MANAGING RECORDS AS EVIDENCE AND INFORMATION IN CHINA IN THE CONTEXT OF CLOUD-BASED SERVICES

by

WEIMEI PAN

BMgt., Tianjin Normal University, 2010
M.M., Tianjin Normal University, 2012

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY

in

THE FACULTY OF GRADUATE AND POSTDOCTORAL STUDIES
(Library, Archival and Information Studies)

THE UNIVERSITY OF BRITISH COLUMBIA
(Vancouver)

March 2019

© Weimei Pan, 2019
The following individuals certify that they have read, and recommend to the Faculty of Graduate and Postdoctoral Studies for acceptance, the dissertation entitled:

Managing Records as Evidence and Information in China in the Context of Cloud-based Services

submitted by Weimei Pan in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Library, Archival and Information Studies

Examining Committee:

Dr. Luciana Duranti
Supervisor

Dr. Luanne Freund
Supervisory Committee Member

Dr. Hasan Cavusoglu
University Examiner

Dr. Carson Chia-Siang Woo
University Examiner

Additional Supervisory Committee Members:

Dr. Giovanni Michetti
Supervisory Committee Member

Dr. Sherry L. Xie
Supervisory Committee Member
Abstract

Placed against the backdrop of the increasing use of cloud-based services, this study aims to explore the management of electronic records as evidence and information in Chinese enterprises to support them in fulfilling regulatory and legal requirements as well as satisfying business needs.

A qualitative case study method was adopted to achieve the research purpose. Two Chinese enterprises—one Sino-foreign joint venture and one state-owned enterprise—were studied through interviews and document analysis.

The findings show that, in the two Chinese enterprises studied, the impact of cloud-based service on records management practice is very limited. As to the management of electronic records as evidence, due to various reasons, these two enterprises are prompted to either employ a trusted third party or convert them to paper format for preserving and demonstrating their evidentiary capacity. Despite many benefits offered by these two methods, the examination of their application in the two enterprises identifies some issues, for instance, the lack of procedures to verify that the authenticity of the data in the cloud is not compromised, the lack of archival methods for the management of the data deposited with the trusted third party, and the way the paper versions of the records is managed does not account for their “digital” past, all of which may affect the ability of the records in question to adequately fulfill their intended purpose.

As it regards the management of records as information, both cases provided positive evidence of increasing efforts to exploit the informational content of records for daily
operation and strategic planning. Moreover, for the state-owned enterprise, its records management work is largely, if not exclusively, focused on the informational value of records.

This study suggests that there is some incoherence in the records management systems within the two enterprises, which is manifested in two aspects: the design of different records management programs to manage the evidentiary capacity and the informational value of records, and the absence of clear principles informing the management of records.
Lay Summary

This study explores how two Chinese companies manage their electronic records to prove their business activities to the government and the courts as well as support daily operation and competitive advantage. Using two case studies – a Sino-foreign joint venture and a state-owned enterprise, it was found that, due to juridical and administrative reasons, Chinese enterprises often convert electronic records into paper format or deposit them with a third party to ensure their ability to serve as evidence. Yet, examination of these methods shows that they may not be able to do the job successfully. Additionally, both cases provided positive evidence of increasing efforts to exploit the informational content of electronic records for daily operations and strategic planning, especially in the case of the state-owned enterprise, where records management is largely, if not exclusively, focused on the value of records as information.
Preface

This study was conducted as a requirement for the degree of Doctor of Philosophy in Library, Archival and Information Studies at the University of British Columbia.

The author was responsible for the identification of the research problem, and for the research design, data collection, data analysis, and the writing.

Data collection reported in Chapter 3 is covered by UBC Ethics Certificate H17-02448.
# Table of Contents

Abstract ................................................................................................................................. iii  
Lay Summary ............................................................................................................................ v  
Preface ..................................................................................................................................... vi  
Table of Contents ....................................................................................................................... vii  
List of Tables ............................................................................................................................ x  
List of Figures ........................................................................................................................... xi  
Glossary ...................................................................................................................................... xii  
Chinese-English Interlinear ....................................................................................................... xiv  
Acknowledgements ................................................................................................................... xix  
Dedication ................................................................................................................................. xxi

## Chapter 1: Introduction

1.1 Overview .......................................................................................................................... 1  
1.2 Research Problem ............................................................................................................. 2  
1.3 Research Questions .......................................................................................................... 6  
1.4 Dissertation Structure ..................................................................................................... 8

## Chapter 2: Literature Review

2.1 Introduction ....................................................................................................................... 10  
2.2 Records and Archives Management in China .................................................................. 12  
  2.2.1 Records and Archives Management in the Public Sector in China ......................... 12  
  2.2.2 Enterprise Records Management in China .............................................................. 18  
  2.2.3 Electronic Records Management in China: The Dual Track System and the Dual-Copy System .......................................................... 22  
2.3 Managing Records as Evidence and Information ........................................................... 31  
  2.3.1 Managing Records as Evidence ............................................................................... 31  
    2.3.1.1 Requirements for the Admission of Digital Records as Evidence in Canada .......... 33  
    2.3.1.2 Requirements for the Admission of Paper and Digital Records as Evidence in China ... 42  
      2.3.1.2.1 A Brief Review of the Chinese Legal System ................................................. 46  
      2.3.1.2.2 Requirements for the Admission of Paper Records as Evidence in Civil Cases in China .......................................................... 49  
      2.3.1.2.3 Requirements for the Admission of Digital Records as Evidence in Civil Cases in China .................................................. 60  
    2.3.2 Managing Records as Information ......................................................................... 76  
2.4 Cloud-based Services ....................................................................................................... 84  
  2.4.1 Definition and Characteristics of Cloud Computing ................................................. 84  
  2.4.2 Challenges Posed by the Use of Cloud-based Services to Records Management .......... 88  
  2.4.3 The Use of Cloud-based Services in Enterprises in China and Challenges Posed by Their Use to Records Management .................................................. 93  
2.5 Summary ........................................................................................................................ 98

## Chapter 3: Methodology

3.1.1 The Two Cases .......................................................................................................... 103  
3.1.2 Data Collection ........................................................................................................... 105  
3.1.3 Data Analysis ............................................................................................................. 109

## Chapter 4: Case Study #1

4.1 Research Site ................................................................................................................... 113  
4.2 Background ..................................................................................................................... 114  
  4.2.1 Elevator Maintenance .............................................................................................. 114  
  4.2.2 Going Digital ............................................................................................................ 117  
  4.2.3 Cloud Strategy ......................................................................................................... 119  
4.3 Records Management at Company 1 ............................................................................. 120
Chapter 5: Case Study #2

5.1 Research Site.................................................................175

5.2 Background.................................................................175

5.2.1 The External Context..................................................175

5.2.1.1 The Economic Environment in China Today.....................175

5.2.1.2 The Port and Coastal Engineering Industry Environment in China Today..................................................177

5.2.1.3 China’s Public Institution (Shiye danwei) and State-owned Enterprise (SOE) Reform........................................178

5.2.2 The Internal Context....................................................187

5.2.2.1 A Brief Reform History of Company 2.............................187

5.2.2.2 Current Strategy.........................................................189

5.2.2.3 Informatization..........................................................191

5.2.2.4 Quality Certification.................................................193

5.2.2.5 The Use of Cloud Services at Company 2.......................194

5.2.2.6 Information Systems Used at Company 2.......................196

5.3 Cloud-based Application: Cloud Communication.................199

5.3.1 Background..............................................................199

5.3.2 Functionalities...........................................................200

5.3.3 Integration with Other Business Systems..........................200

5.3.4 Records Generated While Using Cloud Communication.........201

5.3.5 The Influence of the Use of Cloud Communication...............203

5.4 Records and Archives Management at Company 2...............203
Appendices .......................................................................................................................... 279

Appendix A Interview Consent Form .................................................................................. 279
A.1 Interview Consent Form in English ............................................................................. 279
A.2 Interview Consent Form in Chinese ............................................................................ 282
Appendix B Interview Questions for Case 1 ......................................................................... 285
B.1 Interview Questions for Interviewee 1 ........................................................................ 285
B.2 Interview Questions for Interviewee 2 ........................................................................ 293
B.3 Interview Questions for Interviewee 3 & 4 ................................................................. 299
B.4 Interview Questions for Interviewee 5 ........................................................................ 305
Appendix C Interview Questions for Case 2 ......................................................................... 309
C.1 Interview Questions for Interviewee 6 ........................................................................ 309
C.2 Interview Questions for Interviewee 7 & 8 ................................................................. 322
C.3 Interview Questions for Interviewee 9 ........................................................................ 324
Appendix D A List of Some Examples of the Categories Generated in Case 1 and Case 2 .......................................................... 325
D.1 Some Examples of the Categories Generated in Case 1 ............................................. 325
D.2 Some Examples of the Categories Generated in Case 2 ............................................. 327
Appendix E An Example of the Mind Maps Generated in the Study .................................. 328
List of Tables

TABLE 1 ROLE OF EACH INTERVIEWEE IN THE TWO CASE STUDIES

................................................................. 109
List of Figures

FIGURE 1. THE PATH OF MAINTENANCE DATA TRANSMISSION ................................................................. 148
FIGURE 2. CERTIFICATION TEMPLATE (TRANSLATED FROM THE ORIGINAL FORM) ........................................ 154
FIGURE 3 DIRECTORY TREE IN THE ELECTRONIC RECORDS MANAGEMENT SYSTEM AT COMPANY 2 (CREATED BASED ON THE COMPANY’S ELECTRONIC RECORDS MANAGEMENT SYSTEM) ........................................ 213
FIGURE 4. PROCESSING FORM FOR CREATING A DOCUMENT (TRANSLATED FROM THE ORIGINAL FORM) ........ 224
Glossary

**Classification Scheme**: A plan for the systematic identification and arrangement of business activities and records into categories according to logically structured conventions, methods and procedural rules. (“Classification scheme”, 2007, p. 10)

**Cloud Computing**: A model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. This cloud model is composed of five essential characteristics, three service models (i.e. Software as a Service, Platform as a Service, and Infrastructure as a Service), and four deployment models (i.e., Public cloud, private cloud, community cloud, and hybrid cloud). (Mell & Grance, 2011)

**Cloud-based Services** (or **Cloud Services**): A shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction and made available to customers on demand via a network, typically, the Internet.

**Community Cloud**: Cloud infrastructure shared among several organizations from a specific community with common concerns (security, compliance, jurisdiction, etc.), whether managed internally or by a third party.

**Document**: An indivisible unit of information constituted by a message affixed to a medium (recorded) in a stable syntactic manner. A document has fixed form and stable content. (“Document”, 2007)

**Electronic Record**: An analogue or digital record that is carried by an electrical conductor and requires the use of electronic equipment to be intelligible by a person. (“Electronic record”, 2007, p. 20)

**Electronic Records Management System (ERMS)**: Information systems that are designed to capture and manage records in paper and electronic formats in accordance with the organization’s records management policies and principles.

**Hybrid Cloud**: A composition of two or more clouds (private, community or public) that remain distinct entities but are bound together.

**Infrastructure as a Service (IaaS)**: The capability provided to the consumer is to provision processing, storage, networks, and other fundamental computing resources where the consumer is able to deploy and run arbitrary software, which can include operating systems and applications. The consumer does not manage or control the underlying cloud infrastructure but has control over operating systems, storage, and deployed applications; and

---

1 Definitions without citations are provided by this author for the purpose of this dissertation.
possibly limited control of select networking components (e.g., host firewalls). (Mell & Grance, 2011)

**Platform as a Service (PaaS):** The capability provided to the consumer is to deploy onto the cloud infrastructure consumer-created or acquired applications created using programming languages, libraries, services, and tools supported by the provider. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, or storage, but has control over the deployed applications and possibly configuration settings for the application-hosting environment. (Mell & Grance, 2011)

**Private Cloud:** Cloud infrastructure operated solely for a single organization and for its exclusive use; it can be managed internally or by a third party.

**Public Cloud:** Services are delivered by third-party cloud service providers over a network and are open for public use.

**Record:** A document made or received in the course of a practical activity as an instrument or a by-product of such activity, and set aside for action or reference. (“Record”, 2007)

**Records Management System:** A unified set of resources, responsibilities, procedures and equipment designed to maintain and provide access to records. (Shepherd & Yeo, 2003).

**Records Management:** A field of management responsible for the efficient and systematic control of the creation, receipt, maintenance, use and disposition of records, including processes for capturing and maintaining evidence of and information about business activities and transactions in the form of records. (International Standards Organization [ISO], 2016)

**Retention Schedule:** A document providing description of records series and/or classes and specifying their authorized dispositions. (“Retention schedule”, 2007, p. 43)

**Software as a Service (SaaS) Applications:** Also known as cloud-based applications, are applications hosted by a vendor or service provider using cloud infrastructure and made available to customers via a network, typically the Internet. Customers can access the applications through a web browser or a program interface.
Chinese-English Interlinear²

CAD¹ 电子文件光盘存储、归档与档案管理要求 (GB/T 17678.1–1999): Requirements for Optical Disk Storage, Filing and Archival Management of CAD Electronic Records (GB/T 17678.1–1999)⁴

财政部: Ministry of Finance

档案: Archives


档案馆: Archives

档案室: The internal Archival Unit

档案著录规则 (DA/T 18–1999): Bibliographical Description for Archives (DA/T 18–1999)

党政机关公文处理工作条例: Regulations on the Handling of Records in the Party and Government Organs


电子公文归档管理暂行办法: Interim Measures on the Filing and Transferring of Electronic Records


² In this dissertation, the English translation of the titles of Chinese records and archives management regulations, specifications, standards, legislations, and other relevant documents cited were taken from the original documents, if one was provided, to facilitate their identification by the readers, or, if one was not provided, was made by this author. Despite the decision to respect the original sources as much as possible, this author was aware of the inconsistencies and inaccuracies in some the English translations and strove to clarify them in the text of the dissertation.

³ Computer Assisted Design

⁴ This English translation is taken from the one provided in the standard in the spirit of paying due respect to the original source. "Guidang" was translated into “filing”, which, however, is not quite accurate in terms of reflecting the substance of this action. For the purpose of this dissertation, a better translation would be “filing and transferring”. For a detailed discussion, please see footnote 26.

电⼦⽂件管理暂⾏办法: Interim Measures for the Administration of Electronic Documents


法：Legislation

公⽂，⽂件，⽂件材料: Records

公⽂电⼦邮件归档与管理规则 (DA/T 32–2005): Standards of Electronic Mail Document Filing and Management (DA/T 32–2005) \(^7\)

关于办理刑事案件排除⾮法证据若干问题的规定: Provisions on Several Issues Concerning the Exclusion of Illegal Evidence in Criminal Cases

关于办理刑事案件收集提取和审查判断电⼦数据若干问题的规定: Several Issues Concerning the Collection, Taking, Examination, and Judgment of Electronic Data in the Handling of Criminal Cases

关于⼯程勘察设计单位体制改⾰的若⼲意见: Several Opinions on the Structuring Reform of Surveying and Engineering Institutions

关于⼯业企业技术档案⼯作的报告: Report on Scientific Records Management Work within Industrial Enterprises

关于加强中国(上海)自由贸易试验区电⼦⽂件和电⼦档案管理的指导意见: Guidance on Strengthening Digital Records and Digital Archives Management

关于勘察设计单位试⾏技术经济责任制的统治: Notice on the Adoption of Economic Responsibility System Among all Surveying and Engineering Institutions on a Trial Basis

\(^5\) This English translation is taken from the one provided in the standard. In this standard, Wenjian (文件) was translated into “documents”, and guidang (归档) was translated into “archiving”. For accuracy, wenjian should have been translated into “records” and guidang should have been translated into “filing and transferring”. Yet, the original translation is used with the intention to respect the original source to the fullest extent.

\(^6\) See the above footnote.

\(^7\) This English translation comes from the standard and is kept in order to give full respect to the original source. In line with the terminology used in this dissertation, gongwen (公文) should have been translated into “records” rather than “documents”, and instead of “filing”, guidang (归档) should have been translated into “filing and transferring”. 

xv
管理办法: Measures

归档: File and transfer

规定: Provisions

国家发展和改革委员会: National Development and Reform Commission

国家基本建设委员会: State Basic Construction Commission

国家计划委员会: State Planning Commission

国家质量监督检验检疫总局: General Administration of Quality Supervision, Inspection and Quarantine (AQSIQ) of the People’s Republic of China

国务院办公厅: General Office of the State Council (the State Office)

国务院国有资产监督管理委员会: The State-Owned Assets Supervision and Administrative Commission (SASAC)

国营工业企业工作条例(草案): Regulations on the Work of State-owned Industrial Enterprises (Draft)

国营企业档案管理暂行规定: Provisional Regulations on Enterprise Records Management at State-Owned Enterprises

国有企业文件材料归档办法: Measures on Filing and Transferring of Records at State-Owned Enterprises

互联网电子数据证据举证、认证规程(试行): The Code of the Admission and Evaluation of Internet-based Electronic Data Evidence (For Trial Implementation)

机关档案工作条例: Regulations on Archives Management Work Within State Organs

家庭联产承包责任制: Household responsibility system

经济责任制: Economic responsibility system

劳动与社会保障部: Ministry of Labour and Social Security

企业文件材料归档范围和档案保管期限规定: Provisions on the Scope of Enterprise Records to be Filed and Transferred and Their Retention Period

全国档案事业发展“十三五”规划纲要: Outline of the 13th Five-year Plan for the Development of Archival Undertaking in China (2016-2020)
人力资源部: Ministry of Personnel

人力资源和社会保障部: Ministry of Human Resources and Social Security

人民法院统一证据规定(司法解释建议稿): Provisions on Uniform Evidence in People’s Courts (Proposed Draft for Judicial Interpretation)

书证: Documentary evidence

双轨制: Dual track system

双套制: Dual-copy system


特种设备安全监察条例(2009 修订): Regulations on Safety Supervision of Special Equipment (2009 Revision)

条块结合: Vertical and horizontal administration system

条例: Regulations

外商投资企业档案管理暂行规定: Provisional Regulations on the Archives Management of Foreign-Funded Enterprises


指导意见: Guidance

质检总局特种设备局关于鼓励使用无纸化电梯维保记录的指导意见(质检特函【2013】3 号): Guidelines for Encouraging Use of Paperless Elevator Maintenance Records

中共中央办公厅: General Office of the Communist Party of China Central Committee

中共中央十四届五中全会: Fifth Plenary Session of the 14th Party Central Committee

中共中央十五届四中全会: Fourth Plenary Session of the 15th Party Central Committee

中国共产党第十八届中央委员会第三次全体会议: Third Plenum of the 18th Party Congress


中华人民共和国公证法 (2017 修正): Notary Law of the People’s Republic of China (2017 Amendment)

中华人民共和国国家档案局: National Archival Administration of China


中华人民共和国合同法: Contract Law of the People’s Republic of China


中华人民共和国特种设备安全法: Special Equipment Safety Law of the People’s Republic of China


中华人民共和国中外合资经营企业法: Law of the People’s Republic of China on Chinese-Foreign Joint Equity Ventures

中华人民共和国中外合资经营企业法实施条例: Regulations for the Implementation of the Law of the People’s Republic of China on Chinese-Foreign Joint Equity Ventures

抓大放小: Grasping the large ad freeing the small

Acknowledgements

This dissertation would not have been possible without the support and guidance of many people.

I owe my greatest debt of gratitude to my supervisor, Prof. Luciana Duranti, whose unconditional support, inspiring guidance, and confidence in me enabled me to start and complete this project.

I would also like to thank the other members of my committee for their invaluable support and input throughout the research: Prof. Luanne Freund for her critical, insightful, and constructive feedback on the methods, structure, the underlying theories, and other aspects of the research; Prof. Sherry L. Xie for her guidance on the translation of Chinese terminologies, on the Chinese records and archives management system, and the overall Chinese context; and Prof. Giovanni Michetti for his critical and constructive comments on the dissertation.

I would like to thank my past committee members Prof. Anthony Sheppard and Prof. Michael Rochemont for their guidance and assistance.

I would like to thank Prof. Rick Kopak, Prof. Erik Kwakkel, Prof. Pierluigi Feliciati, and Prof. Luciana Duranti for attending my “mock defence” and providing invaluable advice.

I would like to thank the Records in the Cloud (RiC) project and the InterPARES Trust project for giving me the opportunity to work with many top scholars in the records and archives management field.
My studies would not have been possible without the support of China Scholarship Council (CSC, File No. 201208120021).

My thanks also go to friends and colleagues who supported and encouraged me through this whole journey, specifically, Daisy Hui, Scott Owens, Joy Rowe, Corinne Rogers, Lois Evans, Elaine Goh, Elizabeth Shaffer, Adam Jansen, Jessica Bushey, Evelyn Markwei, Darra Hofman, Danielle Batista, Michelle Kaczmarek, Saguna Shankar, Hoda Hamouda, Samuel Dodson, Millicent Mabi, and Alamir Novin.

Finally, a special thank you to my family, my son, my husband, my parents, my mother-in-law and father-in-law, my sisters, my brother, for their unconditional love for me regardless of my flaws.
Dedication

To my son, who made me rethink the meaning of life

To my parents, who provided the best education possible for me
Chapter 1: Introduction

1.1 Overview

One recent technological innovation is the shift to cloud-based services (or cloud service), which refer to “a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services)” that can be “rapidly provisioned and released with minimal management effort or service provider interaction” (Mell & Grance, 2011, p. 2) and made available to customers on demand via a network, typically, the Internet.

In 2016, a Forrester Research predicted that, by 2020, cloud service revenues will reach US $236 billion in the private sector and Software as a Service (SaaS) will make up more than two-thirds of spending related to customer relationship management, human resource management, e-commerce, and e-purchasing (“Forrester”, 2016). The use of cloud-based services has brought both benefits and risks to records management: “a field of management responsible for the efficient and systematic control of the creation, receipt, maintenance, use and disposition of records, including processes for capturing and maintaining evidence of and information about business activities and transactions in the form of records” (ISO, 2016, p. 3). Some of the benefits include lower cost, higher flexibility and scalability, ease of use, improved reliability and security, and ubiquity (Cunningham, 2016; Cunningham & Wilkins, 2009; Datskovsky, 2016). Some of the risks include concerns related to loss of physical control of data and records stored in the cloud, threat to the long-term trustworthiness of the data stored in the cloud, lack of

---

8 In this dissertation, a record is defined as “a document made or received in the course of a practical activity as an instrument or a by-product of such activity, and set aside for action or reference” (“Record”, 2007, n.p.).
records management functionalities of cloud-based services, and challenges for legal proceedings (Barnes, 2010; Blair, 2010; Cunningham, 2016; Cunningham & Wilkins, 2009; Datskovsky, 2016; Ferguson-Boucher & Convery, 2011; Gatewood, 2009, National Archives and Records Administration [NARA], 2010; Stuart & Bromage, 2010).

The present study is situated against this backdrop and aims to examine records management in the context of emerging cloud-based services — more specifically, to scrutinize how the evidentiary capacity of records is protected and demonstrated and how the informational value of records is exploited. Yet, as records are the by-products of business activities and thus are influenced by a great many interrelated contextual factors, it would be extremely challenging to segregate the impact of the use of cloud-based services from the impact of other factors. This is particularly so in a qualitative case study like this one, the advantage of which is the ability to examine the subject of study in its context. Therefore, the influence of cloud-based services will be examined together with other contextual factors.

1.2 Research Problem

In an increasingly accountable environment, records generated in the conduct of business activities are used as evidence of such activities to demonstrate that organizations have met the legal, regulatory, and fiscal requirements in regular audits or inspections, and to protect their interests in resolving legal disputes. It is the evidentiary capacity of records that is utilized in these activities. Shepherd and Yeo (2000) state that it is the “essential characteristic of a record” to provide evidence of some specific activity (p. 2). To
successfully fulfill such purpose, records usually have to satisfy admissibility rules. For instance, in common law countries, they have to satisfy, in addition to the relevancy to the matter at issue, three rules: 1) the business records exception to hearsay rule\(^9\), 2) the best evidence rule\(^10\), and 3) the authentication rule\(^11\). However, electronic records\(^12\) in general and those created and stored in cloud-based services in particular are raising questions about the applicability of these rules (Chasse, 2010; Duranti, Rogers, & Sheppard, 2010). Statutory law in Canada has replaced the best evidence rule—which is no longer relevant to digital records—with proof of the integrity of the system in which the record in question resides (Canada Evidence Act (R.S.C., 1985, c. C-5)\(^13\)). And, for records stored in the cloud, the Electronic Records As Documentary Evidence (CAN/CGSB-72.34-2017), a standard issued by the Canadian General Standards Board, suggests that, in negotiating the contract with the cloud service provider, the user incorporates a clause in the contract allowing “access to the identity and recordkeeping metadata…and the ability to verify the integrity of the system” (p.32). The ability to access the “identity and recordkeeping metadata” is indeed a key issue, as it affects the user’s ability to monitor, audit, and prove the continuing trustworthiness of records stored

---

\(^9\) The exception to the hearsay rule aims to ensure that the statements contained within the record truthfully reflect the business matter it documents. Records are considered as hearsay as the person who made the statements in them cannot subject to confrontation and cross-examination. However, they can be admitted under the condition that the circumstances in which the statement was made were equally effective to confrontation and cross-examination in terms of ensuring their reliability. For a detailed description of this rule, please see section 2.3.1.1.

\(^10\) The best evidence rule aims to establish the integrity of the records. Under this rule, it is often required that the original of a record be submitted in evidence as it is easier to detect falsification in the original than in a copy. For a detailed description of this rule, please see section 2.3.1.1.

\(^11\) The authentication rule aims to establish the identity of the records, such as the connection between the author and the claims within the record. For a detailed description of this rule, please see section 2.3.1.1.

\(^12\) Electronic record refers to “an analogue or digital record that is carried by an electrical conductor and requires the use of electronic equipment to be intelligible by a person” (“Electronic record”, 2007, p.20). Further, according to the definition of “analogue” in the InterPARES project, analogue record can be defined as the representation of a record “through the use of continuously variable electronic signals or mechanical patterns” (“Analogue”, 2007, p. 4), and digital record means that the representation of a record through discrete, binary values (“Digital”, 2007, p. 4). In this dissertation, electronic record and digital record are used interchangeably.

\(^13\) Current to August 19, 2018.
in the cloud. However, cloud providers often restrict access to these metadata for business reason and the security of the services (Ferguson-Boucher & Convey, 2011; Bushey, Demoulin, & McLelland, 2015).

Another related issue is whether identity and recordkeeping metadata exist in the system and whether records stored in the cloud are under records management control. Gatewood (2009) identified “not having records management control” over the information stored in the cloud as one of the two major compliance concerns, with the other being “not knowing where their information is stored” (p.33). In comparison with in-house Electronic Records Management System (ERMS) and information systems, most cloud-based services were not designed and implemented with records management requirements in mind (Blair, 2010; Ferguson-Boucher & Convey, 2011). As a result, some key records management functionalities may be missing (Ferguson-Boucher & Convey, 2011). For instance, a survey conducted by this author found that only about sixty-five percent of Software as a Service (SaaS) applications that were reported by respondents functioning as records management systems were able to classify and dispose of records in accordance with the organization’s requirements.

14 In this dissertation, an electronic records management system (ERMS) is defined as an information system that are designed to capture and manage records in paper and electronic formats in accordance with the organization’s records management policies and principles.
16 Also known as cloud-based applications, these are applications hosted by a vendor or service provider using cloud infrastructure and made available to customers via a network, typically the Internet. Customers can access the applications through a web browser or a program interface.
This lack of records management control over records stored in the cloud and of the ability to monitor the control performed on records in the cloud may seriously affect an organization’s ability to demonstrate that the records used to account for compliance activities or for legal purposes are not altered (Cunningham, 2010; Gatewood, 2009).

Additionally, cloud-based services present us with a distinct opportunity to examine the assumptions underlying traditional archival practices and to use cloud technology to enhance such approaches (Michetti et al., in press). For instance, one study suggests that the validity of the retention and disposition schedule in coping with records stored in the cloud may require re-examination, given that cloud-based services can store data at a low cost and offer strong capability to analyze the data, and it appears that organizations are now willing to store records longer than the retention period specified in the retention and disposition schedule in order to exploit their content for strategic and operational purposes (Pan & Mitchell, 2015). Other research, although not specifically focusing on the cloud context, goes so far as to suggest that a traditional compliance-related rationale for records management is inadequate, as it is essentially “a defensive strategy”, and advocates instead the adoption of “an offensive strategy” in which records management can help an organization achieve its mission (Sprehe, 2005).

As a country striving to achieve national rejuvenation, China has experienced huge and rapid changes in every aspect of its society, including economy, environment, technology, culture, legislation, and politics, and this trend will likely continue in the foreseeable future. Because of this dynamic environment, issues that are common in other contexts become particularly intense in China and require a conducive and supportive
environment. This is also why reform has been a central theme in the state’s policies and strategies. Thus, China provides a very interesting setting to explore emerging issues and possible solutions. The topic of this study—the management of the evidentiary capacity and informational value of records in the context of cloud-based services—is not an exception.

Therefore, research is needed to understand: 1) how the evidentiary capacity of records generated in the context of cloud-based services can be protected and demonstrated so that these records can be used by their creator to prove that obligations have been met, and 2) how the information in the records generated in the context of cloud-based services can be exploited for strategic and operational purposes in support of organizational mission and objectives.

1.3 Research Questions

In light of the research problems identified above, the purpose of this study is to explore how the two uses of records as evidence and as information are managed in practice in the context of cloud-based services in China, and what the challenges are, if any. Modern records management, as commonly understood and discussed, is a discipline originated in the United States in 1930s, to cope with the large volume of records generated after the war (Bahmer, 1943; Rasmussen, 2010). For political reasons, management of records in China is influenced by the Soviet Union rather than the United States and thus is different from the latter (Cui, 2016b). Yet, with the shift towards electronic records management, including the publication of international standard on records management (e.g., ISO 15489), which is primarily based on western records management practice—in particular
the Australian standard AS4390 (Healy, 2010), and the translation and endorsement of these standards in China\textsuperscript{17}, there is a potential conflict between existing records management program in China and the electronic records management principles and methods advocated. The existence of this conflict and its possible resolution is an important feature of Chinese records management that enables this author to examine the two important uses of records in a rapidly changing environment.

The overarching research question that guides this study is:

- *How are records managed as evidence and information in the context of cloud-based services?*

The research sub-questions guiding this study are: for organizations using cloud-based services,

- What is the impact of an organization’s digital and cloud strategy on its records management practices?
- How and to what extent is the trustworthiness of records protected and proved in such organizations?
- How and to what extent is the informational content of records exploited for operational and strategic purposes in such organizations?

\textsuperscript{17} For instance, ISO 15489-1: Information and documentation – Records Management – Part 1: General was translated and identified as a national standard GB/T 26162.1-2010 信息与文献 文件管理 第 1 部分：通则, and ISO 23081-1: 2006 Information and documentation - Records management processes - Metadata for records - Part 1: Principles was translated and identified as a national standard GB/T 26163.1-2010 信息与文献 文件管理过程 文件元数据 第 1 部分：原则
1.4 Dissertation Structure

Chapter 2 offers a review of legal and regulatory literature on the methods for assessing the trustworthiness of records as well as records and archives management literature on the methods for exploiting the information contained in records for strategic and operational purposes both in China and around the world. The literature on the characteristics of cloud-based services and the challenges and opportunities they present for records management are also reviewed to identify prior research and gaps in our understanding.

Chapter 3 outlines the methodology of this study, including a brief introduction to case study method, the two cases studied, data collection and analysis methods used in the course of the case studies.

Chapter 4 presents the results and findings of case study #1, including a description of the company’s background, its use of cloud services, the cloud-based application studied, its records management work, and salient themes emerged. The chapter concludes by discussing the research questions.

Chapter 5 presents the results and findings of case study #2, including a description of the company’s internal and external context, its use of cloud services, the cloud-based application studied, its records management work, its Electronic Records Management System, and the salient themes that emerged. The chapter concludes by discussing the research questions.
Chapter 6 concludes this dissertation by discussing the major findings of this study, its implications for records management theory and practice, its limitations, and possible future research topics and areas for inquiry.
Chapter 2: Literature Review

2.1 Introduction

This research sits at the interface between records management and emerging cloud-based services, and examines how the evidentiary capacity of records is safeguarded and demonstrated so they can be used to help the organizations prove their business activities to the government and protect their interests in legal disputes and how the information in them is systematically exploited. Therefore, this literature review examines existing legislation, regulations, and legal literature, and records and archives management literature that address the rules of admissibility and the use of the information contained in records. The review seeks to identify achievements of prior research upon which to build on as well as gaps and opportunities warranting further research.

Depending on the disciplinary context and the perspective taken, the understanding of the concept of evidence and hence the requirements for the protection of records’ ability to serve as evidence vary greatly. For instance, the archival concept of evidence is understood as a relationship between a record and the facts or event(s) it is about or is produced by (Meehan, 2006); as a result, archival theory, principles, and methods (e.g., the definition of records, the principle of provenance) are designed to protect and demonstrate this relationship. Legal evidence, in its most limited sense, is defined as that “which satisfies the criteria set out in the rules and which is therefore admissible in a court of law” (Meehan, 2006, p.133). Despite being criticized as a “narrow” and “rule-bound” conception of evidence, this understanding of legal evidence and the rules governing its admissibility nevertheless provide records managers and archivists with
justification to manage records effectively and with a point of reference from which to formulate records management requirements (Meehan, 2006).

This dissertation will consider evidence in a legal sense rather than focusing on the archival concept of evidence. This is not to dismiss the importance of the archival concept—on the contrary, a follow-up review of literature shows that it is very relevant to the discussion—but rather to focus on the practical needs of records creating organizations, especially enterprises, for whom satisfying regulatory accountability and legal compliance through records is of immediate importance.

The ever-increasing amounts of data generated each day by business, due to the use of information systems, the emergence of data analytics techniques such as big data, and the ubiquitous computing capacity offered by on-demand by cloud computing present enterprises with unprecedented opportunities to tap into digital information assets to identify trends, linkages, and risks or detect new saving opportunities to sustain competitive advantage in a rapidly changing environment.

Therefore, in this dissertation, the expression “informational use” of records refers to the analysis and exploitation of the content of records in a systematic manner via information technologies and business processes to support the organizational mission and operation. Traditional reference to records through keywords searches to look up individual records or facts is not included in this concept of “information use” and does not fall under the scope of this research.
2.2 Records and Archives Management in China

2.2.1 Records and Archives Management in the Public Sector in China

Xie, Feng, and Ma (2017) declared in their efforts to identify the equivalence between Chinese and English records and archives management concepts that “it is incredibly challenging to find true equivalents in different languages and in some cases, simply impossible” (p. 1). Though it is not the purpose of this research to clarify the correspondence between the two, to introduce records and archives management in China it is necessary to provide an explanation of the meanings of the English records and archival terms used in this dissertation in order to accurately reflect the Chinese context.

In China, the records and archives management lifecycle can be divided into three stages based on location: records in the creating office, records in the internal Archival unit, and records in the archives. When records are in the creating office, according to Regulations on the Handling of Records in the Party and Government Organs—a key regulation issued by the General Office of the State Council (or the State Office) along with the General Office of the Communist Party of China Central Committee—

---

18 The public sector includes governments, public institutions, and mass organizations. Mass organizations, or literally, people’s organizations are organizations led by the Chinese Communist Party and created per their respective characteristics to perform certain social activities; they are used as a means to “penetrate the society at large, encourage participation, mobilize the masses, and integrate them with the party” (Worden, Savada, & Dolan, 1988, p. 418). Some examples of mass organizations include Communist Youth League of China, All-China Women’s Federation, and All-China Federation of Industry and Commerce. It is important to note that although this dissertation focuses on Chinese enterprises in the private sector, as will be discussed later, many Chinese enterprises, especially state-owned ones, were originally public institutions under the centrally planned economy and, therefore, have inherited the records and archives management system of the public sector in China.

19 It is out of the scope of this dissertation to provide a thorough discussion of the corresponding relationship between the key concepts in archival science in Chinese and in English. Sources that might be helpful to grasp this issue include Pan & Fang (2013), Xie et al. (2017), Xie & Wang (2015a), and Xie & Wang (2015b)

20 The way the term “records” is used in this section and throughout this dissertation, unless otherwise specified, is the North American’s way of using this term, as defined at the beginning of this dissertation.

21 In China, regulations are usually issued by the state council or a local government. Those issued by the state council are only inferior to the law.
management activities performed on them include control on their making (for outgoing records or internal records) (e.g., writing, reviewing, signing) or receipt (for incoming records), control on their handling and use (i.e., on their movement, e.g., for incoming records, registration, first-review, action, circulation, reminder, and reply; for outgoing records, review, registration, printing, and dispatch), filing once the matters contained in the records have been dealt with, and transferring to the internal Archival Unit.

According to this Regulations, the state authority overseeing the management of records in the creating office is the State Office; and, within organizations, the responsibility for overseeing the management of records in this stage usually falls on the Office or the secretary (Article 6, Article 7). However, this Regulations only identifies 16 types of administrative records, for other records in the creating office, there is no regulations on how they should be created and handled.

The Chinese terms used to describe records in this stage include wenjian cailiao \(^{22}\) (records \(^{23}\), and gongwen \(^{24}\) (official records created by the state and the Party). With the trend of going paperless, the manual control performed on records in most Chinese

\(^{22}\) As in Measures for the Implementation of the Archives Law of the People’s Republic of China (2017 Revision)

\(^{23}\) The translation of the English term “record” into Chinese is a heated issue in the Chinese records and archives management field. Some Chinese scholars maintain that the English term should be translated wenjian (文件) in Chinese (e.g. An, Sun, & Bai (2016), Wang (2012)); this, however, is a term used colloquially to refer to records in the creating office in China and does not cover records in the internal Archival Units; others argue that it should be translated dangan (档案) (e.g., Hou (2016), Jiang (2015), Wang (2010)), a term which is used to describe records in the internal Archival Unit and the archives, with those in the former usually being distinguished as xianxing dangan (现行档案) or, literally, current archives. However, reversely, when translating from Chinese to English, dangan is usually translated archives, which is used to describe records that have been accessioned into an archival institution in English speaking countries. This confusion in the translation of Chinese terms and those in English is due partly to the difference between the Chinese records and archives management system and the system of English speaking countries, in particular North America, and partly to the confusion between colloquial use and professional use of the terms. Nevertheless, this issue becomes increasingly serious when Chinese scholars participate in international discussion and draw on statements made in other countries.

\(^{24}\) As in 档案机关公文处理条例
institutions and organizations has been automated, for instance, being embedded into the Office Automation [OA] system\(^{25}\), which creates, handles, and manages the records before they are “filed and transferred” to the internal Archival Unit (e.g., Hong, 2017; Su, 2017).

Once the business activity or transaction that originated the records is completed — namely, records have accomplished the purpose for which they were created (i.e., made or received) — the records are “filed and transferred”\(^{26}\) to the internal Archival Unit (\textit{Dangan shi}) for internal recordkeeping purposes. Appraisal is performed at this point to determine which records will have to be transferred to the internal Archival Unit; and the archival policy document guiding appraisal is the organization’s “retention and disposition schedule”. All government organizations over a certain size have an internal Archival Unit.

---

\(^{25}\) In China, the Office Automation (OA) system is one of the most widely used information systems within different types of organizations and its use usually signifies the transition from a paper environment to a digital environment. The range of functionalities the OA systems can offer varies, but most of them incorporate functionalities such as making a record, obtaining approval from relevant managers for the record, and managing the record once the business matter it relates to is completed. In some organizations, all business processes involving an approval procedure are embedded into the OA system. Therefore, to a certain extent, the OA system is where all the administrative records of an organization are created and stored.

\(^{26}\) This action is identified in the Chinese records and archives management system as \textit{guidang} (归档). According to relevant Chinese regulations, policies, and standards, this action is usually associated with three activities: arrangement (整理), filing (立卷) and transferring to the internal Archival Units (移交) (e.g., Article 10 in the \textit{Archives Law of the People’s Republic of China} (2016 Revision), and the entry 3.1.1 \textit{guidang} in the \textit{Archival Glossary} (DA/T1–2000)). In fact, according to Xie & Wang (2015a), \textit{guidang} can be considered as a threshold action for the use of the term \textit{dangan} in China as regardless of the types of materials discussed in the text, once they have undergone the process of \textit{guidang}, they are considered “archives” (or the Chinese term \textit{dangan}). (p. 128) However, the translation of this term into English is not consistent among Chinese records and archival regulatory documents, and, to some extent, is inadequate. For instance, the national standard on the \textit{guidang} and management of electronic records (i.e., GB/T 18894–2016) uses the English term “archiving” to describe the \textit{guidang} action, while the national standard on the storage, \textit{guidang} and management of CAD electronic records (GB/T 17678.1–1999) and the \textit{Archival Glossary} (DA/T1-2000) uses the English term “filing” to describe \textit{guidang}. In light of the lack of exact equivalent records and archival term in English for this Chinese term, the phrase “filing and transferring” within quotation marks will be used in this dissertation to describe this action to accurately reflect the types of activities involved. The activity “arrangement” is implied in the activity of “filing”.
Records that have been transferred to the internal Archival Unit are usually identified as *dangan*
\(^{27}\) (or its English translation “archives”) or *xianxing dangan* (literally “current archives”) to distinguish them from records preserved in archives, which are also identified as “archives”. As internal Archival Units are under the professional guidance and supervision of the state’s archival administrations (Article 7, *Regulations on Archives Management Work Within State Organs*), this also marks the moment from which the state’s archival administration can exercise its professional responsibility over these records. However, the internal Archival Units are internal units of the records creating organizations and, therefore, under their administrative control (Article 6, *Regulations on Archives Management Work Within State Organs*). The main responsibilities performed by internal Archival Units include: 1) guiding and supervising the “filing and transferring” of records within the organization; 2) managing all of the organization’s archives [records in North America]\(^{28}\), providing them for use, assisting every aspect of the organization’s work, and accumulating historical materials for the party and the state; and 3) the archival units within central and local organs that are in charge of a certain industry should, in consideration of the organizational structure of the industry, advise, supervise, and inspect the archival work within the industry and of their subsidiaries (Article 4, *Regulations on Archives Management Work Within State Organs*).

\(^{27}\) In China, a category of records called personnel records (in Chinese 个⼈档案) is identified ever since its creation, which is out of the scope of this dissertation.

\(^{28}\) As discussed above in footnote 24, according to Chinese records and archives management terminologies, when records are transferred to the internal Archival Unit, they are identified as *dangan* (档案), a term that is often translated to “archives”, which is a term often restricted to records accessioned into archives for permanent preservation in the North American records management field and rarely being used for records preserved in records creating organizations. Therefore, a more accurate translation of this term should be “records”.

15
Organizations\(^\text{29}\) that have a responsibility to transfer records of enduring value to archives at their respective levels (e.g., central archives, municipal archives, or the local archives) for long-term or permanent preservation will have to transfer these records 10 or 20 years after their creation\(^\text{30}\). For most private organizations, the internal Archival Unit also functions as an organizational archives to perform permanent preservation of their records in addition to its regular responsibilities.

Records that have been transferred to and preserved in archives are identified as *dangan* (or its English translation, archives), and archives management functions such as arrangement, indexing, and reference, have to be performed on them. Archives in China are basically equivalent to archival institutions around the world except that archives are responsible for both the long-term and permanent preservation of government records and other records that are of value to the country and the society at large. Archives in China are fully funded by the state and usually are combined with archival administrations\(^\text{31}\), making them responsible for both the archival preservation work and supervision of archival work within government and other public institutions—as in the case, for instance, of the internal Archival Unit mentioned above.

A centralized and unified system is adopted in Chinese archives administration; archives exist at each level of Chinese government, from the state level down to the

\(^{29}\) Mostly are public organizations, including governments, state-owned enterprises, and mass organizations. And the number of organizations that have responsibility to transfer records of enduring value to the archives decreases as many state-owned enterprises are now converted to private enterprises.

\(^{30}\) According to Article 13 in *Measures for the Implementation of the Archives Law of the People’s Republic of China (2017 Revision)*, for records creating organizations that should transfer their records to archives at the state level, provincial level, or municipality with district level, their records should be transferred 20 years after the creation of the records; for records creating organizations that should transfer their records to archives at county level, their records should be transferred 10 years after the creation of the records.

\(^{31}\) In the most recent institutional reform, the archival administration work and the preservation work has been separated and the archival administration responsibility has been assigned into other organizations, e.g., the Office of the Party (Xu, 2019).
provincial/municipal level and the district and county level. Archives at each level receive professional guidance and advice from the State Archives Administration and other upper level archival administrations (Article 6, Archives Law of the People’s Republic of China (2016 Revision)); however, they are under political, financial, and procedural administrative control of their respective levels of government and are primarily responsible for the needs and policies of that government.

As part of the State Archives Administration’s responsibility to guide and oversee archival work across the country and industries, a wide range of legislations, regulations, guidelines, and standards has been developed. The Archives Law of the People’s Republic of China (2016 Revision), which went into effect in 1988 and was amended in 1996 and 2016, is the legislation governing archival work in China. In addition, there are regulations for archival work within the Party, the state, the army, and mass organizations; regulations for scientific and technical archives work; and measures and provisions relating to various aspects of archival work. A list of standards has also been developed to provide a source of reference for archival work.

---

32 According to the State Archives Administration’s website (http://www.saac.gov.cn/xxgk/node_140.htm), the State Archives Administration of the People’s Republic of China is responsible for: 1) overall planning and macro management of archival work across the country; making policies, legislations, and regulations in accordance with the Party’s and state’s policies and legislations; organizing, guiding, inspecting, monitoring, and coordinating the archival work of the Party, the government, the army, mass organization, and provincial, autonomous region, and municipal levels; 2) centrally and uniformly managing the Party’s and the state’s archives, guarding the Party and the state’s confidentiality, maintaining the integrity of archives, and ensuring the safety and security of archives; 3) acquiring, collecting, managing, and preserving the Party’s and the central government’s archives, promoting scientific management and modernization of archival work, compiling and publishing archives to make them available for public use, and collecting archives that were scattered abroad and those that are relevant to China; and 4) making guidelines for the development of the cadre of future archivists, organizing professional education and training, and the professional certification of archivists.

33 Consisting of 26 articles divided into six chapters, the Archives Law stipulates general provisions, archival institutions and their responsibilities, archives management, use and publication of archives, and transgressions that would be prosecuted.

34 Depending on the types of organizations that have approved the standards, there are industry standards approved by the archival administration and national standards approved by the Standardization Administration of the People’s
This dissertation, for ease of understanding, will use Anglo-Saxon terminology to describe records in different stages of their life. Therefore, for its purpose, “records” and “documents” will be used interchangeably to identify materials kept in the creating office; the term “records” will be used to identify materials transferred to the internal Archival Units; the term “archives” will be used to identify records accessioned into an archives; the expression “records management” will refer to the combination of records creation and management within the records creating office and the management of records within the internal Archival Unit, even though the internal Archival Unit may also function as a corporate archives; and “records and archives management” refers to the management of records by the records creating organization and the archives, or the work of internal Archival Unit that has both a records management and a long-term preservation component.

2.2.2 Enterprise Records Management in China

A review of the reform history of Chinese enterprises and the development of enterprise records management in China shows that the two go hand in hand with each other. Three aspects of the development of enterprise records management that are of particular interest are: the changing relationship between enterprise records management and the

---

35 This introduction is based on a report published by the Association of Chinese Archivists (i.e., Zhang et al. (2014)) on the development of Chinese enterprise records management since the foundation of the People’s Republic of China.

36 For a detailed description of enterprise reform in China, please read section 5.2.1.3
state archival administration, the establishment of enterprise records management as a corporate function, and the shifting focus of enterprise records management work (Zhang et al., 2014).

As to the relationship between enterprise records management and the state archival administration institutions, the latter’s influence on the former has shifted from administrative control to professional guidance through standards, legislations, and regulations (Zhang et al., 2014). When the People’s Republic of China was founded in 1949, all private industrial enterprises were nationalized by the Chinese government and operated as administrative units (i.e., danwei) of the government (Geng, Yang, & Janus, 2009). As a result, every aspect of the operation of the enterprises has to be controlled by the government; the records management work is not an exception. According to the vertical and horizontal administration system (Tiao kuai jie he), records management work in each enterprise was under both the vertical administration control of the superior ministry (e.g., the Ministry of Transportation) to which it belonged and the horizontal administration control of the archival administration at the relevant level (e.g., state, municipal, city, and local); at that time, the vertical administration control prevailed (Zhang et al., 2014).

With the adoption of a socialist market economy and the accompanying institutional and governance reform in the 1980s, many danwei were converted into private, collectively-owned, or state-owned enterprises that freely participated in the market competition; to align with such economy, the Chinese government also undertook institutional reform, with the objectives of emphasizing macro-management and coordination and law-based
governance. As a result, the direct administrative control exercised by the Chinese government over danwei’s records management work was replaced by a supervisory relationship of the state above the newly born enterprises, where the state guides and assists enterprise records management work, and formulates policies, standards, and regulations to create an appropriate legal environment for the autonomous development of enterprise records management work (Zhang et al., 2014).

The establishment of enterprise records management originated from the need to manage the large volume of scientific and technical records and other scientific and technical materials created and collected by danwei in the 1950s (Zhang et al., 2014). At that time, no distinction was made between scientific and technical records and other scientific and technical materials, and different governance frameworks, in terms of the roles and lines of responsibility for the management of scientific and technical records and other materials, were established in different organizations (Zhang et al., 2014). Then, in the 1960s, with the release of a few regulations37 by the State Council and the State Archival Administration which emphasized the management of scientific and technical records and other scientific and technical materials, these were officially differentiated from one another and a scientific and technical records management department was established within many enterprises (Zhang et al., 2014).

The 1980s witnessed the establishment of a comprehensive records management function that centrally managed all types of records created by the enterprises regardless of their content (e.g., administrative records, or scientific and technical records), and the official

---

37 For instance, *Regulations on the Work of State-owned Industrial Enterprises (Draft), Report on Scientific Records Management Work within Industrial Enterprises*
recognition of the concept of “enterprise records”, which was defined as the totality of records created by the enterprise in the course of its business activities \(^{38}\) (Zhang et al., 2014). This trend continues to this day.

Regarding the shifting focus of enterprise records management work, prior to the 1980s, because of the centrally planned economy, the management of enterprise records and other materials was to comply with state policies and regulations rather than developing on its own; therefore, contributions made by records management work to the business was reactive and unsophisticated (Zhang et al., 2014). After the 1980s, with the application of information technology to the field of records management, records began to be considered as important information resources and assets by the enterprises, and the focus of records management work therefore was shifted to effectively reuse and exploit the content of records to demonstrate the value of records management work to enterprise production and profit-making (Zhang et al., 2014). More recently, with the emergence of the concept of knowledge management and its introduction into the enterprise records management field, enterprise records management is experiencing another paradigm shift from records as information resources and assets to records as knowledge assets (Zhang et al., 2014).

\(^{38}\) Provisional Regulations on Enterprise Records Management at State-Owned Enterprises.
2.2.3 Electronic Records Management in China: The Dual Track System and the Dual-Copy System

The formulation of the dual track system and dual-copy system is a transitional strategy adopted in the Chinese records and archives management field to temporarily fill the gap between the widespread use of information technology in the conduct of business on the one hand, and legislations, management principles, and methods that lag behind the advancement of information technology and which are needed for the recognition, assessment, maintenance, and long-term preservation of the trustworthiness of electronic records on the other hand (Liu, 2015a). These systems are needed to ensure that the evidentiary capacity of records can be protected and demonstrated so that they can be used to show regulatory and legal compliance and protect the organizations’ interest in legal litigations (Chen, 2018; Tao & Tian, 2014), while the state, lawyers, archivists, and records managers strive to close the legislative, regulatory, and methodological gap.

The dual track system involves using both the paper and digital version of each record in the conduct of business activities (Feng, 2003; Liu, 2011a; Yang, 2014). The degree to which the paper and digital versions participate in the handling of the business matter affects the completeness of documentation as well as their reliability in terms of truly reflecting the business activity producing the records (Li, 2011). For instance, sometimes, the paper and digital versions of a record are created, handled, and used simultaneously and independently in the conduct of the business activity to the point that each action involved in the performance of the business activity has to be undertaken twice: once on each of the two versions; in this way, the two versions of the record are equally reliable in
terms of reflecting the business activity. Despite this, because the procedures and
techniques used for the creation and handling of these two versions are different, in
practice, the use of the dual track system is likely to introduce inconsistencies between
the two (Wang, 2008).

More often, the paper and the digital versions of a record are used alternatively and
exclusively during a business process: only one version of the record is participating in
the business process at any given time (Li, 2011). For example, to respond to a record
received in paper format, the organization may scan the paper record, include it into its
OA system, draft a response using the OA system, print it out, and present it along with
the original incoming paper record to the manager to obtain approval. Once the manager
gives approval on the paper record, the relevant officer then scans or inputs the
manager’s approval and accompanying comments into the OA system, and sends them to
the relevant business department to act upon. In this example, while the paper record
bears the manager’s signature, its digital form documents the making of the record and is
the one being acted upon and participating in and advancing the business activity,
therefore, the digital record should be considered as the one fully documenting the
records creation process. The use of the dual track system creates a hybrid office
environment, which poses a challenge for the design of records management programs
that can keep records trustfully reflecting the business activities from which they result.

With the great advancements in the use of information technology made in recent years at
the government and industry level in China (National Development and Reform
Commission, 2017; “A survey”, 2017), it was reported that sixty percent of Chinese
enterprises have implemented at least one information system and about half of Chinese enterprises have implemented OA system (“A survey”, 2017). The *Regulations on the Handling of Records in the Party and Government Organs*, issued in 2012 by the General Office of the CPC Central Committee and the General Office of the State Council to promote scientific, regulated, and standardized handling of records, specifies that the term “record” includes digital records (Article 38) and therefore officially recognizes the effectiveness of records in digital form and hence the necessity to manage them in accordance with records management requirements. In addition, the *Contract Law of the People’s Republic of China*, issued in 1999, recognized the effectiveness of contract in electronic form and the *Electronic Signature Law of the People’s Republic of China* issued in 2005, recognized the effectiveness of data messages in electronic form in the conduct of business activity.

While this official endorsement of the effectiveness of electronic data will facilitate their use in the conduct of business, for these electronic data to be used as evidence of business activities, principles, methods, policies should be established to guide their authentic maintenance after their creation.

In the *Regulations on the Handling of Records in the Party and Government Organs*, it was stated that methods for the handling and transmission of digital records would be enacted separately (Article 38). The *Interim Measures on the Filing and Transferring of Electronic Records (2018 Revision)*, a regulation specifically for the filling and transferring of electronic records that have been processed by the Electronic Records Transmission System—a system uniformly deployed by the State’s Office and therefore
having standardized format (Article 2), requires that the filing and transferring of electronic records shall take place on the “E-mail system platform within the government’s office resource network” (Article 10), and records creating organization shall configure the audit trails of the electronic records processing system to record automatically the person, time, equipment, item, and content, etc. involved in the real time operation of electronic records to ensure their authenticity (Article 12). But these are essentially for the filing and transferring of public records created by the government.

For the management of electronic records in general, the *Interim Measures For the Administration of Electronic Documents* specifies the institutions responsible for the lifecycle management of electronic records and their respective responsibilities (Chapter 2), and requirements for the creation and handling (Chapter 3), filing and transferring (Chapter 4), and maintenance and use (Chapter 5) of electronic records. For the creation and handling of electronic records, for instance, it is required that:

Article 11 Electronic records, in their creation and handling, shall be in the form of original as prescribed by the state’s legislations and regulations, and meet the following requirements:

1. The electronic records can effectively show the contents contained within them and can be referenced and collected;
2. Electronic records and their metadata can be kept complete and intact, and their source can be identified, and have not been illegally altered; and
3. Changes to the form of records in their transmission, storage, and manifestation do not affect the authenticity and integrity of their content. The original of confidential records shall comply with the provisions of the confidentiality legislations and regulations of the state.

These requirements recognize the importance of metadata in documenting and demonstrating the integrity of electronic records, changes to the form of electronic
records does not necessarily affect their authenticity, and the electronic records have to be intelligible. Yet, it is interesting that the concept of “original” is still in use here and it is not clear what it means and whether there is difference between the original of paper records and electronic ones.

For the maintenance of electronic records, it is required that,

Article 20 The safeguarding of electronic records shall meet the following requirements:

(1) An Electronic Records Management System and informational content security and confidentiality framework shall be established in accordance with the national information security level protection standards and the administrative provisions on the graded protection of confidential information system, and strict security and confidentiality measures shall be implemented;

(2) The safekeeping and readability of electronic records shall be tested and inspected on a regular basis, and all issues found shall be resolved in a timely manner;

(3) If there is any change to the software, hardware, or storage environments of the electronic records, the electronic records shall be migrated and/or converted in a timely manner;

(4) Electronic records shall be backed up regularly;

(5) Appropriate conditions shall be set in accordance with the requirements for the maintenance environments of different media.

These requirements have addressed the challenges posed by software and hardware upgrade, disaster, network security, and maintenance environments, which are mostly from an IT perspective and focusing on the technological infrastructure. The trustworthiness of electronic records and their verification are not addressed.

Other measures or specifications related to the management of electronic records include, for instance, *Specification on Electronic Documents Archiving and Electronic Records*

Yet, it appears that most of these measures and specifications are targeted at the management of electronic records in the government or public institutions, and it is not clear how widely these measures and specifications are used in the management of electronic records either in the public sector or the private sector and whether reference to the implementation of these measures and specifications in the management of electronic records will increase their admissibility in a court or their use as evidence to prove their business activities to the government.

While the dual track system concerns the use of information technology in carrying out business, the dual-copy system concerns the management of digital records when the business activities in which they participate are completed. More specifically, it refers to the generation of an additional paper or microfilm copy of the digital record and the maintenance of both versions when a digital record is transferred into the internal Archival Units for recordkeeping (Feng, 2003; Tao & Tian, 2014). It is a passive strategy for the management of the large volume of digital records created when there is a lack of mature principles and methods for their reliable and authentic transfer, maintenance, and long-term preservation, and when their admission in court as evidence and their probative force in fact-finding cannot be fully guaranteed.
The scope of digital records that has to be maintained in dual copies varies according to different regulations. For instance, in the Specification on Electronic Documents Archiving and Electronic Records Management (GB/T 18894–2002), it was required that, if textual and graphical digital records identified as having long-term preservation value have no paper copies, a paper or microfilm copy has to be generated, and both have to be kept (Article 4.5). In Measures on Filing and Transferring of Records at State-Owned Enterprises, issued in 2004, it was stipulated that, for digital records identified as having permanent or long-term preservation value, a paper copy had to be generated and transferred (Article 21). And, in Interim Measures for the Administration of Electronic Documents, issued in 2009, it was required that for digital records identified as having permanent preservation value or other important value, a paper or microfilm copy has to be generated and transferred (Article 16). Similar requirements are also present in Interim Measures on the Filing and Transferring of Electronic Records (Issued in 2003) and Standards of Electronic Mail Document Filing and Management (DA/T 32-2005).

Regardless of the different wording in these regulations, it can be concluded that the dual-copy system is destined to digital records with permanent or long-term preservation value, and therefore, was designed to ensure the long-term authentic preservation of digital records.

A critical issue with the dual-copy system is that the reliability and authenticity of the paper copy generated cannot be guaranteed, considering that the paper version either does not participate in the business activity but is only, at best, an authentic copy of the original digital records, or only partially participates in the business activity and therefore, only documents part of the business activity (Li, 2011; Liu, 2011a; Zhang, 2009). The
reliability and authenticity of the paper version of the digital records is complicated due to the use of the dual track system (Li, 2011).

Other drawbacks of the dual-copy systems mentioned include a waste of resources, difficulties in generating the paper or microfilm copy of some digital records, loss of digital records, the co-existence of a paper records management system and an electronic records management system, and the danger of losing the evidentiary capacity of digital records (Feng, 2003; Tao & Tian, 2014).

As a transitional strategy, the dual track system and the dual-copy system were enthusiastically embraced by scholars and practitioners in the Chinese records and archives management field in the early 2000s (Pan, 2003; Peng, 2002; Wang, 2004). However, recently, more and more scholars and practitioners are emphasizing the limitations and drawbacks of these two systems and announcing that it is time that the dual track system and dual-copy system, especially the latter, be reformed to reflect the developments of the past decade in the management and long-term preservation of digital records and to promote China’s digital transition (Chen, 2018; Su & Liu, 2015; Tao & Tian, 2014).

The changing attitude towards the dual-copy system in particular is also reflected in the recent update to state regulations and policies. For instance, when the second edition of the Specification on Electronic Documents Archiving and Electronic Records Management (GB/T 18894–2016) was issued, the dual-copy requirement was removed. And when the revised version of Interim Measures on the Filing and Transferring of Electronic Records (2018 Revision) was published, it was instead required that electronic
records satisfying the state’s requirements could be “filed and transferred” only in digital format (Article 7). Further, the Outline of the 13th Five-year Plan for the Development of Archival Undertaking in China (2016-2020) recommends pilot testing the one-track system (i.e., the exclusive use of electronic records in the conduct of business) and the one-copy system (i.e., digital records will be kept and preserved only in digital format with no extra paper or microfilm copies generated) in organizations that are suitable. Soon after the publication of the 13th Five-year Plan, the Shanghai Free Trade Zone Administration Committee issued *Guidance on Strengthening Digital Records and Digital Archives Management*, which indicates the official adoption of the one-copy system in the Shanghai Free Trade Zone. This marks the first case in China where digital records are officially and legally recognized and exclusively maintained as the evidence of business activities.

In light of this tendency to replace the dual-copy system with a one-copy system, Chinese scholars and practitioners are researching and writing on the conceptual foundation and the implications of the adoption of a one-copy system, and on the factors influencing the shift from the dual-copy system to the one-copy system (e.g., Qian (2017), Shen (2017), Shen (2018), and Sun and Yuan (2018)). In her Master’s thesis on the factors influencing the adoption of the one-copy system, Shen (2018) used an expert survey method to investigate the weight of 24 factors grouped into three categories: external context, records creating organization, and management of digital records; among these 24 factors, the legal admissibility of digital records, relevant regulations and policies, willingness of the manager in the records creating organization to use digital records, level of
information technology use, and attitudes of the superior organizations were given the highest weights in ascending order.

2.3 Managing Records as Evidence and Information

2.3.1 Managing Records as Evidence

Keepers of records were in the past accorded very high social status due to their responsibility of “buttressing claims of right, privilege, and jurisdiction” and guarding over “the arsenals of law and administration” (as cited in Duranti, 1989a, p. 3). Thus, the evidentiary capacity of records, which supports the continuity of the society and guarantees people’s entitlement to properties, rights, and privileges, has been at the core of records management since ancient times. As a result, a fundamental goal of the theory, principles, and methodologies supporting the creation and maintenance of records is to safeguard and demonstrate their reliability and authenticity—their ability to serve as evidence.

Diplomatics, a discipline focusing on “the Wesen [being] and Werden [becoming] of documentation, the analysis of genesis, inner constitution and transmission of documents, and of their relationship with the facts represented in them and with their creators,” originated in the seventeenth century from the need to assess the authenticity of legal documents, and the patrimonial rights embedded in them (Duranti, 1989b, p. 7). It was once considered an auxiliary science of law and was taught in many European faculties of law up until the eighteenth century (MacNeil, 1998). Sir Hilary Jenkinson, one of the most influential archivists in the English-speaking world (Eastwood, 2004), emphasized the evidentiary capacity of records to such an extent that he referred to the “sanctity of
evidence” provided by them (Jenkinson, 1948). Jenkinson argued that archivists should not intervene in the creation of records and declared that the primary duties of archivists are their “physical and moral defence” (Jenkinson, 1922).

Electronic records and their widespread use in the conduct of business activities have posed new challenges to records management; among them, there is the protection and verification of the records’ reliability and authenticity (Duranti & MacNeil, 1996). To effectively address this challenge, it is necessary that the records and archives management field collaborate with the legal and law enforcement field so that records managers and archivists are cognizant of the application of the law of evidence and can design appropriate policies, procedures, and methods for the lifecycle management of records, thereby satisfying the legal requirements for evidence. At the same time, legal professionals and scholars can grasp the implications of information technology on compliance with the existing law of evidence and understand the nature and trustworthiness of electronic records so that the law of evidence can be amended to maintain its relevancy and adequacy (Duranti et al., 2010; Sheppard & Duranti, 2010). In consideration of the fact that evidence law in the People’s Republic of China may not be fully developed as in Canada given its short history (Zhang, Feng, & Zhu, 2018), this study will discuss the reforms undertaken within a common law system, the Canadian one, and the Chinese civil law system to accommodate the pervasiveness of digital evidence, in order to demonstrate how the admissibility and weight of digital evidence has been handled in each system and their implications for the management of electronic records within each country.
2.3.1.1 Requirements for the Admission of Digital Records as Evidence in Canada

As one of the two prevalent legal systems around the world, the common law system is based on the principle of *stare decisis et quieta non movere*, which means “to abide by precedent and to not disturb the undisturbed”; in other words, a precedent judge’s ruling applies as binding authority to subsequent cases when judges determine the outcome of a legal dispute (Force, 2013, p. 18). The approach which prevails in the common law system to deal with claims in legal proceedings is called the adversary system, in which the court takes on the role of a “neutral umpire,” and the legal proceedings are “viewed as a contest between opposing views,” with the legal representatives of both parties challenging each other’s evidence “by cross-examining their witnesses and seeking to undermine any expert evidence produced by the opposing side” (Le Sueur, 2008, n.p.). The purpose of cross-examination and confrontation is to test the trustworthiness of evidence, as it is presumed these will expose any deficiencies, distortions, or suppressions (MacNeil, 1998).

In the common law system, the rules governing the admission of documentary evidence in general and business records in particular are authentication, best evidence, and exception to the hearsay rule\(^\text{39}\) (MacNeil, 1998). The authentication of a record submitted as evidence (i.e., the attestation of its identity) and the application of the best evidence rule (i.e., the presentation of the original to support the demonstration of integrity)

---

\(^{39}\) Much of the information regarding rules governing the admission of business records is sourced from Heather MacNeil’s dissertation: *Trusting Records: The Evolution of Legal, Historical, and Diplomatic Methods of Assessing Trustworthiness of Records, from Antiquity to the Digital Age.*
address the authenticity of the record (i.e., the record is what it purports to be and is free from tampering or corruption), while the exception to the hearsay rule deals with the reliability of records (i.e., the trustworthiness of the statement contained within the record) (MacNeil, 1998).

All documents are considered a type of hearsay evidence, which, as defined by McCormick, is “testimony in court, or written evidence, of a statement made out of court” which are “being offered as an assertion to show the truth of matters asserted therein, and thus resting for its value upon the credibility of the out of court asserter” (McCormick, 1972, p. 584). The overarching principles guiding the exception to hearsay rule include a circumstantial probability of trustworthiness and necessity, with the former meaning that “the circumstances in which the statement was made make its probable trustworthiness practically sufficient to those statements tested by cross-examination” (MacNeil, 1998, p. 45), and the latter applied on a case basis (MacNeil, 1998). Business records are considered an exception to hearsay, on the basis of Ewart, Lomer, and Casey’s (1984) argument that it is critical that the proponent of a business record be able to prove that “the circumstances of the document’s creation provide an adequate substitute for the traditional safeguard of cross-examination” (p. 14). Some criteria used in common law system to admit a record according to the business records exception to the hearsay rule include that the record be made:

1) at or near the time of the event of which it depicts; 2) in the ordinary course of duty; 3) by a person having personal knowledge of the matters; 4) by a person who is under a duty to make the record or report; and 5) by a

\[40\] In this dissertation, authenticity of records is considered inclusive of their identity and integrity, and a distinction between these two characteristics of records will only be made where necessary.
person who has no motive to misrepresent the matters recorded. (Paciocco & Stuesser, 2008, p. 167)

The business records exception to the hearsay rule is also included in statutory law; for instance, under the Canada Evidence Act (R.S.C., 1985, c. C-5) 41,

Where oral evidence in respect of a matter would be admissible in a legal proceeding, a record made in the usual and ordinary course of business that contains information in respect of that matter is admissible in evidence under this section in the legal proceeding on production of the record.

A record being made in “the usual and ordinary course of business” thus delegates the satisfaction of the reliability of the statements in it to the “nature of bureaucracy,” “the mercantile nature of record,” or the systematic and habitual nature of the creation of records in the ordinary course of business (MacNeil, 1998, p. 46, 50, 86).

As mentioned earlier, while the business records exception to the hearsay rule concerns the reliability of records, the authentication and best evidence rule deal with the authenticity of records; more specifically, the purpose of the authentication rule is to establish the identity of the records, while the purpose of the best evidence rule is to establish their integrity (MacNeil, 1998).

The necessity of establishing the identity of records is based on the common sense assumption that “whenever a claim involves any element of personal connection with a physical object, that connection must not be presumed, but shown” (MacNeil, 1998, p. 59). This connection between a person and a record can be established through direct evidence or circumstantial evidence (MacNeil, 1998). Direct evidence for purposes of authentication may include “the identification of the document by the writer, a signatory,

---

41 Current to August 19, 2018.
or an eye-witness to its writing or signing,” while circumstantial evidence may include “handwriting or typewriting identification by a witness who did not see the making or signing of the actual document but who can identify the writing” (Sheppard, 1996, para. 531). Public documents and ancient documents are usually presumed to be authentic (MacNeil, 1998). According to the Canada Evidence Act, section 30(6),

For the purpose of determining whether any provision of this section applies, or for the purpose of determining the probative value, if any, to be given to information contained in any record admitted in evidence under this section, the court may, on production of any record, examine the record, admit any evidence in respect thereof given orally or by affidavit including evidence as to the circumstances in which the information contained in the record was written, recorded, stored or reproduced, and draw any reasonable inference from the form or content of the record.

The common law best evidence rule requires that, wherever possible, the litigants who seek to support their claims with the content of a record must submit the original, which is considered as primary evidence. The underlying rationale for preferring the original of a record is that “the epistemically best evidence” is the “most complete” (MacNeil, 1998, p. 74), and “may contain subtle details that may be missing from the copy and that may be significant in terms of the record’s meaning” thereby “decreasing opportunities for deliberate or inadvertent falsification” (MacNeil, 1998, p. 63).

In statutory law, the Canada Evidence Act (R.S.C., 1985, c. C-5)42 stipulates that “where it is not possible or reasonably practicable” to produce the original, a copy of the record can be produced, accompanied by two documents, “one that is made by a person who states why it is not possible or reasonably practicable to produce the record and one that

42 Current to August 19, 2018.
sets out the source from which the copy was made, that attests to the copy’s authenticity and that is made by the person who made the copy”.

Electronic records have raised significant challenges to the rules governing the admissibility of documentary evidence. In Canada, the *Uniform Electronic Evidence Act* (UEAA), a model statute on electronic evidence, was adopted in 1998 to identify the requirements for establishing the trustworthiness of electronic records introduced as evidence. The UEAA was incorporated into the *Canada Evidence Act* as sections 31.1-31.8.

Believing that medium of the records had no impact on truth of a record’s content, the Uniform Law Conference of Canada (ULCC), a law reform body which aims to harmonize the laws of the provinces and territories of Canada and which developed the UEAA, decided not to modify the business records exception to the hearsay rule, but only the authentication and best evidence rule. As to the authentication rule, Section 31.1 of the *Canada Evidence Act* states,

> Any person seeking to admit an electronic document as evidence has the burden of proving its authenticity by evidence capable of supporting a finding that the electronic document is that which it is purported to be.

Arguing that, given the absence of an original, the identity and integrity of electronic records are interwoven and inseparable, Duranti et al. (2010) contended that merely focusing on the authenticity of electronic records was not only “legally incomplete” but may also result in the authenticating of an electronic record of questionable integrity.
As to the best evidence rule, the UEAA shifted the focus from the integrity of the record to the integrity of the underlying record-keeping system: Section 31.2(1) of the *Canada Evidence Act* stipulates,

> The best evidence rule in respect of an electronic document is satisfied (a) on proof of the integrity of the electronic documents system by or in which the electronic document was recorded or stored; or (b) if an evidentiary presumption established under section 31.4 applies.\(^4^3\)

Duranti et al. (2010) maintained that this shift of focus from the integrity of the record per se to the integrity of the recordkeeping system in which the record is stored has “underestimat[ed] the complexity of electronic records and of the systems producing and containing them” and “weaken[ed] the application of the best evidence rule practically to irrelevancy” (p. 112). Duranti et al. (2010) concluded that the UEAA is not capable of dealing with the complexity of the records created, used, or stored in the digital environment.

Nevertheless, the principle that the integrity of a system guarantees the authenticity of the records stored in it was confirmed in 2017 by the Canadian Government Standard Board 74:32 standard *Electronic Records as Documentary Evidence*. The standard, first published in 2005, was amended in 2017; its purpose is to “specif[y] principles, methods, and practices for the creation (i.e., making, receipt, and capture) and management of all forms of electronic records (e.g., e-mail, cartographic, audio-visual, textual, multimedia, etc.) to support their admissibility and weight as evidence in legal proceedings”.

\(^{43}\) Section 31.4 outlines the presumptions regarding secure electronic signatures.
Therefore, at the moment, for electronic records to be admitted as documentary evidence, the following three criteria have to be met:

- authentication,
- integrity of the electronic records system, and
- business records exception to the hearsay rule.

One of the primary responsibilities of records managers and archivists is to manage records in such a way that their evidentiary capacity can be preserved so that they can be used to resolve legal disputes or help the organization to satisfy regulatory requirements. An understanding of the rules governing the admissibility of electronic records will inform the design of policies, requirements, systems, and practices in order to guarantee the trustworthiness of electronic records and increase their probability of serving as evidence.

Stephen Mason (2007), a barrister in England and Wales, supports the implementation of policies and procedures based on standards and best practices, and on documentation of the adherence to these policies and procedures as well as decision-making criteria for building a solid foundation for improving the trustworthiness of electronic records.

The *Canada Evidence Act* stipulates the consideration of standards used in the management of electronic records in determining the admissibility of electronic records. Section 31.5 states,

> For the purpose of determining under any rule of law whether an electronic record is admissible, evidence may be presented in respect of any standard, procedure, usage or practice concerning the manner in which electronic documents are to be
recorded or stored, having regard to the type of business, enterprise or endeavor that used, recorded or stored the electronic record and the nature and purpose of the electronic document.

In the commentary to this section in the UEAA, two groups of standards—those issued by the Canadian General Standards Board and those issued by the International Standards Organization (ISO), were identified. The commentary also specifies that this provision does not intend to make compliance with standards obligatory in order to get electronic records admitted, but rather to give some “comfort” to records managers who seek to develop record-making and recordkeeping systems that will produce records which can be admitted into evidence.

Chasse and Gurushanta (2002) maintained that since there was no definitions of the concept of system integrity in the rule governing the admissibility of documentary evidence, reference to standards could help “fill the gap” and provide the necessary “foundation” to prove the “integrity” of the electronic records before the courts had a body of decisions explaining how these concepts were interpreted. The CGSB 74:32 2017 Standard has identified a list of factors, which can be used to infer the integrity of records in electronic system:

a. sources: the origin of the data in its electronic records is known;
b. contemporaneous recording: the electronic records are made or received or stored within a reasonable time after the events to which they relate, or stored within a reasonable time after they are received;
c. routine business data: the data within a record is of a type regularly supplied to the originating organization, or created by it during its regular activities;
d. data entry: the data entry procedures are part of the usual and ordinary course of business of the organization, and are carried out in compliance with the RM manual and IT system management guide;
e. standards: the organization complies with applicable electronic records management standards;
f. decision making: the organization, when making decisions, relies upon the electronic records in its electronic records system;

g. software: the organization’s software reliably operates the electronic records system and processes its data;

h. system changes: a record of record system changes and alterations is kept;

i. privacy: the use of the data in the organization’s electronic records complies with the relevant Canadian, provincial and territorial privacy statutes governing the collection, use or disclosure of personal information, confidential commercial information, trade secrets, privileges or other confidential information; and

j. security: security procedures, such as protection against unauthorized access and disaster recovery plans, are used to guarantee the integrity of the electronic records system.

Yet it is cautioned that reference to standards should not be considered as a guarantee that electronic records would be admitted; the ultimate decision rests solely with the court (Fisher, 2004; Duranti et al., 2010).

The 2017 version of the CGSB 74:32 standard also contains an information section on cloud computing, which describes its meaning as well as the benefits and risks brought about by the use of cloud services. Then, after briefly discussing the implications of the use of cloud computing for the integrity of records, the standard declares that “admissibility of records held in a cloud environment is possible if the contract with the CSP [Cloud Service Provider] includes clauses that allow access to the identity and recordkeeping metadata…and the ability to verify the integrity of the system” (p. 32).

Despite this recommendation on the reference to standards to support the admissibility of electronic records in court, judicial practices does not provide positive evidence on the reference to standards in proving, in particular, the reliability of business records. For instance, in his doctoral research, one of the questions that Donald Force (2013) explored was on what grounds Canadian lawyers and judges based their assessment of
documentary evidence as meeting the business records exception to the hearsay rule; more specifically, he asked whether the adoption of a recordkeeping standard was one of the grounds for admission as evidence. After reviewing Canadian legal literature and Canadian case law, Force (2013) concluded that the two salient methods used by counsel when demonstrating that a record is reliable are “1) witness testimony, either in person or by affidavit, by a person familiar with the record at issue or the process that created the record; and 2) the use of recordkeeping documentation such as policies, procedures, and standards that help counsel to illustrate the circumstantial guarantee of trustworthiness of the record” (p. 173). Moreover, Force (2013) found that recordkeeping standards were not referred to in support of the reliability of the records. The possible explanation for this is that, while witness testimony and/or recordkeeping documentation can “offer more precise information about the circumstances that led to the creation and use of a particular record,” a standard may only be able to “justify why the organization created particular recordkeeping policies or adhered to specific records management practices” (Force, 2013, p. 174).

2.3.1.2 Requirements for the Admission of Paper and Digital Records as Evidence in China\textsuperscript{44}

Pursuant to Article 48 of the *Criminal Procedure Law of the People’s Republic of China (2012 Amendment)* (The Criminal Procedure Law), all materials that may be used to

---

\textsuperscript{44} It is important to note that what are described and discussed in this section are based on legal literature and existing laws, legislations, interpretations, and other legal document. Therefore, how the admission of paper and digital records is determined in cases is out of the scope of this dissertation.
prove the facts of a case are considered as evidence. Further, the three major procedural laws identify and enumerate the types of evidence that can be used in litigations. However, whereas in the common law world, both the paper and digital form of records are considered as documentary evidence, in China, paper records are identified as documentary evidence and digital records are identified as electronic data evidence.

Prior to the addition of electronic data as one type of evidence in the three major procedural laws—thus, legally recognizing its evidentiary capacity, there were numerous discussions in the Chinese legal field regarding whether digital evidence should be subsumed under documentary evidence or audio-visual recordings, or identified as one independent type of evidence (some examples of these discussions include He (2009), Zhou (2010), and Liu and Qu (2010)). The identification of the type should be grounded in a thorough understanding of the nature and characteristics of electronic evidence, as this will have significant implications on the rules governing its admissibility into legal proceedings and its probative force. However, as will be discussed below, it is important to note that the classification of evidence in the procedural laws in China is not proactive,

45 English translation of Chinese legislations, legal interpretations, regulations, and other legal documents are taken, when available, and refined only when deemed necessary by this author, from the China Law Info database. When no English translation is available, the translation is made by this author.
47 The Criminal Procedure Law identifies eight types of evidence, including (1) physical evidence, (2) documentary evidence, (3) witness statement, (4) victim statement, (5) confession and defense of a criminal suspect or defendant, (6) expert opinion, (7) transcripts of crime scene investigation, examination, identification, and investigative reenactment, and (8) audio-visual recordings and electronic data. The Civil Procedure Law of the People’s Republic of China identifies eight types of evidence, including (1) statement of a party, (2) documentary evidence, (3) physical evidence, (4) audio-visual recordings, (5) electronic data, (6) witness testimony, (7) expert opinion, and (8) transcripts of survey. The Administrative Litigation Law of the People’s Republic of China identifies eight types of evidence, including (1) documentary evidence, (2) physical evidence, (3) audio and video recordings, (4) electronic data, (5) witness testimony, (6) statement of a party, (7) opinion of a forensic identification or evaluation expert, and (8) survey transcripts and on-site disposition transcripts.
48 The Chinese original is 电子数据. Its English translation i.e., electronic data, was taken from the China Law Info database.
rationale-based as the classification of evidence in common law world, though Chinese legal scholars and practitioners have been striving to rectify this problem and promote the development of rules to govern the admission of different types of evidence (Lin, 2015). The de facto separation of the paper and digital records as two different categories of evidence in procedural laws may create some serious obstacles for protecting and demonstrating the evidentiary capacity of digital records and cause incongruity in the management of paper and digital records in organizations.

While classifying evidence into categories is not unique to China—for instance, in the common law world, evidence is usually identified as testimony, exhibits, or documentary evidence—China is one of only two countries in the world that identify types of evidence in its legislation (Lin, 2015). It is commonly asserted by Chinese legal scholars that the intent for listing types of evidence in legislation is to prevent the admissibility into litigation of evidence that does not conform to the law (Lin, 2015); in other words, as Chinese law textbooks often state, the specification of types of evidence in procedural laws has legal force in that only evidence that belongs into one of the types listed can be used as evidence in litigation, so that evidence that has no evidentiary capacity can be excluded (Bian, 2002, p. 51). Scholars who maintain this position often argue that classification of evidence can facilitate the examination of evidence on the basis of rules defined for the admissibility of different types of evidence.

However, judicial practices show that, rather than a rationale-based legal decision, the classification of evidence in procedural laws is but a product of the investigation-centered

49 The other country is Russia.
criminal procedural mode\textsuperscript{50} and files-centered (i.e., case file centered) judgment mode\textsuperscript{51} (Lin, 2015). In the case file, almost all types of evidence, including but not limited to enquiry records, interrogation records, examination records, and search records, have been converted into written form. It is argued that to distinguish and facilitate the presentation of different types of evidence in a case file in written form, it is necessary to identify these types in the procedural laws (Lin, 2015). Therefore, the purpose for identifying evidence types in procedural laws is to justify the evidentiary capacity of evidences collected and used in fact-finding in the investigation conducted by the public security bureau and presented in the case files in written form (Lin, 2015). This is why the types of evidence listed in procedural laws conform to the steps involved in the investigation procedure specified in criminal procedural law, such as interrogation of criminal suspects, interviewing witnesses, crime scene investigation and examination, search, seizure and impounding of physical evidence and documentary evidence, forensic identification and evaluation, and technical investigation (Lin, 2015). This is also why the types of evidence listed in the procedural laws are not consistent with those in the common law world and have serious issues if examined from the standard of a good classification, such as inconsistency of the criteria used for the classification, and classes

\textsuperscript{50} Jiahong (2013) compares the procedural relationships among the public security bureau, the people’s procuratorate, and the people’s court—the three Chinese juridical institutions—in the handling of a case to those among the production, sale and consumption of products in that the three legal bodies divide the work and cooperate with each other to make sure that the criminal cases are handled properly and social justice can be achieved (i.e., a satisfactory product can be delivered). However, currently, the problem with the cooperation among the three bodies is that it is in the seller’s market in that the consumption body (the people’s court) has to sell and the consumers have to consume whatever products produced by the production body (the public security bureau). As a result, the investigation performed by the public security bureau drives and determines the results of the case, and the people’s court’s function is but to a formality.

\textsuperscript{51} Partly due to the investigation-centered procedural mode, the criminal trial process in China is basically reduced to a “perfunctory ritual” in that “the judge’s conclusion is reached through reviewing the whole records of the case before or after the trial, not according to hearing quote, query and attestation of the evidence at the trial” (Jiahong, 2013, p. 160).
that are not exclusive with respect to each other. This also explains the lack of rules in procedural laws for the admissibility of the different types of evidence identified.

2.3.1.2.1 A Brief Review of the Chinese Legal System

As early as the Chinese Western Zhou dynasty (1046-771 BC), a method called “Five-Listening” had been established to determine if the statement made by a witness or a defendant in a trial is true or false (Zhang & Walton, 2010). However, the official evidence law did not come into being until the late 1800s and early 1900s by translating laws from other countries, e.g., Germany, Japan (Zhang & Walton, 2010). Therefore, the Chinese evidence system was deeply influenced by the law-making tradition of Japan and the Continental Europe Legal System from the beginning (Zhang & Walton, 2010).

With the founding of the People’s Republic of China in 1949, the legal system established in the Republic of China was abandoned, and for political reasons the Soviet Union became the new model for China to learn from. Under the influence of the Soviet Union, the Chinese evidence law system established, among others, the following principles and procedures: a confession provides sufficient evidence for conviction; facts at issue must be established beyond all doubt; and the “super-inquisitorial mode” is the basis for juridical procedure. During the Cultural Revolution (1966-1976), the legal system, along with the evidence system, in China completely collapsed, and legal

---

52 This introduction of the Chinese legal system has drawn heavily on a comparison made by Zhang and Walton (2010) between the Chinese evidence system and the Anglo-American law system. Nanning Zhang, one of the two co-authors of this paper, is a prominent and highly qualified lawyer and expert in the field of Chinese evidence law.
53 Five-listening refers to observing a witness or defendant’s words, observing his facial expressions, observing his breathing, observing his listening, and observing the expression in his eye.
54 According to Zhang and Walton (2010), under the super-inquisitorial mode, “the courts were responsible for finding the truth, the burden of proof on parties was not emphasized and the submissions of the parties did not place any constraint on the judge’s decision making” (p. 105).
research was suspended. It was only after the end of the Cultural Revolution in 1978 that the legal system was rebuilt. Since then, China’s legal system in general and the evidence system in particular have experienced significant development and ongoing reform in response to the country’s political, social, economic, and technological development (Zhang et al., 2018).

The Chinese judicial institutions consist of police stations (i.e., offices of police investigators), that are responsible for factual investigations in criminal cases, procuratorates (i.e., offices of prosecutors), that are responsible for prosecution and investigation, and the courts, that are responsible for adjudicating legal disputes and dispensing civil, criminal, or administrative justice55.

As opposed to the adversarial system, the Chinese legal system is an inquisitorial system, which is the prevailing system in civil law jurisdictions, including the continental Europe and Latin America, and under which “the court plays an active, authoritative, and interventionist role at all stages of the proceedings, while the parties have only a minor, tentative, and supportive function” (Vogenauer, 2008, n.p.).

The two trial procedures are different in terms of the role of the court, the legal profession, the parties in the proceedings, and the nature of the truth to be sought (Le Sueur, 2008). For instance, while the role of the court in the adversarial system is rather limited in that the court is regarded as a “neutral umpire” to view “a contest between opposing views” (Le Sueur, 2008), and usually does not intervene in the collection of

---

55 For a discussion of the relationship among the three entities in criminal trial in China in English, please read Jiahong (2013).
evidence, in the inquisitorial system, the court has much greater power and is more active in investigating the facts. For instance, the judge in China can investigate and collect evidence either per the parties’ application or when it is deemed necessary by the judge for finding the truth; the aim is “to remedy the deficiency of the competency of parties in collecting evidence and help fact-finders to make factual determination accurately” (Zhang & Walton, 2010, p. 112).

Furthermore, while the admission of evidence in adversarial systems is usually determined by the judge based on rules, the acceptance and rejection of evidence, as well as its probative force and the truth of the case in China, are primarily determined based on the judge’s conscience and rationale (Qi & Zhong, 1998), with rules taking on an auxiliary role. For instance, the Provisions on Several Issues Concerning the Exclusion of Illegal Evidence in Criminal Cases prescribes that,

> Article 64. The judges shall verify the evidences according to the legal procedures all-roundly and objectively, shall observe the provisions of law, follow the professional ethics of judges, use logical reasoning and daily life experience to make independent judgments concerning the validity and forcefulness of the evidences, and publicize the reasons and result of judgment.

In addition to the principle adopted for examining evidence, the nature of truth that is sought in fact-finding also varies between the inquisitorial system and the adversarial system: namely, the former is an objective truth and the latter a legal truth. The inquisitorial system as associated with the Chinese legal system usually seeks facts at the ontological level and requires that “people involved in judicial activities should make their cognitive facts completely tally with the ontological facts,” viz., the objective truth (Zhang & Walton, 2010, p. 107). The adversarial system usually seeks truth constructed
based on the evidence available and what the law describes or admits, *viz.*, the legal truth (Zhang & Walton, 2010).

While the Chinese legal system, particularly in the case of criminal trials, strives for the objective truth in order to punish criminals and enforce state policy, the adversarial system “emphasizes that the outcome could be a good or acceptable one if and only if it comes about through a due process in order to promote the entire social public interest through protecting individual rights” (Zhang & Walton, 2010, p.111). As a result, while the Chinese legal system emphasizes protecting the victim’s rights, and uses every piece of evidence for truth-finding as long as it is relevant to the trial, the Anglo-American justice system places more emphasis on protecting a defendant’s rights (Zhang & Walton, 2010).

Regardless of the differences described above between the adversarial system and the inquisitorial system, it would not be incorrect to state that no one legal system is a pure adversarial system or inquisitorial system, or, as Vogenauer (2008) argued, all legal systems have some form of inquisitorial and adversarial elements. This is the case in China, the contemporary Chinese legal system in general, and its evidence system in particular, has absorbed, and expectedly will continue to absorb, many principles from the Anglo-American law of evidence.

**2.3.1.2.2 Requirements for the Admission of Paper Records as Evidence in Civil Cases in China**
Paper records or records in paper form are identified as a type of documentary evidence in the three procedural laws in China. According to the *Provisions on Uniform Evidence in People’s Courts (Proposed Draft for Judicial Interpretation)*, documentary evidence refers to records that contain content or information regarding the facts in the case in writing, such as words, number, or graphs, and recorded in paper. According to this definition, the meaning of documentary evidence in China is substantially equivalent to that in Canada, which defines it as “recorded information admitted as evidence in legal proceedings” (CAN/CGSB-72.34-2017, p. 4) except that documentary evidence in China is restricted to documents in paper form, thus excluding those in digital form, which are included in the concept of electronic data.

A review of existing procedural laws and relevant provisions shows that rules governing the admission of paper records as evidence for determining the disputed facts in a case in China include the authenticity rule, the reliability rule, and the best evidence rule, corresponding to the authentication rule, the exception to hearsay rule, and the best evidence rule in common law world.

Under Article 67 of the Civil Procedure Law, “a people’s court shall identify the authenticity and examine and determine the validity of documentary evidence provided by the relevant entities and individuals”. The Civil Procedure Law does not provide further explanation as to what “authenticity” and “validity” refer to in this clause. Yet, Chinese law scholars contend that the purpose of this article is to guarantee the
“formalistic authenticity”\textsuperscript{56} and “material authenticity”\textsuperscript{57} of the records produced as evidence in court (Liu, 2012).

Different definitions have been provided for formalistic authenticity. For instance, Liu (2012) explains that a record is formally authentic if it is created by the person that the party who produces the record in court claims to be the creator of the record; Xiao (2010), on the other hand, defines formalistic authenticity as a quality being possessed by a record whose content is recorded by the claimed creator of the record; furthermore, Shi, Wang, and Shen (2010) explain that formalistic authenticity refers to the authenticity and validity of the creation of the records, namely, to whether the record has been tampered with. While Shi, et al.’s (2010) definition concisely reveals the essence of this concept, Liu’s (2012) and Xiao’s (2010) definitions uncover two aspects of the creation of records that are likely to be questioned: the creator and the content. These definitions show that examination of the formalistic authenticity of documentary evidence in the Chinese juridical context is equivalent to the examination of the authenticity of records in the common law world and is associated with their identity (i.e., the record is what it purports to be), which is the focus of the authentication rule.

Material authenticity refers to the consistency between what is recorded in the content of the record and the fact to be proven (Liu, 2012). If the content of the record does not reliably reflect what actually happened in respect to the disputed facts in the case, then the record is considered as materially inauthentic. Additionally, in order to comprehensively describe the capacity of the submitted documentary evidence in

\textsuperscript{56} The Chinese original of this term is 形式真实
\textsuperscript{57} The Chinese original of this term is 实质真实
affirming the disputed fact, some authors add relevance as a dimension of material authenticity and argue that a record is materially authentic if it is relevant to the disputed fact and its content reliably describe what actually happened (Shi, et al., 2010; Xiao, 2010). However, this author believes that relevance refers to the strength of the relationship between the submitted record and the fact to be proven and describes the probative force of the submitted evidence in affirming the disputed fact; therefore, it should not be addressed by the concept of material authenticity. Understood this way, material authenticity is equivalent to the reliability of records (i.e., the trustworthiness of the statement contained within the record), and thus, corresponds to the exception to the hearsay rule in the common law world.

The best evidence rule in the Chinese judicial practice is consistent with the best evidence rule in the common law world in that it concerns the submission of originals of documentary evidence. For instance, Article 70 of the Civil Procedural Law stipulates that, “The originals of documentary evidence shall be submitted. The originals of physical evidence shall be submitted. If it is difficult to submit the originals, replicas, photographs, copies or extracts may be submitted”. This rule is closely related to the previous two rules, as any changes occurring in the copies of records may have impact on the formalistic authenticity and material authenticity of records.

Additionally, Provisions on Several Issues Concerning the Examination and Judgment of Evidence in Death Sentence Cases confirms the employment of these three rules in the examination of documentary evidence, as stated in Article 6 below,

   Article 6. The examination of physical or documentary evidence shall focus on:
Whether the physical or documentary evidence is the original object or document, and whether the photos, visual recordings or the reproductions of the physical evidence or the duplicates or photocopies of the documentary evidence are identical with the originals [the best evidence rule]; whether the physical or documentary evidence has been identified [the authentication rule], authenticated [the exception to hearsay rule]; whether the photos, visual recordings or the reproductions of the physical evidence or the duplicates or photocopies of the documentary evidence are made by two persons or more, and whether there is any written explanation and signature of the makers regarding the process of making reproductions and the place where the original object or document is put [the best evidence rule].

While Chinese laws have hinted to the use of these three rules governing the examination of documentary evidence for their admissibility as evidence, the lack of specific criteria and guidelines in legislation and legal cases, and the prevalence of the judge’s conscience and rationale in the examination of the evidence make the application of these rules in judicial practices rather vague and ambiguous (Liu, 2012; Shi et al., 2010; Zhao & Zhao, 2015). For instance, provisions specifically dedicated to the authentication of documentary evidence in Chinese legislations are scant. Furthermore, authenticity of documentary evidence is not treated and examined independently based on a set of specifications, but is inferred from the fact that the documentary evidence is original. As a result, the authentication rule does not enjoy an independent status as its counterpart in the common law world, but is embedded into the best evidence rule. For instance, pursuant to Article 94 of the Provisions on Uniform Evidence in People’s Courts (Proposed Draft for Judicial Interpretation),

Identification refers to creator, collector, keeper, and other witnesses that have personal knowledge of the physical evidence, documentary evidence, and demonstration evidence identity their source and chain of custody, including:

(1) whether the evidence is relevant to the facts in the case, and whether it is sufficient to support the adducing party’s claims;
(2) whether the evidence is the original object or document;
(3) whether the reproductions of the physical evidence or the duplicates of the documentary evidence are identical with the originals; and
(4) whether the evidence has maintained its original properties and whether it has been tampered with or modified.

This Article identifies three aspects to be focused on when performing identification: relevancy, whether the evidence is original, and whether the reproduction of the evidence is identical to the original. These three aspects should be determined on the basis of the source and chain of custody of the submitted evidence. The recognition of the impact the source and chain of custody of the evidence have on its authenticity is crucial in that it recognizes that the essence of authenticity is about what has happened to the evidence after its creation. Yet, further information is needed to clarify what requirements should the source and chain of custody of the evidence satisfy for it to be considered as authentic.

The best evidence rule concerns the preference for originals of evidence and under what circumstances reproductions of the originals can be submitted as evidence. For instance, under Article 49 of the Some Provisions of the Supreme People’s Court on Evidence in Civil Procedures (2008 Amendment), it is stated that,

Article 49. When cross-examining documentary evidence, physical evidence or audio-visual materials, the parties concerned shall be entitled to demand the other party to present the original document or original object with the exception of the following circumstances:

(1) It is indeed difficult to present the original document or original object and it is approved by the People’s court to present the reproduction or photocopy thereof; and

(2) The original document or original object no longer exists and evidence shows that the reproduction or photocopy is identical to the original document or object.
The Interpretation of the Supreme People’s Court on the Application of the Civil Procedure Law of the People’s Republic of China clarifies the circumstances that can be considered as “indeed difficult” for the submission of the originals, including: (1) the original documentary evidence is lost, extinguished or damaged; (2) the original is under the control of the opposing party who, despite lawful request, refused to submit it; (3) the original is under the control of another person who is entitled not to submit it; (4) it is inconvenient to submit the original because of excess space or volume; and (5) the party who bears the burden of proof is unable to obtain the original through applying for investigation and collection to a people’s court and other ways (Article 111). Under the previous stated circumstances, the people’s court shall determine, after consideration of other evidence and the specific circumstances of the case, whether copies of the documentary evidence can be used as evidence to affirm the disputed facts.

Furthermore, per Article 69 of Some Provisions of the Supreme People’s Court on Evidence in Civil Procedures (2008 Amendment), when the copies of the documentary evidence cannot be verified against the originals, they cannot be used independently as the basis for affirming the facts of a case; in other words, they have to be examined together with other evidence to affirm the facts. This means that copies of documentary evidence whose authenticity and reliability cannot be determined can be admitted as evidence but their weight will be affected.\(^\text{58}\)

\(^{58}\) With regard to this, Chinese law scholars have been researching on the concept of and principles for the admission of 瑕疵文书, which can be defined as records with defects or bad records; copies, reproductions of records that are not identical to the originals are addressed by this concept, for instance, Xu’s (2008) work.
As to the examination of the trustworthiness of statements contained within the record (the exception to hearsay rule), Article 114 of Interpretation of the Supreme People’s Court on the Application of the Civil Procedure Law of the People’s Republic of China states that,

Article 114. The matters recorded in the documents, which are created by a state organ or other organizations providing public services, in the conduct of their business activities, shall be presumed to be true, unless otherwise overthrown by sufficient evidence to the contrary. When necessary, a people’s court may request the creating organ or organization to provide explanation on the authenticity of the document.

This article specifies the presumption of reliability of public records created by a state agency and other public organizations. Prior to the enactment of the Interpretation of the Supreme People’s Court on the Application of the Civil Procedure Law of the People’s Republic of China in 2015, a draft judicial interpretation—Provisions on Uniform Evidence in People’s Courts issued by the Supreme People’s Court, identified a wider scope of documents presumed to be reliable, as stated below,

Article 95. The following documents, in the absence of evidence to the contrary, are presumed to be reliable, and thus, do not require collateral evidence for their admissibility.

(1) Documents certified by a notary;

(2) Domestic public records created by a state organ or other public organizations in carrying out their responsibility and bearing a stamp and a registration number; public records created in Hong Kong, Macao, and Taiwan should undergo relevant certification process;

(3) Foreign public records that have been certified by Chinese embassies abroad or foreign embassies in China;

(4) Books, pamphlets, and other official publications edited and published by state organs and other public organizations; and
(5) Newspapers or journals that have been permitted to publish by the state and local press and publication agencies.

However, these documents are all public. The only article that may provide some guidance on the examination of the authenticity and reliability of private records is Article 97 of Provisions on Uniform Evidence in People’s Courts (Proposed Draft Judicial Interpretation), which states:

Article 97. For documentary evidence that need to be identified [i.e., authenticity] or authenticated [i.e., reliability], including but not limited to:

(1) written records (including written statements provided by witnesses who cannot testify in court) whose authenticity and reliability when disputed by the opposing party shall be identified and authenticated by their creator, collector, and keeper on the author, source, content, place of maintenance, or its unique content.

(2) public records or business records\(^{59}\) whose authenticity and reliability when disputed by the opposing party shall be identified and authenticated by their keeper on its being in a status beyond doubt, being kept in a reasonable place, or the operation of the search system and the process of how the records are retrieved from the file or by using certain search methods.

This first part of the Article concerns the creation and maintenance of records, thus, their reliability and authenticity, while the second part concerns the maintenance of records of public records or business records, thus, their authenticity. While this Article provides guideline for the identification and authentication of the disputed records, further specification in terms of what criteria should their author, source, content, place of maintenance satisfy for them to be considered reliable and authentic is needed on the basis of which the creation and management of records can be conducted. Additionally,

---

\(^{59}\) It is not clear whether the expression “business records” in this Article is equivalent to the concept of business records in the common law world. The Chinese expression for the English “business records” is 业务档案, and no definition is provided for this term throughout the Interpretation. Based on this author’s background on Chinese records and archives management, this expression is not a records and archival management concept as well. The expression 业务 is defined as the main responsibility of a person or an organization (“业务”, n.d.). Therefore, records generated can be of public or private nature.
according to this Article, the burden of proof, once disputes arise concerning the reliability and authenticity of the records, falls on the creator, collector, and keeper of the records. Yet, without further specification, the creator, collector, and keeper of the records can be either the party who submits the records as evidence or the opposing party.

The ambiguities in Chinese legislations on the examination of the reliability and authenticity of private records make it especially difficult to admit them into legal proceedings; and the judges usually have to utilize “logical reasoning and daily life experience” to determine the admissibility and probative force of private records (Shi et al., 2010), as prescribed by Article 105 of the Interpretations of the Supreme People’s Court on the Application of the Civil Procedure Law of the People’s Republic of China:

Article 105. A people’s court shall, in accordance with legal procedures, utilize logical reasoning and daily life experience to comprehensively and objectively examine and verify evidence, determine the admissibility of and the probative force of the evidence, and publicize the rationale and results of the judgment.

Additionally, according to the Civil Procedural Law, “A party shall have the burden to provide evidence for its claims” (Article 64). And while there is disclosure in civil litigation in common law world, it was only in 2015 that Interpretations of the Supreme People’s Court on the Application of the Civil Procedure Law of the People’s Republic of China stipulated that a party can, with the assistance of the court, request the opposing party to submit the documentary evidence that is under its control, as stated below,

Article 112. Where the documentary evidence is under the control of the opposing party, the party who bears the burden of proof may submit a written

---

60 Disclosure in civil litigation is “the process which enables the parties to discover evidence relevant to the issues between them which is or has been in the control of the other party. It can be crucial in assisting a party in proving or resisting a claim, and also in revealing the strength of the other party’s case” (Fitzpatrick, 2008, n.p.).
application requesting the people’s court to order the opposing party to submit it before the expiry of the time limit for adducing evidence.

Where the grounds for the application are tenable, a people’s court shall order the opposing party to submit. The expenses arising from the submission of the documentary evidence shall be borne by the applicant. Where the opposing party refuses to submit without justified reason, a people’s court may determine that the contents of the documentary evidence requested by the applicant are true.

Prior to the introduction of this article in 2015, in civil litigations, a party could only submit documentary evidence that was under its control or under the control of a third party. For documentary evidence adduced that is under its control, it is very easy for the opposing party to dispute their reliability and authenticity. When such disputes arise, the court has to decide whether the burden of proof of the reliability and authenticity of the adduced evidence should fall on the submitting party or the opposing party; judicial practices show that judges are not consistent on this (Xiao, 2010). Either way, the lack of guidance and criteria for proving the authenticity and reliability of documentary evidence will makes it considerably hard to discharge such burden.

This review shows that, while rules governing the admissibility of private records in Chinese civil litigations are suggested by legislations and are equivalent to those in the common law world, the lack of specific guidance on the application of these rules makes it hard to implement them in practice. This is further complicated by the principle of burden of proof and the prevalence of logical reasoning and daily life experience when the judges evaluate the evidence. Chinese law scholars have recognized the issues surrounding the admissibility of private records, and are suggesting distinguishing between public records and private records when designing rules, guidelines, specifications for examining the reliability and authenticity of documentary evidence;
however, other than this, there has been no clear specification of how the reliability and authenticity of private records can be determined (Liu & Liu, 2007; Shi et al., 2010; Zhao & Zhao, 2015; Xiao, 2010).

2.3.1.2.3 Requirements for the Admission of Digital Records as Evidence in Civil Cases in China

Research on electronic evidence in the Chinese legal field commenced in the 1980s (Long & Pei, 2016), and has been ongoing since. The first legislation relevant to electronic evidence is the Contract Law of the People’s Republic of China, issued in 1999. In Chapter 2, Conclusion of Contracts, the Contract Law stipulates:

Article 10. The parties may use written, oral or other forms in entering into a contract. A contract shall be in written form if the laws or administrative regulations so provide. A contract shall be concluded in written form if the parties so agree.

Article 11. “Written form” refers to a form such as a written contractual agreement, letter, electronic data text (including a telegram, telex, fax, electronic data exchange, and e-mail) that can tangibly express the contents contained therein.

Therefore, an electronic data text (including a telegram, telex, fax, electronic data exchange, and email) is considered one of the effective written forms that a contract can take. The law further stipulates how a contract is considered concluded when it takes the form of electronic data text, how the time limits will be calculated if a telegram is used for an offer, when acceptance of an offer in the form of data-telex becomes effective if notice of acceptance is not required, and other relevant issues. Yet, the purpose of these articles is only to provide recognition of electronic data text as a written form for a contract, hence its effectiveness, and to promote e-commerce; this Contract Law does not
specify how an electronic data text “fulfills the legal requirement of originality, retention and admissibility as evidence, amongst other things” (Wang & Wang, 2005, p. 79).

The *Electronic Signature Law of the People’s Republic of China*, enacted in 2005, is considered the first national e-commerce legislation in China (Wang & Wang, 2005). Amended in 2015, the Electronic Signature Law states that an electronic signature refers to “the data included and attached in data message in electronic form, for the use of identifying the identity of the signatory and showing that the signatory has recognized the contents therein,” and data message refers to “the information created, sent, received or stored by such means as electron, optics, magnetism or similar means” (Article 2).

The Electronic Signature Law further specifies a data message’s legal effect and ability to serve as evidence by providing that “the legal effect of any document using electronic signature and data message as stipulated by the parties shall not be denied only because it takes the form of electronic signature and data message,” (Article 3) and that “no data message may be rejected for being used as evidence only because it is created, sent, received or stored by ways of electron, optics, magnetism, or similar means.” (Article 7) Further, Chapter 2, Data Message provides the requirements that must be met for the data message to be considered original and for the preservation of data messages, and the factors to be considered when examining the truthfulness of any data message as evidence.

The requirements that shall be met by the data message to be considered original as prescribed by the Electronic Signature Law are:
(1) Data message that is capable of effectively showing the contents it specifies and may be picked up for reference and use at any time; and

(2) Data message that is capable of unfailingly ensuring that the contents are complete and unaltered from the time when it finally comes into being. But the integrity of the data message will not be influenced by the adding of endorsement in the data message and the alteration of forms during the course of data interchange, storage and display. (Article 5)

The content of this Article recognizes that the concept of original cannot be applied to electronic data the same way it is applied to paper records. For electronic records, as long as the content can be effectively shown and demonstrated that it is “complete and unaltered from the time when it finally comes into being”, the electronic data message is considered original. This Article also specifies that “alteration of forms” and “adding of endorsement” will not affect its being an original.

The factors that shall be taken into consideration when making an examination into the truthfulness of any data message as evidence as prescribed by the Electronic Signature Law are:

- (1) the reliability of the methods for creation, storage or transmission of data message;
- (2) the reliability of the methods for keeping the integrity of the contents;
- (3) the reliability of the methods for identifying the addressee; and
- (4) other relevant factors. (Article 8)

These factors reveal that the truthfulness of any data message is essentially about the reliability of its creation, its identity, and its integrity after the creation. Yet, further specifications or guidance are needed to guide the determination of the reliability of these
methods, for instance, what criteria the methods for keeping the integrity of the contents should meet for the records to be considered reliable.

While the enactment of the Contract Law and the Electronic Signature Law endowed electronic data with legal effects, and hence, officially approved the use of electronic data in the conduct of business, it was only with the addition of electronic data as a type of evidence in the three major procedural laws that the ability of electronic data to be used as evidence in litigations was legally recognized. The *Criminal Procedure Law of the People’s Republic of China (2012 Amendment)* lists electronic data and audio-visual recordings as one category; the *Civil Procedure Law of the People’s Republic of China (2017 Revised)* lists electronic data as a separate category; and the *Administrative Litigation Law of the People’s Republic of China (2017 Revised)* lists electronic data as a separate category as well. However, other than recognizing electronic data as one type of evidence to be used, the three procedural laws do not specify rules for electronic data collection, storage, transfer, display, or examination, or the probative force of electronic data in judicial practice. This issue was then addressed by criminal judicial interpretations.

The *Provisions on Several Issues Concerning the Examination and Judgment of Evidence in Death Sentences Cases* stipulates that

Article 29. The examination of electronic evidence such as e-mails, electronic data interchanges, online chat logs, blogs, mobile phone text messages, electronic signatures and domain names shall focus on:

(1) whether the magnetic disc, compact disk or any other movable medium which is used to store the electronic evidence has been submitted along with a hardcopy;
(2) whether the time and place when the electronic evidence is formed, the object, the producer, the production process, the relevant facilities and other relevant information about the evidence have been specified;

(3) whether the procedures and steps for the production, storage, transmission, obtainment, collection, and presentation of the electronic evidence are legal, and whether relevant persons involved in the collection of the electronic evidence, including collector, producer, holder, witness, have provide their signatures or stamps;

(4) whether the content of the electronic evidence is authentic, and whether it has been cut, pieced together, distorted, added or otherwise forged or altered; and

(5) whether it is relevant to the facts in the case.

A forensic examination shall be performed if there is any doubt about the electronic evidence. The authenticity and relevance of electronic evidence shall be examined in combination with other evidence of the case.

As interpreted by Liu (2011b), this article identifies the use of the following rules in the examination of electronic evidence: (1) a hardcopy of the electronic evidence has to be submitted together with the electronic evidence; (2) relevancy; (3) authenticity; (4) the use of forensic examination when there is doubt about the electronic evidence; and (5) the examination of electronic evidence should be performed in combination with other evidence.

The Provisions on Several Issues Concerning the Collection, Taking, Examination, and Judgment of Electronic Data in the Handling of Criminal Cases, issued in 2016, is an interpretation jointly given by the Supreme People’s Court, the Supreme People’s Procuratorate, and the Ministry of Public Security that specifically deals with electronic data. It outlines the collection and taking, transfer and display, and examination and evaluation of electronic evidence in criminal cases. In this document, electronic data is defined as “data that is formed in the process of case occurrence, stored, processed, and
transmitted in digital form, and can prove the case facts” (Article 1). For the collection and seizure of electronic data, three methods are provided with decreasing degrees of preference: seizing the original storage medium; fixing the evidence by printing, picture-taking, or video-recording; and freezing the data. The primary goal guiding the collection and taking, transfer and display of electronic data is to ensure and demonstrate their integrity in the process. The examination and judgment of electronic data shall focus on its authenticity, legality, and relevance (Article 2). Furthermore, the Provisions specifies that, when examining whether electronic data is authentic, the following factors shall be given priority:

(1) whether the original storage medium is transferred; when the original storage medium fails to be sealed up or is inconvenient to be moved, whether there is any explanation of the reasons and whether such information as the process of collection and taking, the place for storing the original storage medium, and the source of electronic data is indicated;

(2) whether electronic data has such special identifiers as digital signature and digital certificate;

(3) whether the process of collecting or taking electronic data may be reappeared;

(4) whether an explanation is attached where electronic data is added, deleted, or modified;

(5) whether the integrity of electronic data can be guaranteed. (Article 22)

And the protection of the integrity of the electronic data shall be verified by examining the methods used for the protection of the electronic data’s integrity:

(1) examining the seizure or sealing-up status of the original storage medium;

(2) examining the process of collecting or taking electronic data and checking the video records;

(3) comparing the Integrity Check Value of electronic data;
(4) comparing the electronic data with the backup;

(5) examining the access and operation logs after the freeze; and

(6) any other methods. (Article 23)

These two juridical interpretations provide guidelines for the collection, transfer, display, and examination of electronic evidence in criminal cases. Since it is investigation officials who carry out the collection of evidence in Chinese criminal cases, it is presumed that as long as the integrity of the electronic data during its collection, transfer, and presentation—hence, authenticity—can be protected, the electronic data will be admitted in court as evidence. Therefore, the examination of electronic evidence mostly focuses on its relevance, legality, and authenticity.

In comparison with criminal cases, the admission and the examination of electronic evidence in civil cases are more complicated and face more challenges. Chinese judicial practice shows that electronic evidence is less often used in civil cases than in criminal cases (Liu, 2015c), to the extent that electronic evidence is basically marginalized in civil cases and stands in an “awkward position” (Ji & Niu, 2016; Liu, 2015c; Wang & Fan, 2018). Part of the reason is the principle of the burden of proof, prescribing that a party shall have the burden to provide evidence for its claims (Article 64) according to the procedural law of civil cases, and that, without a disclosure process in civil cases, the plaintiff or defendant can only submit electronic evidence that the party or a third party has maintained or controlled. However, according to the interpretation of the civil procedural law adopted in 2015, it is possible for one party to request the court to order the other party to provide documentary evidence under its control (Article 112). This Article has restricted the applicability of this procedure to documentary evidence; thus, it
is not clear whether it is not applicable to electronic data, which is a separate type of evidence. Owing to the fact that electronic evidence is easy to corrupt and the party has motive to do so in order to support its claims, the authenticity of electronic evidence submitted by the party to support its claims is hard to verify, and therefore is often denied admission. In some cases, even when the electronic evidence submitted by the party itself is admitted, its probative force is very weak in determining the facts of the case.

Another reason that causes the limited use of electronic evidence in civil cases is that the rules for the admission of electronic evidence have not been fully established yet (Ji & Niu, 2016; Long & Pei, 2016; Mo, 2016), and Chinese law scholars and practitioners are still exploring the applicability and relevance of rules for the admission of traditional evidence for electronic data and what should be the rules for the admission of electronic evidence. Considering the short history of the modern Chinese evidence system and that most of the laws are imported from other countries, the existing Chinese evidence system does not provide a solid foundation for the Chinese law scholars and practitioners to build on and adapt to the challenges brought by information technology. In the China-Canada Seminar on Evidence & the First Roundtable Meeting of China-Canada Supreme Courts

---

For instance, in *Shanghai Liuhua Machinery & Equipment Co., Ltd. Versus Jetford International Trading (Shanghai) Co., Ltd.* (Case No. (2014) Pu-Min-Er (Shang)-Chu-Zi No. 1290), on disputes regarding contracts, the plaintiff submitted emails between the two parties. The defendant did not provide evidence to deny the emails, but argued that since these emails had been kept by the plaintiff itself, their contents could have been altered and therefore the authenticity of the emails could not be verified. The court stated that emails belonged to the category of electronic data. Electronic data is easily forged and/or altered with no traces left. The authenticity of electronic evidence should be verified in accordance with the following considerations (and determined in combination with other evidence): the identity of the sender and recipient of the emails; whether there is a possibility that the content of the emails may be altered; and whether the collection of emails is legal. Firstly, though the plaintiff argued that the sender and recipient of the emails were current employees of the two parties, it did not provide relevant evidence to prove this, and the defendant denied that the recipient was its employee, so the court could not determine the identity of the sender and recipient of the emails. Secondly, the court arranged for the two parties to demonstrate the collection of the emails; though the two parties had no disputes concerning the collection process, they confirmed that the emails were not originals, but rather had been forwarded by a former employee of the plaintiff to its manager prior to his resignation. Therefore, there was a possibility that the content of the emails had been altered during forwarding. Furthermore, the plaintiff could not provide other evidence to prove the authenticity of the emails. Therefore, the court could not establish the authenticity of the emails, nor the facts revealed by the emails.
held in Beijing in 2006, Shen Deyong, the then Executive Vice-President of the Supreme People’s Court in China, commented that

The lack of cohesion and logic between different provisions and judicial interpretation of provisions has, to a certain extent, led to the chaos in the use of rules of evidence during judicial practices, such as, witnesses do not attend court, repeated examination of evidence, and no legislation to guide the use of digital evidence. Reform and modernization of the evidence system becomes an important and urgent task in the Chinese legal reform. (首席大法官, 2006, n.p.)

Nevertheless, electronic evidence has provided a tremendous opportunity for Chinese law scholars to clear up “the chaos in the use of rules of evidence” and finally modernize the evidence system. Recent research conducted in the Chinese law field, as will be discussed below, shows that this is actually happening.

Due to the lack of rules and principles to guide the examination and determination of the reliability and authenticity of the electronic data submitted as evidence in court, the parties have to use other approaches to circumvent the necessity to prove the reliability and authenticity of the electronic data submitted as evidence in civil cases. These approaches include: printing out the digital evidence and submitting the paper printout instead; applying to a notary or copyright society for collecting and preserving the digital evidence; applying to the court for collecting and preserving the digital evidence; and entrusting digital evidence to a third party (Liu, 2015c; Ni, 2016; Wang & Fan, 2018).

As to printing out the digital evidence, this is often used when requested by the court when the electronic data is in the form of documents, e.g., emails, instant messages, digital photos, or the snapshot of the act (e.g., copyright infringement resulting from the opposing party making video available online without permission) (Liu, 2015c). By
printing out the electronic data, its content will be frozen; therefore, this is a way to make sure that no change can be made to the evidence in the collection, transfer, and presentation of the evidence, and this is also an alternative way to display the evidence. However, in judicial practice, the opposing party usually would question the authenticity of the printout submitted by the plaintiff, and without further evidence to corroborate the authenticity of the printout, the courts usually deny their admission\(^{62}\). Because of this, the parties usually ask a notary to certify the printout and submit the certification along with the printout.

Digital evidence preservation undertaken by a notary or copyright society upon application of parties, involves collecting and freezing electronic evidence and providing certification of the evidence. This is the most popular approach adopted in judicial practice in the collection of electronic evidence, and the probative force of evidence obtained in this way is relatively high (Qiu, 2018; Wu, 2018). The popularity of notaries for the certification of electronic evidence and the high probative force of the evidence obtained this way is partly due to Article 9 of *Some Provisions the Supreme People’s Court on Evidence in Civil Procedures (2008 Amendment)*, which states that facts that have been proved in a valid notary document do not need to be proved by the parties concerned with additional evidence unless the submitted evidence can be overthrown by

---

\(^{62}\) For instance, in *Liu, Yanjun Versus Zhejiang Taobao Network Co., Ltd (Case No. (2009) Hang-Xi-Shang-Chu-Zi No. 2710)*, on disputes regarding contracts, the plaintiff submitted a printout of product information page of the sports t-shirt that the plaintiff bought from a seller named “d diao h li” on Taobao to support the claim that the sports t-shirt the plaintiff bought was a fake one rather than as advertised by the seller on Taobao that it was genuine. The product information also include that the seller would accept examination of the product by a retail store, ten-time compensation for one-fake, and the product has participated in consumer protection service, so if the seller did not pay the compensation, Taobao would fulfill the compensation responsibility first. When cross-examining this printout, the defendant disputed its authenticity on the basis that it was a printout, and that the original webpage no longer existed. The court ruled in favor of the defendant maintaining that the plaintiff did not submit evidence to prove the source of the printout, and it did not satisfy the form requirements of evidence; therefore, the court denied its authenticity.
evidence to the contrary. Considering the trust attributed to the notary document, it is expected that a notary should provide certification of both the reliability and authenticity of the evidence, namely, the trustworthiness of the statements contained in the evidence and the evidence per se. However, considering the technological characteristics of electronic evidence and the fact—according to the Notary Law of the People’s Republic of China—that the notary only has the right to verify the matter to be certified based on the materials submitted by the applicant and does not have the right to investigate the matter, it is hard to ensure that the matter that is certified is actually trustworthy (Wu, 2018). Added to the complexities inherent in verifying the reliability and authenticity of electronic data are the lack of reliable techniques and methods that can be used by notaries for verifying the electronic data to be certified, and the lack of uniform procedural rules across districts for the preservation and certification of electronic evidence by notaries (Ni, 2016; Wu, 2018). Because of these reasons, the certification provided by the notary of electronic evidence can at the most ensure that electronic evidence was not altered in and after the collection process; it cannot guarantee that the evidence per se is reliable and authentic prior to collection. Therefore, there is a possibility that the notary may be “deceived” (Wang & Fan, 2018).

According to the Civil Procedure Law of the People’s Republic of China, when evidence may be destroyed or difficult to obtain at a later time, a party may, in the course of litigation, apply to the court for evidence preservation, and the court may also take preservation measures on its own initiative (Article 81); the law further specifies that application for evidence preservation can also be submitted prior to the litigation or arbitration. These conditions for evidence preservation are applicable to electronic
evidence as well; thus, parties can apply to the court for electronic evidence preservation. The probative force of electronic evidence preserved by the court is higher than that of evidence printed out and certified by a notary or copyright society. However, the issue that the reliability and authenticity of electronic evidence prior to active evidence preservation cannot be established is not resolved with this method either; additionally, the intervention of the judge on evidence preservation might create bias and therefore compromise the litigation process (Wang & Fan, 2018).

In comparison with the above three approaches, maintenance of electronic evidence by a trusted third party appears to be the most promising approach as it resolves the issue of maintaining the trustworthiness of electronic evidence during its whole lifecycle from creation to maintenance, collection, transfer, to presentation, if the third party can start the evidence preservation procedure prior to the creation of the records that may be submitted as evidence. It is asserted that electronic evidence preserved using this method has the highest probative force (Wang & Fan, 2018). Nonetheless, this method is not without its own drawbacks and complications, such as establishing the credibility and capability of the third party in acting as a trusted preservation party, the methods and mechanisms for the uploading of electronic data to the third party’s servers, and the methods for the maintenance of electronic data in the third party’s servers, among others. At the moment, this is one of the most popular approaches used for electronic evidence preservation in China.63

---

63 For instance, Ancun (安存), an emerging Chinese company focusing on digital evidence preservation, has partnered with China Mobile, China Unicom, China Telecom, Aliyun, China Notary, the National Service Center, the Office of Security Commercial Code Administration (OSCCA), Taobao.com, and other organizations to offer a one-stop solution
The above discussion on the approaches most frequently used in the submission of electronic evidence in civil litigations and their drawbacks indicates that the distinction between the reliability and authenticity of electronic evidence and the methods that can be used to protect these qualities have not been fully grasped by the Chinese law field. Yet, recent studies show that Chinese scholars are making progress in examining the meaning of the two concepts of reliability and authenticity, the distinction between them, and the methods that can be used to examine and verify them.

For instance, Liu (2017b) investigated the reliability of electronic evidence when he argued that the issues examined are about the “relevance” of evidence. Nonetheless, by identifying the issues related to relevance, Liu (2017b) provided a new perspective to approach the issues involved. The theoretical foundation of Liu’s ideas is that electronic evidence exists in a virtual space that is comprised of bytes and that investigators can only use certain tools to examine this space as they cannot enter it like they do with a physical space (Liu, 2017a). Accordingly, electronic evidence has the following three characteristics. First, electronic evidence does not exist in isolation but is the product of codes and software that interact with each other based on certain rules; as a result, all electronic evidence is comprised of the following three categories of data: content, data about the creation and maintenance of the content (e.g., creator, format, version, sender, etc.), and data about the trail of the previous two categories of data on the media (e.g.,

---

to the preservation and authentication of digital evidence. So far, they have products for the preservation and authentication of emails and phone calls. Taking phone calls as an example, after users purchase such service, the phone calls they make will simultaneously be recorded and preserved in Aliyun, one of the biggest cloud service providers in China. Later, if there is litigation, users can retrieve these recordings from Ancun, who, upon request, also offers Notary services to prove the integrity and authenticity of the recordings. What is required for such notary services is to provide documents proving that the applicant is the owner of the phone number from which the requested phone calls were made. In the case of emails, the establishment of the relationship between the legal or physical persons and their email address is the first step to set up such services.
cache file, directory, hibernation, etc.) (Liu, 2017a). Second, electronic evidence is stable in that it is not possible to make any change without leaving any trails (Liu, 2017a). Third, electronic evidence is multidimensional in that the virtual space should be seen as a site where different pieces of electronic evidence interact with each other to tell the whole story (Liu, 2017a).

On the basis of this understanding of electronic evidence, Liu (2017b) argued that the reliability or, in his words, the “relevance” of electronic evidence is about the correspondence between activities in the virtual space and those in the physical space. It consists of two dimensions: content “relevance” and medium “relevance”, with the former referring to the correspondence between the content of the electronic evidence and the facts in the case; and the latter referring the correspondence of person, activity, object, time, and space involved in the disputed fact between the virtual space and the physical space (Liu, 2017b). Further, Liu (2017b) believes that the implementation of the following policies and practices will facilitate the determination of the reliability, or in Liu’s review “relevance,” of the electronic evidence: (1) records management policies, (2) policies for the management of electronic devices and media, (3) documentation of the evidence collection process, (4) corroboration of electronic evidence by means of other types of evidence, such as documentary evidence, oral testimonies, and (5) digital forensic examination.

The authenticity of electronic evidence is an issue that is better understood in comparison with the concept of reliability; and Chinese law scholars start recognizing that the authenticity of electronic evidence is not equivalent to the authenticity of the statements.
contained in the evidence, which should be examined for their reliability (Liu, 2018). As discussed above, the approaches that are commonly used in electronic evidence preservation in civil cases and the provisions enacted on the collection, transfer, display, and examination of electronic evidence are essentially methods for the protection of the authenticity of the electronic evidence. Some methods proposed for the examination of the authenticity of electronic evidence include: digital forensic examination, chain of custody examination, and comprehensive examination (Liu, 2017c; Liu, 2018).

Writings from the Chinese records and archives management field on the evidentiary capacity of electronic records emerged in the late 1990s, and increased in recent years with the amendment of the three procedural laws and the enactment of juridical interpretations on the admission of electronic data as evidence. While most of these writings aim to improve the admissibility of electronic records in litigations, they mostly approach this topic from two perspectives: 1) identifying gaps in the law and records and archives management fields that hinder the admissibility of electronic records as evidence in legal proceedings, and proposing improvements to address these gaps (some examples of publications taking this perspective include Cui (2016), Wang (2003), Xiao & Duan (2018), Yu (2000)), and 2) identifying the provisions relevant to records and archives management on the basis of which to develop requirements for the management of electronic records that would improve their admissibility (some examples of publications adopting this perspective include Cai (2015), Li (2017), Zhang (2010), Zhu & Zhang (2017)).
Some legal gaps identified by Chinese scholars inhibiting the admissibility of electronic records include deficiencies in existing provisions on the legal effectiveness of electronic records, deficiencies in evidence laws on the rules governing the admission of electronic records, deficiencies in the applicability of the best evidence rule to electronic records, and deficiencies in the rules governing the examination of the authenticity of electronic records (Xiao & Duan, 2018; Wang, 2003; Zhang, 2007). Some records and archives management gaps which inhibit the admissibility of electronic records include lack of a coherent set of regulations which should consist of general requirements, specifications, and standards, to guide the management of electronic records; conflicts in administrative control over the management of electronic records; lack of effective measures over the management of metadata; lack of robust security measures; and lack of layman technologies for the management of electronic records (Cui, 2016; Zhang, 2007; Xiao & Duan, 2018; Yu, 2000). And, Chinese scholars recognize that it is records managers and archivists’ responsibility to guarantee, to the fullest extent and via management measures, the integrity and authenticity of electronic records (Huang, 2000, p. 26).

However, almost all of these writings are opinion pieces. There are no empirical studies on this topic. Besides, rarely have Chinese scholars in the records and archives management fields distinguished between civil cases and criminal cases when it came to the difficulties facing the parties submitting electronic records as evidence in court.

---

64 Two exceptions are Cui’s (2016a) and Yu and Zhang’s (2007) papers. Yet, even though it is highlighted in the title of these two papers that their focus is on admissibility of electronic records in civil cases, their content does not reflect such distinction as there is rarely a discussion on the difference between submitting electronic evidence in civil cases and in criminal cases.
Furthermore, few\textsuperscript{65} of these writings approach the admissibility of electronic records systematically from the point of view of the rules governing their admission. All these gaps in existent writings make the present study necessary and unique.

2.3.2 Managing Records as Information

Where records and information managers have traditionally concentrated on the \textit{evidential} qualities of records, they are now realizing a greater interest in the \textit{informational} content of records that can be used for decision making and action… There is no doubt that the newly focused work of RIM professionals has, in many ways, become more central to the core business of organizations as they seek to preserve intellectual property and gain competitive advantage in an increasingly volatile environment. (Emphasis in original) (Myburgh, 2002, p. 37)

\begin{quote}
– Sue Myburgh
\end{quote}

While safeguarding the evidentiary capacity of records is the primary responsibility of records and archives managers and is what differentiates them from other information management professionals, an enterprise records management program that is solely justified based on its ability to demonstrate legal and regulatory compliance and protect the organization in legal proceedings is not adequate, as this is essentially “a defensive strategy” (Sprehe, 2005). This “defensive strategy” is usually justified from a risk management decision to prevent the organization from potential dangers resulting from lack of compliance; however “in itself [it] does nothing to further the positive pursuit of the enterprise’s goals and mission” (Sprehe, 2005, p. 299). To avoid overreliance on a “defensive strategy” and demonstrate the usefulness of records for advancing an enterprise’s goals and mission, it is necessary to design and implement policies and

\textsuperscript{65} A few exceptions are Ding’s (2011b), Huang’s (2000), Zhang’s (2010), Yu & Zhang’s (2007), Wang’s (2003), and Zhu & Zhang’s (2017) papers. However, instead of the best evidence rule, the authentication rule, and the exception to hearsay rule, the rules they examined are relevance, legality, and authenticity.
methods for the utilization of the informational content of records to support business operations, decision-making, and strategic planning.

A review of literature in the records and archives management field shows that writings discussing theories, principles, and methods for the utilization of the informational content of records are scarce. In the late 1990s and early 2000s, a body of records management literature emerged that discussed the concepts of “strategic information management” and “knowledge management”, highlighting the role of records as containers of information and the use of this information to achieve a competitive edge. Yet, these discussions gradually waned, particularly after the Enron-Arthur Andersen scandal and the enactment of the Public Company Accounting Reform and Investor Protection Act of 2002 (or The Sarbanes-Oxley Act), when the records management literature came to be dominated by discussions on risk management and good records management for accountability and transparency. The usefulness of information in the records, though always acknowledged, has rarely been thoroughly researched and discussed.

Referring to the five stages that Cornelius Burk and Forest Horton (1988) identified to show the focus of change as information management matures, Myburgh (2002) argued that the focus of records management had moved from the efficient management of the

---

66 The Enron-Arthur Andersen scandal featured the bankruptcy of Enron, an American energy company, which used Market-to-market accounting, special purpose entities, and poor financial reporting to hide its losses, and the dissolution of Arthur Andersen, an accounting firm to the Enron, which was convicted of obstruction of justice as it instructed its employees to destroy all records relating to the Enron except the basic information.

67 As an Act enacted in wake of the Enron scandal, its goal was to improve corporate accountability and the integrity of the financial and accounting systems of publicly held companies.

68 These five stages are: stage 1 paperwork management; stage 2 management of corporate automated technologies; stage 3 management of corporate information resources; stage 4 business competitor analysis and intelligence; and stage 5 strategic information management.
records to the strategic use of the information in the record, which emphasizes the use of information for decision-making and the overall improvement of business performance, and called this trend strategic information management.

Different definitions have been offered of strategic information management; for instance, Dearstyne (2004) defined it as the “imaginative, systematic management and use of information to achieve objectives that are clearly aligned with and contribute to the organization’s objectives” (p. 30). Most definitions are consistent in that they identify the goal of strategic information management as the achievement of organizational objectives; in addition, they all state that, although IT is important to strategic information management, it is information that actually counts.

Strategic information management involves understanding “how and why people search for information,” “how they evaluate that information,” “when they stop looking,” “how they use the information they have found,” and “how information containers or documents can be described and organized so that they can be retrieved effectively” (Myburgh, 2002, p. 42). Adequately performing these tasks requires knowledge of business practice, organizational culture and dynamics, fundamental information management, retrieval theory, and information gathering. In concluding her paper, Myburgh (2002) also noted that, “to some extent…the traditional work of records and information managers is and always has been about strategic information management”; however, in light of the changing societal, educational, and legal issues and the pervasive effects of information technology, records and information managers must adapt in order to survive (p. 43).
Two years later, Bruce Dearstyne (2004) wrote another article reiterating the relevancy of strategic information management to the field of records and information management, though the concept per se was still being developed. Yet, after 2004, the concept of strategic information management all but disappeared from the records and information management discourse.

Knowledge management is another concept that might be relevant in exploiting the information in the records. Interest in knowledge management in the field of records and information management surged in the late 1990s and early 2000s, as shown by the many related papers and books published during that period on this topic. This interest however gradually declined after this period, to the point that, in 2004, Kenneth Tombs (2004) declared in the title of his paper that “knowledge management is dead: long live records management.” As a concept, knowledge management has to be examined in order to understand its relationship to records management, even if its incorporation into records management has never actually happened.

Depending on the perspective adopted, knowledge and knowledge management can be defined in different ways. As it regards knowledge, a differentiation between the state of knowing and the body of knowledge can be found in various definitions (Saffady, 2000). In the context of this dissertation, the definition that Davenport and Prusak (1998) proposed in their book will be adopted. It describes knowledge as “a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of knowers. In organizations, it often becomes embedded not only in
documents or repositories but also in organizational routines, process, practices, and norms” (Davenport & Prusak, 1998, p. 5). Knowledge can further be divided into tacit knowledge and explicit knowledge, with the former referring to knowledge undocumented and embedded in the human mind and the latter referring to knowledge that is codified and documented.

Taking into account its relationship with records management, knowledge management is most frequently defined as “a discipline that promotes an integrated approach to identifying, capturing, evaluating, retrieving, and sharing all of an enterprise’s information assets. These assets may include databases, documents, policies, procedures, and previously un-captured expertise and experience in individual workers” (Harris et al., 1999, p. i).

As to their relationship, knowledge management and records management are regarded as complementary, interrelated, sharing a common purpose in achieving organizational objectives through systematic management of specific information-oriented resources (Duffy, 2000a; Hughes, 2003b; Juma & Mzera, 2017; Saffady, 2000). Hughes (2003b) argued that knowledge management is not a distinct and discrete discipline, and its success relies on it “being at the heart of the business process of an organization and integral to all such processes, including records management” (p. 119). This is primarily because records, as the by-product of business activities, are an important embodiment of an organization’s knowledge (in particular explicit knowledge) and intellectual capital that is accessible and organized (Duranti & Xie, 2012; Phillips, 2000; Saffady, 2000) and
can therefore be considered as “a precursor to and a precondition of knowledge” (Saffady, 2000, p. 6).

To facilitate the extraction of knowledge from records, it is critical that records be made accessible or, as Duffy (2000b) observed, examples of knowledge management programs show that knowledge management is inherently about information retrieval. To systematically distill and capitalize on the knowledge inherent in records requires the guidance of a set of principles, standards, methods, and practices; though the knowledge management field is rather vague about the details (Duffy, 2000a), this can be done in the following ways:

- understanding what requirements the organization has for knowledge;
- decomposing the records and identifying separate information units, such as executive summaries, abstracts, main text, graphics, tables, charts, cross-reference;
- indexing the separate information units;
- identifying how the separate information elements relate to each other by accessing similar units in an aggregation of records;
- adding an intervention stage to the process of managing records, which has the intention of deriving value from the records, and adding value to future activities by, for instance, retrieving the key nuggets from records, examples of best practices, the prime instances of what the organization does best, etc.;
- combining records with other intellectual assets, such as books; and
• combining records with tacit knowledge. (Duffy, 2000a; Hughes, 2003a; 
Hughes, 2003b).

If knowledge management and records management are complementary, while a well-
implemented records management program will facilitate the extraction of knowledge 
from records, the success of knowledge management will—in addition to helping the 
organization to sustain a competitive advantage—demonstrate how organizations can 
utilize their own records to create knowledge and how records management can add 
value that goes beyond meeting legislative, regulatory, and administrative requirements 
(Hughes, 2003a).

Nonetheless, the pursuit of knowledge management by records managers can engender 
some conflicts as well, especially with “the need to minimize the risks associated with the 
use of records as evidence” (Duffy, 2000a, p. 64). From a risk management perspective, 
records will have to be disposed of in an accountable manner (i.e., destroyed or 
transferred to long-term preservation) once they’ve reached the end of their retention 
period, so that the information will not be discoverable in future legal proceedings and 
cause unwanted harm to the organization. However, from a knowledge management 
perspective, it is vital that records be retained so that information contained in them can 
be exploited and leveraged. To address this emerging dilemma, the use of records for 
knowledge management may be an additional factor to be considered when determining 
the retention period of records.

What implications does the incorporation of knowledge management into records 
management have for records management professionals? Yakel (2000) maintained that
“archivists and records managers have long been knowledge managers” (p. 24), though she did not elaborate further on this assertion. Further, Yakel (2000) stated that to stay relevant in emerging knowledge-creating organizations, records management professionals have to embrace the mission of the organization and the functions that must be supported, understand how and when records are used and could be used, and provide the right information, in the right amount, in the right package, and at the right time.

There are also other forms of relationship that exist between records management and knowledge management. For instance, Duranti and Xie (2012) state that the relationship between knowledge management and records management can be transformative when organizations utilize externalized knowledge in the conduct of business and document this knowledge in the records which are the by-product of the business activity, inclusive when knowledge management activities are considered as one type of business activities and the knowledge products considered as records, reciprocal when knowledge assets are used for the development of records management rules, supportive of the theoretical development, and essential for the practical implementation of knowledge management.

As discussed in section 2.2.2, the informational use of records has been the main focus of Chinese enterprise records management work ever since its early establishment. More recently, a report on the development of enterprise records management in China published by the Association of Chinese Archivists has declared that a new paradigm is to manage enterprise records and archives as knowledge assets (Zhang et al., 2014). Other Chinese archival scholars shared this view by asserting that knowledge management has become the newest of archival research and will lead the innovation and
growth of record and archives management (Ding, 2011a; Xu & Wang, 2004). Yet, writings from the Chinese records management field on knowledge management seem not reflect the strategic importance accorded to it, as most of them are by practitioners and focus on exploring the relationship between knowledge management and records management and the importance and benefits of using knowledge management concepts for the exploitation of the content of records (Some examples include (Liu, 2015b), (Sun & Wang, 2016), (Zhou, 2012)). There is a lack of systematic and robust research studies on this topic.

2.4 Cloud-based Services

2.4.1 Definition and Characteristics of Cloud Computing

The technology that enables the delivery of cloud-based services is cloud computing, which, from a historical view, is the most recent form of computing provision model, following the terminal-mainframe era, the PC era, the network era, the Internet era, and the grid-computing era (Voas & Zhang, 2009). In the terminal-mainframe era, people used a dumb terminal to connect to the mainframe that was shared by many users and which performed computing (Voas & Zhang, 2009); in the PC era, stand-alone personal computers (PCs) obtained much higher internal capacity such that they could perform basic tasks independently (Voas & Zhang, 2009); in the network era, personal computers (PCs) were connected through a local network, allowing them to share resources (Voas & Zhang, 2009); in the Internet era, local networks were connected to other networks, thereby leading to a global network, which allowed them to get access to resources around the world (Voas & Zhang, 2009); and in the grid-computing era, geographically
distributed resources (e.g., cluster systems, data storage facilities) were utilized and aggregated through standardized middleware to deploy computing-intensive applications (Foster, 2002). The capacity of personal computers has been increasing exponentially throughout this evolution.

The core technologies underlying and enabling cloud computing include grid computing, virtualization, utility computing, and autonomic computing (Zhang, Cheng, & Boutaba, 2010). Though these technologies are not new, it is their combination that distinguishes cloud computing from any existing distributed computing model (i.e., grid computing), other types of web services, and traditional IT outsourcing.

“Cloud computing was not invented by any one architect—person or company”; rather, it emerged from the infrastructure created by the major web service providers originally for their own core businesses; for instance, Amazon built the cloud provision infrastructure to address the surging demand for computing resources by its online retailing service (Kushida, Murray, & Zysman, 2011, p. 224). As a result, the popular understanding

---

69 Virtualization is a technology that abstracts away from underlying physical infrastructure, thus making the physical hardware transparent to end users and providing virtualized resources for high-level applications. It allows the “computing power of a single machine to be subdivided into a number of smaller virtual machines by permitting a single piece of hardware to run multiple operating systems or multiple sessions of the same operating system,” enabling end users to share the same machine while at the same time giving the impression that their application is running on a separate, dedicated machine (Yoo, 2011, p. 407). A Virtual Machine (VM), a key technology for virtualization, is “a software implementation of a machine (for example, a computer) that executes programs like a physical machine” ("Virtual machine", n.d.). In general, there are two types of virtual machines depending on where virtualization occurs: process virtual machines and system virtual machines (Smith & Nair, 2005). As a technology that enhances “software interoperability, system impregnability, and platform versatility” (Smith & Nair, 2005), the Virtual Machine is critical to many characteristics of cloud computing, for instance, the ability to accommodate users’ on-demand needs, elasticity, and scalability.

70 Utility computing refers to the pay-per-use pricing model adopted by cloud computing. This is enabled by the other supporting technologies of cloud computing, such as grid computing, virtualization, and autonomic computing.

71 Autonomic computing enables the computing system to automatically respond to internal and external change without human intervention (Zhang et al., 2010). It is essential to the core services of cloud computing, for instance, discovery and replication, load balancing, and resource management, as discussed in Rimal, Choi, and Lumb (2010).
shared today about cloud computing has its roots in the common business challenges that prompted big companies to establish the cloud computing infrastructure.

Depending on where the cloud is hosted and the degree of exclusiveness to the client, there are four deployment models of cloud computing: public cloud\(^{72}\), private cloud\(^{73}\), community cloud\(^{74}\), and hybrid cloud\(^{75}\). As a service-oriented architecture (Vouk, 2008), cloud computing mostly delivers services at the following three different layers:

- **Infrastructure as a Service (IaaS)**\(^{76}\),
- **Platform as a Service (PaaS)**\(^{77}\), and
- **Software as a Service (SaaS)**\(^{78}\). However, a rapidly growing body of functionalities based in the cloud are now highlighting their connection with cloud computing and the characteristics implied by such connection, such as Archiving as a Service\(^{79}\) (Askhoj, Nagamori, &

---

\(^{72}\) Cloud infrastructure in which services are delivered by a third party cloud service provider over a network and are open for public use.

\(^{73}\) Cloud infrastructure operated solely for a single organization and for its exclusive use; it can be managed internally or by a third party.

\(^{74}\) Cloud infrastructure shared among several organizations from a specific community with common concerns (e.g., security, compliance, jurisdiction, etc.), whether managed internally or by a third party.

\(^{75}\) A composition of two or more clouds (private, community, or public) that remain distinct entities but are bound together.

\(^{76}\) Provision of processing, storage, networks, and other fundamental computing resources where the consumer is able to deploy and run arbitrary software, which can include operating systems and applications. The consumer does not manage or control the underlying cloud infrastructure but has control over operating systems, storage, and deployed applications, and possibly limited control of select networking components (e.g., host firewalls) (Mell & Grance, 2011, p. 3).

\(^{77}\) Provision to the consumer of the capability to deploy onto the cloud infrastructure consumer-created or acquired applications created using programming languages, libraries, services, and tools supported by the provider. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, or storage, but has control over the deployed applications and possibly configuration settings for the application-hosting environment (Mell & Grance, 2011, pp. 2-3).

\(^{78}\) Also known as cloud-based applications, are applications hosted by a vendor or service provider using cloud infrastructure and made available to customers via a network, typically the Internet. Customers can access the applications through a web browser or a program interface.

\(^{79}\) As per this concept, records and archives management functionalities are offered and consumed as services (Askhoj et al. (2011b), Askhoj et al. (2011a)). The information types described in the OAIS reference model for example (i.e., digital object (bit-sequence), content data object (digital object + representation information), information package, and function) are converted into layered services, with each layer built on services offered in the layers(s) below, and in turn offers services to the layer above, and layers can be abstracted so that when considering the SaaS layer, there is no need to worry about the operation of the layers below it. The concept covers the entire record lifecycle, including the migration and transfer between information management systems; each organization simply needs to choose the required layer of service.
Sugimoto (2011b); Askhoj, Sugimoto, & Nagamori (2011a) and InterPARES Trust\(^{80}\) Preservation as a Service for Trust (PaaST)\(^{81}\) (Thibodeau et al., 2018).

Some benefits brought by the use of cloud-based services include the following:

- **Scalability.** Users can scale up and down the computing capacity they require based on their changing needs so that they don't need to purchase and maintain large numbers of in-house servers, most of which would sit idle for most of the time;

- **Ubiquitousness.** Users can access the service anywhere anytime as long as they have a portal and Internet service;

- **Enhanced security.** For users who do not have the resources (e.g., IT staff, hardware, and software) and therefore are not able to deploy and maintain robust and state-of-the-art security measures, the cloud services which are run and maintained by professionals indicate a higher level of security;

- **Easy to deploy and maintain.** The services can be deployed in a much shorter time frame in comparison with applications developed in-house, which usually require tremendous amount of resources to research, develop, deploy, and maintain; and

---

\(^{80}\) As the fourth phase of the InterPARES project series which commenced in 1998, the InterPARES Trust project (ITrust 2013-2018) aims to “produce frameworks that will support the development of integrated and consistent local, national, and international networks of policies, procedures, regulations, standards, and legislation concerning digital records entrusted to the Internet, to ensure public trust grounded on evidence of good governance and a persistent digital memory” (InterPARES Trust, 2018); it has conducted many sub-projects specifically focusing on issues relating to records entrusted to the Internet.

\(^{81}\) The PaaST project builds on earlier InterPARES project findings and provides “a comprehensive set of functional and data requirements that support preservation of digital information regardless of the technologies used or who uses them” (Thibodeau et al., 2018, p. 8). The requirements are intended to be technological neutral in that they can be used not only for authentic preservation in the cloud but also in-house preservation or other hybrid contexts. Additionally, the project provides criteria for evaluation and demonstration of the preservation actions.
• Low cost\textsuperscript{82}. The reduced cost is usually justified by the fact that users don’t need to pay for the expenses associated with the purchase and maintenance of in-house servers, licenses of software, and IT staff, and instead pay on a use basis (Cunningham, 2016; Cunningham & Wilkins, 2009; Datskovsky, 2016).

2.4.2 Challenges Posed by the Use of Cloud-based Services to Records Management

Not unlike other emerging technologies, the use of cloud-based services raises great legal, operational, and technical concerns for the storage and management of records, which, if not addressed, will threaten “the long-term trustworthiness and sustainability” of the data and records stored in the cloud (NARA, 2010, n.p.).

It is widely acknowledged that the primary cause underlying the records management concerns arising from the use of cloud-based services is that, while the physical custody of data and their control is entrusted to the cloud, the responsibility for the protection, management, retention, and disposition of the data in compliance with legal, regulatory, and operational requirements remains with the organizations (Barnes, 2010; Blair, 2010; Datskovsky, 2016; Ferguson-Boucher & Convery, 2011). As a result, while many of the concerns raised are similar or even identical to those posed when an organization manages the data in its in-house servers, the characteristics of cloud computing and the

\textsuperscript{82} There are conflicting views concerning whether the use of cloud services will in the long term save money or not. For instance, in their examination of two cases involving cultural institutions using cloud for digital preservation, Oliver and Knight (2015) highlighted that the shift towards digital preservation in the cloud suggested a funding model changed from “capital expenditure (CapEx)” to “operating budget (OpEx)”, which from a long-term preservation perspective, could be much more complicated. Additionally, McLeod and Gormly (2018) found that, while there were models for estimating cloud storage costs, these models were not widely used by archivists and records managers in their decision-making process; moreover, they found that these models were inadequate to estimate the storage cost for long-term and permanent records storage.
inexperience and inadequacies of the legal systems in dealing with the emerging
technology add an additional layer of complexity (Barnes, 2010; Ferguson-Boucher &
Convery, 2011).

Most cloud-based services were designed and implemented without regard for records
management principles, and therefore are not able to perform life-cycle management of
records in accordance with records management rules (Cunningham, 2016; Cunningham
& Wilkins, 2009; Ferguson-Boucher & Convery, 2011; Gatewood, 2009; NARA, 2010;
Stuart & Bromage, 2010).

For instance, in a separate study\textsuperscript{83} in which this author surveyed the use of Software as a
Service (SaaS) applications—one type of cloud-based service—by organizations and
their influence on business practices and records management, it was found that, despite
the fact that SaaS applications were reported as the most popular (66.67%) storage site
for the data/records created by the organizations, and more than half of SaaS applications
(52.38%) were reported also functioning as records management systems, among those
SaaS applications reported functioning as records management systems, only 60.87% of
them were reported able to dispose of records in a managed, systematic, and auditable
manner in accordance with the organization’s retention and disposition schedule, and
only 65.22% of them were reported able to classify records in accordance with the
organization’s classification scheme. These numbers suggest the following two areas of
risks: records are stored in SaaS applications that are not functioning as records
management system; and SaaS applications that claimed to be functioning as records
management systems.

\textsuperscript{83} Pan, W. (2017). Records creation and maintenance in the context of Software as a Service (SaaS) applications survey
management systems are not able to adequately fulfill such purpose. The results of this study are consistent with a previous observation that most cloud service providers only apply a blanket retention period rather than dispose of records in accordance with a disposition authority (Cunningham, 2010; Cunningham, 2016).

In another survey focusing specifically on records retention and disposition in a cloud environment, Franks (2015) found that only half of responding organizations’ retention schedules addressed content that was evidence of an activity or transaction and which was only stored in a cloud service. This suggests organizations have not examined the content generated and stored in the cloud and placed it under the organization’s control.

Other concerns include, for instance: 1) cloud users may not be aware of the geographic locations where the cloud service providers’ data centers are located and this might have legal implications, as some countries might have restrictions on the transfer of data to jurisdictions that could not provide the same level of protection (Datskovsky, 2016); 2) due to the use of a multitenancy architecture, which is a key enabling technology of cloud computing, allowing multiple users to share resources, yet giving them an impression of an exclusive space, the data of one user may become comingled with that of others using the same service, and this may lead to unauthorized access if the vulnerability of the application is exploited (Mather, Kumaraswamy, & Latif, 2009); and 3) the use of the data stored in the cloud for litigation purpose, including e-discovery, legal hold, and computer forensics might be challenging; more specifically, it is doubtful whether the organization can provide a list of the information (including its backup) it holds and its locations, whether the service provider can lock down the information in the event of a
lawsuit, and whether computer forensics techniques that were designed for a traditional in-house environment can be effectively applied in the cloud environment to establish the integrity of the data and obtain uncontaminated copies (Barnes, 2010; Cunningham, 2016; Cunningham & Wilkins, 2009; Gatewood, 2009).

While whether the cloud has embedded records management functionalities into its design is a significant issue, the adequacy of the strategies and principles developed for the management of records in the physical world requires reexamination as well if those records are to be transferred to the cloud environment (McLeod, in press; Stuart & Bromage, 2010). For instance, Michetti et al. (in press) suggest that archivists should question the assumptions underlying traditional practices and consider the opportunities presented by emerging technology to enhance existing practices. In a case study, Pan and Mitchell (2015) found that the international organization being examined would retain records stored in the cloud longer than the period originally designated in light of the low cost (or absence of cost) for the storage of records, the easiness of reusing the information contained in records, and the data analytics functionalities offered by the SaaS application in exploiting the information in the records.

A further issue is how to prove the reliability and authenticity (i.e., the evidentiary capacity) of data stored in the cloud so that they can be used by the creating organization for legal and compliance purposes (Cunningham, 2010; Gatewood, 2009; Ferguson-Boucher & Convery, 2011; NARA, 2010). This is one of three categories of trust issues identified by the InterPARES Trust project, including: trust in the digital data/information/records (their accuracy, reliability and authenticity, but especially the
latter over the long term); trust in the systems and services; and trust in the parties involved (McLeod, in press). The major threats identified include the lack of records management control on the data stored in the cloud (Stuart & Bromage, 2010), the lack of “formal technical standards governing how data are stored and manipulated in cloud environments” (NARA, 2010, n.p.), and the lack of ability to monitor and audit the cloud provider’s service (Ferguson-Boucher & Convery, 2011).

As to the third threat, for instance, in the previously mentioned survey conducted by this author, it was found that while about 76% of respondents indicated that their organization considered the data/records created and/or maintained in the SaaS application capable of serving as evidence of their business activities and transactions, only about 38% of respondents admitted that they were familiar with the SaaS application’s metadata schema, which is crucial to assess the trustworthiness of records. This lack of availability of metadata, which can be used to prove the authenticity of data is also confirmed by an analysis of existing cloud service contracts (Bushey et al., 2015).

To mitigate these risks, it is commonly suggested that records managers be pro-active and involved in the evaluation and procurement of cloud-based services so that issues and risks can be considered and effectively addressed (Barnes, 2010; Blair, 2010; Cunningham, 2016; Cunningham & Wilkins, 2009; McKemmish, 2013; McLeod, 2019; Stuart & Bromage, 2010). Further, one conclusion of the InterPARES Trust project is that while in theory the creators should be responsible for the data stored in the cloud, since

---

they don’t have the ability to control the whole lifecycle of the data, some responsibilities should be shared between the creators and the cloud service providers (McLeod, in press).

It is frequently suggested that the issues identified with the use of cloud-based services must be explicitly addressed in the contractual documents (e.g., Service Level Agreement (SLA), Terms of Service (ToS), Terms and Conditions (T&C)) with the cloud service provider to ensure that cloud service providers deploy robust techniques and measures to mitigate potential risks, and to hold them accountable. Various checklists have been developed to make sure that relevant issues can be addressed in the contract (e.g., Barnes, 2010; Bushey et al., 2015; Cunningham, 2016; Ferguson-Boucher & Convery, 2011; Gatewood, 2009; McKemmish, 2013). For instance, the Checklist for Cloud Service Contracts developed by the InterPARES Trust project has included issues around data ownership and use, availability, retrieval, and use, data storage and preservation, data retention and disposition, security, confidentiality, and privacy, and data location and cross-border data flow (Bushey, Demoulin, How, & McLelland, 2016).

2.4.3 The Use of Cloud-based Services in Enterprises in China and Challenges Posed by Their Use to Records Management

According to a white paper published by Chinese Academy of Information and Communications Technology (CAICT)\(^{85}\) (2018a) on the development of cloud computing in China, cloud computing market size in China is worth 10.076 billion US dollars in 2017, and its use is spreading from the Internet industry to government, finance,

\(^{85}\) The CAICT is a scientific research institute under the Ministry of Industry and Information Technology (MIIT) of China. It is identified as “a specialized think-tank for the government and an innovation and development platform for the industry” with a mission to support the formulation of major strategies, plans, policies, standards, testing, and certification in China’s information and communication industry (CAICT, 2018d).
communication, transportation, health, and other traditional industries. Among public-cloud services market, IaaS contributes to major market share, and among private-cloud services market, hardware contributes to major market share (CAICT, 2018a). Despite this, CAICT (2018a) stated in the white paper, the market size of China is relatively small and there is a 3-5 year gap with the worldwide cloud market.

Approximate 55 percent of Chinese enterprises are using cloud-based services, 34.7% of which are exclusively using public-cloud services (CAICT, 2018b) and 13.4% of which are exclusively using private-cloud services (CAICT, 2018c). Security (67.2%) and high degree of control (51%) are the most frequently voted reasons that motivate enterprises to choose private-cloud services; and private-cloud services are mostly used for the support of internal information systems, such as enterprise management system (48.1%) and office automation (OA) system (47.8%) (CAICT, 2018c). Data security is the most emphasized aspect (62.7%) of the security capacity of private-cloud services, followed by Internet segregation (40.1%), Internet attack defense (33.7%), application security (21.8%), remote backup (17.9%), and server security (7.9%) (CAICT, 2018c).

“Reducing capital expenditure investment” (56.4%) and “ability to scale up and down quickly” (52.6%) are the two most cited reasons for choosing public-cloud services and security is the highest expressed concern for not using public-cloud services (53.6%) (CAICT, 2018b). Cloud host (71.1%) and cloud storage (56.6%) are the two mostly used public-cloud services, with SaaS applications (e.g., OA, CRM) being used only by 30.6% of Chinese enterprises that use public-cloud services (CAICT, 2018b). More than one-third of Chinese enterprises that use public-cloud services have moved more than thirty-
percent of their applications and data into the cloud (CAICT, 2018b). “Products and services offered are not varied” (46.7%) and “the security of information cannot be guaranteed” (42.4%) are the two mostly encountered issues in the use of public-cloud services (CAICT, 2018b). When users are signing the Service Level Agreement (SLA) with the public-cloud service provider, “availability of the service” (61.1%) and “data resiliency” (48.7%) are the two mostly emphasized issues (CAICT, 2018b).

The results of the survey conducted by the CAICT on Chinese cloud market and the use of public-cloud and private-cloud services among Chinese enterprises show that the Chinese cloud market is less developed and far from mature considering the relative small market size, the market share are mainly contributed by services at the infrastructure level (e.g., IaaS, hardware for building private cloud), and that the services/products offered are not varied and cannot meet users’ demands. Additionally, it was found that data security is a critical factor affecting the cloud deployment model chosen and the assessment of the cloud services; CAICT (2018a) notes that the use of cloud services has changed the responsibility of parties involved for the management of the risks arising in that users and cloud services providers should collaboratively protect the security of data, which should be managed throughout its lifecycle (p. 30).

The Chinese records and archives management field has been researching on the opportunities and challenges cloud computing has brought to the field ever since 2010. Yet, a review of the literature shows that Chinese records and archives management academics and professionals mainly focus on the opportunities—for instance, building “digital archives in the cloud” or archives community cloud (Huang & Xie, 2011; Yang,
2017), utilizing cloud computing to upgrade the information technology capacity of archives (Fang & Guo, 2010), and enhancing services provided (e.g., archival information resource integration (Niu & Han, 2013), archives management (Cui & Zhang, 2013), remote backup (Huang & Xie, 2011)), and sharing (Liang, 2015)—and rarely do they discuss the challenges the use of cloud services are posing for records management from the perspective of records creating organizations. In a literature review conducted by Xue and Huang (2011), they stated that, up until then, there was no paper published in Chinese focusing on electronic records management in the cloud context.

Ever since 2011, there are a few papers published discussing, for instance, the security and confidentiality of records in the cloud (Du et al., 2017) and contract with cloud service providers from the perspective of records management (Zhang, 2017; Zhu, 2017) in the Chinese context, which are products of the InterPARES Trust Asia team and, therefore, have heavily drawn on the research conducted by InterPARES Trust North America team and English Literature.

Du et al.’s (2017) paper presents the result of a study parallel to InterPARES Trust North America team study #6 entitled “Retention and Disposition in the Cloud”; it found that Chinese cloud service contracts were focusing on specifying the management responsibility the service providers can avoid and records management requirements, including security and confidentiality requirements and the responsibility of each party was not clearly specified (Du et al., 2017). As a result, Du et al. (2017) concluded these cloud services could not guarantee the reliability, authenticity, integrity, and usability of records stored in them. Zhang’s (2017) paper presents the result of a study parallel to
InterPARES Trust North America team study #14 entitled “Trust in Cloud Service Contracts”. More specifically, Zhang (2017) discussed the Checklist for Cloud Service Contracts developed by this study and examined some of the issues that are relevant against the Chinese legal and regulatory context. The issues identified include ownership of data, the use of data, data disposition, evidentiary capacity of data, data location and trans-border migration, and termination of contract (Zhang, 2017). Though endeavoring to conduct parallel studies in the Chinese context, a shared problem between these two studies is that they didn’t recognize the difference between the Chinese records and archives management system and those in North America, for instance, the retention and disposition schedule in China is different that that in North America.

Zhu’s (2017) paper investigated the cloud contract from a legal perspective focusing on the storage of records and archives in the cloud. One issue that Zhu (2017) highlighted is the evidentiary capacity of records in the cloud when negotiating a contract with the cloud service provider; he further noted that cloud service providers usually do not include terms in the contract that can effectively guarantee the evidentiary capacity of records because 1) cloud service providers do not have a clear understanding of records management requirements and standards, 2) it is hard for them to provide the level of protection required, or 3) they are not willing to do so because of the cost. But Zhu (2017) does not specify what kind of terms, if included, can safeguard and demonstrate the evidentiary capacity of records stored in the cloud.

---

86 For a detailed discussion, please see section 5.4.2.
2.5 Summary

Due to historical reasons, and in particular the fact that China was adopting a centrally planned economy after its foundation in 1949, all enterprises existed as public institutions and were under administrative control with respect to different aspects of their operations (including records management) prior to the launch of the reform and opening up policy and the establishment of a socialist market economy in 1970s. As a result, though many enterprises have exited from the public sector and gained independence in every aspect of their operations, the way their records management work is organized basically remains unaltered. Furthermore, partly by reason of their close connection with the government, the focus of enterprise records management work has been mostly on managing scientific and technical materials and records as information and knowledge assets to contribute to research and development and operational and strategic purposes rather than promoting accountability and transparency, which require the protection of the evidentiary capacity of records. The recent assertion made by the Association of Chinese Archivists that the new paradigm of Chinese enterprise records management is to manage enterprise records as knowledge assets further confirms the continuing prevalence of this mindset in Chinese enterprise records management work.

Yet, it has been shown that, while there have been attempts to systematically exploit the information in the records both in China and around the world (for example by using strategic information management and knowledge management), these initiatives are not widely practiced. Therefore, currently, except for records management methods such as
basic retrieval, it appears that there is a lack of systematic methods, standards, and best practices for leveraging the information contained within records.

The enthusiastic embracing of information technology for the transformation of business activities by the Chinese government and its industries has raised serious challenges to the existing regulatory, legal, and management framework, to the extent that the framework has to be updated so that any obstacles to and concerns about the use of information technology can be removed and the transformation brought by the digital era can be promoted. However, the review conducted in this chapter also shows that the progress is rather slow with respect to the updating of the legislations on the admissibility of electronic data as evidence in legal procedures and to the promotion of a thorough electronic records management from a regulatory perspective.

With regard to the admissibility of electronic records as evidence in legal proceedings, in comparison with Canada, where a great many studies and opinion pieces have been published by the legal and records and archives management professionals to examine the relevance and adequacy of the three traditional rules of admissibility (i.e., authentication, best evidence, and the business records exception to hearsay rules) in governing the admission of electronic records, and the statutory law has been updated to incorporate clauses on the examination of electronic evidence, the development in China is rather slow. Moreover, while electronic data is considered a type of documentary evidence in Canada, the three major procedural laws in China identify electronic data as a separate type of evidence different from documentary evidence. While this is beneficial to the examination of the nature and characteristics of electronic data and can avoid any
restraint imposed by a paper mindset, it is also likely causing inconsistencies in the management of paper and electronic records and making rules for the admission of documentary evidence irrelevant. Despite recent contributions by Chinese legal scholars, the rules governing the admission of electronic data in litigations are unclear. This is complicated by the lack of disclosure procedure for electronic data in civil procedures and the prevalence of the use of conscience and reason by the judge in the examination of electronic evidence.

With respect to regulatory requirement for electronic records management, the Chinese government currently is still requiring a dual-copy system for the maintenance of electronic records, which is increasingly criticized by Chinese scholars and practitioners for its being resource intensive, creating inertia for research on electronic records management, and marginalizing the role of electronic records. The Chinese government will need to reconsider the benefits and risks of this dual-copy system and determine a schedule for its lift. And, though there are specifications and measures published on the maintenance of electronic records, most of them are targeted at public records created in the government and public institutions and it is not clear how widely used are these specifications and measures in practice and their applicability for the protection of the evidentiary capacity in the private sector.

The storage and management of data in the cloud further complicates the situation, especially as it regards the protection and demonstration of the trustworthiness of records. This is because data stored in the cloud usually are not subject to records management principles, there is a lack of formal technical standards governing the storage and
manipulation of data in the cloud, and cloud service users lack the ability to monitor the performance of the cloud in terms of carrying out records management requirements. These issues raise serious challenges for the use of data created by or stored in cloud-based services for legal and regulatory purposes. At the moment, research and studies are suggesting the use of contractual documents to make sure that records management concerns can be adequately addressed and users can have the ability to prove the trustworthiness of data stored in the cloud. Similarly, the Electronic Records As Documentary Evidence (CAN/CGSB-72.34-2017) standard suggests that cloud users demonstrate the trustworthiness of their records by requesting that service providers give them access to “the identity and recordkeeping metadata” of the records and demonstrate the integrity of the system.
Chapter 3: Methodology

A case study method was employed to address the research question. According to Yin (2008), the case study method is

An empirical inquiry that investigates a contemporary phenomenon in depth and within its real life context, especially when the boundaries between phenomenon and the context are not clearly evident. (p. 18)

One distinguishing feature of the case study method is its ability to allow researchers to gain an in-depth understanding of a phenomenon in its context through multiple sources of evidence. The origin of the term “case study” is associated with that of case history, which is widely used in clinical fields such as psychology and medicine (Hamel, Dufour, & Fortin, 1993, p. 1). It is now a research method used across a variety of fields, e.g., anthropology, social science, political science, medicine, and law. The case study method is particularly suitable for answering “how” and “why” questions (Yin, 2008). As the qualitative research for this dissertation seeks to grasp “how” records are managed as evidence and information in the context of cloud-based services in organizations, the case study method is deemed suitable.

According to Robert Stake (1995), a case must be a well-bounded, specific, complex, and functioning “thing” (e.g., a person or a program) and not a generality (such as the relationship among schools or an education policy) (pp. 1-2). Similarly, Yin (2008) advises that the definition of “case” be related to the way the research questions are framed, and the desired case should be some real-life phenomenon involving spatial, temporal, and other concrete boundaries, rather than an abstraction (e.g., a topic, an argument, or a hypothesis) (pp. 31-32). Following Yin’s and Stake’s suggestions, in this
research, a case is defined as an organization that uses cloud-based services, which is a specific, functioning unit, and well-bounded. Within the organization’s boundaries, there are a records management program, a records management system, a cloud-based service, business activities, an organizational structure, and so on. Outside the organization’s boundaries, there are the legislative, administrative, political, economic, and technological contexts.

One characteristic of the case study method that is frequently the target of criticism is the limited number of cases studied, which is believed to affect the generalizability of its findings. However, the cases under study do not represent a “sample” as in quantitative research. Rather, the goal of employing the case study method is “to expand and generalize theories (analytic generalization) and not to enumerate frequencies (statistical generalization);” therefore, the findings of a study employing the case study method are “generalizable to theoretical propositions and not to populations or universes” (Yin, 2008, p. 15).

Taking into account the above considerations, as well as the resource- and time-consuming nature of case studies, this study examined two organizations that use cloud-based services.

3.1.1 The Two Cases

The identification and selection of cases was carried out with the help of Chinese scholars. This researcher contacted her former professors in China, stated her research purpose, and requested guidance in identifying appropriate cases for study. The criteria for the
identification of cases were that the organization be an enterprise, and use at least one cloud-based service. In the end, two cases were identified and selected.

The two cases identified and selected are two Chinese enterprises; Case 1 is a Sino-foreign joint venture with limited liability, and Case 2 is a state-owned enterprise. Case 1 uses a Digitized Elevator Service Maintenance System deployed in the cloud—thus, a cloud-based service, and Case 2 uses a SaaS application called *Cloud Communication*. The nature of both the two enterprises and the cloud-based services they use is significant in that it provides valuable information for answering the research question of this study.

The Digitized Elevator Service Maintenance System in Case 1 is a customized software application hosted in a public cloud; its use is not open to the public but rather is restricted to Company 1 (i.e., the Company in Case 1) and it is designed and developed by the Company. The Digitized Elevator Service Maintenance System is a line of business system that is essential to the delivery of the maintenance service offered by Company 1. The *Cloud Communication* in Case 2 is a public-cloud based Software as a Service (SaaS) application that is designed, developed, delivered, and maintained by the service provider. *Cloud Communication* is an instant communication system, which is meant to facilitate collaboration. Both applications are identified as cloud-based services (Blair, 2010).

There are many types of enterprises in China in terms of their form of ownership; for instance, there are state-owned enterprises, private enterprises, wholly foreign-owned enterprises, Sino-foreign joint ventures, and individually owned enterprises. While the two companies examined in this research could not represent all types of enterprises in
China, they nevertheless represent two very different groups of enterprises in China and provide the desirable basis for comparison. The state-owned enterprises are no doubt deeply influenced by the Chinese historical context in terms of its political, economical, technological, and records and archives management reform history. And the Sino-foreign joint ventures, in some ways, represents the groups of companies that do not have the records and archives management system commonly used in state-owned enterprises and hence the basis to use the specifications, measures, and policies published by the state for the management of electronic records, which raises the question as to how they can manage their electronic records so that their evidentiary capacity can be recognized by the state and the court to prove their business activities.

This author believes that these two cases effectively complement each other, offering a valuable, unique, and complementary insight into the management of records as evidence and information in enterprises in China, particularly in relation to the problems that might be encountered by enterprises in China for the protection and demonstration of the trustworthiness of records in China.

3.1.2 Data Collection

The questions guiding the collection of data were:

- **Question 1**: What are the organization’s strategies, policies, administrative structure, technology infrastructure, culture, regulatory environment, and other contextual factors that might influence its records management practice? What are the organization’s digital strategy and cloud strategy?
• **Question 2**: How are records currently managed (including any records management policies, administration, software used, etc.) in the organization?

• **Question 3**: What is the background for the introduction of a cloud-based service? What are the main functionalities of the cloud-based service? How are records generated by and stored in the cloud-based service being managed?

• **Question 4**: What methods have been used to guarantee the trustworthiness of records so that they can serve as evidence of regulatory and legal compliance?

• **Question 5**: What methods have been used to exploit the informational content of records for strategic and operational purposes?

A multi-method approach was employed for data collection, encompassing document analysis, semi-structured interviews, and site visiting.

As a “systematic procedure for reviewing or evaluating documents—both printed and electronic (computer-based and Internet-transmitted) material” (Bowen, 2009, p. 27), it is believed that document analysis “is likely to be relevant to every case study topic” (Yin, 2008, p. 101). For Case 1, the types of documents analyzed include media releases, Terms and Conditions regulating the relationship between Company 1 and the city archives, application procedures for the certification of elevator maintenance data maintained at the city archives, national and local regulations on elevator service management and maintenance, and other relevant documents. For Case 2, the types of documents analyzed include media releases, Electronic Records Management System User Manual, records management policies (including Measures for Enterprise Records Management, Rules for Enterprise Scientific and Technical Records Management, Rules

Semi-structured interviews ensure that the research topic can be covered while allowing for new themes to emerge. Interview questions were written beforehand to guide the interview and make sure that key areas were covered. Separate interview questions were prepared for each interviewee based on their role and responsibilities within the companies, the research purpose, and what had been learned so far (Interview questions in Chinese and the English translation for each interviewee can be found in Appendix B Interview Questions for Case 1 and Appendix C Interview Questions for Case 2). For instance, for Case 2, Interviewee 6 (Director of the internal Archival Unit of Company 2) has been interviewed four times, each time with different interview questions.

Interview questions were pre-tested with two colleagues and refined based on their suggestions. All interviews were conducted in Chinese and in-person. A copy of the interview questions was sent to the interviewees prior to the interview. This author went through the consent form (Consent form in English and the Chinese translation can be found in Appendix A Interview Consent Form) with each interviewee prior to the interview and answered questions they had. If the interviewees had no further questions, they were asked to sign the consent form before proceeding with the interview. Each
interview lasted from 40 minutes to two hours and a half. All but three interviews were audio-recorded with the permission of the interviewee and transcribed immediately afterwards. Personal identifying information that could identify the interviewee or the organization was removed and substituted by a number, e.g., Interviewee 1, Interviewee 2, Company 1, Company 2, etc. Extensive notes were taken for interviews that were not recorded, and a memo was written outlining key points which emerged from these interviews immediately afterwards.

The selection of the interviewees was made on the basis of including key figures involved in the organization’s records management work and the management of the data and records stored in the cloud service studied. For Case 1, six interviews were conducted in total, three of which were with the CIO (Chief Information Officer), the application development manager of the IT (Information Technology) department, and the software development engineer of the IT department from Company 1. The remaining three were with the director of the city archives, an employee from the Digital Records Department of the city archives, and the head of the Enterprise Records Management Department of the city archives. All interviews were conducted on-site and during work hours.

For Case 2, the director of the internal Archival Unit and two employees of the internal Archival Unit of Company 2 were interviewed. Six interviews were conducted in total, four with the director of the internal Archival Unit and one with each of the employees. Four interviews were conducted off-site and two were conducted on-site. All interviews were conducted off-hours. A table of the role of each interviewee is provided below (Table 1).
### Table 1: Role of each interviewee in the two case studies

<table>
<thead>
<tr>
<th>Interviewee Identification</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interviewee 1</td>
<td>Software development engineer of the IT department in Company 1</td>
</tr>
<tr>
<td>Interviewee 2</td>
<td>An employee from the Digital Records Department of the city archives</td>
</tr>
<tr>
<td>Interviewee 3</td>
<td>Application development manager of the IT department in Company 1</td>
</tr>
<tr>
<td>Interviewee 4</td>
<td>Chief Information Officer (CIO) of Company 1</td>
</tr>
<tr>
<td>Interviewee 5</td>
<td>Director of the city archives</td>
</tr>
<tr>
<td>Interviewee 6</td>
<td>Director of the internal Archival Unit in Company 2</td>
</tr>
<tr>
<td>Interviewee 7</td>
<td>Employee of the internal Archival Unit in Company 2</td>
</tr>
<tr>
<td>Interviewee 8</td>
<td>Employee of the internal Archival Unit in Company 2</td>
</tr>
<tr>
<td>Interviewee 9</td>
<td>The head of the Enterprise Records Management Department of the city archives</td>
</tr>
</tbody>
</table>

During a site visit to Company 2, the director of the internal Archival Unit gave this researcher a tour of the archives and a demonstration of their systems, including the Office Automation (OA) system, the Project Management (PM) system, the Records Management system, and the *Cloud Communication* application.


#### 3.1.3 Data Analysis

Data analysis involved analyzing two types of data: documents and interviews. For documents, analysis involves “skimming (superficial examination),” “reading (thorough examination),” and “interpretation,” which “combines elements of content analysis and thematic analysis” (Bowen, 2009, p. 32). The content analysis described here is used as a qualitative analytic technique contrasting with the quantitative analytic technique, which codes text into explicit categories and then describes it using statistics (Hsieh & Shannon, 2005, p. 1278). Therefore, document analysis entails “a first-pass document review, in
which meaningful and relevant passages of text or other data are identified” (Bowen, 2009, p. 32).

As per Saldaña’s (2013) method, two cycles of coding were performed on the data. A combination of attribute coding, in vivo coding, and descriptive coding was used in the first cycle of coding; pattern coding was used in the second cycle of coding. Definitions for the coding methods are provided below.

- **Attribute coding** is a notation “of basic descriptive information such as: the fieldwork setting (e.g., school name, city, country), participant characteristics or demographics (e.g., age, gender, ethnicity, health status), data format (e.g., interview transcript, field note, document), time frame (e.g., 2010, May 2012, 8:00-10:00 a.m.), and other variables of interest for qualitative and some applications of quantitative analysis” (Saldaña, 2013, p. 70).

- **Descriptive coding** “summarizes in a word or short phrase—most often as a noun—the basic topic of a passage of qualitative data” (Saldaña, 2013, p. 88).

- **In Vivo coding** uses “terms used by [participants] themselves” (Strauss, 1987, p. 33) to code the data.

- **Pattern codes** are “explanatory or inferential codes, ones that identify an emergent theme, configuration, or explanation. They pull together a lot of material into a more meaningful and parsimonious unit of analysis. They are a sort of meta-code… Pattern coding is a way of grouping those summaries into a smaller number of sets, themes, or constructs” (Miles & Huberman, 1994, p. 69).
Interview transcripts were read three to four times prior to formal data analysis in order to obtain a deep understanding of their content and immerse this researcher in the interviews. Instead of using data analysis software such as NVivo, this researcher chose to use mark pen, pen, and hard copy interview transcripts for data analysis. More specifically, firstly, interview transcripts were read word-by-word and line-by-line; phrases that were found significant were highlighted with mark pen; and tentative codes and memos were assigned to segments following the rules of attribute coding (e.g., the characteristics of the enterprises, the functions of the records management department, and for a system, the time the system was implemented, its functionalities, the reason for its introduction, and the influences of the use of the system on the organization), descriptive coding (e.g., the advantages and disadvantages of traditional methods for records retrieval, evidence in paper format or paperless), and in vivo coding (e.g., “core data”, “non-core data”, “dual-copy system”, and “use of records”) and written in the margin of the text. Then, all codes along with relevant segments were transferred to a separate Word document. The Word document was then printed out and each code, along with relevant segments, was cut out to facilitate the organization of codes into categories (A list of some examples of the categories generated in Case 1 and Case 2 is provided in Appendix D). Afterwards, mind mapping software MindNode was used to organize the categories and relevant codes into a mind map (One mind map is provided in Appendix E to give a sense of the final product). Each mind map has a theme at the center and all the related codes are grouped around; one mind map is created for each category. The categories and codes in the mind maps are used to structure the presentation of the results. To make sure that the coding process was reliable and all relevant segments were identified, interview transcripts were
read again against the mind map generated to situate the codes and categories into their original context, and to revise the mind map where appropriate. The rules described above were applied for coding all the interview data. Data of Case 1 and Case 2 was analyzed separately. Data analysis was performed in May 2018.
Chapter 4: Case Study #1

4.1 Research Site

The first case studied is a Sino-foreign joint venture with limited liability (hereafter Company 1), focusing on the manufacture, sales, installation, maintenance, and modernization of elevators, escalators, and moving walkways. It is the regional headquarters of a renowned elevator company, which in turn is a unit of a corporation (henceforth its parent company), which is a leading provider for the aerospace and building systems industries worldwide. The elevator brand is present in many of the tallest buildings around the world. As one of the earliest elevator companies to enter the Chinese market, many landmark infrastructure high-rise projects in China have used Company 1’s equipment as well. Company 1 has six production bases and eight joint ventures manufacturing and selling products under three brands and covering more than 100 cities in China.

As part of a traditional electromechanical industry, the elevator brand has nonetheless continued to reinvent itself to sharpen its competitive edge and shape the future of the industry. With digital transformation occurring in various industries, the brand is keeping up by going digital. It is reported that, on a year-to-year basis, the brand’s investment in Research & Development and digitalization strategy increases 40%-50% every year. Currently, innovation in Company 1 is mostly associated with digitalization, connectivity, and “smart” technologies. The elevator company is striving to harness the power of information technology and use sustainable and environmentally friendly materials, methods, and products to make its elevators and escalators safer and more reliable and
innovative, and to lead the way into the future of the industry. The ultimate goal is to deliver superior passenger experience as well as superior value to its customers.

4.2 Background

4.2.1 Elevator Maintenance

The aim of elevator maintenance is to analyze the condition of the elevator by inspecting its components (i.e., in the machine room, the hoistway, or the car), predict the risk and probability of accidents, and provide remedial maintenance so as to ensure that the elevator operates safely and reliably, breakdowns and unscheduled repairs are avoided, and the life of the elevator is prolonged; tasks usually involved in elevator maintenance include regular inspection, adjustment, and lubrication (“elevator maintenance”, n.d.). Elevator maintenance plays a critical role in preventing accidents and ensuring the reliability and safety of elevators.

According to a report published by the Intelligence Research Group on the market demands and investment planning of the Chinese elevator industry, as of 2015, there were 4.26 million elevators and escalators in service in China, accounting for one third of all elevators and escalators in service around the world (Intelligence Research Group, 2017). Yet, when it comes to the number of elevators per person, as of 2015, every 10000 persons have 26 elevators in China, which is only one third of the average number around the world. Therefore, the Chinese elevator market is far from saturated.

In developed countries, as the demand for new elevator installation is very limited, elevator maintenance service has become the primary revenue stream and the industry is
well developed and mature. In comparison, in the Chinese market, new elevator manufacture and installation remains the primary revenue driver at the moment, and the elevator maintenance service market is still at an early stage of development and is less well regulated. Consequently, due to a variety of reasons\textsuperscript{87}, the elevator maintenance service market is currently characterized by disorderly and vicious competition to the extent that the elevator maintenance service provider has to lower the quality of the service they provide in order to remain profitable (He, 2016). This is at the cost of the safe and reliable operation of the elevator, its life span, and eventually, the safety of the passengers.\textsuperscript{88} According to a report, among the 48 elevator accidents that occurred in China in 2016, 13 were caused by the failure of safety accessories and protectors, which could have been avoided with proper maintenance (Deng, 2017).

Despite this, considering the large number of elevators in service in China, it is expected that elevator maintenance service will replace elevator manufacture and installation to

\textsuperscript{87} In the Chinese context, the manufacturers of elevators usually provide a few years’ (usually one or two years) free maintenance service after the installation and quality verification of the elevators. After that, the responsibility for the maintenance of the elevators is handed over to the owners of the property. The property owners usually hire a property manager, who, on behalf of the owners of the property, hires a maintenance service provider for the maintenance of the elevators. The property manager can choose to either extend the contract with the manufactures of the elevators or hire a new one. In China, companies that are qualified and allowed to provide elevator maintenance service can be loosely divided into the following five types: 1) companies that have the qualifications to install elevators, 2) companies that are subsidiaries of a property management company, 3) companies that have independent qualifications for elevator maintenance, 4) companies that are subsidiaries of an elevator manufacturing company, which therefore have the qualifications to provide elevator maintenance service, and 5) companies that do not have the qualifications but are affiliated with a company that has (电梯维保, 2017). The quality of the maintenance service provided varies greatly among these five different types of companies. It is reported that the fifth type of company currently holds about forty percent of the market share (电梯维保, 2017). From the perspective of the property managers, on the one hand, they have to consider the interests of the property owners; yet, on the other hand, they have to consider the cost of the maintenance. Given that there are often conflicts between owners of the property and the property manager concerning the reasonableness of the elevator maintenance fee, it is hard for the property manager to collect higher fees from the owners. Consequently, the property manager has to reduce the spending on elevator maintenance to maintain their profit level. Due to the unwillingness of the property manager to spend more on elevator maintenance, elevator maintenance companies that offer a lower price are more likely to win the bid. However, sometimes, the price can be set so low that it can hardly cover costs. To remain profitable, maintenance service providers have to lower cost in other areas, for instance, by hiring inexperienced maintenance technicians, by extending the maintenance cycle, by increasing the workload of each technician, and by doing shoddy work and using inferior materials, which have seriously affected the quality of the maintenance service they provided.

\textsuperscript{88} Other factors that contribute to this situation include that safety supervision authority does not adequately fulfill its responsibility and the flaws in existing yearly inspection system (Xinhua, 2015).
become the major revenue driver in the near future. In addition, the relevant authorities in China are issuing regulations and designing policies to control the vicious price competition between different service providers and guide the industry to formulate a healthy competitive market. For instance, the *Special Equipment Safety Law of the People’s Republic of China*, promulgated in 2014, stipulates that the maintenance of elevators shall be performed by elevator manufacturers or organizations that have obtained the license for the installation, modernization, and repair of elevators in accordance with this legislation (Article 45); it also requires that the elevator manufacturer regularly monitor the elevator’s safe operation, offer recommendations to the entity maintaining or using the elevators on addressing relevant issues, and provide necessary technical assistance (Article 46). The enactment of these provisions will help prevent the entry of companies that are not qualified to enter the market and promote the hiring of the manufacturer of the elevators to continue providing the maintenance service. In light of the market demand and policy support, elevator maintenance will certainly become an important business area for the sustainable growth of the elevator industry (Intelligence Research Group, 2017).

In terms of the regulatory requirements on elevator maintenance, the *Regulations on Safety Supervision of Special Equipment (2009 Revision)* requires that elevators be cleaned, lubricated, adjusted, and inspected at least every 15 days. According to Interviewee 3, the 15-day minimum maintenance interval is perhaps the shortest and strictest around the world, and has therefore significantly increased the cost associated with preventive maintenance—especially when maintenance is carried out on a paper-based and manual basis.
In China, other than those commissioned by certain elevator maintenance companies, there is no professional training in whatever form on elevator maintenance provided by colleges or universities. New maintenance technicians are often trained by way of apprenticeship (Interviewee 1). As a result, the maintenance is carried out according to technician’s experience and individual way of working and is unregulated and unstandardized (Interviewee 1), giving rise to issues of forgery of maintenance records, elevators left unmaintained, and components of elevators left uninspected (Chen et al., 2016). Moreover, due to the lack of professional training and unstandardized maintenance process, the technicians often neglect safety issues when conducting inspection, which is a major cause of accidents to them (Interviewee 1).

4.2.2 Going Digital

Innovation has been given a prominent place in shaping the story that the elevator brand tells about itself. The most recent strategy of innovation is characterized by the use of digital technologies. According to the President of the worldwide headquarters of the elevator brand, digitization is the future of the elevator brand and is considered an important milestone in the brand’s history; in addition to promoting the company’s sustainable and healthy development, digitization will also lead the technological reform of the whole industry.89 China, with its world-leading number of skyscrapers, growing urbanization, increasing public facilities, and large number of residential buildings, has provided the best stage for the digital transformation of the company; moreover, as the world’s largest market for the mobile Internet industry, China is leading the direction and

89 Media release.
demand of world intelligent applications, which provides the best opportunity for the realization of the company’s digital transformation.\(^90\)

The Digitized Elevator Service Maintenance System (Hereafter the System), which is the focus of this case study, is the outcome of digitization transformation in the field of elevator maintenance service in China. Ever since the rolling out of the System in 2013, Company 1, its worldwide headquarters, and companies in other regions around the world have been pushing forward with a digital strategy throughout the whole lifecycle of an elevator—including design, manufacture, and service—to provide high quality, high efficiency, and highly safe products and services. A series of applications have been developed and implemented, and many technologies have been utilized, including cloud computing, Internet of Things (IoT), big data, and mobile Internet.

For instance, one application has been developed to monitor the performance of elevators by collecting vast amounts of data generated during their operation using IoT products. The use of this application will improve transparency as it can provide customers with real-time data related to any elevator so that they can know immediately the current status of that elevator. The application can also give Company 1 more autonomy; for instance, when maintenance or repair is required, technicians can arrive at the site with knowledge of the elevator’s status as well as any problems, and can bring along the parts needed. In addition, the application can give customers more control over their equipment and

\(^90\) Media release.
building by harnessing data generated by the elevator brand’s 3 million elevators in service to generate predictive analysis reports. 91

Other than the monitoring application, other applications developed by the elevator company include one aimed at protecting technicians’ safety, one facilitating the parts-searching process, one assisting technicians in identifying issues relating to noise, one intelligently sending cars to lobbies where they’re needed by automatically detecting people crowds in critical areas, and one allowing users to call a lift from their phones.

4.2.3 Cloud Strategy

To a certain extent, Company 1 does not have its own cloud strategy; its use of cloud services has largely been influenced by its parent company’s cloud strategy. Though the concept of cloud computing has been around since at least the year 2010, according to Interviewee 3, at that time, the corporation was not very familiar with this new form of information technology (IT) provision; in addition, the parent company was cautious regarding information technology. Therefore, it was not until 2013 that the parent company started embracing cloud computing. Now, the corporation has a coherent and uniform cloud strategy; all its subsidiaries follow this strategy and any accompanying policies, standards, and regulations on the use of cloud services. Subsidiaries can choose from a list of cloud-based services purchased and offered by the parent company.

The Digitized Elevator Service Maintenance System, which will be discussed in more detail later, is the first among the corporation’s Chinese subsidiaries migrated into the

91 Media release.
cloud and is considered a pilot-test of the use of cloud services. Following the success of this case, other Chinese subsidiaries are gradually migrating applications into the cloud as well. According to Interviewee 3, about 20% to 30% of the corporation’s applications are now deployed in the cloud and, according to the corporation’s strategy, it is expected that all applications will be migrated into the cloud in the future.

When Interviewee 3 was asked whether any risks have been identified in considering the use of cloud services, he commented,

There are definitely risks. However, there will be risks as well if you deploy the application in an in-house environment. But as cloud computing matures, its security and protection measures mature as well. Besides, [Our cloud service provider] is the global collaboration partner of our parent company, and is also one of the biggest cloud service providers around the world. We believe our parent company has exercised due diligence in selecting it as our cloud service provider. Therefore, we believe the service is secure.⁹²

4.3 Records Management at Company 1

According to the Law of the People’s Republic of China on Chinese-Foreign Equity Joint Ventures (2016 Amendment), all activities of joint ventures shall abide by the provisions of the laws and regulations of the People’s Republic of China (Article 2). Records management activity should, as a result, comply with Chinese legislations and regulations. Yet this law does not contain provisions on records management. Other Chinese legislations and regulations that might address records management in Sino-foreign joint ventures include archival and industry legislations.

⁹² All the interview quotes in this dissertation are translated by this author.
A close examination of the *Archives Law of the People’s Republic of China (2016 Revision)* finds that its subject are archives of preservation value to the state and the society regardless of the nature of its ownership. For records that are owned by the state and have preservation value, the archival programs within the organization (i.e., the internal Archival Units or Archivists) have the responsibility to transfer them to the archival institutions at the respective levels after a certain period (Article 10). For records that are collectively owned, individually owned, or others that are not owned by the state, but which are of preservation value to the state or the society, as outlined by the respective archival administrations and the National Archival Administration of China, these records have to be transferred to the archival institutions as well (Article 2, *Measures for the Implementation of the Archives Law of the People’s Republic of China (2017 Revision)*). For records that are collectively owned or individually owned, but which are of preservation value to the state or society, or those which should be kept confidential, the *Archives Law* also dictates that the owners take proper care of them (Article 16) and “if the archives are considered liable to serious damage or unsafe because of the adverse conditions under which they are kept or because of any other reason, the national archives administration department shall have the right to take such measures as may ensure the integrity and safety of the archives, such as by keeping the archives on the owner’s behalf or, when necessary, by purchasing such archives or requisitioning them by purchase” (Article 16). As to how to determine the preservation value of records, Article 15 of the *Archives Law* states that “the principles by which the value of archives for preservation is appraised, the standards for determining the periods

---

95 In this law, all records are described as *dangan* (or archives in English). Yet, according to the terminology of this dissertation, when they are still in the records creating organizations, they should be identified as records.
of preservation, and the procedures and methods for destroying archives shall be formulated by the national archives administration department” and “unauthorized destruction of archives shall be prohibited.” Further, the Archives Law requires that state-owned archives and those specified in Article 16 of the Archives Law as well as their duplicates, “shall not be carried or transported out of the country without authorization” (Article 18).

The focus of the Archives Law is archival programs within the organizations and archives. Though the Measures for the Implementation of the Archives Law of the People’s Republic of China (2017 Revision) states that the responsibility of archival programs within the organizations includes guiding the creation, accumulation, and filing and transferring of records within the organizations, the authority of the Archives Law over records creation within the organization is very limited.

As to the relevancy of the Archives Law to the records management work at Sino-foreign joint ventures, this examination shows that, as long as the records and archives created by the enterprises are not deemed of preservation value to the Chinese state or society and are not considered confidential, its authority is very limited.

The Provisional Regulations on the Archives Management of Foreign-Funded Enterprises, promulgated in 1994, was formulated in accordance with the Archives Law of the People’s Republic of China and other relevant legislations and regulations concerning foreign-funded enterprises⁹⁴, with the aim to “strengthen the management,

---

⁹⁴ It is clarified in this legislation that foreign-funded enterprises include Sino-foreign joint equity ventures, Sino-foreign cooperative ventures, and solely foreign-owned enterprises.
protection, and the use of their archives for safeguarding their own legal rights and interests” (Article 1). This might be the most relevant legislation in terms of dealing with records management matters within Sino-foreign joint ventures. In this legislation, archives are defined as records in different forms generated in the conduct of various activities since the foundation of the enterprise, which are of referential and preservation value to the enterprise, the state, and the society (Article 2). The legislation stipulates that foreign-funded enterprises are the owners of their archives and therefore shoulder the responsibility for the protection of these archives (Article 3). Yet state archival administration at different levels and the government agencies overseeing foreign-funded enterprises have the right to supervise and inspect the archival work of foreign-funded enterprises within the industry or sector. This regulation also outlines the scope of records to be filed and transferred\textsuperscript{95} to the internal archival institutions and relevant departments (Article 6) and requires that foreign-funded enterprises should scientifically classify and manage these in accordance with relevant national standards and regulations and internationally advanced method (Article 8). In addition, it is required that, “after foreign-funded enterprises are terminated or disbanded, the archives of the Sino-foreign joint

---

\textsuperscript{95} The scope of records to be filed is outlined below:

1. records relating to the application, approval, and registration of the foundation and amendment of foreign-funded enterprises, and the liquidation after their termination and disbanding (including the statutes of the enterprises and the joint venture agreements signed by relating parties);
2. records created by the board or joint management body;
3. financial and accounting records and records created in the course of financial management;
4. records related to the management of salary, personnel, and legal affairs;
5. records related to operation management;
6. records related to scientific and technical management;
7. records related to the management of manufacture technology;
8. records related to the manufacture of products;
9. records related to basic construction;
10. records related to research and development, technology import, and technology transfer;
11. records related to education and training;
12. records related to competitive intelligence information;
13. records related to the Chinese Communist Party and the union; and
14. other records that are of referential and preservation value. (Article 6)
equity ventures and the Sino-foreign cooperative ventures should be given to the original Chinese sides to keep or be handed over to the local archival institutions” (Article 13).

Formulated more than two decades ago, the content of this regulation, and in particular the way it regulates records management work within foreign-funded enterprises, reflects Chinese records and archives management system and its underlying conception. Without further research, it is not clear what impact this regulation has on records management work in foreign-funded enterprises in China and, with more than two decades having passed since its initial enactment, whether this regulation is still adequate given the changes that have occurred since then. Academically, a search of writings whose subject focuses on this regulation in CNKI shows that it has extremely limited influence to the extent that only 15 sources were identified, with 13 of them published in the 1990s.

According to Interviewee 4, the records management work at Company 1 is distributed among different departments. There is no central records management or archival unit within Company 1 to uniformly and systematically manage different types of records generated by different departments in the conduct of business. For instance, at Company 1’s headquarters, personnel records and contracts are managed and maintained by the Human Resources department. At its branches, the management of different types of records (e.g., personnel records, service records, sales records, and contracts) may be distributed across three departments or may be assigned to one person if the branch is small. Elevator maintenance records in paper format are maintained by branches to facilitate their use by local quality and technical supervision authorities. At the moment, 

---

96 CNKI or China National Knowledge Infrastructure is an Internet publishing platform that contains journals, doctoral dissertation, master dissertation, conference proceedings, newspapers, reference books, yearbook, patents, classics, and international resources. It is the most frequently used platform for academic literature searching in China.
there is no digital records management; all the records (except the elevator maintenance records which will be discussed below) are in paper format. Yet, with the implementation of the digital strategy, the company is considering the digitization of records management as well. According to Interviewee 4, what the company is considering at the moment is the adoption of a document management software offered by its printers/scanners provider. It is envisioned that the document management software will be deployed in Company 1’s cloud, and when documents are scanned, they will automatically be uploaded into the cloud and managed by the document management software.


According to Article 35 of the Special Equipment Safety Law of the People’s Republic of China,

Article 35. Special equipment users\(^{97}\) shall establish special equipment safety technical records. Safety technical records shall include the following:

(1) special equipment design records, quality certificate of the equipment, instruction for the installation, use and maintenance of the equipment, inspection certificate, and other relevant technical materials and records;

---

\(^{97}\) Later, the Special Equipment Service Administration Regulation (TSG 08–2017) clarified the meaning of special equipment user by defining it as below:
Special equipment users refer to organizations or natural persons with full legal capacity and who have management obligations for the use of the special equipment; these usually are the owners of the special equipment or could be the actual manager of the special equipment hired by the owners with a formal contract in accordance with the law. For co-owned special equipment, the co-owners may entrust a property service provider or any other manager with the management of the special equipment, and the entrusted person is identified as the user; when co-owners do not entrust anyone with the management of the special equipment, the actual manager of the equipment is identified as the user; and when there is no actual manager, the co-owners are identified as the user (Article 2.1.1).

For most residential buildings, the owners usually contract with the property manager for the management of elevators, hence, the obligations and responsibilities for the elevator maintenance. For the purpose of this dissertation, the elevator user and property manager will be used interchangeably to refer to the entity that makes a contract with an elevator maintenance service provider.
(2) records of periodic inspection and regular self-inspection of the special equipment;

(3) records of daily usage of the special equipment;

(4) records of maintenance of the special equipment and its subsidiary equipment; and

(5) records of operational failures and accidents of the special equipment.

According to *Lift Maintenance Regulation (TSG T5002–2017)*, the elevator maintenance service provider shall create maintenance records for each elevator, incorporate them into the elevator safety technical records, and keep them for at least 4 years (Article 5). Also according to this regulation, when the maintenance service provider performs elevator maintenance, it shall record this activity. The record shall include at least the following content:

1. basic information and technical parameters of the elevator, including the names of the companies for its manufacture, installation, alteration, and repair, elevator classification depending on application (e.g., passenger lifts, goods lift, and goods-passenger lifts), product number, device code, elevator model number or elevator model number after the alteration, and basic technical parameters of the elevator;

2. the user, the location of use, and number of the elevator assigned by the user;

3. maintenance service provider, maintenance date, and maintenance technician (signature); and

4. items maintained (content), maintenance work performed, requirement satisfied, and detailed information on adjusting and replacing wearing parts.

Maintenance records should be confirmed with the signature of the safety management staff within the elevator using organization. (Article 7)

When technicians conduct elevator maintenance using paper records, they fill out two copies of the maintenance report: one kept by the elevator users; and one kept by Company 1. These maintenance records are kept at branch companies for 4 years. When
China’s General Administration of Quality Supervision, Inspection and Quarantine (AQSIQ) and local quality and technical supervision authorities (Hereafter safety regulators) perform regular inspection of elevators or when there are accidents that require investigation, they examine the maintenance records to determine if maintenance has been performed in accordance with the law. In China, at least three parties are involved for the safe and reliable operation of elevators: elevator users, elevator maintenance service providers, and safety regulators. Although both the elevator user and the maintenance service provider have the responsibility to establish and keep elevator safety technical records, which include elevator maintenance records, as required by Special Equipment Safety Law of the People’s Republic of China and the Lift Maintenance Regulation (TSG T5002–2017) respectively, in practice, safety regulators usually turn to elevator maintenance service providers for maintenance records for convenience when they conduct an inspection or investigation, as in reality elevator users usually cannot fulfill their responsibility to monitor elevator maintenance (Interviewee 3). Due to this, the elevator maintenance service providers usually have to manage a tremendous volume of paper records for accountability purposes. If maintenance service providers cannot provide the records requested by safety regulators, they will have to face penalties.

Yet, other than for accountability purpose, the business usefulness of keeping these paper records is very limited, as maintenance records in paper format are very difficult to use to support strategic planning, trends identification, maintenance improvement, and marketing. When elevator maintenance records are in paper format, maintenance supervisors need to read a great many records one by one and manually summarize and
identify issues related to maintenance. It usually takes two to three weeks for the senior leaders to receive feedback on maintenance. As Interviewee 3 commented,

Senior leaders cannot track the state of maintenance, for instance, whether maintenance has been completed on time, if anything special popped up in the course of the maintenance, and what is the customer’s feedback. This information cannot be obtained on time. Only at the annual inspection or when there is an audit that some information can be obtained. This way of feedback is too backward and slow. When the company is making a strategy or assigning a task, the maintenance records cannot provide informational support in time. The information is very hard to consult.

Because of the risk of not keeping and improperly keeping these records, and the difficulty experienced in exploiting the information contained in them for operational and strategic purposes, Company 1 usually views the responsibility for elevator maintenance records management as a burden.

4.5 Cloud-based System: The Digitized Elevator Service Maintenance System

In light of the issues experienced in manual and paper-based elevator maintenance, the strategic importance of elevator maintenance as the next revenue stream in the Chinese elevator market, and the implementation of a digital strategy in the parent company, in 2013, Company 1 designed, developed, and implemented the Digitized Elevator Service Maintenance System to replace paper-based elevator maintenance, which focuses on the digitization of elevator maintenance processes. This indicates the shift from paper maintenance records to digital records.
4.5.1 Design and Development

The System was designed by Company 1, but the development of the software was outsourced to a Chinese software development company (Interviewee 1). According to Interviewee 1, the design of the System is from the point of view of tool development; the System was envisioned to be a powerful assisting tool for elevator maintenance. Three departments were involved in the design of the System: the legal department, the information technology (IT) department, and the service department. The service department is the business owner of the System, providing information on elevator maintenance processes; the IT department provides technology support for the design, development, and maintenance of the System; and the legal department examined and identified all Chinese legislations on elevator maintenance to make sure that maintenance performed with the assistance of the System would conform with the law.

A list of regulatory requirements has been identified with respect to elevator maintenance, including elevator maintenance intervals, items to be maintained, signature from the customer, information to be recorded in the maintenance record, and others. Chinese legislation requires that maintenance on elevators shall be carried out at least every 15 days. To make sure that the 15-day maintenance interval requirement could be met, Company 1 set the maintenance interval in the System at 14 days so that, in cases where the maintenance schedule wasn’t being kept up, there would still be one day to remedy the situation. As to the maintenance checklists, the System basically follows what is required by the legislation.
Concerning the technological architecture of the System and its security measures for the protection of data, the System mainly follows the policies and standards set by the parent company, which are mostly from IT perspective.

When the System was first developed in 2013, it was deployed in the in-house server of Company 1. With the embracing of cloud services by the parent company, the System was the first in the Chinese region migrated into the cloud in 2014. Ever since, the System runs in the cloud. Two types of terminals are used for the System: laptop and smart phone. Each technician is equipped with an iPhone by the company to make them enjoy the benefits of the corporation’s digital strategy, and to facilitate their use of the System during elevator maintenance. Though it is a business phone, this smart phone can be used for personal purposes as well. Security measures of the company have been installed in the phone and restrictions have been set to protect the maintenance data on the phone.

4.5.2 Functionalities

The functionalities offered by the server side of the System deployed in the cloud include processing and analysis of maintenance data, generating maintenance schedules, synching with the contract system, and issuing of a warning when a violation of rules is detected.

On the client side, two different sets of functionalities are offered based on the role of the users: the managers or the technicians. For managers, the available functionalities include tracking the daily maintenance schedule, generating maintenance reports, formulating
new maintenance processes, scheduling tasks, visualizing maintenance processes, and optimizing maintenance routes. For technicians, functionalities embedded include confirmation and execution of daily maintenance work, collaboration, automated attendance checks and timesheets, digitized maintenance records and e-signatures, and maintenance safety checklists.

The following is a detailed account of a typical workday of a maintenance technician with the assistance of the Digitized Elevator Service Maintenance System. This account, provided by Interviewee 1, helps delineate the functionalities the smart phone provides in the execution of actual elevator maintenance by the technician.

A typical workday of a maintenance technician starts with him opening and logging in the System with his smart phone. Once he logs in, the technician will download the maintenance schedule of this day onto his phone. The maintenance schedule shows the elevators on which he will have to perform maintenance this day. Then, all technicians of a branch company will have a team meeting with their supervisors and confirm with their supervisors their maintenance schedule for the day. After a brief summary at the team meeting, the technician will start his day of work. He will first check the System and plan his route of the day. Once the technician arrives at the site, he opens the maintenance checklist for the elevator, follows steps to inspect each item as required by the maintenance checklist, and fills out the maintenance form. When the technician completes the maintenance, he shows the maintenance form on his phone to the person responsible for elevator maintenance at the elevator using organization, who will confirm the maintenance by putting his electronic signature on the phone. At a close of the day, the technician uploads all the maintenance data of completed maintenance to the servers of the System in the cloud.

Ever since its rolling out, the System has been expanded to cover more and more service work. For instance, the System now supports callback service as well. Unlike regular maintenance, which is preventive and carried out according to a schedule, callback service occurs when the elevator breaks down, someone is trapped in the elevator, the elevator does not operate properly, or something urgent happens; these events usually
require immediate action, and are therefore responsive and often urgent. Per Article 5 of *Lift Maintenance Regulation (TSG T5002–2017)*,

Elevator maintenance service providers shall set 24-hour maintenance hotline, ensuring that elevator breakdowns can be resolved in time. Upon receipt of the notice that people are trapped in elevators, the maintenance technicians shall arrive on the site to perform rescue within 30 minutes for a province-level municipality or a city with districts and within 1 hour for other districts.

When one of these problems arises and an elevator requires immediate action, the elevator user will call Company 1’s 24-hour hotline. The customer service representative who answers the phone asks for information concerning the problematic elevator (e.g., its location, the exact elevator, and a brief description of the problem) and enters this information into a system. Then, based on the information collected regarding the problematic elevator, the customer service representative decides which technician to send to the site and initiates an automated phone call to him/her notifying him/her of the problematic elevator. The technician would learn more about the callback from the System and then decide whether to accept the task or not. If he accepts the task, he stops the maintenance work at hand, puts up necessary safety signs, and sets off to the site of the problematic elevator. Once arrived at the site of the problematic elevator, the technician follows the guidance in the System step by step to assess risks, diagnose problems, perform repairs, and provide feedback concerning the repairs. As time is of the essence with a callback service, the exact time of each important event throughout the responding process is recorded with the aim of evaluating the quality and efficiency of the callback service and the performance of the technician.
4.5.3 Integration with Other Systems

The Digitized Elevator Service Maintenance System is currently integrated with the contract management system and the remote monitoring system (Interviewee 1). Integration with the contract system ensures that any new service contracts and relevant information concerning the elevators that have to be maintained can be synchronized with the System to generate a maintenance schedule.

The System is also primarily connected to the remote monitoring system, at the core of which is IoT-based monitoring technology and advanced data analytics. As a proactive maintenance strategy, the remote monitoring system installs sensors in different parts of the elevators and collects real-time signals, such as door operations and stopping accuracy. Advanced data analytics is then performed on the huge volume of data collected from millions of elevators to identify any pending problem. The results are then shared with the System, which sends maintenance technicians to fix the problem before it even happens. This significantly minimizes the chances of a breakdown. In addition, as unscheduled callbacks would disrupt technicians’ schedules, resulting in low labor utilization and increased cost, proactive monitoring maintenance considerably reduces cost and improves efficiency.

4.5.4 Implementation

The implementation of the System was carried out and managed by branch companies in different cities. Without a doubt, various issues were encountered during the implementation. While some of these issues relate to the transformation from paper-based
maintenance to digitized maintenance (i.e., a change in work habits), and some to the acceptance of the System (a challenge common to the implementation of all kinds of information systems), some are unique to the field of records and archives management. These issues reflect some fundamental struggles China has been facing throughout its process of going paperless. This section outlines these issues, while the next section will be dedicated to describing the solutions adopted by Company 1 in addressing these challenges.

Prior to the use of the System, Company 1 had to communicate with its customers (i.e., elevator users) regarding the change from paper-based maintenance to electronic maintenance, as according to the law, the elevator users will also have a receive a copy of the maintenance records; and the company had to communicate with the safety regulators as well to obtain their approval on the use of electronic maintenance records to account for their maintenance activity. The core issue is whether the effectiveness of digital data and records generated by the System and their ability to serve as evidence of elevator maintenance activity are recognized, thereby helping Company 1 and its customers to discharge their accountability to the safety regulators and resolve legal disputes. The following comments by Interviewee 4 are concise and insightful in defining the key issues at play here:

Actually, it is the legal effect of digital maintenance data and records [and their ability to serve as evidence in disputes and litigations], which are the key issues here. For instance, digital invoices are now legally recognized; and there is no need for certifying the authenticity of a printout copy of the digital invoice by a public/relevant authority with a stamp. However, in the case of the Digitized Elevator Service Maintenance System, when there are disputes or litigations on elevator maintenance, it is still an issue whether the digital maintenance records are legally valid. The solution we currently are using is that the city archives
administration [which serves as a trusted third party for the maintenance of the digital maintenance data] will print out the digital maintenance records and then stamp the printout to certify its authenticity. But, I was wondering if in the future it may be possible that the digital maintenance records per se will not need to be converted to paper format, or if it may be possible that an electronic stamp will be sufficient so that we will not need to go to the city archives administration to obtain a certified printout copy with stamp. All in all, I guess what I want to say here is going paperless should be thorough and real for it to be transformative; otherwise, it will be reduced to another formalistic practice and less meaningful [if the legal effect of digital records are not recognized, and they have to be converted into paper format for legal admissibility].

When Company 1 communicated to its customers the shift from paper-based maintenance to electronic maintenance, according to Interviewee 3, most customers did not care whether paper-based or electronic maintenance was used as long as the safety regulators gave their approval. It was also noted that only a small percentage of customers (for instance, in one province-level municipality, about one or two percent) insisted on paper maintenance records because they have their own paper-based records management system, and the majority of customers requiring only electronic maintenance records are foreign-based enterprises (Interviewee 3). It appears that the obstacles arising from the customer side and related to the transition from paper-based maintenance to electronic maintenance are few; the decisive vote lies with the safety regulators. In fact, approval by the local safety regulators\(^9\) has to be obtained in order for Company 1 to shift from paper-based maintenance to electronic maintenance.

Taking the city where the headquarters of Company 1 is located as an example, in 2014, Company 1 contacted relevant local authorities on this matter. The local safety regulator, after serious consideration and discussion with Company 1 on the major issues involved,

---

\(^9\) Company 1 has to negotiate with the safety regulator in each district where the company or its branches provide elevator maintenance service about the transition from paper-based maintenance to digitized maintenance, as if they want to use electronic maintenance records to prove their maintenance activities to the safety regulators in the future, they will have to make sure that the local safety regulators recognize the evidentiary capacity of these records.
eventually gave its approval for this proposal on the condition that maintenance data has to be transferred to a trusted third party and wouldn’t be altered. Therefore, as will be discussed in the next section, Company 1 invited the city archives to serve as a trusted third party for the maintenance of its electronic maintenance data. Currently, it is arranged that maintenance data generated in all branches of Company 1 in China be kept in this city archives. In an official letter\textsuperscript{99} addressed to Company 1 by the local safety regulator, it was stated that the local safety regulator approved Company 1’s request of using the Digitized Elevator Service Maintenance System for elevator maintenance within the city; that safety regulators and the customers of Company 1 could login onto the city archives’ website to access relevant digital maintenance data; and that, to those who needed original evidence, Company 1 would provide a print copy of the maintenance records stamped by the city archives and which were consistent with the digital records. The core issue here is the authentic maintenance of electronic records after their creation.

Later, in February 2016, China’s General Administration of Quality Supervision, Inspection and Quarantine (AQSIQ) issued the \textit{Guidelines for Encouraging Use of Paperless Elevator Maintenance Records} encouraging the industry to adopt information technology to improve the quality and efficiency of elevator maintenance management and safety supervision. This \textit{Guidelines} states below:

\begin{itemize}
\item[(1)] For those using information technology to create paperless elevator maintenance records, the format and content of and requirements for the paperless
\end{itemize}

\textsuperscript{99} The local safety regulator approved of Company 1 using the Digitized Elevator Service Maintenance System within the city. 2014. Internal document.
elevator maintenance records shall conform to Special Equipment Safety Law of the People’s Republic of China, the Elevator Service.

(2) For those using paperless elevator maintenance records system, its data cannot be altered in any form or degree in its maintenance in order to ensure their fairness, objectiveness, and security; and the system has to provide the data to be searched in real time.

(3) When special equipment safety regulator, inspector, user, and other relevant organizations need the original evidence of digital maintenance records, elevator maintenance service provider shall provide them with a print copy of the maintenance records stamped by the records maintenance organization.

(4) In the trial run stage of the paperless elevator maintenance system, paper maintenance records and digital maintenance records shall be used and kept simultaneously; when the system is officially launched, stop using paper maintenance records.

The first and second bullet points of this Guidelines was then incorporated into the Lift Maintenance Regulation as Article 10.

The content of these two policy documents at the local and state levels reflects the Chinese government’s concern over the integrity, accessibility, security, and legal effectiveness of electronic records in their maintenance. These concerns are also the reason why governments in different districts of China hold varying attitudes towards the use of electronic maintenance records, despite the state level approval and encouragement, as revealed by Interviewee 3. And a relationship can be identified between the economic development level of the district and its attitude towards going paperless: the more developed the district is, the easier it is to push forward with the paperless strategy, and the less developed the district, the more conservative it is towards going paperless and emphasizing the risks over the potential benefits. As confirmed by Interviewee 4, the core concerns identified are the legal effectiveness and the authentic maintenance of electronic maintenance records and electronic signatures. Another question that often arose when
Company 1 communicated with local authorities on going paperless was why maintenance records generated in the maintenance of elevators under their supervision had to be maintained in other places\textsuperscript{100} (Interviewee 4). This reveals a trust issue between authorities in different districts of China.

Nonetheless\textsuperscript{101}, there are also cities that are open-minded, flexible, and bold towards going paperless. For instance, the safety regulator of one city\textsuperscript{102} has developed and deployed its own electronic elevator maintenance system consisting of functionalities that can satisfy the needs of all involved stakeholders in elevator maintenance: the safety regulator, the elevator maintenance service provider, and the elevator user. The elevator maintenance service provider can use the system to carry out elevator maintenance, and maintenance records generated will automatically be kept within the servers of the safety regulator. If the maintenance service provider has already developed its own maintenance system, the safety regulator assists the provider to integrate the two systems so that maintenance records generated can be uploaded to the safety regulator’s system. All three parties involved can search maintenance records in this system, and the records maintained are considered official records and evidence of elevator maintenance.

4.5.5 The Influence

The use of the System has exerted tremendous influence on various aspects of elevator maintenance. First and foremost, the use of the System eliminated many issues in elevator maintenance and improved compliance with regulations and legislations. For

\textsuperscript{100} To clarify, as mentioned before, all the maintenance records generated by the branch companies of Company 1 in elevator maintenance are deposited in the city archives of the city where the headquarters of Company 1 locates.

\textsuperscript{101} Source of information for this paragraph is Interviewee 3.

\textsuperscript{102} A different city from the one where the headquarters of Company 1 is located.
instance, to address some common issues in elevator maintenance mentioned above—e.g., failing to maintain elevators on time, omission of critical maintenance items and improper maintenance, and maintenance data forgery—the System set the maintenance interval at 14 days rather than the 15-day period required by legislation, so that an extra day is built in to address any omissions. For important maintenance items, the System sets reminders to make sure that these items are not left out during maintenance. Managers can track the completion rate of both the maintenance schedule and maintenance items to make sure not only that elevator can be maintained on time but also that important maintenance items are not omitted. Regarding the issue of maintenance data forgery, the System requires that the customers affix their signature on the maintenance completed; additionally, maintenance data is stored in the city archives to protect its authenticity after its creation. More recently, the System has been upgraded to include a new feature wherein a Quick Response (QR) code is stuck to each elevator and the maintenance technician has to scan the QR code in order to start the maintenance; this can help avoid the issue wherein the technician may forge the maintenance data without actually conducting the maintenance or even physically being at the site.

Second, the use of the System has greatly improved management efficiency. All maintenance data is uploaded to the servers at the end of the working day. All kinds of analysis—e.g., completion rate of the maintenance schedule, completion rate of maintenance items, parts analysis, and damage rate—can be performed on the maintenance data, and this assists the managers to provide personalized and improved service to the customers. It is reported by Interviewee 3 that almost all service department perform certain analysis on the maintenance data.
Third, the use of the System can bring about changes in the work of the quality supervision authorities, as the safety regulators can implement lifecycle management of elevators and long-distance monitoring of elevators. As mentioned previously and commented by Interviewee 3, the 15-day maintenance interval requirement is perhaps the shortest and strictest around the world. One possible explanation is that, with so many elevators of varying quality and different ages to supervise, it is easier and safe to require that they all follow the strictest requirement. Yet, this adds additional burden and unnecessary cost to the big brands, whose products are of a high quality and who know their products well in terms of what will be the most suitable maintenance interval. With the implementation of digital maintenance systems like the one adopted by Company 1 and other digital monitoring technologies, it is now the best time for the safety regulators to collaborate with elevator manufacturers, elevator maintenance service providers, and other relevant stakeholders to discuss the possibility of revising the 15-day maintenance interval requirement and designing a more sophisticated program that can set tailored maintenance intervals taking into consideration the condition of the elevator, the maintenance quality, and other relevant factors, and delegate more power to the maintenance service providers to design intervals that are suitable for them.

Fourth, the use of the System has enabled maintenance technicians to follow the required procedures and has greatly reduced accidents. The System has set safety reminders at each step of the maintenance, and reminds the maintenance technicians to follow correct and safe operations. As confirmed by Interviewee 3, ever since the use of the System, the number of accidents occurring during maintenance has dropped considerably.
Lastly, the success of the System has greatly pushed forward the digital transformation at the parent company. The parent company has now fully launched the digital transformation program, aiming to leverage the benefits of information technology to transform its business and realize sustainable growth.

4.6 Trustworthiness of Elevator Maintenance Data

4.6.1 Elevator Maintenance Data

A variety of data is generated and captured by the System. As the System expands to include more and more areas of the maintenance technicians’ work, the types and amount of data captured and generated increases as well. Some examples of data captured include geographic coordinate information, results of safety analysis prior to maintenance, elevator maintenance items, timesheets, and all types of time (e.g., the time when a day’s maintenance results are submitted, the time when and place from which the maintenance technician sets off to the site, the time when the technician arrives at the site, the time when the technician starts site analysis, and the time when the technician finishes the repair). The elevator maintenance data generated is stored in database format.

As the System is deployed in the cloud, maintenance data is primarily stored in the cloud as well. Additionally, for security reasons, maintenance data is backed up in another cloud service. As Company 1 uses some of the maintenance data in its daily management, for convenience and efficiency reasons some data is also downloaded into its in-house servers.
When Interviewee 1 was asked how long maintenance data would be kept, he responded that it would be kept permanently; as to the methods used for permanent preservation, depending on the performance and capability of the cloud used and the System, maintenance data generated a few years ago will be pulled out of the System and stored separately as an independent file.

4.6.2 Measures Employed by Company 1 for Protecting the Trustworthiness of Elevator Maintenance Data

In addition to the data protection measures offered by the cloud, Company 1 has deployed security protection measures both in in-house servers and in the cloud. Company 1 mainly uses IT measures for the protection of maintenance data. As per Interviewee 1’s introduction, some examples of adopted measures include data encryption, transmitted data encryption, account management, server intrusion prevention, and access authorization. Relevant policies are in place as well to cope with emergencies, such as regular backup, disaster recovery, and steps undertaken in emergencies. The data protection measures and technologies employed by Company 1 comply with its parent company’s standards and policies. When Interviewee 1 was asked whether records management standards and policies were considered in the design and development of the System, he answered “No.”

In addition to the general measures mentioned above, another critical measure employed by Company 1 in protecting the reliability and authenticity of maintenance data is its conditional and traceable revision. According to Interviewee 1, maintenance data has been divided into core and non-core data with the agreement of the three parties (i.e.,
Company 1, the city archives, and the safety regulator). The criterion for the division of data into core and non-core data is whether the data is essential to the elevator maintenance activity. Some examples of non-core data are the elevator user’s name and contact information. Core data are those critical to the maintenance activity, such as maintenance items, maintenance date, etc. Non-core data can be revised, and core data cannot be revised. It is presumed that revision of non-core data will not affect the essence of the data to serve as evidence.

Notwithstanding the above, the revision of non-core data requires obtaining approvals from managers at different levels. Depending on the degree of seriousness of the revision, approvals from the head of the branch company, the CIO of the company, or the president may be required. What’s more, even in circumstances where a revision is deemed necessary, the revised maintenance data will be treated and generated as new data rather than overwrite the old data. Therefore, all the revisions undertaken will be traceable.

Additionally, according to Interviewee 1, another method for verifying the authenticity of maintenance data is a comparison between different copies of the data that are maintained in different places. For instance, the data maintained in Company 1 can be compared with data maintained in the city archives; the data maintained in the city archives can be compared with the data kept by customers; and a comparison can also be conducted between electronic maintenance data and paper records where applicable.

---

[103] As discussed previously, when property owners hire a property manager for the management of their property, the obligations and responsibility for the maintenance of elevators are entrusted to the property manager as well; and, in this case, the property manager is identified as the elevator user. As the property manager may change from time to time, the name of the elevator user in the elevator maintenance records has to change as well.
4.6.3 Archives as a Trusted Third Party in the Protection and Demonstration of the Authenticity of Elevator Maintenance Data

With the increasing use of the System for elevator maintenance in Company 1, another question arose: how to manage the elevator maintenance data generated in the course of elevator maintenance so that their authenticity can be protected and demonstrated and they can be used as evidence to help the company demonstrate its conformance to legal and regulatory requirements and defend its interests in litigations? (Interviewee 1) The ability of electronic data to serve as evidence of business activities is a critical issue here; and this is a common concern shared by the Chinese government and the court. As discussed previously, Chinese government at both the state and local level requires that “digital maintenance data cannot be altered in any form or degree in its maintenance in order to ensure their fairness, objectiveness, and security; and the system has to be searchable in real time.” The review of existing Chinese legislations, judicial practices, and relevant legal literature shows that the rules governing the admission of electronic data in court and the criteria that can be used to examine the fulfillment of the admission requirements (i.e., reliability and authenticity) are still developing. This leaves organizations like Company 1 in a state of uncertainty and confusion in managing electronic data and, therefore, is harmful to digital transition. In this confusing and ever-changing environment, organizations have to find their own ways about in terms of both harnessing the benefits of information technology and mitigating potential risks.

In the case of Company 1, the solution to address this uncertainty and confusion or to protect and demonstrate the authenticity of the maintenance data is to engage the city
archives as a trusted third party for keeping elevator maintenance data to guarantee the authenticity of the data, hence their ability to serve as evidence. This solution is one of the methods popularly adopted in the protection and demonstration of the authenticity of electronic data to facilitate their admission in court, including printing out the digital data and submitting the paper printout instead; digital evidence preservation undertaken by a notary or copyright society; digital evidence preservation undertaken by the court; and maintenance of digital evidence by a third party (Liu, 2015c; Ni, 2016; Wang & Fan, 2018). The following statements made by Interviewee 1 and Interviewee 3 have explained the rationale underlying this decision.

If it is us who maintain and supply the maintenance records, as you suspected, customers may cast doubt about the authenticity of the records. In other words, when we [the customers] search for maintenance information through your System, have you [Company 1] revised the records before providing us the information? For this reason, we collaborate with the city archives. We guarantee that all our data will be uploaded and maintained for a long term in the archives and will not be corrupted. [The ultimate purpose is] to establish mutual trust based on the principles of fairness and equality, I have to say. (Interviewee 1)

Our expectation is that the city archives can provide a space for the preservation of our maintenance data… During the negotiation, we discussed many issues such as how to prevent tampering of maintenance data and the process for providing maintenance data by the city archives… Our goal is that the city archives can provide a robust third-party guarantee of the maintenance data, either to the customers or to the safety regulators… What means the most to us is, as a third party, whether it can provide robust evidence of elevator maintenance to our customers and the safety regulators. As to other benefits of maintaining data in the city archives, such as open to the public, is not part of our consideration yet. (Interviewee 3)

When they were asked why they chose the city archives rather than a commercial third party for evidence preservation, they responded:

We trust government more… The credibility of government is higher, and likely easier to be recognized than commercial third parties. (Interviewee 1)
When asked his opinion regarding the credibility ascribed by Company 1 to the archives, Interviewee 5, the director of the city archives, attributed this credibility to the following factors: 1) citizens trust the authority of the government; 2) Chinese archives are fully funded by the government; 3) archivists are professionals in records and archives management; and they have established and matured methods for the management of records in paper and electronic format; and 4) the records the archives provide are more trustworthy, and the court and government is more likely to recognize them.

As to the archives’ views on it serving as a trusted third party for the maintenance of Company 1’s elevator maintenance data, according to Interviewee 5, as elevator maintenance data are representative of electronic records, the archives would like to use this project as an opportunity to test and promote electronic records maintenance and preservation, and eventually create the necessary and sufficient conditions for eliminating the dual-copy system. Furthermore, this can be considered as an expansion of the social function of the archives in addition to its primary responsibility of preserving public records.

After several rounds of discussion and a site visit, Company 1 and the city archives\(^{104}\) signed the contract and the Terms and Conditions (T&C)\(^{105}\) for this project.

According to the T&C, Company 1 is responsible for the security of elevator maintenance data in its transferring from Company 1 to the archives (Article 2.6). The archives guarantees that elevator maintenance data that has been transferred to the

---

\(^{104}\) This is the city archives of the city where the headquarters of Company 1 is located; elevator maintenance data generated by every branch company of Company 1 is transferred to this city archives.

\(^{105}\) Terms and Conditions between Company 1 and the local archives. Internal document.
archives will not be corrupted, and provides accurate elevator maintenance records to Company 1’s customers when needed (Article 3.3). The archives is responsible for the maintenance of elevator maintenance data, and, with the permission of Company 1, provides access to and certification of electronic elevator maintenance data to Company 1, its customers, and the safety supervision authorities (Article 3.7). The archives also guarantees that data entered into its system and elevator maintenance data in its custody are non-repudiable (Article 3.7). The archives guarantees the confidentiality of elevator maintenance data stored in its servers, and would not release the data to any third party without Company 1’s authorization (Article 3.4). Once the contract terminates, all data stored in the archives’ server should be destroyed immediately and should be unrecoverable after Company 1 has backed it up (Article 11.4).

4.6.3.1 Transferring Elevator Maintenance Data to the City Archives by Company 1

At the moment, all data generated in the course of elevator maintenance are transferred to the city archives without any selection, screening, or the like. This is also one of the measures for guaranteeing the integrity of maintenance data, as Interviewee 1 explains below.

What we do at the moment is pushing all elevator maintenance data to the city archives. We can guarantee this. All data generated in the course of elevator maintenance that has been completed that day will be pushed to the city archives. There is definitely not any kind of data screening, such as manual processing or the kind. There is absolutely no such kind of processing. This is also to ensure the authenticity of the maintenance data. As the customers also have a copy of the maintenance data, they can for sure compare their copy with the one kept in the city archives. We have to make sure that the two copies can match. (Interviewee 1)
At the end of a working day, once the maintenance technician finishes his work, he will upload all the maintenance data generated throughout the day in one bundle to the cloud through his smartphone. Once in the cloud, the maintenance data are downloaded onto Company 1’s in-house servers, which in turn transfer the data into the city archives through a leased line. The path of maintenance data transmission among these entities is illustrated in the following Figure 1.

**Figure 1. The path of maintenance data transmission**

As can be inferred from the path of data transmission described above, maintenance data is not transferred to the city archives in real time when it is generated. There is a time delay. In addition, maintenance data is not transferred to the city archives directly from the cloud where the Digitized Elevator Service Maintenance System is deployed, but has
to go through Company 1’s servers. When Interviewee 1 was asked why maintenance data is not transferred in real time to the city archives, he responded that the primary consideration is efficiency, for if a new piece of data were to be transferred to the city archives the moment it was created, a large volume of cache would be generated, which would consume too many resources and would not be efficient.

From another perspective, Interviewee 5 commented:

The fact that maintenance data is not uploaded in real time to the city archives is indeed an issue; however, it is not an urgent one. Because, most often, it is many years after the maintenance when, for instance, there is an accident [or dispute] that the safety regulators [or Company 1, or the customers] will request and examine the maintenance data and determine if maintenance has been conducted properly in accordance with law. Therefore, there is no motive to alter the maintenance data at the time they are generated. (Interviewee 5)

Regardless, the fact that maintenance data is not transferred in real time to the archives and goes through extra stops in the transfer path is an issue potentially affecting the demonstrability of the authenticity of maintenance data preserved in the city archives.

4.6.3.2  Maintenance Conducted by the City Archives for Protecting and Demonstrating the Authenticity of Elevator Maintenance Data

Once uploaded, maintenance data is in the custody of the city archives. The city archives then applies appropriate security measures to protect the authenticity of maintenance data. At the moment, the measures adopted are mainly from an IT perspective. As confirmed by Interviewee 2, no archival theories, principles, and methods (e.g., classification, appraisal) have been employed and no metadata has been utilized from a records and
archives management perspective in terms of either verifying or continuously protecting
the authenticity of maintenance data, as explained by Interviewee 2 below.

No metadata. Our authority cannot extend to the system where the maintenance
data originates. For instance, the Digitized Elevator Service Maintenance System
will not follow our metadata requirements, as our requirements do not conform to
their standards… If metadata is to be used to protect the authenticity of
maintenance data, they will have to follow our requirements, and we need to be
able to be involved in the design of the Digitized Elevator Service Maintenance
System and instruct them [on] the types of metadata to be generated. But we don’t
have such authority. (Interviewee 2)

In the initial pilot-testing stage, the city archives attempted to convert the structured
maintenance data in database format into an un-structured, unchangeable format (e.g., in
PDF format) to comply with current archival management standards and best practices.
However, the pilot-testing results and a further comprehensive comparison of these two
approaches suggested that storing the data in its original database format might be a more
feasible and efficient approach. The reasons given by the city archives for this are three-
fold, as outlined below.

First, in terms of the time taken for conversion, Company 1 generates approximately
7,000 entries of maintenance data each day, and it would take about 15 seconds to
convert each entry into a PDF format (a total conversion time of 29 hours each day). This
would cause backlogs and delays and put the underlying infrastructure under significant
pressure. By comparison, if the elevator maintenance data are maintained in the original
structured format and converted into a PDF format only when needed by the elevator
customer, the supervising authority, or the general public, the pressure would be
significantly reduced.
Second, in terms of the resources required for the storage of the data, if the maintenance data is preserved in a PDF format, it would require at least 1.4 GB for the data received each day and 500 GB each year, not to mention those required for their backup and the increase of the maintenance data. Therefore, preserving records in a PDF format would place great pressure on the city archives in terms of the resources required for storage.

Third, as discussed above, the elevator maintenance data is likely to be updated by Company 1 in the future when, for instance, there is a revision of the name of the elevator user. Consequently, if all the elevator maintenance data were to be managed and preserved in a PDF format, then a new record would have to be generated every time changes are made to the data. This would raise issues as to version control and the management of the relationships among different versions.

Two systems have been designed and implemented by the city archives to protect the authenticity of maintenance data, including an elevator maintenance database real-time monitoring system and a server security management system.

The elevator maintenance database real-time monitoring system observes, documents, and analyzes any activity occurring in the elevator maintenance database, and provides daily report on the status of the database to overseeing staff via email. The types of activities monitored include search, read, delete, alter, and insert operations performed on the data in the database. Detailed information about the activity, including the author of the activity, activity type, changes to the data made by the activity, and the time of the activity will be documented as well; this information will be organized and analyzed in different ways. For instance, for each entry in the database, a whole history of each
segment of the entry including its creation, updates, and elimination can be presented chronologically. Even when one entry is deleted, it can be recovered using the change history. Search and retrieval functions are also available to identify specific events occurring in the database. Daily reports can be generated analyzing and discovering patterns, distributions, and frequencies of the different activities performed on the data, identifying potential risks, and reporting the backup of the database. Dashboard, graphical chart, and bar have been used to display the monitoring data.

In addition, the monitoring system can detect and issue an alarm to alert the overseeing staff when any unauthorized or unusual activities occur. Yet, it is not clear whether any changes made to the maintenance data preserved in the archives will be documented as a new piece of data or will overwrite the original one.

The server security management system has been deployed to defend against infrastructure attacks. It can detect any attack on the underlying operating systems and the Web service, hence providing maximum protection of the integrity of the data. Tamper-proof packaging is also installed to protect the transaction data from intentional or accidental alteration. Other measures adopted include firewalls and authorized access.

4.6.3.3 Certification of Elevator Maintenance Data Stored at the City Archives

In approving Company 1’s application to use digital maintenance records, the local safety regulator has set two functional requirements for the trusted third party that maintain the digital elevator maintenance records: providing search service for the customers of Company 1 and the safety regulators to access the maintenance data, and certifying the
maintenance data so that they can serve as evidence. To accomplish the former goal, the city archives, upon receiving the data, synchronizes, through a firewall, a copy of the maintenance data in the server where the official website of the city archives resides and offers a portal through which customers and supervision authorities can access and download a copy of the maintenance data they requested in a PDF format.

As to the second goal, this is achieved through carrying out the following procedures, including 1) examining the identity and determining the eligibility of the person applying for certification, 2) searching for, downloading, and printing the required maintenance data, 3) logging into the elevator maintenance database real-time monitoring system to search for, generate, download, and print the change history of the requested elevator maintenance data, 4) stamping the record which is comprised of the requested maintenance data and their change history, and 5) registering and filing the records generated.

In determining the eligibility of the person—mostly Company 1’s customers—applying for the certification, the city archives asks the applicant to provide the following documents: personal ID, service contract with Company 1, and a letter of authorization specifying identity of the elevator using organization [i.e., Company 1’s customer], the registration number of the elevator whose maintenance data are requested, and the time range for the maintenance data requested.

Certification of elevator maintenance data is different from certification of other records preserved at the city archives. For the latter, e.g., marriage certificates, the archives would simply stamp a copy of the record. However, for the elevator maintenance data,
the archives has to certify its change history by specifying the time that the maintenance data was first received and any subsequent changes, if any, occurring to the data after its reception, including the segment of the entry that a change was made, activity type, change type, content prior to the change, content after the change, and author of the change, as shown in Figure 2.

Certification of Company 1 Elevator Maintenance Data Change History

<table>
<thead>
<tr>
<th>Basic Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of the Elevator User:</td>
</tr>
<tr>
<td>Model number of the elevator:</td>
</tr>
<tr>
<td>Machine number:</td>
</tr>
<tr>
<td>Contract number:</td>
</tr>
<tr>
<td>Contract type:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Certification Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time of Certification:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Change History</th>
</tr>
</thead>
<tbody>
<tr>
<td>Since (the time the maintenance data was received)<strong><strong>, to (the time of the certification is issued)</strong></strong>, the following changes have occurred to the requested maintenance data:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Segment of the entry changed</th>
<th>Activity type</th>
<th>Change type</th>
<th>Content prior to the change</th>
<th>Content after the change</th>
<th>Author of the change</th>
</tr>
</thead>
</table>

Stamp:
Time:

Attachments:

Figure 2. Certification template (Translated from the original form)

Therefore, certification is an explanation saying either that no change has occurred to the maintenance data since its acceptance into the archives or, if there were changes, what the changes are. As per Interviewee 2’s explication, it is the judge’s responsibility to determine the trustworthy of the maintenance record provided.
When asked about the admissibility and probative force of the certification provided by the city archives in litigation, Interviewee 2 recounted an instance where a lawyer of Company 1 went to the archives requesting a certified copy of the maintenance data of certain elevators. The request was urgent as the lawyer said the record had to be submitted to the court that afternoon. Interviewee 2, who was responsible for certification of elevator maintenance data, responded that it was impossible to provide a certification on such short notice, as he would have to obtain several levels of internal permissions for the certification, not to mention that this was the first time the archives had issued a certification for the elevator maintenance data. Failing to obtain a certification of the electronic maintenance data, the lawyer went to court with a plain copy of the data downloaded from the archives’ website instead. Later, Interviewee 2 was told that the plain copy downloaded from the archives’ website was admitted as evidence by the judge in the case.

4.7 Discussion

4.7.1 What is the Impact of Company 1’s Digital and Cloud Strategy on its Records Management Practices?

The shift from paper to digital and cloud has varying degrees of impact on different aspects of Company 1’s records management practice. Since digital elevator maintenance data is much easier to reuse to contribute to the company’s daily operation and strategic planning, a change in the perception of elevator maintenance data is observed. It is no longer perceived as a “burden” to the company whose preservation is simply for accountability purpose. As a result, instead of only keeping maintenance records for the
period required by law, Company 1 now keeps elevator maintenance data permanently. This is consistent with the result of a previous study, which found that an organization was inclined to keep the records stored in the cloud longer than required by the retention and disposition schedule for business purpose (Pan & Mitchell, 2015).

Yet, other than the changing perceived value of elevator maintenance data and the longer retention period, it appears that the impact of going digital and cloud-based services on other aspects of Company 1’s records management practice is very limited. In the paper environment, there was no centralized records management program; each department or person managed their own records in their own way. Therefore, there is no retention and disposition schedule or classification scheme in place. This does not change in the digital records environment for this company.

Though the company is planning to upload all its records into the cloud using the service and system provided by its printers/scanners provider, this is treated as an information technology task. No records management principles or methodologies were considered in this initiative, nor in the design and development of the Digitized Elevator Maintenance System.

As to the impact of the cloud on records management practice, although Company 1 acknowledged their awareness of the risks associated with moving data in the cloud, it appears that these risks were not interpreted and addressed from a records management perspective through the implementation of policies and procedures. Hence, the impact of a shift to the cloud on Company 1’s records management practice is very limited as well.
4.7.2 How and to What Extent is the Trustworthiness of Records Protected and Demonstrated in Company 1?

In the current Chinese legal, regulatory, and records management environment, the method employed by Company 1 in protecting and demonstrating the trustworthiness of elevator maintenance data, viz., depositing them in the city archives, is an efficient, innovative, and collaborative approach. Most existing research projects\textsuperscript{106} approach authentic maintenance of digital records from the perspective of records per se and the system in which they are residing by developing system functional requirements to document the lifecycle management of the records to prove that the records are authentic. In contrast, the method adopted by Company 1 takes a different approach: trusting someone – an external organization – to protect the records for them. What is more interesting is that this “someone” is an archives, whose job since the ancient times is to safeguard the authenticity of records (Duranti, 1989a). In a world of increasing documentation, which, however, is an indication of diminishing trust (Sundqvist, 2011), the approach taken by Company 1 suggests the opposite direction: less documentation and higher trust.

4.7.2.1 Ensuring and Demonstrating the Reliability of Elevator Maintenance Data

Given the meaning of reliability, in the context of Case 1, examination of reliability should focus on the capacity of the Digitized Elevator Maintenance System to reliably document the elevator maintenance activity and the reliable use of the System in the

\textsuperscript{106} For instance the Pittsburg project, and the UBC-MAS project.
maintenance of elevators. The case study shows that, Company 1 is continuously upgrading the System to implement robust measures to ensure that technicians can maintain the elevators in accordance with regulations and addressing the common issues that affect the reliability of maintenance, such as failing to maintain elevators on time, omission of critical maintenance items and improper maintenance, and maintenance data forgery. Some of the measures deployed to ensure proper maintenance include 1) requiring elevator user’s signature to confirm the completion of the maintenance, 2) the capture of the geographic coordinate information, 3) the capture of all types of time (i.e., the time a day’s maintenance results are submitted, the time when and place from which the maintenance technician sets off to the site, the time the technician arrives at the site, the time the technician starts site analysis, and the time the technician finishes the repair), 4) the design of a 14-day maintenance interval rather than the 15-day period required by the legislation, and reminders on important maintenance items, and 5) more recently, the scanning of a Quick Response (QR) code, which is stuck to each elevator in order to start the maintenance.

A comparison of these measures with the list of criteria used by the common law system and Chinese scholars shows that these measures mainly address two items in the list: 1) the correspondence between the time the record is made and the time of the event, and 2) the correspondence between the place documented in the system where the record is made and the place where the recorded activity is actually conducted; these two can help avoid the possibility for the technician to forge the maintenance data without actually conducting the maintenance or even physically being at the site.
To improve the reliability of the records and be more convincing when arguing their evidentiary capacity in court, Company 1 can improve the following aspects, which are identified as critical issues in the maintenance industry: ¹⁰⁷ 1) the qualification of the maintenance technician, including any training, and certification (i.e., having the knowledge of the elevator maintenance activity documented), and 2) the amount of workload with respect to the average workload in the industry so that the quality of the work is not reduced by the need to complete it (i.e., lack of a motive to misrepresent the matter documented).

The reliability of records is a very complicated issue that involves many factors. While records management can design robust and sophisticated documentation procedures and controls, the successful resolution of this issue requires resolving the social, organizational, economical, political, industrial, and other related issues, which are the causes of the misrepresentation of the matter documented in the record. This is a critical issue, as it affects the trustworthiness of records and their ability to serve as the “instruments of trust”, for instance, to ascertain accountability (Sundqvist, 2011).

4.7.2.2 Protecting and Demonstrating the Authenticity of the Elevator Maintenance Data

The authenticity of elevator maintenance data refers to whether the data presented to court or used in demonstrating fulfillment of legal or regulatory requirements is consistent with those first created. This should be addressed by the management of the

¹⁰⁷ See footnote 87.
elevator maintenance data after its creation, including within Company 1, through the transfer, and at the city archives.

4.7.2.2.1 Protection of the Authenticity of the Maintenance Data in Company 1

After elevator maintenance data is generated by the maintenance technician using the smart phone, it is uploaded to the server of the System residing in the cloud, from where the data is then downloaded onto Company 1’s in-house servers, which in turn transfer the data into the city archives through a leased line. Data collected shows that Company 1 mainly relies on IT measures and techniques for the management and protection of the maintenance data and these measures have been implemented both in the in-house servers and those in the cloud. These measures and techniques are compliant with the requirements and policies in the parent company and considered very robust. The security measures deployed by the cloud service provider are regarded as another level of protection of the authenticity of the maintenance data and the potential risks inherent in cloud-based services for the authenticity of the maintenance data is not considered. This is perhaps because the cloud-based service was chosen and purchased by the parent company and Company 1 simply followed the parent company’s decision without conducting its own assessment.

In addition to the path delay between the creation of maintenance data and its transfer to the city archives for evidence preservation, there is a time delay as well. Maintenance data is not transferred in real time to the city archives; instead, maintenance technicians do not submit daily maintenance data until the close of the workday. Although it can be argued that there is no motive from the creator to tamper with the data for its own
interests immediately after its creation and that this is a reasonable practice, risk can be eliminated if the data is transferred in real time to the city archives.

According to the interview data, no records management standards or policies (including any standards on metadata) were considered or used in the design and development of the System. The maintenance data is managed in database format rather than in a fixed form. One important management measure used for the protection of the authenticity of maintenance data is authorized and traceable revision of non-core data, which is defined as data that is considered unimportant to the ability of the data to serve as evidence of the maintenance activity according to the three interested parties (i.e., Company 1, the safety regulators, and the city archives). Approval for the revision of the data has to be obtained from managers at different levels depending on the seriousness of the revision. Any revision of the data will not overwrite the original piece of data but generate a new piece of data.

Other measures adopted include comparison between data maintained in the company and those kept by its customers, and between electronic maintenance data and paper records, where applicable.

A description of these measures can be used to infer the authenticity of the maintenance data kept in Company 1. Nonetheless, there are risks in these measures which, if not adequately addressed, may invite suspicion and compromise the trust into the authenticity of the data. It is uncertain how to prove that the measures adopted by Company 1 in protecting the data are robust enough, that the authenticity of the maintenance data in the cloud is not compromised, and that the authorized and traceable revision is sufficient to
prevent unauthorized revision and document all authorized revision. For the first risk, reference to national and international standards and best practices, and comparing the measures adopted by Company 1 against these standards and best practices may help. As per the 2017 version of the CGSB 74:32, a contract with the cloud service provider that includes “clauses that allow access to the identity and recordkeeping metadata… and the ability to verify the integrity of the system” (p. 32) might help address the second risk. Finally, the conversion of maintenance data into records and their management in accordance with records management principles and methods might help address the third risk.

4.7.2.2 Protection of the Authenticity of the Maintenance Data at the City Archives

In the 1990s, a heated debate about the custodial role of archives for the long-term authentic preservation of electronic records emerged in the archival field. At the core of the debate was the issue of whether archival institutions should acquire the physical custody of records for their long-term preservation. The proponents of the custodial role of archives included Luciana Duranti, Terry Eastwood, Heather MacNeil, and Ken Thibodeau; the advocates of the concept of distributed custody included David Bearman, Greg O’Shea, Frank Upward, and David Roberts.

The emergence of the concept of distributed custody was in part a response to the problems presented by the exponential growth of electronic records for long-term preservation, which, up until then, had not been sufficiently studied and practiced. Reasons cited by those who supported distributed custody included technological
obsolesce and cost. Furthermore, those who upheld the concept of distributed custody contended that records could be left with the creating organizations, and archives could instead exercise intellectual control, supervision, guidance, or audit to ensure that appropriate measures and methods are implemented by the creator for long-term preservation and access. In Cook’s words, archives would no longer be “buildings where old records are stored, but…access hubs to (and auditing centers controlling) records left out in their originating systems”; in other words, as Cook (1994) declared, “we will have virtual archives without walls” (p. 314). The primary argument put forward by those who supported the custodial role of archives in the long-term preservation of records was that by serving as “a neutral third party who is specifically responsible for the preservation and accountable for the authenticity of the records” (Duranti, 2007, p. 461), archives provide “the documents with trustworthiness, [and give] them the capacity of serving as evidence and continuing memory of action” (Duranti, 2007, p. 447). Other reasons included the fact that the creating organizations have little motivation and may be unwilling to invest resources required to preserve records for the long term once the these records no longer have value for their current business.

The end of the 1990s saw efforts\(^\text{108}\) by practitioners and researchers toward grasping the implications of the widespread creation of electronic records for existing archival theories and practices, and formulating policies, principles, and methods for their long-term authentic preservation. As the long-term authentic preservation of electronic records today is no longer a challenging issue, and the concept of distributed custody is basically restricted to some practices in Australia, the debate over this idea has gradually

\(^{108}\) For instance the InterPARES projects, the UBC-MAS project, and the University of Pittsburg project.
disappeared from archival writings. However, this case study—in particular the fact that the city archives serves as a trusted third party in safeguarding and declaring the authenticity of Company 1’s electronic elevator maintenance data and hence their capacity to serve as evidence—provides new support to the custodial role of archives in the Chinese context. For the purpose of this dissertation, the concept of the custodial role of archives could provide a conceptual framework for analyzing and assessing the ability of the city archives in Case 1 to protect the authenticity of the maintenance data. More specifically, this author drawn on the concept of the custodial role of archives in protecting and demonstrating the trustworthiness of archives transferred to it, especially, how does the archives achieve that, to analyze the ability of the city archives in Case 1 in protecting and demonstrating the trustworthiness of elevator maintenance data. However, this author recognizes that the custodial role of archives as discussed in the debate mentioned earlier and practiced by archives differs from the situation of Case 1 in that the former focuses on long-term preservation of authentic records that are no longer of value to the records creating organization while the latter focuses on the authenticity of current records so that they can be used as evidence to account their business activity to the government and protect their interest in legal disputes.

In discussing why records deposited in archives are considered trustworthy and have “the capacity of serving as evidence and continuing memory of action” (Duranti, 2007, p. 447), Duranti (2007) emphasizes the following requirements:

1) The place of custody of the records must belong to the authority to which the records creators owe first account of their action, 2) the transmission of the records to such a place must be under the jurisdiction of a neutral third party, 3) the records must acquire stable and immutable relationships with records already
endowed with authenticity, and 4) this authentic records aggregation, with all its
network of internal relationships, must be destined to indefinite preservation. (p. 448)

These four requirements identify three aspects of depositing records in a place different
from the creating organizations for recognizing and declaring their authenticity and
ability to serve as evidence. These are: the relationship between the creating organization
and the place of deposit, the transmission of records to the deposited place, and the
intellectual and physical control of records to safeguard their authenticity over the long
term in the place of deposit.

1) The Relationship between Company 1 and the City Archives

In Duranti’s (2007) outline of the history of records creating organizations depositing
their records in another place to endow them with the capacity to serve as evidence, three
possible types of relationships between the records creating organization and the place of
deposit are identified: 1) the place of deposit and the records creating organizations
belong to the same authority, such as an archives and government agencies; 2) the place
of deposit has some form of right of preservation over the records of the creating
organizations, such as a city state and a university; and 3) the records creating
organization is not under the control of the place of deposit. Regardless of the type of
relationship between the creating organization and the place of deposit, the fact that the
latter is a separate party is necessary for avoiding conflict of interest.

In Case 1, the relationship between the city archives and Company 1 is of the third type;
in other words, the city archives has no authority over Company 1, which is not
accountable to the city archives for any of its business activities. For a comparison, one
might consider a case mentioned in section 4.1.5.4, in which the safety regulator of a city in China developed and deployed its own electronic elevator maintenance system offering elevator maintenance service providers the option of either using that system to carry out elevator maintenance or integrating the system with their own system. Either way, elevator maintenance records generated are deposited in the safety regulator, which then recognizes and declares the authenticity of the maintenance records. In this case, the relationship between the safety regulator and the elevator maintenance service providers is of the second type among those listed above, as the safety regulator has supervising responsibilities over elevator operation and safety, and therefore has authority and power over elevator maintenance service providers, and can hold them accountable for their work.

Each of these two types of relationships has its own benefits and limitations in terms of verifying and guaranteeing the authenticity of elevator maintenance data. The archives that acts as the place of deposit for elevator maintenance data is a fully state-funded organization, whose primary responsibility is to manage and preserve records generated by a government of the same level. For enterprises (except state-owned enterprises that have the obligation to transfer certain categories of records to the archives and non state-owned enterprises whose records are determined as of preservation value to the Chinese state and society and therefore should be transferred to the archives) over which the archives mainly exercises supervision over their records and archives management work and provides professional guidance, safeguarding and verifying the authenticity of the records of a private organization is not part of the archives’ responsibility, and there are
no regulations and standards to support the management of the records of a private organization by an archives.

This raises the issue of lack of motivation on the part of the archives, which might become a bottleneck for the long-term development of the project. At this time, in addition to valuing it because it provides an opportunity for exploring and pilot-testing digital records management, the city archives considers this project an innovation and an expansion of its social responsibilities. However, considering the resources required and the extent of responsibility the archives has to take on, without legal endorsement, it is doubtful whether the archives will provide such service on a regular basis.

In contrast, it appears legitimate for safety regulators to act as the place of deposit for elevator maintenance data, as it is their responsibility to oversee elevator maintenance and hold elevator maintenance service providers accountable. However, a prerequisite for such role is that safety regulators have strong credibility and private organizations trust them. Otherwise, when safety regulators are held accountable by their supervising authorities or the state, the records they keep might invite suspicion as well.

Thus far, regardless of the types of relationships existing between the places of deposit and the records creating organizations, the places of deposit are all public authorities with strong credibility. In light of the difficulty of verifying the authenticity of electronic evidence submitted by parties in civil cases in China, and the pervasiveness of electronic records in the conduct of business in China, commercial third parties for the preservation of electronic evidence are emerging rapidly. A contractual relationship has to be formulated between the commercial evidence preservation entities and the records
creating organizations. However unlike public authorities, which usually are more trustworthy, commercial third party’s credibility and ability to remain neutral is an essential issue. As a result, in China, commercial electronic evidence preservation third parties usually involve some public authorities—e.g., a notary—in their operation and procedures. In comparison with public authorities, it appears that commercial third parties have met the demands of the market and have the motivation to further grow.

2) The Transmission of Elevator Maintenance Data from Company 1 to the City Archives

In articulating the function of the Roman Tabularium of authenticating the records deposited in it, Duranti (2007) describes the physical structure of the Roman Tabularium, in particular the fact that “corridors and enclosed stairs connect the building to the public offices of Republican Rome, so that the documents can securely and safely flow from the place of creation to that of preservation” (emphasis added) (p. 447). And, in imperial Rome, “the public officer would read aloud to the interested assemblies the inventories of the documents that had crossed the threshold of the archives and become depositories of truth” (emphasis added) (Duranti, 2007, p. 450). Both transmission methods highlight the important fact that the integrity of records shall not be corrupted in the course of transfer from the place of creation to that of preservation, and this can be achieved through procedural control, the supervision of a public authority, or both. A real-time transfer from the place of creation to that of preservation is not implied by the two control measures discussed by Duranti (2007) and this is understandable considering that the purpose of transfer was for long-term preservation and therefore the transmission would not start until after the records were no longer of value to the creator. A direct
transfer is implied by the use of “corridors and enclosed stairs”, which suggests that no other person can access and potentially corrupt the records during their transfer.

In Case 1, at this time, electronic elevator maintenance data is not transferred in real time or directly from the technicians’ smart phone to the city archives’ server. Instead, for efficiency reasons, maintenance technicians do not submit daily data until the close of the workday. Thus there is some time delay between the creation of the data and its transfer to the city archives. Additionally, rather than being transferred directly from the smart phone or the server of the System, the data first has to be downloaded to the in-house servers of Company 1, from which the data is then transferred to the city archives. In other words, there is a path delay as well. If the time delay is only a minor issue, considering that most of the time delay occurs in synchronizing the server of the System with the technician’s smartphone rather than in transferring data from the server in the Cloud to that in the city archives, the non-direct transfer, in particular, the fact that the data has to be first downloaded onto Company 1’s in-house server, considerably affects the effectiveness of this method in protecting the authenticity of the maintenance data from possible alteration by Company 1 for self-interest reasons, and consequently the fulfillment “mutual trust based on the principles of fairness and equality”.

In addition to Company 1—the creator of the elevator maintenance data, the other party that has access to the elevator maintenance data prior to its acceptance into the city archives includes the cloud service provider, and possibly its many unknown subcontractors. Since the cloud service was purchased by the parent company of Company 1, it is not clear if records management concerns have been taken into
consideration in the introduction and evaluation of the cloud service and if these concerns have been adequately addressed in the contract.

Furthermore, according to the T&C between Company 1 and the city archives, Company 1 is responsible for the reliability and authenticity of elevator maintenance data in its custody and in the leased line, which is used for transferring data to the archives; the city archives is only responsible for the authenticity of the data in its custody. At the moment, the city archives has not adopted any policy, procedure, or method for verifying the authenticity of data prior to its acceptance into the archives; and neither does it have the intention to do so or implement methods that guarantee the authenticity of data it accepts, given that the archives has neither the authority nor the relevant knowledge to guide or control the creation and management of maintenance data in the creating organization.

As discussed previously, due to many reasons, organizations usually choose to entrust their records into a trusted third party to protect and demonstrate their authenticity and therefore their ability to serve as evidence. However, this analysis of the existing route, time requirement, and method for the transmission, the division of responsibility between Company 1 and the city archives in protecting the authenticity of the maintenance data, and the lack of measures from the city archives to verify and guarantee the authenticity before its receipt shows that this method of inviting a trusted third party to protect the authenticity of the maintenance data does not succeed in fully avoiding suspicion of tampering.

Although Interviewee 5 stated that, because there is usually some delay between the creation of the data and its use in resolving disputes, the creator has no motive to alter the
data, the risk that archives may accept data that lacks authenticity still exists. In particular, considering that the primary reason Company 1 engages the city archives to hold its maintenance data is its expectation that the archives will guarantee and demonstrate their authenticity and issue certified copies that are considered trustworthy by the public and the courts, there is a risk that the city archives may be “deceived” by the creator and may keep “authentic” records that are in fact inauthentic. To improve the situation, it can be decided that technicians simultaneously synchronize the maintenance data generated in a given day with the Company 1’s servers residing in the cloud and the city archives’ servers.

3) The Intellectual and Physical Control Performed by the City Archives on the Elevator Maintenance Data

Duranti (2007) noted,

> acceptance into custody is more than a declaration of authenticity. It is taking responsibility for preserving that authenticity, and it requires taking the appropriate measures for guaranteeing that authenticity will never be questioned, measures that go much beyond physical security. (p. 454)

Some of these measures include arrangement and description so that the records can be placed into relationships with other records of the same provenance.

In Case 1, as discussed in section 4.1.6.3.2, the measures used for the maintenance of records deposited in the city archives are primarily IT-oriented. No intellectual control from the perspective of record and archives management (e.g., classification, description) is applied. The reasons cited for this are that the elevator maintenance “records” are in the form of a database containing data that is updated from time to time, and the city archives
is not familiar with the management of databases. In addition, there are no standards or regulations to guide the treatment of material of this type from a private organization.

The decision to manage the elevator maintenance data in the original database format rather than converting them into un-structured record form is made in consideration of resource demands and the efforts involved for managing and demonstrating the relationships of different versions of a record. While the former reason is justifiable, considering this project does not fall under the responsibility of the archives and therefore may place some pressure on its budget, the articulation of the latter reason indicates that the city archives misses a critical opportunity to demonstrate its professional advantage over other commercial third parties in protecting the trustworthiness of data and its ability to serve as evidence, as well as the opportunity to utilize this project to pilot testing the authentic long-term preservation of records in database format.

As the elevator maintenance data is transferred to and maintained in the city archives in database format, and only converted into a fixed form when searched by the customers of Company 1 and the safety regulators via the web portal and when there is a need to certify them, to a certain extent, the city archives is the creator of elevator maintenance records.

In the letter addressed to Company 1 on the approval of the use of the System for elevator maintenance, the local safety regulator requires that, to those who need original evidence, Company 1 shall provide a print copy of the maintenance records which are consistent with the digital version and stamped by the city archives. Since there was no elevator maintenance record but only elevator maintenance data prior to the production of the
printout, the printout is the first and original elevator maintenance record and the city archives is the creator of this record. The certification issued by the city archives is an explanation of the history of the data within the record, rather than the record per se. Additionally, as the printout is the original record, the electronic elevator maintenance data is transformed from electronic data to documentary evidence and, therefore, is subject to rules and requirements for the admission of documentary evidence instead. Due to the high credibility ascribed to archives in China, any certified record provided by it usually is admitted in court and attributed great weight. This has circumvented the uncertainty and confusion in the admission of electronic data evidence and yet further marginalized electronic data evidence and its development.

Despite this, the above analysis of the preservation method used by Company 1, and the identification of its risks shows that the authenticity of the data certified by the city archives and the trustworthiness of the record created may be compromised. In other words, there is a risk that the city archives may be “deceived” by the data creator.

4.7.3 How and to What Extent is the Informational Content of Records Exploited for Operational and Strategic Purposes in Company 1?

As mentioned by Interviewee 1, one reason for the shift from paper-based elevator maintenance to the development and implementation of the Digitized Elevator Service Maintenance System is that when maintenance records were in paper format, the business usefulness of keeping these records is very limited as it is really difficult (in terms of the efforts needed and time taken) to analyze the information contained in these records to identify trends of elevator maintenance (e.g., parts replacement rate, damage rate), to
improve the generation of maintenance schedule and optimize maintenance route, and to contribute to marketing.

The shift to digital has greatly improved this as it is now much easier to analyze the maintenance data in digital form and almost every department in Service is using and analyzing the data in some form to support their work. Yet, it seems that the analysis is done on the raw data and there are no efforts in terms of utilizing the concepts and methodologies of knowledge management or strategic information management. Possible explanations are that there is no centralized records/information management program within the company, or nature of maintenance data restricts such initiatives.
Chapter 5: Case Study #2

5.1 Research Site

The second case studied is a state-owned, port and harbor surveying and engineering company (hereafter Company 2) that specializes and has been recognized for its expertise in the planning, consulting, engineering design, construction and testing projects involving the construction of many types of waterfront and navigational facilities. It is a wholly owned subsidiary of a large state-owned engineering and construction company, Corporate Group 1 (the parent company), which is primarily focused on the design, construction, and operation of infrastructure assets.

5.2 Background

5.2.1 The External Context

5.2.1.1 The Economic Environment in China Today

Ever since the launch of the “reform and opening-up” (also referred as “Socialism with Chinese Characteristics”) policy in December 1978, China has enjoyed rapid growth for the past four decades. It is now the world’s second largest economy by nominal GDP (Gross Domestic Product), and an engine of the world economy, contributing more than 30% of global growth. From 2013 to 2016, China’s annual GDP growth rate has averaged 7.2% calculated with 2010 U.S. dollar prices, higher than the average 2.7% growth rate of the world economy (Xinhua, 2018). Along with this economic prosperity, China has been deepening reforms in various fields and opening up its doors even more widely to the world (Xinhua, 2018).
After 40 years of growth, more recently, China’s economy is transitioning from a phase of rapid growth to one of high-quality development, as set forth in the 2018 Government Work Report. This indicates a “people-centered philosophy of development,” “more balanced development,” “lower risks,” “innovation-driven development,” “improved economic structure,” “better economic effectiveness,” “greener development,” and “medium-high growth development” (“Eight key high-quality”, 2018, n.p.). Moreover, according to Premier Li Keqiang, state capital and state-owned enterprises (SOEs) should, “through reform and innovation, become front-runners in pursuing high-quality development” (State Council of China, 2018, n.p.).

Up until 1999 China amassed huge amounts of foreign reserves and this put increasing pressure on the foreign exchange rate of the RMB (“Go out policy”, n.d.). Therefore, the Chinese government devised the “Going Out” policy, encouraging Chinese enterprises, mostly state-owned ones, to acquire assets and expand business overseas (“China hands”, 2017). Then, in 2014, President Xi Jinping and Premier Li Keqiang revamped the policy emphasizing the need to export high value added manufacturing and technology products, like high-speed railways, thereby promoting China’s image abroad and showcasing its competitiveness (“China hands”, 2017). It is also argued that contracting infrastructure projects to export materials such as steel and cement would likely relieve the overcapacity in these industries (“China hands”, 2017). To achieve these goals means that Chinese SOEs will expand into sectors traditionally dominated by Western firms, requiring them to be more strategic, efficient, and competitive (“China hands”, 2017).
The capstone of the “Going Out” policy is the Silk Road Economic Belt and the 21st century Maritime Silk Road or One Belt and One Road (OBOR) initiative proposed by President Xi Jinping in late 2013. The goal of the initiative is “to connect Asia with Europe and Africa along, and beyond, ancient trade routes by putting in place an unparalleled trade and infrastructure network” (Xinhua, 2017, n.p.). The initial focus of OBOR has been infrastructure investment, education, construction materials, railways and highways, automobiles, real estate, power grid, and iron and steel (General Office of Leading Group of Advancing the Building of the Belt and Road Initiative, 2016).

5.2.1.2 The Port and Coastal Engineering Industry Environment in China Today

The birth of China’s port and coastal engineering industry dates back to the 1970s, when the focus was on constructing new ports and increasing cargo handling capacity and throughput. As with other industries in China, the port and coastal engineering industry experienced rapid growth during the 1980s and 1990s. Afterwards and up to 2009, ports in China suffered the problem of overcapacity, which is considered one of the bottlenecks in China’s port industry. Thus, as China’s port and coastal engineering industry matured, port and coastal infrastructure building has shifted from massive, unplanned, and environmentally unfriendly construction to well-planned and designed construction, which is characterized by care for environment, the use of high technology, and other such considerations.

---

109 This section is sourced from two master theses written by staff of Company 2 researching its strategy and records management.
With the downturn of China’s port and coastal engineering market, domestic competitors started stealing market shares from each other’s traditional regional markets; the competition became even worse with the entry of international competitors.

Based on the current state and development trends of China’s port and coastal engineering industry, it is predicted that, in the near future, China’s port construction will shift from rapid growth to slow, stable growth, and from rough development to innovative and rationale-based development. Against such a backdrop, the port and coastal engineering industry needs to explore a new business-operating model, expand the scope of business, advance business operation, and modernize management practices to strengthen its own competitive advantage.

5.2.1.3 China’s Public Institution (Shiye danwei) and State-owned Enterprise (SOE) Reform

When the People’s Republic of China was established on October 1st, 1949, the country was extremely poor after decades of war and turmoil. With the country having “a very low stage of economic development and an extremely backward economic structure” (Lin, Cai, & Li, 2001, p. 20), there was literally no foundation to build on. The level of industrialization was extremely low (Lin et al., 2001, p. 20). Besides this, there was essentially no infrastructure; social security, education, and healthcare were scarce; and agriculture and energy resources were underdeveloped (Gang & Hope, 2013).

A centrally planned economic system was adopted by the Chinese government after the foundation of the country. In contrast to the market economy, in which the market
determines the allocation of resources and the price of goods, in a centrally planned economy, the state or government controls the allocation of resources and the production plan. The *Danwei* system is one type of institutional arrangement set up by the Chinese government to help support the centrally planned economy. A *danwei*, according to Lv and Perry (1997), refers to a work unit that has *personnel power, communal facilities*, and *independent accounts and budgets*; it is generally in the urban or nonagricultural sector and belongs to the public sector.

Based on the line of operations, *danwei* can be classified into three categories: *Qiye danwei* (state-owned enterprise), *Shiye danwei* (nonproduction, nonprofit entities, or public institutions), and *Xingzheng danwei* (administrative bodies) (Lv & Perry, 1997). Unlike enterprises in the market economy, in a centrally planned economy, *Qiye danwei* or “state enterprises” refers to

enterprises that were owned fully by the state and run as government units under the direct control of line ministries. Following rules set by the government, state enterprises fulfilled the output targets assigned by state planners and sold their products at predetermined prices. (Gang & Hope, 2013, p. 5)

In the 1950s, all private industrial enterprises were nationalized by the Chinese government and operated under a centrally planned economy (Geng et al., 2009). As they were operated as administrative units of the government, the executives of state enterprises were government officials. State enterprises produced goods based on the mandatory manufacture plan set by the government, sold them at prices set by the government, and turned over revenues to the government. *Xingzheng danwei* are nonproduction and nonprofit entities that involve state power, such as government agencies, mass organizations (e.g., the Women’s Federation, the Communist Youth
League), and other organizations that receive regular budgets from the state. *Shiye danwei*, also nonproduction, nonprofit units but without state power, include scientific research institutes, educational institutions, government-sanctioned social and professional organizations, health services, cultural organizations, and athletic organizations (Lv & Perry, 1997).

Depending on their status in the administrative hierarchy, three types of *danwei* can be identified, namely, *Zhongyang danwei* (units that are subordinate to a certain ministry and receive finance appropriations from the central government), *Difang danwei* (units that are overseen by and receive finance appropriations from the local government), and *Jiceng danwei* (units that fall at the bottom end of the command chain in the Chinese political hierarchy) (Lv & Perry, 1997). When Company 2 was first established, it was one of the *shiye danwei* at the central level or a *Zhongyang danwei*.

In addition to being workplaces, *danwei* also help the state to maintain political control and provide social welfare. In terms of political control, it was through *danwei* that the state could mobilize the working population for political participation, implement public policies, monitor the political loyalty of its citizens, inhibit large-scale organized opposition, and limit the mobility of employees (Lv & Perry, 1997). In terms of the provision of social welfare, *danwei* would usually provide such a comprehensive list of welfare ranging from entitlements, to housing, to car fleets, dining services, barbers, kindergartens, guesthouses, clinics, and sometimes even cremation services, that *danwei* basically became “small societies” (*xiao shehui*) that are self-sufficient and separated from one another (Lv & Perry, 1997). This arrangement of *danwei* serving as a
community and social cell and providing social welfare was helpful for the state when there was basically no social welfare system and the focus of construction was on industry after the founding of the country.

The launch of the “reform and opening up” program marked the start of China’s gradual transformation from a centrally planned economy into a socialist market economy. The transformation process unfolded steadily and slowly as the Chinese government recognized that any reform undertaken would have direct and significant impact on all aspects of the society and should be handled with great care, as a stable and peaceful domestic environment was a pre-condition for the economic revival of the country—hence the political stance taken by the Chinese government at the time, that “maintaining stability is the top priority.”

Among the numerous reform decisions made by the Chinese government, a chain of policies relevant to Company 2 was charted out to sketch its reform history. In general, the reform can be divided into three phases with different foci. The first phase of reform focused on converting public institutions (shiye danwei) into enterprises, thus increasing their autonomy and incentive.

The first reform rolled out post-1978 was in the agricultural sector, with the introduction of a “household responsibility system” that “allowed households to contract land, machinery and other facilities from collective organizations” and “freely dispose of surplus production over and above national and collective quotas.” (“1983 Household responsibility system”, 2009, n.p.) The counterpart of the “household responsibility system” in the urban sector was the so-called “economic responsibility system” (Jingji...
Zeren Zhi), which “defined the responsibilities and tasks of every workshop, shift, team, and individual in a given enterprise” (Brødsgaard, 1987, p. 33).

The transformation of surveying and engineering *danwei* (public institutions) into enterprises commenced officially in 1979 when the State Planning Commission (the precursor of the National Development and Reform Commission), the State Basic Construction Commission, and the Ministry of Finance jointly designated 18 surveying and engineering institutions to pilot-test generating revenues using contracts and implementing an enterprise management system. After four years of pilot-testing, in 1983, the State Planning Commission, the Ministry of Finance, the Ministry of Labour and Social Security, and the Ministry of Personnel (the precursor of the Ministry of Human Resources and Social Security) jointly issued a *Notice on the Adoption of an Economic Responsibility System Among all Surveying and Engineering Institutions on a Trial Basis*. 

In order to improve surveying and engineering institutions and their staff’s incentives, the notice stated that 1) the state would cease appropriations for overhead expenditure of surveying and engineering institutions; they had to make their revenues based on the quantity and quality of services, and the prices set by the state; 2) surveying and engineering institutions would have to sign contracts with customers to specify each other’s rights and responsibilities; 3) surveying and engineering institutions should conscientiously implement the economic responsibility system, and connect staff’s economic interests with the quantity and quality of completed tasks; 4) surveying and engineering institutions had to complete the tasks assigned by the overseeing ministry; and 5) surveying and engineering institutions that adopted the economic responsibility
system remained public institutions, and therefore had to follow the finance and welfare regulations of public institutions.

The cessation of appropriations for overhead expenditure forced surveying and engineering institutions to be directly involved in the market. Though the characterization of surveying and engineering institutions as public institutions remains unchanged, this notice no doubt initiated a change that would become part of their transformation into enterprises.

The year 1999 witnessed another milestone in the history of reform of surveying and engineering institutions when several ministries jointly issued *Several Opinions on the Structuring Reform of Surveying and Engineering Institutions*. According to this regulation, the goal of this round of reform was to convert surveying and engineering institutions into scientific and technical enterprises to make them legally independent market entities that fit with the marketing economy.

The second phase of reform focused on ownership reform, with privatization and diversification of ownership being the primary goal. At the Fifth Plenary Session of the 14th Party Central Committee in 1995, the central leadership officially promulgated a new policy known as “grasping the large and freeing the small” (*Zhuada fangxiao*) to undertake strategic structuring of SOEs. This policy was reaffirmed at the Fourth Plenary Session of the 15th Party Central Committee in 1999. As a part of ownership reform of SOEs, “grasping the large and freeing the small” emphasized that, on the one hand, large SOEs should be strengthened through corporation or public-listing so that they could help stabilize the economy, participate in international or domestic competition, and
implement industry policies, and, on the other hand, for the large quantity of small SOEs, which covered a wide spectrum of industries, the state should allow them to explore ownership forms, operational mechanisms, and development modes that fit for them. For small SOEs ownership reform, measures included financial infusions, huge layoffs, debt reduction, non-government buyouts, provincial government grants, and others. After the launch of the “grasping the large and freeing the small” policy, the state sectors shrank dramatically.

The third phase of reform focused on improving SOEs’ competitive edge through establishing new operational mechanisms, introducing a modern enterprise system, expanding the scope of services offered, obtaining international standards certification, etc. On 11 December 2001, with China becoming a member of the World Trade Organization (WTO), many sectors were open for foreign competition. To ensure that Chinese SOEs could maintain a competitive edge amid fierce competition, the focus of SOEs reform was channeled toward “improving corporate governance and establishing a modern enterprise system” (as cited in (Chen, 2013)).

In 2003, the State-owned Assets Supervision and Administration Commission (SASAC), directly under the State Council, were set up to invest on behalf of the state, which, as argued by Naughton (2015), marked “the end of dramatic state-sector downsizing and the beginning of state-sector stabilization” (p. 46). SASAC then acquired the ownership of many (non-financial) SOEs from the line of ministries and thereby resolved the conflict
between the government’s roles as regulators and owners of enterprises (Geng et al., 2009). Currently, central SASAC oversees 97 SOEs.110

SASAC is regarded as the link between the government and the large centrally owned firms, meaning the latter could continue to enjoy favoritism and partially protected markets (Naughton, 2015). Ever since its establishment, SASAC has been very successful in stabilizing the large SOEs it oversees, improving their profitability and growing their assets, but has been less successful in improving corporate governance and transforming institutional structures (Naughton, 2015).

As a measure to split the ownership and management of SOEs, many large SOEs undertook corporatization (Wang, Xu, & Zhu, 2004). A key measure of corporatization is public listing. As Wang et al. (2004) argued,

In theory, public listing can potentially help separate government from enterprises and hence increase enterprise autonomy and harden budget constraints. It may improve managerial incentives if it results in a more clearly defined structure of rights and responsibilities and the involvement of shareholders with incentives and the ability to monitor managers. Public listing should also help to raise capital for SOEs and thus reduce their traditionally high debt-to-asset ratios. (pp. 1-2)

In 2005, a pilot program was launched to establish standard boards of directors within SOEs and delegate the nomination rights of top executives to the board (Gang & Hope, 2013). According to the “Trade Policy Review” published by the World Trade Organization in 2016, in May 2015, 1,012 “state-owned holding” enterprises were listed on the Shanghai and Shenzhen Stock Exchanges with a total equity of 2.67 trillion shares,

accounting for 68.14% of the total equity of all the companies listed on these two stock exchanges (World Trade Organization, 2016).

The November 2013 Third Plenum of the 18th Party Congress represents another hallmark session in the history of SOEs reform. It was then that Xi Jinping “emphasized improved SOE operational transparency and legal reforms that would subject SOEs to greater competition by opening up more industry sectors to domestic and foreign competitors and by reducing provincial and central government preferential treatment of SOEs” (Bureau of Economic and Business Affairs, 2017, n.p).

In his most recent report to the 19th Party Congress, Xi Jinping reiterated the importance of SOEs reform by saying, “We will further reform SOEs, develop mixed-ownership economic entities, and turn Chinese enterprises into world-class, globally competitive firms;” he further stated, “In the state-owned sector, we will step up improved distribution, structural adjustment, and strategic reorganization.”

Overall, the achievements of years of SOEs reform are the decrease in the number of SOEs and improved competitive capability and size of the existing ones. The number of SOEs has dropped significantly from 39.2% of all industrial companies in 1998 to 5.2% in 2011 (Gang & Hope, 2013). On the 2017 Forbes Global 2000 list, four Chinese corporations made it to the top ten (“Global 2000”, 2018).

Despite the various efforts made by the Chinese government to weaken the state’s control of state sectors and eliminate the preference state sectors enjoy during competition, some measures implemented by the government seem to lead to contrary results (Brødsgaard,
For instance, it is required that all SOEs have a Party organization headed by a Party secretary and that all important decisions be first studied and discussed by the Party committee of the enterprise before the board makes any decision based on the recommendations put forward by the Party committee. In addition, in enterprises where a board has been established, it is required that the Party secretary and chairman of the board be the same person, and members of the company’s Party committee should also serve on the board of directors, management team, and supervisory board (Brødsgaard, 2018).

Though this is not a phenomenon unique to China (Fan & Hope, 2013), it is not an exaggeration to say that SOEs have played a crucial role in the revival and spectacular rise of the Chinese economy. It is expected that SOEs will continue to play a prominent role in the Chinese economy in the coming years, particularly in strategic sectors and pillar industries, such as aviation, defense, aerospace, telecoms, power generation, oil and petrochemicals, and shipbuilding.

5.2.2 The Internal Context

5.2.2.1 A Brief Reform History of Company 2

When Company 2 was founded, it was a scientific and technical public institution (Shiye danwei). As a government work unit, Company 2 was managed fully under the bureaucratic system and enjoyed direct financial appropriation. Under the centrally planned economy, it basically functioned as the consultant for the state’s construction policies and their implementation, and the government was the sole customer that
Company 2 served (Dong, 2018). Due to the scope of its work, Company 2 was categorized as part of the surveying and engineering industry.

In the 1980s, Company 2 was among the earliest to implement the economic responsibility system, which meant that it could generate extra revenues by providing services to the market once it completed the tasks assigned by the state. Yet, at this time, Company 2 remained as a public institution.

Then, in late 1980s, Company 2, along with other danwei, amalgamated with another stated-owned limited company and established a larger corporation, which will be called Company 3. At that time, Company 2 was formally converted from a public institution to an enterprise.

When the SASAC was established in 2003, Company 3, along with its subsidiaries, including Company 2, was transferred to SASAC. Then, Company 3, along with several of its subsidiaries—including Company 2—and another corporate group, consolidated and established Corporate Group 1 (the Group), hence the current structure.

Overall, the history of Company 2 is characterized by its transition from being a government unit that was financially dependent, providing services according to the state’s production plan, and managed using a bureaucratic approach, to a modern enterprise that operates independently, assumes sole responsibility for its profits and losses through market competition, and is managed using modern, scientific, and internationally accepted methods. In terms of its ownership, Company 2 has evolved from a wholly state-owned public institution to a publicly listed company whose
ownership is distributed among the general public and the state. As Company 2 was going through this transition process, it experienced dramatic changes in terms of its sphere of business, organizational structure and operating mechanisms, and primary market region. As we will see later in this chapter, all these changes have considerable influence on Company 2’s records management work (Interviewee 6).

5.2.2.2 Current Strategy

In light of China’s overall economic environment and the port and coastal engineering industry background, Company 2 set as its strategic goal to become a global leader in providing knowledge service and management service.\(^{111}\) Guided by this strategic goal, in recent years, Company 2 has been working hard to strengthen its core competitive ability by adopting the following measures: utilizing new technology—such as unmanned operations, wireless transmission, and automatic collection of data—to innovate traditional business practices; expanding its scope of business around the supply chain, horizontally, by covering all transportation industries, and vertically, by covering cultivating projects, planning, and other components; actively expanding domestic business and prioritizing international business development; and refining intensive management, actively restructuring business processes, and promoting standardized design.\(^{112}\)

In terms of the expansion of its business, the sphere of business of Company 2 has expanded both horizontally and vertically. Vertically speaking, instead of focusing solely

---

\(^{111}\) Business plan 2017. Internal document.

\(^{112}\) Business plan 2017. Internal document.
on surveying, planning, and consulting, Company 2 now provides services covering the whole lifecycle of infrastructure construction, including both upstream services—such as financing, policy and strategy, planning and approvals, and feasibility—and downstream services, such as design, construction, operation and maintenance, and closure. For instance, Company 2 is now able to offer EPC, which means that it is responsible for all activities, from design, procurement, and construction, to commissioning and handover of the project to the owner. Other services that Company 2 offers include the operation and maintenance of the infrastructure once it is handed over to the owner, and public-private partnership (PPP) when two or more public and private entities cooperate, typically involving “a private entity financing, constructing, or managing a project in return for a promised stream of payments directly from government or indirectly from users over the projected life of the project or some other specified period of time” (Weimer & Vining, 2016, p. 309). Horizontally, Company 2 has expanded its area of focus from port and harbor engineering to other areas, such as roads, bridges, etc.

In addition to the expansion of the range of services provided, Company 2 is now shifting the focus of its business from the domestic market to the global market by prioritizing expanding its business overseas, strengthening resources invested overseas and exploring localization of overseas operation. The One Belt and One Road (OBOR) strategy and the establishment of the Asian Infrastructure Investment Bank (AIIB) and the Silk Road Fund have revitalized the infrastructure construction market abroad and provided opportunities for Company 2 to cultivate its market abroad.
5.2.2.3 Informatization

Informatization, or e-development,

is defined most holistically so as to facilitate a way of systematically thinking about ICT as [an] enabler of development, of strategically managing informatization programs, of tapping synergies among interdependent elements of ICT, and of communicating to a broad community of practice. (Hanna & Qiang, 2010, p. 128)

Since the mid-1990s, China has been emphasizing building an information society through informatization. Especially considering that China missed the development opportunity of the industrial age, it seems the country feels the urge to ride the wave of the information age and achieve the great rejuvenation of the Chinese nation. Moreover, as an enabler of development, informatization is often regarded as the driving force for reform and for promoting the development of enterprises and industry.

Corporate Group 1 has pushed forward with informatization within the enterprise through the five-year guidelines. The most recent 13th five-year guideline (2016-2020) on informatization has designed the following tasks:

1) Constantly optimize business processes and promote management reform.

Informatization should not be promoted independently; instead, it should be treated as an integral part of management work, and understood as the driving force for promoting enterprise reform. Through combining informatization and management reform, the enterprise is able to introduce modern management concepts, fix and optimize management requirements so that management problems and bottlenecks that could not be resolved through traditional methods can be broken through, and ultimately improve management levels.

Informatization and management reform should be treated as an integrated whole and promoted simultaneously. Business process restructuring should serve as a

---

113 Taken from Corporate Group 1’s internal report.
pre-condition for information systems development, thus simultaneously sorting out, optimizing, and fixing the restructured business processes through the information system. Understanding of the connection between informatization and operational management should be deepened, and a business process oriented organization built. Business processes, organizational structure, and information technology should be integrated, and organizational reform pushed forward through business process reform.

2) Fully promote the “piercing through” plan.

During the 13th five-year plan, the primary goal of informatization should be to support strategic transformation and upgrade of the enterprise, which could be achieved through the “piercing through” plan, namely, integrating data from different sources and using them for policymaking. More specifically, three different levels of piercing through are identified: first, piercing through management levels so that senior managers can improve management efficiency by making decisions based on project data; second, piercing through horizontally different services offered to realize value chain integration and information sharing; and third, piercing through the division between internal and external resources by integrating them.

Corporate Group 1 also called for the use of big data, cloud computing, Internet of Things (IoT), mobile business, and other information technology to resolve the problems encountered in the transformation and upgrade of the enterprise.

3) Forge a corporate ecology in the “Internet plus” environment.

The enterprise will use Internet technology as the driving force, customer demand as the guide, and capital operation as the core, and through vertically integrating upstream and downstream services and horizontally expanding customers and partners, it will break the boundaries and operational mode of traditional industries and build a brand new enterprise ecology system, ultimately realizing the transformation from traditional infrastructure construction enterprise to “platform enterprise” in the “Internet plus” environment.

Against the backdrop of Corporate Group 1’s informatization strategy, Company 2 has been pushing forward with informatization within the company as well. According to an internal report, the focus of Company 2’s informatization in 2017 was to “make a full move across the board to implement informatization and improve efficiency.” Guided by this strategy, Company 2 has restructured its Information Management Center, which now comprises six units, among which there is the internal Archival Unit. The
restructuring of the Information Management Center is intended to strengthen the reorganization and amount of corporate technology knowledge, to assist in the gathering and analysis of competitive technical intelligence, to provide IT support for the production and push of technical knowledge, and to offer more effective knowledge and management services to the company and its customers.

5.2.2.4 Quality Certification

As many Requests for Proposal (RFP) require that potential suppliers be certified by certain (mostly international) quality standards in order to be qualified to submit a proposal, Company 2 has had its quality management system, occupational health and safety system, and environment management system certified as compliant with ISO 9001:2008\textsuperscript{114}, ISO 14001:2004\textsuperscript{115}, and OHSAS 18001-2007\textsuperscript{116} by Lloyd’s Register Quality Assurance Limited to demonstrate its capacity to manage relevant risks and improve performance. This certification also entails standardized management and controllable quality.

As part of the assessment for gaining certification, Company 2 had to create first its own quality control documents, which are basically specifications of international standards in the context of Company 2. The quality control documents had to be certified by Lloyd for them to be effective. Previously, assessment was conducted on functions. Yet, while function oriented assessment can evaluate an enterprise’s compliance with quality control

\textsuperscript{114} ISO 9001: 2008 Quality management systems — Requirements. This standard has been revised and replaced by ISO 9001: 2015.
\textsuperscript{115} ISO 14001:2004 Environmental management systems — Requirements. This standard has been revised and replaced by ISO 14001: 2015.
\textsuperscript{116} OHSAS 18000:2007 Occupational Health and Safety Management Certification.
documents, it fails to evaluate the enterprise’s efficiency (Interviewee 6). Emphasizing efficiency more than compliance, the subject of assessment shifted from department-function towards business processes. According to Interviewee 6, a business process usually corresponds to a business goal and can involve several different business departments; therefore, a business process oriented assessment is able to assess collaboration between different business departments. Business processes can be divided into two categories based on its degree of influence on enterprise production: core business processes (e.g., design, surveying) and supporting business processes (e.g., human resources, finance). During assessment, enterprises should provide evidence that their work is conducted in accordance with quality control documents. Certification documents (including materials prepared before the assessment, materials produced during the assessment, and the final report) have to be preserved.

5.2.2.5 The Use of Cloud Services at Company 2

Though Company 2 has been pushing forward with informatization at a strategic level, it appears that most of the work is concentrated on the development of information systems and there is no attempt to systematically leverage the benefits of cloud computing to transform the company’s IT capacity. Moreover, when it comes to the meaning of cloud computing, Interviewee 6 believes that cloud computing and big data are two sides of the same coin. As a result, two conditions have to be satisfied for a technology to qualify as cloud computing, namely, the presence of a large volume of data to be processed and of a large pool of computing resources to be managed by the cloud computing technology, which is used to process the large volume of data. This understanding reveals an
assumption that only when an organization’s data amount or the needed computing resources (such as storage, services) reach a certain level is there a motivation to use cloud computing. In other words, cloud computing is for organizations that have a high demand for computing resources that the organizations themselves cannot provide—in which case, Company 2 does not qualify.

Other reasons Interviewee 6 mentioned for not using cloud services include security and confidentiality. At Company 2, records are considered a type of enterprise asset. As electronic records are easily reproduced and distributed at low or no cost, it is insecure to move records to the cloud. In addition, Interviewee 6 stated that enterprises in general do not like public cloud because the services offered are ready-made; instead, they like tailored services and a private cloud. However, since Company 2’s current in-house infrastructure is sufficient to satisfy its needs, it seems unnecessary to build its own private cloud. All in all, according to Interviewee 6, at the moment, Company 2 has no motivation to use cloud services.

In contrast to Company 2’s indifference to cloud computing, its parent company—Corporate Group 1—has been embracing cloud computing since 2008, as manifested first in the use of cloud computing for transforming finance management and then the building of a corporate private cloud. With the rapid development of Corporate Group 1, its finance management became increasingly challenging and the risks increased as well. To address these challenges and mitigate risks, Corporate Group 1, in collaboration with one of the top finance service providers in China, built a finance sharing cloud in which different subsidiaries could share and consolidate their finance data. The use of the
finance sharing cloud has enabled integration of business and finance, intelligent control, and delicacy management\(^{117}\); it has therefore greatly reduced risks.

Then, in 2016, Corporate Group 1 built a private cloud in addition to its in-house technological infrastructure. This private cloud provides strong storage, computing, and development capacity to advance the implementation of smart city, smart transportation, smart port, and transportation integration. It serves as the backup center for the in-house infrastructure and provides an operating environment for the Group’s information systems. As of May 2017, the Group’s Manufacturing Planning and Controlling System and its Production, Operation Data Collection and Assistant Decision-making System had been migrated into the private cloud.

In addition to being the data center of the Group, it is reported that the private cloud will be open to the Group’s subsidiaries on a pay per service basis. Subsidiaries can deploy their business information systems on the private cloud and use it for backup and disaster recovery so as to reduce investment on information technology infrastructure.

5.2.2.6 Information Systems Used at Company 2

Information systems used at Company 2 can loosely be divided into two groups: unified information systems developed by the Group and self-developed information systems. Unified information systems are intended to be deployed in all subsidiaries to help control them. If subsidiaries already have business systems with the same purpose, they can keep their own systems and integrate them with unified information systems to share

\(^{117}\) A type of enterprise management mode, whose main aims is to reduce enterprise resource and management cost (Ma, 2015).
required data. Subsidiaries usually do not use unified information systems as their business systems; instead, these are only used to share data with the Group. Some examples of unified information systems include the Manufacturing Planning and Controlling System, the Production, Operation Data Collection and Assistant Decision-making System, the Communication System, and the Finance Sharing Center.

Self-developed information systems are information systems developed by subsidiaries themselves based on their own needs. At Company 2, two business information systems are used most in their everyday business: the Office Automation (OA) System and the Production Management System.

Prior to discussing these two systems, it is necessary to describe Company 2’s network architecture. For security reasons, Company 2’s network is divided into three layers according to their level of security: the Local Area Networks (LANs) that are physically isolated from the Internet, and therefore forbidden to access the Internet, the LANs that are allowed to visit the Internet using a whitelist, and the Internet. The LANs that are forbidden to access the Internet is used exclusively for design and production business; its users are engineers and some of the management staff. The LANs that are allowed to partially visit the Internet is set up mainly for administrative work, so its users are mostly administrative departments (e.g., finance, human resources, logistics, sales) and staff responsible for administrative work within the production department. The Internet is accessible to all staff for business other than design and production and administration.

In general, business processes that require approval by managers at different levels are all embedded in the OA system, which is deployed in the LANs with partially access to
Internet. The OA system consists of functional modules that correspond to different business departments and their responsibilities. Under each functional module, all business processes of the corresponding department are included. According to Interviewee 6,

As more and more business processes are being refined and streamlined, and many business processes that were offline are now automated and embedded into the OA system, the scope of the OA system is expanding considerably. To a certain extent, you can say that the OA system comprises many subsystems.

In addition, the OA system is now integrated with many other information systems at Company 2, such as the Electronic Records Management System, the Production Management System, *Cloud Communication*, and the Finance System. For instance, regarding the integration between the OA system and the Finance System, since all business processes that require approval from managers have to be completed within the OA system, those involving money are no exception; yet, when a process involving money is concluded, the outcome of the approval process has to be shared with the Finance System to serve as input to initiate another business process to execute the outcome, and this is when the integration between the OA system and the Finance System occurs. Systems at enterprises are no longer isolated, but are integrated with each other. According to Interviewee 6, integration among different information systems is very common among large state-owned enterprises.

The Production Management System plans, organizes, and coordinates projects throughout their lifecycle, from the assignment of the project, allocation of tasks, and design, to the closure of the project. The Production Management system comprises two parts: administration management and production management. The administration
management part includes the following functional modules: customer information, contract management, sub-tier supplier management, and operation analysis; the production management part includes project establishment, project organization, project design, project completion, coordinate design, and drawing prints. The Production Management system is integrated with the Electronic Records Management System and RTX (an instant communication system).

5.3 Cloud-based Application: Cloud Communication

5.3.1 Background

Cloud Communication is a public cloud-based instant communication application used by Company 2. Prior to its adoption, another instant communication application called FeiQ was used within Company 2. FeiQ supports instant messaging, file transferring, and group chat. However, as FeiQ uses point-to-point file transferring and there is no server for the storage of the file to be transferred, a file can be lost sometimes due to failure of the transferring process. To address risks identified with the company’s previous security and confidentiality measures and properly design the network architecture, Company 2 divided its network into three layers based on security level, as mentioned earlier118. The division of the network structure required the deployment of an instant communication application in each of the layers. In 2014, the OA system, which was deployed in the office network, was upgraded, and provided the opportunity for integration with a communication application.

---
118 Definitions of each layer of the network can be found in section 5.2.2.6.
The drawbacks of FeiQ, along with the design of network architecture and the upgrade of the OA system, prompted the adoption of Cloud Communication to replace FeiQ and be deployed in the LANs that can partially access the Internet.

5.3.2 Functionalities

In comparison with FeiQ, Cloud Communication offers a much wider range of functionalities: file transferring, cloud drive, enterprise mail, conference calling, web conference, live webcast, instant messaging, scheduling, tasks lists, and announcements. Among these functionalities, enterprise mail is used the most, followed by instant messaging and file transferring.

The cloud drive is not an enterprise drive, but a personal drive offered to each employee; it is often used as a third-party environment where employees can store and access their own documents whenever they like and wherever they are. Therefore, it is mostly used when people are away on business.

The company has experienced some minor issues in the use of Cloud Communication, for example, with data interchange, when integrating with other information systems at the beginning (Interviewee 6). However, no major issues have been experienced thus far (Interviewee 6).

5.3.3 Integration with Other Business Systems

Cloud Communication is integrated with the OA system, employees’ cell phones, and a videoconference application. The integration between Cloud Communication and the OA
system occurs at the notification point, aiming to push notifications in the OA system out in real-time on the employees’ *Cloud Communication*. In this way, employees do not need to log in their OA system to check the status of the business process and other notifications relevant to them. The integration between *Cloud Communication* and the employees’ cell phones serves the same purpose, so that employees can be notified even when they are not at their desks.

### 5.3.4 Records Generated While Using *Cloud Communication*

All the data generated in the course of the use of *Cloud Communication*—including chat messages, emails, and records stored by employees in the cloud drive—are stored in a virtual “private” cloud in the public cloud of the service provider. A virtual private cloud is “an on-demand configurable pool of shared computing resources allocated within a public cloud environment, providing a certain level of isolation between the different organizations using the resources.” (“Virtual private cloud”, n.d., n.p.) In contrast to a real private cloud, which is physically exclusive to one user, the virtual “private” cloud allows for resources to be virtually dedicated to one user and provides “a certain level of isolation” enabled by technology. There is no in-house backup of the data stored in the cloud. Company 2 has signed an agreement with the service provider concerning the protection of data security and privacy.

When Interviewee 6 was asked whether data generated while using *Cloud Communication* is considered evidence of the company’s business activities, he responded with a definite “no.” He further elaborated,
The chat log definitely cannot be the evidence of our business and operation. Only the official records, which result from the conduct of the business process, can be considered as evidence... All decision-making has to go through a business process, as it has to obtain layers of approval.

Since data generated while using *Cloud Communication* does not document business transactions and therefore is not considered evidence of business activities, it is not captured in the company’s records management system\(^\text{119}\) either. Taking enterprise emails as an example, when Interviewee 6 was asked whether enterprise emails would be captured and kept as records, he said that it was necessary to keep enterprise emails, as they could complement records that have gone through formal business processes, therefore all together providing a more complete picture of the company. However, Interviewee 6 added that keeping enterprise emails is of little value, as the use of enterprises emails is mostly restricted to their senders or recipients, beyond whom the content of emails is rarely known.

In addition to its limited value, Interviewee 6 uttered other issues with keeping records generated in the use of *Cloud Communication*: the assessment of their reliability and authenticity, the determination of which record is the complete and final one, their use, their transfer from the cloud to the in-house environment, and their size.

Due to their limited value and the various issues involved in keeping them, enterprise emails, along with other data generated in the use of *Cloud Communication*, do not fall under the scope of the records to be kept by Company 2, and at this time, Company 2 has no intention of bringing them into such scope.

\(^{119}\) In this dissertation, records management system refers to “a unified set of resources, responsibilities, procedures and equipment designed to maintain and provide access to records” (Shepherd & Yeo, 2003, p. 23).
5.3.5 The Influence of the Use of Cloud Communication

As there is no business process embedded in Cloud Communication, it is believed that the use of Cloud Communication has no influence on the business processes other than for making them more efficient.

5.4 Records and Archives Management\textsuperscript{120} at Company 2

5.4.1 Records and Archives Management Organizational Structure

Company 2’s records and archives management work is conducted under the guidance and supervision of the Group, which is in turn under the supervision of the State Archives Administration because Corporate Group 1 is a centrally owned state enterprise. As a result, Company 2’s records and archives management work is also under the State Archives Administration’s guidance and requirements, which usually come to the company in the form of statistics, work plans, reports, and case recommendations. Within

\textsuperscript{120} As discussed above, records management as intended in North America is equivalent to the combination of records creation and management in the records creating office and their management within the internal Archival Unit in China. And, records in these two different locations—in particular for organizations in the public sector and state-owned enterprises—are under the supervision of different authorities, the former under the State Office and the latter under the archival administration in respective level. With the widespread adoption of the OA system, the control that used to be exercised by the records creating office on creation and management of records has now largely been automated, and therefore, reduced. Since the focus of this dissertation is on the management of records as evidence and information after their creation, it will mainly discuss the management work performed by the internal Archival Unit and discuss the OA system where necessary. And, since the internal Archival Unit of Company 2 also undertakes long-term preservation of the company’s records—though does not fall under the scope of this dissertation—the work performed by the internal Archival Unit is identified as records and archives management work and this author will only make the distinction where necessary. Also, as acknowledged previously, records preserved in the internal Archival Unit are identified as “archives” according to the Chinese terminology, but in this dissertation, for consistency reasons, the term “records” will be used to highlight the records management component of the internal Archival Unit’s work, in particular for assisting the performance of current business, though it is really hard to determine the boundary of each.
the company, the department responsible for records and archives management work is the internal Archival Unit, which is under the Information Management Center.

The internal Archival Unit consolidates the library and archives functions into one department where each staff member has some of the functions of each within his/her responsibility. Despite this, the major focus of the internal Archival Unit is records and archives management work, with library work only having a minor role. The internal Archival Unit centrally and uniformly manages and preserves all types of records created by the company from their acquisition by the internal Archival Unit right after filing, to their permanent preservation or destruction. According to Company 2’s policy documents, the main responsibilities of the internal Archival Unit are so described:

1) maintaining and managing the company’s scientific and technical records, personnel records, administrative records, finance records, artifacts, standards and regulations, and different types of books, journals and materials;

2) safeguarding the security and confidentiality of records;

3) organizing, supervising, and examining filing practices at different departments;

4) providing archival publications to internal and external users;

5) purchasing, examining, indexing, classifying, and shelving books and materials;

6) collecting standards and regulations on engineering records and maintaining and applying digitization regulations;

7) collecting, classifying, arranging, and describing the company’s engineering drawings, and other engineering records;

8) conducting version control of paper engineering drawings and engineering records;

9) maintaining digital records; updating and maintaining the exhibit within company museums;
10) burning records to CDs;
11) maintaining and managing hard copy and digital journals;
12) managing and checking out artifacts and personal awards;
13) filing, managing, and checking out personnel records; and
14) collecting, compiling, and publishing scientific and technical records.

A departmental records management committee is established to coordinate records management work across the company. Each department or project appoints a Records Liaison Officer to serve as a point of contact between the department or project and the internal Archival Unit. As Records Liaison Officers are more familiar with the types and status of records generated within their departments or projects, they are more qualified for “filing and transferring” them to the internal Archival Unit in accordance with relevant records management standards and regulations. In addition, Records Liaison Officers are also responsible for coordinating the application of records management policies and regulations within their respective departments. There are about 20 Records Liaison Officers at Company 2. The main duties and responsibilities of Records Liaison Officers include the following:

- collecting records once the business activity that gave rise to them is complete,
- processing records for filing, including examining their readability, if any stamps are missing, whether the signature is clear, and whether any page is missing,
- examining whether both the paper and digital versions of each records exist, and if not, generating the missing one by either digitizing the paper records or printing out the digital records,
• writing journals attesting to the transfer of records, and
• transferring records to the internal Archival Unit.

When records are submitted to the internal Archival Unit, its staff examines the quality of filing and provides feedback and, if filing does not meet relevant records management standards, the records will be returned to the Records Liaison Officers for improvement. At the moment, Company 2 mainly uses money as an incentive to boost Records Liaison Officers’ engagement, but it is looking for other ways to effectively motivate Records Liaison Officers. Although there are some issues such as not transferring records on time, in general, it appears that the records liaison program works well at Company 2.

5.4.2 Records to be Filed and Transferred to the Internal Archival Unit

Once the business activity in the conduct of which records are created is completed, records will be captured into a records management system so that their qualities (authenticity, integrity, usability, and reliability) will remain intact over time (Shepherd & Yeo, 2003). According to Shepherd & Yeo (2003), capture refers to “the actions that are taken to secure a record into an effective records management system, where the record can be maintained and made accessible for as long as it is needed” (p. 4).

The action “capture”, to some extent, is equivalent to “filing and transferring” in the Chinese records and archives management context, which, according to the Chinese Archival Glossary (DA/T1–2000), involves the activities of arrangement, classification, determination of retention period, and locking against change. Although “filing and transferring” and “capture” describe the same step in the lifecycle of records, due to the
differences in the management of records after this step, the activities involved in these
two concepts differ as well.

A “retention and disposition schedule” is used in determining the types of records that
have to be transferred to the internal Archival Unit, along with the length of time for
which records are kept. Yet, it is important to note that the purpose of the “retention and
disposition schedule” in the Chinese context is different from that in North America. In
North America, the retention and disposition schedule\textsuperscript{121} is a legal authority specifying
the retention periods of classes of records and their authorized disposition (e.g.,
destruction, or transfer as appropriate); it is usually combined with the classification
scheme\textsuperscript{122}, which will help describe groups of records, mostly based on functions and
activities; and it will cover all types of records created by the organization, regardless of
their physical form or characteristics, devices used to create it, transitory or permanent, or
locations. The retention and disposition schedule in North America can be used to justify
their disposition (including destruction) of records.

By contrast, in the Chinese context, the “retention and disposition schedule” is an
authority that serves as a filtering tool determining the records that are required to be or
can be transferred to the internal Archival Unit\textsuperscript{123}; it is not combined with a classification
scheme; and it describes the types of records based on the organizational structure and the
content of the records.

\textsuperscript{121} According to the InterPARES 2 project, retention schedule refers to “a document providing description of records
series and/or classes and specifying their authorized dispositions” (“Retention schedule”, 2007, p. 43).
\textsuperscript{122} According to the InterPARES 2 project, classification scheme refers to “a plan for the systematic identification and
arrangement of business activities and records into categories according to logically structured conventions, methods
and procedural rules” (“Classification scheme”, 2007, p. 10).
\textsuperscript{123} For instance, in Company 2, this policy document is entitled “文件材料归档范围和档案保管期限表”.

207
Appraisal is being carried out in the application of the retention and disposition schedule, as only records listed in it will be transferred. The retention and disposition schedule at Company 2 is based on the *Provisions on the Scope of Enterprise Records to be Filed and Transferred and Their Retention Period* issued by the State Archives Administration. It organizes records by departments; then, under each department, records that are deemed to be of preservation value are listed and their retention period will be identified. Two types of retention period are identified: permanent and long term (i.e., either 10 years or 30 years).

As a guidance on the scope of enterprise records to be transferred into the internal Archival Unit, *Provisions on the Scope of Enterprise Records to be Filed and Transferred and Their Retention Period* are made from the perspective of preserving records of value to the state and society, rather than records that are of business value to the enterprise. Besides, as Interviewee 6 commented, the categories listed in the *Provisions on the Scope of Enterprise Records to be Filed and Transferred and Their Retention Period* are too general, and are therefore of limited value in terms of helping organizations determine whether a record should be transferred to the internal Archival Unit or not. Partly because of these reasons, it seems that the retention and disposition schedule at Company 2 is largely ignored when deciding whether a record should be transferred to the internal Archival Unit or not. For instance, when Interviewee 7 was asked to comment on the company’s retention and disposition schedule, he said, “all records bearing the company’s stamp would have to be kept.”
In addition, the scope of records to be transferred to the internal Archival Unit at Company 2 has been greatly expanded with the evolution of the company’s records management strategy and the development of its business. The various aspects of this expansion are discussed below.

At Company 2, while in the past only the final document was kept, now documents generated throughout the whole business procedure (which led to the issuing of the final document) will be kept as well. For instance, in the case of a contract, in the past, only the final contract would be kept; now, all documents generated in the course of the bidding process—ranging from the initial request for proposals, to the business proposal submitted, to notification of winning the bid, to the finalized contract—will be filed and transferred to the internal Archival Unit. In addition, while in the past only the document per se would be kept, now the metadata of the document (e.g., time of the creation of the document, time of approval, time of signature, persons involved) will all be collected as well in order to give a more complete picture of the business process.

Another expansion of the scope of records to be captured results from the expansion of the company’s business. For instance, as the company now offers services related to the operation and maintenance of infrastructure once its construction is completed and is handed over to the owner, records generated from this operation and maintenance service will be kept as well.

As to the reason for the expansion of the scope of records to be kept, it is reported that the ultimate purpose of archival work is to assist the operation of the business and contribute to the company’s sustainable development through the provision of information and
knowledge (Interviewee 6). Therefore, it is important that the internal Archival Unit strengthen its collection by acquiring as many and as detailed records as possible so that it can provide as much detailed and broad information as possible.

5.4.3 Record Types

The concept of record types plays a crucial role in Company 2’s records and archives management practices in that it provides the foundation upon which records and archives management functions are based. For instance, record type is the first level of classification in the records classification scheme, and also a criterion used to assess the business value of records. In addition, different types of records are arranged, indexed, and preserved differently according to their respective typological characteristics. Despite the significance of this concept, no explanation has been provided regarding the meaning of the concept; in the company’s *Measures for Records and Archives Management*, the concept is illustrated by providing a list of records types, including scientific and technical records, administrative records, finance records, artifacts, research and development records, equipment records, audio and visual records, and digital records. Management rules for different records types have been developed to ensure that they can be treated in accordance with their characteristics.

For instance, the appropriate time for filling and transferring records to the internal Archival Unit varies among different record types. Administrative records, which are defined as records that document and reflect the company’s administrative management
activities and which have preservation value\textsuperscript{124}, are required to be filed and transferred to the internal Archival Unit every half year. On the other hand, for scientific and technical records, the time for their transfer into the internal Archival Unit varies according to their sub-types. Scientific and technical records are defined as records created in the company’s operations, production technology, construction, and research and development activities and which are of value to the company and the society, and kept for reference and research purposes\textsuperscript{125}; scientific and technical records can further be divided into engineering records, surveying records and supporting documentation, engineering drawings and supporting documentation, equipment records, and others. For instance, engineering drawings and supporting documentation are required to be transferred to the internal Archival Unit within one month after they are submitted to the customer. Equipment records are required to be transferred to the internal Archival Unit within two weeks after new equipment inspection. Engineering records are required to be transferred to the internal Archival Unit after their acceptance by the local archival administrative organization where the project is located.

The rules for the classification and arrangement of administrative records also differ from those for scientific and technical records. For administrative records, the year records are created, the creating department, and the retention period are often used. For instance, at the series level, records are categorized according to the year that they were created; then, at the sub-series level, records are grouped according to the creating department; next, at one level further down, records are grouped according to their retention period. On the

\textsuperscript{124} Company 2’s \textit{Measures for Records and Archives Management}, internal document.  
\textsuperscript{125} Company 2’s \textit{Specifications for Scientific and Technical Records Management}, internal document.
other hand, for construction records—a sub-type of scientific and technical records—the city where the project is located, the name of the project, and the lifecycle of the project are often used for their classification and arrangement.

According to Interviewee 6, the concept of record type is a product of traditional paper records management, when the emphasis was largely on preservation rather than use. The identification of record types was based on their physical form (e.g., artifact versus written document), function (e.g., administration versus operation), or other characteristics. As different types of records have different requirements for their storage and preservation, record type-based management has greatly facilitated this process. However, record type-based management has a major drawback, in that it destroys the relationship among records originating from the same business activity. For instance, based on current division of record types, engineering records and contract records belong, respectively, to the types of scientific and technical records and administrative records, and are managed and preserved separately according to corresponding rules. Different types of journals, which are not compatible with each other, are used for their management. As a result, when one wants to look at the contracts and the engineering records of one project, one has to retrieve the contract from administrative records, and the engineering records from scientific and technical records.

In light of the paperless trend, Interviewee 6 noted, it is no longer meaningful to categorize and manage records according to their physical forms, but maintained that the concept was still relevant and valid for their intellectual management. For instance, Interviewee 6 said that record type could be added as one of the attributes of records so
that, upon query, records of the same type can be identified and returned. At the moment, in the Electronic Records Management System (ERMS) used at Company 2, record type is still adopted as the primary class of classification. A directory tree, with a top-level directory and many subdirectories, and with each level of the directory corresponding to one level of classification, is used to illustrate the classification and physical arrangement of records, as shown in Figure 3.

Figure 3 Directory tree in the Electronic Records Management System at Company 2 (Created based on the company’s Electronic Records Management System)
It is important to note that the ERMS at Company 2—despite its name—is not exclusively dedicated to records management as we commonly understand, rather it would be more appropriate to identify it as a platform that centrally manages and consolidates all information resources that internal Archival Unit is in charge of, and provides relevant reference service on demand. This is why among the types of materials managed by this system there are books, journals, and other materials that traditionally would not fall under the scope of records management.

As Interviewee 6 noted, the ultimate purpose for the division of records into different types is not to isolate them but to consolidate them. The internal Archival Unit processes records in order to better satisfy employees’ information needs, and one of the methods they use is to identify and register how one record is associated with records or materials of other types. Yet the relationship established among the records in this way is different from the relationship inherent to records and generated in the conduct of the same business activity or transaction, namely, the archival bond. Instead, this relationship is identified and summarized from tracking users’ use habits: in other words, what record types are used the most by users when they conduct one enquiry.

With the evolution and expansion of Company 2’s business and its records management work, more record types are identified and added. For instance, in the past, contract records were considered as a sub-type of administrative records and managed in accordance with the rules for administrative records. However, as contract records are used more and more often, they have now become an independent type. In another

---

126 According to Duranti (1997), archival bond refers to the “network of relationships that each record has with the records belonging in the same aggregation” (pp. 215-216).
example, as the company has been transformed from a public institution to an enterprise that freely participates in marketing competition, this gave rise to a new type of records documenting its marketing activity—bid management records. As the company is expanding its business, both along the supply chain and in the regions of operation, it is expected that some of the records generated in the course of these new business activities may not fit within the existing record types. As a result, new record types will have to be created to accommodate these records.

5.5 Trustworthiness of Company 2’s Records

5.5.1 Electronic Records Management: The Adoption of the Dual-Copy System

With the promotion of informatization at the Group level and the company level, digital records are used for the entire conduct of business; therefore, the dual track system has been abandoned at Company 2. However, at the moment, the use of digital records is mostly restricted to internal use; when it comes to the use of records as evidence to account for the company’s business to the government or other supervisory authorities, digital records have to be transformed into paper format. As Interviewee 6 explained below,

It is the government’s attitude towards digital records that plays the decisive role here. If the government does not recognize the effectiveness of digital records, we will have to submit paper records instead.

Furthermore, the lack of official endorsement of the one-copy system means that Company 2 still has to keep records in both paper and digital formats for their maintenance and likely long-term preservation. As records are mostly in digital format when participating in business activities, a paper copy has to be generated when filing
them. Yet it is important to note that not all born-digital records require the generation of a corresponding paper copy; instead, only those specified in the company’s retention and disposition schedule will have to follow the dual-copy system. At the moment, both administrative records and scientific and technical records have dual copies. When the company is required to provide evidence of its business activity, paper records maintained and preserved in the internal Archival Unit are provided.

Therefore, in some way, the paper copies of records maintained at Company 2 are considered reliable and authentic and are the official records documenting the company’s business activities.

On the other hand, as the company is striving to transform itself from a traditional infrastructure construction company to a global leader providing knowledge and management service, internal information assets are considered powerful resources to facilitate such a transformation. For instance, the Manager of Company 2 stated that

The company has to strengthen the information technology infrastructure of the internal Archival Unit and include the exploitation of records as a part of the critical matter agenda. By combining modern information technology, network technology, and records management, the company will have to upgrade the records management platform, and transform it into a knowledge obtaining platform, learning and development platform, and experience sharing platform. Through the use of big data technique, the company has to achieve the pushing of knowledge in the course of design to effectively share the company’s historical achievement and experience and to enable the improvement of product quality.

As a result, on the one hand, the company has to convert digital records into paper format for recordkeeping purpose and to use them as evidence to account for its activities to the overseeing authorities; on the other hand, to support the company’s strategic transformation and efficiently exploit the company’s records to enable knowledge sharing,
due to the limitations of paper records in exploiting the information and knowledge contained within them, their digital counterpart is mainly used for reorganizing and publishing information to provide a reference for business operations and satisfy the company’s internal information needs. For instance, the internal Archival Unit has significantly expanded the scope of digital records collected and managed, and designed many methods to organize and publish these resources. As to the scope of digital records collected, the retention and disposition schedule does not apply anymore; instead, all digital records whose chain of custody (and thus their authenticity) can be identified are collected.

As a result of the different purposes and management methods for paper records and digital records, to a certain extent, the dual-copy system creates two records management programs inside Company 2 that operate parallel to each other: paper records management for evidential purposes, and digital records management for informational purposes.

5.5.2 Electronic Records Management System (ERMS)

5.5.2.1 Background

The Electronic Records Management System (ERMS) plays a key role in Company 2’s records management work. As Interviewee 7 commented, “all our work now needs to use the ERMS. If the ERMS breaks down, we cannot proceed with our work.” The ERMS is an off-the-shelf product that focuses on the management of both paper and digital records, and is deployed in the company’s in-house servers. According to the system provider’s promotion, the primary targeted customers of the ERMS are government agencies,
enterprises, public institutions, and comprehensive and specialized archives of different sizes. The ERMS offers customized interface to integrate seamlessly with the OA system and other business information systems. It supports the capture, classification, appraisal, maintenance, retrieval, and use of records; other functionalities include identity authentication, authorization management, the handling of graphics, xml, and report, database operation, and data storage. The main functionality blocks of ERMS are capture of records, data management, exploitation of records, and system maintenance.

5.5.2.2 Functionalities

Three databases are embedded into the ERMS used at Company 2 for the processing and maintenance of paper and digital records: the pre-filing database, the records management database, and the maintenance database. The pre-filing database can be considered as a container that contains data about records that will be visualized and processed prior to their being captured into the records management database. The records management database can be considered as a container that contains data about records that are to be arranged and described prior to their transfer to the maintenance database. The maintenance database can be considered as a container that contains data about records kept at the internal Archival Unit.

In each of these databases, a directory tree corresponding to the classification of Company 2’s records has been created, as shown above in Figure 3. The top directory corresponds to the fonds, namely, aggregations of all records created or received by Company 2; the next sub-directory corresponds to record types; and the next sub-directory further down varies among different record types, with some commonly used
criteria being the year of creation, the creating department, the project, or the matter documented in the record. For instance, administrative records, which are one major type of records created at Company 2, are firstly classified according to the creating department; then, records created by the same department are further classified according to their year of creation. Scientific and technical records are first classified by regions where the projects are located, and then projects.

As a rudimentary method for the organization of records, as discussed in section 4.2.4.3, the use of record types—which couldn’t consistently reflect either the content of the records or the business activity that gave origin to them—as the first level for classification of records has arbitrarily destroyed the relationship that exists among different types of records that are generated in the conduct of the same business matter.

For a variety of reasons, e.g., compliance with the dual-copy system, inability of digital records to serve as evidence in litigations and satisfy regulatory requirements, and the responsibility of the internal Archival Unit to provide knowledge and referential services to the company, two records management systems currently operate in parallel at Company 2: the paper records management system and the digital records management system. Though the ERMS at Company 2 is intended to manage both digital and paper records, it appears that it is primarily paper format oriented, in that the way the ERMS is used to manage paper records is simply a digitization of the methods and processes used for the management of paper records and, as a result, digital records have been reduced to an alternative way to access paper records and resources that are of informational value to the company.
At the moment, in each database in the ERMS, an entry corresponding to a record in paper format is created that documents its properties (e.g., author, time of creation, addressee, place of preservation in the archives, etc.); this information is extracted from the metadata of the original digital version of the paper record. Only metadata that is relevant to paper records management will be extracted, with properties relevant to digital records only (e.g., size, format, software, etc.) rarely being included. The digital counterpart—whether the original digital record or the digitalized one—is included in this entry as an attachment. At the moment, there is no separate database exclusively dedicated to the management of digital records.

Yet, according to Interviewee 6, the plan is to gradually go paperless. To achieve that, the company will first transition from paper records oriented management to treating paper records and digital records as equally important; then from there, the company will transition to digital records oriented management; and in the end the company will move towards going completely paperless. For the transition from paper records oriented management to paper records and digital records being equally important, Interviewee 6 envisioned the creation of an additional database that is a counterpart to the database that manages paper records, and which will be dedicated to the management of digital records. Within this database, entries that document properties related to digital records (such as format, size, application, and operating system) will be created. In this way, paper records and digital records can be managed separately and equally.

The pre-filing database provides an environment where digital and paper records will be processed, including creating entries in the database for each paper record, attaching its
corresponding digital record, putting digital records in order, and transferring records to the corresponding categories in the records management database. The entry documents information about the record, including creating department of the record, year of creation, document number, title, date of creation, page numbers, and notes. Yet, unlike what happens in paper world, where this data has to be obtained by examining the record, the data can be automatically retrieved from the corresponding digital records. Once the entry is added, the digital format of the record will be attached to the entry. Then, this whole entry will be filed into the corresponding category and record type in the records management database.

When records are in the records management database, records management information will be added to the entry, such as the person responsible for the transfer, the time of the transfer, its position in the archives, and a unique identification number. Once records management information has been added, the records will be transferred to the maintenance database for maintenance, use, and long-term preservation.

5.5.2.3 Integration with Business Systems

While paper records are transferred to the internal Archival Unit by the Records Liaison Officer, digital records are transferred to the ERMS through its integration with business systems. The method of integration is the use of one temporary database, one of the three integration methods recommended by Chinese standard, with the other two being web service and data packets. The temporary database serves as a third-party database for the

127 Specification on Electronic Documents Archiving and Electronic Records Management (GB/T 18894–2016), section 8.2.3.
storage of records into the business systems and the ERMS. When the business activity is completed, digital records, along with their relevant metadata, which are the by-products of the business activity, will be automatically transferred to the temporary database. The transfer is incremental and will occur once; therefore, follow-up transfers will not overwrite previous ones. Once the records are transferred to the temporary database, the ERMS will automatically pick up these records at regular intervals, after which the business system will be notified that the records have been successfully transferred to the ERMS.

In comparison to web service and data packets, a temporary database is a loose integration method. With the use of a temporary database, the ERMS does not need to synchronize with the business systems in real time (Interviewee 6). Instead, any change occurring will be documented as incremental—in other words, generating a new entry rather than overwriting the previous one (Interviewee 6). This can ensure the authenticity of records kept in the ERMS (Interviewee 6). In addition, the temporary database integration method can avoid the risk that when the database structure of the business system changes, records cannot be transferred to the ERMS (Interviewee 6). Another advantage of the temporary database is that most of the development work for the integration occurs in the temporary database; the temporary database integrates with all business systems and the ERMS only has to integrate with the temporary database. This can help ensure the stability of the ERMS (Interviewee 6). A disadvantage of the temporary database integration method is that there is no corresponding application that uses the database; therefore, the database cannot be visualized (Interviewee 6). At Company 2, this issue is addressed by making the temporary database visualized at the
**pre-filing database** at the ERMS. The visualization of data can avoid issues such as incomplete data transfer.

When business systems transfer records to be kept to the ERMS through the **temporary database**, metadata on the formulation and processing of the incoming and outgoing records will be transferred as well. These metadata will be transferred in two forms: **html files**, which are independent of any applications (as seen in Figure 4, below), and direct matching of the fields in the business system with those in the ERMS. Metadata that is required in the entry about the record in the ERMS consists of those properties that paper records have and which are needed in the management of paper records. No local or national standards are consulted in determining what metadata should be acquired.

According to Interviewee 6, the director of the internal Archival Unit, a metadata schema management is planned, which will consult both national and local standards and take into consideration future needs in relation to metadata.

In addition to its integration with business systems through a **temporary database** for the transfer of records, the ERMS is also integrated with the OA system to deliver the functionality of approval of applications to loan certain materials. For instance, when patrons want to loan certain materials, they first log into the ERMS and search them; once they identify the material they want to loan, they click on the loan application; then, information about the materials and the patrons will be sent to the OA system, in which an application will be generated and routed to the relevant manager for approval. Once the manager gives approval for the application, the result will be sent back to the ERMS
to notify records management officers; the result will also be sent to the patrons through Cloud Communication to notify them.

**Processing Form for Creating a Document**

<table>
<thead>
<tr>
<th>Document No. of relating document</th>
<th>Degree of emergency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title of relating document</td>
<td></td>
</tr>
<tr>
<td>The document to be distributed</td>
<td></td>
</tr>
<tr>
<td>Attachment</td>
<td></td>
</tr>
<tr>
<td>Title of the document</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Document type</th>
<th>Document No.</th>
<th>Degree of emergency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Whether the document is published on the front page of the OA system</th>
<th>Whether the document is printed</th>
<th>No. of copies printed</th>
</tr>
</thead>
<tbody>
<tr>
<td>The main addressee</td>
<td></td>
<td></td>
</tr>
<tr>
<td>cc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other organizations (mostly superior organizations) to cc</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Writer</th>
<th>Time of subscription</th>
<th>Whether the document is regulations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Author</th>
<th>Date</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Person who drafted the document</th>
<th>Department which drafted the document</th>
<th>Date the document was drafted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Document formation process</th>
<th>Person</th>
<th>Department</th>
<th>Time</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Draft Document</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Draft document</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial review</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Validate the content</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Examine and review</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sign and issue document</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distribution processing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Figure 4. Processing form for creating a document (Translated from the original form)**

### 5.5.2.4 Limitations of the Electronic Records Management System

The ERMS does not have the ability to automatically dispose of records when the retention period is complete. In the Chinese context, disposition of records is linked to items, which means that a file cannot be destroyed if one of its items is to be preserved long-term.
Within the ERMS, searches are mainly conducted through keywords and unique identification numbers. As unique identification numbers are generated according to certain rules, if records related to a certain project are required, the unique identification number of the project will be inferred based on the rules and then the inferred number used to search for the relevant records. As to searching using keywords, the search has to be conducted under certain record types; it is impossible to conduct a keyword search across all record types (Interviewee 6).

To protect the reliability and authenticity of records, mostly technological methods are used, such as certificate authority, digital signature, antivirus, and data loss prevention. Interviewee 6 noted that there are risks in whatever methods are used; therefore, what needs to be done is risk management. Archival principles and methods have not been used in guaranteeing the reliability and authenticity of records.

As Company 2 does not transfer its records to archives for long-term preservation, it has to undertake long-term preservation itself. The primary strategy used for long-term preservation is to constantly back up the data: including online backup, offline backup, and offsite backup. Yet, the company recognizes that backup does not equal long-term preservation, for backup only guarantees that the data is not lost, and cannot guarantee that the data is readable or usable. When it comes to offsite backup, interestingly, Company 2 prefers to find its own backup place than to use the resources offered by the Group.

Another limitation of the ERMS is the absence of the functionality to document and hence account for records management work per se—in other words, what work the
records managers have done in the processing and management of these records. For instance, for the transfer of records to the internal Archival Unit, the ERMS should record at least which officer has processed the transfer, and what the officer has done to the records after the transfer. According to Interviewee 6, they are planning to reengineer and standardize records management processes on the basis of internal and external standards; they will then embed the restructured records management work processes into the ERMS.

5.6 Use of Records

Use of records has been given the utmost importance at Company 2, as it is considered the lifeblood of enterprise records management work. As Interviewee 6 commented,

Actually, use of records has always been the characteristic of our records management work. It is the lifeblood of enterprise records management work. Where does the value of enterprise records come from? Unlike archives, which take the long-term preservation of societal history as its responsibility, the value of enterprise records is determined by their use [and the value they can contribute to the operation of the enterprise]. At enterprises, not one penny is spent without considering its return, especially at state-owned enterprises, which limit the term of office the leader can hold. As a result, the leader mostly emphasizes the profit within his term of office, and has little consideration of long-term influence. Therefore, use of records is of paramount importance among our work.

Yet traditional methods (e.g., keywords search, unique identification number search) are not very effective in terms of providing records for use to employees. This is especially the case with scientific and technical records, whose content is very specialized, meaning that natural language-based keywords searches are usually very ineffective in identifying resources. This is even worse for new employees, who have no idea what projects the company has done and which of them are relevant to the project they are working on. In
light of this, Company 2 has undertaken a series of projects to understand and describe the information needs of different user groups, process and represent records as well as their component parts in standardized domain specific language\(^{128}\), design methods to push information required at the right time and in the right format to the right audience, and develop information systems to publish information relating to certain subjects.

The characteristics of digital records, especially the fact that their medium and content are separable, make it easier to dissect the whole record, extract parts that are specifically relevant to the users, index the parts, and organize and publish the content in a user-friendly manner. While traditional records and archives management theories, principles, and methods mostly take the whole document (diplomatics) and aggregations of records (archival science) as their object of study and apply intellectual control to records on that basis, the use of records in Company 2 goes in the opposite direction by atomizing records and identifying sections within them that are relevant to the users’ information needs. Since the primary goal of electronic records management in Company 2 is to reuse these records as knowledge assets within the company, trustworthiness of the electronic records is less central and the user (in this case the employee) will apply their own assessment methods to determine if the information retrieved is relevant, valuable, and trustworthy.

In order to provide relevant records to employees for use, three major tasks have to be addressed: properly capturing employees’ information needs and representing them in standardized domain-specific language; using this standardized domain-specific language

\(^{128}\) The standardized domain-specific language is a set of ontologies summarized by the company’s engineers that can be used to describe the projects conducted by the company; it is very specialized and specific to the company.
to represent the content of records; and matching users’ information needs with appropriate records through the standardized domain-specific language. Company 2 has made significant strides in recent years in terms of these three aspects.

In order to identify employees’ information needs, two methods have mainly been used: asking employees to express their information needs using standardized domain specific language, and sorting out employees’ record use habits by studying the keywords used in searches and the different types of records accessed in one search.

A key approach used in indexing records is to utilize the record use process—for instance, when users search records through the ERMS using keywords. The keywords are considered to represent important topics or aspects of the records that correspond to information needs; thus, in addition to being able to find the records that users were searching for, the keywords are included in the list of words used to index the records.

In another case, both the use of records and their indexing have been integrated and embedded into business processes, more specifically the Production Management System. When carrying out the project using the Production Management System, at various stages in the development of the project, relevant managers will tag the project using the standardized domain-specific language. The tags will then be used to identify historical projects that have been indexed with the same standardized domain-specific language. The match of the tags will return projects that might be relevant to the current one, so that engineers can browse these projects for inspiration and innovation. The tags attached by

---

129 According to Interviewee 6, the controlled vocabularies are created and maintained by the company’s engineers. For historical projects, engineers would review them and tag them using professional vocabularies. For on-going and future projects, the engineers in charge of the projects will tag them using professional vocabularies. All together, the controlled vocabularies generated will become a professional dictionary that is specific to the company.
relevant managers in the conduct of the project will also be kept along with the records generated in the conduct of the project and will be transferred to the internal Archival Unit when the project is completed. These tags will then be used to match information needs expressed by standardized domain-specific language in the conduct of future projects. Therefore, the process is cyclic. The integration of records use in the business process is a key factor that contributes to the success to this case. According to Interviewee 6, business processes play a pivotal role in records management work, even more important than managerial power, as they guarantee that records of preservation value can be filed and transferred to the internal Archival Unit once the business matter is concluded. He commented,

Power is changeable, but business process is resilient. As long as records management requirements are included in the design of business process, they are rarely changeable… While in the past, it was easy to determine what belonged to the internal Archival Unit (i.e., records that have been arranged and filed in an archival portfolio box), it is now hard to determine what belong to archival department when it comes to digital records. [Therefore, it is important that records management processes can be embedded into business processes to ensure that records can be filed and transferred to the internal Archival Unit in time.]

In addition to indexing the records per se, relationships between different record types have also been established so that, when users conduct their searches, all record types that might be relevant to the search can be presented to them. The relationships among different record types are mainly identified and summarized through tracking users’ use habits and business needs—for instance, what record types are most often used simultaneously when the user conducts a search. The establishment of the relationship among different record types is accomplished through matching of property fields of different record types.
Separate information systems, for instance, Bidding Information System, Engineering Information Management System, have been developed to facilitate records use by extracting records or parts of them that are about certain subjects and of interest to certain groups of employees.

5.7 Discussion

5.7.1 What is the Impact of Company 2’s Digital and Cloud Strategy on its Records Management Practices?

The research shows that the implementation of digital strategy (including the movement to the cloud) in both Company 2 and its parent company (Corporate Group 1) has had a limited impact on Company 2’s records management practice. Although the majority of records are generated in born-digital form now in Company 2 thanks to the deployment of many business information systems, because of the adoption of the dual-copy system, born-digital records are converted into paper format and managed in a traditional way. The Electronic Records Management System simply automates records management practice.

When it comes to cloud services, it appears that the commonly advertised benefits, such as scalability, ubiquitous access, enhanced security, easy deployment and maintenance, and economic advantage (Cunningham, 2016; Cunningham & Wilkins, 2009; Datskovsky, 2016) do not enjoy equal emphasis at either Company 2 or its parent company. For the parent company, cloud computing is promoted as one type of technology that can be used to reengineer business processes, and transform the operations of the enterprise. This is in conflict with previous studies on cloud computing,
which found that business-oriented benefits, such as business process modernization and new application development, are not the most important drivers for the use of cloud-based services (Ferguson-Boucher & Convery, 2011).

For Company 2, it is evident that, despite the use of the *Cloud Communication* system, it does not have a coherent strategy towards moving into the cloud. Interviewee 6 said that cloud computing will only be considered when the company has an enormous amount of data whose processing requires large computing resources. Thus, cloud computing is mainly associated with large computing capacity with other benefits not acknowledged. Indeed, the most relevant move is the construction of a private cloud by the parent company. However, data collected revealed that Company 2 has concerns over the security and confidentiality of data residing in the cloud and indicated that their company has signed an agreement with the service provider of *Cloud Communication* to address these issues.

This finding is consistent with the results of survey conducted by CAICT (2018a, 2018b, 2018c) on the cloud market and use of public- and private- cloud services in China, which found that the cloud computing market in China is not mature yet and major market share are contributed by IaaS and cloud hardware. The types of cloud services offered in China are not varied and therefore, could not satisfy users’ needs, and users are still concerned about the security ability of cloud services, in particular for the protection of data. In light of these, and considering that Company 2 and its parent company are large companies having the ability to purchase and develop information technology
services (in particular IT infrastructure) on their own, it is understandable that the
benefits commonly offered by cloud services mean little to Company 2.

As there is no business process embedded in *Cloud Communication*, the use of *Cloud
Communication* has no impact on records creation process. Company 2 recognizes that
maintenance of these records can present a more complete picture of the company’s
business activities. However, since records generated through the use of *Cloud
Communication* are not considered as evidence of Company 2’s business activities, these
records do not fall into the scope of records to be filed and transferred into the internal
Archival Unit. In other words, Company 2 does not deploy methods to capture these
records in their records management system, nor do they employ methods to protect the
records from the risks posed by the cloud or to demonstrate their trustworthiness. This
suggests that the use of *Cloud Communication* has no impact on Company 2’s records
managements practice, and that data generated in the use of *Cloud Communication* is not
under the records management control of Company 2.

The criteria articulated by the director of the internal Archival Unit of Company 2
(Interviewee 6) for assessing the need for capturing records are, in general, consistent
with those identified by Shepherd and Yeo (2003), as listed below:

- the requirements of the organization, or particular business units, for records
  that provide evidence and information for operational use;
- the requirements of the organization, particular business units, or external
  stakeholders for evidence that can support accountability; and
- the costs of creating, capturing, and maintaining the records that are required,
  and the risk to the organization if it does not have those records.
Records generated through the use of Cloud Communication may not constitute evidence of the business transactions per se, but do provide evidence of the exchange of information among employees and between employees and external parties. Until operational needs arise, external legal, regulatory, and auditing requirements are created, or the possibility that the communications among employees and with external parties is subject to litigation increases (Shepherd & Yeo, 2003), it seems that mere informational value does not guarantee the capture and management of these records.

With the development of electronic evidence laws in China, data generated in the use of Internet-based applications is increasingly admitted in court and used in resolving disputes. For instance, recently, on July 18th, 2018, the people’s court of the Nansha district of Guangdong issued The Code of the Admission and Evaluation of Internet-based Electronic Data Evidence (For Trial Implementation), which defines Internet-based electronic data evidence as data messages generated in the use of instant messaging, emails, QQ, WeChat, Alipay, and other applications that have communication and pay functions in the Internet environment, which can show its content in material form and which may be accessed for reference and use at any time. The Code also specifies the methods for assessing the reliability and authenticity of electronic data evidence. The enactment of this Code suggests that electronic data generated during the use of Internet-based applications is increasingly being used as effective evidence in litigations. Whether this will have any impact on the use of Internet-based applications and their management in organizations merits further research.
Considering the ubiquitous use of email (one of the services offered by the *Cloud Communication*) in the conduct of business activities, the confidence that Company 2 shows in asserting that records (including email) generated in the use of *Cloud Communication* are not considered evidence of their business activity shall also be based on the capacity of their records management system of adequately documenting those business activities and being able to be used for such purposes.

### 5.7.2 How and to What Extent is the Trustworthiness of Records Protected and Proved in Company 2?

In discussing the choice of media for record capture, Shepherd and Yeo (2003) argue that, except for vital records security, it is not necessary to keep a record in more than one medium. Yet, they also caution that when there are legal or regulatory requirements for records to be created in a specific medium, records may be challenged if this has not been done correctly (Shepherd & Yeo, 2003).

In the context of Company 2, due to the government’s reluctance to recognize the effectiveness of digital records and the uncertainty of their admissibility as evidence, digital records are mostly restricted to internal use; and a paper copy has to be generated when submitting them to external parties (including the government) or for recordkeeping purpose. A dual-copy system is adopted in Company 2’s records management practices. Yet, a close examination of the use of the dual-copy system in Company 2 shows that, the reliability and authenticity of the paper records generated and kept cannot be guaranteed. This confirms what other scholars identified as a limitation of this system (Li, 2011).
First, since digital records are created and used throughout the conduct of business activity and are only converted into paper format when they are being submitted to external parties for evidential or recordkeeping purposes, and the conduct of the business matters occurs by means of digital records rather than their paper copy, the digital records should be considered as the originals and their paper counterparts as only copies. From the perspective of the best evidence rule, as not all digital records can be converted to paper format, it is hard to affirm the authenticity of the record when examining it in paper format.

Second, since the conversion of digital records to paper records is primarily for regulatory and legal reasons and no business activity is carried out by using the paper version, the latter are not even records. The printing also removes the metadata that would authenticate the copies as evidence. At Company 2, the making of the paper copies of digital records is carried out by the Records Liaison Officer prior to their transfer to the internal Archival Unit and the printing process is not documented, so it is not even possible to speak of authentic copies.

Third, data collected on the functionalities of the ERMS shows that the ERMS is not capable of protecting or demonstrating the authenticity of either the paper records or the digital records. The ERMS used at Company 2 primarily fulfills two functions: the tracking and management of paper records and the storage of digital records. Since paper records are considered as the “official” records of Company 2’s business activities, the focus of the company’s records management activities is the paper records and currently no management activities have been performed on the digital records. However, the way
paper records are managed—for instance, only metadata that are relevant to paper records are extracted from the previous digital records—does not account for the “digital past” of the paper records and, therefore, does not make the lifecycle of the records transparent. The metadata documented in the system is primarily paper records management related and aims to automate the process for paper records management; at the moment, digital records are only included as attachments to the paper counterparts.

Fourth, the ERMS is more properly identified as a database rather than a business system as no records management process has been embedded into the system. Therefore, no records are generated to document and account for records management activities embedded into the system.

This use of the dual-copy system might work well temporarily to cope with the lack of principles and methods for guaranteeing the reliability and authenticity of digital records over time and the inability of digital records to serve as evidence in litigations. However, this strategy cannot be regarded as a permanent solution, as this system has many inherent shortcomings, including wasting resources, obstructing the development of digital records, further marginalizing electronic data evidence, and perpetuating parallel records management systems (Tao & Tian, 2014).

Many new forms of digital records cannot be converted into paper format without losing some of their characteristics and metadata, e.g., Building Information Modeling (BIM). Also, the implementation of the dual-copy system might to a certain degree restrain academia and practitioners from exploring and testing methods and principles for
authentic preservation of digital records. This will further marginalize electronic data evidence.

Organizations have formulated their own strategies to both meet the legislative requirements and take advantage of the opportunities offered by digital records—namely, the maintenance of two parallel records management systems: paper records management for evidential purposes, and digital records management for informational purposes. The maintenance of different records management systems results in lack of cohesion and duplication in records management.

Therefore, the Chinese government might want to consider eliminating this system in a planned manner and facilitating the study and experimentation of methods for long-term preservation of digital records.

5.7.3 How and to What Extent is the Informational Content of Records Exploited for Operational and Strategic Purposes in Company 2?

Enterprise records management in China was born out of the need to manage scientific and technical materials and records so that their content can be exploited and utilized to assist production and research and development (Zhang et al., 2014). Despite four decades of reform and development, examination of the records management in Company 2 shows that the informational use of records remains the main focus of enterprise records management work, with the use of records as evidence only assuming a minor role. One possible reason is that the reform of the state-owned enterprises is not complete, as the government still holds control over some state-owned enterprises.
(Brødsgaard, 2018), which will likely complicate the supervisory relationship between the two and make state-owned enterprises less exposed to risks and therefore the trustworthiness of records is less important. Another possible reason is that the legislation, regulations, and industry standards in China are far from mature enough for the government to properly and effectively exercise supervision over enterprises.

5.7.3.1 The Expanding Scope of Records Transferred to the Internal Archival Unit

The State Archives Administration has issued provisions on the scope of records to be transferred to the internal Archival Unit at enterprises. However, the rationale for this is to preserve records that are of value to the state and society, which is in conflict with the strategic purpose of providing information and knowledge services to employees and to assisting a company’s strategic transformation. Besides, these provisions are too general in terms of helping enterprises to determine case by case whether a record should be captured and transferred to the internal Archival Unit or not.

As a result, the internal Archival Unit at Company 2 has significantly expanded the scope of records to be transferred. This includes the capture of 1) all records generated in the whole business procedure, 2) all records metadata, and 3) records generated as a result of the company’s expansion of business. The expansion of the scope of records transferred enables the archives to record a more complete picture of the company’s business activities.
Duranti (1991) writes that Gérard and Christinane Naud pointed out that, while the medieval document, as either the instrument or product of the transaction, documented the whole transaction, the contemporary document documents “only one phase of the transaction, or even less, and its creation, as a means of carrying out the transaction, is integrated in each of the phases through which the transaction develops” (Duranti, 1991, p. 14). Therefore, from a diplomatic point of view, the closing document or official document resulting from the conduct of business activities actually only reflects the execution phase of the whole procedure; the initiative, inquiry, consultation, deliberation, and deliberation control phases of the procedure, which led to the execution phase, are usually absent from the final document. As a result, to fully reconstruct the procedure, it is not sufficient to preserve only the final document; rather, documents generated from the previous phases have to be kept as well. Further, this breaking down of the business procedure can be applied to each separate phase; for instance, the initiative phase can further be divided into the phases of initiative, inquiry, consultation, deliberation, deliberation control, and execution, with documents being generated in the conduct of each phase.

The expansion of the scope of records to be transferred to the internal Archival Unit enables the internal Archival Unit to record a more complete picture of the company’s business activities but also reveals the emerging conflict between the increasing emphasis of the internal Archival Unit’s responsibility to serve current business and its obligation to receive guidance from the state archival administration, whose primary goal is to preserve records that are of historical value to the state and the society at large.
Yet new forms of records generated by using information technology in the conduct of business, such as WeChat messages, instant messages, and emails created in the use of Cloud Communication, have not been included in the scope of the records to be captured into the records management system. As the director of the internal Archival Unit of Company 2 noted, there are some difficulties in managing these records, including how to assess their reliability and authenticity, how to differentiate business records from personal records, and how to exploit these records to serve business needs; and how to consider them as evidence when in fact they do not result from business transactions or business procedures. Therefore, while the internal Archival Unit considers it necessary to keep these records to complement those documenting business activities and formal business procedures in order to offer a more complete picture of the company’s operation, the limited use value and the cost of keeping and using them render it difficult to do so.

Robust methods have been devised at Company 2 to ensure that records will be captured into the records management system systematically, automatically, and as soon as possible after their creation. These include integration of the ERMS and the OA system through a temporary database, assigning unique identification numbers to the scientific and technical records to be generated prior to the commencement of a project, and on-site supervision.

5.7.3.2 Classification of Records

Once records have been captured into the ERMS, physical and intellectual controls are established to safeguard the records’ trustworthiness over time. However, at the moment, it appears that the methods, in particular those for the classification of records, employed
by the internal Archival Unit do not have sufficient theoretical underpinning, which makes classification redundant and unstable (Interviewee 6).

Classification of records would provide users with structural and contextual information that can situate them in the context of the business activities that gave rise to them, and hence help users interpret their content (Foscarini, 2009). However, the record type-based classification currently adopted by Company 2 cannot establish the relationship between records and the business activities that give rise to them. A variety of criteria have been used in the identification of different record types: functions giving rise to records (e.g., administrative records versus scientific and technical records), format (e.g., audio and visual records), and content (e.g., contract records). The lack of consistent criteria makes the classification schemes vulnerable to change and the organic relationship between records being disrupted, which is a detriment to protecting and verifying the authenticity of records.

5.7.3.3 The Use of Knowledge Management Methods to Exploit the Content of Records for Use

Company 2 has emphasized the use value of records to such an extent that it is considered the “lifeblood” of the company’s records management work. Indeed, in recent years, many projects carried out by the internal Archival Unit focus on exploiting the contents of records for business needs. The methods used in these projects are in line with those used to distill and exploit knowledge inherent in records (Duffy, 2000a; Hughes, 2003a; Hughes, 2003b).
Chapter 6: Discussion

6.1 Discussion of Main Findings

The overarching research question guiding this study was:

- How are records managed as evidence and information in the context of cloud-based services?

Existing literature shows that the characteristics of cloud-based services, on the one hand, make it difficult to prove the integrity of the underlying system/technological infrastructure, which is an essential requirement for the use of the records generated and/or stored in the service as evidence, and, on the other hand, provide opportunities to better exploit the informational value of records. This study contributes to the discussion by examining how, in the Chinese context, the evidentiary capacity and informational use of records are managed when organizations use cloud-based services.

The first major finding of this study concerns the understanding and use of cloud-based services in enterprises in China and their impact on records management practice. The two cases studied present differing results. Case 1—a Sino-foreign joint venture in the traditional electromechanical industry—has a relatively mature understanding of cloud-based services in terms of its benefits and risks and has included it among the technologies it uses, along with IoT, mobile internet, big data, and others, to realize its digital transformation and to sharpen its competitive edge. In Case 1, a coherent digital transformation strategy is formulated and implemented at the corporate level; all units within the corporation follow the corporate’s cloud strategy and use the cloud services
adopted by the corporation. The corporation—including Company 1—has been actively embracing cloud services for its operation and it is predicted that all of Company 1’s applications will be migrated into the cloud in the future. The cloud services used are at the infrastructure level and are residing in the public cloud. Company 1 is well aware of the risks associated with the use of cloud-based services, but has a rational understanding of them. However, as the cloud service was purchased by the parent company and the contract was signed between the parent company and the service provider, this study was not able to examine whether the risks posed by cloud-based services to the evidential capacity of records were adequately addressed.

By contrast, Case 2—a state-owned enterprise in the traditional surveying and engineering industry—has a very different understanding of cloud-based services. While Company 2 and the corporation have a similar goal of utilizing information technology to assist strategic transformation and strengthen their core competitive ability, it appears that their use of information technology is aimed at modernizing their management and operation to improve efficiency and promote evidence-based decision making. As a result, most of the informatization activities are about developing information systems to digitalize business processes and integrate and exploit the information assets. As to cloud computing, at the moment, the cloud strategy formulated at the corporate level refers to the construction of a private cloud, which is used by the corporation, while subsidiaries have to pay to use it. For Company 2, there is no strategy for the use of cloud-based services, and employees’ understanding of cloud computing is mostly focused on the limitations: security, confidentiality, and un-customizable service.
In both cases, the impact the use of cloud services has on records management practice is limited and has made pre-existing issues worse.

In Case 1, in comparison with paper-based elevator maintenance, the changes brought by the shift to a Digitized Elevator Service Maintenance System deployed in the cloud include the place where maintenance data is stored, how long maintenance data is kept, lack of records management control, and in what form is maintenance data kept (e.g., fixed form or database format). Other than these, while there was no centralized records management program in Company 1 either before or after the adoption of cloud services, the use of cloud service allows Company 1 to centrally store all its records.

In Case 2, the influence of the use of cloud service on the company’s records management practice is even more limited, as the use of cloud service is basically restricted to one application—Cloud Communication. As the records generated in the use of Cloud Communication do not document business transactions and are not the byproduct of business procedures, they are not considered evidence of Company 2’s business activities, and therefore, they are not captured into the company’s records management system and are not under records management control.

As a new form of technology provision model (Voas & Zhang, 2009), the characteristic of cloud computing to deliver computing resources remotely upon demand via the Internet means that the physical custody of the data is moved out of the boundary of the organization and into the cloud, which is the primary cause of all the issues posed to records management (Barnes, 2010; Blair, 2010; Datskovsky, 2016; Ferguson-Boucher & Convery, 2011). From the perspective of the life-cycle management of records, it is not
that the issues are different, but that they are more complicated (Barnes, 2010; Ferguson-Boucher & Convery, 2011). To ensure that records/data moved in the cloud can be effectively managed, it is important that effective records management policies, processes, and controls first exist within the organization and then being extended to the cloud (Gatewood, 2009). However, the reality for many organizations (including the two enterprises studied in this research) is that the policies, tools, and processes for the life-cycle management of data do not even exist within the organization. And, as Gatewood (2009) argued that, “unless the management controls are already in place, it is unlikely that individuals are going to seek advice about extending controls to cloud-based repositories” (p.36). In the two cases studied, it appears that the use of cloud services does not enable the organization to establish new or improve existing records management controls; thus, the existence of an effective in-house records management program is more important than ever before if the organization wants to be able to apply effective control to their data stored in the cloud.

The second major finding of this study concerns the protection and demonstration of the evidentiary capacity of digital records for organizations to meet regulatory and legal accountability. Examined from a legal perspective, evidentiary capacity suggests the degree of satisfying criteria set out in the rules for the admission in court. The Chinese legal system, and specifically the three major procedural laws in China have added electronic data to the categories of evidence, thereby, officially recognizing it as one type of evidence that can be used in legal proceedings; yet, it is added as a category of evidence separate from documentary evidence. A review of existing Chinese legal literature, laws, legal interpretations, and other legal documents shows that examination
of documentary evidence mainly focuses on three aspects: originals, “formalistic authenticity”, and “material authenticity” with the latter two addressing its authenticity and reliability. Rules for the examination of electronic data evidence in China is less mature in comparison with documentary evidence, though Chinese scholars are making great efforts to catch up. Due to these reasons and a variety of other reasons, in judicial practices, parties often employ three other approaches in the collection and admission of electronic data: printing out the digital evidence and submitting the paper printout instead; digital evidence preservation undertaken by a notary or copyright society; digital evidence preservation undertaken by the court; and maintenance of digital evidence by a third party. Each of the two cases studied by this research, coincidentally, employed one of them.

Company 1 uses the third approach stated above (i.e., maintenance of digital evidence by a third party) in protecting the evidentiary capacity of electronic elevator maintenance data generated to satisfy regulatory and legal requirements. What makes this case especially interesting and relevant to the records and archives management field is that the third party invited to act as the preserver is a city archives. Electronic elevator maintenance data, once created in the smart phone used by the technician in conducting regular maintenance, is uploaded to the cloud where the Digitized Elevator Service Maintenance System resides; then, the data is downloaded into Company 1’s in-house server, from which the data is then uploaded to the city archives’ server through a leased line. The city archives is responsible for the authenticity of elevator maintenance data in its custody; it helps Company 1 provide access to elevator maintenance data it maintains through a portal on its website and issues a certified copy of the elevator maintenance
data. As elevator maintenance data is stored and managed in database format in the city archives and only converted into a PDF form when a certified copy is requested by the customers of Company 1 or the safety regulator, the city archives is de facto the creator of the elevator maintenance record.

This study has identified a few issues with the use of the third party method in Case 1: 1) the lack of sufficient procedures to verify the reliability of the data created by Company 1; 2) the lack of procedures to verify that the authenticity of the data in the cloud is not compromised; 3) the lack of procedures to verify that the ability to access the data by its creator prior to its acceptance into the city archives does not compromise its authenticity; 4) whether authorized and traceable revision of the data is sufficient to prevent unauthorized revision and document all authorized revisions; and 5) the lack of archival methods in the management of the maintenance data deposited in the city archives.

Before these major issues are successfully resolved, the reliability and authenticity of the records managed with this approach may invite disputes and there is a risk that the city archives may be “deceived” and provide certification of authenticity of data that is neither reliable nor authentic.

Regardless of the limitations inherent to this approach, the use of a trusted third party has bypassed the difficulties in protecting and verifying the trustworthiness of electronic records as well as the challenges raised by the use of cloud-based services. Thus, it is an efficient, innovative, and collaborative way for the authentic maintenance of data.

As to Case 2, the protection of the evidentiary capacity of the electronic records generated at Company 2 is achieved by printing out electronic records and preserving
them in paper format as well as in original electronic format, namely, the dual-copy system. However, this study has identified issues with this approach in terms of its ability to safeguard and demonstrate the reliability and authenticity of records. These issues include the following: 1) since digital records are created and used throughout the conduct of the business activity, and are only converted into paper format when they are submitted to external parties for evidentiary purpose or transferred to the internal Archival Unit for recordkeeping purpose, and the conduct of the business matters are acted upon by means of digital records rather than their paper copy, the digital records should be considered as the originals and their paper counterparts only copies. However, only paper records are managed as the official records and the digital records are only managed for exploiting their content; 2) it is not clear whether the process of transforming digital records into their paper copies is sufficiently documented to demonstrate that the latter can be treated as authentic copies of the former; 3) the way paper records are managed does not account for their “digital” past; and 4) no records are generated to document and account for records management activities embedded into the system.

Similar to the method employed by Case 1, this approach also bypasses the difficulties encountered in the protection and verification of the trustworthiness of electronic records.

The **third** major finding of this study is about the exploitation of the informational content of records to serve strategic and operational purposes. A review of existing studies shows that there have long been calls for a greater emphasis on the informational value of records and efforts to design systematic methods for exploiting it. Yet, it appears
that the informational value still plays a secondary role to that of evidentiary capacity in western records management discourse and practice. The use of cloud-based services, however, presents an opportunity for a re-examination of this value of records, as it provides analytics techniques and the storage cost is so low that records not required as evidence can be kept for long periods to exploit the information in them. In this study, although the influence of cloud on exploiting the informational value of records was very weak, both Case 1 and Case 2 provide positive evidence as to the business value of records to the enterprise.

In Case 1, it was found that the use of the Digitized Elevator Service Maintenance System has greatly improved management efficiency as it enables all kinds of analysis to be performed on the maintenance data for strategic and operational purposes, e.g., completion rate of the maintenance schedule, completion rate of maintenance items, parts analysis, and damage rate.

In Case 2, where the use of records is considered as the lifeblood of the company’s records and archives management work, a variety of methods for exploiting records’ content and proactively providing records for strategic and operational use have been identified. These methods involve understanding and describing the information needs of different user groups, processing and representing records as well as their component parts in standardized domain specific language, designing methods to push information required at the right time and in the right format to the right audience, and developing information systems to publish information relating to certain subjects.
Though the conceptual bases for these methods were not explicitly identified, they show the influence of knowledge management and information science. Furthermore, in Case 2, because of the information value of records, the scope of the records to be retained has been expanded so that a more complete picture of the company’s business activities can be maintained.

The fourth major finding of this study is that this examination of two cases suggests that there is some incoherence of the records management systems within enterprises in China. In both companies, such incoherence is manifested in two aspects: the design of different records management programs to manage the evidentiary capacity and the informational value of records, and the absence of clear principles informing the management of records (e.g., classification of records in accordance with the nature of records).

The risks associated with the first incoherence, in particular, on the protection and demonstration of evidentiary capacity have already been discussed above in the second major finding. In terms of the second incoherence, this is particularly manifested in the lack of theoretically based records classification. As Foscarini (2009) argued, records classification should not be understood merely as a retrieval tool, instead, its values and the intellectual control it exercises is irreplaceable, in particular, in the current digital environment. Foscarini (2009) further explains that,

What makes of classification a crucial tool in the electronic environment – more fundamental than it was in the paper world – is primarily the fact that it provides essential information about the contexts of records creation and use, information that would otherwise be unattainable. (p. 54)
By linking records to their context of creation, records classification will facilitate the carrying out of records management processes and activities, including “the application of access and permission rules”, “the execution of appropriate disposition rules”, and “the migration of records of a particular business function or activity to a new environment as a result of organizational restructure” (ISO, 2016, p. 14). Among these three, “the execution of appropriate disposition rules” is realized through the integration of a records classification scheme with retention and disposition schedules. This is important, not only because it is impossible to appraise records at an item level given their number, but also because item-level based appraisal will break the “archival bond” existing among records (Foscarini, 2009). It is commonly recommended that classification schemes should be based on functions and activities, so that they can be resilient to organizational change (ISO, 2016; Shepherd and Yeo, 2000), although how to define “function” is still an issue (Hurley, 1993; Foscarini, 2009).

In the Chinese context, since retention and disposition schedules have different purposes from those in western countries, it appears that a theoretically based classification scheme has little value. However, this fails to account for other records management processes that are based on classification, including, among others, linking records back to their context of creation, appraisal, application and access and permission rules, and protection of the “archival bond” among records originating from the same business activity.

In recent years, Chinese archival scholars have been researching function-based appraisal and function-based classification and exploring their applicability in China (e.g., Chen, 2017; Ma, 2014; Song, 2018; Li & Sang, 2014), and Chinese archival scholars have been
repeatedly commented on the insufficiency of the theoretical foundations of the Chinese records and archives management discipline (e.g., Fang, 2014; Pan, 2018). This suggests the need for further research studying Chinese records and archives management practices and the problems they are experiencing in order to derive theoretical foundations that are consistent with the Chinese context, regardless whether or not this theoretical foundation is consistent with that of Western countries.

6.2 Significance of the Study

This qualitative research uses multiple case studies to explore the management of the evidentiary capacity and informational value of records in the context of cloud-based services in China. It has contributed to the discussion of several concepts in the field of records and archives management.

First, this study enhances and contributes to current discussion on the admissibility of electronic evidence in China from a records management perspective. In comparison with existing publications, which are mostly opinion pieces and short papers\textsuperscript{130}, this dissertation is the first that systematically examines, analyzes, and compares the rules governing the admission of documentary evidence (both in paper and electronic) in China and Canada from the records management field. This contributes to the understanding of the concept of trustworthiness of records from a legal perspective in the Chinese juridical context and the design of methods and principles protecting and demonstrating the trustworthiness of records from this perspective.

\textsuperscript{130} Ding’s (2011b), Huang’s (2000), Zhang’s (2010), Yu & Zhang’s (2007), Wang’s (2003), and Zhu & Zhang’s (2017) papers.
Second, by analyzing the relevant Chinese legislation and the two popular methods (i.e., depositing records in a trusted third party and converting electronic records to paper format) used for the admission of digital records—in particular, the problems presented by these two methods for the protection and demonstration of the trustworthiness of records—this study has provided evidence supporting the call to improve these two methods so that they can be more robust, for developing legal rules and criteria to assess the trustworthiness of electronic data and facilitate their admission in court, for developing theories, methodologies, and principles for the creation and maintenance of digital records so that their reliability and authenticity can be guaranteed and demonstrated, for the removal of the dual-copy system to promote the development of electronic records, and for refining the theoretical and methodological foundations of records management in China.

Third, the study of the methods used in safeguarding and demonstrating digital records’ ability to serve as evidence by meeting regulatory and legal requirements has identified an alternative that can bypass the difficulties encountered due to the characteristics of digital records and those of cloud-based services: the maintenance of digital evidence by a trusted third party. This method is of significant commercial value and can be used when the regulatory and legal requirements for the evidentiary capacity of records are not clear and there is a lack of standards, policies, strategies, and methods to address the emerging difficulties.

Fourth, this study has identified the necessity of placing greater emphasis on the informational value of records and developing systematic methods to exploit their content
by re-examining and adapting existing records management principles and methods and/or drawing on achievements made in other fields (e.g., knowledge management, information science). This will complement the existing risk management based defensive strategy for justifying records management and will demonstrate the benefits of records management to an organization’s strategic and operational purposes.

Fifth, this study has contributed new evidence in support of and provided an updated and nuanced interpretation of the custodial role of archives in protecting the trustworthiness of records in the digital environment. The physical custody of records by the archives is not unnecessary, as those upholding the concept of distributed custody suggests; on the contrary, this study shows that, not only the custodial role of archives remains relevant and should not be abandoned, but it has been used to fulfill new needs generated by the digital environment.

Sixth, as this researcher is Chinese, her understanding of the history of the country and its language has produced a rich, contextualized, and nuanced picture of records management in enterprises in China. As one of few such studies in English about records management in China, this will serve as a useful source for those who are interested in Chinese literature about records and in comparing records management studies across jurisdictions.

6.3 Implications of the Study

While the purpose of this study was to explore the “how” with regard to the management of records as evidence and information, the use of the case study methods also allowed it
to obtain information on the “why” certain methods are used. This study concludes that the use of two systems—a trusted third party system for the maintenance of digital evidence and the dual-copy system, even when their defects are addressed, is not a sustainable solution for ensuring the use of electronic records as evidence as it will harm the internal coherence of records management and jeopardize its status in an organization. Therefore, this study suggests addressing the factors that led to the use of the double method and gradually decreasing its use for the protection of the evidentiary capacity of records. This is particularly important for the success of the paperless policy and will facilitate the development of e-commerce in China. Thus, this study makes three recommendations.

First, the Chinese government should make a plan to gradually lift the dual-copy system and shift to full acknowledgement of the evidentiary value of digital records. While the dual-copy system is an interim solution to deal with the lack of sufficient methods for the long-term authentic preservation of digital records, the existence of this system also hinders the research for better methods, as people will take comfort in the fact that records will be preserved in paper format.

Second, the electronic data evidence legislations in China should be updated to explicitly specify the rules and criteria for examining and determining the reliability and authenticity of digital records for their admissibility in legal proceedings. Only when the rules are clarified can organizations understand the requirements to be met and design methods and systems appropriate to satisfy them.
Third, Chinese scholars and practitioners in the field of records and archives management should conduct research designing and developing strategies, policies, methods, and requirements for the protection and verification of the trustworthiness of electronic records throughout their lifecycle. A great many studies have been conducted on this topic in the past two decades (e.g., the InterPARES projects), and yielded many products that the Chinese scholars can consult so that they do not need to reinvent them. However, it is crucial that these products are critically examined against the Chinese circumstances, including the juridical context, records management traditions and practices, the regulatory and cultural context, and other factors unique to the Chinese environment.

6.4 Future Research

This qualitative research, which has situated the topic under study into its cultural context, has led this author to identify a few more research possibilities that would allow us to obtain a more nuanced and complete understanding of the management of records as evidence and information in China and further contribute to the identification of solutions to the relevant practical problems.

The first topic identified for future research arises out of the intent to investigate the how the trustworthiness of electronic records are protected and demonstrated in non state-owned enterprises, e.g., private enterprises, collectively owned enterprises, and foreign owned enterprises. As discussed earlier in the dissertation, non-state owned enterprises are the owners of their records and therefore can decide how to manage their records. However, considering the lack of specifications and measures for the management of
electronic records in private sectors, it is not clear how electronic records are managed in these enterprises to protect and demonstrate their evidentiary capacity and to reuse their information content for business purposes. Therefore, more research is needed to assess whether the findings of this research is transferable to other types of non-state owned enterprises.

The second topic identified for future research is born out of the goal to improve electronic evidence legislations in China by studying previous cases to extract rules that are used by judges in establishing the reliability and authenticity of electronic evidence. This will not only contribute to the development of legislation in China, but also provide a set of benchmark requirements that can be used by records managers to improve their programs and increase the degree of admissibility of records in legal proceedings.

Despite the numerous studies conducted in China on records management, interdisciplinary research involving the legal field on the evidentiary capacity of records is scarce.

The third topic identified is to extend one of the findings of this study that the records generated in the use of Cloud Communication in Case 2 are not considered as their official records and therefore are not under records management control. More research is needed to investigate this claim in terms of how new information or communication technologies (e.g., emails, instant messaging) are used in the conduct of the company’s business, and their relationship with formal documentation processes on the basis of which to determine whether these records should be considered as the evidence of the
organization’s business activity and whether records management control should be applied to them.

The fourth topic for future research aims to advance the incorporation of the informational value of records among the justifications for a records management program, along with their evidentiary capacity. The present research confirms the benefits for an organization of exploiting the informational content of its records. However, more research is needed to explore necessity and possibility of establishing the informational value of records as an alternative justification of records management program in addition to their evidentiary capacity.

6.5 Limitations of the Study

The limitation of this study relates to data collection and data analysis. Semi-structured interviews and document analysis are primarily used as methods for data collection. Despite the large amount of data collected, due to security concerns and the decreasing willingness of the gatekeepers to share more about their organization, there were areas not sufficiently covered by the information collected. For instance, for Case 1, only a brief introduction of records management at Company 1 was provided by the CIO. No interviews could be conducted with staff responsible for records management at Company 1. For Case 2, interviews were exclusively conducted with staff from the internal Archival Unit, whose account can only be validated by results from document analysis. No interviews could be conducted with staff at higher-levels of management or from the IT department to offer a different perspective on the problem identified in Company 2. This researcher addressed this limitation by drawing heavily upon public and
internal documentation that was available or which could be found in order to draw a more complete picture of these two organizations.

As this is a doctoral dissertation research, and this researcher was the only one performing data analysis, the reliability obtained by the presence of more than one coder could not be achieved in this study. Yet, two rounds of analysis have been performed to increase its reliability of the analysis, and this researcher has been making great efforts to make the research process as transparent as possible (e.g., increasing the references to sources when presenting the data) and constantly discussing the study with her Chinese colleagues to seek their opinions on the reliability and validity of the findings. The international nature of the dissertation committee, including scholars from Canada, Europe and China, helped to ensure that findings were reviewed from multiple viewpoints.

6.6 Final Thoughts

This study was designed to examine how the emerging cloud context influence the management of records as evidence and information in China. However, as the research progressed, it was found that the understanding and use of cloud-based services in China varies greatly from that in North America, and many assumptions about the benefits and problems of cloud computing which are commonly discussed in existing studies are not valid in China. Further, it was found that enterprises in China are still wrestling with the issue of going digital. As a result, instead of being at the center of the study, cloud computing was gradually reduced to a contextual factor and the management of digital records as evidence and information became the core subject of this study.
The overall impression of this author in conducting this study is that, despite the great achievements China has made in the past four decades in its economy, infrastructure, technology, and other aspects that contribute to its “hard” power, the “soft” side of the country, including its institutional structure, legislations, regulations, and even the theoretical foundations of its records and archives management work, is not as well developed. This imbalance between the “hard” side and “soft” side creates many frictions in the Chinese society, which, if not addressed properly, may in the long term become the bottleneck of the country’s sustainable development and further national rejuvenation.
References


131 For sources in Chinese, the English translation of the title is either taken verbatim from the original text, if one is provided, or translated by this author.
132 For articles from Chinese journals, the English title of the periodicals will be used here, if one is provided; otherwise, the original Chinese title will be used.


Chen, Y. (2018). “双套制” “双轨制”走向何方[What are the future directions for the
dual-track system and the dual-copy system?]. 机电兵船档案, (2), 36-38. Retrieved from CNKI.
Cui, S. (2016b). 建国初期我国对前苏联档案学理论和方法的借鉴融合 [Translating and learning the archival theories and methods of the former Soviet Union when the People’s Republic of China was newly founded ]. HeiLongJiang University. Retrieved from CNKI.
Cunningham, P. (2016). Another walk in the cloud. Information Management, 50(5), 20-


Press.


Liu, S. (2015b). 从知识管理角度探讨我国企业档案管理如何实现知识共享 [How to realize the sharing of knowledge through enterprise archives management from the perspective of knowledge management]. Shanxi Archives, (1), 48-49. Retrieved from CNKI.


from the perspective of electronic evidence]. *Graduate Law Review. CUPL*, 31(2), 37-44. Retrieved from CNKI.


Appendices

Appendix A  Interview Consent Form

A.1  Interview Consent Form in English

Consent Form for Interviewees
Records Management in the Context of Cloud-based Services
Case Study Interview

Principal Investigator:
Dr. Luciana Duranti
Professor, Archival Studies

Co-Investigator:
Weimei Pan
PhD Candidate, School of Library, Archival and Information Studies

Study Purpose:
In the context of cloud-based services, Weimei Pan’s dissertation research involves exploring records management under the direction of her supervisor, Dr. Luciana Duranti. The research purpose is accomplished by a) examining the contextual factors that influence the organization’s records management practice, b) assessing the ability of the cloud-based services in performing records management functions and protecting the characteristics of records, 3) analyzing the capability of the organization’s policies in protecting the organization against risks arising from the use of cloud-based services, and d) identifying any issues arising.

Procedure:
You are invited to participate in this semi-structured interview because of your knowledge of and interaction with [cloud-based service]. The interview in which you agree to take part will draw on your knowledge, experience and opinions about various issues related to the use of the cloud-based service adopted by your organization – [cloud-based service]. This interview will be conducted by Weimei Pan at a time and location mutually agreed upon, either in person, over the telephone or by other means of digital communication. The session will last between 20 and 60 minutes. The interview questions will be sent to you prior to the scheduled interview, however no preparation is
necessary. This interview will be audio-recorded and transcribed into print format. Your participation is voluntary, and you may choose to end the interview at any time.

**Confidentiality:**
Your identity as a participant in this study will be kept in strict confidence. All sensitive data collected will only be used in aggregated form. Any identifying information (organization name and participant name) reported will be coded to ensure that data are not connected to interviewees. All electronic research data collected will be kept on a password-protected and encrypted computer, including (optional) audio recordings. Hard copies of participant data (e.g. filed notes) will be locked in cabinet. By no means will any of the data gathered in the course of this interview be communicated to anybody within your organization.

**Potential risk:**
There are no known risks or potential risks from participating in this interview.

**Contact for information about the study:**
If you have any questions or would like further information with respect to this study, please contact Weimei Pan (the researcher) by email at **** or Dr. Luciana Duranti (the Principal Investigator) by email at ****.

If you have any concerns or complaints about your rights as a research participant and/or your experiences while participating in this study, contact the Research Participant Complaint Line in the UBC Office of Research Ethics at 604-822-8598 or, if long distance, e-mail RSIL@ors.ubc.ca or call toll free 1-877-822-8598 (Toll Free: 1-877-822-8598).

**Consent:**
Your participation in this study is entirely voluntary and you may refuse to participate or choose to withdraw from the study at any time without jeopardy.

If, for any reason, you decide to withdraw from the study before its completion, any collected data will be immediately destroyed and you will be excluded from the study.

Your signature below indicates that you consent to participate in this study and have received a copy of this consent form for your own records.

---

Print Name of Participant
A.2 Interview Consent Form in Chinese

受访知情同意书
云服务背景下的文件管理研究
访谈

Principal Investigator:
Dr. Luciana Duranti
Professor, Archival Studies

Co-Investigator:
Weimei Pan
PhD Candidate, School of Library, Archival and Information Studies
University of British Columbia

研究目的:
在云服务的背景下，潘未梅的博士论文旨在研究文件管理。该研究是在其导师 Luciana Duranti 博士的指导下进行的。潘未梅将通过以下研究达到其研究目的：a) 调研影响组织机构文件生成和管理的背景因素，b) 评估云服务在执行文件管理职能和保护文件特性方面的能力，c) 分析组织机构的规章制度在帮助其规避风险方面的能力，和 d) 确定其他问题。

研究步骤:
您之所以被邀请参加该访谈是因为您对【云服务】的了解或使用。在访谈过程中，您将与我分享您在使用【云服务】过程中遇到的一些问题，以及您对【云服务】和这些问题的理解、经历、和个人观点。访谈将在您和我本人之间进行，具体时间和地点由您和我共同商议决定。访谈将会持续大约 20 到 60 分钟，将通过以下方式中的一种进行：面对面，电话，或其他电子通讯方式。我将提前将访谈的问题发给您以便于您了解访谈的内容。为了方便后续的数据整理和分析，我将对访谈进行录音,
然后转录成文稿。是否参加该访谈完全取决于您的意愿，您可以在研究过程中的任何时间退出本研究。

保密性：
您在本研究中的所有身份信息将被严格保密。所有收集到的数据将会以汇总的方式使用。可以识别您身份的信息（如单位名称和个人姓名）将用代码代替以保证该数据不被关联到您。所有收集到的电子数据将被保存在有密码保护的加密的电脑上，包括录音资料。纸质数据（如笔记）将被锁到文件柜中。收集到的收据将绝对不会透漏给任何人。

潜在风险：
参与该项研究无已知风险或潜在风险。

联系信息：
如果您有任何问题或者您想获得关于此研究的进一步信息，请联系潘未梅（研究员）（****）或者 Luciana Duranti 博士（导师）（****）。

如果您有关于您作为此研究参与者或者您参与此研究的顾虑或抱怨，请拨打不列颠哥伦比亚大学研究伦理办公室的研究参与者热线：604-822-8598。如果是长途，请通过以下邮件联系：RSIL@ors.ubc.ca，或者拨打免费电话：1-877-822-8598。

同意：
您可以完全自愿地选择是否参加本次访谈，您可以拒绝参与或在访谈中随时中断参与而不会有任何危险。

不论什么原因，如果您决定在该研究结束之前退出，从您这里收集到的数据将会被立即销毁并且您将被从该研究中排除。

您的签名意味着您同意参与该研究并且已经收到一份该知情同意书的复印件。
受访者姓名

_______________________________________________________

受访者签名

日期
Appendix B  Interview Questions for Case 1

B.1  Interview Questions for Interviewee 1

Background of the Interviewee

1. Would you please first give a brief introduction of your position within the company and your responsibility, etc.?

Background and motivation for the introduction of the Digitized Elevator Service Maintenance System (The System)

2. What motivated you to develop the System?

3. How widely used is the System within the company? Are all subsidiaries of the company using the System? Is the headquarter using the System? To what extent do you plan to implement the System in terms of the percentage of subsidiaries? What difficulties have you encountered in the promotion of the System?

4. Who developed the System? Did you develop the system yourself or you outsource it to an external company?

Standards followed in the development of the System

5. What national and/or international standards did you follow in the development of the System? What is the difference between the national standards and international standards?

6. What data management standards in general or elevator maintenance data management standards in particular did you follow in the development of the System?

7. Your company’s manager revealed in an interview that the design and development of the System is based on international elevator maintenance

---

133 The English translation of the interview questions are made by this author and checked by a family member, who has a Bachelor degree in English Literature and a Master degree in English Literature with a focus on Business English.
能否请您详细谈一下这两个标准以及两者之间的差异？

8. 文件或档案管理部门是否参与到了系统的设计中？从维保数据的管理的角度提出了哪些需求？

9. 另外，新闻中报道说该系统符合某级别的安全要求，能否请您详细谈一下这个“某级别的安全”？这是指的哪些方面？这对于该系统意味着什么？

维保数据的管理

10. 能否请您以一个例子的形式来介绍一下该系统的工作流程，从维保数据的生成到推送至档案馆？

11. 在该描述中，“维保电梯的详实资料”是如何获得的？这些资料会存储到该系统成为维保数据的一部分吗？“扫描工地环境的安全性”是如何做到的？

12. 能否请您介绍一下维保过程的哪些流程和数据会被记录下来？对此，国家或国际上是否有相关标准？

13. 新闻报道中说，该系统在工作完成后向客户及云计算中心强制性反馈结果，为什么强调强制性？对客户与对云计算中心的反馈分别是就什么进行反馈？
馈？是如何做到的？

14. 维保数据都在哪些地方有保存？（档案馆？云计算中心？（私有云？））

15. 推送到档案馆的数据是全部维保数据吗？如果不是的话，都有哪些数据将会被推送至档案馆，以怎样的格式？参照怎样的筛选标准，比如质监局的规定、公司内部的规定、还是其他规定？是由人来完成挑选生成还是系统自动生成？

16. 在维保数据从维保技师的移动终端上传到公司的数据库、从公司数据库到生成维保文件、然后再从公司数据库推送到档案馆这整个流程中，维保数据的真实性是如何保证的？假如公司的维保数据库被篡改了，那么数据库是否会留痕？能否追根溯源找到修改过程？您认为公司有没有义务向档案馆证明其所传数据的真实性、可信性？为什么？反过来讲的话，您认为档案部门有没有义务在接收维保数据之前核实其真实性、可靠性、可信性？

17. 维保数据推送到档案馆是否有推送时间上的要求？生成之后多久会推送至档案馆？为什么不即时推送？为了保障维保数据的真实性，您觉得有必要即时推送吗？

How does the System do this?

14. Where is the maintenance data stored, the archives, the cloud, or any private cloud?

15. Is all maintenance data uploaded to the archives? If not, which maintenance data will be uploaded and in what format? Based on what criteria (regulatory authority’s regulations, internal regulations, or other regulations) do you decide what maintenance data will be uploaded to the archives? Is such selection performed manfully by human or automatically by the System?

16. Once created, the elevator maintenance data stored in the technician’s smartphone will be synchronized with the company’s database; in the company’s database, the maintenance data will then be converted to maintenance records; then, the maintenance records will be transferred from the company’s database to the archives. In this whole process, how is the authenticity of maintenance records protected? If the company’s database is tampered with, can it be traced? Does the company have the responsibility to prove to the archives that the data it transferred to the archives is reliable and authentic, and why? Does the archives have the responsibility to evaluate the reliability and authenticity of maintenance data before it accepts the data?

17. Is there a time requirement for the transfer of maintenance data to the archives? When will maintenance data be transferred to the archives after its creation? Why is it not transferred in real time? For the sake of the maintenance data’s authenticity, is it necessary that the data transferred in real time to the
18. 既然是维保数据库，说明维保数据时即时更新的，那么已经完成的维保，是如何保证维保数据不再修改？正在进行的维保是保证每次的更新是流程需要所进行的必要更新而不是对已有数据的篡改？

19. 公司内部维保数据的管理权限是如何设置的？用户群可以分为哪几类？分别对数据库有怎样的权限？

20. 能否请您谈一下，公司内部所保存的原始维保数据将被保存多久？是一直保存在该系统中还是会移交到别的系统中？如果移交的话，什么时候移交？以什么格式移交？是移交整个数据库还是文档化的维保记录？

21. 在监管需求通过档案馆满足以后，公司内部所保存的维保数据主要是为了满足哪些需求？

22. 您准备如何利用这些数据？是否有对这部分数据开发和利用的规划？

23. 现在是完全无纸化运行，还是纸质维保记录与电子维保记录同时进行？如果有纸质维保记录的话，纸质维保记录是如何被保管的？保存多长时间？保管期限到了以后将会对其进行怎样处？比如销毁？移交到公司档案馆（如果公司有档案馆的话）？

24. 除上述问题以外，您还对该系统
所产生的维保数据实施了哪些管理措施？
与维保系统对接系统所生成文件的管理

25. 公司现在在积极使用物联网技术，如钢带检测仪、传感器还有远程电梯监控系统，来监控电梯的运行，以便在问题发生之前就检测出隐患，并排除隐患，这些技术的使用应该产生了海量的数据。

a. 能否请您结合实例谈一下对这些数据对档案管理工作提出了哪些新要求，以及在对这些数据的管理过程中你们遇到了哪些问题？从档案管理角度呢？这些问题又是如何解决的？

b. 另外，能否请您介绍一下该系统与公司其他哪些系统（公司服务中心、配件中心）具有对接？预期与哪些系统有更多的对接？比如配件中心的系统，关于配件的数据？

c. 对接所共享的数据是否会在该系统保存？

d. 与该系统对接的系统其文件生成与保管过程是否是受控的？您们采取了哪些措施保证这些文件的真实性与可靠性？

e. 这些数据在原来的系统中将会被保存多长时间？是否所产生的所有数据都会保存？（不会被篡改）您们对各个系统的文件生成与保管是否有单独的

Management of Data Generated by Systems Integrated with the System
25. The company is now using the Internet of Things (IoT) technology, such as strip detector, sensor, and remote elevator monitoring system, to monitor the operation of the elevator, in order to detect potential issues before it happens, and resolve the issues. The use of these technologies has generated large volumes of data.

a. What challenges does the management of these data raise for archives and records management work? What issues have you encountered in managing these data in general? What about from the perspectives of archives and records management? How are these issues resolved?

b. In addition, what systems (e.g., service center, parts center) is the System integrated with? What other systems is the System expected to be integrated with, such as systems for parts center?

c. Will the data shared in the integration with other systems be stored within the System?

d. Are records management requirements applied to data generated by the systems integrated with the System managed with records management requirements? What measures have you implemented to ensure the reliability and authenticity of these data?

e. How long will the data be kept in the original systems? Is appraisal performed on the data? Do you have separate requirements for the management of data generated by each system?
The Collaboration with the Archives

26. The Guidelines for Encouraging Use of Paperless Elevator Maintenance Records issued by China’s General Administration of Quality Supervision, Inspection and Quarantine (AQSIQ) requires that for those who use digital elevator maintenance data management system, the data cannot be altered in any degree or any form in the process of management to ensure the impartialness, objectiveness, and security of the stored data and search function has to be provided. How did you meet these requirements?

27. Why did you choose the archives to serve as a trusted third party to maintain and keep the maintenance data? In comparison with public cloud service providers and other commercial records maintenance bodies, what advantages does the archives have?

28. In the collaboration with the archives, what requirements have you had for the management of the data maintained by the archives? How did they meet those requirements?

29. What access rights does the archives have for the company’s systems? For instance, does the archives have access to the System? For the sake of the maintenance data’s reliability and authenticity, is it necessary to give the archives all rights to all systems within the company so that they can monitor the selection of data and the running of the systems? If so, are you willing to do so? Would you please provide further explanation on your choice?

30. What difficulties has the company,
过档案网调取维保数据时遇到过哪些困难？能否以一个实例的形式介绍一下在使用档案馆作为维保数据保管第三方以后对于客户、公司、或者监管部门发挥了怎样的作用？

31. 在应用该系统之前，您的客户是否有留存维保记录的需求？如果有的话，您是如何配合满足这些需求的？该系统的使用对满足这些需求产生了怎样的影响？

32. 能否请您解释一下，客户及政府访问公司云计算核心与他们从档案网获得维保数据是什么关系？是否有功能上的重复？如果不重复的话，分别为了满足什么需求？公司云计算核心对那些客户开放，开放那些数据？

33. 公司对保存在档案馆的维保数据的保管期限是否有要求？公司对保存在档案馆的维保数据未来的处置有什么计划，比如合同终止以后，这部分数据是继续保存在档案馆、迁移到公司内部的系统里、迁移到第三方的系统里、还是直接销毁，以及选择这样处置的原因？

34. 除了帮助公司满足监管的需求以外，将维保数据保存在档案馆数据中心对于你们的文件/档案管理工作有什么意义？

35. 您认为这种模式有没有推广的价值？如果有推广的价值的话，您认为可以向哪些客户，和哪些监管机构推广？
以在哪些领域进行推广?

该系统的升级

36. 结合该系统近三年的使用经历，如果再升级该系统的话，您会在哪些方面对该系统进行改善和提升？

what fields?

36. If the system is upgraded again, in which ways will you improve and upgrade it?
B.2 Interview Questions for Interviewee 2

受访者背景
1. 能不能请您简单作一下自我介绍，工作方面，包括您在档案馆所在的处室，您主要负责的工作等？能不能再请您介绍一下您在与公司1合作项目中的角色，比如您主要负责什么？

项目背景
2. 能否请您概要介绍一下跟公司1的这个合作项目，包括项目背景、项目的具体实施、项目的评估等？

甲方的需求
3. 上次咱们在跟公司1的访谈中问到他们为什么选择档案馆而不是其他商业性的档案管理机构，对方提出档案馆作为政府部门更有公信力，对于这个公信力您是怎么理解的？
4. 在与档案馆的合作上，对方透露过哪些顾虑？
5. 能否请您谈一下对方对这些数据的保管提出了哪些需求，你们是如何满足的？
6. 咱们上次跟公司1访谈的时候，他们提到分为保养和召修两块儿，所以传到档案馆的目前仅仅是

Background of the Interviewee
1. Would you please give a brief introduction of yourself, including your position within the archives, your responsibility? Would you please introduce your role in the collaboration with Company 1, such as your main responsibilities?

Background of the Collaboration with Company 1
2. Would you please give a brief introduction to the collaboration project with Company 1, including the background, the implementation, and assessment?

Company 1’s Requirements
3. In the last interview with Company 1, when they were asked why they chose the archives to serve as the trusted third party rather than other commercial archives and records management bodies, they believed that as government organizations, archives are more trustworthy. Would you please comment on this? Why the archives is more trustworthy?
4. What concerns does Company 1 have in entrusting records to the archives?
5. What requirements does Company 1 have for the management of these data? How do you meet these requirements?
6. According to our last interview with Company 1, the System can be divided into two modules: one for regular maintenance, one for callback service. So just to confirm with you is it correct that at the moment only regular maintenance data will be transferred to the
archives and callback service data will not?

Terms and Agreements

7. According to section 2.4, 2.5, 2.6 of the Terms and Agreement, Company 1 is responsible for the reliability and authenticity of maintenance data within its System and in the transfer, this means the archives is only responsible for the data within their custody? What is the background for this arrangement? Who brought forward such arrangement, the archives or Company 1?

8. According to section 3.1 of the Terms and Agreement, the firewall and servers that the archives provide for Company 1 should meet the relevant quality and technology requirements from relevant state bodies. What do the relevant state bodies refer to? Would you please elaborate on quality and technology requirements?

9. According to section 3.3 of Terms and Agreement, the archives guarantees that the elevator maintenance data stored at the archives will not be tampered with.
   a. How is this achieved? Please specify the measures taken, including any in technology, management, and software and hardware?
   b. If you are asked to prove that the data is not tampered with, how would you do that?
   c. Up until now, have you encountered any problems with these measures?
   d. Have you encountered any doubts on the trustworthiness of the maintenance data you provided?
10. According to section 3.7 of the Terms and Agreement, the archives guarantees that data in the archives’ custody is non-repudiable. Would you please elaborate on the concept of “non-repudiable” and how do you guarantee that?

11. According to section 3.7 of Terms and Agreements, the archives is responsible for the maintenance of elevator maintenance data, and will provide search service and certification service to Company 1, its customer, and the regulatory authorities with Company 1’s permission.
   a. How is the permission from Company 1 obtained?
   b. Who give the access rights to Company 1’s customers and the regulatory bodies, Company 1 or the archives? What access rights do they have respectively? Who provide them the account and password to access the maintenance data?
   c. What types of search can the customers and regulatory authorities perform on maintenance data?
   d. Whether access rights have been set for staff within the archives? What access rights do you have? Does this have to be granted by Company 1?
   e. How is search service and certification service provided?

Management of Elevator Maintenance Data at the Archives
12. Would you please talk about the technological infrastructure (such as servers, software) the archives has implemented for the management of the elevator maintenance data?
的？

13. 能否请您详细介绍一下当维保数据上传到档案馆的数据库以后，档案馆对这些数据做了怎样的处理，采取了怎样的管理措施？

14. 电梯维护保养报告查询系统是布置在公网服务器上的？

15. 咱们档案馆这边儿对这些数据的管理主要设计哪些系统，比如数据库跟踪审计系统、主机安全管理系统？这两个系统是专门因为公司1这个项目开发的，还是本来就有？能否请您详细讲一下这两个系统包括其工作原理？

16. 维保数据的真实性、完整性、安全、隐私等是如何保证的？

17. 公司1对咱们档案馆的系统有访问权限吗？什么样的权限？

18. 在对维保数据的管理中是否涉及到了元数据？采用了怎样的元数据标准？档案馆接收公司1推送的维保数据时是仅接收维保数据本身还是也包括相关的元数据？您认为是否有必要同时接收元数据？如果有必要的话希望能接受哪些元数据？

19. 在对这种非版式文件的保管中遇到了哪些挑战？档案馆在过去接收过这种数据库吗？对维保数据库

13. After receiving the elevator maintenance data, what processing the archives will do to the data and what management measures will be applied to the data?

14. Is the search system for the elevator maintenance data deployed in the public network?

15. What systems does the archives implement for the management of the elevator maintenance data, such as elevator maintenance database real-time monitoring system, server security management system? Are these two systems developed specifically for this project? Would you please talk about these two systems, including how they work?

16. How are the authenticity, integrity, security, and privacy of maintenance data being protected?

17. Does Company 1 have access rights to the archives’ systems? If yes, what kinds of rights?

18. Is metadata used in the management of elevator maintenance data? What metadata standards are being employed? When Company 1 transfers elevator maintenance data to the archives, is metadata being transferred too? Is it necessary to receive metadata? If yes, what kinds of metadata do you expect to receive?

19. What challenges have you encountered in managing structured data like the elevator maintenance data? Has the archives acquired this type of databases before? What’s the difference between managing elevator maintenance
的保管与以前接收数据库的保管有什么区别？

20. 您觉得传统档案学的管理环节，比如分类、著录等在对维保数据的保管中有用武之地吗？

21. 档案馆对公司1维保数据的保管与其在正常职能范围内所接收的电子文件的保管有什么不同？

22. 除此之外，在对维保数据的管理中您还遇到了哪些难题？下一步准备怎么升级系统？如果升级到云系统有哪些优势？又有哪些风险？

提供利用

23. 每天的查询量和下载量能达到多少？有统计吗？咱们这儿可以看到吗？

24. 当初把公司1档案的查询入口放在档案网的公网是一种怎样的考虑，为什么不用内网？您觉得有必要？您觉得把入口放在公共网站上对公司的维保数据的安全是否会构成一些威胁？

25. 能否请您详细介绍一下这个出证的流程？这个也是三方约定的吗？还是档案馆自身的规定？

26. 据您了解，公司1、公司1的维保客户、以及监管部门在通过档案网获得维保数据时遇到了怎样的
database and the databases you acquired before?

20. Do you think archival methodologies, such as classification, indexing, play a role in the management of elevator maintenance data?

21. What’s the difference between managing Company 1’s elevator maintenance data and the digital records that the archives acquire within its responsibility?

22. In addition to the above questions, have you encountered any other problems in the management of elevator maintenance data? How will you upgrade the systems used for the management of the elevator maintenance data? What are the benefits and risks of migrating the systems to the cloud?

Use of the Maintenance Data

23. How is the usage of the maintenance data? For instance, how many searches and downloads are there every day? Do you keep track of this?

24. Why did you put the search portal for the maintenance data in the public network? Why did not you put it in private network? Is it necessary to put it in the public network? Will this pose any threats to the security of the data?

25. Would you please describe in detail the certification of maintenance data? Is the process worked out by the three parties or designed by the archives?

26. As far as you know, what difficulties have you Company 1, its customers, and the regulatory bodies encountered in obtaining data through the archives’ website? If yes, how did or will the archives resolve these issues?
困难？档案馆以后打算怎么解决？
档案馆自身的定位
27. 在与公司 1 合作的这种模式中，档案馆对自己是一种什么样的定位？是单纯的数据接收保存者（确保接收数据的安全性）还是文件真实性的保障者？
推广的意义
28. 该项目的实施对于档案馆未来的发展而言具有怎样的意义？档案馆作为第三方提供这种服务的话？这种模式运行是否成功？如果比较成功的话，您觉得有没有推广的价值？如果有推广的价值的话，您觉得在哪些领域有推广的意义？您觉得对于提升档案馆的社会功能方面有什么意义？

Role of Archives in the Collaboration with Company 1
27. In the collaboration with Company 1, what role does the archives envision for itself, a recipient and keeper of data in its custody or a guardian of the authenticity of records?

Implications of the Collaboration
28. What implications does this collaboration with Company 1 have for the future development of archives, especially, archives as a trusted third party in maintaining the authenticity of records? Is this collaboration successful? If it is successful, can it be generalized to other fields? If so, what fields? What implications does this collaboration have for improving the social functionality of archives?
受访问者背景
1. 能否请您简单描述一下您在公司的职位和主要负责的工作？能不能再请您介绍一下您在电梯维保系统这个项目中的角色和主要负责的工作？

公司的职能架构
2. 能否请您描述一下公司的职能架构、行政结构？

公司的数字化状况
3. 能否请您详细谈一下公司的云服务使用状况，
   a. 使用云服务的背景
   b. 经历了哪些变化？
   c. 现在的使用情况，使用的是 IaaS（基础设施及服务），PaaS（平台及服务），还是 SaaS（软件及服务）？
   d. 未来预期的使用情况

4. 公司使用了哪些应用系统？哪些系统布置在公司内的服务器上？哪些系统布置在云上？这些系统中哪些与电梯维保系统存在数据上的交互，通过哪种方式进行的，如中间库，web service 等？

5. 大数据这个概念对于公司意味着什么？公司的大数据主要由哪些业务数据构成？大数据分析主要用于辅助公司的哪些业务领域？大数据的管理和维护将

Background of the Interviewee
1. Would you please give a brief introduction to yourself, including your position within the company and your main responsibilities? Would you please also give a brief introduction to your role and your main responsibilities in the development of the Digitized Elevator Service Maintenance System?

Functional Structure of Company 1
2. Would you please describe the functional structure of the company?

Digital Strategy
3. Would you please describe in detail the use of cloud-based services at the company, including,
   a. background of using cloud-based services
   b. any changes experienced in the use of cloud-based services
   c. current state of use of cloud-based services, for instance, whether the services used are in the level of IaaS, PaaS, or SaaS, and
   d. how cloud-based services is expected to be used in the near future.

4. What information systems are being used at Company 1? Which of the information systems are deployed in the in-house servers, and which of them are deployed in the cloud? Among these systems, which are sharing data with the System, and how, for instance, through temporary database, web service?

5. What big data means for the company? What business functions and activities is the company’s “big data” generated by? What functions and activities will big data analytics be used to assist with? What measures will be adopted for the management and
6. Would you please talk about
   a. In what areas are IoT technology mainly used? What are the expected effects of the use of IoT?
   b. What is the relationship between IoT and the System? And what influence the use of IoT will have on elevator maintenance?

**Digitized Elevator Service Maintenance System**

7. Would you please talk about the background for the development of the Digitized Elevator Service Maintenance System? Which departments were involved in the design and development of the System?

8. Would you please describe the underlying infrastructure of the System, such as physical layer, data layer, platform layer, application layer?

9. Would you please describe what functionalities the System have in the management portal, cloud, and smartphone portal, such as processing and analysis of maintenance data, generation of a maintenance schedule, tracking the daily maintenance schedule?

10. What functionalities are provided in preventing data from being tampered with, such as access control, audit trail management?

11. How does the System address the issues frequently encountered in the maintenance of elevator, such as elevators left unmaintained, elevators not maintained on time, components of elevators left uninspected, forgery of maintenance records, and inconsistent and unstandardized maintenance records?

12. What standards and regulations have been followed in the creation of the maintenance checklist?
置上，咱们是参考了哪些标准与规范？

13. 相比于纸质维保单，电梯维保系统的使用对维保流程有怎样的影响？维保流程有什么变化呢？

14. 在使用纸质维保报告的时候，维保报告是一式两份，然后公司存一份，客户存一份。电梯使用单位要将维保记录存入电梯安全技术档案，并至少保存2年；维保单位需要建立每部电梯的维保记录，并且归入电梯技术档案，档案至少保存4年。能不能请您介绍一下公司以及客户的纸质维保单的存档保存是如何进行的？

15. 现在国家在力推无纸化维保记录，但在对电子维保记录的具体保管方式上，目前尚没有明确的规定。公司推行电梯维保系统之前，是否向客户沟通过电梯维保系统将取代纸质维保单？客户是如何回应的？

16. 据您了解，客户对电子维保记录是如何管理的？客户在接受特种设备安全监督管理部门的检查的时候，如何出具维保记录？

17. 电梯维保系统的使用对维保记录的存档保存产生了怎样的影响？主要面临怎样的挑战？在对电子维保记录的保管方面，您有什么想法和建议？

13. In comparison with paper maintenance records, what influence does the use of the System have on elevator maintenance process? How has the maintenance process been changed with the use of the System?

14. When maintenance is conducted manually using paper records, two copies of maintenance are created by the technician: one kept by the customers; and the other kept by Company 1. The facility owners will keep maintenance records together with other safety technical records of elevators and keep them for at least 2 years. The contractors should maintain the maintenance records of each elevator and file them into the elevator technical records and keep them for at least 4 years. Would you please talk about how paper maintenance records are managed by facility owners and by contractors?

15. The government is now encouraging the use of digital records in elevator maintenance but does not have specific regulations as to how to manage them. Did the company communicate with its customers concerning the use of digital maintenance records in replacement of the paper maintenance records prior to the rollout the System? How did they respond?

16. As far as you know, how do your customers manage digital maintenance records? When your customers are inspected by the safety regulatory authorities, how do they provide maintenance records?

17. What influence does the use of the System have on the management of maintenance records? What challenges does the use of the System pose for the management of maintenance records? What comments or advice do you have on the management of digital maintenance records?
18. Is there any difference between the regulations on elevator maintenance in different provinces? If so, how does the System accommodate such differences?

19. To my best knowledge, the quality supervision authority of LianYunGang developed an elevator public safety centrally control platform which quality supervision authority, facility owners, and elevator service providers can log into to conduct elevator maintenance and inspection, would you please compare and comment the approaches that LianYunGang and Company 1 adopt respectively in the management of elevator maintenance records? What do you think of the co-existence of different approaches in the management of elevator maintenance records?

20. Can technicians use the smart phones the company provides them with for personal use? Will there be any conflicts between business and personal uses? Does the company have policies on the use of the smart phone?

21. Have you encountered any difficulties in the promotion of the System?

Collaboration with the Archives

22. In the collaboration with the archives, what requirements have you raised for the management of elevator maintenance data transferred to them? How did the archives meet these requirements?

23. To your knowledge, what difficulties have the company, your customers, and the safety authority encountered in retrieving maintenance data from the archives website? Would you please describe the implications of inviting the archives to serve as a trusted third party maintaining and managing elevator maintenance records?
24. Would you please describe the implications the collaboration with the archives has for the records/archives management within the company and for helping the company fulfill regulatory requirements? Can this collaboration with archives be exported to other fields? If yes, what fields?

Significance of the System in the History of the Company

25. Would you please describe the role of the System in the company’s digital transformation?

Records/Archives Management Work

26. Would you please describe how the records created by the Finance Department, IT department, and other departments are managed?

a. Who is responsible for the collection, arrangement, and maintenance of records?

b. Are there any requirements for the collection, arrangement, and maintenance of records? Does the company have any policies on these? If yes, what legislations, regulations did the company follow when forming the policies?

c. Is there any policies on the scope of records to be collected, or will records be collected without any selection?

d. Are records created by different departments managed by themselves or centrally managed by the company? How long will these records be kept for?

e. In terms of the use of the records, what purposes are those records mainly used for?

f. What influence does the company’s digital strategy have on the collection, arrangement, and maintenance of records?
f. 公司的数字化战略对这些档案的收集、整理以及保管产生了怎样的影响？
B.4  Interview Questions for Interviewee 5

Collaboration with Company 1

1. If the collaboration with Company 1 is viewed from a contract’s perspective, the archives is the service provider, and should be accountable to the service purchaser—Company 1. However, apart from Company 1, other interested parties such as safety supervision authority, and the facility owners are also involved. Therefore, from the perspective of the archives’ social function,

a. Should the archives be accountable to the safety supervision authority and the facility owners?

b. If being accountable to Company 1 entails protecting the authenticity of the elevator maintenance data received from Company 1, then what should be protected of the records when the archives is accountable to the safety supervision authority and the facility owners? More specifically, what qualities of the elevator maintenance data should the archives protect? Are there any conflicts between being accountable to Company 1 and being accountable to safety supervision authority and the facility owners?

c. To my best knowledge, the quality supervision authority of LianYunGang developed an elevator public safety centrally control platform, which quality supervision authority, facility owners, and elevator service providers can log into to conduct elevator maintenance and inspection, would you please compare and comment the approaches that LianYunGang and Company 1 adopt respectively in the management of elevator maintenance records? In your opinion, which approach is more efficient? Which approach can provide better protection of the evidentiary
2. When asked why they choose archives as a trusted third party to manage and maintain elevator maintenance data, they explained that as government organizations, archives are more trustworthy.

a. Would you please talk about your understanding of the high trustworthiness that Company 1 accords to the archives? Do you think this trustworthiness derives from it being a government organization or its professional identity as the guardian of the evidentiary capacity of records? In other words, is this trustworthiness unique to the archives or common to all government organizations?

b. If the trustworthiness is derived from its professional identity, what archival principles, methods have been used in the management of the elevator maintenance data to protect its evidentiary capacity and distinguish it from other government organizations?

c. In the digital era, what implications does the archives’ professional identity being the guardian of the evidentiary capacity of records have?

3. As you may know, one of the reasons that Company 1 transfer elevator maintenance data to the archives is to protect the authenticity of records and their ability to serve as evidence, so that their accountability to the safety supervision authorities can be successfully discharged. This indicates that private organizations, customers, and the regulatory bodies have recognized the easiness of digital records to be tampered with and the arising disputes surrounding it serving as evidence.

a. From the digital records’ long-term development and the trend of digitization point of view, how to resolve the disputes
Cloud Computing

4. What does the concept of cloud computing mean for archives? How can it help archives support and expand archives’ functions and services?

5. What does the concept of cloud computing mean for enterprise archives and records management work? What influence does the use of cloud-based services have on archives and records management work?

The Relationship between Archives and Enterprise Archives and Records Management Work

6. From a historical perspective, the relationship between archives and enterprise archives and records management work has evolved from direct administrative control to professional supervision, guidance, and service. In the digital era, how the relationship between archives and the archives and records management work in non-public organizations change? What roles will archives play? What challenges will they be faced with?

7. For my doctoral research, I’ve studied two cases: a Sino-foreign joint venture (Company 1) and a state-owned enterprise (Company 2). The two enterprises are faced with very different challenges in the management of digital records; Company 1 is struggling with the difficulties in meeting regulatory requirements with digital records, and Company 2 is focusing on demonstrating the value of records to the company’s
在当前电子文件证据属性和真实性不断遭到质疑的环境下，对公司2这种企业的电子文件真实性保障上是否需要干涉？如果需要的话，将扮演怎样的角色？

8. 近期档案局在对各类型企业（比如，国企、民营企业、科技型中小型企业、外企）的指导工作上的重点是什么？
Appendix C  Interview Questions for Case 2

C.1  Interview Questions for Interviewee 6

Archives and Records Management Work

1. In the document you shared with me, you argued that the functions of archives and records management work within surveying and engineering enterprises has been incorporated into the conduct of the enterprise’s core business and that archives and records management has been given management functions, such as quality control, strategic analysis, operation intelligence collection, staff training, and the enterprise’s window to the outside. Would you please discuss in detail these functions?

2. Would you please elaborate on the asserted conflicts between existing archives and records management processes and the emerging records types, emerging client groups, additional functions given to the archives and records management work, and different operations? How does the internal Archival Unit respond to these conflicts?

3. You also argued that in the new management and technology environment, archives and records management processes are not flexible enough to cope with the new requirements raised for it. Would you please discuss in detail these limitations in the archives and records management processes?

4. Would you please discuss in detail how the concepts of “front control”, “stand-by supervision”, and “lifecycle management” are applied in the archives and records management work?

The document in this interview refers to the policy and other internal documents the interviewee provided to the researcher for her research.
5. 能否请您结合实际详细阐述一下您单位档案工作的以下业务理念：“文档管理一体化”、“档案、图书、情报管理一体化”、“双轨制管理”、“数字化管理”、“信息化管理”和“知识管理”？

6. 您提到现有档案管理由载体层面管理发展到信息层面管理，而且目前针对企业档案的信息层面管理又在向着档案信息集合的微观分解与宏观整合方向发展。对于档案信息的开发利用具有逐步脱离固有的以文件作为信息集合基本单位的模式。
   a. 能否请您结合您单位的实际谈一下您对这一发展趋势的看法？
   b. 另外，您能否举例说明这一变化仅仅局限于开发利用层面还是已经渗透到了档案管理工作的各个方面？
   c. 这种趋势对于保证档案的真实性、可靠性的存在哪些矛盾？

7. 您进一步提到，在没有实体依托的计算机网络环境中，档案的管理也势必将摆脱原有文件这一数据集合形式的束缚，转而向具有原始记录性的档案数据与不同层面数据集合的细化管理。
   a. 能否请您谈一下“摆脱原有文件”这一数据集合形式对文件的原始记录性是否有产生了影响？
   b. 能否请您结合您单位的实际详细阐述
释一下这种对“具有原始记录性的档案数据与不同层面数据集成的细化管理”是如何实施的？

8. 能否请您详细解释一下档案、文件、记录之间的数据转化关系？

9. 扩展企业档案的归档范围，将以文件为主要来源的归档范围扩展为针对不同程度集合下原始记录性数据的归档管理。主要通过收集各业务支持系统、信息管理系统中的原始性业务流程记录与管理行为记录加以实现。
   a. 能否请您以一个例子的形式介绍一下，这里的“原始性业务流程记录”与“管理行为记录”分别指的是什么？
   b. 扩展企业档案的归档范围这里的“扩展”是相对于国家规定的归档范围？还是企业所规定的归档范围？扩展的原则是什么？这些扩展后归档的文件将被保存多长时间？
   c. 公司的归档范围有没有进行调整来反应扩展后的归档范围？

10. 搭建数据的归档渠道。通过数据接口、中间数据库等手段实现各业务系统数据库、信息管理系统数据库与档案数据库的对接。实现信息化条件下，原始记录性数据的完整归档。
    能否请您具体讲一下这里的业务系统数据库、信息管理系统数据库分别指的是什么哪些系统？这些业务系统数据库是你的公司？

   8. Would you please explain the relationship between archives, records, and documents?

   9. For the expansion of scope of documents to be captured, you mentioned that, this is achieved by expanding from records focused capture to the capture of different forms of original documentation. This is realized by collecting original business process data and management decision data though business systems and management information systems.
      a. Would you please explain what business process data and management decision data refers to?
      b. What the expansion of scope of documents to be captured is in relation to, retention and disposition required by the state, or the retention and disposition required by the company? What is the principle for the expansion? How long will records captured in accordance with the new retention scope be kept for?
      c. Has the company’s retention and disposition policy been adjusted to reflect the new scope?

   10. Would you please explain what business systems and management information systems refer to? How are they integrated with the Electronic Records Management System? What measures and controls does the internal Archival Unit implement to ensure the reliability and authenticity of the data transferred to the Electronic Records Management System? Is data or record being captured?
11. Would you please discuss the set of policies and regulations developed by the company for standardized handling of records, including their content and how they help protect the reliability and authenticity of records?

12. The company’s archival database has expanded from four sub-databases—administrative records, scientific and technical records, financial records, and personnel records, to a comprehensive database containing records, books, and intelligence. Now, the archival database is comprised of 26 sub-databases corresponding to the 26 record and material types identified.

Why do you add books and intelligence into the Electronic Records Management System? Are these considered as “records” as well? If so, is it necessary? What influence does including books and intelligence into Electronic Records Management System have for Archives and Records Management Work?

13. How are the relationships among different record types being established?
management institution will transform digitization work to enterprise production projects in professional information. Through project management systems, the digitization of data is formed into a standard set of project data labels. These labels can directly describe the professional characteristics of the project.

Could you please explain this set of labels?

What does "digitization of professional information" mean?

What significance does the tags have for archives and records management work?

15. Would you please discuss in detail the IT infrastructure of the Group?

16. Would you please talk about projects management introduced by the internal Archival Unit?

Records Liaison Officer Program

17. Would you please talk about Records Liaison Officer program, including the reasons for appointing Records Liaison Officers, achievements made and issues to be resolved, at which level is records liaison officer appointed, and the number of Records Liaison Officers appointed?

18. What responsibilities do Records Liaison Officers have in the management of digital records and paper records?

19. How to make sure that Records Liaison Officers will fulfill their responsibilities? For instance, are there incentives or punishments? How to guarantee the quality of records that Records Liaison Officers transfer to the internal Archival Unit?

Electronic Records Management System
20. 预归档库具体指的是什么，与整编管理库还有临时文件库是什么关系? 登记行为具体是以怎样的方式被记录下来的?

21. 在谈到档案管理信息系统的开发时，您指出要将大数据思想的数据先导理念植入系统的结构中，在内部机制与外部标准规范体系构建的基础上，新型系统的构建要实现真正意义上的“管理系统”职能。能否请您结合您单位的档案管理系统谈一下如何算是真正意义上的“管理系统”? “数据先导”的理念又是什么意思? 是如何实施的?

22. 其中特色功能涵盖电子文件批处理功能、档案数据关联功能、数据标签检索功能、系统日志分析功能、用户互动评价功能等。能否请您详细介绍一下这些功能?

23. 除了上述功能以外，在档案管理信息系统中，档案管理的业务职能如分类、鉴定、保管期限的设置、保管期限到期后的处置是如何实现的?

24. 纸质文件与电子文件的一体化管理是如何实现的?

25. 在完善归档收集上，您谈到通过数据接口完善档案系统与业务系统间的文档收集渠道确保电子文件收集的真实性、完整性、安全性。能否请您具体谈
一下电子文件的真实性、完整性和安全性是如何保证的？

26. 档案管理机构完善了一系列专题应用系统，在这些系统的研发和完善中档案管理机构承担了怎样的角色？这些系统与档案管理信息系统是什么关系？这些系统的研发对于档案管理工作有什么样的影响？

云计算的应用对档案管理工作的影响的问题

27. 能否请您详细介绍集团以及公司的云使用情况，两者之间是什么关系？

28. 能否请您详细介绍一下公司的云存储的使用情况？

29. 能否请您详细介绍一下你们单位哪些系统是基于云的？

30. 能否请您谈一下云计算的使用对档案管理工作的影响？

质量认证

31. 您公司获得英国和美国劳埃德公司颁发的质量体系认证书，并在2017年通过英国劳氏质量认证有限公司的认证审核，获得环境、职业健康和安全管理体系认证证书。

   a. 能否请您详细谈一下这三个质量认证，包括什么样的动机或原因促使你们获得认证？
   b. 在获得质量认证和维持质量认证过程中，电子文件的真实性、完整性和安全性是如何保证的？

   26. The internal Archival Unit has improved Bidding Information System, and other records use systems how was internal Archival Unit involved in the design and development of these systems? What is the relationship between these systems and the Electronic Records Management System? What influence does the development of these systems have on archives and records management work?

   The Use of Cloud-based Services and its Influence on Archives and Records Management Work

   27. Would you please talk about the use of cloud-based services at the Corporate Group and at the company? What is the relationship between the two?

   28. Would you please talk about the use of cloud storage at the company?

   29. Which business systems at your company is deployed in the cloud?

   30. Would you please talk about the influence the use of cloud-based services has on archives and records management?

   Quality Certification

   31. Your company has had its quality management system, occupational health and safety system, and environment management system certified by Lloyd’s Register Quality Assurance in 2017.

   a. Would you please discuss these three quality certification and the reasons that motivate you to obtain certification?
   b. In obtaining and maintaining certification, which areas, functions, or business processes have been required to improve in order to be certified?
   c. What requirements do the three certifications have for archives and records
程中，公司的哪些领域、职能、或流程被要求补充、改进、完善以获得认证？

c. 这三个质量认证对档案管理工作有哪些要求？

d. 在获得认证和保持认证过程中，档案管理工作的表现如何？遇到了怎样的问题？这些问题是如何得到解决的？

e. 档案工作为其他领域、职能、或流程的认证以及认证的获得提供了怎样的协助？

f. 目前档案工作以大数据为先导的理念对档案工作满足认证要求有怎样的影响？

g. 质量认证对档案管理工作具有怎样意义？

h. 公司从获得质量认证过程中获得了哪些益处？

32. 在我们上次的谈话中，您是公司内审委员会的一员，公司的内审又是否有档案管理工作的内容呢？是否包含档案管理工作？如果包含的话，能否请您谈一下对档案管理工作的内部审核，包括审核的内容、审核遇到的问题等？

33. 除了内审，您公司是否需要经过外审呢？如果有的话，档案管理工作是外审的内容吗？是的话，能否请您介绍一下具体是如何审核的？

34. 各个档案系统（如工程信息采集系统、管理工作）？

32. You mentioned that you are a member of the company’s self-assessment committee, what does self-assessment involve? Is archives and records management part of the assessment? If yes, would you please discuss in detail how the assessment of archives and records management work is performed, and what issues were identified in the assessment?

33. In addition to self-assessment, does your company need to undergo external assessment? If so, is archives and records management work part of external assessment? If so, would you please discuss how external assessment is carried out?

34. How are different records management systems (such as Bidding Information System, Engineering
317

统、投标信息系统、知识资源管理平台）之间是如何配合的？

35. 作为集团的一级全资子公司，集团对公司的档案管理工作有怎样的要求？您公司又是如何满足这些要求的？

36. 您公司下属的子公司与合资公司，您公司对他们的档案管理工作有怎样的要求？是如何监督与指导的？

37. 档案管理机构在公司的决策中或战略转型中曾经有过哪些典型性的决策支撑作用？档案管理机构作为内部的信息支撑与情报室有怎样的角色区分与角色合作？

38. 能否请您简单介绍一下公司现在的信息化水平在整个集团层面处于怎样的层级与层次？

39. “随着企业资产和产权关系的变化，档案的权属性质日益发生了变化，企业档案工作必须以满足各项业务活动的需求为导向。”能否请您详细解释一下这两句话及两者之间的关联关系？企业资产和产权关系的变化指的是什么？档案的权属性质指的又是什么？又发生了怎样的变化？

40. 能否请您从公司的发展史角度谈一下，档案管理机构在公司不同发展时期所起到的作用？

Cloud Communication

Information Management System, and Knowledge Push System) integrated with each other?

35. As a wholly owned subsidiary of Corporate Group 1, what requirements does the Group have for the company’s archives and records management work? How do you meet these requirements?

36. As your company has subsidiaries and joint ventures, what requirements do you have for their archives and records management work? How do you supervise and guide them?

37. Would you please talk about the role of internal Archival Unit in the company’s decision-making and strategic transformation? How does the internal Archival Unit—as the internal information provider—differentiate from and collaborate with the Competitive Intelligence Unit?

38. How do you rate the informatization level of the company within the Group?

39. “As the company’s assets and property rights change, the owners of records change as well. Now enterprise archives and records management work should be guided by the goal to meet the needs of all business activities.” Would you please explain the two sentences and the relationship between them? What does assets and property rights change refer to? What does the change of the ownership of records refer to? And, how do they change?

40. From a historical perspective, would you please discuss the roles and functions of the internal Archival Unit at different development stages of the company?
能否介绍一下 Cloud Communication 引进的背景?

在引进 Cloud Communication 的时候，是否考虑到安全、隐私等方面的因素?

公司使用的 Cloud Communication 包含哪些功能（如企业邮箱、企业网盘、电话会议、网络会议、视频会议和互动直播等）?

Cloud Communication 是部署在公有云、私有云、还是混合云上的?

能否请您以实例的形式介绍一下您在日常工作中是如何使用 Cloud Communication，以及它是如何辅助您进行通信和协同办公的?

Cloud Communication 的使用对公司的通信和协同有哪些影响?

Cloud Communication 的使用对公司业务流程是否有影响?

Cloud Communication 以及其各功能在公司的使用程度如何?

您在 2015 年的协作组交流中提到“此外，我们依托企业内部的即时通讯系统，在业务办理中积极与利用者进行沟通交流，并将档案利用的在线审批流程嵌入即时通讯系统（Cloud Communication），大幅提高了利用效率，取得了良好的利用效果。”

a. 能否请您介绍和展示一下档案利用

b. 能否介绍和展示一下 Cloud Communication 的使用？
的在线审批流程是如何嵌入到 Cloud Communication 的？

b. 使用的频率和效果如何？

c. 审批流程如何归档？

50. 除了档案利用的在线审批流程，Cloud Communication 还与企业哪些应用有整合？

51. 会使用 Cloud Communication 的企业网盘吗？

a. 如果答案是肯定的话，那么在哪些情况下会使用网盘？

b. 档案部门对网盘上所保存的文件类型和范围是否有了解？这些是否属于公司的归档范围内？如果属于的话，档案部门是否有计划将这些文件纳入档案管理框架内？

c. 目前，公司档案管理机构对 Cloud Communication 企业网盘上的文件主要采取哪些管理措施？

d. 网盘是否提供导出这些文件的功能？

e. 您如何评价云网盘在档案管理上的能力，例如对档案的分类、组织、编目、四性的保障等？

52. 使用 Cloud Communication 过程中所产生的文件能否作为你们业务活动的证据，如聊天记录等？

53. 从档案管理角度而言，Cloud Communication 的使用过程中所产生的过程使用和如何归档的？

c. How is the approval process documented and kept?

50. In addition to the online approval process, what other business systems is cloud communication integrated with?

51. Is the cloud drive provided by cloud communication being used by the company?

a. If yes, how is the cloud drive being used?

b. Does the internal Archival Unit have knowledge of the types and amounts of records stored at the cloud drive? Do these records fall into the company’s scope of records to be kept and transferred to the archives? If yes, does the internal Archival Unit have plan to bring them into the records management program?

c. At the moment, what management measures does the company apply to records stored at the cloud drive?

d. Does the cloud drive provide capability for the exportation of the records?

e. How do you evaluate the records management capability of the cloud drive, for instance, classification, arrangement, indexing, and protection of the trustworthiness of records?

52. Are the records (such as chat log) generated in the use of cloud communication considered as evidence of your business activities?

53. From the perspective of archives and records management, do records (such as chat log) generated in the use of cloud
文件（如聊天记录）是否具有保存价值？现在是否属于归档范围？未来是否有计划列入归档范围？

54. 在使用 Cloud Communication 过程中遇到过哪些问题？

55. 公司邮箱是公司自己部署的还是依托外部产品生成的公司后缀？邮件存储在哪里？

中间库

56. 当中间库数据更新时，数据提供方（如 OA 系统、生产系统）如何通知档案系统同步中间库的数据？

57. 业务系统的推送权限：业务系统中的数据是自动归档到中间库还是需要人为的设置？如果是后者谁有权设置归档标识？

58. 中间库数据的提取：档案管理系统是定期自动去中间库提取数据还是需要档案人员人工去提取？如果是后者谁有提取权限？

其他问题

59. 您提到咱们公司的数据是与集团的另外一个子公司实行互相备份？是这样子的吗？

60. 下文档案文件类型的划分是基于什么标准？

61. 企业档案分类规则是基于什么进行分类的？

62. 电子文件分类方案和保管期限表是

communication have preservation value? Are they covered by the retention and disposition schedule? If not, do you have plans to bring them into the retention and disposition schedule?

54. What issues have you encountered in the use of cloud communication?

55. Was your company’s business mails solution developed by yourself or provided by an outside email service provider? Where are emails stored?

Temporary Database

56. When the data in temporary database is updated, how does the data supplier (e.g., OA system, Production Management System) notify Electronic Records Management System to retrieve the data?

57. Is data within the business systems pushed to temporary database automatically or manually? If the latter, who has the right to initiate the transfer?

58. Is the data in temporary database being retrieved automatically by the Electronic Records Management System or manually by archivists? If the latter, who has the rights?

Other Questions

59. For offsite backup, is it correct that the company and another subsidiary of the Group are backing up data for each other?

60. What criteria have been used in the division of different record types?

61. What approach has been adopted in the classification of records?

62. How are records classification
63. How is the relationship between digital records and their metadata established?
C.2 Interview Questions for Interviewee 7 & 8

Background of the Interviewee

1. Would you please give a brief introduction to your position within the internal Archival Unit and your main responsibility?
2. How long have you been working at the internal Archival Unit?
3. How has the internal Archival Unit changed ever since you started working here? What do you think of these changes?

Electronic Records Management System

4. What functions of the Electronic Records Management System do you use in your daily work? Do they work well in terms of supporting your work? Have you encountered any issues?
5. In comparison with paper environment, what influences the use of Electronic Records Management System has on your business activities and processes?
6. Based on your work experience and your communication with colleagues, how does the Electronic Records Management System perform in supporting archives and records management functionalities, such as appraisal, capture, arrangement, maintenance, search, and publications?
7. How can the Electronic Records Management System be improved?

Project Management

8. What internal Archival Unit projects have you participated? How does the
项项目？参与这些项目的经历让您对档案管理工作产生了哪些新的认识？

9. 据我了解，档案管理机构设计与开发了一系列专题应用系统，结合您的经历，您觉得这种通过设计开发信息系统的方式来提供档案服务的方式怎么样？优点与缺点是什么？

10. 伴随着信息化的趋势，公司的档案工作也在逐步实现数字化，您认为完全数字化以后将对档案工作产生怎样的影响？面临的主要挑战将是什么？

11. 您认为档案资源在公司 2 的业务开展过程中扮演怎样的角色？这种角色是否符合您对档案工作的认识？

12. 在您现在的工作岗位上，结合您现有的工作职责或资源，如果给您一个机会，您想做哪些创新？这些创新不用局限于形式？

13. 除了上述问题以外，您在具体工作过程中遇到过哪些问题？

14. 关于档案工作您还有其他想与我分享的吗？

experience working in these projects influence your understandings of archives and records management work?

9. The internal Archival Unit has designed and developed Bidding Information System, and other information reuse systems. What are the advantages and disadvantages of developing independent and separate information systems to provide records for use?

10. Against the backdrop of informatization, the Company’s archives and records management work is going digital as well. What influences will going digital have on archives and records management work? What challenges will archives and records management work be faced with?

11. What roles are archival assets playing in the conduct of business at Company 2? Are these roles consistent with your expectation?

12. If you are given an opportunity, what innovation will you introduce to your work?

13. In addition to the above questions, what issues have you encountered in your daily work?

14. About archives and records management work, do you have other comments or thoughts to share with me?
C.3 Interview Questions for Interviewee 9

1. How widely are digital records being used in different types of enterprises in this city? For instance, are they paperless, using a dual-copy system, or still primarily paper dominant? Can any trend be detected in the use of digital records and paper records among different types of enterprises?

2. How does the Enterprise Records Management Department regulate and guide digital records management within enterprises? Are there any regulations, standards, or policies issued? If so, would you please give a brief introduction to their purposes and contents and how they guide the management of digital records from different aspects?

3. Does the archives have the authority to supervise archives and records management work within Sino-foreign Joint Ventures and wholly foreign-owned enterprises?

4. How are Electronic Records Management Systems used in different types of enterprises in this city?

5. How well do you know cloud, cloud storage, and cloud computing? To your knowledge, how widely is cloud used in state-owned enterprises, and for what purposes are they being used? What influence does the use of cloud-based services have on archives and records management? Would you please elaborate, with examples, on these questions?
Appendix D  A List of Some Examples of the Categories Generated in Case 1 and Case 2

D.1 Some Examples of the Categories Generated in Case 1

<table>
<thead>
<tr>
<th>Categories in Chinese original</th>
<th>Sub-categories in Chinese original</th>
<th>English translation of categories</th>
<th>English translation of sub-categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>电梯维护保养系统</td>
<td>功能模块</td>
<td>Functional modules</td>
<td></td>
</tr>
<tr>
<td></td>
<td>维保数据保管期限</td>
<td>Retention period of maintenance data</td>
<td></td>
</tr>
<tr>
<td></td>
<td>与其他系统的对接</td>
<td>Integration with other systems</td>
<td></td>
</tr>
<tr>
<td></td>
<td>实施</td>
<td>Implementation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>数据存储</td>
<td>Data storage</td>
<td></td>
</tr>
<tr>
<td></td>
<td>保养数据的组成</td>
<td>Components of maintenance data</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IPhone 手机的配备</td>
<td>Equipped with iPhone</td>
<td></td>
</tr>
<tr>
<td></td>
<td>与外包公司的合作开发</td>
<td>Collaboration with an external company for the development of the System</td>
<td></td>
</tr>
<tr>
<td></td>
<td>影响</td>
<td>Influences</td>
<td></td>
</tr>
<tr>
<td></td>
<td>系统的使用及推广过程中的影响因素</td>
<td>Factors affecting the use and implementation of the System</td>
<td></td>
</tr>
<tr>
<td></td>
<td>客户存档</td>
<td>How elevator users keep maintenance records</td>
<td></td>
</tr>
<tr>
<td>受访者</td>
<td>Interviewee</td>
<td>Interviewee</td>
<td></td>
</tr>
<tr>
<td>维保数据真实性与可靠性保障</td>
<td>公司 1 项目遭遇质疑的原因</td>
<td>Protection of the authenticity and reliability of maintenance data</td>
<td>Risks associated with the use of a trusted third party to guarantee and demonstrate the trustworthiness of maintenance data</td>
</tr>
<tr>
<td></td>
<td>电子文件真实性与</td>
<td>Protection of trustworthiness of</td>
<td></td>
</tr>
</tbody>
</table>

325
<table>
<thead>
<tr>
<th>可靠性保障</th>
<th>electronic records</th>
</tr>
</thead>
<tbody>
<tr>
<td>档案馆作为可信的第三方</td>
<td>Archives as a trusted third party</td>
</tr>
<tr>
<td>公司 1 采取的措施</td>
<td>Measures adopted by Company 1 to protect the reliability and authenticity of maintenance data</td>
</tr>
<tr>
<td>匹配</td>
<td>Comparison</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>背景</th>
<th>Background</th>
</tr>
</thead>
<tbody>
<tr>
<td>公司 1 的应用系统</td>
<td>Business systems in Company 1</td>
</tr>
<tr>
<td>纸质维保单的管理</td>
<td>Paper maintenance records management</td>
</tr>
<tr>
<td>电梯维保中的相关责任者</td>
<td>Stakeholders in elevator maintenance</td>
</tr>
<tr>
<td>公司 1 的数字化战略</td>
<td>Digital strategy in Company 1</td>
</tr>
<tr>
<td>公司 1 的档案管理体制</td>
<td>Records management at Company 1</td>
</tr>
<tr>
<td>系统开发之前的维保工作</td>
<td>How elevator maintenance was carried out prior to the implementation of the System</td>
</tr>
<tr>
<td>好处</td>
<td>Benefits brought by the use of the System</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>云</th>
<th>Cloud</th>
</tr>
</thead>
<tbody>
<tr>
<td>风险</td>
<td>Risks</td>
</tr>
<tr>
<td>集团的云战略</td>
<td>Cloud strategy at the corporation</td>
</tr>
<tr>
<td>成熟度</td>
<td>Degree of maturity</td>
</tr>
<tr>
<td>电梯维保系统</td>
<td>Digitized Elevator Service Maintenance System</td>
</tr>
<tr>
<td>数据的永久保存</td>
<td>Permanent preservation of data</td>
</tr>
</tbody>
</table>
### D.2 Some Examples of the Categories Generated in Case 2

<table>
<thead>
<tr>
<th>Categories in Chinese original</th>
<th>English translation of categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>档案管理概念、原则</td>
<td>Records and archives management concepts and principles</td>
</tr>
<tr>
<td>档案管理机构的定位</td>
<td>Role of internal Archival Unit within the company</td>
</tr>
<tr>
<td>归档范围</td>
<td>Scope of records to be filed and transferred to the internal Archival Unit</td>
</tr>
<tr>
<td>背景</td>
<td>Background</td>
</tr>
<tr>
<td>Cloud Communication</td>
<td>Cloud Communication</td>
</tr>
<tr>
<td>档案管理系统</td>
<td>Electronic Records Management System</td>
</tr>
<tr>
<td>档案管理体制</td>
<td>Records and Archives Management Program</td>
</tr>
<tr>
<td>云</td>
<td>Cloud Computing</td>
</tr>
<tr>
<td>中间库</td>
<td>Temporary database</td>
</tr>
<tr>
<td>业务系统</td>
<td>Business Information System</td>
</tr>
<tr>
<td>档案管理工作</td>
<td>Records and archives management work</td>
</tr>
<tr>
<td>利用</td>
<td>Use of records</td>
</tr>
<tr>
<td>双轨制、双套制</td>
<td>Dual track system and dual-copy system</td>
</tr>
<tr>
<td>归档</td>
<td>Filing and transferring</td>
</tr>
<tr>
<td>流程</td>
<td>Business process</td>
</tr>
<tr>
<td>档案类型</td>
<td>Record types</td>
</tr>
<tr>
<td>变化</td>
<td>Changes</td>
</tr>
</tbody>
</table>
Appendix E  An Example of the Mind Maps Generated in the Study\textsuperscript{135}

\textsuperscript{135} Only one mind map from Case 2 is provided to illustrate the data analysis process.