The Executive's Guide to AI and Analytics

The Foundations of Execution and Success in the New World

Scott Burk and Gary D. Miner

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Authors

Scott Burk has been solving complex business and healthcare problems for 25 years, through science, statistics, machine learning, and business acumen. Scott started his career, well actually, in analytics, as an Analytic Chemist after graduating with a double major in Biology and Chemistry from Texas State University. He continued his education, going to school at night and taking advanced courses in science and math at the University of Texas at Dallas (UTD). He then started programming at the toxicology lab where he was working and thus started taking computer science (CS) and business courses until he graduated with a Master's in Business with a concentration in finance soon after.

Texas Instruments (TI) hired him as a financial systems analyst in Semiconductor Group, but due to TI's needs and Scott's love of computers, he soon became a systems analyst for corporate TI. He worked there for three years and started itching to get back to school (even though he continued to take courses at night [Operations Research and CS] through TI's generous educational program). TI granted him an educational leave of absence and he went to Baylor University to teach in the business school and get a PhD in Statistics. He joined Baylor as a non-tenure track professor teaching Quantitative Business Analysis (today = business analytics).

After graduating, Scott went back to TI as a Decision Support Manager for the consumer arm of TI (today called consulting data scientist). Here he engaged in many functional areas – marketing and sales, finance, engineering, logistics, customer relations, the call center, and more. It was a dream job, but unfortunately, TI exited that business.

Scott joined Scott and White, a large integrated healthcare delivery system in Texas as a consulting statistician. He moved into an executive role as Associate Executive Director, Information Systems, leading Data Warehousing, Business Intelligence, and Quality Organizations working with clinics, hospitals, and the health plan. At the same time, he received a faculty appointment and taught informatics with Texas A&M University. He left, but later came back to Baylor, Scott and White (BSW) as Chief Statistician for BSW Health Plan.

Scott continued his education, getting an advanced management certification from Southern Methodist University (SMU) and Master's degree (MS) in Data Mining (machine learning) from Central Connecticut State University. Scott is a firm believer in lifelong learning.

He also worked as Chief Statistician at Overstock, reengineering the way they tested and evaluated marketing campaigns and other programs (analytics, statistics). He launched their "total customer value" program. He was a Lead Pricing Scientist (analytics, optimization) for a B2B pricing optimization company (Zilliant) for a number of years. He thoroughly enjoyed working with a rich, diverse, well-educated group that affected the way he looks at multidisciplinary methods of solving problems.

He was a Risk Manager for eBay/Paypal identifying fraud and other risks on the platform and payment system. He has been working the last few years supporting software development, marketing, and sales, specifically data infrastructure, data science, and analytics platforms, for Dell and now TIBCO. He supports his desire to learn and keep current by writing and teaching in the Masters of Data Science Program at City University of New York.

Gary D. Miner earned his BS from Hamline University, St. Paul, MN, with Biology, Chemistry, and Education as majors; his MS in Zoology and Population Genetics from the University of Wyoming; and his PhD in Biochemical Genetics from the University of Kansas as the recipient of a NASA Pre-Doctoral Fellowship. During the doctoral study years, he also studied mammalian genetics at The Jackson Laboratory, Bar Harbor, ME, under a College Training Program on an NIH award; and another College Training Program at the Bermuda Biological Station, St. George's West, Bermuda in a Marine Developmental Embryology Course, on an NSF award; and a third College Training Program held at the University of California, San Diego, at the Molecular Techniques in Developmental Biology Institute, again on an NSF award.

Following that he studied as a postdoctoral student at the University of Minnesota in Behavioral Genetics, where, along with research in schizophrenia and Alzheimer's Disease (AD), he learned "how to write books" from assisting in editing two book manuscripts of his mentor, Irving Gottesman, PhD (Dr. Gottesman returned the favor 41 years later by writing two tutorials for this *Practical Text Mining* book). After academic research and teaching positions, Gary did another two-year NIH-postdoctoral in Psychiatric Epidemiology and Biostatistics at the University of Iowa where he became thoroughly immersed in studying affective disorders and Alzheimer's Disease. Altogether he spent over 30 years researching and writing papers and books on the genetics of Alzheimer's Disease (Miner, G.D., Richter, R, Blass, J.P., Valentine, J.L, and Winters-Miner, Linda, *Familial Alzheimer's Disease: Molecular Genetics and Clinical Perspectives*, Dekker: NYC, 1989; and Miner, G.D., Winters-Miner, Linda, Blass, J.P., Richter, R, and Valentine, J.L., *Caring for Alzheimer's Patients: A Guide for Family & Healthcare Providers*, Plenum Press Insight Books: NYC, 1989).

Over the years he held positions, including professor and chairman of a department, at various universities, including the University of Kansas, the University of Minnesota, Northwest Nazarene University, Eastern Nazarene University, Southern Nazarene University, and Oral Roberts University Medical School, where he was Associate Professor of Pharmacology and Director of the Alzheimer Disease and Geriatric Disorders Research Laboratories. For a period of time in the 1990s, he was also a visiting Clinical Professor of Psychology for Geriatrics at the Fuller Graduate School of Psychology and Fuller Theological Seminary in Pasadena, CA.

In 1985, he and his wife, Dr. Linda Winters-Miner (author of several tutorials in this book), founded The Familial Alzheimer's Disease Research Foundation (also known as "The Alzheimer's Foundation"), which became a leading force in organizing both local and international scientific meetings and thus bringing together all the leaders in the field of genetics of AD from several countries, which then led to the writing of the first scientific book on the genetics of AD; this book included papers by over 100 scientists who participated in the First International Symposium on the Genetics of Alzheimer's Disease held in Tulsa, OK, in October 1987. During this time, he was also an Affiliate Research Scientist with the Oklahoma Medical Research Foundation located in Oklahoma City with the University of Oklahoma School of Medicine.

Gary was influential in bringing all of the world's leading scientists working on genetics of AD together at just the right time, when various laboratories from Harvard to Duke University and University of California-San Diego, to the University of Heidelberg, in Germany, and universities in Belgium, France, England, and Perth, Australia, were beginning to find "genes" which they thought were related to Alzheimer's Disease.

During the 1990s, Gary was appointed to the Oklahoma Governor's Task Force on Alzheimer's Disease, and was also Associate Editor for Alzheimer's Disease for the *Journal of Geriatric Psychiatry & Neurology*, which he still serves on to this day. By 1995, most of these dominantly inherited genes for AD had been discovered, and the one that Gary had been working on since the mid-1980s with the University of Washington in Seattle was the last of these initial five to be identified – this gene on Chromosome 1 of the human genome. At that time, having met the goal of finding out some of

the genetics of AD, Gary decided to do something different, to find an area of the business world, and since he had been analyzing data for over 30 years, working for StatSoft, Inc. as a Senior Statistician and Data Mining Consultant seemed a perfect "semi-retirement" career. Interestingly (as his wife had predicted), he discovered that the "business world" was much more fun than the "academic world", and at a KDD-Data Mining meeting in 1999 in San Francisco, he decided that he would specialize in "data mining". Incidentally, he first met Bob Nisbet there who told him, "You just have to meet this bright young rising star John Elder!", and within minutes Bob found John introduced me to him, as he was also at this meeting.

As Gary delved into this new "data mining" field and looked at statistics textbooks in general, he saw the need for "practical statistical books" and so started writing chapters and organizing various outlines for different books. Gary, Bob, and John kept running into each other at KDD meetings, and eventually at a breakfast meeting in Seattle in August 2005 decided that they need to write a book on data mining, and right there reorganized Gary's outline which eventually became the book *Handbook of Statistical Analysis and Data Mining Applications* (published in 2009 by Elsevier). And then, in 2012, he was the lead author of a second book *Practical Text Mining* (published by Elsevier/Academic Press). And then came a third in this "series" in 2015: *Practical Predictive Analytics* and *Decisioning Systems for Medicine*. All thanks to Dr. Irving Gottesman, Gary's "mentor in book writing", who planted the seed back in 1970 while Gary was doing a postdoctoral with him at the University of Minnesota.

His latest book was released in 2018, the second edition of *Handbook of Statistical Analysis* (published in 2009) and *Data Mining Applications*. His book *Healthcare's Out Sick – Predicting a Cure – Solutions that Work!!!* is written more for the layperson and decision-maker. It was published in 2019 by Routledge/Taylor & Francis Group.

Gary is currently finishing the 2nd Edition of *Practical Data Analytics for Innovation in Medicine: Bringing Person-Centered & Patient-Directed Healthcare To the World*, publication date late in 2022 by Elsevier-Academic Press; and is also working on a second and third book in the *It's All Analytics* series with Scott Burk, PhD. He also teaches courses periodically in "Predictive Analytics and Healthcare Analytics" at the University of California-Irvine.

Chapter 1
Introduction: Sources of Failure

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> In any given moment we have two options: to step forward into growth or to step back into safety.
>
> What one can be, one must be!
>
> **– Abraham Maslow**

Where is the artificial intelligence (AI) and analytics revolution? We often hear miraculous stories of cutting-edge breakthroughs. It started with IBM's Watson's defeat against champions Brad Rutter and Ken Jennings in Jeopardy ten years ago for $1M. Six years ago, the AlphaGo was the first computer to beat a professional Go player, Fan Hill.

If you listen or read the news, you will hear stories of the miraculous wonders of AI and analytics; how they are changing the world. From this you would think that companies across the globe are achieving miraculous results, right? From LinkedIn to whitepapers, from national news outlets and syndicated news to blogs, AI and analytics have been hot stories for years. Programs are now mature and successful, right?

IBM's Watson has been plagued with failure and lawsuits. In 2017 AlphaGo was retired.

Not so much. We don't get the full picture. We don't read the unwritten story. We read what is available and what is available is meant to sensationalize the stories of the practice. It turns out a large number of AI and analytics programs are not living up to expectations, a number are sick or dying.

Is investment lacking? No. Companies now are spending more than ever on data, analytics, and AI technologies. AI investment in the United States is growing 36% per year, and it is growing faster in some other countries with China growing over 300%. In healthcare, 74% of executives said their organizations would invest more in predictive modeling in 2021.

Is it lack of technology? No. There are fascinating breakthroughs occurring on all fronts with image, voice, and streaming pattern recognition at the forefront. These technologies are driving investment and leading many initiatives, with applications from radiology to autonomous vehicles.

Is it lack of technical talent? Not really. While some studies cite that we need to train more data scientists, developers, and related professionals, the curve of demand by supply is dampening. And, some experts are suggesting the increasing popularity of data scientists may cause an oversupply of talent.

Is it lack of creating an executable strategic plan? While there has been a lot of strategic wishing, organizations lack meaningful strategic plans – specifically, **the development of executable strategies and the leadership to see these strategies brought to fruition**. This is the missing element. The critical element that many organizations lack.