hire and the time to fill a position correlate with performance quality a year later? By examining these relationships, analysts can uncover what is happening in the organization.

In the near future, companies will become more sophisticated with their analytic techniques. Understanding *what* is happening in an organization will not be sufficient. Leaders will want to understand *why* things are happening. Correlation will still be useful, but it will be a gateway to more sophisticated techniques, such as multiple linear regression, structural equation modeling, logistic regression, linkage analysis, and discriminant analysis. Three things will support this change:

1. **Thirst for information among leaders**. The C suite will quickly get bored with descriptive statistics, dashboards, and correlations that simply define the current state. They will want predictive analytics, and they will track future performance against predictions.
2. **Tools will be readily available**. Advanced statistical tools like SAS, R, SPSS, Minitab, and even some features of MS Excel will enable analysts to dig past the *what* to the *why*. These tools are currently available, but you can expect that they will be packaged with systems like SuccessFactors, SalesForce.com, or Saba so analysts can conduct statistical tests without downloading the data to an offline system.

3. **Resources will be abundant:** In October 2012, Davenport and Patil openly stated that the sexiest job of the twenty-first century will be data scientists (business analysts, statisticians, quants, data jockeys).[5] You may be asking, "Really?" Well, there is a business need, and because of their article, it has been publicly marketed. Additionally, universities are responding by offering analytics degrees. Henschen published a list of the top 20 master's degree programs for Big Data analytics in *InformationWeek*.[6] Newly minted data scientists should be available to fill positions soon.

Automated Processes: Decision Support

Athletes get better by practicing. They perform, observe their behavior, and adjust. If they can't observe their own behavior, they hire a coach. Performance is measured and goals are set. In this way, athletes create a feedback loop to drive performance improvement.

During a TED Talk in 2013, Raffaello D'Andrea demonstrated how he and a team of scientists have made quadcopters (small helicopters with four rotors) perform like athletes. A quadcopter can orient in space, balance a pole, carry a glass of water, hit a ball back to Raffaello, work in tandem to catch a ball in a net, and even do a backflip. Like the waterwheel, this TED video is fascinating to watch. The science behind it is mathematically complex, but the process is simple: Use mathematics to model the flying behavior, set control parameters around the performance, monitor the performance, and provide a continuous feedback loop in real time. (Real time in this case is 20 times per second.)

The continuous improvement process is not new, and organizations currently have various types of monitoring, feedback and action loops in place. The use of a Kaplan and Norton balanced scorecard is a perfect example of such a feedback loop.[7] It begins by selecting key performance indicators along four critical business dimensions: financial, internal business processes, learning and growth, and customer. Data is gathered, analyzed, and reported in a scorecard. Leaders review the scorecards quarterly and take actions to improve metrics. The TDRP framework is also a viable structure for gathering and reporting data in a continuous improvement loop.

BRINGING IT ALL TOGETHER

In the near future, the following processes will happen within organizations:

- IT departments will help HR integrate talent systems so organizations can link data from various talent processes.
- HR will create standard scorecards that gather the right data (efficiency, effectiveness, outcomes) to demonstrate the influence of HR on the business.
- Data scientists within HR will use advanced analytic approaches to assess what and why to provide insights to business leaders.
- HR departments will set up continuous, automated feedback loops that put information in the hands of decision makers to increase the efficiency and effectiveness of HR processes.

PREDICTIVE ANALYTICS FOR HR IN ACTION

The conversation between employees and HR will change dramatically. Involuntary turnover will disappear for all practical purposes because talented employees will be retained. The future of predictive analytics in HR might look something like the situation described next.

Imagine for a moment that you are a newly hired recruiter and you are attending a one-on-one termination meeting with your coach. She has brought you in to learn by shadowing her. The employee who is being terminated, Joe, enters the room. He knows he is being let go but is reluctant to leave. He asks several questions about benefits and then leaves the meeting and the organization. Although you are new to the organization, you know him. He has a reputation as is a solid performer. He is friendly in a professional way and is considered an asset to his team. When he leaves, your coach asks, "Do you have any questions?"

"Just one," you answer. "Why did you fire him? He is a good performer."

"Yes," she says, "He *is* a good performer. But he is not a great performer. He used to be great, and that's why he has been here for seven years." As she talks, she types on her computer. She is opening a file

for you to review. "His stellar performance lasted through year five when he was promoted and received a large salary increase. During the last two years, he has plateaued as an average performer."

"So, average performance in a new role is a reason to fire someone?"

"No, but this file shows us that we have many options. I received an alert last month from the HR system that there is a 75% probability that Joe is likely to leave for a new position that opened at a competitor. That percentage jumped to 95% when he requested a day off last Monday—likely for a job interview. If he had taken a day off on Wednesday, I would not have been concerned. Mondays and Fridays are usually interview days."

"You said there are options. Many options."

"Yes." She points to the screen. "I have an account with an online sourcing system. I entered the job profile for Joe last week, and there are 100 candidates that match the requisition. Ninety percent of them are in the metro area. Twenty of them make 25% less than Joe, and have 25% more experience. Fifteen are men. Five are women, and two of them are minorities. The colleagues on Joe's team indicated they would like to have a female leader. This is also a chance to expand the diversity of the team." She points to a name on screen. "This is my top candidate. New hires like to prove themselves, so she is likely to work harder than Joe, and we expect that she will be 21% more productive. If we offer her the job at a salary 19% lower than Joe's, there is an 85% chance she will take it."

"But she lives outside the metro area. That will be long commute."

"The probability jumps to 87% if we give her one flex day per week. It jumps to 99% if we let her work from home and only require her to come to the office for critical meetings."

Then you ask, "When do we interview her?"

"In 15 minutes."

"I better get ready then," you say as you get up to leave the office.

"You'll find her resume in your e-mail. Just sent it to you."

Before you exit, you stop at the door and ask, "Can I see the report you had about me prior to my job interview?"

She laughs. "Yes, I'll share it with you during your performance review. There's a 90% chance you'll stay with us long enough to have one."

NOTES

1. James Gleick, *Chaos: Making a New Science* (New York: Penguin, 1987).
2. Ibid., p. 29.
3. J. Fitz-enz, "Predictive Analytics and Big Data," *M World* (Winter2012/2013): 24–27. www.shl.com/assets/MWorld-Winter-12_13.pdf
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7. Robert S. Kaplan and David P. Norton, *The Balanced Scorecard: Translating Strategy into Action* (Cambridge, MA: Harvard Business Publishing, 1996).

EPILOGUE

Prediction is very difficult, especially if it's about the future.

—Niels Bohr

The future is unimaginably wonderful. Consider how advances in health care, communications, business, and technology will expand in the next couple of decades. But if you want to know the future, don't listen to the so-called experts. They have a sorry record with prediction. Look at this:

"It is impossible to transmit the human voice over wire."

—Lord Kelvin, Royal Society

"Who the hell wants to hear actors talk?"

— H. M. Warner, Warner Brothers

"A rocket will never be able to leave earth's atmosphere."

—*New York Times* editorial

"I think there is a world market for five computers."

—Thomas Watson, IBM

"No reason anyone would want a computer in their home."

—Ken Olson, Digital Equipment Co.

"The Internet will soon collapse."

—Robert Metcalfe, co-inventor Ethernet

"Remote shopping, while feasible, will flop."

—*TIME* magazine

> "Cellular phones will not replace local wire systems."
>
> —Marty Cooper, inventor
>
> "No chance the iPhone is going to get any significant market share."
>
> — Steve Ballmer, Microsoft

These opinions are useless because they are an attempt to extrapolate the past into the future. Ever since technology appeared in the form of the Industrial Revolution 200 years ago, change and advancement have been the norm. Look at just a few key events of the past 20 years.

- 1990: First major layoffs bring end to loyalty and lifetime employment
- 1997: Dot-com mania promises a new order before crashing in 2001
- 2003: Wars in Iraq and Afghanistan reconfigure America's world reputation
- 2008: Liquidity crisis leading to prolonged reconfigure in the United States and in Europe
- 2000+: Growth in personal computers, cell phones, Internet, tablets
- 2004: Social networks changing human communications and turning chief technology officers into risk managers

Major events change life as it was previously known. That is why predictions are fragile. Therefore, if you do not limit your thinking to what has gone before and let your imagination run free, your guess is as good as anyone's.

Currently, we think of advancement in terms of new and better machines. From the Jacquard loom to the iPhone, it has been about leveraging human capability. Each invention changed the way we lived. However, that is now an obsolete way of looking at the future of the planet, if not the universe. We are past the machine stage and into the human capability era. Realize it or not, the application of the conscious and the unconscious minds in pursuit of advancement is the new game. Future production leverage will not be through a

new communication machine. There is already preliminary research on brain-to-brain connections. We are on the threshold of truly unleashing the power of human intelligence. So, let's think ahead in those terms.

What might 2033 look like? The odds are that if you are under 50 years of age today, you will still be working. You may work at home or from other remote sites. But one thing is undeniable. Long before then, analysis in various forms will be the common calculus of business and human capital management. Calculus is the mathematics of change, and change is the defining process of the universe.

In the near future, all administrative work will be handled directly from beginning to end by computers. Pay and benefits will be processed according to some objective goal. Most of staffing's hands-on processing will be eliminated. Recruitment requests will go directly from the hiring supervisor to the staffing database of applications. In return, applications/resumes will be scored against a standard and forwarded for interview or rejected.

But all that is not the goal. It is merely the means to free ourselves for more profound thinking, decision making, and communication. We are closing in on the direct application of human intelligence to managing change.

The role of human resources (HR), if the role even exists, will be focused on human capital planning and development and on organizational effectiveness. For example, a new and better way to appraise performance will develop, possibly wherein each person is given verifiable objectives and the system automatically records and scores the work as it is performed. Intelligent programs will make the evaluation. Also, 360-degree performance reviews may be improved to provide an objective balance. A computer will collect and score all the data with intelligent interpretations included. A report will go to the supervisor as well as the employee and into the permanent record for future evaluation and planning. Development programs will be provided automatically to improve performance. All this will occur without someone from HR needed to process it.

One does not have to be clairvoyant to know that predictive and prescriptive analysis will necessarily be applied to the competitive talent market and the Big Data problems we face. It simply has to be,

given these dynamics. If HR wants, as it says, to add value and claim a seat at the table, it must employ analytics in the daily course of its business.

Assume nothing from the past or present and let your imagination run. Haven't you said there is a better way to do something? Analytics will find it.

The scenario at the end of Chapter 7 provides a small glimpse of the future.

Appendix: Example Measures of Efficiency, Effectiveness, and Outcomes

Talent Development Reporting Principles (TDRP) is mentioned several times throughout this book as a valuable approach for structuring and reporting results to business leaders. More information is available from the Center for Talent Reporting at www.centerfortalentreporting.org. Currently, the center maintains a comprehensive set of more than 600 metrics organized into three categories, as shown next. The goal of using TDRP is to find and measure business outcomes, the value-adding objectives of metrics and analytics. Several metrics that align with the TDRP are shared in Chapters 4, 5, and 6. The next list is more extensive but still is only a small sample of what is available. The critical step for any organization is to define the most important metrics for success and to begin gathering them for monitoring and reporting.

Efficiency	Effectiveness	Outcomes
Number of open requisitions	Quality of hire	Length of stay
Number of hires	Quality of the recruiting process	Monthly productivity
Hires by level	Quality of service from recruiter	Improved cycle time in job

(*Continued*)

Efficiency	Effectiveness	Outcomes
Hires by business unit	Fit with the job	Contributions to customer satisfaction
Average cost to hire	Fit with culture	Contributions to quality
Average salary per hire	Performance rating	Increased sales
Amount of training attended	High/low potential status	Increased margins
Amount of coaching received	Employee engagement	Improved project quality
Performance improvement plan	Employee loyalty	Improved on-time projects
Job rotation learning path	Project management capability	Improved on-budget projects
International assignment	Ability to coach	Improved efficiency
Mobile workforce	Ability to be coached	Increased cost savings
Hours/job task	Develops others	Increased innovation
Cost/job task	Creates standard procedures	Faster product development cycle

About the Authors

Jac Fitz-enz, Ph.D., is widely regarded as the father of human capital strategic analysis and measurement. He founded the famous Saratoga Institute and published the first HR metrics in 1978 and the first international HR benchmarks in 1985. HR World cited him as one of the top five "HR Management Gurus," IHRIM gave him its Chairman's Award for Innovation, and SHRM chose him as one of the persons in the twentieth century who "significantly changed what HR does and how it does it." He has authored 13 books and more than 350 articles and has trained 90,000 managers in 46 countries on strategic management and measurement. His 2010 book, titled *The New HR Analytics*, introduced predictive analytics to human resources. Dr. Jac holds degrees from Notre Dame (B.A.), San Francisco State (M.A.), and University of Southern California (Ph.D.) in organizational communications.

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