Foundations of Library and Information Science

FOURTH EDITION

RICHARD E. RUBIN

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Foreword

by Joseph Janes

I envy you.

That may not be quite what you expected to read here, so let me explain. First and foremost, I want to congratulate you, and thank you, for choosing this profession. People come to work in library and information settings for so many reasons: getting a job in a library and discovering it's right for you, having early positive experiences in these fields, having a parent or friend who works in an information field, or just feeling an affinity, being drawn to the work, the environment, the institutions, a desire to serve. Whatever brought you here, welcome.

Surveys of our field have shown, and my own experiences and discussions with colleagues reinforce this, that the huge majority of people who do this sort of work love it, would recommend it, and would do it all over again. That's not to say there aren't challenges and frustrations—there are—but for a great many of us this is work we find nourishing, satisfying, rewarding, and enjoyable.

So, I envy you. Not only that you're joining us, but that you're joining us now. As somebody who got his library degree back in the dim dark ages of the early 1980s, I can tell you there has been no more exciting and significant time for what we do. While one still occasionally hears the old "what do we need libraries for when everything's on Google" canard, libraries of all kinds have never been in more demand, the importance of what librarians do has never been greater, and I believe the recognition and acknowledgment of that importance continues to grow as well. That's a testimony to the vision and hard work of your predecessors.

Nor have the challenges, or the opportunities, been greater. You—your generation—will get to figure out how libraries and other information organizations reenvision, reinvent, repurpose, and re-present themselves to constituencies and communities that want and need our services and collections and help more than ever, in an information environment that has never been more competitive,

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mercurial, fickle, and diverse. That may seem daunting, even burdensome, and it may well be, but it's also true, and when you succeed, the fruits will be all the sweeter.

I also envy you this book. Rick Rubin has done his usual Herculean effort to wrap his arms around the entirety and totality of our field, its history and scope. There are things talked about in this book that didn't exist a few years ago, along with ideas and practices a century old or more, and when you look back at this in a couple of decades, you'll chuckle with fond remembrance of things here that are long gone. (Oh yeah, whatever happened to e-mail, anyway?)

I know this seems like a lot to take in, and it is. You've got a sure hand to guide you through it. (And believe it or not, there's a lot more that isn't even in here! You'll get to that later.) There is so much more to what we do and how we do it than meets the eye—it ain't about reading books and shushing people, and it never was—and in the process of uncovering all that, I bet you'll find something that speaks directly to you and you'll find a career you too will love for a lifetime. Find the joy in what you do, and the rest will come.

Mostly, I envy you because it's all ahead of you. This field and profession have been very good to me, and when I see the tools and the environment and the possibilities that are available to my students, and to you, I think how wonderful it would be to start over, though I'm also quite happy I don't have to. We are waiting for you to join us, to share your enthusiasm and your creativity and your vision for a future no one else has yet imagined, for the betterment of the communities and clienteles you will serve. All best wishes to you as you make your way. Bon voyage!

Preface

Today's library and information science (LIS) professionals are experiencing both excitement and trepidation as sweeping societal, technological, political, and economic changes affect our users and institutions and transform our discipline. Today, we are part of a sophisticated knowledge infrastructure: the boundaries of knowledge creation, acquisition, organization, dissemination, use, and evaluation are rapidly blurring and creating new challenges. Similarly, we are also part of a changing environment: an aging population, a ubiquitous and evolving Internet, the proliferation of social media and mobile devices, significant financial stresses on public institutions, and changing information policies affecting creators and distributors of knowledge—print and digital. All these forces are shaping libraries and information services in various ways.

Much has happened since the third edition of *Foundations of Library and Information Science* was published. The LIS field continues to expand, the issues proliferate and grow in complexity, and the challenges we face are serious and relentless. It is daunting and delightful. Our profession demands constant growth, continuous learning, and open minds. We know that next year something new will again force us to reexamine our thinking and reassess our practices, policies, and sometimes even our purpose. We are fortunate that we have a firm foundation on which to make changes: a distinguished history, strong values, and an active profession and academic communities ready to address our challenges.

As with its predecessors, this new edition has been designed to respond to the many changes occurring in the field and the society at large. It preserves some of the content of the third edition but has been reorganized, rewritten, and extensively updated. Most important, new or enhanced discussions have been added. These include (1) the impact of digital devices and social networking, (2) the impact of digital publishing on the publishing industry and the effects of e-books on libraries, (3) the evolution of library services including virtual reference, embedded librarianship, digital access and repositories, digital preservation, and civic engagement,

(4) the new efforts to organize knowledge, including the Functional Requirements for Bibliographic Records (FRBR), the Resource Description Format (RDF), BIBFRAME, the Semantic Web, and the next-generation catalog (Catalog 2.0), (5) the significance of the digital divide and policy issues related to broadband access and network neutrality, (6) legal developments such as new interpretations of copyright related to mass digitization of books (Google Books) and scholarly articles, (7) the continuing tensions in LIS education between information science and library science, and (8) the spawning of new initiatives to integrate libraries, archives, and museums (LAMs).

There remains an ongoing debate as to whether library science and information science are separate disciplines. There are also arguments about what constitutes the domains of each. *Foundations of Library and Information Science* is focused on the complementary nature of these disciplines using Boyd Rayward's 1983 description of the relationship between library and information science as "a disciplinary continuum . . . with no easily identifiable boundary separating them though the difference between the extreme ends of the continuum are clear and even dramatic" (p. 344). This book focuses on the points of convergence.

I. PURPOSE

The primary purpose of *Foundations of Library and Information Science* is to describe the current LIS environment and examine some of the ever-changing forces that shape that environment and the larger society. The intent is to help prepare LIS professionals to cope with and effectively manage their many complex responsibilities. Bearing this emphasis in mind, this text is designed to accomplish six objectives:

1. To provide an introduction to the field for individuals intending to work in libraries or library-like institutions, related settings, or the information field in general.
2. To identify and discuss major topics and issues in LIS that are current in the United States and that will continue to affect the profession for years to come.
3. To provide librarians and information professionals with an opportunity to refresh their knowledge through a systematic review of major issues and topics that have changed the field.
4. To introduce the profession to interested individuals or those undecided about entering the LIS field and to show its multifaceted character and possibilities.

5. To place LIS in a larger social, economic, political, and cultural context. It is too easy to view the work of LIS professionals purely within an institutional setting. Increasingly, librarians and other information professionals must negotiate and respond to a variety of political, economic, technological, and social forces.
6. To invite the interested reader to further explore topics raised in this book. Many of these topics are part of an ongoing discussion in our field that requires further reading, research, and exchange.

II. ORGANIZATION

Chapter 1, "The Knowledge Infrastructure," provides a broad overview and context for the ensuing chapters examining the infrastructure's characteristics: the devices, networks, processes, and institutions that it comprises. The interrelationship of LAMs is also explored. Chapter 2, "From Past to Present: The History and Mission of Libraries," examines the character of libraries through time with specific emphasis on their many and varied missions. Chapter 3, "The Library as an Institution: An Organizational Perspective," examines contemporary libraries, their types (public, academic, school, and special), their functions, and some of the major organizational issues and challenges that they face. Chapter 4, "Transforming the Library: The Impact and Implications of Technological Change," deals with one of the biggest areas of change in our field. The chapter addresses the topic through both a historical and a current lens, paying special attention to the growth of digital content and its impact on library services. Chapter 5, "Library and Information Science: An Evolving Profession," reviews the evolution and development of the profession. The contemporary American library and information professional is a product of more than a hundred years of growth and change. The current role of LIS professionals and the professional tensions that they experience are best understood when placed in the context of the historical development of LIS education and the profession. The chapter also addresses current issues, including the nature of the LIS labor force, gender and minority representation, and recruitment. Chapter 6 examines the intellectual organization of libraries. "The Organization of Knowledge: Techniques and Issues" discusses the organizational systems that make knowledge, in all its myriad forms, available. In spite of the vast quantities of disparate materials, our classification systems, subject headings, thesauri, databases, and powerful catalogs have enabled LIS professionals to offer effective service for many years. The chapter also addresses the impact of the dramatic increases in digital content and the

evolution of the traditional catalog to the next-generation catalog. Chapter 7, "Information Science: A Service Perspective," focuses on the nature of information science as a field of study, calling special attention to those aspects of the discipline that inform the work of LIS professionals. Chapters 8, 9, and 10 deal with philosophical and policy issues affecting LIS. These include the policies, laws, values, and ethics that define our work. Chapter 8, "Information Policy: Stakeholders and Agendas," discusses the general aspects of information policy and the legal environment in which libraries and other information institutions operate. Government, business, industry, public institutions, LIS professionals, and citizens all are stakeholders in trying to shape how information will be disseminated and who will disseminate it. Chapter 9, "Intellectual Freedom," focuses on libraries. Intellectual freedom is a central value of librarianship, and this chapter examines the key policies that affect equitable and open access to knowledge resources. The factors that promote or discourage censorship are addressed. Chapter 10, "The Values and Ethics of Library and Information Science," examines the many ethical ramifications of working in the field and the values of our profession, reviewing ethical principles, codes, and situations.

To permit an examination of the same topic from different vantage points, *Foundations of Library and Information Science* addresses most topics primarily in one chapter, but some important issues are raised anew in a different context in other chapters. For example, censorship and intellectual freedom issues are discussed most thoroughly in chapter 9, but they also arise in chapter 8 on information policy and chapter 3 on the library as an institution. The Internet, because it undergirds much of our knowledge infrastructure today, is covered in multiple chapters. Similarly, because of the tremendous breadth of our field, some complementary areas are mentioned but not explored in depth, including such fields as publishing, book arts, archives, and computer science.

A list of selected readings follows each chapter. These selections provide sources of additional information and stimulate thought on the basic issues raised in this text.

Rounding out the book, three appendixes provide supplemental information on LIS associations and accredited schools of LIS in the United States and Canada, including ALA accreditation standards. A final appendix provides an example of a public library manifesto.

No burgeoning LIS professional can function unless he or she understands the importance of information, how libraries are organized intellectually and administratively, the effects of information policies, and the values and ethics of the LIS profession. The challenge of all professionals is to stay current in a world in flux. The library is a special place; LIS is a special profession. The roles of the former

and latter, as well as the broader forces that shape those roles, constitute the major focus of *Foundations of Library and Information Science*. Its goal is to be a valuable resource for those entering the profession and those who have already taken their place within it.

REFERENCE

Rayward, Boyd. 1983. "Library and Information Sciences." In *The Study of Information: Interdisciplinary Messages*, edited by Fritz Machlup and Una Mansfield. New York: Wiley, 343–363.

1

The Knowledge Infrastructure

I. INTRODUCTION

Since the nineteenth century, American libraries have served the educational, recreational, informational, and cultural needs of their users. Libraries serve educational needs either by directly assisting schools and colleges in the formal education process or by providing individuals with an opportunity to educate themselves. Similarly, few would question the entertainment value that libraries provide through recreational fiction, newspapers, popular magazines, programming, and, more recently, by DVDs, e-books, computer games, and Internet access. The library meets informational needs through reference services either face-to-face or virtually. Cultural needs have been met by including works of great literature, music, and art in physical collections, by programs and exhibits, and by providing Internet access to cultural repositories worldwide. Of course, not all types of libraries attempt to meet all these needs. Some special libraries and information centers, for example, might focus only on information needs; nonetheless, many libraries with broader scope, such as public, academic, or school libraries, attempt to serve several or all of the needs of their users.

To function effectively, libraries and library-like organizations rely on an extensive knowledge infrastructure that supports their activities. The knowledge infrastructure is composed of the informational, recreational, educational, and cultural components of our society. The infrastructure is both a foundation and a framework, much like the infrastructure of a house. Without such a structure the house

collapses. Societies have a variety of infrastructures, such as a transportation infrastructure that includes highways, train tracks, air routes, and waterways that allow people and goods to travel efficiently. It also includes the governmental agencies that regulate transportation. The knowledge infrastructure is similar, except that the traffic is knowledge rather than moving objects. This infrastructure could exist without libraries, but it is greatly enhanced by their presence.

The knowledge infrastructure integrates a variety of elements, the boundaries of which are not precise and often overlap. For example, educational resources can also be recreational; some recreational resources also have substantial educational and informational value. Understanding the components of the knowledge infrastructure highlights the interdependence of libraries with educational institutions, information producers and distributors, as well as cultural agencies and provides an understanding of the place and function of libraries in the greater society.

II. CHARACTERIZING THE KNOWLEDGE INFRASTRUCTURE

There are many ways to characterize the knowledge infrastructure. In this section it will be viewed in five ways: as processes, devices, networks, media industry, and institutions.

A. Knowledge Infrastructure as Process

The knowledge infrastructure can be viewed as a process by which knowledge and information are created, disseminated, and used in a society. Historically, the traditional process involved five actors in a linear relationship:

1. *Creators*—authors, artists, and musicians who embody their ideas in a physical form or a product.
2. *Products*—traditionally books, articles, paintings, or music and, more recently, multimedia presentations, databases, websites, and other digital content.
3. *Distributors*—publishers or vendors who make the products of many creators available, sometimes through other agencies serving as disseminators; also individuals who distribute their own digital content (e.g., blogs).
4. *Disseminators*—institutions or agencies that acquire content from distributors and make it available to users.
5. *Users*—those who consume and use the knowledge or information.

Traditionally, the role of libraries, as well as archives and museums, was as disseminator, serving as an intermediary between users, distributors, and creators. However, as technology, digitization, and the Internet created new possibilities, the linear nature of the traditional process was irrevocably and dramatically altered. Today, the ability to create and distribute digital content through the Internet blurs the relationship between creators, products, distributors, disseminators, and users. In the digital environment, creators can be distributors and disseminators. Distributors such as publishers and disseminators such as schools and libraries can also be creators (e.g., through e-sites, blogs, Twitter accounts, wikis, and digital repositories). Creators can be distributors: novelists can write a novel, put it on the Internet, and distribute it directly to consumers for a fee or for free. Similarly, musicians can distribute their own compositions online. Users can be creators: Wikipedia is a prime example. The convergence of these components creates a complex infrastructure where the actors exchange roles depending on the circumstances. Nonetheless, each of these processes must occur for the infrastructure to function effectively.

B. Knowledge Infrastructure as Devices

Another way to view the knowledge infrastructure is in terms of the devices used to transmit information and knowledge. The major devices of the twentieth century were books, periodicals, newspapers, televisions, radios, telephones, and at the end of the century, computers. Most of these devices have been commonplace in U.S. homes for many decades. For example, for many years almost all households had a telephone landline. Today, merely 8% have a landline only and 45% have a landline and wireless phone service; another 44% have wireless service only (CDC 2014). Nearly 114 million people (99% of U.S. households) have radios, and not just one; the average household has more than eight radios (U.S. Census Bureau 2012a). Similarly, nearly all U.S. households, more than 116 million, have televisions—the highest number in history; the average number of sets per household rose from 2.43 in 2000 to 3.01 in 2012 (TekCarta 2014).

By the turn into the twenty-first century an entirely new generation of devices had been developed—digital and mobile devices such as smartphones, tablets, and e-readers. The extent to which these devices can be found in U.S. households is notable. Approximately 84% of U.S. households own a computer (73% with broadband connections to the Internet). A third of American adults own tablet computers and 56% own smartphones (Rainie and Cohn 2014; Statistica.com 2014; Zickuhr 2013; Smith 2013). On a worldwide basis, 6% of the world's population owns a tablet, 20% own a PC, and 22% own smartphones (Heggestuen 2013).

Many of the most recently developed devices can access and store a range of digitally produced content that was traditionally designed for only one format. For example a television program can now be viewed on a tablet or a smartphone as well as a television set. With the proliferation of digital content, our devices make possible the convergence of knowledge resources and services. For example, a tablet can access digitally produced radio and television programs, movies, lectures, courses, digital repositories, newspapers, and magazine content. Although the utility of these mobile devices is obvious, their constant updating and alteration in addition to new, competing technologies create challenges for institutions like libraries that attempt to organize and disseminate knowledge resources to accommodate these ever-changing devices.

C. Knowledge Infrastructure as Networks

Networks perform vital interlocking functions in the knowledge infrastructure; they provide both direct access to content and enable access to other networks that provide this content. Among the types of networks that comprise the infrastructure are telephone, radio, and digital or satellite links; wireless network utilities; and the Internet. The evolution of networks has been remarkable. For example, land-based telephone networks although still in existence have been widely supplanted by wireless ones; broadcast radio remains commonplace, but satellite radio has gained in popularity; broadcast television networks, once the dominant media in American culture, encountered major competition from cable networks in the last quarter of the twentieth century, which in turn encountered competition from digital satellite networks. Additional competition now comes from digital services such as Netflix and Hulu providing streaming video content based on movies and television programs. In addition, wireless network utilities such as AT&T and Viacom enable access to digital networks and the Internet, providing a vital link to the knowledge infrastructure.

The Internet, of course, is the most prominent network of networks enabling the storage and transmission of digital content of all types from around the world. There are more than 3 billion Internet users worldwide comprising more than 40% of the world's population. In the last few years, the growth rate of Internet users worldwide was between 8% and 10% (Internetlivestats 2015). The Internet's influence, capabilities, and impact will be discussed in the ensuing chapters, but suffice it to say that it is ubiquitous and profound in its capacity to make knowledge resources available.

D. Knowledge Infrastructure as Media Industries

Libraries are dependent in large part, on the media industries that produce and distribute the knowledge and information they provide. As such, understanding the characteristics of these industries is vital to developing library collections and services.

1. Radio Industry

There are currently approximately 6,600 FM commercial stations and 4,700 AM stations. Although the number of AM stations has remained flat since 2000, the number of FM stations has increased steadily by 12% from 2000 to 2014 (U.S. Census Bureau 2012a; FCC 2014). Radio stations, both profit and nonprofit, offer a wide variety of programming, music, traditional news broadcasts and talk shows spanning the political spectrum, and educational programs informing us about issues in the community and the nation. The ubiquitous radio not only sits on our bedside tables and kitchen counters, it is affixed to our heads when we walk and run, it broadcasts in restaurants, automobiles, and other public places. But here too, the Internet has expanded people's access to radio stations. Both subscription-based and free Internet radio services provide national access to stations and are widely used.

Radio remains a heavily used medium; approximately 177 million Americans ages 12 and older listen to commercial radio including nearly 70% of individuals between the ages of 18 and 54 (Nielsen 2014). Despite its popularity, its growth rate is slightly negative losing about 2% a year since 2010. Radio listening tends to increase with level of education and income. AM/FM radio users listen to radio an average of nearly 12 hours a week. The amount of time spent per day is trending slowly downward (Statistica.com 2014c, 2014e). Radio listening tends to decline sharply for those 65 and older (Nielsen 2014).

2. Television Industry

There are more than 1,780 commercial and educational television stations in the United States. The number of commercial stations, 75% of the total, has increased modestly (8%) since 2000, while the number of educational stations has remained relatively unchanged (FCC 2014; U.S. Census Bureau 2012a).

The television industry is diversifying its delivery mechanisms. For example, in the 1960s, cable television was new and not well received. By 1980 only 15 million

households (20%) had cable television. By 2000, more than 66 million households had cable television subscriptions. Since 2000, cable subscriptions have been flat as competition from satellite services and Internet access increased. Those umbrella-shaped satellite antennae once thought to be the domain of astronomers at observatories now adorn the roofs and yards of many American homes. There were no home satellite stations in 1980, but by 2013 there were more than 34 million satellite subscribers (SatelliteMarkets.com 2014). Overall, network TV stations have lost ground while cable and satellite television have increased.

The advent of digital recording devices has also changed the way people use their television. Not only can viewers fast-forward, rewind, and otherwise customize and manipulate what was before a static experience, but they can time shift, allowing them to view programs at any time and multiple times. Additionally, many people view television programs on alternative devices, such as tablets, employing Internet services like Hulu. These new services and technologies mean that people can view what they want when they want.

Television viewing has increased slightly since 2010. An average adult viewed TV in 2013 for 279 minutes (4 hours, 39 minutes) daily compared to 269 minutes in 2010. TV viewing is greatest among those 65 and over (97%), although viewing is heavy for all age groups (90% or more). Level of education does not appear to affect TV viewing except for cable viewing: those with less than a high school education view cable less often. In addition, households with very low incomes also have lower cable viewing. A substantial proportion of the TV viewing audience (18%) views free online TV, and the number of such viewers and revenue generated from such viewing is expected to increase substantially over the next few years. The most popular TV website is The Weather Channel (Statistica.com 2014d, 2014e).

3. Telephone/Smartphone Industry

In the history of communications, the importance of the telephone cannot be overestimated. Land-based telephone lines provided the crucial foundation for the computer information revolution. Although ground-based telephone networks will likely remain in some parts of the country for the foreseeable future, their importance will decline as mobile devices supplant them.

The advent of the cell phone and smartphone has had a tremendous effect on the way people receive and transmit information. As of 2014, 90% of Americans owned cell phones. As they evolved into smartphones, their uses broadened considerably, and they now take pictures, send and receive text messages, access the Internet, connect to social networks, send and receive e-mail, record videos, and download applications (Pew Research 2014; Duggan and Rainie 2012).

Libraries have responded to these developments by offering services using websites that function both technically and aesthetically on handheld devices. IM (instant messaging) and SMS (short message service) reference applications via texting have become commonplace, and such services are likely to evolve in conjunction with enabling communication technologies.

4. The Internet and Mobile Access

There are more than 3 billion Internet users worldwide and 280 million in the United States. The rate of U.S. growth is between 7% and 8% per year (Internetlivestats 2015). U.S. adults spend nearly three hours online per day. Internet use decreases with age, with 93% of those ages 18–24 accessing the Internet in a given week, compared to only 43% of those 65 and over doing so. Among GenXers, about one in four uses the Internet to watch movies, television, and video-on-demand. Internet access also increases with level of education and household income. (Statistica.com 2014e, 2014f).

The rate of growth in time spent on mobile devices now exceeds 50% annually. Smartphone use in particular is growing substantially. In 2010 the average adult used a smartphone for 32 minutes daily; in 2013 that number increased to 93 minutes, and it was projected to reach 134 minutes by 2014. Nearly a quarter of the total time spent on media in a day is now spent on mobile devices, compared to 11% on radio, 18% online, and 4% with print. Time spent on mobile devices now exceeds time spent on PCs (eMarketer 2014; Statistica.com 2014). A more detailed discussion of the impact of the Internet and mobile access will follow in the ensuing chapters.

5. Print Publishing Industry

More than 193,000 book titles were produced in 2013 (Barr and Harbison 2014). Average prices of print books have been erratic over the last several years although book publisher revenues have been relatively stable—between 26 and 27 billion from 2008–2012 (Vassallo and Maier 2014). Consumer (popular) print book sales were substantial—$13.1 billion for 2011 (not including e-books), but this is expected to decline to about $8 billion by 2018 due primarily to the rise in e-book sales. Even among children and young adult books, which traditionally have shown strong growth, sales in 2013 fell 6.6% (Milliot 2011). Only academic book sales increased, rising between 4% and 12% from 2010–2012 (Tafuri 2014).

The periodicals industry has been a mainstay of the print industry. More than 75,000 periodicals are published each year in the United States and Canada, including general interest magazines, trade publications, and scientific and other scholarly

journals (LOC 2014). In the United States alone, there are more than 8,300 periodical publishers, but the industry is heavily concentrated, with the fifty largest companies comprising 70% of the market (First Research 2009) (U.S. Census Bureau 2012a). A majority of the $46 billion in revenue comes from general-interest magazines followed by trade publications (15%). Consumer (popular) magazine publishing remains a stable component. Approximately 7,200 such titles are published in the United States, and many of the most popular magazines still have single copy sales in the hundreds of thousands. Revenues for such magazines were expected to exceed $25 billion for 2014–15. The size of the popular magazine audience is considerable: in August 2014 alone, *People* magazine had a readership of more than 70 million (Statistica.com 2014b). Of course, many popular magazines are published simultaneously in print and electronic formats and some new magazines are "born digital." Although periodicals are still widely read, scholarly publishing has experienced serious challenges in recent decades as the costs of publication have grown while demand has not.

About half the world's adults read a daily newspaper. In recent years, newspapers began offering digital versions often as an alternative to print or as an additional format if a print subscription was purchased. Worldwide, approximately 2.5 billion people read a print newspaper and another 800 million read a digital version (First Research 2014). Despite the popularity of newspapers in some regions of the world, circulation for weekday and Sunday newspapers in the United States has been declining since 1990. Today there are approximately 1,300 daily newspapers in the United States. However, the trend for newspaper reading has been flat or declining with only 42% of U.S. adults (mainly older, more educated, with higher incomes) reading a daily newspaper either in print or online. In 2013, the average adult read a newspaper for about 30 minutes but reading time is projected to decline in the next few years possibly by as much as 15% a year. This might be due, in part to the shrinking size of the newspaper. As print advertising revenue declined, newspapers have decreased the number of pages. Although online advertising increased in the last few years, the gain has not been sufficient to offset print advertising losses (stateofthemedia 2014).

Newspapers also suffer from lack of spontaneity; a morning paper cannot compete with continuously updated online news websites and 24-hour cable TV news. These sources are often viewed as more interesting, timely, or appealing to a visually oriented society. By 2012, nearly three-quarters of digital device owners got their news on a desktop or laptop computer, more than half on a tablet, or on a smartphone. In addition, an increasing number of news consumers employ a variety of platforms using desktops/laptops, smartphones or tablets, or a combination of all three (stateofthemedia 2014a).

6. Digital Publishing Industry

With the rapid rise in the ownership and use of digital devices and the ubiquity of Internet access, there has been a concomitant increase in the publication of digital content. Such content includes physical content that was subsequently migrated into digital form as well as content that was "born digital" and might or might not have a physical version.

A significant portion of the digital publishing marketplace is e-books. E-books have been around for several decades, but they expanded rapidly in the first decade of the twenty-first century with the development of the Kindle in 2007, the Nook in 2009, and the iPad in 2010 (Greco 2012). Since then, e-readership expanded quickly and broadly. Early e-book adopters tended to be dedicated readers, but today even casual readers use e-books. Although some people read e-books exclusively, many consume both print and digital books. Interestingly, as e-reading expanded throughout the population, computer tablets became the preferred e-reading device rather than dedicated e-readers (Vassallo and Maier 2014). Readers use e-books for many reasons: cost savings, readability (ability to adjust font size etc.), and portability as well as ease and speed of access (Vassallo and Maier 2014). E-books have evolved from a novelty to a maturing industry including best sellers. In fact, e-books have changed the ways books are produced, marketed, and consumed. For example, Stieg Larsson's Millennium trilogy, which includes *The Girl with the Dragon Tattoo*, sold more than one million e-copies in 2010 (Milliot 2011). The largest proportion of adult fiction is now produced in the e-book format. "Immersive" genres such as mystery, romance, fantasy, and science fiction appear to be particularly attractive to e-book users; users lose themselves in the story and the format is irrelevant to them. In contrast, growth of e-books in the K–12 and professional book categories has been slower.

In general, the publishing industry views the e-book as a "disruptive technology." Although a majority of publishers' sales still comes through physical retail stores and from print materials, by 2015 as much as 15%–25% of all book sales were from digital content (Vassallo and Maier 2014; Behar, Colombani, and Krishnan 2011). E-book prices have been somewhat erratic—declining sharply from $20 per book in 2009 to $8 per book in 2012 and then rising by 21% in 2013 (Tafuri 2014). Nonetheless, sales of e-books grew dramatically from $67 million in 2007 to approximately $2.3 billion in 2011, growing particularly fast in adult and juvenile fiction, and nonfiction. Some predict that e-sales will overtake print and audio books by 2017 (Statistica.com 2014a). Others believe that e-book sales have hit a plateau, but none can deny that they have become a substantive presence in the book publishing industry and are very likely to remain so (Vassallo and Maier 2014).

Attempting to find an acceptable economic model for e-books has been a challenge for both the publishing industry and for libraries. Only a few years ago, many major publishers denied licensing rights to public libraries (Macmillan and Simon & Schuster) or significantly limited the titles available (Penguin and Hachette). Predictably, this generated a great deal of friction and consternation that produced an aggressive action by the American Library Association in defense of libraries. By 2012 publishers provided access to libraries, although sometimes with many limitations. With e-books, rather than buying a book, libraries purchase a subscription or pay a fee through a vendor service, such as OverDrive to download copies for a limited time. The library user then can download books under varying time constraints (Vassallo and Maier 2014). Among the continuing challenges facing libraries are the higher prices (sometimes three times higher) charged for digital versions, significant limitations on the number of times an item can be downloaded through subscription services, the restriction against simultaneous use of an e-book, and sometimes restrictions against nonresident use (Vassallo and Maier 2014; Bocher and Tijerina 2012; Feldman, Russell, and Wolven 2013). The current pricing models might not be sustainable for libraries over time. Brantley (2013) suggested a possible alternative:

> What libraries need is their own cross-library open source discovery service married to an e-book file hosting and management platform that can replace OverDrive with a less intrusive, open source, interoperable system that can relieve libraries from per-loan fees and excessive setup costs. Unfortunately, this is a tall order. (p. 27)

But e-books are not the only area of digital publishing interest. To a large extent, periodicals, both popular and scholarly, as well as newspapers are now being published in digital format. Some periodicals and newspapers have converted exclusively to digital versions while others offer parallel publications in both physical and digital formats. In addition, much research and general information gathering is now conducted using digital content. Library users, for example, commonly conduct research or seek information relying on Internet access or on databases provided by subscription to libraries. The content is identified, located, accessed, and delivered digitally. The publication of some digital content, particularly articles in research-oriented databases in academic settings, has raised a variety of issues regarding who controls the content and how use might be unduly restricted. These issues are discussed in ensuing chapters.

In addition, there has been tremendous growth in self-publishing. In book titles alone, between 2007 and 2012, the number of self-published book titles increased 422% to 391,000 titles (Vassallo and Maier 2014). Although self-published books used to be considered "vanity publishing" today there is a group of well-established "indie authors" (independent authors) who publish their own works or use fee-based

publishers who produce digital copies on demand for a fee. These authors often combine their distribution strategies using both a traditional publisher as well as publishing independently (Palmer 2014). As Palmer (2014) noted:

> Self-publishing has been enjoying an exceptional run in recent years, as new technologies and growing acceptance of indie books have led to an explosion of new titles and industry growth. (p. 138)

Indie publishing has substantially increased access to authors whose voices might not otherwise be heard. In addition, it encompasses more than books. Consider, for example, the creation of blogs by individuals who have readerships in the tens or hundreds of thousands.

The concept of self-publishing has also stimulated, particularly in academic institutions, the growth of digital repositories in which faculty and others deposit digital content (scholarly articles, datasets, etc.) into a database often managed by the academic library. Although there are many issues related to such repositories (discussed in subsequent chapters), they are growing in number and popularity. Libraries and bibliographic utilities have also responded to the self-publishing trend. Some public libraries, for example, provide a digital venue for local authors interested in self-publishing services. The Online Computer Library Center (OCLC) through WorldCat now lists some self-published works in its catalog, and some reviewing services now review selected self-published works (Bradley, Fulton, and Helm 2012). Digital publishing has clearly altered how content is created, edited, marketed, sold, distributed, accessed, and managed. It has also changed the relationship between creators, publishers, and end users. Today, authors and publishers might be in regular contact with consumers through blogs and websites and other social media (Huwe 2013). Digital publishing has clearly had an impact but its future for libraries is uncertain. Huwe (2013) poignantly observed:

> The way forward is not fully settled, but it promises to be exciting. Will there be creative disruption? It seems a certainty. But as users increasingly become creators, authors, and "makers," we have an obligation to provide the quality services that they need—including digital publishing. (p. 55)

E. Knowledge Infrastructure as Institutions

1. Libraries

Libraries have been an important component of the knowledge infrastructure since the seventeenth century in America, although the number and sophistication of these libraries were quite limited until the nineteenth century. Detailed discussion

FIGURE 1.1
Numbers of Public, Academic, Government, and Special Libraries*

1980–2013 BY FIVE-YEAR INCREMENTS (EXCLUDES BRANCHES AND COMMUNITY COLLEGES)					
Year	**Public**	**Academic**	**Government**	**Special**	**Total**
1980	8,717	4,618	1,260	8,609	28,665
1985	8,849	5,034	1,574	8,955	29,843
1990	9,060	4,593	1,735	9,051	30,761
1995	9,165	4,730	1,875	11,340	32,666
2000	9,480	3,491	1,411	9,993	31,628
2005	9,734	3,698	1,225	9,526	30,416
2010	9,744	3,745	1,113	8,476	29,329
2013	9,640	3,703	1,006	7,616	28,182

Source: American Library Directory. Medford, NJ: Information Today, 1980–2013.

*Total includes branch, departmental, divisional, military libraries, and some specialized libraries in academic institutions.

of the library as an institution will follow in the ensuing chapters. Figure 1.1 illustrates the number and growth of libraries in the United States since 1980.

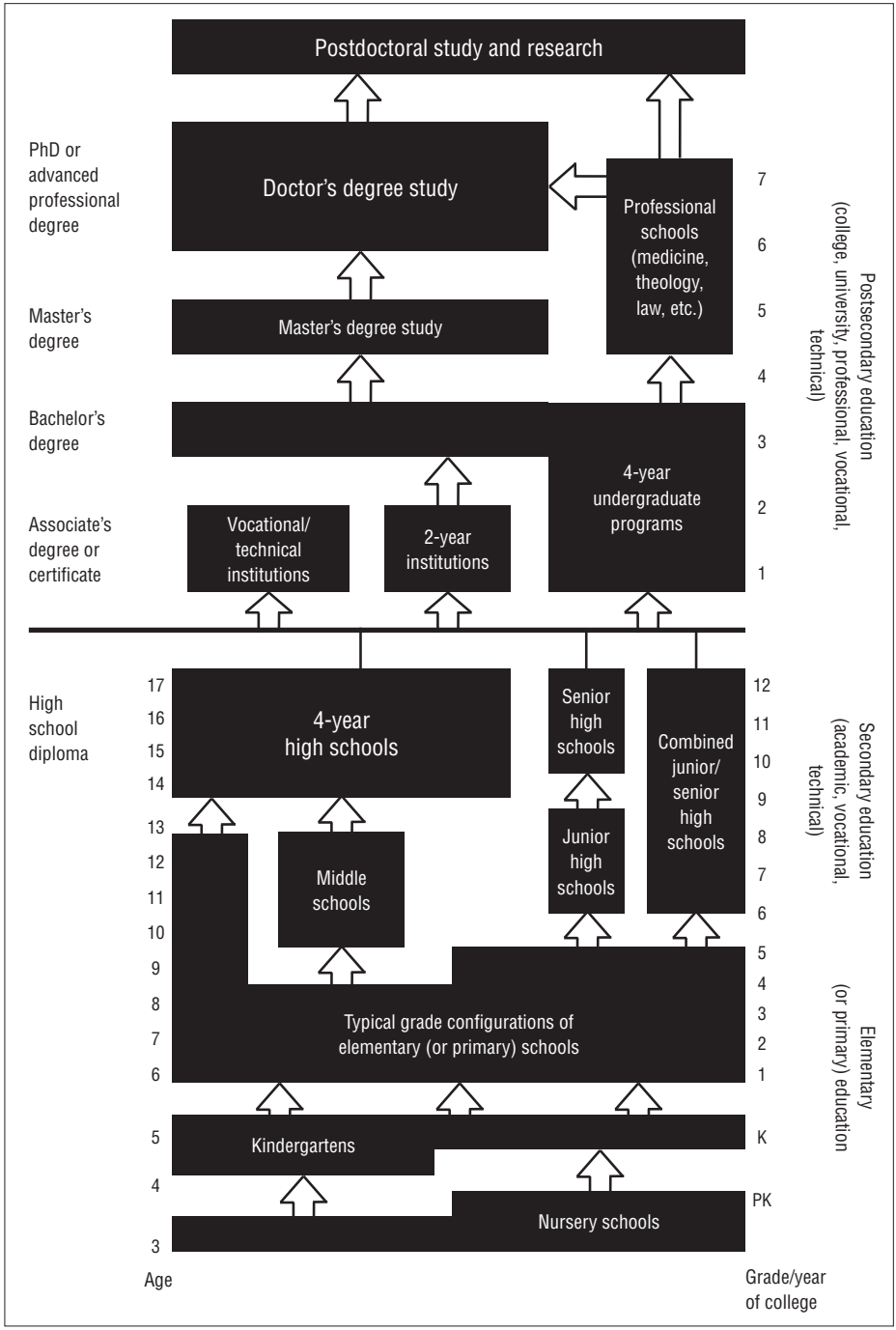
Today, there are more than 120,000 libraries in the United States: more than 16,000 public libraries (including branches), 3,700 academic libraries, 7,600 special libraries, and 98,000 school or media center libraries (ALA 2014). The various libraries support primary and secondary education; higher education; business, industry and government; and the general public. They are trusted sources of information and provide a wealth of materials and services as well as access via the Internet to resources worldwide. Libraries have been an especially important channel for introducing children and adults to books and reading, literacy, and self-education. The special roles that libraries play are discussed in detail in the chapters that follow.

2. Schools and Academic Institutions

Educational institutions serve as the foundation of knowledge creation and dissemination in our society. The United States boasts one of the largest universal education systems in the world, characterized by "its large size, organizational structure, marked decentralization, and increasing diversity" (U.S. Department of State 2008, p. 2). Figure 1.2 represents the basic structure of formal education in the United States.

Primary and secondary education is offered in preschools, kindergartens, elementary schools, middle or junior high schools, and high schools. Postsecondary

FIGURE 1.2
Educational Infrastructure in the United States



Source: U.S. Department of Education, National Center for Education Statistics, Annual Reports Program. nces.edu.gov/programs/digest/d07/figures/fig.01.asp.

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