

STEDELIJK

MUSEUM

FROM

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TO

INK

PRESERVING AND
PRINTING DIGITAL-BASED
PHOTOGRAPHIC ARTWORKS

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PREFACE

This guideline for emerging practice, developed within the NWO Museum Grant project “Print on Demand: Printing digital-based artworks through a collaborative mode of production.” research project, explores how museums can effectively manage the process of translating a digital file into a photographic print. As such, it is meant to ensure a careful and thoughtful approach every step of the way, from acquisition to (re)printing. This guideline is specifically intended for collection caretakers responsible for the acquisition, conservation and presentation of digital-based photography. This document is the outcome of numerous interviews and discussions with professionals from various fields, including artists, photograph paper and time-based conservators, conservation technicians, conservation theorists, curators, project leaders, registrars, digital art and digital heritage preservation experts, and printing specialists. Their collective expertise has been instrumental in shaping this guideline.

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INTRODUCTION

WHAT

In a world in which digital technologies increasingly shape artistic practices, more artists create artworks that are digital-based or born digital or that have digital components. More and more artists sell their photographic works as **digital image files**, which implies that museums become responsible for the printing process. Instead of acquiring a finished physical object, a museum will purchase a digital file along with the right to print from it for display. As a result, the responsibility for translating stored digital files into exhibited artworks **shifts from the artist to the museum**. This shift presents museums with a new challenge: rather than solely caring for a physical artwork, they now have to put in place a **network that supports its production**.

FOR WHOM

This guideline has been designed for **collection caretakers** concerned with the acquisition and long-term preservation of digital-based photographic artworks, who are not necessarily specialists in **digital heritage preservation, photograph conservation** or **printing experts**.

WHY

Many artworks that combine digital and physical components **do not fall under the existing preservation categories**. The specialized knowledge needed to care for such works is **fragmented** and frequently overlooked. This guideline helps bridge that gap by providing structured guidance.

GOAL

This guideline is a **practical tool** designed to support the development of a **strategy for acquiring, preserving and printing digital-based photographic works**. As such it outlines key topics and considerations, offering a flexible framework that can be tailored to specific needs. Rather than prescribing rigid steps, it serves as a guide to develop emerging practices, allowing users to focus on the aspects most relevant to the preservation and documentation of these works.

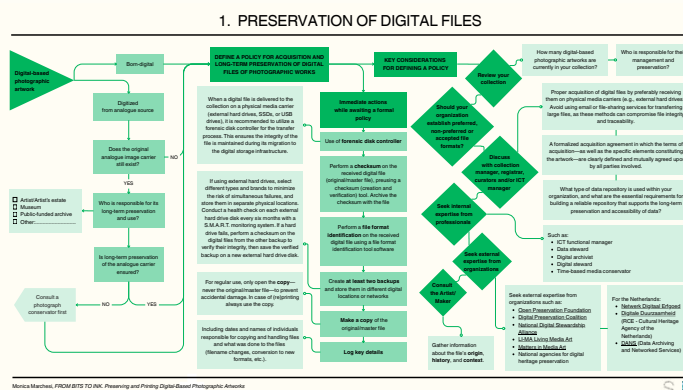
Importantly, this guideline emphasizes a dynamic approach, as various elements of this process may be subject to changes—such as evolving participants, shifting materials and techniques, and the obsolescence or disappearance of technologies. Its main goal is to help manage particular changes, also given the fact that variations between different versions may occur during (re)printing. As such this guideline prioritizes the documentation of **work-defining properties of the artwork** and the **identification of essential stakeholders** involved in the process. Given the inherent volatility of the processes involved, the adopted approach has a broad scope in order to ensure its usefulness across different contexts and timelines. Additionally, several components may well be adapted to other digital-based works requiring (re)printing, including graphic design objects, prints and drawings.

HOW TO USE THIS GUIDELINE

The care of these digital-based artworks can be divided into **two key areas**:

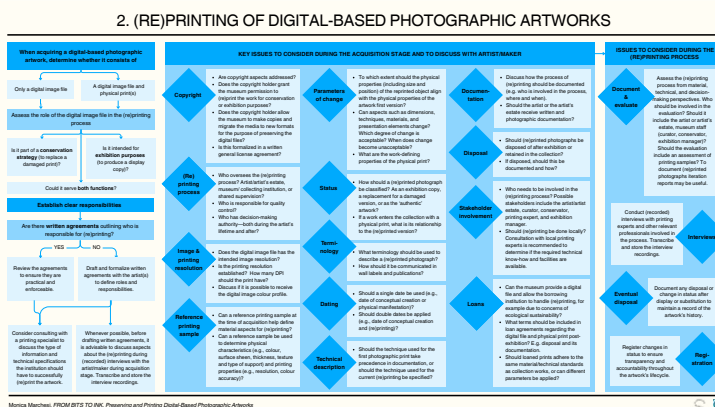
1. PRESERVATION OF DIGITAL IMAGE FILES

- Developing strategies for the **long-term preservation** of digital art preservation.
- Ensuring proper **documentation and storage** of the digital file.



2. TRANSLATING THE DIGITAL IMAGE FILE INTO A PHYSICAL PRINT

- a. **Documenting the printing process** to maintain consistency over time.
- b. **(Re)printing strategies**, including choice of materials, techniques and responsible parties.



Each of these areas presents **distinct yet interconnected conservation challenges**, which this guideline will address separately. However, it does not focus on the preservation and conservation of the physical digital print itself. For an introduction to these topics, the following websites serve as excellent starting points: the [Digital Print Preservation Portal \(DP3\)](#) of the Image Permanence Institute and the [Photographic Materials Group Wiki \(PMG Wiki\)](#) of the Photographic Materials Specialty Group of the American Institute for Conservation. At the end of this guideline, a glossary briefly explains more specialized terms.

GLOSSARY OF TERMS

Accepted file formats refer to specific types of digital files that are recognized and allowed by a system, application or platform for storage, transfer or processing. Accepted file formats are included in a digital archive by an institution under a (minimum) set of guarantees regarding their usability, accessibility and long-term robustness. If the data is stored in a file format that is neither accepted nor preferred, it is advisable to contact the creator of the files to discuss possible solutions tailored to the specific situation. See also preferred file formats.

Artist interview in contemporary art conservation is a structured conversation with the artist (and sometimes their collaborators) aimed at gathering essential information about the artwork's materials, techniques and intent, as well as the preferred methods for display, preservation and future conservation. It helps ensure informed decision-making and respect for the artist's vision over time. In the Netherlands, DANS offers long-term storage solutions for digital files, ensuring that artist interviews are preserved and accessible for future use.

Checksum is a special number created from a file or set of digital information to check if that data is still correct and has not been changed or damaged. Think of it like a digital fingerprint. When a file is first made or saved, a checksum is calculated from its contents. Later, when you want to make sure the file is still the same (e.g., after moving it to another computer or making a backup), the checksum is calculated again. If the new checksum matches the original, the file is safe and unchanged. If they do not match, the file may be corrupted or may have been tampered with. It is a simple way to check that digital information remains accurate and safe.

Checksum (creation & verification) tool is a software program that calculates and compares checksums to verify the integrity of a file or data. It works by creating a unique number (checksum) from the contents of a file when it is first saved. Later, it can recalculate the checksum and compare it to the original. If the numbers match, the file is unchanged and safe. If they don't match, it means the file might be corrupted or altered. This helps ensure that digital data remains accurate and hasn't been damaged or tampered with.

DANS (Data Archiving and Networked Services) is the Dutch national centre of expertise and repository for research data, helping researchers make their data available for reuse. Dans gives examples of preferred file formats that based on international agreements should offer long-term guarantees in terms of usability, accessibility and sustainability. In the Netherlands, it is recommended to consult with DANS for long-term archiving and accessibility of interviews recordings.

Data steward is a person or role responsible for ensuring the quality, consistency, and proper governance of data within an organization. This includes managing metadata, enforce data standards and policies, and act as a bridge between technical teams and data users to ensure that data is accurate, accessible, and fit for purpose.

Digital image colour profile is a set of data that defines the colour characteristics of an image, for consistent colour reproduction across different devices and media. This profile ensures that the colours viewed on a screen are accurately reproduced in the printed output.

Digital steward is a person or role responsible for managing, preserving and protecting digital information to ensure its long-term accessibility and integrity. This includes organizing digital files, safeguarding them from loss or corruption, maintaining data security, and ensuring they remain usable as technology changes over time. A digital steward oversees digital collections, implements best practices for data storage and may coordinate digital preservation strategies within organizations such as libraries, archives, museums and cultural institutions.

Dots per Inch (DPI) is the standard unit used to measure printing resolution. A higher DPI value generally means that the printer can produce finer details and smoother gradations in colour, resulting in sharper and more defined prints.

File format identification is the process of determining a file's type based on its structure, content or extension. This helps to understand how the file can be used or to identify the software needed to open it. File identification typically occurs by checking whether the file corresponds to a recognized standard or format

File format identification tool is a software that helps determine a file's type based on its content, structure or extension. These tools help verify file formats, especially when files are misnamed or their extensions are misleading. Commonly used identification tools are DROID (Digital Record and Object Identification) and JHOVE (JSTOR/Harvard Object Validation Environment).

Forensic disk controller is a specialized hardware device used to safely access and copy data from storage media (such as hard drives, SSDs or USB drives) without altering the original data. It normally has features such as **write-blocking**, which prevents any data from being written to the

original source disk; **imaging and cloning**, which allows exact copies of a disk; and **verification tools** to verify that the copies match the original files.

Identification of essential stakeholders is an information-gathering step designed to identify and establish the people and companies needed for the preservation and (re)printing of digital-based photographic artworks.

Image resolution refers to the level of detail of an image, typically measured in **pixels per inch (PPI)** for digital displays or **dots per inch (DPI)** for printing. Resolution is an objective measure based on pixel count and it is crucial for determining how an image will appear when printed or displayed on different devices.

Integrity (external hard drive disk): Integrity in the context of an external hard drive refers to the accuracy, reliability and consistency of the data stored on the device. It means that the files saved on the hard drive remain unchanged and uncorrupted over time, ensuring that the information is complete and accurate every time it is accessed. Maintaining integrity involves protecting the data from accidental loss, corruption, hardware failure or unauthorized changes.

Iteration report in the context of time-based conservation refers to a document that tracks the ongoing progress and outcomes of conservation efforts applied to time-based media (such as video, audio or digital art) over multiple phases or cycles (Philips 2015). The concept of iteration report, tailored to the needs of digital-based photographic artworks with a collaborative production process, may be a valuable documentation method to be used when creating photographic prints. The purpose of the iteration reporting is documentation of a **history of change**.

Pixels per inch (PPI) describes the density of pixels in a digital image when it is displayed on a screen. PPI is calculated by dividing the number of pixels in either the horizontal or the vertical direction by the physical length of the image in inches. A higher PPI value means more pixels are packed into each inch, resulting in a sharper and more detailed image when viewed on a screen.

Preferred file formats are file formats that an institution, focusing on sustainable access, ideally stores. These digital file types are recommended for long-term storage, sharing or preservation because they are more likely to remain accessible and usable over time. These formats are typically chosen for their stability, widespread compatibility and low risk of becoming obsolete. They are usually non-proprietary and well-documented, and they support lossless data compression, which helps maintain the quality and integrity of the content. Choosing preferred file formats helps ensure that digital files can be opened and used in the future, regardless of changes in technology or software.

Printing resolution refers to the level of detail and clarity that a printer can produce in a printed image or document. It is typically measured in **dots per inch (DPI)**, which indicates the number of individual dots of ink or toner that a printer can place within a one-inch line

(Re)printing is used to indicate that a photographic work may be printed for the first time or reprinted a second time (Marchesi 2025). In this document, when ‘reprinting’ appears without brackets, it specifically refers to instances where the work has already been printed and is being printed again as part of a conservation strategy.

Reprinting as a conservation strategy refers to instances where a photographic artwork has become too damaged or discoloured to be displayed. This approach typically takes place after the damage has occurred and involves replacing the work with a new, pristine version. Achieving a close resemblance between the original and the new print—such as matching the photographic image and dimensions—is often considered critical, with the artist’s involvement playing a pivotal role in the process (Marchesi 2017).

Reprinting as an exhibition practice involves different artistic approaches. In some cases, artists foresee that their preferred method of display may damage the prints, so they plan to reprint them for both exhibition and conservation strategies. In other cases, artists create photographic works that only exist physically during the exhibition.

S.M.A.R.T. (Self-Monitoring, Analysis and Reporting Technology) is a monitoring system built into most modern hard drives and solid-state drives (SSDs) that tracks the **health** and performance of the drive. It collects data on various aspects such as temperature, read/write errors and bad sectors. By analysing this information, S.M.A.R.T. can predict potential drive failures before they happen, allowing users to take preventive actions, such as backing up data or replacing the drive. This helps maintain the integrity and reliability of stored data.

Work-defining properties are the essential characteristics that define the identity of an artwork (Laurenson 2006).

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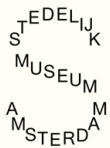
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