Strategy for Archival Management in the Digital Age

Cai Xuemei
The State Archives Administration of the People's Republic of China

The rapid development and widespread application of information technology has had a profound and comprehensive effect on the administration of archives. From the perspective of archival formation, the recording mode, storage carriers and rendering tools use computer technology and equipment as core elements, and the standard archiving of electronic documents and the credible long-term management of electronic records have become the subject of archival work in the information age. From the perspective of archival management, IT management tools are necessary for scientific storage and the speedy access of archives in today's world, while the establishment of the MARC database covering entire collections and the digitization of archives in traditional carriers are imperative for an enhanced level of archival management.

From the beginning of the 1990s, China has gradually commanded archival departments at all levels to meet the development requirements of the information age from the aspects of system design, technology application and process reengineering, etc.

I. The system design in IT processing of archives

Faced with the impact of information technology on archival work, archivists should on the one hand actively adapt to new changes brought about by information technology, and on the other hand also standardize the filing of electronic documents and management of electronic archives. In system design, we follow the set processes of archival management of traditional paper documents, and emphasize the requirement of filing links to transfer electronic documents from the archive creating unit to the archives section and from each creating department to the archive institutions. Regarding the handover of electronic documents, the State Archives Administration of the People's Republic of China (SAAC) formulated and released in 2002 the national standard "Electronic Document Filing and Management Norms," presenting the normative, operational requirements for electronic filing from the creation and accumulation of electronic documents, electronic document archiving, testing and arranging, the transfer, reception and storage of electronic archives and other aspects. In the transfer link of electronic archives from file creating units to the archive institutions, the SAAC formulated and promulgated in 2012 the "Methods for the Transfer and Reception of Electronic Files," regulating the duty, time, processes, data organization, transfer formalities, etc. in the transfer and reception of electronic files.

Table 1: Regulations and standards concerning archival informatization issued by the SAAC in the past decade

No.	**Titles**	**Time**	Type
1	Filing and management norms of electronic documents	2002	technical standard
2	Interim Measures for Electronic Document Archiving	2003	departmental regulation
3	Detailed regulation for the structure of catalogue and description database of archives at the item-level	2004	technical standard
4	Standard for archives catalogue data collection	2005	technical standard
5	Technical specification for digitization of paper archives	2005	technical standard
6	Business Email Archiving and Management Rules	2005	technical standard
7	Disc technology requirements and application specifications for the filing of electronic records	2008	technical standard
8	Technical specification for microfiche digitization	2009	technical standard
9	A Guide for Building Digital Archives	2010	normative document
10	Methods for transfer and reception of electronic archives	2012	departmental regulation
11	A Guide for Building Digital Archives Section	2013	normative document
12	Specifications for Filing and management of Digital Photos	2014	technical standard
13	Technical specification for digital archives COM and COLD	2014	technical standard
14	Technical specification for transferring Archives Model Database into XML files	2014	technical standard
15	Basic terminology of electronic archives management	2014	technical standard

II. To enhance efficiency in keeping and use of archives with information technology

The use of information technology to improve the level of storage and efficiency of use is inevitable in archival work in order to adapt to the social reality of the digital age. Through the establishment of the MARC database covering the collections and digitizing parts of traditional archives, we can improve the speed of archives use, recall rates and precision, and reduce or avoid the use of the original files, to achieve storage protection of the original files. Archive institutions now provide the public with remote service on their websites, which is a new application for archives in the digital era. Chinese archives in provinces and cities have actively used IT to enhance their management and service levels, established on a basic level a MARC database covering all collections, and gradually promoted the digitization of traditional files; more than 90% of have built a website for their archives on the Internet. However, there is uneven development between the developed areas and economically backward areas of China. The websites also provide an insufficient archive catalogue or full-text archives.

Table 2: Archives digitization and website construction in China (data digitization rate as of the end of 2013; site data as of August 2015)

The local Archives	Digitization rate of archives	Website established	Current file services provided	Archives inquiry service	Uploaded catalogues or full-text queries	Online archives display
Beijing	66%	√	√	√	√	√
Tianjin	11%	√	√	√	none	√
Hebei	10%	√	√	√	none	√
Shanxi	1%	√	none	none	none	none
Inner Mongolia	14%	√	none	none	none	none
Liaoning	26%	√	√	√	√	√
Jilin	16%	√	√	√	none	√
Heilongjiang	4%	√	√	√	none	√
Shanghai	52%	√	none	√	√	√

Jiangsu	51%	√	none	√	√	√
Zhejiang	35%	√	√	√	none	√
Anhui	3%	√	none	√	√	√
Fujian	24%	√	none	√	none	√
Jiangxi	11%	√	√	√	√	√
Shandong	16%	√	√	√	√	√
Henan	9%	√	√	none	none	√
Hubei	43%	√	none	√	none	√
Hunan	1%	√	none	√	√	√
Guangdong	9%	√	√	√	√	√
Guangxi	19%	√	none	√	√	√
Hainan	6%	√	none	√	none	√
Chongqing	23%	√	none	none	none	√
Sichuan	25%	√	none	√	√	√
Guizhou	10%	√	none	√	√	√
Yunnan	31%	√	none	none	none	√
Tibet	10%	√	none	none	none	√
Shaanxi	16%	√	none	√	none	√
Gansu	44%	√	√	√	none	√
Qinghai	9%	site not accessible				
Ningxia	6%	√	none	√	none	√

Xinjiang	40%	site not accessible				
Dalian	24%	√	none	none	none	√
Ningbo	15%	√	√	√	none	√
Xiamen	25%	√	√	√	none	√
Qingdao	52%	√	none	√	√	√
Shenzhen	83%	√	none	√	none	√
Xinjiang Corps	40%	not established				
Shenyang	1%	√	none	√	none	√
Changchun	21%	√	none	none	none	√
Harbin	95%	√	√	√	none	√
Nanjing	12%	√	none	√	√	√
Hangzhou	57%	upgrading				
Jinan	59%	√	√	√	√	√
Wuhan	50%	√	none	√	none	√
Guangzhou	7%	√	none	none	none	√
Chengdu	29%	√	√	√	√	√
Xi'an	23%	√	none	√	none	√

III. To explore the positioning and strategy of archives in the digital era

Various types of data are generated in the digital age and composed of complex and diverse data types; technology and equipment to produce and read data are quickly updated. It is a challenge for every archivist to figure out how to position the role of archives and archival work. In the past era of paper documents archives served three roles. First, the role of evidence, access and research. Archives could provide society and the public evidence as well as details for the basis of an event.

Second, the role of knowledge and experience. Archives as the results and experience of past work could provide the basis and reference for future work. Third, the role of history and memories. Archives were the records of the historical development of a locality and reflected the history of the state and society. Because of the diversity and convenience of knowledge channels in the digital age, the traditional knowledge role once played by archives is gradually weakening. This is happening at a time when the proof and memory roles of archives are even more important and prominent because of their function and credibility. To bring into play the proof and memory role of a file in the digital era, especially of electronic documents and archives, is a major challenge for current and future archivists to figure out how to ensure reliable and credible electronic records for long-term availability. Chinese archivists have not formed a consensus on norms and operating requirements in this regard. According to Chinese law and other provisions on the control of electronic data, we have done some research and piloting work, and achieved preliminary results and observations.

How can we manage electronic records in order to meet legally required evidence features? As can be seen from the relevant provisions of Chinese law, electronic data storage as evidence should satisfy three conditions: a) the electronic data can be effectively presented; b) the electronic data have not been changed since its formation, and the format of electronic data should remain unchanged. If the format has changed, the content of the electronic data should be consistent; c) when the storage address of electronic data is changed, the relevant processed information has to be recorded, especially the information regarding time. Thus, we can summarize the management requirements in saving electronic files for various types of archives.

Firstly, to develop a management method for electronic records; according to laws and regulations, the management methods of electronic records are developed for archives (or Archives Sections) to regulate job duties and give posts for managing electronic archives. Second, to take appropriate technical measures to ensure that electronic records within the system will not be changed, or to take effective technical measures to prove that electronic archives have not been changed. Using today's technology, the following types of technical measures can be used as needed: 1) data format cured, that is, when the archive is saved, a streaming file is transferred into a layout file; 2)for the electronic archive data, set attribute to "read only," or set a file into non-editable mode; 3) a small file is stored as an electronic backup using a write-once optical disc as the carrier; 4) the use of digital signatures, digital watermarks, timestamps and other technologies to help prove that the electronic file has not been altered; 5) the use of access control technologies, such as firewalls, intrusion detection and security auditing, authentication, and access control to prevent sabotage and illegal use of electronic files within the system. Third, an electronic archive management system should record and preserve the management process;, to write down operations of electronic files in the event of format conversion, data migration, and changes to the management subjects; and to test and confirm the consistency before and after the operation of electronic archival content.

Another major challenge for archivists is to ensure the long-term available use of electronic records. Summarizing the awareness of the problem among Chinese and international archivists,, we may take the following measures for the long-term preservation and availability of electronic

records.

First, we must formulate management regulations for the long-term preservation of electronic archives, including job functions, staff responsibilities, process determination, technology options, risk assessment, etc. The regulations can also involve interlibrary cooperation, intellectual property, quality management and auditing, and supervision according to need. Long-term preservation includes warehousing, storage, backup, recovery, testing, conversion, migration, and extraction. Second, the provincial archives and above should carry out the registration of mainstream software and data formats, and purchase and retain certain hardware facilities, in particular input and output devices. They should register and track long-term preservation formats for all kinds of electronic records, the storage carrier suitable for long-term preservation, and the hardware and software environment suitable for long-term preservation; if there is anything unusual, they should begin format conversion or data migration operations in a timely fashion. Third, we should construct systems for the long-term preservation of electronic records, including the construction of infrastructure, applications and security systems. This must be done for reception, management, preservation and utilization operations. An application system is part of a three-way separate design architecture of a management library, long-term storage repository, and users' library. A Management Library is for electronic archival data management and disposal; a long-term storage repository is for storing electronic records in line with long-term data retention requirements. In principle, we do not dispose of the long-term data preservation repository. The users' library is to provide file services for different user objects. Fourth, we should retain the records in the management process of an electronic file transfer, receipt, format conversion, data migration, etc., and build their correspondence with the electronic archives.

Archive operations in the digital age have just begun. Chinese archivists have made some achievements and gained some experience after years of research and practice, but problems remain. We have a long way to go, but we hope that through exchanges with our international colleagues we can jointly promote the development of archival work in the new era.