

QlikView

Your Business

An expert guide to Business Discovery
with QlikView and Qlik Sense

Oleg Troyansky
Tammy Gibson
Charlie Leichtweis

WILEY

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QlikView® Your Business: An Expert Guide to Business Discovery with QlikView® and Qlik Sense™

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About the Authors

Natural Synergies, Inc.

This book was created by a team of consultants from Natural Synergies, Inc.—a boutique BI consulting firm that specializes in helping QlikView customers maximize the benefits from their BI and ERP investments.

The company was founded in 2007 by a team of devoted QlikView veterans, with the goal of providing high-quality professional services to QlikView customers. Led by Oleg Troyansky, Natural Synergies, Inc. proudly employs a team of seasoned QlikView professionals who provide a full range of services on the QlikView platform:

- Educating QlikView developers and designers
 - Teaching standard and custom QlikView courses for beginners and advanced developers
 - Mentoring and coaching internal teams of QlikView developers and helping them cultivate their knowledge over time
 - Supporting internal teams of QlikView developers with expert help on demand, conveniently packaged as an affordable subscription
- Assisting customers in developing their analytic applications
 - Leveraging industry expertise to coach customers and design powerful and insightful analytic applications
 - Exposing customers to best practices, industry standards, and robust analytics
- Expert services
 - Performance tuning and optimization
 - QlikView application review
 - Architecture and design of customized QlikView environments, as well as individual solutions

If you enjoy the depth of QlikView expertise in this book, please contact Natural Synergies and let them help you *QlikView Your Business*. Visit

www.NaturalSynergies.com for more information.

Oleg Troyansky implemented QlikView in 2003 as an IT executive at a mid-size manufacturing company. After falling in love at first sight, Oleg developed several analytic applications to help the company improve management of sales, inventories, profitability, freight costs, and more.

Oleg has been an active supporter and advocate for QlikView, speaking at industry events like the Gartner BI Summit, annual Qonnections meetings, and others. Many of Oleg's success stories from that time are published in several on-line publications.

Since forming Natural Synergies in 2007, Oleg has been helping customers generate value from their QlikView and ERP investments. Advanced Inventory Analysis, Plant Capacity Simulation, and Sales & Operations Planning (S&OP) Dashboard are just a few examples of his advanced analytic development work.

Oleg is one of the most active members and among the first moderators of the Qlik Community forums, where he helps thousands of QlikView developers overcome technical challenges and make the most of the tool.

Oleg Troyansky is one of the four recognized QlikView experts who teach advanced QlikView topics at the Masters Summit for QlikView (www.masterssummit.com)—the most advanced technical venue for experienced QlikView professionals. Additionally, in recognition of his contributions to the field, Oleg has been accredited as a 2014 Qlik Luminary.

Oleg writes a QlikView blog on the company's website at www.naturalsynergies.com.

As an educator and a QlikView advocate, Oleg has educated generations of QlikView professionals and experts through his input on the Qlik Community forums, public and private QlikView classes, sessions of the Masters Summit, and entries on his blog.

Oleg and his family reside in Buffalo Grove, Illinois.

Tammy Gibson is a premier QlikView consultant in the United States, with deep architectural and design experience.

Like Oleg, Tammy first discovered QlikView as a customer in 2004. In her role as director of IT and data integration, she provided marketing and sales analytics to a live entertainment organization. By 2007, she had acquired the skills to become a technical consultant, delivering QlikView applications and data warehouse modeling designs. Tammy is renowned for her ideas and techniques on modern dashboard design, as well as her enterprise deployment strategies.

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Charlie has served as the President and CEO of Testor Corporation, a leading manufacturer of coatings, adhesives, and a variety of injection molded products for the hobby and craft markets.

His diverse career is marked by the ability to build sustainable profitable growth through alignment of strategy with process, brand management, cost containment, margin improvement, structure optimization, and cash management.

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Previously, Charlie served as CFO at both Rand McNally Book Services and at Rust-Oleum, and held management roles in finance at Abbott Labs. In addition, from 1997 to 2000, he was the Founder and President of Process Solutions, a business process consultancy. He started his career with Deloitte in Detroit, MI.

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About the Technical Editors

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His area of expertise is the product itself and includes advanced application development, scripting, and data modelling.

In his current role, his main task is technical product communication. He does this via blogs, in the press, and directly with large accounts and user groups. Henric has a doctorate in elementary particle physics from the University of Lund.

Rob Wunderlich has over 30 years of experience in the IT industry, holding positions as a software developer, manager, and consultant. Rob has been working with QlikView and now Qlik Sense since 2006. He authors a popular QlikView blog and publishes the website QlikViewCookbook.com. Rob currently splits his consulting time between QlikView development and training QlikView developers. He is a co-founder and a featured presenter at the Masters Summit for QlikView.

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We'd like to thank all of the QlikView professionals whose questions, issues, and suggestions helped us sharpen our knowledge and ultimately express it in this book. We hope you enjoy the book as much as we do.

I dedicate this book to my beloved family—my parents, my wife Rimma, and our children, Victorya and Eitan, who are both beginning QlikView professionals.

—OLEG

I dedicate this book to my mom, Georgia. She would have been so proud despite not understanding one single word of this book. To my wife, Dayene, and my sons, Cash and Bodhi—thank you for your love, encouragement, and endless patience.

—TAMMY

I would like to dedicate this book to my dad. He was a life-long educator who believed that teaching was one of the most important ways to give back.

—CHARLIE

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Foreword

When Oleg Troyansky told me he was writing a QlikView book, I joked, “Are people writing books anymore?” In our largely digital world, filled with developer forums, blogs, YouTube videos, and Tweets, it seems like our attention span for information is shrinking, leaving little space left for full-size books. Now that I’m holding the manuscript in my hands, I know that *QlikView Your Business* will certainly find its place in the Qlik ecosystem. Now my only question to Oleg is, “What took you so long?”

I remember Oleg as one of the early adopters of QlikView in the United States. He quickly became one of the product’s most vocal advocates. When we opened our Qlik Community forum, Oleg was among the first few active experts who happily shared their knowledge with new developers. Eventually he became one of the first official moderators of the forum. With all of his knowledge and passion for Qlik, it was no surprise when Oleg made the transition from a QlikView customer to a full-time QlikView developer, partner, and co-founder of a reputable BI firm, Natural Synergies. If anyone should write the book on QlikView, Oleg is certainly the right man for the job.

QlikView Your Business takes an unconventional approach. Unlike traditional technology books that rarely talk about business or business books that fail to teach readers how to develop complex analytic applications, this book takes a unique approach by combining the two. In a way it’s very similar to the way we do business at Qlik. It focuses on the individual—the human behind the analysis—and finds a way to help solve their challenges, regardless of where they sit within an organization.

At Qlik, we value the concept of *simplicity*. We believe that BI shouldn’t be complicated, hard, or intimidating. We feel that our products make the job of data analysis *instinctive*. At the same time, QlikView offers tremendous depth for those analytical needs that can’t be solved by simply scratching the surface of data. This is where developers’ expertise comes into play, and Oleg brings these advanced concepts home very elegantly. After reading this book, you will learn real-life techniques for building scalable data models. You will practice the most advanced aspects of Set Analysis and Advanced Aggregation. You will learn how to build the most intricate visualizations.

Most importantly, you will discover how to use QlikView to ask limitless questions and find innumerable insights.

Last year, we launched a new addition to the Qlik family—Qlik Sense. We believe that Qlik Sense makes the task of data analysis more intuitive, natural, and self-explanatory. It also unlocks new possibilities for developers with its open APIs and powerful analytics engine. I'm pleased to see the detail with which Qlik Sense is covered in this book, as it provides further insight into the possibilities both products present to users. With our growing product portfolio, Qlik ensures that the needs of all users are met, unlocking transformative insights along the way.

In conclusion, let me praise you, the reader, on your decision to read *QlikView Your Business*. I'm confident that you will find it both informative and thought provoking and hope it inspires you to take the time to further explore the information around you. Only by discovering great insights can we inspire more powerful action.

—Lars Björk
CEO, Qlik

Introduction

It's no secret that we live in a rapidly accelerating world. Not too long ago, computers were huge and practically brainless and humans had to crunch the data output for months in pursuit of meaningful insight. Not too long ago, anything related to data processing required employing a team of professional programmers—these mysterious gods of cryptic languages, debuggers, and binary code.

In the last 20 years, several things had changed in this picture. Our computers are now small in size yet very powerful. Our tools are so smart that they offer insights at an amazing speed. Data processing has evolved through a number of generations, from Executive Information Systems through data warehousing, to business intelligence, and now to business discovery, enabling a wide community of developers, analysts, and power users to participate in the analytics process.

The data revolution that we are all experiencing has created a new occupation—data scientist, which was called “The sexiest job of the 21st century” by the *Harvard Business Review*. Data scientists bring together the technical knowledge of the traditional *developers* and the business acumen of the traditional *analysts*.

Similarly, this book combines the business aspects of developing business discovery applications and the specific techniques that we use to develop business analytics using QlikView and Qlik Sense.

This book, written by a data scientist, a programmer, and a businessman, is for the data scientist who wants to analyze data with Qlik tools; the developer who wants to learn the technical and the business aspects of Qlik Business Discovery; the business analyst who wants to learn how to develop Qlik visualizations; and anyone who is trying to determine whether QlikView and Qlik Sense are the right tools for their business needs. As each type of reader might want something different from the book, the “How to Read This Book” section provides guidelines for a custom path through the chapters.

The book will take you through the three common scenarios of business analytics—sales analysis, profitability analysis, and inventory analysis. You will learn the business aspects of these topics, the data modeling techniques that we use to build robust

analytic data models, QlikView scripting techniques, and visualizations that can be used for effective, intuitive analytics.

Part V of this book is devoted to Qlik Sense, a new tool in the Qlik family that primarily targets the world of self-service analytics. You will learn how to use Qlik Sense to prepare a self-service analytics environment for your users and how to extend your Qlik Sense apps with extensions.

The book is built as a tutorial, with data sources and supplemental materials available online. Going through the tutorial, you will grasp both basic and advanced techniques of building business analytics with Qlik products.

Overview of the Book and Technology

This book is about business analytics and business discovery, but most of all, it's about QlikView. It wouldn't be an exaggeration to say that QlikView became our passion and the highlight of our professional careers soon after we become acquainted with the tool.

We believe that the secret to QlikView's overwhelming success and almost fanatical following is its focus on *simplicity* and ease of use. In QlikView developers' minds, business intelligence doesn't have to be hard, cumbersome, and expensive. This has been the slogan of all QlikView fans for many years.

At the same time, simplicity shouldn't be confused with a pass to stay ignorant. We still need to know what we're doing when developing an insightful analytical application.

Albert Einstein is believed to have said, "Everything should be made as simple as possible, but not one bit simpler." While most people remember the first part of this sentence, we'd like to reflect on the second. Life is inherently complicated, and business life is no exception. Not every business need can be met with a lightweight, simple solution. We should certainly make every effort to simplify, and yet we need to be prepared to develop something sophisticated and complex when needed.

As a BI tool, QlikView offers it all. It can be simple and lightweight, allowing you to develop a simple solution in hours. At the same time, it offers

enough depth and sophistication to let you create something truly unique and remarkable.

Following the same premise, this book starts from describing the basics, and then moves on to more and more advanced techniques, diving deep into the most sophisticated areas of QlikView such as Advanced Aggregation, Set Analysis, and advanced data modeling.

QlikView development methodology has evolved through the years, along with the evolution of the tool and business analytics. We learned how to deal with large data volumes and how to manage the complexity of our environments. As active contributors in the community, we participated in developing the collective set of tips, tricks, and best practices, and we absorbed tips offered by others. These tricks and best practices are available to you in this book.

The book covers the four main parts of any BI development:

- **Business Case**, which describes the subject of the analysis—the main goals and the main metrics that need to be analyzed.
- **Data Modeling**, which is a theoretical exercise that describes how the source data needs to be organized for an effective analysis.
- **Data Load Scripting**, which is the practical implementation of the data modeling exercise. Here, we build the data model and describe how it's done.
- **Building Visualizations**, which is the process of building the visual layout of the analytical application and creating insightful visualizations, based on the requirements that were laid out in the business case.

We will walk you through these four steps over the three business scenarios. Together, we will analyze sales, profitability, and inventory, moving from simple to advanced techniques of QlikView development.

We all know the saying “wearing multiple hats.” If you happen to work in a mid-size business, you do it every day. Throughout this book, you will get to wear four different hats—the hats of a business professional, a data architect, a developer, and a designer. The ability to wear these four hats is the core of the QlikView professional skillset, and we hope to help you sharpen this ability with this book.

How This Book Is Organized

This book is divided into five sections:

- **Getting Started (Chapters 1 and 2).** Here we describe the case for business analytics and how Qlik fits in the overall business intelligence landscape.
- **Sales Analysis (Chapters 3–6).** We describe the common business requirements for sales analysis and the basic QlikView techniques that are used for developing a typical sales analysis application. We learn the basics of loading data into QlikView and the basic visualization techniques.
- **Profitability Analysis (Chapters 7–10).** Using the business scenario of profitability analysis, we describe more advanced QlikView techniques:
 - We learn how to organize data structures with multiple fact tables using Link tables.
 - We build a QVD data layer and a library of reusable scripts.
 - We describe more advanced visualization techniques including simple and more advanced Set Analysis.
- **Inventory Analysis (Chapters 11–14).** This section describes the most complex QlikView methodologies that are commonly used for complex analytic solutions, such as inventory analysis:
 - Organizing multiple fact tables into a single Concatenated Fact table.
 - Calculating running totals in the data load process.
 - Using generic link tables and an alternative solution utilizing Set Analysis.
 - Answering advanced analytical questions using Advanced Aggregation and advanced Set Analysis.
 - Adding interactivity using buttons, actions, and show conditions.

- **Qlik Sense (Chapters 15 and 16).** This section describes the new tool in the family, Qlik Sense. We demonstrate how to load data and how to build self-service analytical applications, as well as dashboards, using the tool. In addition, we provide a basic example of integrating a simple extension.

How to Read This Book

You can, of course, read this book straight through from cover to cover. However, depending on your goals, you may skip some sections without losing much context. For example, if you are a data analyst trying to learn how to design QlikView visualizations, you may prefer to skip the technical chapters describing data modeling and scripting. The following are a couple of suggested paths through the book for different reader profiles.

The summary of all possible tracks is presented in Figure I.1 at the end of this section (which is, of course, a QlikView chart). In this table, readers can pick one of the three tracks—Executive, Non-Technical, and Technical. The green checkmark signifies chapters that we recommend to readers who follow the corresponding track. Gray checkmarks mean that we suggest skimming through the chapter. Other chapters can be skipped altogether if you are not interested in their contents.

Data Scientist, Developer, Consultant

If you are a data scientist, a developer with a technical background, or perhaps a QlikView consultant, you are most likely to read the book cover to cover, because you will ultimately need it all—the business cases, the technical aspects of data modeling and scripting, and the advanced visualization techniques. You might decide to skim through the business chapters (1–3, 7, and 11) and focus on more technical chapters. See the Technical track in Figure I.1.

If you are familiar with QlikView fundamentals, you can skim through the first two parts and jump right into more advanced topics in Parts III and IV.

Business Analyst, Designer, Power User

If you are interested mostly in creating QlikView visualizations without worrying too much about the technical aspects of data modeling and scripting, you can read the first two chapters in each part and stop there. The electronic materials are built in a way that allows you to develop the layout of each application without worrying about the data. The most recommended chapters for you are: 1–4, 7–8, 11–12, and 15–16. See the Non-Technical track in Figure I.1.

Executive, Project Manager, Technology Evaluator

If you are reading this book with the goal of understanding what Qlik is all about, or to determine if QlikView is the right tool for your business, we recommend you focus on the business chapters of the book and flip through the visualization chapters, where you will see what kinds of visualizations can be created with the tool for each business problem. The recommended chapters for you are: 1–3, 7, and 11. Glance through Chapters 4, 8, 12, and 16. Also, take a look at the list of additional educational opportunities in the appendix. See the Executive Track in Figure I.1.

FIGURE I.1:

How to read this book. In the column for your chosen track, read the chapters marked in green and skim through those marked in gray

Part/Chapter	Executive Track	Non-Technical Track	Technical Track
Part I: Getting Started			
Chapter 1: Basics of Business Analytics	✓	✓	⊘
Chapter 2: Why Use QlikView for Business Analytics?	✓	✓	⊘
Part II: Sales Analysis			
Chapter 3: Defining a Business Scenario for Sales Analysis	✓	✓	⊘
Chapter 4: Visualizing Sales Analysis in QlikView	⊘	✓	✓
Chapter 5: Data Modeling for Sales Analysis			✓
Chapter 6: Developing a Data Load Script for Sales Analysis		⊘	✓
Part III: Profitability Analysis			
Chapter 7: Defining a Business Scenario for Profitability Analysis	✓	✓	⊘
Chapter 8: Visualizing Profitability Analysis in QlikView	⊘	✓	✓
Chapter 9: Data Modeling for Profitability Analysis			✓
Chapter 10: Developing a Data Load Script for Profitability Ana...			✓
Part IV: Inventory Analysis			
Chapter 11: Defining a Business Scenario for Inventory Analysis	✓	✓	⊘
Chapter 12: Visualizing Inventory Analysis in QlikView	⊘	✓	✓
Chapter 13: Data Modeling for Inventory Analysis			✓
Chapter 14: Developing a Data Load Script for Inventory Analysis			✓
Part V: Introducing Qlik Sense			
Chapter 15: Loading Data in Qlik Sense		⊘	✓
Chapter 16: Building Visualizations in Qlik Sense	⊘	✓	✓
Appendix: Where Do You Go Next?	✓	✓	✓

Conventions

To help you get the most from the text and keep track of what's happening, we've used a number of conventions throughout the book:

Boxes like this one hold important, not-to-be-forgotten information directly relevant to the surrounding text.

WARNING

This icon indicates notes, tips, hints, tricks, and asides to the current discussion.

NOTE

Important Comments and Summary Statements

Here we include important comments and summarizing statements that help to clarify and add important, not to be missed detail to the core topic.

Exercises that you can perform as part of our tutorial appear in a box like this:

Exercise I.1: Develop Something Truly Awesome

These are exercises you should work through, in order to maximize the educational value of the book to you.

1. They usually consist of a set of steps.
 2. Each step has a number.
 3. Follow the steps in your own QlikView environment.
-

As for styles in the text:

- We *highlight* important keywords when we introduce them.
- Menu options, buttons, and other texts that you should see on your QlikView screen, are highlighted like this: **File ▶ Open**.
- Text that you need to key in appear highlighted like this: **entered values**.
- We show URLs, database tables and fields, and code within the text in a special monofont typeface, like this: `Customer ID`.

We present code in two different ways:

We use a monofont type with no highlighting for most code examples. We use **bold** to emphasize code that is particularly important in the present context or to show changes from a previous code snippet.

Also, the QlikView script editor provides a rich color scheme to indicate various parts of code syntax. That's a great tool to help you read the script in the editor and to help prevent mistakes as you code. The script examples in this book use colors similar to what you see on your QlikView screen while working with the book's code. In order to optimize print clarity, some colors have a slightly different hue in print than what you see onscreen. But all of the colors for the code in this book should be close enough to the default QlikView colors to give you an accurate representation of the colors.

Preparing Your Work Environment

In this section, we describe the tools and the supplemental materials that you need to download and install in order to use our tutorial. Please take the time to prepare your work environment before you dive into the book materials.

Tools You Need

If you are new to QlikView and/or Qlik Sense Desktop, you need to download and install both tools in order to follow our tutorial. Fortunately,

Personal Editions of these tools are free to use. You simply need to get registered on the Qlik website at www.qlik.com and download the tools there.

At the time when this book was written, we used versions QlikView ver. 11.2 SR9 and Qlik Sense ver. 1.1.0; however, you may use the most current versions of both tools. We don't expect the difference between the versions to impact your experience with the book. If you happen to use an earlier version of QlikView, we recommend installing one of the recent releases of QlikView ver. 11.2.

Once you download the tools, install them with the default settings. The installation process is nothing more than just clicking **Next** at each prompt.

In addition to the Qlik tools, you need the supplemental materials for this book, described in the next section.

Supplemental Materials and Information

The companion website to this book is hosted at <http://www.wiley.com/go/qlikview>. The site contains information about downloading source code and finding the sample data used throughout the book.

Download and install the data package that contains the electronic materials for the book. We recommend installing the folder in the root of your hard drive c:\. You should find the following subfolders:

- \Apps. This subfolder will contain your new QlikView applications.
- \Data. Here you will find all the data sources that are used in this book.
- \Data Loaders. Here you will store the data load scripts that you will use for building a layer of Transformed QVDs.
- \Data Models. Here you will store the data models that you will create as part of the tutorials.
- \Icons. Here you will find images that will be used in your QlikView applications.
- \Metadata. Here you will find and store text files with expression definitions that we will use in the advanced chapters of the book.
- \Resources. Here you will find additional resources, such as the Open Sans font that we used in our template.

- `\Scripts`. Here you will find and store text files with reusable scripts that can be included in your QlikView applications.
- `\Solutions QlikView`. In this folder, we stored multiple versions of solutions to the exercises. Each version is marked with the exercise number and it corresponds to the expected state of your QlikView document after completing the exercise. This structure allows you to find missing answers when needed or to skip a few exercises and pick up further into the chapter. Whenever you need to continue from a certain point, locate the appropriate solution file and save it with the “main” application name under one of the work folders—`\Apps`, `\Data Loaders`, or `\Data Models`. For example, in order to restore your Sales Analysis application to its expected state after Exercise 5.15, locate the `\Solutions QlikView\5.15 - Sales Analysis.qvw` file and store it in the folder `\Apps\` as `\Apps\Sales Analysis XX.qvw`, where `XX` is your initials.

All solution files are stored with no data to decrease the size of the download. After copying one of the solution files, reload the data in the document by using the **Reload** toolbar button.

- `\Solutions Sense`. Similarly, here you can find solutions to the exercises in Qlik Sense. These solutions can be copied into the Qlik Sense standard apps folder:

```
C:\Users\<user>\Documents\Qlik\Sense\Apps
```

We highly recommend installing the Open Sans font that we used in our QlikView template. This step is optional; however, it is easier to use our solution files when this font is installed on your computer.

In order to install the font, locate the `\Resources\open-sans` folder and open all the font files one by one. Click on the Install button on top of the window. Repeat for all 10 font files in the folder.

You are now fully prepared for the journey. We are very excited to be sharing this experience with you and hope that you will find it meaningful and beneficial to your particular needs. Let’s get started!

PART

Getting Started



CHAPTER 1: The Needs and Challenges of
Business Intelligence and Analytics

CHAPTER 2: Why Use Qlik for Data Discovery
and Analytics?

The Needs and Challenges of Business Intelligence and Analytics

Every day we are confronted by the challenges of our business, whether we work in the boiler room or the board room. We worry about how to make things work in the best possible way and we worry about avoiding mistakes that can cause things to go wrong. There are a lot of moving parts to any business and it takes a number of people to monitor and manage those moving parts. The fact that there are challenges to managing your enterprise is not a new revelation. Challenges are the main reasons we face some amount of stress in our jobs each time we care enough to “get it right.” The question is not just, “What am I supposed to be doing right now?” but, “Where are the current and potential problem areas that will prevent me and my business from succeeding?”

This chapter begins to address those questions and provides some insight into the ways this book will help you answer them. You will learn what business intelligence (BI) is, and the analytics that drive an understanding of the strengths and opportunities that exist in your business.

The Case for Business Intelligence

The issues that keep us up at night include *what we don't know about our business* as much as what we do know. For example, one company experienced a 30% drop in sales in a period of two and a half years. It's true that they knew what customers they lost. In fact, they lost all of their mass channel retail accounts in North America. They were also told by the accounts that they were being dropped because of lack of service and poor unit movement of their products on the shelves of the retailers. The company involved, who shall remain nameless, knew they had a big problem, yet they never saw it coming. They didn't know exactly what the problem was. They didn't know what the root cause of the problem was, and most importantly, they didn't know how to fix it! In this case, a significant problem was service level. The company never calculated service level performance, which is the measure of *on time and complete delivery* to customers.

On Time and Complete Delivery

This metric measures the count of orders delivered complete and on time, divided by the total count of orders. In the example here, this measure was below 40%, which means that 60% of the time the company did not deliver the order with the right quantities or in the time frame required by the customer! The requirement for compliance with mass retailers is a minimum of 98.5% on time and complete.

The company failed to service customers because they did not have proper measurement systems in place for many of the major processes of the business. Data that was needed for proper measurements was buried in functional silos, which meant lack of visibility and communication across