CULTURAL HERITAGE INFORMATION
Access and Management

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Memory institutions have long been engaged in managing cultural heritage information resources. However, access to, and use of, such resources have been limited, and in many cases restricted, because of the nature and quality of the resources themselves and the associated conservation issues. This scenario has changed over the past two decades due to the advent and proliferation of internet technologies which have opened up new opportunities for the creation of digital copies of cultural heritage information resources that could be accessed from anywhere in the world without causing any physical damage to the resources resulting from everyday usage. Massive digitization of cultural heritage information resources over the past few years has given rise to a number of digital cultural heritage information services created at the national level, such as the American Memory in the USA (memory.loc.gov), and at the international level, such as the Europeana Digital Library (www.europeana.eu). It also facilitated better access to cultural heritage information due to the adoption of advanced interactive information retrieval techniques by cultural heritage digital libraries.

While the internet and the processes of digitization, indexing and retrieval activities offered new opportunities for providing better and wider access to cultural heritage information, they also posed several new challenges. Some of these challenges are associated with the resources, tools and technologies used for digitization, while others are related to access and use. Cultural heritage information resources can range from manuscripts to text and images, audio and video, and are often a combination of many of these forms; these multiple forms can pose specific challenges for metadata and indexing that are the key to providing access to digitized resources. Users of cultural heritage information can
also have specific characteristics that need to be considered in order to
design the most effective digital information systems that will facilitate
interactive and contextual access to information. Since digitization of
cultural heritage information is quite resource-intensive, such activities
need to be governed by policies and guidelines. Some heritage information
resources may be sensitive to specific communities and cultures, and
similarly some cultural heritage resources may have commercial potential.
Access to such resources therefore needs to be governed by appropriate
policies and practices, and a number of policies and guidelines are also
associated with the creation, access and management of cultural heritage
information resources. Overall, a number of challenges are associated with
the design, development and management of cultural heritage
information systems and services. This book addresses some of these
issues and challenges.

Contributed by 18 researchers from around the world, this book
provides a snapshot of current research and development as well as
outlining the various challenges and trends of research in relation to the
creation, access and management of digital cultural heritage information
systems and services. In Chapter 1, the editors provide a general
introduction to the topic and the book. In Chapter 2, Sula discusses issues
surrounding the current state and future possibilities of analogue versus
digital cultural information services. In Chapter 3, Chowdhury discusses
various policy issues associated with different aspects of cultural heritage
information systems and services, ranging from digitization to access and
use. In Chapter 4, Terras discusses the development, issues and challenges
associated with digitization of cultural heritage information resources of
different kinds. In Chapter 5, Sugimoto, Nagamori, Mihara and Honma
discuss the role of metadata in cultural heritage information, by making
special reference to Japanese graphic novels or comics called Manga. In
Chapter 6, Phiri and Suleman discuss the design and architecture of
cultural heritage digital libraries with special reference to the challenges
facing such service providers in developing countries. In Chapter 7,
Chowdhury discusses the user characteristics and usability challenges of
digital cultural heritage digital libraries and information services. In
Chapter 8, Stiller and Petras propose a framework for analysing and comparing user interactions in cultural heritage information services such as the Europeana digital library. In Chapter 9, Shiri critically analyses how semantic access is supported in some selected cultural heritage digital libraries and information services. Referring to a research project under the EU FP7 programme, in Chapter 10 Clough, Goodale, Hall and Stevenson discuss techniques for supporting information access to digital cultural heritage collections, especially recommendations and visualizations. Pointing out that all of the activities associated with the design, development and management of digital cultural heritage information services have a number of sustainability challenges, in Chapter 11 Chowdhury discusses the economic, social and environmental sustainability issues of cultural heritage information.

The book has been published as the first title in Facet Publishing’s newly introduced iResearch series, which aims to produce research monographs in contemporary themes that are relevant for the students, academics, researchers and practitioners of information science as envisioned by the iSchools around the world (ischools.org). We are thankful to the members of the advisory board of the iResearch series for their support and expert advice. We are especially thankful to Helen Carley, the Publishing Director, and her team at Facet for bearing with us throughout the process, from the conception of the idea to the publication of the book. Finally we would like to thank all our contributors for their submissions, as well as their co-operation throughout the editorial process.

Gobinda Chowdhury and Ian Ruthven
Introduction

Heritage is our legacy from the past, what we live with today, and what we pass on to future generations (UNESCO, 2008). Cultural heritage is commonly divided into two categories (Cane and Conaghan, 2009):

1. Tangible cultural heritage that are material, and can be (a) movable objects, such as paintings, antiquities or artefacts and (b) immovable objects such as buildings, monuments or archaeological sites; and
2. Intangible cultural heritage that cannot be touched but which can be felt through other sensory organs – for example, can be seen, as in the case of a dance or performance of a play or ritual, or can be heard, as in the case of music, stories, etc.

A new form of cultural heritage is born when the tangible or intangible heritage objects are digitized; and this is commonly referred to as digital cultural heritage or cultural heritage information resources (Lor and Britz, 2012). Cultural heritage information resources may include a wide variety of content, objects and artefacts. According to the European Commission, Europe’s cultural memory includes print (books, journals
Cultural heritage in the parlance of the World Intellectual Property Organization may be either intangible, tangible or, most usually, combinations of the two – an example of such a ‘mixed expression of folklore’ would be a woven rug (a tangible expression) that expresses elements of a traditional story (an intangible expression) (WIPO, n.d.).

Cultural heritage content may come in many different forms, such as:

• verbal expressions, such as folk tales, folk poetry and riddles, signs, words, symbols and indications
• musical expressions, such as folk songs and instrumental music
• expressions by actions, such as folk dances, plays and artistic forms or rituals, whether or not reduced to a material form
• tangible expressions, such as:
  — productions of folk art, in particular, drawings, paintings, carvings, sculptures, pottery, terracotta, mosaic, woodwork, metalware, jewellery, basket weaving, needlework, textiles, carpets, costumes
  — crafts
  — musical instruments
  — architectural forms.

WIPO, n.d.

A number of publications covering different aspects of digital cultural heritage have appeared over the past decade or so (Cameron and Kenderdine, 2007; Cane and Conagham, 2009; Feather, 2006; Lor and Britz, 2012), and they cover a wide range of themes such as:

• broader social, cultural and political issues, e.g., digital cultural heritage as a political concept and practice; the reshaping of social, cultural, and political power in relation to cultural organizations made possible through communication technologies; the
representation and interpretation issues of cultural heritage as digital objects; issues of mobility and interactivity both for digital objects and for consumers of digital heritage; the relations between communities and heritage institutions as mediated through technologies

- technical and technological issues that cover a wide range of disciplines and communities of practice such as cognitive science, artificial intelligence, visual art history and theory, cultural communication and learning theory, social research, information management, indigenous knowledge, cultural studies, communications, history, anthropology, museum studies, film studies, and so on.

Digital cultural heritage information: access and management challenges

Rapid progress in ICT, web and mobile technologies have significantly boosted research and development activities aimed at the creation and management of digital cultural heritage resources. Numerous digital libraries and information services on cultural heritage information are now available. The Library of Congress’s American Memory collection is one of the earliest and largest digital libraries of cultural heritage information. Originating from a pilot project of the Library of Congress that began in 1990, the American Memory digital library was launched in 1994. It is a digital record of American history and creativity comprising written and spoken words, sound recordings, still and moving images, prints, maps, and sheet music that document the American experience.¹ Europeana is another example of a large open-access digital library of cultural heritage information. As stated on its website, ‘Europeana is a single access point to millions of books, paintings, films, museum objects and archival records that have been digitized throughout Europe’.²

Numerous other cultural heritage information services have appeared over the past few years through various national libraries, museums, archives and government organizations, for example:
The Oral History Collection of the British Library
The Australian Heritage Database
The Australian Institute of Aboriginal and Torres Strait Islander Studies’ collections on indigenous culture and heritage
The DigitalNZ Service from the National Library of New Zealand
TELDAP from Digital Taiwan.

In order to support digitization activities, researchers also began to develop a variety of novel technologies and tools for digitization of specific types of cultural heritage objects. For example, Papadakis et al. (2011) discuss a portable spectral imaging system for digitizing special types of cultural heritage objects, including paintings, encrusted stonework and ceramics. Many such new technologies, tools and standards for digitization of different kinds of digital objects and artefacts have been presented in the literature and used in cultural heritage information projects.

Access to cultural heritage information involves a number of challenges for several reasons, such as these:

- The sources of cultural heritage information may include a variety of objects, ranging from stone carvings to palm leaves, manuscripts, texts, photographs, paintings, audio – spoken words in oral history, sound from various objects such as musical instruments, music – and video of still as well as moving objects. Each of these objects may require different metadata, indexing, retrieval and filtering techniques.
- The users of cultural heritage information may vary from very expert and professional users in a specific domain like history, archaeology or music to schoolchildren and novice users. Each of these user categories may have different information needs and information-seeking behaviour that need to be considered while designing user-centred information access systems.

Many novel tools and techniques have been developed over the past few
years to facilitate access to cultural heritage information. For example, Pattuelli (2011) discusses the user-centred design of an ontology for access to cultural heritage information. The temporal and spatial dimension and the context of information are extremely important in the retrieval as well as the preservation of cultural heritage information (Chowdhury, 2010). Kauppinen et al. (2010) comment that time is an essential concept in cultural heritage applications because temporal concepts such as time intervals are used for the annotation of cultural objects and also for querying datasets containing information about these objects.

Emphasizing the importance of user modelling and personalization – both at the specific user and community level – for cultural heritage information systems, Ardissono, Kuflik and Petrelli (2012) review the evolution of personalization techniques in museum websites, virtual collections and mobile guides towards recent extensions of cultural heritage toward the semantic and social web. Oral history has remained an important part of the cultural heritage, and many audio and video collections of such cultural heritage information are now available. Specific language processing and information retrieval challenge are associated with building oral history collections. Psutka et al. (2011), for example, employed novel speech recognition and information retrieval techniques to improve access to the Czech language part of a large video archive containing recorded testimonies of Holocaust survivors.

There are also the long-term access and sustainability issues of cultural heritage information. A significant amount of research resources and efforts have been expended over the past decade on digital preservation, many of which focus specifically on cultural heritage information (see, for example, the EU-funded SHAMAN project). Since most of the cultural heritage information services have appeared as an outcome of specific research projects, or have been funded by governments or individual institutions such as national libraries, continuing funding support and thus the economic sustainability of such digital cultural heritage information services will remain a major concern.

Due to the rapid growth in the volume and variety of cultural heritage information, and the rapid growth of user-generated cultural information,
cultural heritage information systems will be a growing organism requiring more and more resources to run them in years to come. Furthermore, although there is the ‘social good’ aspect of cultural heritage information services, it is important to assess how ‘good’ they are, and more importantly how the success of such services can be measured in specific social and economic contexts. This is essential for the long-term sustainability of cultural heritage information systems and services.

The organic growth of cultural heritage information systems and services also cause concerns in terms of environmental sustainability because of the increasing use of ICT infrastructure and the corresponding energy consumptions. Appropriate measures need to be taken to curb the growing energy consumptions of the ICT equipment and infrastructure in order to make the digital cultural heritage information systems and services more environment-friendly.

While open access to cultural heritage information will increase equity of access, this may be affected by a number of factors, such as the digital divide and information literacy. A recent study noted that 16 million people in Britain do not have basic internet skills. This means that almost one in four, or one in three if only the adult (over-16) population is counted, in Britain lack the basic internet skills to access digital cultural heritage; and the situation in many other countries may not be significantly better. Therefore, digital literacy and information skills have to be improved quite significantly in order to enable the public to make optimum use of digital cultural heritage information systems and services. This is an issue we return to in depth in Chapter 11.

**About this book**

This book aims to provide an overview of various challenges and contemporary research activities in cultural heritage information, focusing particularly on the cultural heritage content types, their characteristic and digitization challenges; cultural heritage content organization and access issues; users and usability; and various policy and sustainability issues associated with digital cultural heritage information systems and services.
We intend the book to be useful for researchers in information science, specifically in the areas of digital libraries, digital humanities and digital culture. It will also be useful for practitioners and students in these areas who want to know the different research issues and challenges and learn how they have been handled in course of various research projects.

There are 11 chapters in this book, contributed by 18 authors from 6 countries. While this chapter provides a brief overview of the topic of digital cultural heritage information, the other chapters address specific issues and research activities in this topic. The ordering of the chapters moves from scene setting on policies and infrastructures, through considerations of interaction, access and objects, to concrete system implementations. Finally, we look forward to issues around sustainability, in the widest sense, that need to be thought about in order to maximize the availability and longevity of our digital cultural heritage.

In Chapter 2 Sula presents a critical account of the histories of digital heritage, the challenges of defining the concept and the complementarities between digital and non-digital heritage. He then turns to the future and considers possible futures for digital heritage and concrete suggestions for this future.

In Chapter 3, Gobinda Chowdhury discusses various policy issues associated with the digitization and management of cultural heritage information. He argues that management of digital cultural heritage information involves a number of social, legal and policy issues. For example, while there is a general consensus that cultural heritage information should be made available to everyone for social good, there are a number of intellectual property and digital rights management issues. There are also some ownership and cultural sensitivity issues; for example, specific government policies and guidelines have been formulated for handling of cultural heritage information related to specific indigenous communities in countries like Australia and New Zealand. Chapter 3 discusses some of these policies and their implications as well as the provenance and digital rights management issues associated with cultural heritage information.

Terras points out that there is now an expectation that institutions
should be undertaking digitization programmes, and best practices in this area are now well documented and understood. In Chapter 4 she scopes out the background to the current digitization environment, giving an overview of the methods and approaches involved. She discusses the current developments, highlighting the use of both two- and three-dimensional digitization methods for the creation of digital surrogates of objects and artefacts, indicating the potential for further development in the sector, whilst drawing attention to current issues faced when digitizing objects and artefacts including cost, sustainability, impact evaluation, and expectation management in the changing information environment. She points out that affordances of previously prohibitively expensive techniques – such as multi-spectral imaging and 3D scanning – are now available at relatively inexpensive rates. However, she raises questions about digital literacy and our understanding of what it means, for both the end-user and information professional, to create digital versions of our cultural inheritance.

Sugimoto, Nagamori, Mihara and Honma point out that metadata plays a key role in finding, accessing, collecting, using, organizing, storing, delivering and preserving cultural heritage information in a networked information environment. In Chapter 5, they discuss various metadata issues for digital resources and archives in the networked information environment in the context of a novel metadata framework development for publishing and management of ‘manga’, a Japanese term which means graphic novel or comics. They conclude that having an appropriate and interoperable metadata framework does not only facilitate better access and management of cultural heritage information resources, but also helps us add value to those resources through such activities as linking, annotations, etc.

In Chapter 6, Phiri and Suleman discuss the systems architecture that store, preserve and provide access to digital cultural heritage objects. They discuss major design considerations for implementing cultural heritage system architectures and some existing architectural patterns currently in use. They argue that the current digital library systems architectures are not suitable for institutions and researchers in many Third World countries.
that suffer from poor network infrastructure and access. They propose a simpler architectural design and demonstrate, through two case studies, how such a simple design can facilitate the management of cultural heritage information collections in South Africa.

While Chapters 4–6 focus more on the cultural heritage information objects, metadata and system architecture, Chapters 7–10 focus more on the users, access and usability issues. In Chapter 7, Sudatta Chowdhury discusses various issues and challenges of users and usability studies in digital humanities and digital culture. By drawing several examples from large cultural heritage information services such as the Europeana digital library, she discusses some specific characteristics of users of digital humanities and digital culture and how they influence the design and usability of cultural heritage information systems and services. She also discusses some emerging trends in the context of users and usability studies of cultural heritage information systems and services.

In Chapter 8, Stiller and Petras argue that there are several significant distinct characteristics of user interactions in cultural heritage information services in comparison to conventional information services. They discuss some strategies for cultural institutions to provide users with means for purposeful interactions with digital cultural heritage while maintaining their mandate to offer universal access to curated content. By drawing examples from the European digital library, they provide a framework for evaluating interactions and critically analysing them with regard to serving users and cultural institutions alike. They conclude that for cultural heritage information, it is not only necessary to provide certain features and consequently interactions but it is also important to be aware of their influence on the access modes.

Following on from this in Chapter 9, Shiri provides an overview of knowledge organization systems and metadata standards used in cultural heritage digital libraries. His chapter examines and analyses, using three selected cultural heritage digital libraries as case studies, the ways in which digital libraries have incorporated controlled vocabularies in their search user interfaces and the degree to which this use of semantic access maps
to recent research on the information search strategies of cultural heritage information seekers.

In Chapter 10, Clough, Goodale, Hall and Stevenson discuss techniques to support information access to digital cultural heritage collections and, in particular, helping users explore and use the information they contain. They focus on a particular system called ‘PATHS’ – Personalised Access To cultural Heritage Spaces) project, funded under the European Commission’s FP7 programme – which aims to support multiple user groups with varying degrees of domain knowledge through the provision of state-of-the-art functionalities, such as recommendations and visualizations.

The lifecycle of digital cultural heritage information services is resource-intensive in many ways. First, activities associated with digitization and preservation of digitized content are hugely expensive affairs. Second, the growth of digital cultural heritage content vis-à-vis the growth of users and their information need from such services can be quite demanding. Furthermore, as discussed in Chapter 3, there are various social, cultural and legal issues associated with the management of, and access to, cultural heritage information. All these bring to the fore the question of sustainability of cultural heritage information systems and services. Arguing that the sustainability of information systems and services has so far remained a poorly researched area, in Chapter 11, Gobinda Chowdhury discusses the issues and challenges associated with the economic, social and environmental sustainability issues and challenges of cultural heritage information.

Notes

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3 www.bl.uk/oralhistory.
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