

Preface

It is said that necessity is the mother of all inventions, but often a series of breakthrough scientific discoveries come long before the invention itself. Even business-changing inventions like the steam engine, telecommunications, and the electronic computer were made possible by scientific advances made by other inventors years, decades, or even centuries before. Businesses will always look for new ways to operate faster, smarter, and leaner. Industries are reshaped by inventions borne from a vision of how new scientific discoveries can be applied to better meet the performance goals of businesses.

In the late 1970s, it would be difficult to imagine that the mathematical discoveries made by Dr. Nabil Abu el Ata to define orbits for space exploration would one day solve one of the biggest risk management challenges of modern businesses—the prediction of future unknowns. By solving a problem that was previously defined as unsolvable, Dr. Abu el Ata unknowingly set the foundation for a new era of risk management, termed Optimal Business Control (OBC), which enables companies to more accurately predict the future and take strategic actions to improve business outcomes.

It took time to fully understand how the hidden effects—caused by the dynamic complexity—which made the prediction of satellite orbits difficult, also created challenges in the predictable management of a business. And still longer to prove that the same theories and mathematics that Dr. Abu el Ata applied to predict unknowns for safe space exploration could also be applied to business systems in ways that would redefine how businesses expose and control unforeseen outcomes.

Businesses continuously strive to control the impact of unforeseen events or maximize the realization of opportunities. To do so, a business must have the ability to predict risks and control operations in ways to optimize outcomes. Experience and intuition have long been relied upon for prediction but more recently businesses have begun to formalize how they minimize, monitor, and control the effect of uncertainty on objectives using new risk management methodologies supported by probability and statistical analysis—either in the form of spreadsheets or packaged predictive analytics software. Despite these advances,

businesses are increasingly impacted by new and dangerous patterns of behavior, while the time to act to avoid undesirable business outcomes is shrinking.

During his career at IBM and beyond, working as both an engineer and a business consultant, Dr. Maurice Perks has witnessed firsthand the widening gap between businesses' efforts to build and maintain predictable systems and the chaotic reality whereby unknown influences frequently cause a major deviation from anticipated performance levels. As the interactions and interdependencies between business systems have grown by at least one order of magnitude, so too have the challenges of controlling operations to optimize outcomes. The most popular methods of prediction compare current data to historical references and therefore cannot predict unknowns, which are the very root of the modern day risk management problem. Simply put; *if you haven't seen a pattern in the past and all that you extrapolate is the past you will not see a new pattern in the future until it occurs.*

To achieve better predictability, businesses must be able to expose new, dangerous patterns of behavior in time to take corrective actions and know which actions will yield the optimal results. The scientific discoveries of Dr. Abu el Ata have led to technological innovations that combine data collection, analytics, machine learning, and automation processes to help businesses proactively expose and control dynamic complexity risks.

The methodologies and inventions presented in this book by Dr. Abu el Ata and Dr. Perks are now in the early stages of adoption with over 350 businesses worldwide and the results have been very positive. Businesses use these technologies to evaluate new business models, identify the root cause of performance problems, re-architect systems to meet business growth objectives, identify opportunities for millions of dollars of cost savings, and more. These methodologies and technologies are industry and domain agnostic and therefore limited only by our imagination and how businesses choose to use them.

The purpose of this book is to promote a better understanding of how dynamic complexity creates risk in the execution of business plans and to introduce improved ways for management to predict, evaluate, and when necessary, respond to mitigate risks that hinder the realization of performance goals. This book is intended for anyone who wants to explore new and better ways of predicting the future behavior of commercial systems, i.e., a global financial system, or natural patterns, like weather, and managing these systems with better certainty.

Business, information and technology executives, as well as government leaders can use this book to understand how other organizations are using the principles of OBC along with the underlying mathematics and technologies to determine what risks lie ahead and when sudden shocks may occur. Mathematicians and academia can use this book to understand how a dynamic complexity problem can be accurately solved with the right level of representation and a good level of certainty on the reproducibility by using the combination of Causal Deconstruction Theory and Perturbation Theory.

This book is a starting point. The true impacts of the discoveries presented may not be known for years or decades to come. Like all business-changing inventions,

this is an evolutionary process. While much has been achieved, there is still work to be done by the authors and other inventors. The full value of these efforts won't be realized until the technologies and methodologies become engrained in the culture of the business. When every business, information and technology manager can predict the future with increasing accuracy and confidence and then take strategic action to improve this predicted future, competitive advantage will be won. An ability to understand and control dynamic complexity is the first step toward this goal.

We are such stuff as dreams are made on ...

The Tempest ...

W. Shakespeare

A few Words from Co-author Nabil Abu el Ata

This book would not exist without the perseverance of my co-author and dear friend Maurice Perks. I am grateful for our journey together. In writing a book, we assume a social and public responsibility that differs from delivering a scientific contribution or applying for a degree, which are individual acts. A book is an act of creation—with lots of gestation and revelations, but also at times risk adversity. In the end we must succumb to the simple fact of life: nothing will be perfect. There will always be some important task left undone or thought not communicated. But a starting point is needed. And it is our hope that this book sufficiently satisfies that goal.

Mathematicians are always looking for structures (even when none exist) and physicists are always looking for a phenomenon (even if they must wait a very long time for one to appear). The best results are always achieved when the two professions collectively direct their efforts through a solid engineering and rigorous discipline. We are fortunate to have the collaboration of many great colleagues—including Rudolf Schmandt, Eric Petitjean, Volker Herminghaus, and Bruno Fennebresque—who represent the right expertise and experience to help us navigate the challenges of building a new management science. Our partners Muriel Barneoud, Alain Roset, Sean Daly provided support and encouragement; to all we are indebted.

This book reflects the wisdom of these individuals. Rudi was instrumental in helping me scope and define the new management science of Optimal Business Control as well as the Prescriptive Management of Risk. Volker, Eric, and Bruno are the champions of cost and efficiency optimization—always challenging us to better meet the needs of business. Maurice brings a wealth of IT experience and faithfully pushes the bounds of my thinking. Together we share a common objective to deliver a scientific platform that will enable businesses to proactively solve dynamic complexity problems. We live in a time when this solution is

greatly needed—as the negative impacts of dynamic complexity grow and the window of opportunity to act shortens.

A book that explains the business impacts of dynamic complexity and presents a practical solution is probably long overdue. For the last decade we have seen the compounding effects of dynamic complexity become an increasingly significant and counterproductive force within businesses. Yet the ideas for this book probably could not have been realized earlier in our lives as practitioners or in my evolution as a solution provider. To document and contribute meaningfully to the science of business management, one must have many opportunities to work on problems, which are endemic to business, and have access to a lot of people who are willing to share their experiences and results they have achieved using the proposed technologies and methodologies. Happily, our clients, partners, and joint collaborators have willingly supported our work and accompanied us in our achievements, which have brought us to this point.

Much of the work presented in this book was supported by real cases, which used the technology advances made possible by my dedicated team at Accretive Technologies. I appreciate their commitment to our cause. We have made significant progress over the last decade—from being the first to identify the negative impact of dynamic complexity on systemic business evolution to the present-day offering of commercial products and services that businesses use to diagnose and remediate dynamic complexity risks.

I owe particular thanks to my board, Charlie Fote, Merritt Lutz, and Charlie O'Rourke, for their continuous encouragement and support, and to my executive team, Annie Drucbert, Tomy Abu el Ata, Stephen Wells, Régine Bouladou, and Michael Brookbanks, for their faithful execution. In addition, I value the ingenuity of my development team—for without them a technology solution to dynamic complexity would not be possible. I look forward to continuing our fight against dynamic complexity together.

While on the subject of the Accretive team, we are indebted to the contribution of Valerie Driessen. She kept us on track, imposed rigor and discipline of usefulness, and controlled the trajectory of the book until we landed smoothly. To her we owe the deepest of gratitude.

My sincere thanks are owed to our publisher, Springer. We have benefitted from their advice and continuous encouragements to persevere against the obstacles of life. Closer to home, we have each enjoyed the love, support, and time our families have provided us. Thanks for putting up with us as we worked through nights and weekends to deliver this book.

Even Fewer Words from Co-author Maurice J. Perks

Working with Nabil is always *Dynamic*. He changes the place where he is with great regularity that is unpredictable even with what we have developed. He epitomizes *Change*. His ideas are never *Static*. They are always *Complex*. On a

scale of 1–10 they are 10 plus. My ideas are always *Simple*. On the same scale they are 1 minus. This makes us the ideal paring with respect to developing ideas and opinions. We thrive off each other's extremities. We have been doing this for many years and it's both great fun and greatly rewarding. Nabil inspires. I reason. That's our team. In the best traditions of British friendship and respect, we are mates.

Personally, I would like to thank two large groups for the 'education' and experiences that have allowed me to contribute to this book. They are:

First, the technical community of IBM: nowhere on this planet is there a treasure-store of IT technical talent like there is within IBM. Talent that runs from the Fellows 'on high' downwards to those who are inspired to scale the technical ladder from the bottom rung. This amalgam has unmatched experience of the state of the IT science and what is possible. And, what might be possible to achieve. Someone, somewhere within the greater IBM always knows the answer. Finding that someone can be a challenge though, and hearing that someone's insight can also be a problem. You can argue against my praise of this technical community in terms of success but this community has set the direction for computing with System/360, the IBM PC, operating systems, relational databases, and a score of supporting components of hardware and software (especially middleware) technologies.

Second, the ever-changing world of customers and their businesses has inspired me on countless occasions. If you want to create something entirely new within the IT world you may not find the seeds in a customer's environment. But if you want to understand the next steps in the evolution of IT you will find the pointers within many customer environments. The challenges like: cost reduction and efficiency, 24 × 7, security, customer service, and perhaps most of all, a sense of progress and achievement. Customer environments are for me the laboratories of IT.

Solving the Dynamic Complexity Dilemma

Predictive and Prescriptive Business Management:

Answering the Need for a New Paradigm

Abu el Ata, N.; Perks, M.J.

2014, XXVI, 281 p. 92 illus., 6 illus. in color., Hardcover

ISBN: 978-3-642-54309-8