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Record-keeping Requirements for Digitization

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Standard

Record-Keeping Requirements for Digitization

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1. INTRODUCTION

Digitization is the process of converting any physical or analogue item, such as a paper record, photograph or graphic items, into an electronic representation or image that can be accessed and stored electronically.

In the context of these requirements, digitization of UN records should be done to supports UN objectives for organisational transparency, knowledge sharing and business continuity by providing better access to, and faster retrieval of information, and more cost effective storage of UN records.

In general, digitization is usually undertaken for the following three reasons:

- **Reduction of Paper Records and Business Continuity**

  Digital records can be stored on electronic storage devices and thus reduce the need for physical space while also promoting strategies for vital records protection. This strategy is often undertaken as a result of having to move premises or as part of a disaster mitigation strategy.

- **Better Information Sharing**

  Records digitization and increased use of electronic records improves information sharing by allowing access to digital information on web sites, records and information management systems and by allowing efficient dissemination of information through email and other forms of communication. Electronic records can support more efficient of information access and sharing

- **Archival Preservation**

  Digitization offers a strategy for long-term preservation of archival records by reducing handling of original hard copy archives, improving access to archives by making digital archives available through databases, websites and via email. Please note, that any archival preservation initiatives should be coordinated with ARMS.

A departmental or office digitization programme will follow one or more of these strategies.

2. PURPOSE AND SCOPE

By implementing these requirements United Nations departments and offices will be able to establish a programme for the authentic, complete and accessible digital capture of United Nations' paper records. These requirements identify the necessary resources and standards to implement a compliant records digitization programme for the purposes of good record keeping, archival preservation, and business continuity planning.

The digital capture and the conversion of audio visual materials such as videotape or audiotape recordings is not within the scope of these requirements. Also outside the scope of these requirements is the management of born-digital (electronic) records. For information on the management of born-digital (electronic) records please visit the website of the Archives and Records Management Section at: arms@un.org.

3. PLANNING FOR DIGITIZATION

The digitization process can be divided into four main phases:

1. Project Planning for Digitization
2. Processes Occurring Prior to Digitization
3. Digital Conversion
4. Post Digitization Work

Records digitization is a strategy that should be undertaken as part of an overall records management programme. Digitization should not be a stand alone initiative. Therefore, when determining what records should be set for digitization there are a number of critical planning issues to consider before commencing records scanning.

Given the scale of many paper records holdings, digitization initiatives need the most cost-effective and efficient complement of approaches and tools to achieve the long-term preservation of and access to records.

3.1 Value Assessment for Records Digitization

A records digitization programme offers strategic benefits for storage costs, information sharing, paper reduction and preservation. These benefits form the basis for establishing a value assessment for digitization. The following table offers information to assist in determining whether to proceed with a digitization plan:

VALUE ADDED BENEFIT	REQUIREMENT	COMMENTS
Enhanced Access and Information Sharing	The records are in constant use and accessed frequently by many people.	If the records are frequently accessed and used digitization can support better information sharing and ease of dissemination electronically.
Preservation and Protection of Archives	The records have lasting historical value or they are still active or semi-active but in a fragile condition. The records are vital records that must be protected as a disaster mitigation strategy.	Digitization is a strategy that is often used for older archival records that are in danger of damage due to aging, or to create a digital master or access copy for unstable or damaged materials.

Reduction of Paper Records and Business Continuity	Records storage costs outweigh the benefit of keeping physical records of temporary value. There are conditions that prevent the storage of temporary physical records, such as a lack of space. Your office is implementing an electronic recordkeeping solution that will facilitate increased use of electronic records.	Digitization can be used in situations when storage of physical records is either too costly or unavailable due to moving locations or lack of space. Records retention and disposal policy must be applied to digital and hard copy records. Digital copies of hard copy records can be used for back up and business continuity purposes.

In addition to the above, when undertaking a value assessment of records digitization the following issues should be considered:

- Published materials, UN parliamentary documents and reference documents are not considered records or archives according to the standards of records management and archives and therefore should not be considered for digitization. For example, convenience or reference copies of official UN Official Documents (resolutions, SGBs, AIs, ICs etc) should not be digitised, nor should UN parliamentary documents (General Assembly, Security Council, ECOSOC, etc.) that are kept in offices for reference purposes. The documents are available in digital form through the Official Documents System (ODS) at: http://documents.un.org/.

- Depending on the tools available, some record formats are more suitable for digitization than others. For example, large format records and/or those with reflective surfaces, or materials that are bound such as booklets, may be more difficult to scan effectively. Photographs, maps and plans can also pose challenges and may require a special kind of digital format scanner, software programme and guidelines in terms of resolution and quality. It is also important to consider frail items that may need additional preservation measures such as photographs that are fading or paper records that are fragile.

3.2 Defining Record-keeping Requirements for Digitization

The value of a digitised record is dependent on the content, the quality of digital capture and the security measures taken to protect it from tampering and information loss. Record-keeping systems and requirements are designed to ensure that records are protected according to the best practices available.

3.2.1 The Electronic Copy as Record

Record-keeping standards require that records be *authentic*, *complete* and *accessible* to be relied on as evidence. Departments and offices may be required to prove the

authenticity, accuracy and completeness of digitised records. The following is a summary of requirements for ensuring reliable digital copies:

TO BE…	...DIGITAL CAPTURE MUST BE
Authentic	The product of routine, documented, authorized copying and registration processes.
Complete	Accurate, legible reproduction of the original that contains all intellectual and physical components of the original without alterations to content.
Accessible	Available, searchable and readable to all those with a right to access it, for as long as it is required.

In order to achieve the qualities of authenticity, completeness and accessibility departments and offices must ensure that records digitization efforts are undertaken as part of an overall record-keeping programme. A recordkeeping programme consists of recordkeeping polices, standards, procedures and guidelines, staff members who are qualified and experienced in records management, and robust, reliable technology to support recordkeeping.

A critical part of the planning stage is incorporating good record-keeping practices in to records digitization initiatives through the identification of record-keeping requirements and tools that will ensure digitised records will have the same evidentiary qualities listed above that should be inherent in hard copy original records.

3.2.2 Deciding on a Record-Keeping System

Once records are digitised, consideration will need to be given on how they will be retrieved for use, on how the organisation of your electronic system relates to the system used to manage hard copy records. It is important that electronic and hard copy records are organised, tracked, secure and retrievable within with a record-keeping system. Record-keeping systems facilitate the management of records throughout their lifecycle and minimize the risks associated with poor record-keeping such as loss of or inaccessibility to records. Record-keeping systems provide the tools necessary for records retention and disposal, metadata capture, records classification, tracking and indexing.

For more information on solutions that are available to support record-keeping please consult with OICT, for record-keeping requirements please refer to ***Functional Requirements for Record-Keeping Systems*** on the ARMS website.

During the planning stages of digitization project teams should examine and address requirements for records classification, record-keeping metadata requirements information security, and records disposition that will be required support digitization efforts.

These requirements are addressed in detail below. For more information about record-keeping requirements please see ARMS website at: arms@un.org.

3.3 Retention and Disposition of Records

All UN records are subject to records retention policy. At the end of a records life cycle, when a record progresses from active to semi-active to non-active, the record will either be eventually destroyed or retained as archives due to its enduring historical value. The disposal of physical and electronic (digital) records requires authorisation by ARMS through the issuance of an approved records retention schedule. Records should not be digitised and paper originals disposed of unless the office or department has specific approval from ARMS authorising the disposal of original hard copy records after digitization. Please see below for further information

Image or digitised copies of United Nations records are themselves UN records and are subject to the same rules and regulations established by ST/SGB/2007/5 and ST/SGB/2007/6. Failure to follow these regulations would constitute a breach of United Nations records policy. Physical and digital records that have reached the end of their lifecycle can only be disposed in accordance with established guidelines.

If records are to be retained for 2 years or less, according an ARMS approved records retention schedule, it is probably not be worth the expense of digitization unless the records are very frequently accessed. For more information on retention scheduling see:

http://archives.un.org/ARMS/retention-schedules

3.3.1 Disposal of Original Hardcopy Records

Physical records that are to be kept (according to a records retention schedule) as United Nations archives cannot be destroyed after scanning without ARMS approval. ARMS should be consulted regarding long-term storage and preservation of records that have enduring historical value and are kept as archives. Even when disposition of records is authorised by a records retention schedule there may be other considerations concerning disposition of original hard copy records. Examples of possible special requirements to retain the records in their original format include:

- a legal or operational rule that relies on distribution of a hard copy record for annotation and/or signature;
- the possible use in the future of graphic materials e.g. posters, designs, photographs, brochures for display, or
- clients' expectations that they will be able to access certain records relating to them in their original formats. An example would be the original Court records related to the International Criminal Tribunals of Rwanda or Yugoslavia.

When destruction has been approved by ARMS, original hard copy records should be retained until quality control is complete and digitised versions are certified to be

authentic, complete and accessible. A good strategy for managing original hard copy records to be disposed after digitization is to:

- establish a set period for keeping original hard copy records for quality control purposes – e.g. 3 months, 6 months or 1 year - and apply it consistently;
- ensure responsible staff are aware of possible exclusions outlined above (e.g. records required for current legal proceedings);
- ensure that digital copies are being registered into a record keeping system and properly sentenced using the appropriate retention and disposal authority.

Staff members responsible for digitization projects should document the results of their assessment of such requirements for retaining original hard copy records, and obtain an approval from ARMS before commencing routine destruction of records. Where original hard copy records are not authorised for destruction, they should be registered in a record keeping system for management and retrieval purposes and retained for their full retention periods.

3.3.2 Retention and Disposal of Digital Copies

There are some principles to follow when and managing the imaged copies to ensure that they continue to be authentic, complete and accessible:

- capture of the image copies as records into organisational record-keeping systems;
- management of the image copies under the framework of ARMS' record-keeping rules and requirements;
- keeping adequate record-keeping metadata to facilitate the records' preservation, use and retrieval;
- careful planning for long term accessibility of the images;

It is important to note that records retention schedules apply to a record regardless of its format. When a retention schedule authorises the disposal of records after a certain period, both hardcopy records, as well as any corresponding digital copies of the records should be destroyed. Records management software that is configured with records retention functionality has the capability to manage the disposal of hardcopy and digital records. Guidelines for secure records disposition can be found:

3.4 Organising Records

Good organization of records is critical to successful records digitization. Remember that an unorganized mess of hard copy records will only become and unorganized digital mess after digitization. To facilitate future access and retrieval, records need to be organised and arranged

using a file classification scheme. File Classification Schemes provide a structure for describing and organizing records based on their function and activity. A file plan or classification plan identifies categories to aid in the arrangement of records.
Records being prepared for digitization should correlate with the department or office file classification scheme. Arrangement refers to the physical placement of records within groups according to your file classification scheme. This arrangement should be replicated in your electronic record keeping system, once the records have been digitised. Records should be scanned according to their original physical arrangement and order. It is critical that records be organized before digitization commenced. Where records are organized according to some scheme it is essential that the original order of the records is maintained with the digital records after digitization.

An essential requisite for developing a file classification scheme is for each department or office to undertake records surveys to identify the types (records series, classification) of records that may be eligible for digitization. This information provides a basis for developing a file classification scheme.

If your Department or Office does not have a file classification scheme please contact ARMS for advice on: arms@un.org.

3.5 Sensitive Information

While records digitization can have many benefits it can also present certain risks in relation to the protection of sensitive information. Careful consideration should be given before digitising records marked as “Strictly Confidential, “Top Secret,” or those containing sensitive personal information.

Digitised records containing sensitive information will require appropriate metadata; security and access markers, compliant with ST/SGB/2007/6, to be incorporated into whatever system or database where the digitised records will be stored. This is critical to ensure the records are only accessed by those authorized to access the records, and to reduce the risk of possible unauthorised access to sensitive information. This information can be management in the form of an information security plan that identifies records series and their corresponding information sensitivity levels.

During the digitization process any security classified records (hard copy and digital) should be kept separate from public or unclassified records. This is done to ensure that classified records can be managed as a separate group, in addition to being protected for future records declassification initiatives.

For further information on records sensitivity and handling refer to the following SGBs at ST/SGB/2007/5, ST/SGB/2007/6, and the Information Sensitivity Toolkit.

3.6 Metadata Requirements

All records, hard copy and electronic records (digitised and born-digital records such as emails) require unique identifiers or metadata elements to facilitate their management. Metadata is information about records, such as their date, title, description, security classification, retention, etc. Not all metadata elements are mandatory. However, the more metadata captured, the more complete your record, and the easier it will be to facilitate the management of and access to records.

The following is a list of recordkeeping metadata elements required by ARMS and was developed according to the International Standards Organisation (ISO 15836) and the Dublin Core Metadata Element Set:

METADATA ELEMENTS	OBLIGATION
Identifier	Mandatory
Title	Mandatory
Subject	Optional
Description	Optional
Creator	Mandatory
Date	Mandatory
Addressee	Mandatory for email, Optional for other records
Record type	Mandatory where applicable
Relation	Mandatory where applicable
Function	Optional but highly recommended
Aggregation	Mandatory
Language	Mandatory
Location	Optional
Security & Access	Mandatory
Disposal	Mandatory
Format	Mandatory
Preservation	Optional

For more information on metadata standards:

http://dublincore.org/documents/2008/01/14/dces/

3.7 Documentation Requirements

Departments and offices must be able to certify that their electronic records are accurate, unalterable and complete. Altered digital copies are not considered authentic and cannot be used as evidence of UN business. Therefore, it is essential that all aspects of the digitization process be well documented including image enhancement techniques, use of security controls and preservation techniques.

It is possible that your department or office may be called upon to justify its claims digital records may be relied upon as evidence, either for legal purposes, or by an external investigative body or by a member of the public. The measures recommended to certify that *authentic*, *complete* and *accessible* digital capture are as follows:

- adherence to standards set by organisational policy and procedures;
- application of relevant, complete and accurate metadata;

- implementation of procedures for accommodating documents with incomplete metadata;
- use of 'read-only' controls in network servers used for electronic storage;
- application preservation measures and protection of electronic storage devices (optical discs, hard drives) from deterioration;
- use of security controls such as access passwords, encryption and audit trails to prevent any alteration of the images;
- use of retention scheduling for destruction, retention or transfer of records;
- application of security classification for records that contain sensitive information

3.8 Technical Requirements

3.8.1 Determining on Technical Specifications for Digital Imaging

ARMS requires that digitised records meet the minimum technical specifications for image quality based on UN and international standards. Applying technical standards ensures the accurate reproduction of United Nations records while also considering the levels of access requirements and the cost of electronic storage.

For detailed information technical specifications for image quality please see Appendix 1.

3.8.2 Deciding on Optical Character Recognition (OCR)

Upon starting a digitization programme there may be instances where digital files are used for other purposes besides access and archival storage, for example, applying Optical Character Recognition (OCR) to your digital scans. OCR is the electronic translation of textual image documents into web searchable and editable text. Digital records that undergo an OCR process should be 1-bit none-continuous tone high resolution images for optimal result.

OCR cannot decipher graphic images or tonal gradation between pencil and ink. The minimum resolution should be 300ppi, though higher resolution of 400 ppi is recommended to reduce the risk of pixilation.

3.8.3 Determining Digitization Tools and Resources

Digitization requires a set of tools and resources such as scanners, imaging software, a storage solution and available staff. Consider your budget and available resources. The type of scanner chosen will depend on the document type and volume of records. Scanning and imaging software and file type (PDF, JPEG etc) will also depend on the system you are using and your user needs.

Tools required for digitization include:

- Digital scanner;
- Imaging and scanning software;
- Electronic record keeping system;
- Electronic records storage device, server;
- Records management programme with file plan, retention schedule and metadata schema.

Consult ARMS and your IT professionals for more information on digitization tools.

For a complete set of imaging specifications and imaging samples refer to Appendix 1. For more information on file formats and standards please consult ARMS or your IT professional.

http://memory.loc.gov/ammem/about/techStandards.pdf

3.8.4 Determining Electronic Storage Requirements

Consider what kind of reliable long-term storage methods are available that will both maintain the authenticity of the records as evidence, protection of sensitive information, and provide a means to search and retrieve the records for access. The file format and size of the digitised records will help to determine both your storage methods and your means of tracking, retrieving and viewing them.

Electronic records storage needs regular maintenance and is likely to require data migration should your storage method become outdated or degraded. No storage method is permanent, but some methods are better than others. For this reason it is important that your storage method have a back-up in case of failure. Some options for electronic records storage and storage back-up are:

- Centrally Managed Servers
- Write Once Read Many (WORM) optical media;
- External Hard Drives;

Electronic storage should contain the follow functionalities:

- Read-Only versions;
- Read and present digital records in a readable form;
- Restrict or permit Access to appropriate parties;
- Maintain minimum necessary record keeping metadata.

Storage methods can be used in combination to ensure that proper measures have been taken to back-up your system. ARMS strongly advises against using CD-ROM for long-term storage of records. CD-ROM is an unstable storage medium that is susceptible to degradation and is impractical for record keeping systems.

Consult with ARMS for information on best practices for electronic storage.

3.9 In-House of Off-Site Digitization

This step involves deciding whether the digitization will be done in-house by UN staff members or in house by consultants or off site by a vendor. There are advantages and disadvantages with the three approaches.

Method	Advantages	Disadvantages
In-house by staff	The most risk free way of digitizing records containing sensitive information as there is less risk of unauthorized access to sensitive information. Less risk of damage to records as they remain on-site. UN staff has complete control over the digitization process.	Very resource intensive option that requires staff to be available full time or for most of the time for records digitization. Project management and quality control checking would need to be done by UN staff members, often in addition to performing other duties. Likely to be less digitization expertise in-house. Requires space for records, equipment and staff.
In-house by consultant	Allows UN staff members to focus on project management and/or quality checking of digitised images. Less risk of damage to records as they remain on-site. Less risk of non UN staff accessing sensitive information if confidentiality clause is in contract.	Department and offices would need to budget for consultants costs. UN staff members need to allocate time for project oversight and quality checking. Requires on-site space for records, equipment and staff.
Off-site by vendor	Does not require space in UN premises Digital images can be sent regularly to the UN for quality checking The least resource demanding in	No UN oversight of process. Risk of damage to records during moving. High risk of unauthorized access to records that are

	terms of UN staff involvement.	classified as Confidential or Strictly Confidential.

3.10 Training Requirements

The final step during the planning stage of digitization is to identify training and change management requirements, particularly if the decision is to do the digitization in-house by UN staff members, or in-house using a consultant. A training programme should be developed that addresses the following issues:

- Overview of the digitization initiative, its size, timeframe, purpose and desired outcomes, project manager;
- Proper use of digitization hardware and software;
- Digital image formats;
- Proper records handling techniques to avoid damage to records;
- The use of a file classification scheme for organizing images;
- Maintaining the records in their original order;
- How to identify and process records containing sensitive information;
- Digitization documentation requirements;
- How to identify and process records that require specialised digitization techniques, such as photographs or large format records;
- Standards and procedures for quality control checking;
- Varying work to avoid fatigue from repetition.

4. PROCESSES OCCURRING PRIOR TO DIGITIZATION

The following processes should have been completed prior to commencing digitization of records.

4.1 Record-Keeping Requirements

Records Survey	You have surveyed and analysed the records and determined that digitization is a beneficial, value added exercise.
Records Retention & Disposition	You have an ARMS approved records retention schedule that has been applied to all records to assess their eligibility

	for digitization.
Organising Records	Records have been classified and organised according to a file classification scheme.
Information Security	Records containing sensitive information have been identified and appropriate protection and security measure have been put in place for hard copy and digitised records.
Metadata	All record-keeping and other technical metadata elements have been identified and documented

4.2 Documentation Requirements

United Nations policy and procedures for record keeping and digitization.	Which records are digitised, destroyed, retained or transferred as archives. Verification of quality control measures.
The work plan outlining the digitization system	Ensure that electronic storage and use of file formats were chosen to suit the nature of the records and the organisation's requirements. Ensure that image enhancement techniques are done such as retouching and editing that may substantively alter the records.
Documentation of operational or business requirements that impact the retention, disposal or transfer of records	Reasons why originals should be retained by your organisation.
Planning documents for long term accessibility of the digital copies	Ensure that all risks associated with digital records have been assessed. Ensure that measures are in place to ensure long term accessibility to the images. Ensure that digital records are managed in a trustworthy record keeping system.
Documentation of disposal as required by ARMS	Ensure that records (electronic and physical) are disposed in an authorised, secure and accountable way.

4.3 Information Technology Requirements

Record-Keeping System	You have selected a system that meets ARMS' record-keeping requirements.
Technical Specifications	You have selected digital format standards for preservation and/or access only digitization.
Electronic Storage	You have consulted with OICT to select the most appropriate and cost effective storage
Optical Character Recognition (OCR)	You have made done an analysis and made a decision on whether to OCR the records or not.
Digitization software and hardware	You have acquired appropriate scanners, digitization and related software

4.4 In-House or Off-Site Digitization and Training Requirements

Digitization is being done in house or off site	You have undertaken a value assessment and decided whether to have the digitization done in-house by UN staff members, in-house using consultants, or off-site using a vendor.
Training and change management requirements	You have identified and documented all training and change management requirements

5. DIGITIAL CONVERSION

5.1 Preparing Physical Files for Scanning

The following is a list of preparatory tasks that must be undertaken on records prior to digitization commencing. Any additional preservation measures, such as photocopying fragile items, can be undertaken at this time.

- Remove the following materials: file clips, staples, plastic sleeves, clips, metal clips and rubber bands. Replace them with the stainless steel paper clips placed around paper strips on the document, or replace them with the archival tape if the file is too thick for a clip.

- Remove file dividers such as plastic or cardboard section dividers. If the section divider contains relevant information, make a photocopy and place on file.

- Remove coloured tags and post-it notes from files. If the post-it note contains relevant information, make a photocopy and place on file to be scanned.

- Remove envelopes from file and place the content/s of the envelope on file (in a sleeve first if it is a photograph etc.)

- If thermal fax paper or newspaper is found on file, remove the thermal fax paper and newspaper, make a photocopy and place the copy in the file. The original thermal fax or newspaper should be destroyed. Note that the disposal of newspapers or thermal faxes that are copied for preservation purposed do not need ARMS' approval prior to destruction.

- Documents that are clearly duplicates or copies, and not annotated copies, can be removed from the file of disposed of. Please note that this is only worthwhile if it is a value added exercise involving many copies of the same document are found on file.

5.2 Fragile and/or special format records

If a large collection of photographs is found in a file, remove them from the file, place them in archival plastic sleeves, create a surrogate sheet and place it in the file, and link the records in the record-keeping system. Place photographs and other graphic items such as drawings in archival plastic sleeves, and place them in the file. Consult with ARMS about separate storage for the photographs.

If you come across records of different media types other than paper, such as diskettes, floppy disks, video tapes, audio tapes, CDs, please contact ARMS for further guidance.

5.3 Capturing Digitised Records into a Record-Keeping System

Capturing digitised records in a record keeping system is one of the most important elements of the process for future access, ease of retrieval and disposal. Electronic records must correlate with their physical counterparts in structure, description (file classifications and series). This is where metadata capture becomes increasingly important, because it allows digital records to be tracked.

Depending on the system you are using, whether a simple database programme such as *Microsoft Access* or a high-end records management solution, the intellectual arrangement and context of your digitised records must be maintained.

6. POST DIGITIZATION

6.1 Quality Checking and Control

Quality control measures include periodic testing and cleaning of scanning equipment, imaging calibration (e.g. "tuning" your scanner or computer screen to match each other) and verification of authenticity. The details of your quality control measure will depend on your tools, such as software, scanners and an electronic record keeping system.

Quality control measures for checking digital images should be applied throughout the process, preferably by an assigned staff member who can chart any errors. This can include checking individual files for any errors in arrangement, imaging or classification. For large volumes, it is recommended that random sampling (5% to 10%) be applied. Image quality of digitised records is a big concern, especially when using low resolution, 1-bit black and white non-continuous tone image mode (also known as line-copy). 1-bit B&W image mode “sees” only black and white, and cannot distinguish greys such as pencil marks from ink type.

Quality control of images includes checking for:

- smallest detail legibly captured (digitise smallest type size for text; clarity of punctuation marks, including decimal points);
- completeness of detail (digitise acceptability of broken characters, missing segments of lines);
- dimensional accuracy compared with the original;
- scanner-generated speckle (e.g. speckle not present on the original);
- completeness of overall image area (e.g. missing information at the edges of the image area);
- density of solid black areas;
- true colour rendition in the case of colour images. Where digitization involves colour as an intrinsic part of the record, you should consider including a standard colour sheet for calibrating your image capture tools (such target sheets are commercially available from manufacturers such as Fuji or Kodak, and that comply with the ISO 12641 standard).

6.2 Review, Evaluation and Revision of Digitization Processes

As in any other process it is productive to review the digitization process and evaluate how effective it has been. This is an opportunity to identify any redundancies, inefficiencies or problems in the process and revise and enhance the process accordingly. Any changes to the process must be reflected in an updated training programme.

6.3 Testing Access to Digital Images

It is important to test retrievability of and access to digital images that have been captured into database, server or some other electronic storage system. A retrieval exercise involving a sample of digitised records should suffice.

6.4 Applying Retention Policy to Digital and Hard Copy Records

Ensure that decisions have been made in relation to the retention and disposition of image copy and hard copy records. Please note that hard copies of records that are to be kept as archives

because of their historic value must not be destroyed. Please consult with ARMS about transferring these records to ARMS custody.

Also not that records retention schedules apply to all records regardless or format. In terms of digitization this means that a retention action applied to a hard copy records also applies to its corresponding digital copy.

7. DIGITIZATION CHECK-LIST

1.	**Planning for Digitization**	
1.1	A value assessment been made on the benefits of digitization that relate to access, preservation, storage, cost and other resource requirements and business continuity requirements.	
1.2	Requirements for digital copies to be authentic, complete and accessible have been identified.	
1.3	There is an approved records retention schedule, or the need for a records retention schedule has been identified. There is a plan for retention/disposition of original hard copy records, and a retention policy for digital copies.	
1.4	There is a file classification scheme for future retrieval purposes or have identified the need for one.	
1.5	Information sensitivity issues have been identified.	
1.6	Metadata requirements to facilitate future access, security and preservation have been identified.	
1.7	Adequate digitization documentation process requirements have been identified.	
1.8	Technical specifications for image quality have been identified for future retrieval and retention purposes.	
1.9	Electronic storage requirements and costs have been identified and calculated.	
1.10	A decision has been made of whether to proceed with in-house digitization, in house by consultant or off-site by vendor.	
1.11	Digitization training requirements for staff members have been identified.	
2.	**Processes Occurring Prior to Digitization**	
2.1	You have a record-keeping system in place.	
2.2	An ARMS approved records retention schedule has been implemented.	
2.3	Records have been organized according to a file classification scheme.	

2.4	An information sensitivity plan has been completed and records have marked according to *ST/SGB/2007/6*.	
2.5	A metadata schema is in place.	
2.6	Staff has been trained and internal quality checking controls are in place.	
2.7	Technical specifications for digital images are agreed and configured in the system.	
2.8	Optical Character Recognition (OCR) software has been acquired (if needed).	
2.9	Adequate electronic storage has been acquired	
	.	
3.	**Digital Conversion**	
3.1	The physical records are prepared for scanning.	
3.2	Damaged or fragile records have been identified for special treatment.	
3.3	Digital records and metadata are being captured into an electronic record-keeping system.	
4.	**Post Digitization Work**	
4.1	Quality control measures on digital images and equipment have been applied to all levels of the process.	
4.2	The digitization process has been reviewed and any identified enhancements have been implemented.	
4.3	Access to and retrieval of digital images has been tested.	
4.4	Retention and disposition policy has been applied to digital and hard copy records.	

Appendix 1: Technical Specifications for Image Quality

Image Quality

There are three conditions that will determine the quality of digital capture:

- User needs: access, web use and information sharing.
- Archival preservation: long-term storage for permanent records.
- Re-formatting such as document conversion for Optical Character Recognition (OCR).

Digital records that are to be retained as archives require optimum preservation quality image capture. Digital records to be used for information sharing and web use only, and that will not be retained for an extended period of time, require a lower quality image capture with smaller file sizes for ease of access. Likewise, reformatting or converting files for additional uses such as OCR, can pose an additional set of requirements.

In some cases it maybe necessary to create an *access copy* (lower resolution, smaller file size designed for sending files across the web or for continuous access) for information sharing and a *master copy* (meeting all technical specifications used for long term preservation with minimum access) for long-term preservation and reformatting.

Technical specifications for image quality are made up of four attributes:

- Resolution: the number of elements (dots, lines or pixels) that comprise an image.
- Bit-depth: the number of "colours" or "channels" used to represent tonal values.
- Image mode: defines an image according to its bit-depth and method for "describing" colour.
- File format: the way in which a file is encoded to be read for specific purposes.

Preservation Quality Digital Imaging

For long-term archival preservation, ARMS recommends using standard PDF (Portable Document Format) file format for black & white textual documents with 1-bit-depth bi-tonal black & white mode, and a *minimum* resolution of 300 ppi (pixels-per-inch).

Currently, the International Standards Organisation recommends using PDF/A for long term archival storage archival storage because of its embedded metadata-capture capabilities. However, ARMS recommends using the standard PDF format because of its flexibility, accessibility and smaller file size.

Textual documents with additional details such as an official seal, simple graphics pencil and ink markings require a minimum 8-bit depth greyscale or 24-bit depth colour.

Documents with extensive graphics and photography will require TIFF (Tagged Image Format) with a minimum bit-depth 8-bit greyscale or 24-bit colour. It is advisable to seek advice from ARMS when scanning speciality materials such as photographs for long term archival preservation.

ARMS advises against using JPEG (an image file format that can be non-lossy or lossy compression depending on the type) as it does not have the appropriate attributes for metadata capture, nor meets the standards for archival preservation.

Access-Only Quality Digital Imaging

For information sharing using email or the Internet a smaller compact file size is needed without sacrificing legibility. Reducing quality for the sake of file size can cause pixilation, so it is important to apply a visual test to scans that are captured at the minimum required resolution and bit-depth.

ARMS suggests using, PDF, 1-bit-depth with a minimum resolution of 150 ppi for legibility to keep the file size low. Where there are graphics and photographic images, 8-bit greyscale or 24-bit colour RGB mode may be used with graphics and photographic images; however the minimum 150 ppi should be maintained. Conducting visual tests (simply viewing a scanned document magnified several times on your computer screen) will help to determine the minimum resolution for maximum legibility. JPEG is an adequate file format for information sharing and web use.

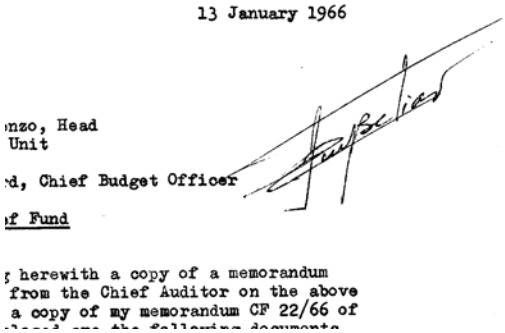
Appendix 2: TECHNICAL SPECIFICATIONS Table and Visual Samples

DOCUMENT TYPE	RESOLUTION	BIT DEPTH	FILE FORMATS	COMPRESSION
Text only, black and white	Minimum 300ppi	1-bit (bi-tonal)	TIFF,PDF, or PDF/A	Lossless compression
Documents with watermarks, grey shading, grey graphics	Minimum 600 ppi	8-bit greyscale	TIFF,PDF,JPEG, or PDF/A	Lossless compression
Documents with discrete colour used in text or diagrams	Minimum 600 ppi	Minimum: 24-bit colour	TIFF,JPEG,PDF, or PDF/A	Lossless compression
Black and white photographs	Sufficient to provide >3000 pixels across long dimensions	8-bit greyscale	TIFF,JPEG, PDF, or PDF/A	Lossless compression
Colour photographs	Sufficient to provide >3000 pixels across long dimensions	24-bit colour	TIFF,JPEG, PDF, or PDF/A	Lossless compression
Black and white negatives	Sufficient to provide >3000 pixels across long dimensions	8-bit greyscale or 24-bit colour	TIFF,JPEG,PDF, or PDF/A	Lossless compression
Colour negatives and transparencies	Sufficient to provide >3000 pixels across long dimensions	24-bit colour	TIFF,JPEG,PDF or PDF/A	Lossless compression

Visuals Samples: Mode

The same document was scanned in the 3 different recommended modes as a visual reference. It is recommended that a visual test be conducted as part of Quality Control measures to ensure legibility of text, visibility of markings, reliability of reproduction. Note the file size as a factor to consider when determining your mode and resolution.

1. 1-bit, bi-tonal, 300ppi. File size, 173 kb.


13 January 1966

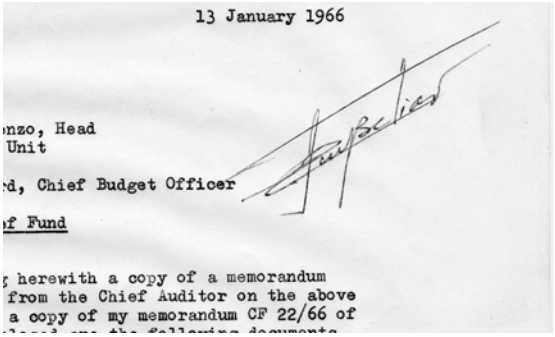
nzo, Head
Unit

d, Chief Budget Officer

f Fund

herewith a copy of a memorandum
from the Chief Auditor on the above
a copy of my memorandum CF 22/66 of

2. 8-bit greyscale, 300ppi. File size, 442 kb.


13 January 1966

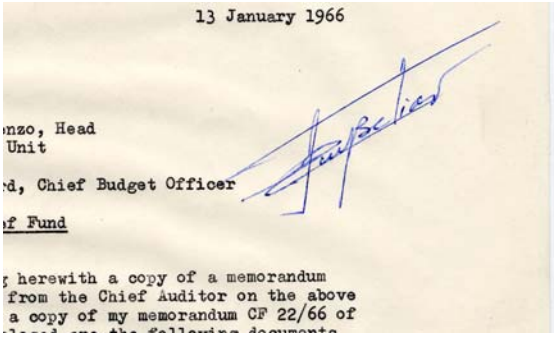
nzo, Head
Unit

d, Chief Budget Officer

f Fund

herewith a copy of a memorandum
from the Chief Auditor on the above
a copy of my memorandum CF 22/66 of

3. 24-bit colour, 300ppi. File size, 716 kb.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Visual Samples: Resolution

The same newspaper clipping was scanned at two different resolutions to show how clarity and quality of the image is altered. Depending on the use of the image being digitised, and the standards and requirements it may be subject to, either resolution can be appropriate if file size is a concern.

a) Newspaper clipping scanned as greyscale at 300ppi. File size: 920 kb.

b) Newspaper clipping scanned at 72ppi. File size, 71.2 kb.

Appendix 3: ADDITIONAL RESOURCES FOR CONSULTATION

Implementing a digitization strategy to meet your record keeping needs requires a lot of research and planning. The following websites can help to understand the various terms, tools and processes associated with digitization and record keeping systems.

The Society for American Archivists (SAA):

http://www.archivists.org/

Manual for Design and Implementing a Record Keeping System (DIRKS) available through ARMS:

Association for Image and Information management (AIIM):

www.aiim.org

International Standards Organisation (ISO):

www.iso.org

The Dublin Core Metadata Initiative

http://dublincore.org/

The United States Administration on Records and Archives

www.archives.gov

Library and Archives Canada

http://www.collectionscanada.gc.ca/index-e.html

National Archives of Australia

http://www.naa.gov.au/

How digital records and metadata will be used in access systems and stored in digital repositories.