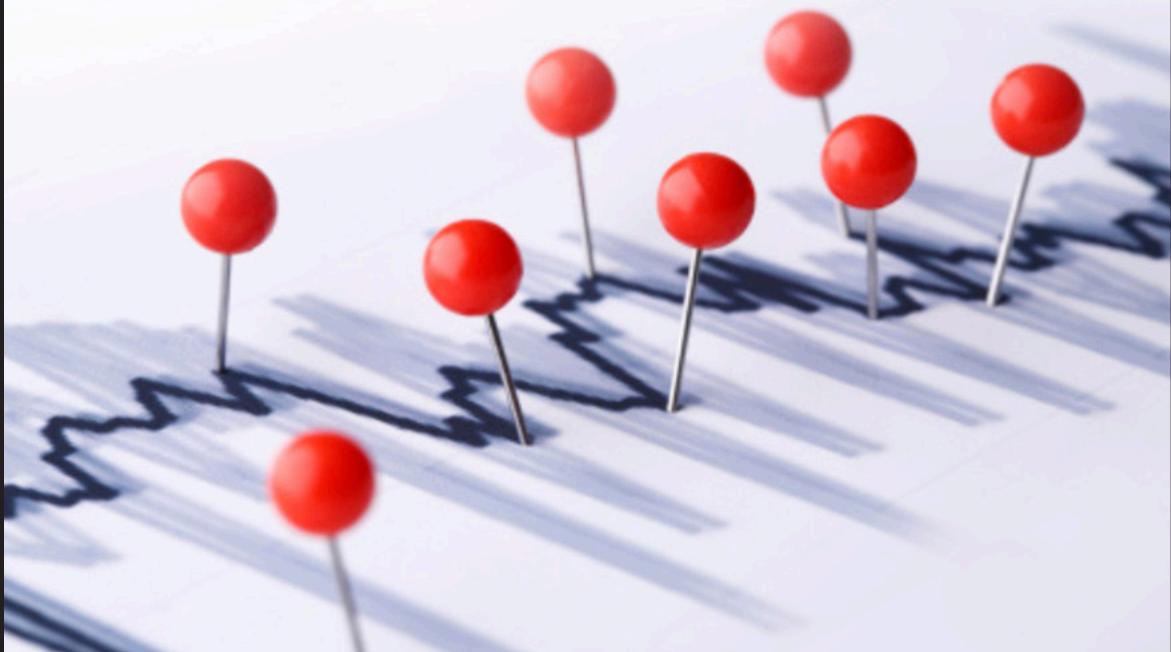


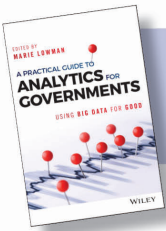
EDITED BY
MARIE LOWMAN

A PRACTICAL GUIDE TO
ANALYTICS FOR
GOVERNMENTS

USING **BIG DATA FOR GOOD**



WILEY



From *A Practical Guide to Analytics for Governments*.
Full book available for purchase [here](#).

Contents

Foreword xi

Acknowledgments xv

Chapter 1 Introduction 1

Marie Lowman

- Child Welfare 4
- Education 5
- Healthcare 5
- Prescription Drug Abuse 6
- Criminal Justice and Public Safety 6
- Smart Cities 7
- Transportation 7
- Fraud, Waste, and Abuse 8
- Establishing a Center of Analytics 8

Chapter 2 Child Well-Being 11

Will Jones

- Introduction 12
- Data-Driven Culture 13
- Data Sharing 16
- Data Quality 18
- Assessing Risk 22
- Addressing the Perceived Limits of Analytics Pertaining to
Assessing Risk 25
- Impact on Workforce 29
- Notes 32

Chapter 3 Education 35

Nadja Young

- Introduction 36
- Build Your Engine—Build the Education Data
System Infrastructure 40
- Use the Dashboard to Measure What Matters Most—Student
Learning Growth 42
- Use the Navigation System to Guide Education Policy 47

Look through the Windshield with Predictive Analytics 56
Drive the Car and Use the Data 62
Notes 64

Chapter 4 Healthcare 67

Jeremy Racine

Role of the Government 68
The Challenge 72
Value-Based Care 89
Conclusion 96
Notes 97

Chapter 5 Prescription Drug Abuse 99

Steve Kearney

Introduction 100
National Initiatives 103
Prescription Drug Monitoring Programs 106
Advanced Analytics 107
Health Outcomes 109
Notes 111

Chapter 6 Criminal Justice and Public Safety 113

David Kennedy

Improving Data Access and Data Quality 117
Analytics throughout the Justice and Public Safety
System 121
Conclusion 126
Notes 127

Chapter 7 Brilliant Analytics for Smart Cities 129

Jennifer Robinson

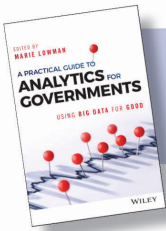
Smart Cities 131
Technologies in Smart City Solutions 133
Data Management 136
Analytics 137
Notes 150

Chapter 8 Transportation 151

Jim Trogdon

Connected and Autonomous Vehicles (CAVs) 152
The Role of Data and Analytics 154
Benefits of Connected and Autonomous Vehicles 155
National Focus on Adoption of Performance Measures 156
Safety Performance Measures 157
System Performance Measures 157

The Role of Data and Analytics	159
Benefits of Transportation Performance Management and Improved Measures	162
Notes	163
Chapter 9 Fraud, Waste, and Abuse	165
<i>Carl Hammersburg</i>	
Healthcare	167
Tax and the Underground Economy	170
Benefits Programs	172
Recommendations	174
Notes	177
Chapter 10 Center of Analytics	179
<i>Kay Meyer</i>	
Why a Center of Analytics?	183
What Makes a Center of Analytics?	184
Building a Center of Analytics?	188
Notes	190
Appendix	191
Index	193



From *A Practical Guide to Analytics for Governments*.
Full book available for purchase [here](#).

CHAPTER 1

Introduction

Marie Lowman

The genius of big data is not only in the great number of new insights introduced, but even more in the new ideas for betterment these insights spawn. This paraphrase of Alexis de'Tocqueville's nineteenth-century observation of our democracy is still applicable today. Our government is expected to act as an honorable steward of our information and tax dollars. Stewardship, the responsible and careful management of something entrusted in one's care, demands that government demonstrate the effective and proper application of tax dollars to services and programs that provide the greatest benefit to its citizens.

Throughout my 21 years in the tech industry and eight-plus years serving in the public sector as an elected city council member and appointed commissioner, I have witnessed the increasing volume and velocity of data sources, and their overwhelming effect on government organizations—at times for the better, and at times, for the worse. The worse is when governments have no idea how to harness this data and use it for good. They make decisions with very little context, sometimes simply rendering a decision based on gut feelings alone. The better is when data is used as a catalyst to drive informed decision making, like the early identification of an at-risk child so a safe place can be provided for that child to stay while offering effective programs to support that child's growth to achieve their potential.

At every point of intersection between government and people, data is created. This data is being generated at an unprecedented rate, from an unprecedented number of sources. Data comes in all shapes and sizes: from citizens, law enforcement communities, businesses, other government entities, hospitals, utilities, roads, courts, prisons, and so on. Collecting this voluminous data enables government entities to better serve its citizens. The rate of data generated and collected daily has long since eclipsed humans' ability to analyze it, let alone identify and make use of *relevant* information. As governments confront the multitude of challenges around collecting and storing data, many are also grappling with how to extract meaningful insight from the data at their disposal.

Empowering government entities to collect meaningful data and then analyze and understand it in order to make better decisions is what I do for a living. It is a passion of mine. Governments must be

able to separate the relevant from the insignificant, and the public from the confidential to ensure effectiveness and excellent stewardship. Analytics is the key to unlocking the true value hidden in this ever-growing data.

Committed government leaders dream of making their communities stronger, more economically viable, safer, and better places to live and work. For some, leveraging analytics is making this dream a reality. Changing the way government views information technology (IT) and analytics requires dedication and persistent engagement. To make the case for analytics—and convince government and citizens of the need to change traditional business models, share data, and update IT infrastructures—government leaders must be able to show tangible beneficial evidence. They must be able to explain exactly how and why investment in analytics can save money, improve lives, avoid unnecessary future costs, and enhance operational efficiency and compliance. Many states have proven that the proper application and use of analytics can make governing more effective—by strengthening fraud detection, enhancing child welfare services, and improving health outcomes. They have shown that by applying analytics strategically, citizen services can be delivered faster and more cost effectively. See the graphic in the appendix to this book, *Holistic Citizen Insight*.

With sophisticated analytics, government leaders can pinpoint the underlying value in all their data. By bringing data together in a unified fashion they can see connections across agencies to better serve citizens. They can get an eye-opening, big-picture view that crosses cultural and political boundaries. They can understand not just what happened in the past, but why it happened and what is likely to happen next. Government leaders can begin to see what they need to do to make it happen again (if it was positive) or to prevent it (if it was negative).

The following chapters touch on several areas of government where analytics can make, and are making, a significant impact in the way governments operate. We highlight how putting analytics in play offers decision makers a holistic view from which they can make sound decisions—from one's childhood through their entire citizen lifecycle. Insights gleaned from early childhood into adulthood and from a broad range of government social and policy areas, offer a clearer

picture of the many touch points government has with its citizens. This provides the ability to understand how our earliest encounters with a child can change trajectories and influence that child's future. Analytics enables insight about the interaction and interrelatedness of government programs to provide clear guidance around effective program performance, efficient government operations, and improved citizen quality of life. The following pages will take you on a journey from the very beginning.

CHILD WELFARE

Our future begins with our children. We must protect, teach, and guide in an environment that will maximize every child's potential. Every child deserves a safe environment in which to grow. In many instances of child abuse or neglect, information is available that could help identify high-risk situations before tragedies occur. Analytics enable a broader, more comprehensive understanding of a child. Having a holistic view of a child enables better decision making about that individual child, and can help ensure he/she receives the best available services and care.

Analytics in play allows a practitioner to go beyond traditional risk assessment tools by incorporating quantitative capabilities that can help improve child safety. Important child-related information can be continually monitored and updated, and automated alerts can notify overworked and overburdened caseworkers whenever established thresholds are breached so they can intervene promptly to help keep children safe.

Valuable, timely information provided to caseworkers and managers enables them to proactively improve other program outcomes as well. Analytic insight can reduce child-support delinquencies, increase collections, and more efficiently manage hundreds of thousands of cases every year. Gaining a holistic view of a child offers his/her caregivers and service providers the ability to truly assist the child in reaching his/her potential. The establishment of a safe environment to grow is the foundation from which a child will learn. Through analytics our education system is gleaning vast insight to ensure every child's potential is realized.

EDUCATION

Public schools are not only the foundation for a thriving economy, they are paramount to developing our greatest resource—human capital. How can we ensure a sustainable future of economic vitality and competitiveness in the purview of today’s global society? Perhaps the most influential factor in the future of our economy is public education. Maintaining a globally competitive workforce begins in the classroom and educators must work creatively and effectively for impact. If our citizens and economies are to remain competitive, state leaders must implement policies and allocate resources to improve the effectiveness of the educational framework in public schools.

A successful education system flourishes in the harmonization of all factors that influence learning. Educators, environments, family backgrounds, health and other determinants all have a vital part to play in the success of a single student’s education.

Transforming our nation’s educational system requires accurate information to more precisely measure the impact of schools, programs, interventions, and teachers on student learning. Using data to understand both students’ and teachers’ strengths and weaknesses can guide implementing strategies that maximize the potential of both parties. The impact of this effort will lead our nation’s schools toward real education transformation, and ultimately help establish the necessary foundation to boost our nation’s economic prosperity. Like education, which lays the foundation for a vibrant economy, healthcare and the well-being of our citizens ensures their quality of life—but also represents one of the greatest challenges in terms of cost and service delivery.

HEALTHCARE

Analytics have become a vital underpinning to Medicaid managed care policy and program administration. In April 2016, the Centers for Medicare and Medicaid Services (CMS) released the first major update to Medicaid managed care in more than 10 years. A decade can bring about a lot of change. A unique opportunity for more comprehensive, advanced analytics for quality of care improvement, value-based care, program and fiscal integrity, and better management of the Medicaid managed care

program is upon us. There are many factors contributing to the breakneck speed with which healthcare costs are rising. Using analytics to identify critical factors offers a mechanism for putting the right pressure on the brakes. Of significant concern is the rampant rise in opiate abuse. This epidemic is hampering first responders' and healthcare providers' ability to meet emergency demand, and is having a crippling fiscal impact.

PRESCRIPTION DRUG ABUSE

Opiate abuse is rising to unprecedented levels, and its abuse is not limited or contained by geographic boundaries. A combination of factors has contributed to the surge in heroin use, including economics (heroin is cheaper than many drugs), a crackdown on prescription painkillers and methamphetamine, and a lack of resources for intensive, effective treatment programs. The toll heroin takes on our communities is undeniable.

Financial costs for law enforcement and public safety agencies, social services programs, child welfare, and the healthcare system have skyrocketed in tandem with the increase in addiction—not just to heroin, but to many substances. Most importantly, the emotional and mental toll heroin takes on families and friends is devastating. Analytics can significantly enhance efforts related to identifying those most at risk for addiction by enabling early, effective intervention.

Introducing advanced analytics can help prescription drug monitoring programs improve upon their success by proactively identifying diversion via multiple provider episodes, inappropriate prescribing, and development of indicators to distinguish between individuals who are abusing prescription drugs and those who are criminally diverting them for profit. Addressing opiate abuse with effective intervention strategies can help alleviate the increased burden on law enforcement tasked with the protecting the public.

CRIMINAL JUSTICE AND PUBLIC SAFETY

Law enforcement personnel place their lives on the line every day to keep our communities safe, to protect and serve, and to safeguard the freedoms and liberties afforded by our country. They are tasked with making split-second decisions that can, and often do, have a profound impact on those involved and the public at large.

It is a challenging time for the U.S. criminal justice and public safety system. Prisons are overcrowded, recidivism rates are high, court systems are congested, and police–community relations are strained. Access to information coupled with real-time analyzed data must be available to those making the decisions. Forward-thinking policymakers and law enforcement personnel rely on data supported by analytics to help them make improvements to current processes based on today’s challenges, today’s data, and today’s best options. Criminal justice and public safety agencies can change outcomes and impact lives via the use of data and analytics.

SMART CITIES

A smart city is an ecosystem where technological solutions facilitate sustainable economic growth and resource efficiency, with the ultimate goal of improving the quality of life of all citizens.

Sensor data, combined with traditional data sources, benefit from technologies that offer real-time decision making, development of rapid analytical models, simulations, predictive analytics, and optimization. Analyzing this voluminous data enables cities to better serve their citizens by presenting the collected data in a highly understandable format for citizens. Traffic alerts, parking availability, retail water usage, and crime reporting are just a few of the many ways citizen intelligence is enhanced. A smart city effectively uses information and communications technology (ICT) to enhance its livability, workability, and sustainability.

TRANSPORTATION

Information and communications technology has strengthened the states’ Departments of Transportation’s ability to improve road safety, save money through better, more efficient decision making, and enhance the overall transportation network. A better understanding of where roads should be constructed while taking into consideration environmental features, improving the quality of the road itself, and implementing maintenance procedures at the right time in the right place have all contributed to bottom-line savings for transportation departments. With the introduction of sensor technology, autonomous

and connected vehicles have the potential to transform personal mobility while generating vast quantities of data to significantly improve safety, improve transportation network performance, reduce congestion, improve freight flows, enhance transportation finance, and improve quality of life.

FRAUD, WASTE, AND ABUSE

All government programs are vulnerable to fraud, waste, and abuse. Government fraud is at an all-time high and growing rapidly. Industry research shows that all together, fraud, waste, and abuse represent about 10 percent of overall government program spending. It's making budget deficits bigger—and forcing elected officials to close deficit gaps by either raising taxes or eliminating programs. Neither option is ideal. What if governments could minimize deficits by eliminating fraud, waste, and abuse? Forward-looking government leaders are already acting by implementing enterprise-level, state-of-the-art fraud detection programs designed to keep pace with increasingly sophisticated perpetrators.

There are several areas where combating fraud, waste, and abuse in government programs can reap big benefits. In the tax and revenue arena, analytics can help close the tax gap with more effective audits and investigations by predicting fraud and noncompliance, and finding suspicious activity quickly. Within workforce programs, analytics can assist with diagnosing the eligibility and legitimacy of claims in unemployment and workers' comp programs—including employee misclassifications—by analyzing disparate sources of data. Looking at benefits program's governments can save billions by moving beyond pay and chase for Medicare, Medicaid, SNAP, TANF, and so on. An integrated workflow offers the ability to analyze data from multiple sources to detect potential fraud in near real time across the entire government enterprise.

ESTABLISHING A CENTER OF ANALYTICS

Putting analytics in play across the entire government enterprise just may be the Holy Grail. Greater IT efficiency, better use of human capital, and smarter decision making are where we all win. The establishment

of a center for analytics, that leverages all available data sources in the most efficient, cost-effective manner, is where we all can experience the rewards of great decision making. Analytics is the key to unlocking valuable insight.

A unique aspect of government is that really, at the end of the day, it does what all private entities do—combined. Governments perform banking and financing functions, economic development functions, travel and tourism functions, service delivery, healthcare, the list goes on. For government, there are lessons to be learned and best practices from which to capitalize with the rapid adoption of analytics in the private sector.

On a daily basis I engage in fascinating conversations with my colleagues, most of whom have dedicated some part of their careers to working in the public sector as practitioners of their respective fields. Their collective knowledge is not only inspiring, but a treasure trove for those who have found the key and are able to unlock it. This book is meant to be that key, unlocking a wealth of domain expertise, practical application, knowledge, and experience. It is my goal that this book will serve as a guide for policymakers, legislators, staffers, government leaders, government employees, and, perhaps most importantly, citizens, to better understand how putting analytics at the forefront of the decision-making process can enable us all to not only know better, but to do better.

Throughout the following pages you'll find we've pulled together some of our favorite best practices that showcase the role analytics plays in better decision making. This compilation is not meant to be exhaustive—we are just getting started! These chapters provide in-depth discussions of the issues at hand, explore the ways analytics can help address those issues, and have real-world examples of how government entities are embracing analytics and doing better as a result—a result where we all win.

To apply Maya Angelou's popular adage to our topic at hand, when governments know better, they can do better. Better policymaking occurs, more effective legislation is enacted, targeted programs and services are appropriately directed to those who most need the assistance, and we can sleep well knowing our taxpayer dollars are being utilized to their fullest potential.

PROFILE

▼ **Marie Lowman** is a Principal Industry Consultant—Government at SAS Institute. For over 21 years, Lowman has overseen SAS's commitment to helping government organizations provide high-quality services to their constituents, while maximizing resources and budgets. Ms. Lowman served for more than 5 years as an appointed planning and zoning commissioner and currently serves as an elected council member for the city of Bee Cave, Texas. She holds a BS and an MS from Indiana University and an MBA from Meredith College.

From *A Practical Guide to Analytics for Governments: Using Big Data for Good* by Marie Lowman. Copyright © 2017, SAS Institute Inc., Cary, North Carolina, USA. ALL RIGHTS RESERVED.

Ready to take your SAS® and JMP® skills up a notch?



Be among the first to know about new books,
special events, and exclusive discounts.

support.sas.com/newbooks

Share your expertise. Write a book with SAS.

support.sas.com/publish

 sas.com/books
for additional books and resources.


THE POWER TO KNOW.®

SAS and all other SAS Institute Inc. product or service names are registered trademarks or trademarks of SAS Institute Inc. in the USA and other countries. ® indicates USA registration. Other brand and product names are trademarks of their respective companies. © 2017 SAS Institute Inc. All rights reserved. M1588358 US.0217