

PRACTICAL GUIDE  
TO EMERGENCY  
DIGITIZATION OF  
PAPER-BASED  
ARCHIVAL  
HERITAGE



INTERNATIONAL  
COUNCIL ON ARCHIVES  
CONSEIL INTERNATIONAL  
DES ARCHIVES



Alliance internationale  
pour la protection  
du patrimoine dans  
les zones en conflit

Authored by Amira Sadik Aly and Andrew Chernevych, in collaboration with the State Archival Service of Ukraine, the State Archive of Kherson, the State Archive of the Chernihiv Region, the State Archives of the Mykolaiv Region and the Central State Audiovisual and Electronic Archive, in coordination with Joana Rizza Bagano-Nuque, as part of the project in support of the Ukrainian Archives funded by the ALIPH Foundation, and led by the International Council on Archives, 2023.

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# Foreword - ALIPH

Preserving our cultural heritage is not merely an act of reverence for the past; it is a testament to our commitment to understanding and shaping our collective future. In the rich tapestry of human history, archives stand as invaluable repositories of knowledge, capturing the essence of civilizations, societies, and individuals across time. Ukraine, with its deep-rooted history and diverse cultural landscape, holds treasures within its archives that are as precious as they are vulnerable.

Through this initiative led by ICA and made in partnerships with local stakeholders, we endeavour to support the efforts of professionals in safeguarding Ukraine's archives. This manual is more than a technical guide; it is a testament to our collective commitment to safeguarding the legacy of Ukraine's rich cultural heritage. By providing practical insights, methodologies, and best practices, it empowers professionals to preserve, in time of war, a shared history for generations to come.

*This manual is more than a technical guide; it is a testament to our collective commitment to safeguarding the legacy of Ukraine's rich cultural heritage.*

ALIPH's commitment to Ukraine extends beyond the pages of this manual. Through our diverse range of projects and initiatives, we strive to protect heritage sites, museums, libraries and support local professionals in their efforts to preserve their rich cultural legacy. It is our firm belief that by supporting the protection of Ukraine's heritage, we sow the seeds of a brighter future.

Valéry Freland  
Executive Director, ALIPH

# Foreword - ICA

In times of conflict, preserving cultural and documentary heritage becomes an act of resilience and hope. Archivists have the responsibility to safeguard the documentary record of our shared history, ensuring that the voices and experiences of the past continue to enlighten and inspire future generations.

The “Practical Guide to Emergency Digitization of Paper-Based Archival Heritage” aims to endow Ukrainian colleagues with the tools and knowledge to digitize and preserve their invaluable archives, even under the most challenging circumstances. Collaboration between ICA, ALIPH and Ukrainian institutions demonstrates the power of international cooperation in adversity.

Despite the destruction of archival facilities, the displacement of staff, and the ever-present dangers of conflict, our partner archives in Ukraine have remained steadfast. Their efforts to rescue, stabilize, and digitize archives, while providing their experience and expertise to this manual, serve as a testament to the resilience of the human spirit and the indomitable value of cultural memory.

*Collaboration between ICA, ALIPH and Ukrainian institutions demonstrates the power of international cooperation in adversity.*

We hope that this manual will serve as both a technical guide and a symbol of our shared belief in the enduring value of cultural and documentary heritage and the role of archives in fostering understanding, reconciliation, and rebuilding. Our aim is for this guide to be a valuable reference and resource for all archivists, heritage professionals, and volunteers as they undertake crucial work in conflict situations.

Josée Kirps  
President, International Council on Archives

# 01 Objectives & Scope

The more specific your objectives and goals, the sharper your focus, the higher the likelihood of achieving them, and the greater your chances of success.

To determine your **OBJECTIVES**, consider: What specific outcomes does the digitization project aim to achieve?

- Preserve the archive to minimize the potential damage to archival materials and protect against their loss.
- Establish a digital backup of the archive collection.
- Enhance accessibility to archival material.

Once you have identified your objectives, you can set specific **GOALS** for each, such as:

- The total number of documents to be digitized.
- The project schedule. Remember, goals should be specific, measurable, achievable, and relevant (SMART).

Regarding the **SCOPE** of the project, it encompasses:

- Deliverables: digital documents, cataloging systems, databases, content management systems.
- Features: full-text search, user permissions, metadata fields, and file format support.
- Requirements: digitization standards, copyright compliance, quality control processes, and security measures.
- Constraints: budget, time, human and material resources, and quality control tools.

## Additional Tips

### Identifying **OBJECTIVES**:

- Detail tasks and operations at every stage.
- Conduct a comprehensive analysis of your collection's value, significance, risks, and vulnerabilities.
- Keep in mind the expected outcomes from local partners and the wider community.

### Setting **GOALS**:

- Ensure quality control for the digitized archive in terms of reachability, reliability, and scalability.
- Manage the project using systems such as the OAI (Open Archival Information System).

### Measuring **SCOPE**:

- Clarify accessibility parameters.
- Estimate the magnitude of each task, considering team size and equipment needed.
- Transition seamlessly from digitization to digital preservation, ensuring that valuable digital information remains accessible and usable over time.



# 02 Situation Analysis

A situation analysis consists of a systematic process of compiling and evaluating data to better understand a specific context. For archives, this process delves deeply into various facets of information, with the aim of achieving a holistic view of present circumstances, thus guiding decision-making for the future.

## Key Information Components

### Physical Environment

*Location Analysis:* A detailed assessment of the archives building and its immediate environment.

#### *Archive Collection*

*Location:* Understanding where archive collections are stored or displayed.

### Risk & Vulnerability Assessment

*Primary and Secondary Risks:* Identification of immediate threats and potential future vulnerabilities.

#### *Exposure Analysis:*

Determining which items or collections are most susceptible to risks.

### Content Analysis

*Material Type:* Identification of collection materials such as documents, photos, maps, digital files, etc.

*Current State:* Insight into the present condition of materials, particularly noting any damages.

### Stakeholder Identification

*Protagonists and Stakeholders:* Recognizing all involved parties and their potential influence.

### Value Assessment

*Significance of Collections:* Unpacking the worth of collections from multiple angles—historical importance, cultural relevance, legal significance, informational and evidential value, and aesthetic importance.

### Resource Audit

*Capacities:* An overview of available human, technical, infrastructure, and financial resources.

*Necessities:* Recognizing needs like staff, training, first-aid materials, security measures, and equipment.

### Accessibility Evaluation

Ascertaining how accessible the location, building, and collection are for stakeholders and the general public.



## Analysis Outcomes

- Compilation of identified risks.
- Comprehensive risk impact assessment.
- Pinpointing pivotal collections for priority protection.
- Formulation of mitigation strategies.
- Implementable actions for identified strategies.

## Additional Tips

- **Adaptability:** Embrace flexibility as situations evolve; consistently update your information base.
- **Collaboration:** Engage comprehensively with all stakeholders, encompassing archivists, librarians, curators, governmental entities, military personnel, and other cultural heritage professionals.
- **Proactivity:** Always stay a step ahead, anticipating issues and addressing them before they escalate.
- **Documentation:** Maintain thorough records of the situation. This type of documentation aids future research, retrospectives, and forward planning.
- **Efficiency:** Time is of the essence. Efficient practices ensure archives are better safeguarded against looming threats.

## 2A. Collection Condition Assessment

A condition assessment should be conducted before a crisis or emergency to identify any areas of the archive that are at risk of damage in the event of a disaster, depending on the expected risk scenario.

Based on this assessment, we can develop a disaster plan and prioritize the collection for protection. Furthermore, we can set needs (human resources, equipment, budgets, qualitative and quantitative goals).



### The MAIN PURPOSE of this assessment is:

- To inform decisions about how to prioritize and protect the collection.
- To scale the quantity of work and operations.
- To identify our list of needs.

### The SCOPE should be:

- Identifying deterioration and damage to the collection.
- Identifying immediate or likely threats to the collection.



### EXAMPLE: *Expected risk scenario of an explosion followed by fire*

**Condition assessment:** The main types of damage likely to the overall archive, accessibility, and priorities based on values and significance.

**Mitigation measures:** Digitization, evacuation.

**Preparedness actions:** Training teams, providing equipment and supplies for salvage and stabilization, depending on the type of materials, sizes, and dimensions of the archive.

**The MAIN FIELDS OF INFORMATION for a condition risk assessment for the archive should cover:**

- **Archive Collection ID**, e.g., code and name
- **Type**, e.g., books, documents, maps, plans, catalogs, digital collections such as cassettes, VHS, CD, microfilms, etc.
- **Dimensions and sizes**, if possible.
- **Location**
- **Physical condition**, e.g., the presence of any tears, cracks, fading, or mold.
- **Environmental conditions.**
- **Provenance:** The known history of the item, including its previous owners.
- **Recommendations:** In the event of evacuation.
- **Authority:** Assessor Data and Assessment Date.

## 2B. Risk and Damage Assessment

Any risk and damage assessment determines potential risks to both physical and digital archives. This essential process lays the foundations for disaster response planning.

**The OBJECTIVES of the Risk and Damage assessment are to address the following:**

- What are the primary risks to your archive?
- What vulnerabilities are related to these risks?
- What levels of damage are associated with these risks and vulnerabilities?

Assess all potential risks, vulnerabilities, and damage – both immediate and long-term – by documenting them in a comprehensive table. This assessment may encompass an examination of the facility, as well as an evaluation of storage conditions and the overall environment in which the collection is housed.



#### EXAMPLE: *Water damage from broken drainage systems*

RISK SOURCE	VULNERABILITY	EXPOSURE & NO.	IMPACT	LEVEL	RECOMMENDATION
Water from a damaged drainage system	Material of the storage unit (carton boxes, wooden cases)	Books, 505 pcs.	Mold/loss of pages	High-risk	Top priority: stabilization and digitization

#### UNDERSTANDING ACTIVE THREATS:

To protect your archive, it is essential to identify potential threats.

- What vulnerabilities are associated with these threats?
- What kind of damage is likely to occur?

This understanding can be deepened by evaluating the archive's condition and determining vulnerabilities and exposure to potential hazards.



#### EXAMPLE: *Partial building collapse*

RISK SOURCE	VULNERABILITY	EXPOSURE & NO.	IMPACT	LEVEL	RECOMMENDATION
Partial building collapses	Material of the storage unit (carton boxes, wooden cases)	Books, 505 pcs.	Cuts, tears, and separation	High-risk	Top priority: stabilization and digitization

Before a crisis, depending on damage and risk assessment, we can formulate a damage reduction strategy and implement mitigation measures to safeguard individuals, archives, and property.

Post-crisis, the insights from the damage and risk assessment can help minimize losses, facilitate faster recovery, and foster the development of more resilient societies.

### The MAIN FIELDS OF INFORMATION for a damage and risk assessment are:

- **Area and location**, e.g., geographical details, GIS data, etc.
- **Risk source**: Categorize as primary or secondary risks.
- **Specific location** within the archive or facility.
- **Authority**: Who is responsible for the section/asset?
- **Type of damage**: Nature of the damage.
- **Level of damage**: Covers aspects such as the physical integrity of buildings, team and equipment capacities, and logistics.
- **Accessibility**: Ease of reaching and addressing the damaged area.

## 2C. Prioritization for Digitization



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In conflict situations, safeguarding an entire archival collection from potential threats is often an unrealistic objective. Identifying and focusing on records of utmost significance is therefore a more pragmatic and judicious approach.

The assessment of record priority emerges as a pivotal component of initial planning. Secondary aspects like volume, medium, and other characteristics of high-priority records are also taken into account.

Determining which records take precedence does not obey a particular standard; it is influenced by the local context. Factors shaping this decision encompass institutional policies, legal structures, societal worth, and public perception. Institutions are faced with challenging choices that must be decisive and consistently upheld. Within a democratic governance framework, these choices should be clear, well-reasoned, transparent, and accountable.

Decisions must clearly identify the archival fonds considered high priority. Selectively choosing within an archival fonds is not advised; it should be preserved holistically. This recommendation stems from fundamental archival principles.

For particularly extensive fonds, certain series or record groups or even items can be ranked based on their internal importance, dictating the order of digitization. Various situations may lead to diverse evaluations.

The assessment should also factor in the historical usage of the materials. An archival fonds that consistently garners attention—from scholars, media, government agencies, and remains in active use—should be deemed of high significance, even in the absence of specific designations or expert appraisal. Certain statistical records (e.g., detailed census data), property-related documents, and records linked to social benefits fall into this category.



**EXAMPLE: *Labeling according to priorities***

A 'national priority' label is meaningful only when attributed to a limited segment of institutional records; otherwise, it will serve no purpose in prioritization. An alternate approach could be evaluating records based on their cultural prominence or historical relevance, whether they belong to specific collections or are independent items. Such evaluations can sometimes be found in expert panel appraisals included in the acquisition file.

After identifying high-priority records, the decision can be forwarded to the relevant national authority for validation. Nevertheless, bureaucratic procedures should not deter management from proactively assuming responsibility and initiating the necessary arrangements.

## 2D. Mitigating Measures

Mitigation involves proactive measures to prevent or reduce potential impacts from various risk sources. These measures primarily address vulnerabilities and exposure.



### **EXAMPLE: Risk of an explosion leading to fire and flooding**

The appropriate (not all may be necessary) mitigating measures would be implemented in regard to the anticipated risks:

#### **Strategic level: Policies, legislation**

Example: Laws mandating the digitization of selected archives, with multiple backup versions stored in safe locations.

**Physical planning level:** Land use, transportation, infrastructure, and development plans.

Examples: Providing secure temporary storage for evacuated archives, and maintaining water supply and drainage systems.

#### **Technical level: Structures and Materials**

Examples: Strengthening the building's structure and enhancing the archive storage units.

#### **Management, maintenance, and monitoring system level:**

Example: Implementing a water pumping system.

#### **Awareness and capacity building level:**

Examples: Forming a dedicated team for archive digitization and a specific first response team for documentary heritage.

**In the example, action across the various levels would involve:**

- Preventing primary or secondary hazards by addressing their sources.
- Shielding against hazards with barriers.
- Early hazard detection using warning/monitoring systems.
- Reducing vulnerabilities of heritage components that face high impact, for example by physically retrofitting heritage items to lessen hazard effects.
- Leveraging existing adaptive/coping capacities.

**All these measures should be applied to:**

- Regions/Districts
- Sites
- Buildings (both structural and non-structural components)
- Display/Storage – including shelves, packaging, supports, and fittings
- Archive Collections (organic, inorganic, composite)

## Additional Tips

- Assess the severity and probability of hazards, and gauge vulnerability levels.
- Ascertain the available financial and human resources for the development, implementation, and maintenance of mitigation measures.
- Evaluate the cost versus benefit.
- Strive for a balance between ensuring safety and preserving heritage values.
- Aim for multi-risk reduction. For example, by storing manuscripts in boxes, risks from floods, pollutants, and theft can be minimized.
- Plan in advance as much as possible with the appropriate partners (building owners, the municipality, the region, etc.) to achieve a reasonable level of readiness.



## CASE STUDY: MYKOLAIV REGIONAL ARCHIVES

When the war broke out, the Mykolaiv Regional Archives had to make a lot of tough decisions, prioritize on the fly, and plan for the worst-case scenario.

Located in the southern part of Ukraine, the City of Mykolaiv was a target of bombing right from the beginning of the full-scale Russian invasion. Possibility of military occupation and large-scale destruction of cultural property was a very real and present danger.



Under these circumstances, in March 2022, the archives administration made the decision to prioritize preservation of the records of the National Archival Fond, particularly the government records of the Mykolaiv Regional Council and the Regional State Administration.

Subsequent events showed that the urgency was justified. A missile strike on the administrative building of the regional authorities on March 29 resulted in partial destruction of the building and extensive damage to the archival facilities located on the first and second floors. Many windows were smashed, and interior partitions and suspended ceilings in the digitization lab were damaged; the building's façade and porch also sustained damage. The damage caused failure of technical infrastructure, particularly the data center located on the premises.

## 03 Digitization Process

A digitization project is a complex process that involves planning, technology, supplies, and human resources. In an emergency conflict situation, challenges can be amplified due to the risk of harm and destruction, time constraints, and lack of resources. Therefore, advance preparation becomes even more crucial.

This section will provide an overview of the essential components of such a program, emphasizing human resources and technological tools.

When **IDENTIFYING EQUIPMENT NEEDS**, it is important to consider a range of solutions based on available options, budget, team size, types of records, and organizational priorities. Key considerations include:

- Dependability,
- Output speed,
- Simplicity to facilitate rapid training of non-specialists,
- Productivity and the capability to rapidly increase capacity by adding more copy stations, and
- A robust backup system to ensure that work is preserved in the event of unexpected calamities.

In a conflict situation, **TEAMS PLAY A CENTRAL ROLE** in preserving documentary heritage; machines would be ineffective without them. The task for management is to:

- Maintain morale,
  - Formulate emergency protocols,
  - Allocate roles, structure the work, and provide daily support,
  - Ensure motivation and the interchangeability of roles (overlap of skills).
- all in challenging and continually changing circumstances.

## 3A. Team Composition

Any successful emergency digitization initiative requires the strategic amalgamation of varied resources and know-how, both within the organization and externally. Central to this is a dedicated team, primed for meticulous planning, efficient coordination, and adept project execution.

The following guiding principles show **HOW A TEAM CAN BE STRUCTURED**:

- **Holistic skillset:** Embrace a blend of knowledge and skills.
- **Task delegation & collaborative responsibility:** Assign tasks clearly and foster a shared sense of duty.
- **Transparent communication:** Establish feedback mechanisms.
- **Quality oversight:** Ensure consistent checks and controls.
- **Skill redundancy:** Foster an environment where team members can support and step in for each other.



### EXAMPLE: *Team Composition*

#### **Project Lead:**

A senior manager or a director who oversees planning, distribution, implementation, decision-making, and external relations.

#### **Scanning Coordinator:**

The digitization head who manages daily operations, tracks progress, mentors staff, provides guidance, and acts as the key contact of the project lead.

#### **Scanner Operator(s):**

Staff, contractors, or volunteers who handle records, operate scanners, and manage data under the Scanning Coordinator.

#### **Quality Controller:**

A role instituted for post-production that otherwise falls to the Scanning Coordinator.

#### **IT Advisor:**

An IT expert who oversees infrastructure and offers tech support and on-site solutions.

#### **Safety Coordinator:**

Upholds health protocols, monitors news/updates, and briefs the team on emerging risks and vital information.

## 3B. Equipment

Each archival repository possesses unique characteristics, which means that digitization solutions must be tailored to the institution's requirements, particularly during conflict situations.

**KEY CONSIDERATIONS** include:

- **Inventory and specifications:** Understand the available equipment, its capabilities, and limitations.
- **Human resources & expertise:** Gauge the technical proficiency of available staff and the training they might need.
- **Record prioritization:** Determine the types of records earmarked for urgent digitization.
- **Conflict circumstances:** Evaluate factors such as the severity of risk, available reaction time, and potential protective measures.



### Equipment Considerations

- ✓ **Output speed:** High-speed capture, digital processing, and data transfer are essential. The workflow should incorporate efficient physical handling and digital processing capacities to ensure rapid operations.
- ✓ **Ease of operation:** The equipment should be user-friendly, enabling both specialists and non-specialists to swiftly master its operation. This ensures wider staff participation and a steeper learning curve.
- ✓ **Reliability:** The equipment should withstand continuous, intensive use over extended periods. Past experience with specific equipment and a manufacturer's reputation can offer valuable insights during the selection process.
- ✓ **Productivity enhancement:** By deploying multiple copy stations simultaneously, productivity can significantly increase. Immediate availability, whether for purchase or loan, is vital. Simple touchless or flat-bed scanners might suffice.

Popular equipment for emergency digitization encompasses:

- **Flat-bed scanners:** Widely available and affordable scanners that can digitize loose sheets and bound materials. Offer simplicity of use but are limited in speed and object size.
- **Planetary scanners:** Specialized devices with a rotating platform to digitize fragile materials. Allow 360-degree capture without direct handling, but have a far higher cost and specialized use compared with standard scanners.
- **Digital camera copy stands:** Provide rapid capture and accommodate large objects, but equipment/setup is expensive and less portable.



For greater productivity, scanners might be more effective. Modern touchless scanners, like the Fujitsu 600, surpass flat-bed scanners in terms of speed and safety.

Certain records, especially non-textual ones, demand specialized equipment, for instance, microfilm scanners or devices for audio-visual transfers. Some equipment caters to specific formats, like 1" magnetic tapes. Procuring and setting up such equipment can be challenging, pricier, and time-consuming.

For expedited emergency digitization, it is often more feasible to concentrate on records that can benefit from a streamlined workflow, for example, textual documents and photographic prints.

## 3C. Annex: Equipment & Accessories

### CHECKLISTS

#### CORE SCANNING EQUIPMENT, COMPUTER SYSTEMS AND CONNECTIVITY

- Flatbed Scanner and software
- CPU with monitor or laptop computer
- Software package, eg., text processor, image editor, spreadsheet
- Internet connectivity
- External hard drives
- Planetary Scanner and software
- Digital Camera and software

#### AUXILIARY EQUIPMENT, ACCESSORIES, FURNITURE, AND SAFETY/BACKUP SYSTEMS

- Power devices, eg., power bar, surge protector, cables
- Handling accessories, eg., cotton gloves, microfiber cloth, dusting spray
- Furniture, eg., copy stand table, chair, desk, lighting fixture
- Periphery devices, eg., keyboard, mouse, charger, connection cables
- Backup electricity generator
- Set of brackets for positioning lights, cameras
- Scanning mat (marked measuring board)
- Copy stand parts, eg., column and mounts, controls
- Additional light sources, eg., stands + strobe heads
- Pedal shutter release (remote camera trigger)
- Protective products, eg., masks and eye protection
- Safety communication devices, eg., handheld transceivers for emergency use

## CASE STUDY: MYKOLAIV REGIONAL ARCHIVES



The March 29, 2022 missile strike on the Mykolaiv Regional State Administration Building damaged the archive facility and digital infrastructure. Servers and the on-site data centre were destroyed, leading to extensive loss of digital records. Persistent shelling created ongoing power fluctuations, outages, and Internet disruption.

The archives mobilized support from the Mykolaiv Regional Military Administration and the State Archival Service of Ukraine by establishing direct coordination. Additional aid came through volunteers and international humanitarian groups like a memorial foundation, which provided critical supplies to sustain operations. This included securing an extra power generator and laptop donations to offset destroyed PCs and electricity issues.

Czur ET16 book scanners from the memorial foundation became vital for the emergency digitization program, despite limitations in the maximum scanning area and the lack of automated document feeding. The 3TB of scanned textual records now reside on a functioning file server, with plans underway for an external hard drive backup.

The IT team is down to 2 out of 3 staff. The digitization unit comprises senior administrators, record custodians, scanning operators, and conservation specialists. The main shortage remains IT personnel to maintain systems, digital preservation, and equipment.

# 4 Action Plan and Implementation

## 4A. Teams

The **Scanning Coordinator** leads the team by designing workflows, training staff, providing technical support, monitoring scanning, and tracking progress. This role demands archival expertise, digitization skills, and extensive media capture experience. Additionally, a seasoned scanning operator on standby can assume the Coordinator's role if needed.

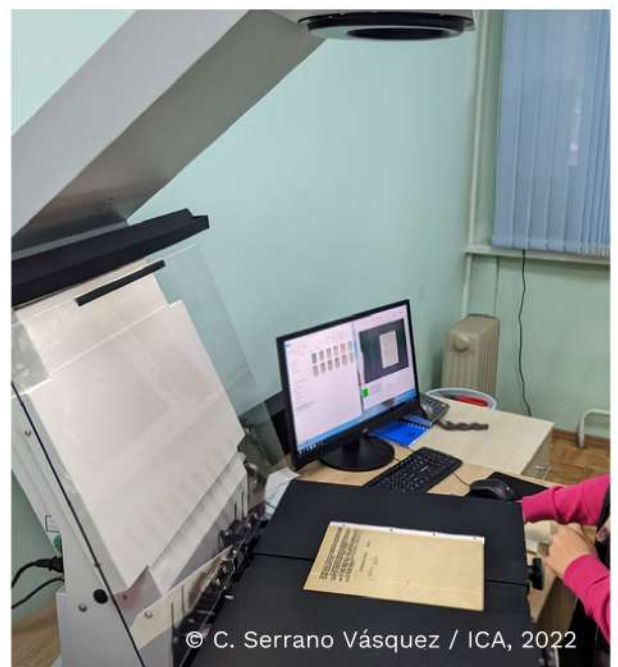
The **Scanning Operator** performs digitization operations at a designated workstation, requiring equipment training and a comprehensive grasp of item handling, file transfers, metadata entry, and image correction. Operators should be existing staff if possible, but can also be external hires or volunteers with mandatory specialized instruction.

Optional roles (may not be required for small teams):

**Quality Controller:** Reviews images, makes corrections, ensures integrity and transfer; may be the responsibility of coordinators or IT support in small teams.

**IT Advisor:** Provides infrastructure support and tech troubleshooting for systems, hardware, software and networks.

**Safety Coordinator:** Upholds protocols by monitoring threats, briefing on risks and providing vital information.





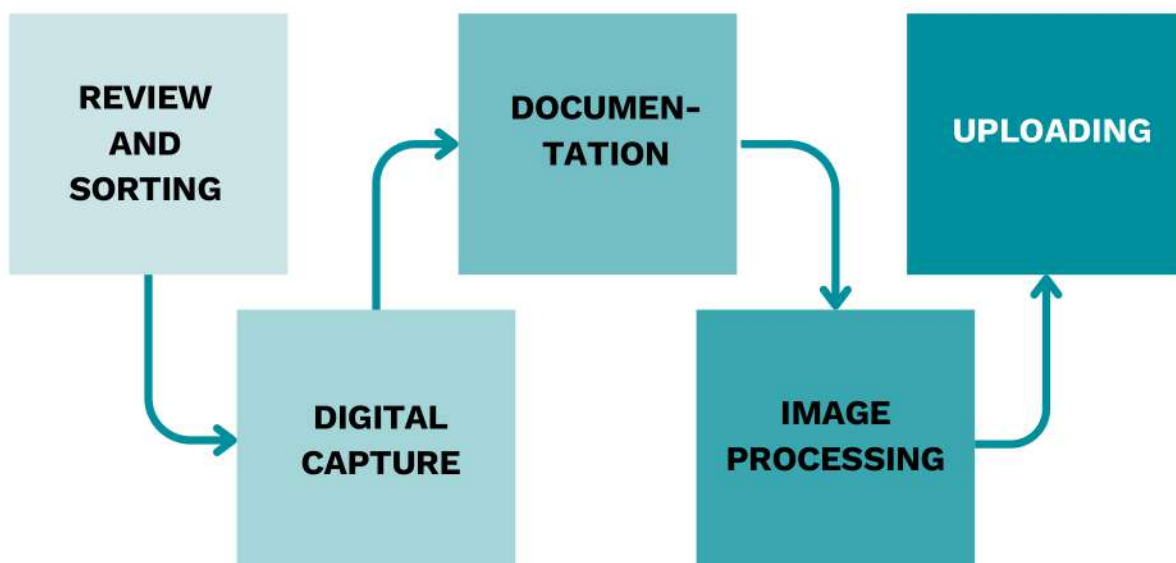
OPERATION	ROLE	SUPERVISION	IT SUPPORT
Item review & sorting	Coordinator	n/a	n/a
Handling & capture	Operator	Coordinator	IT Advisor
Description & metadata	Operator	Coordinator	IT Advisor
Post-production	Quality Controller	Coordinator	IT Advisor
Digital transfer	Operator	Quality Controller	IT Advisor
Data back-up	Coordinator	IT Advisor	IT Advisor
Rehousing	Archives staff	n/a	n/a

## 4B. Logistics and Operations

In conflict situations, the digitization workflow makes use of a standard digitization algorithm, but with certain alterations:

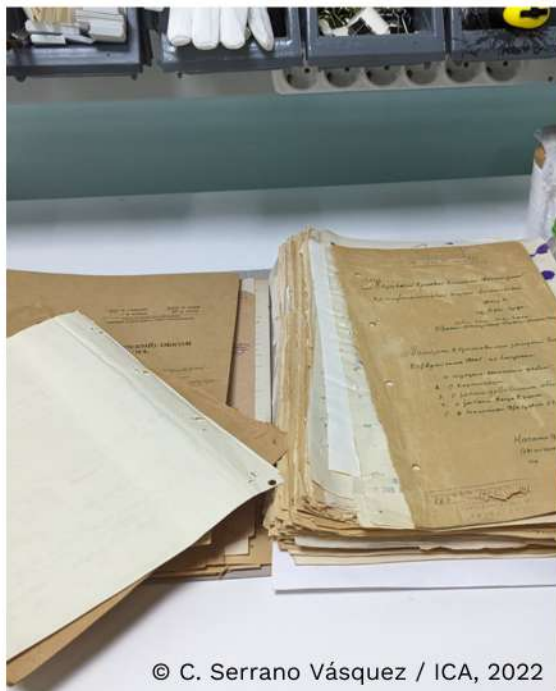
- **Emphasis on speed.**
- **Incorporation of an emergency protocol**, covering evacuation and data security.
- **Ability to continue operating** amidst constant disruptions.

**A structured digitization workflow** encompasses several phases, optimizing the processing of a fonds or a major record group:



1. **Review and Sorting:** Assess physical dimensions, media formats, and condition of records. Group similar items (e.g. text size) while retaining the original order through notation. Optimize workflow by reducing equipment adjustments between items.
2. **Digital Capture:** Folder-level digitization to mirror original order, with consistent descriptive and technical metadata across objects. More efficient than item-level capture.
3. **Documentation:** Detail distinct equipment protocols, common issues, and solutions per record type. For example, curling of edges, fragility, and ink fading concerns for flat maps and charts requiring careful handling. Outline binding support needs for bound materials.
4. **Image Processing:** Carry out any necessary post-scan modifications like de-skewing, cropping, color correction, etc.
5. **Uploading:** Transfer finalized digital surrogates to preservation and access systems.

Depending on the equipment available in the archives, certain materials may be paired with specific devices. For instance, delicate bound materials ideally go to copy stands (using digital camera capture) or planetary scanners, while photographic prints and film negatives are best suited to flatbed stations.



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For specific loose textual records, the digitization team might contemplate employing flatbed devices with an automatic feeder. Typically, this is not a standard practice due to potential risks of damage like jams or misfeeds. However, in conflict scenarios where digitization speed is paramount, the merits of auto-feeding should be weighed against its risks after pilot trials. Suitable documents should be staple-free, consistent, and well-preserved, and the feeder must ensure gentle handling and easy extraction.

## 4C. Post-Production

**Image processing** improves digital object quality. Copy stands can capture dozens of images per minute, so flow-interrupting manipulations should happen later. Such actions include cropping, straightening, and adjusting contrast and brightness. Batch processing automation software enables efficient manipulation of hundreds of images. Investing in more advanced software can boost productivity.

**Textual digitization** benefits from optical character recognition (OCR) scanning at capture, converting typed or handwritten text into machine-encoded text. This text automatically becomes metadata, enabling searchability within documents and improved discoverability. However, OCR slows digitization and can be skipped in emergencies. When performed, OCR should be applied indiscriminately to all items - selective processing decreases productivity. Manual OCR accuracy correction should be avoided.

**Documentation** keeps projects organized, progress trackable, and workflow patterns recorded. It also allows process restoration after interruptions and relocations. Documentation may include:

- Fonds level master-file (progress of workflow segments)
- Project spreadsheet (progress across all fonds, by types of records)
- Troubleshooting log and guide
- Digitization procedures
- Digitization master schedule
- Training manual for new hires
- Cheat sheet for frequently occurring topics



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Color corrections and enhancements, particularly for film and slides, are normally performed frame by frame.

## 4D. Technical Standards: File Naming

File naming is crucial for maintaining control over digital assets, especially in large-scale projects. It is advisable to establish a file-naming system before commencing the digitization process. Typically, this system incorporates pre-existing archival identifiers, like accession numbers, complemented by additional elements.

In an archival digitization project, file names should exhibit several characteristics. They must be:

- Unique (avoid duplication)
- Well-defined
- Consistently structured

Additionally, the naming system adopted should allow for the total number of items to be digitized, and this should be evident in the number of digits in the numbering scheme. For instance, if digitizing 10,000 items, start the numbering with 00001, 00002, and so on, rather than 1, 2, 3. Embedding core metadata such as scan date, page number, etc., within the file names acts as a safeguard, especially if files are relocated or renamed.



File names should adhere to these conventions:

- Use lowercase Latin characters only
- Utilize dashes to separate segments of a file name
- Avoid special characters, slashes, or spaces
- Ensure the file extension corresponds to its format
- Limit the file name length to 30 characters

The most effective approach to devising a naming system is to employ an international standard template. This ensures consistency, intuitiveness, and efficiency in the system, minimizing the need for extensive coordination. The standard AS/NZS ISO 13028 serves as an exemplary template. It suggests following the traditional hierarchy of archival descriptions: fonds, record series, and file. Moreover, the file name can incorporate elements like:

- Country of origin identifier
- Archival repository identifier
- Copy type (master/access)
- Page number

## 4E. Technical Standards: Metadata



Metadata covers descriptors providing insights about a particular digital record. These descriptors assist users in identifying, comprehending, and utilizing the said record more effectively. Importantly, metadata is distinct from the core content within the record; instead, it functions as a reference to the record's contents. For a record to be deemed of superior quality, the capture and maintenance of the appropriate metadata is essential.



## Components of a metadata model for digital records



### **Item Description:**

*Definition:* Adhering to a standard archival description protocol (e.g., ISAD(G)), item description offers a comprehensive view of a record.

*Examples:* For photographic records, an item may refer to a single print or film frame, while for analog textual records, it could signify an archival file, a bound manuscript, or a printed publication.



### **Technical Metadata:**

*Definition:* This captures the specifics with regard to the digital item's properties, the image capture technique, tools employed (both hardware and software), file format, image fidelity, and details about the analog original.

*Purpose:* Technical metadata safeguards the accurate portrayal of the digital image and serves as a guide for seamless transition during format alterations or migrations.

*Storage:* Some of this metadata resides within the digital image file, while some may be found in a distinct linked file.



### **Structural Metadata:**

*Definition:* As the name suggests, this component identifies the connections among the different constituents of a digital asset.

*Example:* This may relate to digital pages nestled within a scanned album.

*Functionality:* By maintaining the hierarchy and sequence, structural metadata ensures a flawless viewing and navigational experience.

*Formats:* This metadata is usually found in file naming patterns, dedicated spreadsheets, or databases.

### **Storage & application of the metadata model:**

Metadata, along with its values, can be embedded within the file itself, consigned to an electronic database, or amalgamated into a Content Management System (CMS). The fundamental system housing the metadata may be as elementary as a tailor-made spreadsheet. However, its effectiveness relies on strict adherence to recognized descriptive norms, the quality and depth of the information, and uniformity in its application. When these standards are met, the data is primed for seamless integration into a sophisticated CMS, particularly after an emergency scenario.

### **Best practices:**

It is advisable to integrate core descriptive metadata (e.g., title, creator) with technical metadata during the digitization phase. This pairing offers practical benefits in file and related record identification. Further, pairing a title with a unique identifier offers a fail-safe solution, ensuring data integrity if the primary archival database faces threats. Another viable approach is to incorporate a caption (a rudimentary description) directly into the image during its capture.

## **4F.** Technical Standards: Image Format and Output Standards

The output format and image standards will depend on the type of record. Normally, these specifications are outlined in institutional or national guidelines.

If these guidelines are lacking or outdated, it is best to rely on international standards, such as the appropriate ISO standards (e.g., ISO 19263 Photography – Archiving Systems) or documents such as "Technical Guidelines for Digitizing Cultural Heritage Material" by FADGI. Below is a summary of the most common specifications.

## PAPER-BASED TEXTUAL RECORDS

PHYSICAL SIZE	RESOLUTION	PRESERVATION: MASTER FILE FORMAT
Smaller than A4	600 dpi	TIFF
A4	300 dpi	TIFF
A3	300 dpi	TIFF
A2	300 dpi	TIFF
Largen than A2	300 dpi	TIFF

## PHOTOGRAPHIC RECORDS

PHYSICAL SIZE	RESOLUTION	PRESERVATION: MASTER FILE FORMAT
35mm film (negatives, slides)	2400 dpi	TIFF
Medium format film (negatives, slides)	1200 dpi	TIFF
Photographic print below A4	1200 dpi	TIFF
Photographic print A4	600 dpi	TIFF
Photographic print above A4	600 dpi	TIFF

Guidelines typically lay out both the minimal and the ideal output parameters. For emergency digitization situations, it is advisable to base the digitization plan on these minimal standards. This approach optimizes speed and conserves storage space. The standard bit depth for images is 8-bit grayscale for monochrome images and 24-bit RGB for those in color. A preservation master file should feature a consistent tonal scale and a broad color range, with as few adjustments as possible to remain neutral in use.

TIFF (Tagged Image File Format) is the preferred format because it's lossless (does not compress), widely recognized, and has stood the test of time. If using TIFF is not feasible, JPEG and PDF are suitable alternatives for textual records. For access files, which are lower-quality versions derived from the master file, JPEG is the best choice. This format offers a balance of reduced file size and wide user compatibility.



## 4E. Technical Standards: Storage and Backup

Data security relies on duplicating and backing up data in multiple locations, following the LOCKSS principle: **"Lots of Copies Keep Stuff Safe."** This strategy emphasizes creating and maintaining several off-site digital copies so that data can still be recovered if any one backup is lost. While challenges like file corruption and media failure are persistent concerns, they are separate from emergency management.

Many archival repositories already have backup systems overseen by IT as part of records management programs. If not benefiting from such measures, archive managers must urgently establish do-it-yourself backup systems in-house.



### Backup recommendations

#### Back up frequency based on risk analysis

- Perform daily full backups of high-risk, mission-critical data to capture additions, deletions, and changes.
- Adjust backup frequency and type (full vs incremental) based on ongoing risk assessments. As threat levels rise, intensify schedules from weekly to daily cycles.

#### Off-site storage for recovery capability

- Create and continuously maintain at least 3 copies of data stored off-site to enable recovery if one site is compromised.
- Strategically distribute geographical locations outside conflict regions to reduce exposure to a single event.

#### Software enabling efficiency

- Leverage backup software with incremental copying to only capture modifications since the last backup, conserving bandwidth and storage.
- Store on-site backups on high-capacity, external hard disk drives for operational recovery.

**Cloud-based storage for resiliency**

- Identify providers situating data centers well outside zones of conflict, focusing on secure backup services over file sharing.
- Vet providers thoroughly on licensing, longevity, credibility, and recovery track record.

**External devices for controlled access**

- Network high-capacity hard disk and solid-state drives for centralized administration, scheduling, and monitoring.
- Allow swift disconnection of devices to evacuate to secure locations during crises.

Lastly, it is recommended that the project team undergo evacuation training and conduct an evacuation drill that includes creating and moving backups under time pressure.

**CASE STUDY: MYKOLAIV REGIONAL ARCHIVES**

The Mykolaiv Regional Archives does not have an electronic management system to automate and integrate archival activities such as digitization, preservation, and access.

Acquiring a system like Archium, developed in Ukraine, is a strategic priority but is currently unaffordable due to wartime budget constraints. Such software would enable vital functions like full-text search, automated requests, remote backup, and personalized support.

The State Archival Service of Ukraine issues guidelines on file formats and digital standards. Two copy types have to be created: a master file directly from the original record, and a working file for reference and distribution. Book scanners with cold light are preferred for digitizing reflective materials, allowing high-quality capture.

File naming conventions follow the Ukrainian Research Institute of Archival Affairs' encryption system based on the fonds-description-file scheme. The long names and paths can cause issues in Windows and deeply nested folders.

# 05 Handling and Stabilization

## 5A. First Response and Handling

First Response procedures for documentary heritage refer to the immediate actions undertaken to mitigate the effects of risks to valuable documents during and post crises. These are integral to our response strategies and, when applied correctly, can substantially minimize damage and losses.

These procedures are derived from a thorough analysis of the situation, evaluations of damage and risk, and the implementation of security and stabilization measures that foster prompt recovery.

Certain procedures are notably employed during our digitizing projects for archive collections.

Here are some common scenarios and the **RECOMMENDED FIRST-RESPONSE PROCEDURES**:



Water damage from floods, leaks, or high humidity levels: water can cause paper swelling, ink smearing, and mold growth.

- Swiftly remove documents from the source of the water.
- Lay the documents on a flat surface, covering them with a clean, absorbent cloth.



Fire damage can result in documents being charred, becoming brittle, or discolored, with ink fading and readability compromised.

- Extract documents from the fire immediately.
- Position them on a flat surface, protected by a clean, dry cloth.
- Handle with care; the documents may be hot and delicate.
- If damp, dry them using methods similar to those for water damage.



Explosion damage may result in physical, chemical, and light-induced damage, such as tearing and discoloration, alongside potential fire and water damage.

- Wear protective gloves and a mask to shield yourself from contaminants and prevent document damage.
- Immediately evacuate the documents from the blast area.
- Refrain from bending or folding documents, as this could further compromise paper fibers.
- Lay the documents on a flat surface, covered by a clean, dry cloth.
- Approach with caution, as documents might be littered with debris.
- If moisture is present, resort to drying techniques as mentioned under water damage.
- If marred by debris, seek the advice of a professional conservator for evaluation and remediation.

## Additional Tips

- Always wear gloves and protective masks.
- Handle documents gently to prevent bends and tears.
- Avoid folding or bending. If documents have suffered burns, it is essential to consult a professional conservator for assessment and treatment.

## 5B. Labeling

Labeling is the process of affixing a label to each document or item in a collection, detailing information such as its content, creation date, and condition. This information plays a pivotal role in tracking the document's location and movement, prioritizing its conservation, and ensuring its return to the correct location after stabilization, digitization, and storage preparation.

Labels should identify documents to ensure they can be located and returned to their rightful place. This is crucial when documents are disorganized or displaced. Use a waterproof marker or label to guarantee the label remains readable, even if the document becomes wet.



### Criteria for Labeling

**Description:** Labels should be concise yet descriptive, encompassing:

**Type of document (e.g., letter, photograph, map)**

- Document date
- Document creator
- Document subject
- Location where found
- Document condition

**Placement:** Affix the label securely to the document. Avoid placing it on the front of the document to prevent potential damage.

**Individual Labeling:** If feasible, label each document separately to facilitate better tracking and management.

**Consistency:** Utilize a uniform labeling system to simplify the identification and tracking process.

**Identification System:** Implement a combination of numbering and letter systems for unique identification of each document, reducing the chances of loss or misplacement.

**Record Keeping:** Maintain a log of all salvaged documents. This log should record each document's label information and the date and time of its salvage.

## 5C. Relocation

Once documents are stabilized, it is crucial to store them correctly to ensure their long-term survival. Preferably, they should be placed in a cool, dry environment. Utilizing acid-free folders and envelopes can significantly mitigate potential damage. Depending on the sensitivity and importance of the documents, they may need to be stored in blast-resistant structures or locations away from potential threats.

To safeguard archive collections from various risks, consider the following guidelines:



### LOCATION SAFETY:

Position documents in secure areas. This could mean relocating them to an upper floor or an entirely different building.



### WATER DAMAGE:

Protect documents from potential water exposure. Use waterproof containers or protect them with tarps.



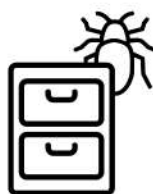
### FIRE DAMAGE:

Mitigate risks of fire damage by storing documents in fire-resistant cabinets or moving them to a fireproof building.



### LIGHT DAMAGE:

Prolonged exposure to light can harm documents. Store them in darkened cabinets or cover with materials that block out light.



### PEST DAMAGE:

Pests can wreak havoc on paper materials. Store documents in airtight containers and implement regular pest control measures.



### CHEMICAL DAMAGE:

Guard against chemical damage by placing documents in areas with good ventilation. Always avoid direct contact with aggressive chemicals.

## 5D. Emergency Stabilization by Damage Type

Stabilization of an archive collection involves taking measures to halt further deterioration, making documents more resilient and accessible for future recovery and conservation efforts. The specific steps vary based on the nature of the damage.



Water damage from floods, leaks, or high humidity levels: water can cause paper swelling, ink smearing, and mold growth.

- **Drying wet documents:** Employ fans and dehumidifiers, ensuring they are not directly targeted towards, to expedite drying. In the case of paintings or colored documents, freezing methods are effective.
- **Handling muddy books:** A wet, mud-laden book should remain closed during rinsing. Use gentle hand pressure to eliminate excess water, taking care not to open or apply undue force.
- **Flattening warped documents:** After drying, flatten documents by placing them under weights or carefully ironing with low heat. Always interpose parchment paper to avoid direct contact between the iron and the document.
- **Repairs:** Damaged documents may require patching, taping, or stitching.



Fire damage can result in documents being charred, becoming brittle, or discolored, with ink fading and readability compromised.

- **Relocation:** Transfer materials away from the source of the fire to a safer location, either outside or within another section of the building.
- **Cleaning:** Use brushes, vacuums, or other gentle methods to eliminate dirt and debris.



Explosion damage may result in physical, chemical, and light-induced damage, such as tearing and discoloration, alongside potential fire and water damage.

- **Avoid metals:** Refrain from using staples, paper clips, or other metals which may corrode and deteriorate the paper.
- **Storage:** Use acid-free folders and envelopes to protect documents from further harm.
- **Documentation:** Continuously photograph or film the damage and stabilization efforts undertaken, providing a clear chronology of recovery operations and spotlighting potential issues.

## Additional Tips



- **Prompt action:** Rapid intervention minimizes further damage to compromised documents.
- **Caution in intervention:** While stabilization is essential, hasty or unskilled action can exacerbate damage. When unsure about procedures, particularly in cleaning or repairing, seek advice or services from a professional conservator. Avoid excessive heat during drying, and never use corrosive metals like staples or paper clips.
- **Documentation:** Consistently document the damage and stabilization techniques employed. This documentation aids in tracking recovery progression and spotting potential concerns.
- **Storage:** Always utilize acid-free storage solutions.
- **Professional assistance:** When uncertain about repairs, always consult a professional conservator.



# 06 Glossary

**Accession:** Formal acceptance and recording of records into an archival repository, each with a unique identifier.

**Appraisal:** Evaluation of records to determine archival value and ultimate disposition.

**Cataloging:** Creation of metadata for information resources following specific standards for access and description.

**Content Management System (CMS):** Software for managing creation, editing, publishing, and storage of digital content. In archives, CMS systems manage both digital surrogates of analog records and born-digital records.

**Description:** Analysis, organization, and recording of details about archival records (creator, title, dates, extent, contents) to aid in identification, management, and understanding.

**Digital preservation:** Activities to ensure continued access to digital materials despite technological changes and deterioration.

**Digitization workflow:** Integration and automation system for the digital transfer of analog records and their storage.

**Evacuation:** Relocation of people and valuables (including archival records) to a safe space in response to emergencies.

**Fonds:** The entire body of records created and accumulated by an organization or individual, maintained as a unit.

**Identifier:** Reference number or code for tracking archival records, preserving their original order.

**Item:** Basic unit within a record series, such as a document, publication, photograph, sound recording, or moving image.

**Metadata:** Structured information describing a resource's characteristics to support its localization, management, and preservation. Recorded at various levels (fonds, series, file, item) and metadata includes elements such as like title, creator, dates, extent, subject terms.

**Mitigation:** Action to reduce harm in disasters, including salvage, stabilization, rehousing, and relocation of archival records.

**Original Order:** The organization and sequence of records as established by the creator, preserved to maintain relationships and evidential significance.

**Preservation:** Discipline of protecting materials to minimize deterioration and damage, extending the life of cultural property.

**Provenance:** Origin or source of records, referring to the creator or receiver of the records.

**Records/Archival records:** Documents or materials created or received by a person, family, or organization, serving as evidence of activities or functions.

**Series:** Records arranged or maintained together due to common functions, activities, transactions, physical forms, or other relationships.