

services for the 'hybrid library,' which would integrate all four categories of resources. As discussed in Chapter 5, from early days to the present, the necessity of accommodating the requirements of hybrid libraries has been a key driver in the field of digital libraries and the profession of librarianship.

Funding

This section provides a high-level summary of key national and international funding sources and programs in the first decade of digital libraries. A subsequent section, which contains a review of early large-scale digital library programs, also contains information about funding. The next chapter also incorporates information about funding from foundations, membership organizations, individuals, commercial or non-profit entities, universities and national libraries.

Funding streams

Federal and international agencies, national libraries, higher education institutions, public and private sector organizations, even individuals – all provided streams of funding for the early development of digital libraries. First-decade digital library funding tended to gravitate to national or local institutional levels, or it was invested as a result of the strategic capital budgeting decisions of commercial firms. The variety of streams has resulted in many technical advances, diverse digital libraries, and a complex landscape.

Large-scale efforts

Large-scale efforts tended to be funded by international bodies, government agencies, foundations and non-profit organizations. Some libraries invested heavily in digital library programs in keeping with their missions to support historical and cultural studies, provide a national research information infrastructure and preserve their nations' creative output (examples from Australia, France, the Netherlands, New Zealand, the UK, the US and elsewhere are represented in the next chapter). As noted previously, the investments of scholarly societies, publishers and indexing and online services also considerably advanced the early efforts to put scholarly content online; the amounts invested are unknown but collectively it must have been substantial.

Universities and institutions

It should also be mentioned that the funding from many universities and institutions supporting individual library projects, when taken as a whole, probably surpasses the financing provided by the centrally organized programs. Daniel Greenstein and Suzanne Thorin's report (2002) of a survey conducted by the Digital Library Foundation indicated that in 2000 responding libraries spent an average of over US\$1 million each on digital conversion and digital library personnel (see their Table 3.1). University library projects at that time focused predominantly on digitization of cultural heritage materials.

Other sources

In a few cases the vision, commitment and financial resources of single individuals produced lasting and influential digital libraries. Brewster Kahle, for example, founded the Internet Archive in 1995, providing the capital himself. In 2003 one journalist reported that 'the ten million-dollar annual budget [of the Internet Archive] continues to come primarily out of Kahle's pocket' (Womack, 2003). Chapter 2 continues the discussion of how a variety of types of organizations supported the emergence of digital libraries as a new field of endeavor.

The one universal digital library

National agendas have contributed to the sense of urgency that spurred the eventual development of digital libraries in many countries. The dream of one universal, global digital library has been relevant everywhere to some degree, and it still is (see Arms, 2005, for a discussion of the user's viewpoint). However, while digital libraries are relevant globally, with some notable exceptions they have been funded at the national or local level. Writing for the 2007 issue of the *Annual Review of Information Science and Technology*, David Bearman (2007, 223–4) stated that 'although the vision of a singular "Digital Library" was what captured the popular and political imagination, and was promoted especially by Vice President Al Gore in the 1992 election campaign, through the 1990s the United States government supported "digital libraries" in the plural.' Bearman's perspective is supported by a review of the *Source Book on Digital Libraries* (Fox, 1993b), which reports on a series of NSF invitational workshops that preceded the NSF's call for the Digital Library Initiative (DLI-1) proposals. That work in the foreground of funded projects had two long-lasting outcomes: a preference

for the term ‘digital library’ over ‘electronic library’ and a shift from the goal to ‘develop a prototype national digital library’ (singular) toward funding opportunities for the development of digital libraries (plural). The last chapter of this book returns to a consideration of the dilemma created for digital library implementers as a result of the disunion between who funds digital libraries and who benefits from them.

Early digital library projects

UK, US and multinational programs had considerable influence on digital library development and they produced significant outcomes that defined the way forward as digital libraries continued to evolve. The key projects included:

UK eLib Programme (eLib)

The driving force for the commissioning of eLib was the Follett report (1993), which reviewed the system of UK academic libraries in light of the problems of huge expansion of undergraduate populations, rising costs for library materials and the opportunities of new forms of information storage, access and retrieval over networks. Recommending that the problems be addressed through the use of information technology, the Follett report was highly influential and released the funding for eLib (Dempsey, 2006b). Managed by the Joint Information Systems Committee (JISC), eLib ran for seven years (1995–2001) and involved 70 projects. For more information see the first feature article in the first issue of *Ariadne*, which itself grew out of eLib (Kirriemuir, 1996). Pinfield (2004) offers a detailed review of eLib’s influential outcomes.

DLI-1

The first large-scale funding for digital libraries in the US began in 1994 with an initial four-year Digital Library Initiative (DLI-1) sponsored by NSF, the National Aeronautical and Space Agency (NASA) and DARPA (Defense Advanced Research Projects Agency) (Arms, 2000, 62–3; National Science Foundation, 1993). The projects emphasized mainly technical aspects of digital libraries (Mischo, 2004, 6) and were led for the most part by computer scientists. Behavioral, social and economic issues got little attention during the first round of NSF funding.

DLI-2

In 1998 NSF issued a second call for proposals (National Science Foundation, 1998a; Griffin, 1999; Mischo, 2004). DLI-2 began with more concern for the social, behavioral and economic aspects of digital libraries and attracted funding from multiple agencies, including national libraries and the Institute of Museum and Library Services (IMLS).

Other US national programs

Arms (2012) reports on American Memory, a digital library that started in 1995 as a result of the Librarian of Congress' establishment of a project to digitize five million items and make them available on the web within five years (see Table 2.1 in this book). Arms, Blanchi and Overly (1997) discussed the technical building blocks, which came from the National Digital Library Project (NDLP) at the Library of Congress. The US National Institutes of Health (NIH) engaged early with digital library efforts. In February 2000 they launched the digital library PubMed Central, which as of this writing contains 2.7 million articles. The US PubMed Central was developed and is managed by the US National Center for Biotechnology Information (NCBI) (Humphreys, 2000).

Joint NSF/JISC international projects

In 1998 NSF called for proposals for multi-country, multi-team projects. In the UK, JISC issued a matching call. Six projects were funded jointly by NSF and JISC to explore cross-domain resource discovery, digital archiving, search and retrieval for musical information, reference linking, subject gateways, and metadata for multimedia digital objects (Chowdhury and Chowdhury, 2003, 56–7).

European Commission (EC)

Even before the first decade of digital library research and practice, the European Commission devoted substantial attention and funding to library-related programs. As Dempsey (2006b) notes, 'the first EU call for proposals in the libraries area was as far back as July 1991. The motivating framework for this and later calls was established in the Libraries Action Plan, a document first circulated in 1988.' Digital library programs were funded under the European Union's Framework Programmes, beginning with the Third. Funding for digital library research has continued at generous levels

(<http://cordis.europa.eu>; see also Collier, Ramsden and Zhao, 1995; Dempsey, 1995; Dempsey, 2006b).

Projects in China and India

A considerable body of digital library research and development has occurred in China and India. Zhou (2005) and Shen et al. (2008) describe a number of large-scale digital library projects in China, starting with the introduction of CALIS (Chinese Academic Library Information System) in 1998, followed by CADLIS (Chinese Academic Digital Library), completed in 2005. Kumar (2010) and Das, Sen and Dutta (2010) describe digital library research and development in India, which began early in the new millennium and now includes open repositories, a number of cultural heritage digital libraries and the Digital Library of India.

Other projects

A number of large-scale, ambitious projects were inspired by democratic ideals and attracted multiple sources of funding and voluntary support:

Project Gutenberg

Project Gutenberg (www.gutenberg.org) is the first and oldest digital library. It began in 1971 as an idea from Michael Hart, who, given free computer time at the University of Illinois, decided to type in the US *Declaration of Independence* and then tried (unsuccessfully) to send it to everyone on the campus network (Hart, 1992). Gutenberg's goal has been to provide public domain e-texts a short time after they enter the public domain, for free, using only volunteers and donations to get the work done.

Internet Archive

Brewster Kahle started the Internet Archive in 1995. The Internet Archive (IA) has numerous components, but the Wayback Machine, which provides access to archived versions of an estimated 220+ million websites, may be the best known. The IA is an advocate for universal and free access to knowledge and it founded a co-operative project called the Open Content Alliance to build and preserve a massive digital library of multilingual digitized text and multimedia content (Dougan, 2010).

The Million Books project

The Million Books project (www.ulib.org; the first project of the Universal Digital Library) began with some preliminary test projects that led to an initial grant from NSF in 2000 (Linke, 2003; St Clair, 2008). Raj Reddy, an award-winning computer science professor at Carnegie Mellon University, continues to inspire and direct it. The Universal Digital Library's mission is to foster creativity and free access to all human knowledge; its purpose is to make digital texts freely available to anyone who can read and has access to the network (www.ulib.org/ULIBAboutUs.htm). Partners came from China, Egypt, India and the US. It reached and exceeded its goal of a million scanned books in 2007. Collections are represented on mirror sites in China and India.

Definitions of digital libraries

The definition used in this book

The definition of 'digital libraries' that underpins this book has two parts. Digital libraries are:

- 1 A field of research and practice with participants from many disciplines and professions, chiefly the computer, information and library sciences; publishing; the cultural heritage sector; and education.
- 2 Systems and services, often openly available, that (a) support the advancement of knowledge and culture; (b) contain managed collections of digital content (objects or links to objects, annotations and metadata) intended to serve the needs of defined communities; (c) often use an architecture that first emerged in the computer and information science/library domain and that typically features a repository, mechanisms supporting search and other services, resource identifiers, and user interfaces (human and machine).

My intention is to provide a practical definition that reflects the current situation, but can evolve as digital libraries evolve in the context of the web. Lagoze (2010, 25–31) has persuasively discussed the trend of digital libraries toward the resource-centered architecture of the web (mentioned again in subsequent chapters of this book). The definition used in this book refers for the most part to the traditional repository-centered architecture, because this model remains characteristic of most digital libraries today. Through the chapters of this book, I attempt to make the case that the important characteristics of digital libraries are (in this order) the social roles they play;

the communities they serve; the collections they gather for those communities; and the enabling technologies that support them. Social roles and communities are more likely to abide over time; collections and enabling technologies are more likely to shift.

Other definitions of digital libraries

Different perspectives

At the start of digital libraries' first decade, what came to be called a digital library had a number of names – electronic library, virtual library, library without walls. The first decade's explosion of activity and funding for digital library research and practice engendered many diffuse definitions of the phrases *digital library* or *digital libraries*. Some of the principal authors during this first decade paid little heed to definitions; others' discussions of definitions are lengthy. Considered as a whole, the digital library literature contains an enormous amount about how to define digital libraries. Fox et al. (1995, 24) suggest an explanation: 'the phrase "digital library" evokes a different impression in each reader.'

The public on the one hand, and those involved in building digital libraries, on the other, naturally had a variety of perspectives on the nature of digital libraries, when they were first conceived. The following list represents a few of these initial perspectives:

- a computerization of traditional libraries (people in general)
- a framework for carrying out the functions of libraries in a new way with new types of information resources (librarians)
- a new set of methods to innovate and improve fee- or membership-based indexing, full-text repositories and hyperlinking systems (publishers, online information services, professional societies, indexing services)
- a distributed text-based information system (computer and information scientists)
- a collection of distributed information services (computer and information scientists)
- a distributed space of interlinked information (computer and information scientists)
- a networked multimedia information system (computer and information scientists)
- a space in which people can collaborate to share and produce new knowledge (those working on collaboration technologies)
- support for formal and informal teaching and learning (educators).

Arguably the most comprehensive and thoughtful discussion of first-decade digital library definitions is by Borgman (1999 and 2000, 35–52), who notes that the many definitions arise because ‘research and practice in digital libraries are being conducted concurrently’ and by individuals and teams from different fields. Borgman made sense of the definitions that had emerged by 2000 by grouping and discussing them in a variety of ways, including:

- orientation (research-oriented versus practice-oriented definitions)
- concept of a library (narrow – library as a collection of content supporting information retrieval – versus broad – library as a continuous and trusted social entity)
- emphasis (definitions emphasizing collections, a particular type of content or communities versus those with an emphasis on institutions or services).

A sample of definitions

Table 1.1 builds out from the core of definitions considered by Borgman in 1999 and 2000. It offers a sample of definitions, considers their principal facets and cites their sources. The sample is far from comprehensive but attempts to show the progression of definitions from those emphasizing the enabling technologies of digital libraries (text analysis, distributed retrieval systems, metadata, indexing and knowledge representation, data communication networks, intelligent agents, interface design, multimedia storage, etc.) toward a new generation of definitions that place more emphasis on the communities and social roles of digital libraries. A number of authors have made the point that early research engendered definitions that focused more on technical issues and less on the broader social context of digital libraries (for example, Lagoze, 2010, 6).

Discussion

The DELOS definition offers a framework for understanding, planning and evaluating digital libraries. Another model is the ‘5S’ framework (Streams, Structures, Spaces, Scenarios, and Societies) introduced in the dissertation of Marcos André Gonçalves (2004), which has been used to inform the development of a curriculum for digital library education and for other purposes. Another influential definitional model – one that pushes beyond read-only digital library repositories – is the one proposed by Lagoze and

others (2005). This paper introduced a more flexible, richer information model for digital libraries based on an ‘information network overlay’ for modeling resources, their descriptions and relationships. It represented breakthrough thinking that led to new possibilities for digital libraries that facilitate ‘the creation of collaborative and contextual knowledge environments.’

Table 1.1 A progression of digital library definitions		
Definition	Facets	Source and comments
‘The library of the future will be based on electronic data ... contain both text and graphics and be widely available via electronic networks. It is likely to be decentralized ...’	<ul style="list-style-type: none"> • Digital data (collections) • Multimedia • Services (widely accessible) • Networked • Distributed • Enabling technologies 	Lesk, Fox and McGill, 1993, 12, 19–24 This was a white paper for NSF created in 1991. It led to the series of NSF workshops and the first NSF call for proposals. The focus of the definition and white paper was on enabling technologies and maintaining US national competitiveness.
‘A service; an architecture ... a set of information resources, databases of text, numbers, graphics, sound, video, etc.; a set of tools and capabilities ... [with] users ... [and] contributors ...’ Another key assumption: For use on the network	<ul style="list-style-type: none"> • Services (networked; with tools/capabilities) • Architecture (enabling technologies) • Digital data (collections) • Multimedia • Community-based (users/contributors) 	Borgman, 1993, 122
‘Systems providing a community of users with coherent access to a large, organized repository of information and knowledge ... enriched by the capabilities of digital technology ... span[ning] both print and digital materials ... provid[ing] a coherent view of a very large collection of information ... integrat[ing] materials in digital formats ... such as multimedia, geospatial data, or numerical datasets ... [characterized by] continuity [with] traditional library roles and missions ... [and with] many digital repositories ... appear[ing] to be a single digital library system ...’	<ul style="list-style-type: none"> • Systems • Community-based • Services (coherence; collected and organized) • Enabling technologies • Distributed, interoperable • Digital and non-digital data (hybrid) • Multimedia • Extension of existing libraries 	Lynch and Garcia-Molina, 1995
‘A large collection of the full contents of high use materials including books, journals, course materials, and multimedia learning packages, which can be directly accessed by students and staff’ [with personal computers]	<ul style="list-style-type: none"> • Multimedia • Terms and conditions (licensed content) • Collection • Digital data (digitized) 	Zhao and Ramsden, 1995 ELINOR project; concerned with digital library development for teaching and learning. Led to insights and progress on copyright and publisher content licensing issues (see Collier, Ramsden and Zhao, 1995). <i>(Continued on next page.)</i>

Definition	Facets	Source and comments
'Organized collections of digital information. They combine the structuring and gathering of information, which libraries have always done, with the digital representation of information that computers have made possible.'	<ul style="list-style-type: none"> • Services (organized, structured and gathered) • Digital data (collections) • Extension of existing libraries • Computers (enabling technologies) 	<p>Lesk, 1997, xx, xxii</p> <p>Lesk also stressed the importance of the economics of digital libraries: 'We know how to build a digital library ... we do not know how to make it economically supportable.'</p>
<p>'The definition of the digital library will require an understanding of the role and nature of public institutions in a postindustrial society.'</p> <p>'A realm of free speech and association as well as an information market place.'</p>	<ul style="list-style-type: none"> • Extensions of existing libraries (but not as collections; rather in their societal roles) • Social (emphasis on social aspects) 	<p>Lyman, 1996</p> <p>Emphasizes the social role of libraries offering free and equal access to knowledge and ponders the question of how digital libraries might support the traditional role of the library as a 'marketplace of ideas' and the public interest in education and democratic participation.</p>
'Organizations [i.e., institutions] that provide the resources, including the specialized staff, to select, structure, offer intellectual access to, interpret, distribute, preserve the integrity of, and ensure the persistence over time of collections of digital works so that they are readily and economically available for use by a defined community or set of communities.'	<ul style="list-style-type: none"> • Organizations (institutions) • Digital data (collections) • Community-based • Services (selecting, collecting, organizing, providing access, delivering, preserving) 	<p>Waters, 1998</p> <p>The definition developed by the Digital Library Federation.</p> <p>Services encompass a curatorial role.</p> <p>See also Deegan and Tanner (2002, 22)</p>
<p>1 Digital libraries are a set of electronic resources and associated technical capabilities for creating, searching, and using information.</p> <p>2 Digital libraries are constructed – collected and organized – by [and for] a community of users, and their functional capabilities support the information needs and uses of that community.</p>	<ul style="list-style-type: none"> • Digital data (collections) • Enabling technologies • Services (collecting, organizing, searching, using information) • Community-based • Use- and user-centered • Emphasis on social aspects (life cycle of information) 	<p>Shortened version of Borgman, 2000, 42.</p> <p>This definition has been very influential in the digital library field.</p> <p>From the beginning, Borgman has stressed the importance of the social aspects of digital libraries.</p>
'Sociotechnical systems – networks of technology, information, documents, people, and practices.'	<ul style="list-style-type: none"> • Systems • Networked • Community-based • Use- and user-centered (work practices and people) • Emphasis on social aspects • Systems • Enabling technologies • Collections 	<p>Bishop, Van House and Buttenfield, 2003</p> <p>Emphasis on balancing the needs of people with the requirements for collections and enabling technologies.</p>

Table 1.1 (continued)

Definition	Facets	Source and comments
'A tool at the center of intellectual activity having no logical, conceptual, physical, temporal, or personal borders or barriers to information. Generally accepted conceptions have shifted from a content-centric system that merely supports the organization and provision of access to particular collections of data and information, to a person-centric system that delivers innovative, evolving, and personalized services to users. Conceptions of the role of Digital Libraries have shifted from static storage and retrieval of information to facilitation of communication, collaboration, and other forms of dynamic interaction . . . [and] the capabilities of Digital Libraries have evolved from handling mostly centrally located text to synthesizing distributed multimedia document collections, sensor data, mobile information, and pervasive computing services.'	<ul style="list-style-type: none"> • Service (Tool) • Systems • Use- and user-centered • Community-based • Social (communication, collaboration, dynamic interaction) • Multimedia • Mobile • Terms and conditions (policies) 	<p>Candela et al., 2007</p> <p>A conceptual definition from the DELOS Digital Library Manifesto (Candela et al., 2006). Defines six core components of digital libraries: content, users (both humans and machines), functionality, quality, policy (e.g., rights) and architecture. The Manifesto contains a useful discussion of digital library definitions.</p>

Other authors have also contributed insightful commentary on how to define digital libraries, rather than specific or formal definitions or frameworks (two examples are Chowdhury and Chowdhury, 2003, 4–9; Chowdhury and Foo, 2012, 2–4). Bill Arms offers an informal definition ('a managed collection of information, with associated services, where the information is stored in digital formats and accessible over a network,' but at the same time Arms has consistently emphasized that digital libraries must be understood as an 'interplay of people, organizations and technology' (2000, ix, 2). The already cited article by Peter Lyman offers another, quite different perspective; I recommend it to anyone with an interest in libraries' (and digital libraries') roles supporting the public good. The IFLA/UNESCO manifesto on digital libraries (www.ifla.org/digital-libraries/manifesto), which contains a definition of a digital library, also emphasizes the role of digital libraries in bridging the 'digital divide' (discussed in Chapter 6).

Levy and Marshall's article (1995, 78, 80, 82–3) is particularly important because it applies a work-oriented (ethnographic) perspective, noting that the emergence of digital libraries challenges the assumptions but not the basic character of libraries as an interplay of collections, enabling technologies, and services supporting the work that communities of users want to do. Noting

'an infrastructure by itself does not constitute a library' and 'the highest priority of a library, digital or otherwise, is to service the research needs of its constituents,' their article presaged the ensuing shift away from enabling technologies and digital collections as ends in themselves and toward user-centered design and networked services supporting collaborative work.

A few definitional issues

There are many challenges associated with attempting to define digital libraries. Some of the issues discussed by various authors include the following:

Distributed digital libraries

Some digital libraries are central archives that provide digital content storage and deliver services from a single system; others' content and services are distributed in multiple locations on the network. Still others aggregate the content of many digital libraries (repositories of repositories). Suleman (2012; 17–21) discusses centralized and distributed digital libraries. It should be noted here that digital libraries that are crawled and indexed by common or academically oriented search engines are discoverable in search engine results as if they were aggregated. The definition of digital libraries in this book covers some of these but excludes the virtual aggregations offered by common search engines like Google or Bing. The academic search engine Google Scholar, however, has characteristics of a digital library (it has a social role and it is intended for scholars' use). Beel, Gipp and Wilde (2010, under section 2.1) further discuss academic search engines, including Google Scholar, PubMed and IEEE Explore.

Hybrid libraries

As already noted, Rusbridge coined the term 'hybrid library' to refer to combinations of traditional collections, licensed e-resources and openly available digital collections produced in-house or elsewhere. Some digital content is directly accessible; other content can be linked to; still other content is represented only by citations (metadata). Schwartz (2000) writes 'the hybrid library is the context within which most academic digital libraries are found – the ecosystem of the digital library, as it were.' Chowdhury and Chowdhury (2003, 6–7) confirm this view; in their book they use the phrase 'digital

libraries' to denote both digital-only and digital-plus-analog (hybrid) libraries. As Bearman (2007, 223) remarks, an assumption that a digital library contains only digital works is overly limiting; it is necessary to include within the scope of digital libraries those that 'service some physical items in addition to digital content.' The definition of digital libraries in this book includes hybrid libraries provided that the amount of digital content directly available or accessible through links exceeds the content represented by metadata only. Databases of metadata only fall outside the definition.

'Library' or 'digital library'?

As library collections are increasingly dominated by online content, the concepts of 'digital libraries' and 'libraries' are less distinguishable than they were in the 1990s, when digital libraries began to emerge. Chapter 5 discusses the possible convergence of strategic agendas for digital libraries and traditional libraries. However, the definition provided in this book does not conflate digital libraries and libraries.

Preservation

Deegan and Tanner's definition (2002, 22) is a set of principles emphasizing the curatorial role of digital libraries as managed collections, requiring that digital objects be selected, made accessible, and preserved as *long-term, stable resources*. The definition of digital libraries used in this book does not explicitly require a preservation mission.

Open or restricted content?

As discussed in Chapter 4 of this book, digital library innovations have led to rapid growth in the availability of open, freely available digital content and a culture of open data interchange. The definition used in this book notes that digital libraries are often open. However, the definition does not exclude fee-based or restricted-access digital libraries such as those produced by publishers and other e-resource providers, provided they are intended to serve defined communities. Borgman (2000, 46–7) and Chowdhury and Chowdhury (2003, 8–9) also discuss this issue. The definition in this book includes, for example, open or fee-based digital libraries from scholarly publishers, professional societies, aggregators like JSTOR or the Directory of Open Access Journals. It also includes library or consortially provided, cloud-

based library discovery layers that provide access to a substantial amount of open, licensed and/or fee-based digital content.

Global digital library

Borgman proposed a working definition of a ‘global digital library’ as ‘a useful construct that encompasses all the digital libraries that are connected to and accessible through a global information infrastructure’ (2000, 48). Such a construct does not exist as of this writing. The world wide web, in and of itself, or its representation in a search engine like Google, falls outside the definition of a digital library that is used in this book.

Conclusion

This chapter has traced the antecedents of digital libraries to 1965 and J. C. R. Licklider’s challenging vision for ‘libraries of the future,’ which, he noted, ‘may not be very much like present-day libraries.’ Key developments from 1965 to 1990 in computer and information science, telecommunications and networks, online publishing, personal computer ownership, libraries, archives and other professional communities – not to mention the internet and web – prepared the ground for an ambitious digital library research and development agenda. The vision for digital libraries was grand, and it attracted top research and professional talent and generous funding.

Early projects in the US and UK, programs funded by the European Commission, scholarly publishing projects, a number of projects inspired by democratic ideals, and many other initiatives led to groundbreaking innovations and the emergence of a new field of endeavor. Multifaceted and surrounded by dynamic technological and societal conditions, digital libraries are challenging to define, because they evoke diffuse impressions and continually evolve. The chapter concludes with a practical definition that underpins the use of the phrase ‘digital libraries’ in this book.

The next chapter examines the outcomes of digital libraries’ exhilarating first decade: a new field of endeavor; transformative change in the processes of scholarly communication and in how (and where) people look for information; new ways of organizing, interlinking, and aggregating digital content; large-scale digitization; digital preservation; the open access movement; and working digital libraries.

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Note: The following abbreviations have been used: *f* = figure;
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