GOVERNMENT ICT STANDARDS

Digitization of Public Records Standard

ICTA-4.3.003:2023

REVISION OF ICT STANDARDS

In order to keep abreast of progress in industry, ICT Standards shall be regularly reviewed. Suggestions for improvements to published standards, addressed to the Chief Executive Officer, ICT Authority, are welcome.

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FOREWORD

The ICT Authority has the mandate to set and enforce ICT standards and guidelines across all aspects of information and communication technology including Systems, Infrastructure, Processes, Human Resources and Technology for the public service. The overall purpose of this mandate is to ensure coherent and unified approach to acquisition, deployment, management and operation of ICTs across the public service in order to achieve secure, efficient, flexible, integrated and cost-effective deployment and use of ICTs. To achieve this mandate, the Authority established a standards committee to identify the relevant standard domains and oversee the standards development process. The committee consulted and researched broadly among subject matter experts to ensure conformity to acceptable international and national industry best practices as well as relevance to the Kenyan public service. The committee eventually adopted the Kenya Bureau of Standards (KEBS) format and procedure for standards development. In an engagement founded on a memorandum of understanding KEBS, participated in the development of these Standards and gave invaluable advice and guidance. The Digitization of Public Records Standard, which falls under the overall Government Enterprise Architecture (GEA), has therefore been prepared in accordance with KEBS standards development guidelines based on the international best practices by standards development organizations including International Organization for standardization (ISO). The ICT Authority in liaison with the Kenya National Archives and Documentation Service has the oversight role and responsibility for management, enforcement and review of this standard. The Ministries, Departments, Agencies and Counties will be audited annually to determine compliance. The Authority shall issue a certificate for compliance to agencies upon inspection and assessment of the level of compliance to the standard. For non-compliant agencies, a report detailing the extent of the deviation and the prevailing circumstances shall be tabled before the Standards Review Board who shall advise and make recommendations. The ICT Authority management, conscious of the central and core role that standards play in public service integration, fostering shared services and increasing value in ICT investments, shall prioritize the adoption of this standard by all Government agencies. The Authority therefore encourages agencies to adhere to this standard in order to obtain value from their ICT investments.

Stanley Kamanguya, OGW
Chief Executive Officer
ICT Authority

1.0　INTRODUCTION

The digital transformation agenda of Government was initiated in 2004, with some Ministries, Departments and Agencies making strides in digitization and automation of their processes to achieve a quick turnaround time in the delivery of public services. The Access to Information Act (2016) obligates MCDAs to computerize or digitize public records. The Kenya Digital Masterplan (2022-2032) envisages a digital one-stop shop for all government common services through automation and digitization.

There are digitization and automation initiatives by Ministries, Counties, State Departments, and Agencies (MCDAs) amidst standardization and sustainability concerns. Some of these initiatives have not been successful as conceptualized. This is attributable to in coordination; limited focus to integration; lack of common approach to the undertakings. There is need to ensure completeness of content; integrity; authenticity; completeness and accuracy of metadata; transparency of implementation; fulfilment of legal requirements; maximization of platform flexibility; business flexibility; and technical feasibility of the electronic records.

This standard sets out requirements for the conversion of analogue records into digital format. It covers the whole digitisation process from initial scanning through to delivery of the images for preservation. This standard covers the scanning of records where the resultant images will become the legal public record for permanent preservation. Additionally, the standard addresses scanning of records where the resultant images will become digital surrogates with the original paper records being retained and remaining the legal public record.

This standard shall guide conversion and the migration of public records at National and County governments to support automation of business processes. It specifically focuses on procedures, and methodologies for changing records from one format to another as well as moving from one media to another.

Further, the Standard establishes a framework for digitization of public records and takes into account need for: reliability and authenticity of digitized records for legal admissibility; accessibility of digitised records to support business operations; long-term preservation of digitised records; and management of original source records following digitisation.

2.0 SCOPE

This Standard cover the conversion of non-digital original records including audio, visual, image, text, or microform into digital records, and management of the original and digitised records.

3.0   APPLICABILITY

This Standard is applicable to:
*   National Government (Ministries, Departments and Agencies),
*   Constitutional Commissions and Independent Offices, and
*   County Governments.

4.0   NORMATIVE REFERENCES

*   ISO/TR 13028:2010, Information and documentation - Implementation guidelines for digitization of records
*   ISO 15489-1:2016, Information and documentation — Records management —Concepts and principles
*   ISO/TR 18128:2014, Information and documentation — Risk assessment for records processes and systems
*   ISO 23081-1:2017, Information and documentation — Records management processes — Metadata for records — Principles
*   ISO 23081-2:2009, Information and documentation — Managing metadata for records — Conceptual and implementation issues
*   ISO/TR 23081-3:2011, Information and documentation — Managing metadata for records — Self-assessment method
*   ISO 30300:2020, Information and documentation — Records management — Core concepts and vocabulary

5.0   TERMS AND DEFINITIONS

For the purposes of this standard, the following terms and definitions apply:

5.1 Attribute
Characteristic of an object or entity

5.2 Authenticity
quality of a record that can be proven to be what it purports to be, to have been created or sent by the agent purported to have created or sent it, and to have been created or sent when purported

5.3 Compression
Algorithms designed to reduce the size of the image for storage or transmission. Multiple options exist but decisions should be made on the characteristics of the document to be imaged

5.4 Conversion
Changing records from one format to another

5.5 Data cleansing
The process of reviewing and correcting data to ensure data are in a standardized format. It is carried out prior to converting due to incompleteness, incorrect formatting, obsolescence, and duplication

5.6 Encryption
This is transformation of data by a cryptographic algorithm to produce ciphertext that is to hide the information content of the data.

5.7 Integrity
Quality of being complete and unaltered

5.8 Migration
Moving records from one hardware or software configuration to another preservation measures taken to maintain the usability, authenticity, reliability and integrity of records over time

5.9 Record
Information created or received and maintained as evidence and as an asset by an organization, in pursuit of legal obligations or in the course of conducting business

5.10 Reliability
Quality of a record that can be proven to be complete and accurate

5.11 Replication
Digital migration where there is no change to the packaging information, the content information, and the preservation description information

5.12 Resolution

A measure of the ability to capture detail in the original work, often quantified in pixels per inch (ppi).

5.13 Source Record

Document or record that has been copied converted or migrated or will be the input for such a process

5.14 Usability

Property of being able to be located, retrieved, presented and understood

5.15 Validation

The process of evaluating a system or component to ensure compliance with the functional, performance and interface requirements.

6.0 ABBREVIATIONS AND ACRONYMS

B&W	black and white
BWF	Broadcast Wave Format
ERMS	Electronic Records Management System
ERMS	Electronic Records Management system
GEA	Government Enterprise Architecture
ICT	Information and Communication Technology
ISO	International Organization for Standardization
ISO/TR	ISO/ Technical Report
JPEG	Joint Photographic Experts Group
KbPs	kilobits per second
kHz	kilohertz
KNADS	Kenya National Archives and Documentation Service
MCDAs	Ministries, Counties, Departments, and Agencies
MXF OP	Material Exchange Format, Operational Pattern
PCM	Pulse-Code Modulation
PPI	Pixel per inch
RGB	red, green and blue
sRGB	Standard Red Green Blue
TIFF	Tag Image File Format

7.0   REQUIREMENTS

The requirements cover planning for digitization, quality specifications, scanning environment and equipment.

7.1   Planning for Digitization

7.1.1   MCDAs in consultation with KNADS shall undertake records survey as a precursor to digitization and migration

7.1.2   MCDAs shall develop a digitisation plan that includes but not limited to: scope, purpose, outcomes, technical standards, equipment and resources, budget, quality assurance, implementation approach, integration, and management of digitized records.

7.1.3   MCDAs shall submit the approved digitization plan to the ICT Authority and KNADS for concurrence.

7.1.4   MCDAs shall develop and implement a digitization quality control and assurance plan

7.1.5   MCDAs will annually review digitisation approach for continuing relevance and cost effectiveness

7.1.6   MCDAs shall implement Electronic Records Management System (ERMS) and other systems that support digitization and management of electronic records

7.1.7   MCDAs shall ensure digitization team undergo training on handling records including refresher training overtime

7.2   Image Capture and Quality

7.2.1   The following technical specifications for digital records shall apply   accordingly to ensure legibility;

- Resolution: 300 PPI for ordinary documents, photographs should be at 600 PPI, photographic transparencies should be at 4000 PPI, for microform the requirement should be for a resolution equivalent to 300 PPI at the size of the original document

- Compression: Use lossless compression for digitised records, though lossy compression is acceptable for digital surrogates

- Physical dimensions: all scans should be size-for-size with sufficient margin (this means the size of the original for microfilm) and if a single scan cannot entirely, there should be sufficient overlap

7.2.2   Digital images may be de-skewed as necessary to achieve nominal skew of not greater than one degree.

7.2.3   All digital images shall be legible and at least as readable as the original image from which they are derived.

7.2.4   The final images shall be single page, unless information crosses both pages.

7.2.5   The digital images shall be viewed immediately after scanning as a check on satisfactory capture (for example images complete or not inverted) and rescanned if required.

7.3   Scanning Area and Environment and Equipment

7.3.1   MCDAs shall implement access control to the scanning area

7.3.2   MCDAs shall use overhead cameras and scanners with a flat scanning bed suitable for scanning.

7.3.3   MCDAs may use flatbed scanners and automatic feed scanners with the approval of the conservator(s).

7.3.4   MCDAs or their contractors should ensure that brightness levels must not have a negative impact on the health and safety of operators.

7.3.5   MCDAs shall adopt open-source formats that are supported by various software, and operating systems.

7.3.6   The workstation of scanning operator should provide adequate surface area   to ensure the full support of documents and allow for an organised workspace.

7.3.7   Shall not permit food or drinks (including chewing gum) in the scanning area.

7.3.8   May permit use pencils only - without erasers. No pens or correction fluid are permitted.

7.3.9   Scanning operator hands shall be clean and dry always, but hand and face moisturisers, moisturising wipes, lip balms or anything similar that is applied by hand shall not be permitted.

7.3.10   Scanning operators shall not wear cotton or powdered gloves

7.3.11   Scanning of bound records shall be supported with a book cradle or wedges

7.4   Document handling during the scanning

7.4.1   MCDAs shall ensure only qualified personnel (preferably a records manager or archivist) will be responsible for issuance of records to be digitized. This will include ascertaining that the records are in good condition for scanning.

7.4.2   Responsible personnel shall remove all varieties of staple, pins, and paperclips as part of the process of preparing the documents for scanning

7.4.3   Scanning operators will should the records with hands at all times when moving boxes and documents.

7.4.4   The operators shall

• Ensure scanning beds are large enough to support the whole document

• Never leave documents exposed on the scanner when unattended

• Support books and other bound documents with a book cradle or book wedges.

• Unfold folded corners but should not then fold them back on themselves

7.4.5 During scanning, the operator shall:

• Ensure turning of is pages from the fore edge (right edge) of the document not from the tail (bottom) edge

• Control use moisture (including licked fingers) for page turning

• Ensure no pinching document corners together to turn the page. The scanning operator should unfold folded corners but should not then fold them back on themselves.

• Ensure applied and pendant seals shall not be knocked or have weight or pressure applied to them.

• Shall not use glass without adjustments approved by the conservator(s) (for instance, lowering the document bed, putting blocks under the glass so there is no weight on the document).

MCDAs shall ensure contents of boxes in the order of picking, work on one record at a time, and replace records in closed boxes and return to storage

7.4.7   MCDAs shall not annotate or label any part of the record or the box

7.5   Conversion and Migration

7.5.1   MCDAs shall determine the conversion or migration methods

7.5.2   MCDAs shall test the chosen conversion or migration method to ensure that no data are lost, corrupted or unexpectedly altered during the process

7.5.3   MCDAs shall create a test file and execute it on digitization infrastructure, equipment and tools, and record any deviations.

7.5.4   MCDAs shall perform any "data cleansing" identified in the planning stage

7.5.5   MCDAs ensure the source records are duplicated prior to commencing the process

7.5.6   MCDAs shall track and document the entire process

7.5.7   MCDAs may engage an external party to conduct an audit of a sample of converted data, representative of the entire scope

7.6   Metadata Capture

7.6.1   Metadata specific to the record and imaging process, and business being transacted shall be captured at scanning

7.6.2   High-level metadata shall include unique identifier, date and time of digitization, agent associated with bureau, capture hardware and software, calibration settings, and date of last calibration.

7.7   Checking and Verification

7.7.1   MCDAs shall establish the baseline for the test by recording the existing state of the records

7.7.2   MCDAs shall establish criteria for acceptable outcomes for the conversion or migration

7.7.3   MCDAs shall perform continuous check for any inadvertent errors that may have affected data integrity during the conversion or migration process

7.7.4   Quality checking shall be completed before

•   The digitised images are accepted into a business process, or as a master copy in the case of digitisation projects

•   The destruction of the source records is considered, but within the legislations

7.7.5   The results of quality assurance processes and quality checks shall be documented

7.7.6   MCDAs shall correct any errors that have been identified: reconciliation of data, manual corrections, or a complete rerun of the operation until the results match the planned target state.

7.8   Validation processes

7.8.1   MCDAs shall establish a validation team, though separate duties of conversion or migration from validation processes

7.8.2   MCDAs shall ensure that the operators are trained and the equipment and tools are prepared to conduct the validation.

7.8.3   MCDAs shall use an issue log to track any file transfer or media read or write errors. It will consist: issue number; description; probability (high-medium-low); impact (high-medium-low); containment action and owner; due date; and resolution date.

7.9   Storage and Disposition

7.9.1   MCDAs shall ensure the retention of physical records after digitization until authorised disposition procedures are duly undertaken

7.9.2   MCDAs shall document all the disposition decisions and activities

Annex A: Specifications for Image Capture

A.1 Paper documents under A3

Digitisation of text documents must be done to a level that ensures not only that the text remains legible, but that any additional markings on the document are also reproduced and retain their meaning Archival Master - Capture ratio 100% with no manipulation.

Derivative	Archival Master Digital surrogate	Derivative 1
Format type	Paper documents under A3	
Purpose	**Preservation**	**Access**
File Type	TIFF 6.0	JPEG
Compression	uncompressed	JPEG compression Photoshop Level 10-12
Resolution	400 ppi	300 ppi
Bit Depth	8 bit colour (24 bit)	8 bit colour (24 bit)
Colour space	sRGB or Adobe RGB	sRGB

A.2 Documents over A3 (including maps, plans and large format records)

Digitisation of maps and plans must be done to a level that ensures all elements in the map or plan are clearly discernible when shown on screen at 1:1 scale, and that all types of crosshatching or other markings are distinguishable from one another.

Archival Master – Capture ratio 100% with no manipulation

Derivative	Archival Master Digital surrogate	Derivative 1
Format type	Documents over A3 (including maps, plans and large format records)	
Purpose	**Preservation**	**Access**
File Type	TIFF 6.0	JPEG
Compression	uncompressed	JPEG compression Photoshop Level 10-12
Resolution	400 ppi	300 pixels shortest edge
Bit Depth	8 bit colour (24 bit)	8 bit colour (24 bit)
Colour space	sRGB or Adobe RGB	sRGB

A.3. Photographic Prints (colour and B&W)

Digitisation of photographs must be done to a level that ensures that all elements in the photograph are able to be clearly discerned when shown on screen at 1:1 scale.

Archival Master – Capture ratio 100% with no manipulation

Derivative	Archival Master Digital surrogate	Derivative 1
Format type	Colour and black-and-white Photographic Prints – Smaller than A6 (10 x 15cm)	
Purpose	Preservation	Access
File Type	TIFF 6.0	JPEG
Compression	uncompressed	JPEG compression Photoshop Level 10-12
Resolution	2700 ppi	1290 pixels shortest edge
Bit Depth	16 bit colour (48 bit)	8 bit colour (24 bit)
Colour space	Adobe RGB or ProPhoto RGB	sRGB

A.4   Microfilm, Microfiche, Aperture card

Archival Master – Capture ratio 100% of original document size (or best estimate), with no manipulation.

Derivative	Archival Master Digital surrogate	Derivative 1
Format type	Microfilm, Microfiche, Aperture card	
Purpose	Preservation	Access
File Type	TIFF 6.0	JPEG
Compression	None	JPEG compression Photoshop Level 10-12
Resolution	400 ppi	400 ppi
Bit Depth	8 bit	8 bit
Colour space	Grey Gamma 2.2	Grey Gamma 2.2

A.5   High-definition video

Digitisation of motion picture recordings must be done to a level that ensures that the entire recording (both audio and video) is clear, and all parts of the medium which was recorded onto are digitised so that there is no question of data being lost e.g. entire length of reel or video must be digitised

Derivative	Archival Master Digital surrogate	Derivative 1 Small
Format type	High definition video	
Purpose	**Preservation**	**Access**
File Type	MXF OP-1a	MPEG 4 Base Media / Version 2
Video codec	MJPEG2000 lossless compression encoding	AVC High@L4.0
Bit depth/rate	10 bit - VBR	8 bit - 5Mb/s CBR
Frame size	Same as original	Same as original
Frame rate	Same as original	Same as original
Colour space	Same as original	YUV
Chroma subsampling	Same as original	4:2:0
Audio stream	BWF 48 kHz, 16 bit PCM encoding	48 kHz, 8 bit AAC,125kbps

Annex B: Technical Committee Representation

The following organizations were represented on the Technical Committee:

- State Department for Culture and Heritage
- Kenya National Archives and Documentation Service (KNADS)
- Information and Communication Technology (ICT) Authority

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