Understanding Data and Information Systems for Recordkeeping

by

Philip C. Bantin

The Archives & Record Manager’s Bookshelf 2

Neal-Schuman Publishers, Inc.
New York London
Contents

List of Figures vii
Foreword ix
Preface xi

1. The Impact of Change on the Management of Electronic Records 1
   Changes in Technology 1
   Changes in Organizational Structure and Workflow 6
   The Effect of Change on Records Management 10
   Models for Managing Electronic Records 18
   References 22

2. Recordkeeping Systems 27
   What Are Records? 27
   What Is Records Management? 29
   Primary Functional Requirements for Recordkeeping Systems 31
   Specific Requirements for Recordkeeping Systems 34
   Non-electronic Records 44
   The Importance of Metadata 45
   Key Recordkeeping Metadata 47
   OAIS Model 55
   Other Points of Agreement about Recordkeeping Metadata 59
   References 61

3. Transaction Processing Systems Constructed on the Relational Database Model 65
   Technology and Information 66
   Data and Information 67
   Information Management Systems 68
   Transaction Processing Systems 72
   Database Structures 81
Transaction Processing Systems as Recordkeeping Systems 103
Making Transaction Processing Systems Better Recordkeeping Systems 112
References 126

   Document Management Systems in the Early to Mid 1990s 130
   Early to Mid 1990s Document Management Systems as Recordkeeping Systems 133
   Changes in Enterprise Document Management Systems in the Last Decade 136
   Modern Document Management/Records Management Applications as Recordkeeping Systems 142
   References 148

5. **Decision Support Systems and Data Warehouses** 149
   Decision Support Systems 149
   Database Solutions for Managers and Executives 158
   Operational Data Store 159
   Data Marts 161
   Data Warehouses 163
   Decision Support Systems Based on the Data Warehouse as Recordkeeping Systems 187
   Making Data Warehouses Better Recordkeeping Systems 193
   References 193

6. **E-mail Management** 199
   Legal Cases Involving E-mail 200
   Court Cases Involving Discovery and Preservation of E-mail 204
   Lessons Learned from the Legal Cases 214
   Surveys on E-mail Management 215
   Strategies for Making Retention Decisions 218
   Strategies for E-mail Management 221
   References 227
7. **Laws, Regulations, and Best Practices Relating to Electronic Records Management**  
   Laws and Acts  
   Impact of SOX  
   Rules and Regulations  
   Guidelines and Best Practices  
   Lessons Learned from the Laws, Regulations, and Best Practices  
   References  

8. **Conclusion**  
   Progress  
   Challenges  
   References  

Index  
About the Author
List of Figures

Figure 1.1: Technology Shifts 7
Figure 1.2: Networked Organizations 11
Figure 2.1: OAIS Content Information Object 57
Figure 2.2: OAIS Preservation Description Information 58
Figure 3.1: Relational Database Design 74
Figure 3.2: Data Models Depicting Entities and Relationships 80
Figure 3.3: Data Models Depicting Attributes 81
Figure 3.4: Representation of the File Management Structure 82
Figure 3.5: Hierarchical Database Structure 85
Figure 3.6: Network Database Model 85
Figure 3.7: Strengths and Weaknesses of the Different Structures 88
Figure 3.8: Example of a Table in a Relational Database 90
Figure 3.9: Example of a Data Dictionary 93
Figure 3.10: PeopleSoft Effective Dated Records 99
Figure 3.11: Example of Effective Dating 100
Figure 3.12: Conceptual Design of Portal, Applications, and Infrastructure 122
Figure 3.13: EDEN Workflow Engine and Electronic Recordkeeping 123
Figure 4.1: Logical Model of the EDMS Architecture 131
Figure 4.2: DoD Comparison of FileNet and ForeMost 138
Figure 4.3: Enterprise Content Management Functionality 157
Figure 5.1: Three-Dimensional Data Cube 157
Figure 5.2: Differences between Operational Data and Derived DSS Data 160
Figure 5.3: Wholesale Database Snapshot 171
Figure 5.4: Selective Database Snapshot 172
Figure 5.5: Cumulative Database Snapshot 173
Figure 5.6: Data Integration Process 174
Figure 5.7: Fact Table 176
Figure 5.8: Dimension Table 177
Figure 5.9: Creation of Relationship Artifacts 180
Figure 5.10: Architecture of a Distributed Data Warehouse 186
Figure 7.1: Smaller Company Cost Summary 249
Figure 7.2: Larger Company Cost Summary 250
Figure 7.3: Relationships in COSO 269
Figure 7.4: Relationships between SOX, SEC, COSO, and COBIT 276
Philip Bantin’s *Understanding Data and Information Systems for Recordkeeping* is an important book for the archives and records management professional. As the author points out in his introduction, archivists and records managers need to understand the information systems that create and manage contemporary records. This understanding is necessary to communicate our needs and concerns to the information technology professionals responsible for systems and the records they contain. This book goes far to bridge the gap between professional perspectives.

After discussing the development of digital information systems since the Second World War, Bantin summarizes archival theory and practice about the nature of recordkeeping systems. Taken together, these first two chapters present a foundation for discussions among information and recordkeeping professionals.

In chapters 3–6, Bantin presents a structured approach for understanding the most common information systems and applying recordkeeping principles to them. He covers in depth: transaction processing systems (TPS) constructed on the relational database model, enterprise document management, and content management systems; decision support systems and data warehouses; and e-mail management systems. Throughout these chapters, Bantin’s central principle is that archivists and records managers need to understand the technology in order to manage the records that flow from each technology. Bantin makes this information accessible to technophobes as well as technophiles.

Chapter 7 recognizes that the information and recordkeeping environments are affected by larger legal and regulatory concerns. Because organizations rely on digital systems for their mission-critical activities, the information systems often are part of legal and regulatory proceedings. Archivists and records managers increasingly are finding themselves part of compliance teams, either permanently or on an ad hoc basis. Understanding the legal system has become as im-
important as understanding the information system itself. This book helps with both levels of understanding.

As series editor, I am pleased that *Understanding Data and Information Systems for Recordkeeping* is part of the Archives and Record Manager’s Bookshelf. This is precisely the kind of book that Neal-Schuman and I envisioned when establishing the series—a book that recognizes the commonality of interest among archivists and records managers and facilitates communication between these closely related professions. Philip Bantin has been a leader in the management of digital records for the last two decades. In this book he summarizes much of what he has learned from being in both the trenches and the classroom. Countless archivists and records managers will benefit from his generosity in undertaking this daunting task.

Gregory S. Hunter, Ph.D., CA, CRM
Long Island University
Series Editor
Preface

The automation of records has caused a revolution in archives and records management. Fifty years ago, an organization would create and archive vital business documents such as annual budgets and long-range plans entirely in paper form. Fifteen years ago, the same organization might have created a budget or plan on the computer, but would print it out as a report and file it physically for long-term access. Today, organizations use automated electronic systems to create, store, and manage many of their most important, mission-critical records.

In order to be effective in this new world of electronic records management, archivists and records management professionals require two types of knowledge. First, they must understand the design features and existing functionality of the information systems commonly used by their institutions. Second, they must define the functional requirements for the type of system they want to build. Existing literature doesn’t address these issues adequately. IT literature has discussed the first point in great detail—and usually in very technical language. Rarely does IT literature analyze the functionality of these information systems in terms of their impact on recordkeeping. Records management and archives literature, on the other hand, has done a good job of defining recordkeeping requirements, but has rarely described and analyzed information systems in any detail.

In Understanding Data and Information Systems for Recordkeeping, I attempt to provide a bridge between the theoretical discussions about recordkeeping requirements and specifications that have taken place in our field and the general technical facts available elsewhere. Using largely non-technical language, I discuss how information systems capture, store, and manage data. I also examine how to adapt these systems for use as recordkeeping systems, which are special information systems that manage and preserve the records that provide evidence of business transactions or of personal activities. I have tried to address the concerns of archivists and records managers in both the public and
private sectors. I hope that the basic content will also be useful for others involved in the process, including IT staff, auditors, risk managers, and lawyers.

My discussion of commonly used information systems, such as relational databases, data warehouses, decision support systems, and document management and content management systems, is organized around four objectives. First, I provide information on how these systems are designed and how to identify which types of functionality are primary and which are secondary. Second, I review the basic architecture of these systems to provide readers with a more detailed analysis of how data, information, and records are processed and managed. A third objective is to use the design features and functionality to analyze how the information systems function as recordkeeping systems. To achieve this goal, I compare the known functionality of the system under review with the functional requirements and metadata specifications that have been established for recordkeeping systems. Fourth, I analyze the strengths and weaknesses of the information systems as recordkeeping applications. As part of this analysis, I recommend some options and strategies for transforming these systems into better, more functional recordkeeping systems.

Understanding Data and Information Systems for Recordkeeping reflects the reality that in most cases, you will not be designing a new structure from scratch. Most projects will involve critiquing what currently exists and building future strategies around and through these information systems. Simply knowing what you want to achieve will not get you where you want to go. To reach your goals, you must understand the present and existing environment and fit your requirements and specifications into that framework.

ORGANIZATION

Chapter 1, “The Impact of Change on the Management of Electronic Records,” examines the outside forces that have impacted how records are created and managed. Questions that are addressed in the chapter include: What changes have occurred in the business environment? How has computer technology developed? How are these changes in organizational structure and in technology transforming archives and records management theory and practice?

Chapter 2, “Recordkeeping Systems,” reviews the definitions of
records, recordkeeping systems, and metadata. Functional require-
ments statements, metadata specifications, and the characteristics that
should be considered essential and fundamental for any such system
are discussed.

Chapter 3, “Transaction Processing Systems Constructed on the
Relational Database Model,” details the design features and function-
ality of these systems. Issues covered include data model construction,
structural components of relational databases, the ways in which a da-
tabase preserves historical information, and strategies for making trans-
action processing systems better for recordkeeping.

Chapter 4, “Enterprise Document Management and Content
Management Systems,” discusses the evolution of document manage-
ment systems from the mid 1990s to the present. It describes the
changes of the past few years, current functionality, and the record-
keeping capabilities of content management systems.

Chapter 5, “Decision Support Systems and Data Warehouses,”
explains these applications, how they are structured, and how they
capture, integrate, and transform data. The types of metadata typically
found in the warehouse and the changes warehouses may undergo in
the near future are also covered. The chapter concludes by examin-
ing whether data warehouses can be transformed into effective
recordkeeping systems.

Chapter 6, “E-mail Management,” outlines strategies for handling
e-mail as a business record. It examines relevant court cases and litig-
ation, pinpointing specific challenges in managing e-mail and actions
that can be taken to overcome these challenges.

Chapter 7, “Laws, Regulations, and Best Practices Relating to
Electronic Records Management,” evaluates the most relevant legis-
lation and requirements from the United States, Canada, and the
United Kingdom. It also identifies lessons to be learned from these
laws, regulations, and best practices as they relate to recordkeeping.

Chapter 8, “Conclusion,” suggests reasons to be both optimistic
and pessimistic about the future of electronic records management.

Developing effective electronic recordkeeping systems requires a
thorough understanding of existing information systems. Understand-
ing Data and Information Systems for Recordkeeping is dedicated to pro-
viding archivists and records managers with essential knowledge on
how commonly used systems process data and information so that our
professions can make a real and significant impact on how records are
managed within our institutions.