State of Michigan
Records Management Services
Best Practices for Reproducing Public Records

1.0 Introduction

The Records Reproduction Act (MCL 24.401-24.406) regulates the reproduction of public records by Michigan government agencies at all levels. This law requires the Records Management Services to promulgate technical standards to ensure the continued accessibility and usability of records that are microfilmed or digitized throughout their retention period. The standards are also intended to help state and local governments ensure the integrity and authenticity of their records.

These recommended best practices are intended to clarify the regulations in the standards that were approved in 2005. They also explain the pros and cons of using various record reproduction technologies for maintaining public records. These best practices and standards place the responsibility for ensuring that public records are not rendered unusable with the state or local government entity.

The Rules for Optical Imaging Systems that were promulgated in 1998 were repealed and replaced by the new standards that were approved in 2005, as a result of amending the original law that was passed in 1992. The motivation for changing these regulations was to help state and local governments use various record keeping technologies in the most efficient and cost-effective manner.

The previous rules permitted the digitization of any public record, however, if the record had a retention period of more than 10 years a human-readable copy (paper or microfilm) had to be maintained in addition to the digital image, because of the instability of electronic record keeping systems. The new standards no longer contain this requirement. The standards do not specify how a local government or state agency should ensure that public records remain usable. Nor do they preclude the transfer of imaged records to other media, or discourage the use of microfilm or paper **(which is still recommended for long-term retention)**.

The standards specify requirements necessary to develop a document capture environment that optimizes the ability to continuously obtain satisfactory reproductions. They require state agencies and local governments to ensure that public records are not rendered unusable because of changing technology before their retention and preservation requirements are met, regardless of the media. Therefore, government agencies are responsible for the selection and implementation of appropriate record keeping systems and/or the consequences of selecting and implementing an inappropriate system.

The best practice documents listed below were developed to assist state agencies and local governments with accomplishing these objectives.

- Best practices for the capture of digital images from paper or microfilm
- Best practices for the microfilming of paper records

- Best practices for the microfilming of digitized records

Information contained in this document will assist state agencies and local governments in determining the appropriate record keeping solution.

2.0 Basic Principles of Record Keeping

Selecting an appropriate record keeping system is like selecting the appropriate level of insurance for your home. Records with a greater value to the agency warrant a greater level of insurance. Records with lesser value "may" warrant a lesser level of insurance. Regardless of the value, all records and record keeping systems maintained by a state agency or local government must possess four basic characteristics to be considered trustworthy. Records must be **authentic**, **reliable**, have **integrity**, and be **usable** regardless of the format and the media they are contained on.

An **authentic** record is one that can be proven to be what it professes to be, to have been created or sent by the person claiming to have created or sent it, and to have been created or sent at that time. To ensure the authenticity of records, state agencies and local governments should implement and document policies and procedures which control the creation, receipt, transmission, maintenance and disposition of records. This will ensure that record creators are authorized and identified, and that records are protected against unauthorized addition, deletion, alteration, use and concealment.

A **reliable** record is one whose contents can be trusted to be a full and accurate representation of the transactions, activities or facts to which they attest and can be depended upon in the course of subsequent transactions or activities. Records should be created at the time of the transaction or incident to which they relate, or soon afterwards, by individuals who have direct knowledge of the facts or by instruments routinely used within the normal course of business to conduct the transaction.

The **integrity** of a record refers to its being complete and unaltered. It is necessary that a record be protected against unauthorized alteration. Records management policies and procedures should specify what additions or annotations may be made to a record after it is created, under what circumstances additions or annotations may be authorized, and who is authorized to make them. Any authorized annotation; addition or deletion to a record should be explicitly indicated and traceable.

A **useable** record is one that can be located, retrieved, presented and interpreted. It should be capable of subsequent presentation as directly connected to the business activity or transaction that produced it. The contextual linkages of records should carry the information needed for an understanding of the transactions that created and used them. It should be possible to identify a record within the context of broader business activities and functions. The links between records that document a sequence of activities should be maintained. The records must be accessible for the duration of the retention period.

3.0 Record-keeping Options

When a state agency or local government is faced with today's "do more with less" work environment, overcrowded file cabinets, and the pressure from the customer to perform services

in more convenient and seemingly efficient ways; the idea of converting records to an alternative media usually comes to the front of the solution list. Too often the problem at hand is not clearly identified, the business process is not clearly understood, and measurable objectives have not been defined, before the solution is chosen and implemented. This can, and often does, lead to the phrase no one wants to hear… "I thought this system would…" Anything following this phrase represents some level of disappointment. Identification of the source of the record-keeping problem is key to a successful and cost effective solution. Therefore, with any system change it is necessary to identify the current business process, identify the current problem set and identify the outcome objectives. It is only when these are clearly understood that a realistic, compliant and functional solution can be defined.

For records currently **created in paper** there are four basic choices for problem resolution. Choices include: 1) retaining the paper, perhaps in a different way or location, 2) re-designing the business process to eliminate the generation of paper, 3) converting to microfilm, or 4) converting to digital image. Each choice has its pros and cons. A fifth choice could include a combination of technologies in order to take full advantage of the pros of all.

3.1 Paper

Typically the least expensive of the choices, paper-filing systems, require no conversion costs. Paper filing systems satisfy the requirement of long-term storage media and require no special equipment to view. They are culturally accepted, and they have established standards for filing and destruction. Paper is easy to interfile, redact and modify.

The disadvantages of paper systems are that there is no disaster recovery mechanism and there is a greater risk of misfiles and lost documents. Paper filing systems can become voluminous, and are not cost effective to duplicate or distribute. Access is mediated through a single user.

Pros

- No conversion cost required
- Satisfies requirement of a long-term storage media
- Requires no special equipment to view
- Culturally accepted
- Established standards for filing
- Established standards for destruction
- Easy to interfile, redact, modify

Cons

- No disaster recovery mechanism
- Risk of misfiles and lost documents
- Single user access
- Voluminous
- Not easily duplicated

Records that should be retained in paper formats often have short retention periods, and low retrieval levels, or they have very long retention periods and possess historical or intrinsic value. Examples include:

Long term
- Sandborn (fire) maps
- State constitution
- Planning maps (with color)

Short-term
- General correspondence
- Administrative subject files
- Budget development records
- FOIA requests

3.2 Business Process Re-design

Automating a business process to eliminate the need for paper can be of great benefit. The result of this effort should create a full understanding of the business process, as well as identify inefficiencies and redundancies. Identifying areas where information can be captured electronically may eliminate the need for paper creation or retention, and reduce staff time for managing the paper filing systems.

Pros
- Potential inefficiencies and redundancies may be identified
- Develops a full understanding of business process
- May eliminate the creation of paper

Cons
- Require expertise
- Cultural change
- May require new, potentially large investments

Business process re-design can be used to streamline processes, eliminate redundant tasks and improve efficiency. A business re-design is an opportunity to reconsider record keeping practices, since it will often identify problems that could be alleviated. Examples of potential findings include but may not be limited to:

- Areas where electronic records are printed and filed unnecessarily
- Records that can be captured and retained electronically
- Records that no longer serve a business purpose and can be eliminated
- Opportunities for automating business processes (workflow)
- Opportunities for re-defining record keeping procedures
- Automated routines (software) that can be built or purchased to handle records more effectively
- Opportunities for the re-allocation of existing staff
- Need for organizational changes
- Information sharing opportunities between departments or other government entities
- Opportunities for improved customer service

3.3 Microfilm

Microfilm systems offer many advantages over paper and are typically overlooked as a viable alternative in today's business environment. Microfilm systems are less voluminous than paper and satisfy the requirements of long-term storage. Microfilm systems require relatively low maintenance and can be easily replicated. They provide a mechanism for disaster recovery, and have established standards for creation, use and storage. Since microfilm requires specific equipment to view and print, they are becoming less popular than they once were. This is true especially for systems that require centralized control with decentralized access.

Pros

- Less voluminous than paper (high density)
- Satisfies requirement of long term storage media
- Human readable
- Low maintenance (periodic inspection required)
- Easily duplicated
- Mechanism for disaster recovery
- Established standards for creation and use

Cons

- Requires specific equipment to view/print
- Requires specific storage environment for the master
- Conversion cost
- Not an easily updateable media (interfile and expunge)

Records that may be suited for conversion to microfilm (either in addition to or in replacement of the paper) are often voluminous, they may have long retention periods, may be accessed from a central location, may require a mechanism of disaster recovery, may have historical value, or they may be considered vital. Examples may include but are not limited to:

- Deeds, easements, encroachments, right-of-way
- Vital records (birth, death, marriage, divorce)
- Criminal records
- Licensing files
- Court records
- Board and commission minutes and agenda materials
- Drawings and maps
- Annual financial ledgers

3.4 Digital Imaging (digitization)

The benefits of imaging reside primarily in the access and distribution of active information. High density storage, multiple user access, rapid retrieval, ease of distribution, ease of updating and duplicating are among the benefits of good imaging systems.

Potential users of imaging systems often confuse their records retention requirements with their retrieval needs. Retrieval and retention are two separate and distinct issues. Imaging systems is

not likely to be cost justified purely on the basis of storage space reduction. Although imaging systems have other inherent benefits, they are primarily designed to provide rapid retrieval and distribution for highly active documents. Ensuring the long-term accessibility and usability of records stored as digital images is dependent on how digital imaging systems are designed, implemented, managed and migrated. A common misperception is that imaged records will be available as long as the physical media used to store the images last. Although this may be the case for paper and microfilm, imaging systems have limited stability and depend on particular hardware and software configurations. Due to rapid pace of technology change, it is unlikely that a single set of imaging components will be able to satisfy retention and access requirements for **any** public record, especially long term and permanent records.

State agencies and local governments need to be aware that maintaining records exclusively in electronic formats requires a serious and ongoing commitment of financial and human resources. This commitment is often overlooked, misunderstood, and/or underestimated, but it is an undeniable fact that must be planned for the life of the record. This commitment includes but may not be limited to the following:

- Routine and/or required software and hardware maintenance
- Replacement of media and system components to achieve cost effectiveness
- Migration of data and images to future systems

The **key** to maintaining usable imaged records for long periods is the ability to **transport** the records, access tools, and required system functionality between hardware, software, and storage media over time. The life of media supporting an imaging system is conservatively estimated at about three years, while records retention and access requirements often exceed this short lifecycle. Appropriate policies, management procedures, and technology must be applied from the point at which a system is designed until it is redesigned or migrated, to ensure that records are accessible for as long as they are needed.

Pros
- Disaster recovery mechanism
- Very high density
- Multiple user access
- Centralized storage control
- Rapidly retrieved
- Easily distributed
- Easily updated
- Easily duplicated
- Modifiable views (redaction, zoom)
- Definable access/security rights
- Multiple indexing options

Cons
- Hardware, software, media dependent
- Requires frequent migration
- Unpredictable storage costs

- Unpredictable conversion costs
- Requires expertise for system development and maintenance
- Annual maintenance costs (hardware, software, personnel)
- Does not satisfy requirements of long-term storage media
- Increased opportunity for corruption of the record
- Fewer established standards

Records that may be suited for conversion to document images are often voluminous, they may have high retrieval levels, they may be stored in a decentralized environment that requires multiple user access, and they often have short retention periods. Examples include but may not be limited to:

- Accounts payable payments
- Journal vouchers
- Canceled checks
- Unemployment applications
- Renewable licenses
- Income tax records

3.5 Multiple Solutions

Understanding the pros and cons of the above options can result in the determination that the use of multiple media may present the best solution for some record collections. A combination of the various media options operating in concert may provide the most cost effective and efficient solution.

Some records are good candidates for multiple layers of redundancy. Using imaging as an example, records may be digitized for the benefits inherent in imaging systems (quick retrieval, decentralized access, etc) and are also maintained as either microfilm or paper to satisfy the long-term retention and preservation needs. Records that may be suited for these types of applications are often voluminous, have high retrieval levels for a short period of time, but also have long-term retention periods, and they may be stored in a decentralized environment that requires multiple user access. Examples include but may not be limited to:

- Land records
- Student records
- Human resources
- Retirement files
- Employer tax records
- Law enforcement records
- Board and commission minutes and agenda materials
- Corporate filings

Other examples of appropriate redundancies may include creating a digitized or microfilm copy of paper for use (to avoid damage to the original) while retaining the original for its intrinsic or archival value. It should be clearly understood that redundancy and backup are not interchangeable terms.

4.0 Backup vs. Redundancy

In electronic systems, a backup is the activity of copying files or databases so that they will be available in case of equipment failure or other catastrophe. The sole purpose of a backup is to insure business resumption. A backup process should be a routine part of the system operation. By nature, a backup is retained for a limited time and replaced with new backups in order to achieve the business resumption objective. A backup is not a replication of the active system. Therefore, searching and accessing records from a backup is difficult, if not impossible, without restoration to the active system. Using the "insurance" simile, one should think of the backup process as the minimum necessary insurance.

For the purposes of this document, a redundancy is defined as a separate independent copy of a collection of records that remains un-altered and un-replaced. The redundancy does not have to be, and is usually not, the same media as the "official" record system (e.g. imaging system with a microfilm redundancy). A system redundancy is recommended when the record collection has long term or historic value, or is of vital importance to the organization. A redundancy is an additional level of insurance that assists an agency in validating the trustworthiness of its system. It can also serve as the preservation copy of a historic record.

If the trustworthiness of a record within a system were to be challenged, a redundancy would help to validate the system integrity. Furthermore, if electronic imaging systems are used, a properly managed and maintained redundancy can be used to recover individual images should they become disassociated with the index and/or corrupted by un-controllable technology factors. To use the "insurance" simile, redundancies should be used when "full coverage" is required.

Examples of system redundancies include but may not be limited to:

- Creating a microfilm copy of a paper record and retaining both
- Creating microfilm from a paper or electronically generated record, creating a duplicate microfilm for use and disposing of the source documents.
- Creating a microfilm copy of imaged records (from the paper source document), retaining the imaged records and the microfilm.
- Maintaining two independent fully replicated imaging systems.
- Creating imaged records for use and retaining the original source documents.

5.0 Risk Assessment

Frequency of use, volume, customer demands, relationships to other records, etc. are factors to be considered in choosing a proper record keeping solution. There is no one best solution for all records. When determining the best solution, each record series and business process must be analyzed to determine its value to the organization and the risk associated with the potential loss or corruption of that information. The goal should be to protect those records with a higher level of value to the organization with a higher degree of redundancy and backup. Records that possess the greatest importance to a government body should strive to obtain 100% certainty of recovery of 100% of the data; 100% certainty of security of 100% the data; 100% of the time. (500% rule)

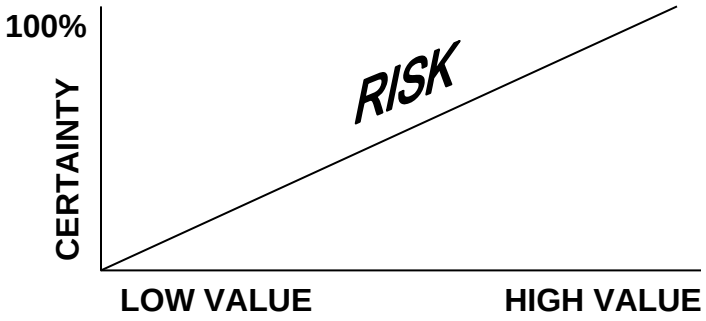

Fig. 1: Risk line = the degree of redundancy and backup required for the records

Agency records management practices are based on operational needs and perceptions of risks. Operational needs (e.g., providing public information, documenting transactions with the public) determine the way agencies address the trustworthiness of a record series. Risk assessment and risk mitigation, along with other techniques, are used to establish both management controls for and documentation requirements of agency activities. These risk assessments can also be used to establish records management controls. State agencies and local governments should conduct risk assessments in order to establish appropriate levels of management controls prior to undertaking new program initiatives.

From a records management perspective, risk relates to (1) challenge to the trustworthiness of the records (e.g., legal challenge) that can be expected over the life of the record; and (2) unauthorized loss or destruction of records. Consequences are measured by the **degree of loss** that the agency or citizens would suffer if the trustworthiness of the records could not be verified or if there were unauthorized loss or destruction.

Examples of records management-related risks include but may not be limited to:

- The inability to document or validate transactions
- The inability to reconstruct the record for the duration of its retention period
- Compromise the documented evidence of transactions
- The inability to track policy development or document agency decisions
- The loss of information with historical value
- The inability to maintain and migrate records
- The inability to resume business functions in the case of a disaster

Consequences can be described as the level of negative organizational, economic, or programmatic impact if records are untrustworthy, lost, or unrecoverable. The negative programmatic consequences that can result from risks include but may not be limited to:

- Litigation or liability
- Impairment of program operations or an inability to detect or punish fraud, false statements, or other illegal behavior because of a lack of valid or probative records
- An inability to produce records that document accountability and stewardship of materials.

- The dissemination of misinformation
- Financial losses due to compromising the citizens' or government's rights
- Financial losses due to the inability to respond to actions of discovery in litigation, state or federal audit or investigation, and/or FOIA
- Compromise of the agency's mission
- Negative reactions of agency stakeholders
- Unfavorable media attention.

The assessment will identify the likelihood that a damaging event will occur, and the costs of taking corrective actions to help state agencies and local governments ensure that the level of risk is tolerable, and that resources are properly allocated. The findings of the risk assessment should be incorporated into the records management solution. Mitigation of these risks may be accomplished by:

- Developing and implementing an approved retention schedule
- Ensuring the records are created and maintained in a secure environment that protects them from unauthorized alteration or destruction
- Developing and implementing standard operating procedures for the creation, use, management, backup and recovery of records
- Training staff in the standard operating procedures
- Training staff regarding information security and the appropriate use of the organizations information
- Implementing system redundancies

The result of a well performed risk assessment and mitigation plan should lead to the conclusion that the following practices will increase risk, and are therefore **not recommended**:

- Records stored purely on a hard drive
- Records stored purely on CD/DVD/CDRW/CD-ROM media
- Records stored on network drives without security restriction or edit/delete controls
- Annotation functions on long-term electronic records
- Microfilm without a security copy, unless the microfilm is a redundancy to another record keeping system
- Closed system architecture and file formats
- The transfer of legal ownership rights to another entity
- The use of commercial Application Service Providers (ASP)

6.0 Business Analysis

Simply put, a business analysis is a combination of a needs analysis, feasibility study, and a cost analysis. The needs analysis is an examination of the current business environment. The results of a needs analysis will give direction to the feasibility study, which will help determine what, if any, alternative approach could be taken. The cost analysis will determine if an alternative solution is financially prudent.

7.0 Needs Analysis

Each business function should be analyzed to identify its value to the organization. The examination of the business function should include but may not be limited to the following questions:

- What records need to be kept to satisfy the business requirements?
- What is the retention period of the records pertaining to the business process?
- At which points in a given business process or transaction should a record be created, captured or converted?
- What content is required to produce a full and accurate accounting of a decision, transaction, or event?
- What processes should be in place to ensure that a record was created by the person responsible for an action, and that it has not been altered in an unauthorized manner?
- Who should have access to records and for what purpose?
- Should an access history (audit trail) be maintained for the record?
- Are there records created in the normal business process that have long-term value?
- Can the business process be redesigned and still incorporate record keeping requirements for business and accountability purposes?
- What are the agency's vital records, i.e. those records that, if destroyed or otherwise inaccessible, would immediately hinder the agency's ability to provide basic services and fulfill its mission?
- Is the current physical environment conducive to maintaining the existing business process?

The conclusion of the needs analysis should yield a project statement that includes a definition of the current business process(s), the records that are generated from them, and a list of problems that could possibly be resolved by a process or technology that is currently not being used. The needs analysis is then used to research and define potential solutions.

8.0 Feasibility Study

The decision to change the business process should be based upon a feasibility study to determine whether a process change is feasible. The feasibility study should consider the pros and cons of each potential solution. Careful consideration must be given to the effect of a process change on staffing, funding, and operations. Agency records management needs often change due to growth, new legislation, new technology, or internal policies. A feasibility study may take several forms. It may be a written report as a result of research of similar business functions, it may take the form of a workflow study identifying potential cost and time savings, or it may take the form of a pilot project that tests a limited portion of the business area to prove feasibility. Regardless of the form, this process will indicate if the proposed solution is more effective than the current one.

9.0 Cost Analysis

During the needs analysis and the feasibility study, data should be collected to determine the cost of doing business with the current system vs. the cost of doing business with any proposed solution. To the extent possible, the cost analysis should define all the cost associated with management of information of a particular business process. Basic costs can be broken down into the following six categories:

1. Creation
2. Use
3. Distribution
4. Maintenance
5. Disposition
6. Training

For each of these categories, the cost of labor, materials and equipment should be defined and documented for comparison with other potential solutions. Long-term maintenance costs such as equipment replacement, software upgrades and migrations to future systems should not be overlooked as they may have a significant impact on the "total cost of ownership".

There are benefits to business process changes that cannot be defined in terms of costs such as "customer satisfaction". Although customer satisfaction in this model would not be a justification for a business process change, it could be a result of system improvement. For example, if the public can access documents on-line, all of the costs associated with the retrieval of those on-line inquires by staff (labor and materials) can be avoided.

10.0 Permanent Preservation

Some electronic formats and microfilm techniques may not be suitable for long-term retention. Issues that effect the permanent preservation of the records include, but may not be limited to: organization, indexing, format, resolution, compression algorithms and storage media. The Archives of Michigan will work with state agencies and local governments to identify proper formats and techniques for those public records that are designated on an approved Retention and Disposal Schedule for transfer to the Archives of Michigan for permanent preservation.

11.0 Summary

Records Management Services is committed to providing information, guidance and recommendations. The options and alternative approaches are varied, can be complex and must be clearly understood prior to implementation of alternative record keeping solutions. It is our hope that this document provides you with information that will assist you in the task of analyzing your business records and the possible solutions for managing them. Additional information and assistance can be obtained from the Records Management Services' website [http://www.michigan.gov/recordsmanagement/] or by contacting Records Management Services at 517-335-9132.