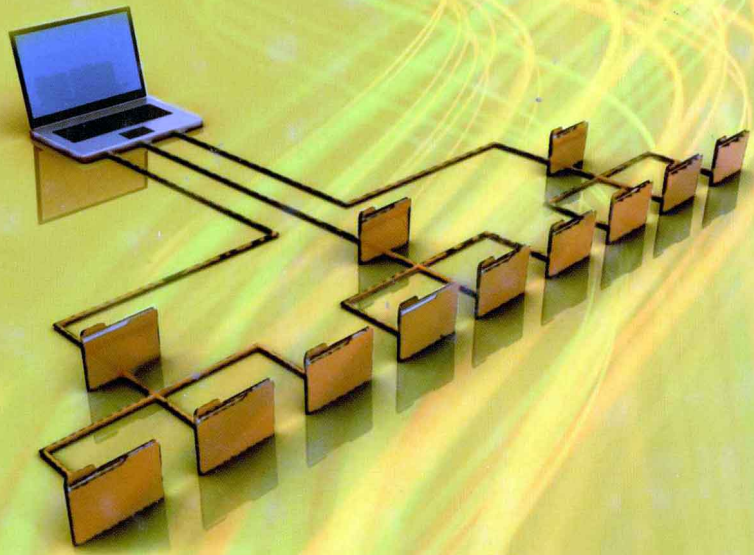
Information-Driven Business



How to Manage Data and Information for Maximum Advantage

Robert Hillard

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WILEY

John Wiley & Sons, Inc.

Published by John Wiley & Sons, Inc., Hoboken, New Jersey.
Published simultaneously in Canada.

Library of Congress Cataloging-in-Publication Data

Hillard, Robert, 1968–
Information-driven business : how to manage data and information for maximum advantage / Robert Hillard.
p. cm.
Includes bibliographical references and index.
ISBN 978-0-470-62577-4 (cloth); ISBN 978-0-470-64943-5 (ebk);
ISBN 978-0-470-64945-9 (ebk); ISBN 978-0-470-64946-6 (ebk)
1. Technological innovations—Management. 2. Information technology—Management. 3. Management information systems. 4. Industrial management.
I. Title.
HD45.H45 2010
658.4'038–dc22

2010007798

Printed in the United States of America.

10 9 8 7 6 5 4 3 2 1

Preface

This book is aimed at anyone who is in any way responsible for information. Executives, managers, and technical staff all need to understand how to manage this most valuable resource.

I wrote this book based on the observation that the concept of information overload is permeating every business that I deal with. At the same time, the global economy is moving from products to services that are described almost entirely electronically. Even those businesses that are traditionally associated with making things are less concerned with the management of the manufacturing process (which is largely outsourced) than they are with the management of their intellectual property. Increasingly, information doesn't provide a window on the business. *It is the business.*

It's a simple equation. Intellectual property is tied up in the data on computers. If it is the subject of focused management, then greater value is extracted from that data. If the intellectual property is a significant proportion of the value of the business, then such a focused effort will have a dramatic effect on the value of the business as a whole. Such an effort will also make the organization much more enjoyable to work in with less time lost searching for information that should be readily available and less time sifting through irrelevant data that should never have hit the e-mail inbox.

As business has become more complex, techniques are appearing almost every day that seek to simplify the task of managing a large, multifaceted organization. Their quest is similar to a physicist looking for the single unifying equation that will define the universe. Any approach that recommends focusing on one part of the business must use a limited set of measures that aggregate complex data from across the enterprise. In providing a simple answer, detail and differentiation must be lost.

A simple set of metrics by itself is no longer enough to sum up the millions or billions of moving parts that define the enterprise. Perhaps, then, it is time to gain a better understanding of the role of information in business.

While large quantities of information have been with us for as long as humans have gathered in groups, it has taken on a whole new dynamic form. The quantity of data has grown dramatically since the cost of computer storage dropped as it did at the end of the twentieth century. The growth has taken business management by surprise and the techniques that we use have not been able to keep up.

With little differentiation in the bricks-and-mortar assets, business needs to enhance its service and differentiate using the informational resources at its disposal. The winners tailor their product to the needs of their markets. Successful leaders have a deep insight into the running of their business. Such an insight can come only from accurate information.

In almost every organization, one or more executives have been assigned accountability for information governance, quality, or records. Similarly, technologists are being asked to make sense of the mountains of data that exist in databases, file systems, and other repositories. This is a book about becoming an information-centric business and achieving significant benefits as a result.

Over many years, I have had the opportunity to work with hundreds of organizations in the private and government sectors. The issues that they face handling business information have a common theme of complexity. Questions that should be simple to answer take too long, reconciliations that should be exact aren't, privacy that should be perfect isn't, and security that should be tight is porous.

Treating information as something that needs to be managed in its own right allows a profession of information managers to develop a common approach to information management. Without common techniques, many organizations have been ad hoc in their approach. The most successful, though, have borrowed approaches from other disciplines and been part of the evolution of a form of professional consensus.

For that reason, I have been pleased over a number of years to be part of the leadership of the MIKE2.0 initiative. MIKE2.0 (Method for the Implementation of a Knowledge Enterprise) is an open collaboration of information management professionals from a variety of organizations seeking to develop a common approach. The content is entirely free under the Creative Commons licensing model. MIKE2.0 can be found at www.openmethodology.org.

I have applied the techniques in this book in some of the world's largest companies and government departments. They have also been effectively adopted in midsized and even small businesses. As a field grows in sophistication, so the knowledge needed by practitioners also increases. This book provides sufficient detail to allow anyone who deals with information to identify the right approach to apply without trying to be a step-by-step guide. Armed with the knowledge within these pages, the reader can then adopt comprehensive methodologies like MIKE2.0 to develop detailed project plans or establish programs of work.

Each chapter introduces a concept and in many cases provides both strategic and tactical advice. The strategic advice will help shape the future enterprise. The tactical advice will help solve immediate challenges. The reader should be left with the overwhelming message that information management is not the responsibility of the information technology department, nor is it able to be governed by any one line of business. Information is an asset with a very real economic value. It is the responsibility of everyone who in any way creates, handles, stores, or exploits this asset to ensure that they achieve the greatest possible value for the enterprise as a whole.

This is not the final book that will be written on this subject. The discipline will continue to develop as we all find better and more effective ways to run organizations to better create, handle, and exploit information. There is no single answer to the question on how you should manage your information resources, so apart from the MIKE2.0 site, I also encourage readers of this book to check in at www.infodrivenbusiness.com where additional references and comments will be posted.

Acknowledgments

Many people have helped to review draft manuscripts, supported the process of getting it published, and constantly challenged me to think deeply about all aspects of information and data management. I'd like to specifically thank, in no particular order, Robin Hillard, Michelle Pearce, Professor David Arnott, Sean McClowry, Professor Graeme Shanks, Dr. Gregory Hill, Frank Farrall, Gerhard Vorster, Giam Swiegers, Brian Romer, and Michael Tarlinton.

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Chapter 1

Understanding the Information Economy

Managing information has become as important to the enterprise as managing financial information has been to the accounting functions of a business. Information now pervades every aspect of an organization, including reporting, marketing, product development, and resource allocation. In the last twenty years, business reports to management and investors have become much more dependent on information derived from nonfinancial sources than ever before.

In fact, as the economy increasingly depends on information, the old assumptions about what is important have changed. The value that business saw in scale due to shared functions and infrastructure have been turned on their head by business process outsourcing (BPO), which is the outsourcing of a business function that might previously have been done within the organization. Examples include the processing of invoices, payroll, or even customer contact through call centers.

BPO is only possible because of advances in the storage, communication, and description of complex information at a cost that is much lower than imaginable even twenty years ago. At the same time, the value that business might previously have seen in owning infrastructure (such as manufacturing plants) has been overtaken by the value of the knowledge of the manufacturing process.

Everywhere we look, we see examples of how the management and exchange of intangible information has become more important than the trade in physical resources. An information economy has been created describing the exchange of information among organizations and between individuals and departments within a single organization.

To extract the greatest possible value from the concept of the information economy, it is worth looking at its origins.

> We should be investing in the new electronic superhighways—satellite and telecommunications technology that is the nerve centre of a new Information Economy—doing for the next century what roads and railways have done for this one.
>
> **—Tony Blair, Labour Party Conference, 1994**

Blair, like most politicians, saw services trading in information as being driven by the Internet and its supporting communications infrastructure. By 1990, however, the networking technologies that drove the Internet were already well established and mature. So why wasn't the economy already online?

DID THE INTERNET CREATE THE INFORMATION ECONOMY?

The concept of electronic or information superhighways appeared as early as the 1970s. Artist Nam June Paik, who is well known for his electronic and video work, appears to be the first person to have used *information superhighway* as a term, in 1974. Certainly, by the 1980s, there are many references to the term. *Newsweek* carried an article on January 3, 1983, which uses the term with reference to networks being built to connect northeastern cities such as New York, Washington, DC, and Boston. Al Gore (Vice President of the United States from 1992 to 2000) and Bill Gates (cofounder of Microsoft) did much to popularize the term in the 1990s.

> The United States could benefit greatly—in research, in education, in economic development, and in scores of other areas—by efficiently processing and dealing with information that is available but unused. What we need is a nationwide network of information superhighways, linking scientists, business people, educators, and students by fiber-optic cable.
>
> **—Al Gore, "Information Superhighways: The Next Information Revolution," *The Futurist*, 1991**

> Now that computing is astoundingly inexpensive and computers inhabit every part of our lives, we stand at the brink of another revolution. This one will involve unprecedentedly inexpensive communications. All the computers will join together to communicate with us and for us. Interconnected globally, they'll form a large interactive network, which is sometimes called the information superhighway.
>
> **—Bill Gates, *The Road Ahead*, 1995**

The consistent theme of speeches and commentary from the era is that the Internet combined with ubiquitous connectivity would drive economic activity and a new way of doing business. What most commentators of the time missed, however, was that the Internet was not a creation of the U.S. government but rather an inevitable consequence of a business and consumer need created by a new phenomenon: mass computer storage.

ORIGINS OF ELECTRONIC DATA STORAGE

In the 1940s and 1950s, the U.S. Navy was undertaking a computer project titled "Whirlwind." Whirlwind was designed to support the development of flight simulations in support of pilot training.

While this would be an easy task today, it was revolutionary in many respects then. Most problems that were tackled using computers at that time were based on individual equations that needed to be applied many times (such as the repetitive calculation of artillery range tables). Flight simulations required complex algorithms with large amounts of data to be shared between the steps.

Apart from the many new and complex tasks involved, the output was time dependent. Until that time, all computing had been undertaken in batches with the only driver for speed being the time it took to get the final result.

The project was run by Jay W. Forrester who realized that existing technology was not able to deliver information to the flight-simulator environment quickly enough to be useful. He also realized that it wasn't processing power that was holding up the system; rather, it was the ability to access information from the archaic technologies in use at the time to store variables.

Forrester leveraged the work of An Wang, a physicist who was developing a technique to use magnetic fields to store individual bits of data. The high speed of this nonmechanical approach was exactly what Whirlwind needed. As a result of this collaboration, Wang's core memory (referred to as *core* because it uses the core magnetic fields) became the standard form of memory until the 1970s when silicon memory manufacture took over.

Previous forms of computer memory had been so inefficient that the concept of data was limited to variables explicitly set by the programmer at the time of computation. There was no need for any relationship to be described between any of these discrete variables.

With the introduction of core memory, however, digital computers could move into the mainstream of industry. They became business as well as mathematical tools capable of handling clerical, data-centric functions such as banking account balances, retail stock control, and financial ledgers.

Once the computer moved out of the purely mathematical world, the handling of complex data became possible, driving even greater storage needs, which in turn spawned developments in both memory and computer disk technologies. This insatiable need for data drove technological development at such a dramatic pace that cofounder of Intel Gordon Moore wrote in 1965:

> The complexity for minimum component costs has increased at a rate of roughly a factor of two per year ... Certainly over the short term this rate can be expected to continue, if not to increase. Over the longer term, the rate of increase is a bit more uncertain, although there is no reason to believe it will not remain nearly constant for at least 10 years. That means by 1975, the number of components per integrated circuit for minimum cost will be 65,000. I believe that such a large circuit can be built on a single wafer.[1]

This statement was later generalized into Moore's Law and extended by others to support the ongoing doubling every twelve to eighteen months of all types of computer storage and processing capacity.

STOCKS AND FLOWS

Economists deal with complex systems with elements that accumulate or reduce as a function of activity or time. The elements that accumulate are often referred to

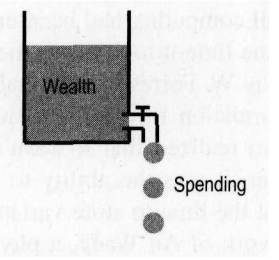

Figure 1.1 Stock of Wealth Reduced by Flow of Spending

as *stocks* because they represent an amount that builds up (a stock) and can be drawn from in the future. A good example of a stock is wealth. To accumulate or reduce a stock, something needs to be added or removed. This process is called a *flow*. Spending money is a good example of a flow because it reduces the stock of wealth (see Figure 1.1).

In the 1950s, the same Professor Jay W. Forrester who was central to the development of magnetic computer storage applied the principles of stocks and flows to create the discipline of *system dynamics*, which describes complex systems (of which the economy is a perfect example) by describing every element in terms of stocks or flows. The author has previously applied Forrester's principles of system dynamics to data warehouse systems in particular (see Hillard, Blecher, and O'Donnell, "The Implications of Chaos Theory on the Management of a Data Warehouse."[2] Chapter 9 introduces system dynamics and its application in more detail.

The Internet can be similarly described in terms of stocks and flows. Each server on the network accumulates information, while the routers direct the flow of information around the system.

Which is more valuable: the stock or the flow? Without the flow of the Internet, there is no ability to access information on individual servers. Without the stocks of information on the servers, there is no reason for the flow of the Internet to exist. Therefore, it can be said that stocks and flows are of equal value. To function, the Internet needs storage capacity and connectivity. Although the network technology for the information superhighway was available before the 1990s, the Internet did not come into existence until there were enough valuable stores of data that people wanted to access.

BUSINESS DATA

With the availability of practical technology for the storage of data, business enthusiastically adopted computing through the 1970s and 1980s; however, the cost of storage remained a substantial impediment to unfettered application and

accumulation of business history. Computing historians can show this by many measures, but none is more dramatic than the rise of the Y2K problem when companies that had systems that were built during these years were so concerned with conserving storage that they reserved only two characters for the year of any date (e.g., *1985* became *85*).

By the end of the 1980s, Moore's Law began to catch up with the latent content generated by business. By the early 1990s, the price of semipermanent storage had reached the psychologically important threshold of US$1 per megabyte.

For the first time, business systems did not need to be so Spartan in deciding what data to keep. In fact, more and more programmers postponed the development of archive routines, knowing that Moore's Law would outpace the growth in their databases. Of even more benefit, business analysts could now require the collection of data that was ancillary to the core transaction, building up a context for every business relationship. The business system had become a data repository of value.

The Internet had existed in some form for decades, with the foundations laid in ARPANET in the 1970s and widely used local area networks (LANs) in the 1980s. The network technology was robust, but public and business interest in applying it further was limited by the lack of content. To leverage the stock and flow metaphor, there was no demand for the flow of information in the absence of any significant stocks of data.

Low-cost storage enabled the stocks of data to build in business and the wider community. Gradually hubs of content built up with proprietary access, such as bulletin boards, AOL (America On-Line), and many other similar services. The networking technology was mature and so it was inevitable that it would standardize.

A useful comparison is the introduction of telephones at the end of the nineteenth century. Initially, the technology was applied to pairs or to small numbers of businesses that needed to connect several of their locations. Even though the technology initially had some minor differences between suppliers, there was a very quick jump to exchanges and then interfaces between different exchanges. Today, we consider it historically inevitable that the telephone would quickly standardize to one network across the globe.

CHANGING BUSINESS MODELS

Historically, business has been heavily decentralized. A very good and illustrative example is the banking industry in which a bank branch manager in the 1970s and 1980s had considerable executive authority and prestige. The advent of centralized information has allowed the head office to take over the day-to-day running, approval, and review of transactions, ultimately leading to today's branch manager generally having a greatly reduced role and responsibility.

Access to complex information covering all aspects of business has coincided with a tectonic shift to centralized power and control in almost every industry sector,

from retail through manufacturing, logistics, telecommunications, and financial services. Of course, one of the problems of this approach is the ability for small head-office errors to be magnified many times. An error in a ledger at a branch is limited to a small part of the business. A centralized error can be a material proportion of the business.

Robin Morgan, a feminist writer, once said that "Information is power." Armed for the first time with masses of information, head-office business executives have wielded previously unimaginable power, taking over not only broad strategy but the minutia of transaction review and approval. Morgan's hypothesis was that those armed with information are tempted to conceal it from others and use it to exercise control. Many staff in large organizations today regularly complain about their access to information and the lack of discretion they are permitted in the fulfillment of their jobs. The excuse most commonly given for the concealment of information is market regulation (such as the prohibition of insider trading) or commercial sensitivities (such as those used by government to avoid disclosing dealings with the private sector).

It is worth considering whether the reason some information is hidden from wider view may be due to a lack of confidence in its quality. This is particularly relevant if published results are derived from the detail and there could be a genuine fear that independent analysis (even within their own ranks) of the data could yield different and challenging results.

The question that any organization needs to ask itself is whether it is using information to create the most dynamic, responsive, and adaptable enterprise possible, or is it using information to satisfy the need for power by a privileged few?

INFORMATION SHARING VERSUS INFRASTRUCTURE SHARING

Companies, like any social network, gain scale because there is an advantage to their constituent parts. Companies, like countries, break apart when the constituent parts are able to realize more value without the parent entity.

During the majority of the twentieth century, conglomerates formed with the express purpose of providing back-end and management scale. By being part of the one entity, constituent businesses were able to share capital, administration services, logistic hubs, office space, and other traditional infrastructure. Business trends through the last decades have created third-party services that can provide such facilities more effectively and usually more cheaply than in-house equivalents.

The growth of superannuation and other pension funds has created cash box investments looking to provide working capital for high-growth business.

Large-scale services firms have standardized the provision of administrative services such as payroll, accounts, and even more hands-on services such as call centers.