

Guidelines to implement digitisation strategies of archive documents

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SUSTAINABLE AND SMART DIGITALIZATION IN PUBLIC SERVICE SECTOR

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1. Introduction

The "DigitSmart" project was established with the objective of promoting the digitisation of documentary materials of public and private organisations.

The digitisation of documentary materials, whether in public administrations or private cultural foundations, is a transformative process that enables the preservation, accessibility, and promotion of technical, cultural and historical heritage. With the rapid development of digital technologies, this process has become not a necessity and a strategic goal for those institutions that are committed to safeguarding important archival records and making them available to a wider audience and to public communities.

The digitisation of documentary material entails converting analog records, such as manuscripts, books, photographs, technical modules, maps and audiovisual content, into digital formats that can be stored, managed, and accessed electronically. These Guidelines explore the objectives, advantages, and current trends in digitisation, with a focus on their relevance for public administrations and private cultural foundations.

DIGITSMART partners represents these different domains: Municipality of Kastela is a public administration interested in digitising cadastral services, while Fondazione di Vagno is a private cultural foundation managing an important historical photographic archive. Romagna Tech is a research organisation working in the field of digital innovation, providing methodological approaches and technical information on documentary digitisation.

The general objectives of the project included the digitisation of archival materials of different nature, both cultural and cadastral, and the creation of platforms that make these materials easily accessible to the public.

These guidelines are intended to be a useful tool to promote knowledge about the process of digital transformation in the different sectors of technical or cultural ecosystems. Actually, another important aspect highlighted within the DIGITSMART project is the exchange of good practices between partners and stakeholders, both public and private.

The document is the result of a study and analysis of the current panorama with the aim of creating clear and comprehensible guidelines for all users.

It has to be noted that the Guidelines analyse aspects that concern digitisation and the technological tools and instruments that are useful to facilitate this process. The subject of archiving and archiving-related techniques are specific to organisations and are not dealt with in this document.

2. Digitalisation of documentary materials

DIGITSMART project is focused on the digitisation of public technical documents and cultural historical documents of cultural organisations.



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2.1 Digitisation of cadastral documents: objectives and advantages for public administrations and citizens

The digitisation of cadastral documents is an essential aspect for the modernisation of land management systems. Cadastral documents—such as land registries, property deeds, maps, and survey data—play a vital role in the administration of land ownership, property rights, taxation, and urban planning. As public administrations and governments continue to embrace digital technologies, the transition from paper-based records to digital formats offers numerous benefits not only for the institutions themselves but also for citizens.

The digitisation of cadastral documents brings significant benefits to both public administrations and citizens. For governments and local authorities, it enhances operational efficiency, reduces costs, improves transparency, and supports better decision-making in land management and urban planning. For citizens, it simplifies access to land and property information, secures property rights, and streamlines legal and financial transactions related to real estate.

As the world continues to move towards digital solutions, the benefits of digitised cadastral systems will continue to grow, offering improved services, enhanced transparency, and more efficient land management for the benefit of all stakeholders.

The main objectives of a digitalisation process of public cadastral documents can be summarised as follows:

- 1. Improved land and property management:** the primary objective of digitising cadastral documents is to streamline and improve land and property management processes. By converting paper records into digital formats, administrations can more effectively track ownership, manage land parcels, and monitor property-related transactions. Digitisation enables quick access to up-to-date information, reducing the time spent searching for and processing paper documents.
- 2. Enhanced accuracy and reliability:** digital systems are less prone to human error compared to manual entry in paper-based records. By using modern technologies such as Geographic Information Systems (GIS) and integrated databases, cadastral data can be more accurate, comprehensive, and reliable. These systems can reduce inconsistencies, avoid data duplication, and ensure that cadastral documents reflect the most current land ownership and boundary information.
- 3. Data integration and interoperability:** digitisation allows for better integration of cadastral information with other governmental and administrative databases (e.g., land use, taxation, urban planning). Interoperability between different data systems can enable more coordinated policy development, urban planning, and infrastructure projects. This integration facilitates improved decision-making at the municipal, regional, and national levels.



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4. Efficient public services: the digitisation of cadastral documents supports more efficient public service delivery. Citizens and professionals (e.g., surveyors, notaries, real estate agents) can access land-related information more quickly, reducing the need for in-person visits to municipal offices or land registries. By creating online portals, public administrations can offer more streamlined, user-friendly services that provide timely and accurate information on property ownership, boundaries, and land use.

5. Preservation and disaster recovery: cadastral documents are often critical for resolving land disputes, verifying ownership, and supporting legal claims. Digitisation ensures the long-term preservation of these documents, safeguarding them from physical deterioration due to age, handling, or environmental damage (e.g., fire, flooding, or other disasters). Digital archives, backed up across multiple locations, ensure that critical land records can be restored in the event of a disaster.

Public administrations benefit from digitisation of cadastral documents in terms of cost reduction and efficiency gains: actually, it reduces the costs associated with physical storage, paper handling, and maintenance of physical records. It also eliminates the inefficiencies of manual processing and retrieval, reducing administrative overhead. Public administrations can improve workflow efficiencies, reducing the time spent searching for, copying, or verifying documents. Over time, these efficiencies lead to cost savings and improved service delivery.

Another important aspect linked to the digitisation process is transparency and a better public governance. A digital cadastral system enhances transparency by providing real-time access to land-related information. This can help reduce the opportunities for corruption, as the system allows for more monitoring, auditing, and tracking of property transactions and land registry updates. Transparent, accurate cadastral data supports better governance by fostering trust in the system and reducing disputes over land ownership.

With digitised cadastral documents, public administrations can more easily manage urban growth, land zoning, and infrastructure development. GIS and mapping technologies allow for more effective planning, monitoring of land use, and evaluation of land value. This information is critical for developing sustainable urban areas, managing public utilities, and making informed decisions about land allocation for public projects.

Digitised cadastral records enable more accurate property valuation and more efficient tax collection. By having easy access to up-to-date land ownership and property value data, public administrations can ensure that property taxes are assessed fairly and accurately. This supports efficient revenue collection for local governments and helps ensure the long-term sustainability of public services.

Citizens as well can take advantage of digitised public services for cadastral information as it means easier access to critical land and property information. Whether they are verifying



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ownership, checking property boundaries, or reviewing land-use regulations, the ability to access this data online or through digital platforms saves time and simplifies administrative processes. This convenience is especially important for individuals living in remote or rural areas where visiting a local land registry office may be time-consuming or costly.

Citizens benefit from the increased transparency that comes with digitisation. With online access to property records, citizens can independently verify property ownership, check encumbrances (e.g., mortgages, liens), and ensure the legitimacy of land transactions. This reduces the risk of fraud or disputes and offers greater security regarding property rights.

Digitisation facilitates smoother property transactions, such as buying, selling, or transferring land. Citizens can more easily obtain the necessary documentation and ensure that the process follows legal requirements. The ability to electronically sign and submit documents, along with quick access to accurate land records, accelerates property transactions and reduces the bureaucratic burden on citizens.

With digitised cadastral systems, citizens are more likely to have secure and well-documented property rights. Electronic records reduce the chances of land fraud or title disputes, ensuring that ownership rights are clear and legally enforceable. In the event of conflicts or claims, digitised records provide an immutable, verifiable source of truth regarding property ownership.

2.2. Benefits and opportunities of digitisation in the cultural sector

As stated in the National Plan for the Digitisation of Cultural Heritage (PND), digitisation of cultural heritage is considered a crucial activity to foster the accessibility of historical, artistic and documentary heritage, while preparing it for the new challenges of the future by exploiting the countless opportunities offered by new technologies. Digital technology has irreversibly transformed both the processes of production and storage of historical material and the ways in which this material is preserved and enhanced. A transformation that, however, does not only consist of the transition from analogue to digital, but rather requires careful planning to avoid wasting financial resources and energy in order to ensure the accurate preservation of heritage over time.

Enhancing cultural heritage

Digitisation offers a unique opportunity to preserve and enhance cultural heritage. Thanks to technologies such as 3D scanning, works of art and historical artefacts can be preserved in digital formats that guarantee their usability over time. In addition, digital archives and virtual exhibitions allow institutions such as museums and libraries to present their heritage to a global audience, increasing visibility and appreciation for local culture.

Interaction and Public Involvement



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Immersive technologies such as augmented reality (AR) and virtual reality (VR) are radically changing the public's experience of cultural venues. Through AR applications, visitors can interact with artworks in innovative ways, exploring details and historical contexts that would otherwise be difficult to grasp. These immersive experiences not only enrich the visit, but can also attract a younger and more diverse audience, stimulating a renewed interest in culture.

Education and Access to Culture

Digitisation broadens access to education and culture. Institutions can offer online courses, seminars and multimedia content that reach a wide audience, regardless of geographic location. This is especially important for schools and universities, which can integrate digital resources into their curricula, providing students with a richer and more diverse educational experience.

Innovation in Cultural Services

Digitisation enables the development of new business models for cultural institutions. Streaming platforms can host cultural events, concerts and theatre performances, allowing artists to reach a global audience. This not only creates new sources of revenue, but also democratises access to culture by bringing quality events and content into people's homes.

Collaboration and Networking

Digital platforms facilitate collaboration between cultural institutions, artists and communities. Digital networking enables the sharing of resources, experiences and knowledge, promoting synergies that can lead to innovative projects. This cooperation can generate richer and more diverse cultural events, enriching the cultural offer of a community.

At the same time, digitisation of cultural heritage allows it to be exploited globally. Museums and archives can offer virtual tours and digital content, making cultural heritage accessible also to those who do not have the possibility to physically visit the sites.

The digitisation of documentary material is an essential component of preserving cultural heritage and increasing public access to historical resources. For both public administrations and private cultural foundations, the objectives of digitisation are multifaceted, including the preservation of materials, enhanced accessibility, and fostering educational and research opportunities. The advantages of digitisation, such as cost savings, security, and improved user experience, are clear, while trends such as AI, cloud storage, and VR integration point to a dynamic future for digital archives. By embracing these trends, institutions can ensure that their documentary materials are not only preserved for future generations but also more accessible and engaging for today's global audience.



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Public administrations and private foundations play a critical role in promoting cultural heritage and fostering public engagement. Through digitisation, institutions can make cultural materials available to the public in interactive formats, potentially involving them in virtual tours, digital storytelling, or participatory online projects. This not only raises awareness of cultural heritage but also encourages public dialogue and interaction with historical documents.

Digitalisation allows institutions to optimise their internal processes, facilitating the automation of repetitive and bureaucratic tasks. By implementing management software and digital platforms, institutions can reduce the workload for staff, improving overall productivity. In addition, the centralisation of data enables more efficient management of information, ensuring smooth communication between different departments and reducing the risk of errors. This approach not only streamlines daily operations, but also allows for more timely and informed responses to citizens.

One of the most relevant aspects of digitisation is the breaking down of physical and time barriers in accessing services. Citizens can access public information and services at any time and from anywhere, thanks to the use of online platforms. This is particularly important for the most vulnerable segments of the population, who may find it difficult to physically travel to public offices.

3. Future trends in the digitisation of document archives

The digitisation of document archives is undergoing a deep transformation, influenced by the emergence of innovative technologies. Among these, artificial intelligence (AI), machine learning and blockchain are redefining how documents are archived, preserved and accessed. In this chapter we will explore how these technologies may shape the future of the archival and cultural sector.

3.1 Artificial Intelligence

Artificial intelligence is revolutionising the way document archives are managed, transforming not only digitisation but also the enjoyment and preservation of cultural heritage. Using advanced algorithms and data processing, AI offers innovative solutions to traditional archival challenges.

Process automation

One of the most significant aspects of AI is its ability to automate repetitive and laborious tasks. Cataloguing, a process that historically requires considerable human effort, can now be done with intelligent tools.

- Document Recognition: AI software can analyse paper and digital documents, automatically identifying the type of content and generating relevant metadata. This not



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only speeds up the archiving process, but also improves accuracy, reducing the risk of human error.

- **Intelligent Indexing Tools:** AI systems are able to create detailed indexes that enable faster and more effective searching within vast archives. Automatic analysis allows documents to be categorised according to keywords, dates, authors and other parameters, making navigation much more intuitive.

Semantic analysis

Semantic analysis represents a significant advance in the way documents can be interpreted and used.

- **Natural Language Processing (NLP):** Through NLP techniques, AI is able to understand and contextualise language in documents. This ability enables it to extract meaningful information and identify relationships between different documents, facilitating research and analysis.
- **Contextualised Searches:** Thanks to semantic analysis, users can search not only by keywords, but also by related concepts, ideas and topics. This approach greatly enhances the user experience, allowing them to discover information that might remain hidden in a simple text search.

Chatbots and virtual assistance

The digitisation of archives can be accompanied by the implementation of chatbots and virtual assistants, which provide a direct point of contact between users and archival resources.

- **Intelligent Interaction:** AI-powered chatbots can answer frequently asked questions, guide users through the search process and provide information about documents. This direct interaction not only improves access, but also offers immediate support, making the archive more accessible to a wider audience.
- **Personalising the Experience:** By analysing user data, AI systems can personalise recommendations, suggesting documents or resources based on interests and previous searches. This not only improves the user experience, but also encourages greater content discovery.

Image and video recognition

AI also plays a crucial role in the analysis of visual materials, a crucial aspect for archives that store photographs, videos and artworks.

- **Facial and Object Recognition:** Advanced facial and object recognition technologies make it possible to identify people and elements within images and videos. This facilitates the cataloguing and retrieval of visual material, enabling users to quickly find what they are looking for.



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- Automatic Tagging: AI can also apply automatic tags to images, describing the content and context. This process not only optimises the organisation of material, but also makes it easier for users to search for specific images.

Digital monitoring and preservation

A further innovative aspect of AI in archives is its application in digital preservation.

- Predictive Analysis: Through predictive analysis, AI systems can monitor the state of digital materials, identifying potential risks of deterioration and suggesting preventive action. This proactive approach ensures that documents remain accessible and usable in the long term.
- Preservation Automation: IA can also automate preservation practices, optimising storage conditions and ensuring that documents are maintained in appropriate environments, reducing the risk of loss or deterioration.

3.2 Machine learning

One of the main branches of artificial intelligence is machine learning, which is based on the assumption that systems can learn from data, identify patterns and make decisions, possibly with minimal human intervention. In essence, these are systems that allow machines to learn from their experiences, correct errors and adapt to new inputs to autonomously perform a task/activity with 'almost' human logic. Machine learning is evolving along a line of research based on the use of neural networks organised in multiple levels of depth and therefore called deep learning.

It is a special type of machine learning inspired by the structure and functioning of our brain, which trains the computer to perform tasks - such as recognising speech, identifying images or making predictions - in a human-like manner. Deep learning requires a very powerful computational capacity capable of 'holding' different layers of computation and analysis (which is what happens with the neural connections of the human brain). This may sound like a futuristic level of technology, but in reality, these systems are already in use in pattern recognition, voice or image recognition and natural language processing systems.

These aim to create systems that foster human/machine interaction and understanding. They mainly deal with texts (of any nature, including web pages, social media posts and tweets, commercial information, etc.).

Among artificial intelligence systems, those based on Natural Language Processing have achieved the most in recent years: spell-checkers in Office Automation suites or automatic translation systems (also available online, such as Google Translate) are just some of the NLP applications that we use in our daily lives.



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In the field of archive digitisation, machine learning is a powerful tool for improving the digitisation process. Machine learning systems can be particularly useful in several areas, including:

- **Intelligent Classification:** Machine learning models can be trained to classify documents according to content, theme or type by learning from previous examples. This approach improves cataloguing accuracy and reduces the need for human intervention.
- **Trend Forecasting:** Predictive analysis, powered by historical data, can help archivists identify which types of records might become more relevant in the future. This anticipation capability enables strategic planning of archival resources.
- **Facial Recognition and Advanced OCR:** Optical Character Recognition (OCR) technologies are advancing through machine learning. This allows handwritten or printed documents to be digitised with greater accuracy. In addition, facial recognition can be used to manage photographic and visual archives, simplifying the organisation of images.

3.3 Blockchain for storage and security

An important emerging trend to consider when it comes to document digitisation processes is blockchain.

Blockchain, or 'blockchain', is a technology that enables the development of applications based on a decentralised system for sharing and validating information. Among its earliest applications is the Bitcoin protocol and the world of cryptocurrency, but today the uses of blockchain are expanding into many different areas.

The term 'blockchain' reflects its distributed structure: each node in the network has a role in verifying information, transferring it to the next node. Information and transactions are then recorded in a blockchain, which is shared and immutable, thus guaranteeing data integrity.

Due to this decentralised and immutable nature, it represents a fundamental change in the way data is managed. In particular, the use of blockchain enables:

- **Data Integrity:** Using blockchain, archivists can guarantee the integrity of digitised documents. Every change or access to a document is recorded securely and transparently, creating an audit trail that increases confidence in the authenticity of the data.
- **Decentralised Access:** The blockchain enables the creation of decentralised repositories, reducing the risk of cyber-attacks and data loss. Users can access documents without an intermediary, promoting greater transparency.
- **Smart Contracts:** Smart contracts, programmable on the blockchain, can automate access processes and user licences. This means that conditions for the use of documents can be managed securely and automatically, simplifying rights management.



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3.4 Challenges and ethical considerations

With the advancement of digital technologies, digitisation of documentary archives offers unprecedented opportunities to preserve, access and enhance cultural heritage. However, this process is not without significant challenges and ethical considerations that need to be carefully addressed.

Accessibility and Inclusion

One of the crucial challenges concerns the accessibility of digitised material. Although digitisation can expand access to historical and cultural documents, there is a risk that certain categories of users, such as people with disabilities, cannot fully benefit from these resources. It is crucial that archival institutions design digital platforms and content to be usable by all, using assistive technologies and following accessibility guidelines. Lack of inclusiveness could perpetuate already existing inequalities in access to cultural heritage.

Privacy and Data Security

Another relevant ethical consideration is data privacy. During the digitisation process, sensitive data, such as personal information contained in historical documents, may be collected. It is essential that archival institutions adopt strict policies to protect the privacy of individuals and ensure the security of information. Transparency in data management is crucial: users must be informed about what data is collected and how it will be used. Furthermore, it is important to ensure that security measures are in place to prevent unauthorised access and privacy breaches.

Authenticity and Accuracy

Digitisation also raises questions about the authenticity and accuracy of documents. While technology makes it possible to create high-quality digital replicas, there is a risk that these versions may be perceived as equivalent to the originals, leading to confusion about their authenticity. Institutions need to establish clear guidelines on how to label and present digitised materials, ensuring that users understand the difference between the original and its digital representation.

Furthermore, the quality of the metadata associated with digitised documents is crucial. Inaccurate or incomplete metadata can compromise the search and use of materials, making it difficult for users to find the correct information. It is therefore essential that institutions invest in training and resources to ensure that metadata is accurate and complete.

Sustainability and Environmental Impact



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Another significant challenge concerns the environmental sustainability of the digitisation process. The production and maintenance of the technologies required for digitisation entail a non-negligible consumption of resources and environmental impact. Institutions must consider the ecological impact of their technology choices and adopt sustainable practices, such as recycling materials and using renewable energy to power servers and infrastructure.

Representation and Cultural Diversity

The digitisation of archives also involves the question of representation. The materials chosen for digitisation may reflect biases or partial narratives of history. It is important that institutions adopt an inclusive approach, selecting documents that represent a variety of voices and histories, avoiding marginalisation of less represented cultures and communities. This not only enriches digital cultural heritage, but also promotes a deeper and more nuanced understanding of history.

In conclusion, while future trends in digitising documentary archives offer extremely exciting opportunities, it is essential to seriously address the challenges and ethical considerations involved. Accessibility, privacy, authenticity, sustainability and representation must be at the core of digitisation strategies, ensuring that digitised cultural heritage is preserved and enhanced in a responsible and inclusive manner. Only in this way will it be possible to create a digital heritage that can be enjoyed and appreciated by all.

4 The document digitisation process

Document digitisation is a fundamental process for the modernisation of institutions and the preservation of cultural and information heritage. In order for the document process to be effective, it is necessary to carefully plan the digitisation process at every stage to ensure high quality and sustainable results.

4.1 Planning and preparation of documentation

The first aspect to consider when starting a document digitisation process is the planning and preparation of the documents to be digitised. In this phase, the focus is on analysing existing documents to determine which materials are to be digitised. This may include historical documents, contracts, reports, photographs and more. It is important to assess several characteristics of the documents, including their value, state of preservation and volume.

Another aspect to pay close attention to at this stage is the definition of objectives. These may include preserving documents, increasing accessibility for the public, or improving operational efficiency. The definition of objectives will guide the technological and methodological choices.



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Document preparation is a very important step that affects the quality and integrity of the digitisation process. This stage includes several steps that, if well executed, ensure that documents are ready for scanning, minimising the risk of damage, ensuring that information is accurately represented in the digital format and that digitised documents are of high quality and easily accessible in the future.

Before digitisation, a thorough assessment of the state of preservation of the documents is carried out. This process involves the physical analysis of each document to identify signs of wear, deterioration or damage. Items such as:

- Physical structure: check for creases, tears, or wear.
- Materials: assess the type of paper, ink and other materials used, as some materials may be more fragile or susceptible to damage during digitisation.
- Presence of harmful substances: ensure that documents are not contaminated by mould, dust or other external agents that may damage the material.

After evaluation, documents showing signs of deterioration may require restoration. This phase may include:

- Cleaning: remove dust and particles with appropriate techniques, avoiding aggressive chemical solvents that could damage the materials.
- Repair: for torn or damaged documents, specialised repair techniques can be used, such as the use of pH-neutral adhesive tapes or Japanese paper to reinforce vulnerable areas.
- Stabilisation: for fragile documents, it is important to stabilise them in order to prevent further damage during the scanning process. This may include the use of special media or mounting techniques.

4.2 Organisation and cataloguing

The organisation of documents is crucial to ensure an efficient workflow during digitisation. This phase includes:

- Classification: group documents according to logical criteria, such as type (e.g. letters, photographs, contracts), date or author. Good classification allows better management of the volume of documents and facilitates future access.
- Numbering and Sequence: assigning numbers or identification codes to each document helps maintain order. This is particularly useful when managing large collections or important historical documents.

After organising the documents, it is necessary to create metadata, as it is these elements that provide key information about the documents. Metadata can include:

- Descriptive information: title, author, creation date, document type and content description.
- Technical information: document size, format and type of material.
- Access information: copyright, access restrictions and possible preservation notes.



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Metadata enable a more efficient search and easier management of digitised documents, improving interoperability with other collections and archives.

4.3 Creating an inventory

Finally, it is useful to create a complete inventory of all documents that will be digitised. This inventory should contain:

- A detailed list of documents.
- Their state of preservation.
- The associated metadata.
- Any necessary restoration work.

An accurate inventory facilitates project planning, provides an overview of the status of materials and serves as a reference throughout the digitisation process.

4.4 Choice of technologies

The selection of scanning tools is a critical step that affects the final quality of digitised documents. Options include different types of scanners and cameras. Each type of technology has its advantages and disadvantages; it is essential to consider the technical specifications and objectives of the project to make the best choice.

Given the nature of the guidelines, we will deal with the topic of technology in depth in the next chapter.

After scanning, it is essential to carry out quality control of the documents. This step involves reviewing the scanned images to ensure that they are sharp, legible and free of defects. It is useful to compare the scans with the originals to ensure that they have been captured accurately. Any errors, such as blurring or cropping, must be corrected before proceeding to the next steps. Implementing quality control protocols will ensure that only documents that meet the required standards are digitally archived.

4.5 Post - production

Post-production is an important step in improving the visual quality of digitised images. This phase can include colour correction, cropping and image optimisation. The use of professional editing software, such as Adobe Photoshop or GIMP, makes it possible to remove imperfections and improve clarity. In addition, advanced processing techniques, such as white balance and distortion removal, can be applied to ensure that the final image accurately represents the original.



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Once the document has been digitised, metadata must be applied so that it is easily searchable and accessible. Metadata should include information such as title, author, date of creation and detailed descriptions. This step may also involve the use of taxonomies and controlled vocabularies to improve consistency and accuracy in cataloguing. The integration of standardised metadata will help facilitate interoperability between different platforms and repositories.

4.6 Archiving and access

The archiving and access phase ensures that digitised documents are stored securely and are easily retrievable. This phase focuses not only on data security, but also on accessibility for users, ensuring that information is available for consultation and search.

4.6.1 Choice of storage platform

The first consideration is the choice of storage platform, which may vary depending on the specific needs of the organisation and the amount of material to be managed. The main options include:

- **Local servers:** This solution provides for the storage of documents on physical servers within the organisation. It is ideal for those who need complete control over data and wish to maintain privacy. However, it requires investment in hardware, maintenance and security.
- **Document Management Systems (DMS):** These systems offer advanced functionalities for archiving, managing and searching documents. DMSs can integrate metadata and enable the categorisation of documents, facilitating the organisation and retrieval of information.
- **Cloud Storage Solutions:** This option allows documents to be stored on remote servers accessible via the Internet. Cloud services offer scalability, cost reduction and global accessibility. However, it is essential to consider security and data protection, especially for sensitive documents.

Regardless of the solution chosen, it is essential to guarantee data security. To do this, a number of aspects must be considered, including:

- **Encryption:** Protect documents with encryption both in transit (when transferred) and at rest (when stored) to prevent unauthorised access.
- **Authentication and Access Control:** Implement robust authentication systems, such as the use of complex passwords and two-factor authentication, to ensure that only authorised users can access documents.
- **Backup and Recovery:** Establish regular backup procedures to protect data from accidental loss or damage. It is essential to have recovery plans that allow documents to be recovered quickly in the event of a malfunction or cyber-attack.

4.6.2 Accessibility and sharing



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Once archived, documents must be easily accessible to authorised users. This requires the creation of user interfaces that are intuitive and easy to navigate. Key considerations include:

- **Access Ports:** Create web portals or applications that allow users to search and view digitised documents. Interfaces should be designed with usability in mind, with advanced search functionality, filters and categorisation.
- **Viewing and Navigation:** Provide tools for viewing documents, allowing users to zoom, rotate and navigate between pages without difficulty. Viewing options should be compatible with various devices, such as computers, tablets and smartphones.

Another important aspect of document searching is the search functionality. These are essential to enable users to quickly find the information they need. They can include:

- **Keyword Search:** Allow users to search for documents using keywords, phrases or metadata. This requires optimisation of the metadata to ensure relevant results.
- **Advanced Searches:** Implement advanced search options that allow users to filter results according to various criteria, such as date, document type or category.

Accessibility for Diverse Audiences

It is essential to consider the different needs of users. This may include:

- **Access for Researchers and Academics:** Providing advanced tools that enable the citation and analysis of documents for research purposes.
- **Access for the General Public:** Create simplified access routes for the public, ensuring that information is presented in a clear and comprehensible manner.
- **Inclusive Accessibility:** Ensure that platforms comply with accessibility regulations, making documents available for people with disabilities, such as the use of screen readers or adaptive interfaces.

4.7 Conservation and Maintenance

Preservation and maintenance of digitised documents ensures the longevity and integrity of data over time. In an ever-changing technological environment, it is crucial to implement preservation strategies that protect digital documents from damage, data loss or technological obsolescence.

Backup Plans

An effective backup plan is essential to ensure that digitised documents are protected from unforeseen events, such as hardware failure, cyber-attacks, or natural disasters. Data loss can have significant consequences, especially for historical documents and unique materials.

Backup strategies must include several key practices:



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- **Regular Backups:** Establish a regular backup schedule, e.g. daily, weekly or monthly, depending on how often documents are updated. Backups should be automated, if possible, to reduce the risk of human error.
- **Storage in Multiple Locations:** Backups must be stored in multiple locations to ensure security. This may include a combination of local (on physical servers) and cloud storage. This strategy protects data in the event of catastrophic events in a single location.
- **Recovery Tests:** It is essential to perform regular recovery tests to ensure that backups are working and that data can be recovered quickly. This practice helps identify possible problems before emergency situations occur.

Updating and Monitoring

Technology is constantly evolving and this can lead to obsolescence in file formats, software or hardware used to manage digitised documents. It is essential to implement an update plan to ensure that systems are always up-to-date and compatible with new technologies.

It is important to constantly monitor the quality of digitised documents. This may include:

- **Periodic Verification:** Carry out regular checks on digitised documents to ensure that there has been no deterioration or corruption of data. Use software tools to detect any errors in the files.
- **Data Audit:** Conduct periodic audits of metadata to ensure that it is accurate and up-to-date. This process helps maintain the relevance and accessibility of information.

Storage Formats and Standards

The choice of file formats for long-term preservation is crucial. Some formats are more suitable for long-term storage than others. For instance:

- **Standard Formats:** Use open, standardised file formats, such as PDF/A for text documents or TIFF for images, as these formats are designed for preservation and ensure greater future compatibility.
- **Avoid Proprietary Formats:** Proprietary formats may become obsolete and may not be supported in the future. It is advisable to limit the use of specific formats of commercial software.

Plan regular migration strategies to transfer documents to new formats or filing systems. This process may be necessary when obsolete formats are identified or when technological systems are upgraded. Migration should be performed in a systematic and documented manner to maintain data integrity and quality.

Physical Preservation of Media



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If digitised documents are stored on physical media (such as external hard disks or tapes), it is essential to implement physical preservation practices:

- **Environmental Conditions:** Media should be stored in controlled environments, avoiding extreme temperatures, excessive humidity and exposure to direct light.
- **Safe Handling:** Follow safe handling procedures for physical media, minimising the risk of damage during use or transport.

At this point, the digitisation process is complete.

We can say that this journey is complex but extremely rewarding, requiring careful planning and a clear strategy. Through the implementation of effective practices and the use of appropriate technologies, it is possible to preserve cultural heritage and improve access to information, thus contributing to the modernisation of institutions and the enhancement of culture.

5. The tools and technologies to digitise

Depending on the digitisation needs, it is possible to identify a number of technological tools that are able to enable the digitisation process.

In our case, we will focus on two fundamental elements: the technologies available for document scanning and the architecture of the web platform.

5.1 Document Scanning

Scanning is the process of digitising a paper document, i.e. the transfer of data from a paper document to one in digital form.

A document is scanned using a special device called a scanner, an optical analyser that transforms the read image into digital signals, connected to a computer that stores the document.

Different types of document scanners are available on the market, each designed to meet specific digitisation needs, depending on the characteristics of the material to be digitised.

5.1.1. Flatbed scanners



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Flatbed scanners are commonly available in sizes ranging from A4 to A2+. These devices use an optoelectronic assembly that moves parallel to the document, while the document remains stationary on a horizontal plane. Within assembly, a cold lamp emits white light, which progressively illuminates the document. The reflected light is then collected by a lens system that separates it into the three basic colours: red, green and blue (RGB). These components are then sent to the sensors, which may be CCD (Charge Coupled Device) in high quality models, or (Contact Image Sensor), although the latter are becoming increasingly rare.



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Figure 1 - Example flatbed scanner

When choosing a scanner model, it is important to consider several characteristics, including optical resolution (real and non-interpolated), dynamic density and bit depth, which are all related. Flatbed scanners are particularly used for digitising bibliographic and archival materials, as well as for scanning glass plate negatives, photographic prints and film formats that cannot be handled by virtual drum scanners.

5.1.2. Planetary scanners



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Professional scanners are specifically designed to digitise bound volumes and loose sheets, even large ones, ensuring the protection of the original without direct contact. They are usually equipped with tilting tables and use infrared- and ultraviolet-free LED lights.

There are two types of planetary scanners: those with a linear sensor and those with a matrix sensor. In the first case, scanning is done by a mechanical movement of the sensor over the document, while in the second case, scanning is done in a single photographic shot.

These scanners enable high-resolution scanning of paper and parchment documents, even in large formats, ensuring excellent productivity. The most common models are in A2 or A1 format, but some also handle formats up to double A0.

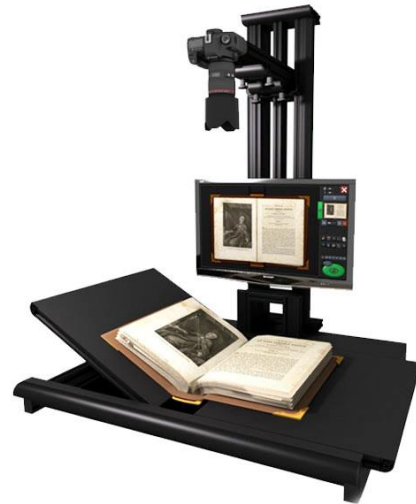


Figure 2 - Planetary scanner example

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The use of these instruments is recommended for digitising bibliographic or archival material, especially for old and delicate documents. Planetary scanners are particularly suitable in these cases, as they can be equipped with tilt or 'V' planes to facilitate the processing of bound materials.

5.1.3 Drum scanner

In contrast to the others, in drum scanners the opto-electronic unit is stationary with respect to the document, which is stretched around a rotating roller. A beam of white light is projected onto the document and a sensor - to which the reflected beam is directed - separates the light reflected from the document into the three fundamental RGB components.

Each component is then sent to a photomultiplier tube (PMT, Photo Multiplier Tube) which converts the light beam into an electrical signal, which in turn is sent to an analogue-to-digital converter and from there to the PC.



Figure 3 - Professional drum scanner

These scanners were used industrially, especially in printing houses, which needed to capture high-resolution images. Nowadays, they are



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increasingly being replaced by flatbed scanners, which are much easier to use and in their more technologically advanced forms have now reached levels of quality comparable to drum scanners.

This tool has been mentioned in order to provide as comprehensive an overview as possible of the technologies in use (yesterday and today) for digitising large print material; it is nowadays considered a highly inadvisable tool for the digital acquisition of cultural assets, as it produces considerable mechanical stress on the object to be digitised.

5.1.4 Virtual drum scanner

Virtual drum scanners are particularly suitable for scanning original photographs, as there is no contact between the capture system, consisting of the lens and CCD sensor, and the original. This minimises the possibility of disturbances during scanning, such as 'Newton's rings' or spots caused by dust and scratches.

Thanks to the use of special magnetic film holders, the original remains perfectly flat while scanning on a slightly curved surface, ensuring flawless focus across the entire image. Unlike traditional scanners, which use glass planes or prisms, and typographic drum scanners, which require the use of gel or oil, the virtual drum scanner allows maximum detail to be captured without any interference or additional material on the original film.

When choosing the most suitable model, it is crucial to consider optical resolution (real and non-interpolated), dynamic density and bit depth, all of which are closely related characteristics.

5.2 Cameras: types and characteristics

The digital camera, together with or instead of the scanner, is the most suitable tool for the digitisation process. Different types of cameras are available today:



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5.2.1 Digital Reflex Cameras (DSLR)

Digital SLR cameras, commonly known as DSLRs, are highly versatile and robust tools designed to deliver exceptional performance in a wide range of conditions. These devices feature a mirror system that allows you to see exactly what the lens captures, thus ensuring a high degree of precision. The ability to swap lenses allows you to choose between macro lenses for extreme detail and wide-angle lenses for wider shots.

These cameras are particularly suitable for photographing works of art, ancient manuscripts and objects of historical value, where image fidelity and quality are crucial. Their versatility also makes them suitable for documenting cultural events and exhibitions.

Examples of Models:

- Canon EOS 5D Mark IV: With a 30.4 MP full-frame sensor, it offers outstanding image quality and excellent colour rendition. It is ideal for projects requiring high resolution and a wide dynamic range.
- Nikon D850: This camera features a 45.7 MP sensor and an impressive shooting speed. Its ability to perform well even in low light makes it perfect for photographing artwork in museums or galleries.



Figure 4 - Digital camera example

5.2.2 Mirrorless Cameras

Mirrorless cameras represent one of the most significant innovations in the world of digital photography. Without the mirror mechanism typical DSLRs, they are lighter and more compact, without compromising image quality. These cameras are equipped with high-quality sensors and offer options changing lenses, making them extremely versatile. They are ideal for digitising works of art, sculptures three-dimensional objects, where manoeuvrability low weight are significant advantages, especially in confined spaces.



Figure 5 - Mirrorless camera example

Examples of Models:



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- Sony Alpha a7R IV: With an impressive 61 MP full-frame sensor, this camera is capable of capturing minute details, making it ideal for digitising valuable parts.
- Fujifilm X-T4: In addition to its high photographic quality, the Fujifilm X-T4 offers high-end video capabilities, perfect for documenting cultural events and artistic creations on the move.

5.2.3. Medium Format Cameras

Medium format cameras are high-end tools, characterised by larger sensors than DSLRs and mirrorless cameras. This larger sensor size makes it possible to capture images with extraordinary detail, a higher dynamic range and richer colours.

One can choose this tool when high quality work is to be carried out, such as digitising paintings or sculptures, where every detail and every shade of colour must be preserved precisely and accurately.

Examples of Models:

- Fujifilm GFX 50S II: This camera features a 51.4 MP sensor that offers exceptional detail and high-quality colour rendition, making it perfect for large format digitisation projects.
- Hasselblad X1D II 50C: With an elegant design and unrivalled image quality, it is particularly suitable for architectural and art photography, capturing details that other formats might miss.

5.2.4 High Resolution Compact Cameras

High-resolution compact cameras are lightweight, easy-to-use devices designed to deliver good quality images without the complexity of professional cameras. They are perfect for those looking for a portable tool without sacrificing quality.

These tools do a good job for quick documentation of objects, photographs of exhibitions or events, and for less complex digitisation projects.

Examples of Models:

- Sony RX100 VII: This compact camera offers a 20.1 MP sensor and a range of advanced features, making it ideal for taking high-quality pictures in variable situations.
- Canon PowerShot G7 X Mark III: Lightweight and portable, it offers good capabilities in variable lighting conditions, making it useful for those who need to quickly digitise documents and objects.



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Whatever the choice of camera, it is still essential to consider a number of elements in order to make the best choice, including:

- **Resolution:** Resolution is a critical factor in digitising cultural heritage. Cameras with higher resolutions (20 MP or more) enable the capture of fine details, which are essential for heritage preservation and enjoyment.
- **Dynamic Range:** A wide dynamic range allows details to be captured in both dark and illuminated areas, making it particularly useful in complex lighting situations, such as in museums or indoor environments.
- **Lenses:** The ability to use specific lenses, such as macro lenses, is essential to capture even the smallest details and to photograph three-dimensional objects accurately.
- **Stability:** The use of tripods and stabilisation systems is essential to avoid vibrations and ensure sharp images, especially in low light or during long exposures.
- **Scanning Functions:** Some cameras offer special functions for scanning documents and artwork, such as depth of field control, which can further improve the quality of digitised images.

Again, to ensure an optimal result, it is good to have some accessories that can make all the difference.

Firstly, tripods are essential to stabilise the camera when shooting, as they help to ensure sharp and clear images, especially in low light conditions or for long exposure shots.

Lighting also plays a key role: the use of LED lights or diffuse flashes allows objects to be uniformly illuminated without creating unwanted reflections or shadows, which is essential for the precise capture of colours and textures.

Finally, some post-production software can be used: programmes such as Adobe Lightroom and Photoshop are indispensable tools for retouching images, optimising the final quality and ensuring that every detail is preserved and enhanced.

In conclusion, we can say that the choice of camera for cultural heritage digitisation requires careful consideration of the specific needs, the type of objects to be digitised and the quality required. Investing in a high-quality camera combined with appropriate accessories and technical expertise will guarantee optimal results, preserving the richness and beauty of cultural heritage for future generations.

6. Scouting technology platforms

The architecture of the web platform can be designed in different ways:

- Developing a fully customised system from scratch
- Developing a customised system from advanced applications that simplify and speed up development time



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- Use existing systems that implement the required functionality for the application to be developed.

In the specific case of this project, for reasons of too high costs and too slow development times, solutions that allow the development of platforms from scratch are excluded from technology scouting, while the analysis will focus on

- Commercial platforms capable of providing the expected functionality then:
 - o On the cadastral archiving platforms for the City of Kastela
 - o On the archiving platforms of cultural historical documents for the di Vagno Foundation
- Development platforms that provide high-level tools to quickly implement high customisation.

6.1 Applications for cadastral document archiving services

Different types of applications used for the management and digital archiving of cadastral documents were analysed. These technological solutions, ranging from specific software for cataloguing to advanced platforms for online sharing and consultation, enable a more efficient, secure and accessible management of cadastral information.

6.1.1 GeoCadastrre

GeoCatasto is an advanced information system that combines geographical and cadastral data, designed to manage information on real estate and land. Its operation is based on the collection of georeferenced data, which includes details on property, land and cadastral information. This data is then stored in a geospatial database, which allows quick access and efficient consultation of information.

One of the key aspects of GeoCadastrre is its ability to visualise data through interactive maps. This allows users to intuitively explore cadastral and spatial information. In addition, the system integrates easily with other information tools, such as those related to urban and fiscal planning, thus offering a more complete and informed analysis.

The advantages of GeoCatasto are manifold. First of all, it facilitates access to cadastral information, significantly reducing search times. This enables users to make more informed land and urban planning decisions. Another important aspect is the ability to update data in real time, ensuring that information is always current and accurate.

Transparency is another advantage offered by GeoCadastrre. It makes cadastral information more accessible and understandable, facilitating clarity regarding ownership and associated rights. Finally, the system also supports property valuation by providing the information needed to make more accurate estimates.



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Based on these considerations, we can state that GeoCadastré is an excellent, powerful and versatile tool for the management and analysis of cadastral and spatial information, with positive impacts in multiple areas, from urban planning to resource management.

6.1.2 CadastreWeb

CatastoWeb is an information system designed to simplify the management and consultation of cadastral data. Accessible through a web interface, CatastoWeb allows users to register and authenticate themselves to enter the system, guaranteeing secure access to sensitive data. This authentication process is essential to ensure that only authorised users can view and manage cadastral information.

One of the main functionalities of CatastoWeb is the possibility to perform advanced searches on cadastral data. Users can search for information using various criteria, such as owner name, address or cadastral code. This search system delivers results quickly and clearly, making it easier to consult the information requested. Once displayed, the data are presented in an intuitive manner, making it easy to navigate through the information.

In addition to consultation, CatastoWeb offers tools for managing cadastral practices. Users can enter and update information on practices such as changes of ownership, land registration and declarations of new construction. The platform also handles user queries, with structured workflows that simplify the approval and monitoring of paperwork. This approach maintains an efficient organisation and ensures that all information is always up-to-date.

CatastoWeb's user interface is designed to be intuitive, allowing people with various levels of technological expertise to easily navigate the system. In addition, the platform can include guides and tutorials to help users understand the available functionalities and make the most of them.

A crucial aspect of CatastoWeb is data security. The system implements strict access controls, ensuring that only authorised users can modify or view sensitive information. In addition, backup procedures are built into the system to protect data from accidental loss or cyber-attacks, thus ensuring service continuity and information security.

Finally, CatastoWeb offers reporting and analysis capabilities. Users can generate customised reports based on cadastral data, useful for internal analysis and strategic planning. Monitoring tools help keep track of cadastral practices, facilitating information management and deadline compliance.

6.1.3 EstateDocs



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EstateDocs is a software designed to facilitate document management in the real estate and land registry sector. This system offers a series of functionalities that optimise the process of archiving, consultation and document management.

First of all, EstateDocs allows users to upload paper documents by scanning, making them digital and archivable in electronic format. Once uploaded, documents can be organised into folders and subfolders, facilitating cataloguing according to criteria such as document type, date or specific project.

Metadata management is another key feature of EstateDocs. Each document can be enriched with descriptive information, such as the owner's name, address or date of registration, making searching much more efficient. Users can then perform advanced searches using this metadata, allowing them to quickly retrieve the documents they need.

A very useful aspect of the software is workflow management. EstateDocs allows structured procedures for document review and approval to be set up, ensuring that each step is tracked and managed efficiently. This is particularly important in contexts where collaboration between different members of a team is essential.

In terms of security, EstateDocs offers access controls to define who can view or edit certain documents. This ensures that sensitive information remains protected. In addition, the system provides backup procedures to prevent data loss, thus ensuring continuity of service and protection of stored information.

Finally, EstateDocs includes reporting capabilities that allow users to generate customised reports on archived documents. These reports can provide useful analysis for management and planning, allowing users to monitor access and changes to documents over time.

6.1.4 PropertyDocs

PropertyDocs is software designed to simplify document management in the real estate sector, offering an effective system for storing, organising and sharing documents related to property and real estate transactions. Key features include:

Document Archiving

PropertyDocs allows users to upload documents of various types, such as contracts, floor plans, and cadastral documentation, directly to the platform. Through an intuitive interface, users can easily drag and drop files, making the filing process quick and effortless.



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Organisation and Cataloguing

Once uploaded, documents can be organised into folders and subfolders. Users can assign labels and metadata to documents, such as the owner's name, property address or transaction date. This advanced cataloguing facilitates search and retrieval of information, making the platform very efficient.

Advanced Search

The search functionality is one of the strengths of PropertyDocs. Users can search using different criteria, such as keywords in the metadata, to quickly find the documents they need. This system makes information retrieval extremely fast and simple.

Workflow Management

PropertyDocs includes workflow management tools, which enable the creation of procedures for document approval and review. Users can define roles and responsibilities within the team, ensuring that each document is systematically checked and approved.

Collaboration and Sharing

The software allows documents to be shared with colleagues or external parties, such as customers and suppliers. Users can send secure links to documents, facilitating collaboration and teamwork. In addition, the platform allows comments and annotations on documents, making communication more effective.

Security and Data Protection

Security is a priority for PropertyDocs. The platform offers granular access controls, allowing administrators to define who can view or edit specific documents. In addition, data is encrypted and regular backup procedures are in place to protect stored information from loss.

Reporting and Analysis

PropertyDocs offers reporting capabilities that allow users to generate detailed reports on document activity. These reports can include information on access, changes and status of files, providing a useful overview for management and monitoring.

6.1.5 LandRegistryHub



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LandRegistryHub is an innovative software platform designed to simplify the management of land registers and cadastral practices by offering a complete system for archiving and consulting documents. Users can access the platform via a web interface, where registration and authentication is required to ensure data security. This process ensures that only authorised persons can access sensitive information, creating a secure environment for records management.

One of the key functionalities of LandRegistryHub is the management of cadastral data. Users can upload and archive various documents, such as registration plans, contracts and property documentation, all in digital format. This makes document consultation much easier than traditional paper-based methods. Each document can be organised in specific folders and enriched with metadata, such as property information and owner details, facilitating cataloguing and information retrieval.

The platform also offers advanced search capabilities, allowing users to quickly find documents and information using specific criteria such as addresses or land registry codes. This search capability makes the consultation process extremely efficient, saving time and resources. In addition, LandRegistryHub enables workflow management for the review and approval of files, allowing users to define roles and procedures within the team. This structured approach ensures that each document is checked in a systematic way and that the dossiers are managed consistently.

Collaboration is further facilitated by the ability to share documents with team members and external parties, enhancing communication and teamwork. Data security is a top priority for LandRegistryHub, which implements strict access controls to ensure that only authorised users can view or edit sensitive documents. Data is protected by encryption and the platform provides regular backup procedures to prevent loss of information, thus ensuring the protection of stored data.

Finally, LandRegistryHub offers reporting tools that allow users to generate detailed reports on the activities and documents managed. These reports can provide valuable information on access, changes and file status, helping in the management and monitoring of day-to-day operations. With its intuitive interface and advanced functionalities, LandRegistryHub is an efficient solution for the management of land registries and cadastral practices, significantly improving operational efficiency and transparency in the real estate sector.

6.2 Applications for archiving services of historical and cultural heritage documents

There are several software applications specifically designed for document management in the historical and cultural context. These applications, developed specifically for museums, archives, libraries and other cultural institutions, enable the organisation and digital preservation of a wide



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range of resources, including documents, images, videos and historical records, thus ensuring easier access and long-term preservation.

6.2.1 CollectionSpace

CollectionSpace is an open-source platform designed for the management of collections in the cultural sector, such as museums, libraries and archives, offering a powerful tool for the cataloguing, preservation and management of cultural assets. Accessible via an intuitive web interface, CollectionSpace allows users to register and access different functionalities, with varying levels of access depending on responsibilities. This access management system ensures that only authorised personnel can modify or view certain data, creating a secure environment for information management.

One of the main functionalities of CollectionSpace is the cataloguing of collections. Users can enter and manage detailed information on each object, including descriptions, metadata, images and provenance details. The platform is highly customisable, allowing users to define specific fields and forms according to their institution's needs, which facilitates appropriate and targeted archiving.

Searching and retrieving data is further optimised with the advanced search tools offered by CollectionSpace. Users can quickly find objects and information within collections by searching by keywords, metadata or other criteria, making browsing extremely efficient and fast. In addition, the platform supports workflow management, allowing users to define and monitor cataloguing and review steps. This is particularly useful for institutions that require approval processes for adding new objects or modifying existing data, ensuring adequate control over the quality of the information.

CollectionSpace also offers tools for preservation and documentation, allowing users to record and monitor the condition of objects over time. Maintenance notes can be entered, preservation actions recorded and care schedules managed, helping to ensure the long-term preservation of cultural assets. Furthermore, the platform is designed to integrate with other systems and software, facilitating the exchange of data between different applications. By supporting open standards, CollectionSpace makes it easier to import and export data to and from other platforms, increasing the interoperability and flexibility of the system.

An additional advantage of CollectionSpace is the possibility to publish collections online, allowing the public to explore and access the materials through a web interface. This helps make collections more accessible and visible, promoting public interest and participation. By using



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CollectionSpace, institutions can manage their collections more efficiently, customise the system according to specific needs and ensure the long-term preservation of their historical heritage. CollectionSpace therefore presents itself as a robust and flexible solution for managing cultural collections, fostering the preservation and accessibility of historical assets.

6.2.2 Axiell Collections

Axiell Collections is a software platform designed for the management of collections in the cultural sector, such as museums, libraries and archives. This versatile solution offers tools for cataloguing, preserving and sharing cultural assets, making the collections management process more efficient and intuitive.

The operation of Axiell Collections starts with access via a user-friendly web interface, which allows users to easily navigate between the different functionalities. After registration, users can be assigned to various roles, with different permissions according to responsibilities, ensuring adequate control over access and modification of sensitive data.

One of the central aspects of Axiell Collections is cataloguing. Users can enter details about the various objects, including metadata, descriptions, images and provenance information. The platform is highly customisable, allowing users to define the necessary fields and forms to meet the specific needs of their institutions. This facilitates accurate archiving and effective information management.

The search functionality is another strong point of Axiell Collections. The platform offers advanced search tools, allowing users to quickly find objects and information using keywords or filters based on metadata. This makes data browsing much faster and more efficient, reducing the time needed to access the desired information.

Axiell Collections also supports workflow management, allowing users to define approval and review procedures for entering new objects and modifying existing data. This is particularly useful in contexts where rigorous review of information is required. In addition, the platform offers tools for preserving and monitoring the condition of objects, allowing maintenance and care interventions to be recorded, thus contributing to the long-term preservation of cultural assets.

Sharing and publishing collections online are further functionalities of Axiell Collections. Users can make their collections publicly accessible via a web interface, increasing visibility and interest in cultural heritage. In addition, the platform enables the generation of reports and analyses on collections data, providing valuable information for management and strategic planning.

Finally, Axiell Collections integrates well with other systems and software, allowing a smooth exchange of data between different applications. Thanks to this flexibility and an intuitive interface, Axiell Collections represents a complete solution for collection management in the cultural sector,



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improving operational efficiency and promoting the preservation and accessibility of historical heritage.

6.2.3 TMS (The Museum System)

TMS (The Museum System) is a collection management software specifically designed for museums and cultural institutions. It is an integrated system offering comprehensive functionality for cataloguing, conservation and collection management. Here is how it works.

Access to TMS is via a user-friendly web interface, allowing users to easily navigate between different functionalities. Users must register and can be assigned to various roles, with differentiated permissions according to responsibilities, ensuring that only authorised personnel can access sensitive data or make changes.

One of the fundamental aspects of TMS is the cataloguing of collections. Users can enter and manage detailed information on each object, including metadata, descriptions, images and provenance information. The platform is highly customisable, allowing users to define specific fields and forms according to their institution's needs, thus facilitating accurate and complete cataloguing.

The search functionality is another strong point of TMS. Users can perform advanced searches using keywords, filters and metadata, making information retrieval quick and intuitive. This is particularly useful when managing large and diverse collections.

TMS also supports workflow management, allowing users to establish approval and review procedures for entering new objects or modifying existing information. This ensures strict control over data quality and facilitates collaboration between team members.

The platform includes tools for conservation, allowing users to monitor the condition of objects and record maintenance work. Users can enter notes on conservation work and plan future interventions, contributing to the long-term preservation of collections.

Another feature of TMS is the possibility to generate detailed reports and analyses on collection data. Users can create customised reports to monitor activities, analyse trends and facilitate strategic planning.

Finally, TMS enables the online publication of collections, allowing the public to explore and access materials through a web interface. This not only increases the visibility of the collections, but also promotes public interest in cultural heritage.

In summary, TMS (The Museum System) is a comprehensive and flexible museum collection management solution that improves operational efficiency, facilitates conservation and promotes accessibility of cultural heritage.



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6.2.4 Archiui

Archiui is a document management software designed specifically for archives and cultural institutions. The platform facilitates document cataloguing, preservation and access, offering a range of tools designed to make the work of archivists more efficient and organised.

The operation of Archiui starts with an intuitive web interface that allows users to easily navigate between the various functionalities. Users can register and, depending on their assigned roles, have access to different areas of the system, ensuring that only authorised persons can edit or view sensitive information.

One of the main aspects of Archiui is document cataloguing. Users can enter detailed information on each document, including metadata, descriptions and provenance information. The platform is highly customisable, allowing fields and forms to be adapted to the specific needs of the archive, which facilitates accurate and complete archiving.

Document search is equally crucial. Archiui offers advanced search tools, allowing users to quickly find specific documents using keywords or filters based on metadata. This makes searching much faster and more efficient, reducing the time needed to access information.

In addition, Archiui supports the management of workflows, allowing users to establish review and approval procedures for entering new documents or modifying existing ones. This helps to ensure strict control over the quality of archived information.

The platform also includes tools for preserving and monitoring the condition of documents. Users can record preservation actions and plan maintenance activities, thus helping to ensure the long-term preservation of archival materials.

An additional advantage of Archiui is the ability to generate detailed reports and analyses on managed documents. Users can create customised reports to monitor activities and analyse trends, facilitating strategic archive management and planning.

Finally, Archiui enables the online publication of documents, allowing the public to explore and access the materials through a web interface. This not only increases the visibility of archival collections, but also promotes public interest and participation.

Archiui offers numerous advantages for document management in archives and cultural institutions, helping to improve operational efficiency and the quality of services offered.

6.2.5 eHive



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eHive is an innovative online platform designed for the collection management of museums, archives and cultural institutions, appreciated for its user-friendliness and functionalities that support the cataloguing, preservation and sharing of cultural heritage. By accessing eHive via an intuitive web interface, users can easily navigate between different functionalities. After registration, it is possible to choose between various levels of access, allowing permission management according to specific staff roles, thus ensuring that only authorised users can edit sensitive data.

One of the main features of eHive is the cataloguing of collections, which allows users to enter detailed information on each object, including metadata, descriptions and images, as well as provenance information. The platform offers predefined forms that can be customised according to the institution's needs, facilitating accurate archiving tailored to specific requirements. The advanced search functionality is a further strength; users can quickly find objects within collections using keywords, filters and metadata, making browsing very efficient and reducing the time needed to access the required information, a crucial aspect when managing large collections.

In addition, eHive supports workflow management, allowing users to define procedures for entering and reviewing documents, thus ensuring that information in the system is accurate and up-to-date. The platform also includes tools for the preservation of cultural assets, enabling the monitoring of the condition of objects and the recording of any maintenance work, which is crucial for the long-term preservation of collections and for preventing the deterioration of materials.

A distinctive aspect of eHive is the possibility to publish collections online, allowing the public to explore and access materials via a web interface. This feature increases the visibility of collections and promotes public interest and participation, allowing institutions to create virtual exhibitions and share their collections with a global audience. eHive also offers the possibility to generate reports and analyses on collection data, providing valuable information for management and strategic planning. Users can create customised reports to monitor activities and evaluate trends, supporting informed strategic decisions.

Finally, the platform is designed to integrate with other systems and software, facilitating the exchange of data between different applications. This interoperability capability is crucial for institutions that use multiple management tools and wish to ensure a consistent workflow. In summary, eHive provides a comprehensive and versatile solution for the management of cultural collections, improving operational efficiency, facilitating preservation and increasing the accessibility of cultural assets.

6.2.6 Re:discovery Software

Re:discovery Software is a versatile platform designed for the management of collections and information in the cultural sector, such as museums, archives and libraries. This solution is



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appreciated for its flexibility and customisation capabilities, which allow users to adapt it to their specific needs.

The operation of Re:discovery Software starts with access via an intuitive web interface, which makes it easy to navigate between the different functionalities. After registration, users can be assigned to various roles, each with specific permissions, ensuring that only authorised personnel can edit or view sensitive information.

One of the main functionalities of the platform is the cataloguing of collections. Users can enter details about each object, including metadata, descriptions, images and provenance information. The platform is highly customisable, allowing users to define the necessary fields and create specific forms, which facilitates precise and detailed cataloguing.

Advanced search tools are also available, allowing users to quickly retrieve information using keywords, filters and metadata. This search capability is essential for managing large and diverse collections, making the consultation process extremely efficient.

Workflow management is another important aspect of the platform. Users can establish procedures for entering and reviewing documents, ensuring strict control over the quality of the data. This is particularly useful in contexts where careful review of archived information is required.

Another significant advantage of Re:discovery is its preservation functionality. Users can monitor the condition of objects and record maintenance actions, thus contributing to the long-term preservation of collections. The platform facilitates active care management of materials, preventing deterioration.

The software also offers the possibility of generating customised reports and detailed analyses of collection data. This information can be used to monitor activities, analyse trends and support strategic planning, making it easier to make informed decisions.

Finally, the platform enables the online publication of collections, increasing the visibility of materials and making them accessible to a wider audience. This feature promotes public interest and participation, facilitating the creation of virtual exhibitions and the sharing of collections with a global community.

We can therefore state that Re:discovery Software is a comprehensive solution for managing cultural collections, improving operational efficiency and promoting the preservation and accessibility of cultural assets. With a customisable feature set and robust management tools, it is an ideal choice for institutions seeking to optimise their document management and increase interaction with the public.



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6.2.7 ArchivesSpace

ArchivesSpace is an open-source software designed for archive management, particularly useful for libraries, museums and cultural institutions. The platform is designed to facilitate the cataloguing, management and access to archival materials, making the work of archivists more efficient and organised.

The operation of ArchivesSpace starts with a user-friendly web interface that allows users to navigate through the various functionalities. After registration, users can be assigned to specific roles with different permissions, ensuring that only authorised personnel can access and edit sensitive information.

One of the strengths of ArchivesSpace is its cataloguing capability. Users can enter and manage detailed information on documents and collections, including metadata, descriptions and provenance information. The platform enables the creation of hierarchical archives, facilitating the organisation and search of materials in a clear and structured manner.

The search functionality is particularly advanced; ArchivesSpace allows users to search by keywords and filters, making information retrieval fast and efficient. This is crucial for institutions that manage large collections of archival material.

Another significant advantage of ArchivesSpace is the management of workflows. Users can establish procedures for entering and reviewing documents, ensuring that all information is accurate and up-to-date. This helps maintain data quality and ensure that staff work together efficiently.

ArchivesSpace also offers tools for preserving and monitoring the condition of materials. Users can record preservation and maintenance actions, helping to ensure that documents are preserved long-term and in good condition.

The platform includes the possibility to generate customised reports and detailed analyses, providing valuable information on collection management. These reports can help institutions monitor activities and plan future strategies in an informed manner.

Finally, ArchivesSpace supports the online publication of archival materials, allowing the public to explore and access collections via a web interface. This feature increases the visibility of archival resources and promotes public interest by facilitating access to documents and collections that might otherwise remain little known.

In summary, ArchivesSpace is a comprehensive and flexible archive management solution that improves operational efficiency and promotes the preservation and accessibility of cultural



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material. Thanks to its numerous functionalities and intuitive interface, it is particularly useful for institutions wishing to optimise the management of their archival holdings.

6.2.8 Archaeobase

Archeobase is software specifically designed for the management and cataloguing of archaeological data. It is used by archaeologists, cultural institutions and universities to organise and analyse information about excavations, finds and archaeological contexts. The platform is built to facilitate the work of experts in the field by improving efficiency and collaboration.

The operation of Archeobase starts with a user-friendly interface that allows users to easily navigate between the different functionalities. Users can register and, according to their assigned roles, have access to various areas of the system, ensuring that only authorised personnel can edit or view sensitive information.

One of the main features of Archeobase is the cataloguing of finds and excavation data. Users can enter detailed information on finds, including metadata, descriptions, photographs and contextual details. The platform is highly customisable, making it possible to define the fields and modules required to meet the specific needs of each archaeological project.

Archeobase also offers analysis and reporting tools, which allow users to generate detailed reports on collected data. This functionality is particularly useful for archaeologists who need to present results and conclusions to researchers, institutions or funding bodies.

Another significant advantage is the ability to manage the workflow during the various phases of an archaeological project. Users can establish procedures for data input and review, ensuring that information is accurate and up-to-date. This also facilitates collaboration between team members, improving communication and operational efficiency.

In addition, Archeobase supports digital preservation of data, allowing all information about artefacts and contexts to be stored securely. This is essential to ensure that the data is also accessible in the future and to prevent the loss of valuable information.

Finally, the platform enables the online sharing and publication of archaeological data, increasing the visibility of research and promoting public interest. This feature facilitates scientific dissemination and allows users to explore and access materials that might otherwise remain inaccessible.

In summary, Archeobase is a comprehensive and flexible solution for managing archaeological data, improving operational efficiency and promoting the preservation and accessibility of information. With its intuitive interface and numerous functionalities, it is particularly useful for archaeologists and institutions wishing to optimise the management of their collections and research data.



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6.3 Custom Development Support Systems

Today, the standard for implementing web platforms for content representation is the use of CMSs. Some of the main CMSs are:

- **WordPress:** One of the most popular CMSs in the world, WordPress is known for its flexibility, ease of use and wide range of plugins and themes.
- **Joomla:** Another widely used CMS, with a strong community of developers and a wide range of extensions available.
- **Drupal:** A powerful and highly customisable CMS used for the creation of complex and scalable websites.
- **Wix:** A cloud-based CMS that makes it easy to create professional websites with a wide range of templates and customisation tools.
- **Umbraco:** A Microsoft .NET-based CMS, known for its flexibility and customisation, mainly used for the creation of corporate websites and intranets.

6.4 CMS

Content Management Systems (CMS) are software designed to facilitate the creation, management and editing of digital content on a website. These tools allow users, even without advanced technical skills, to efficiently manage their site, from uploading text and images to structuring the content and customising the design.

Their main characteristics are:

- **Intuitive user interface:** allows users to add, edit and delete content through an easy-to-use graphical interface.
- **Content management:** enables the effective organisation and structuring of website content, including text, images, videos, multimedia files, etc.
- **Customisation:** offers the possibility of customising the appearance and functionality of the website through themes, plugins and additional modules.
- **Access control:** allows the assignment of roles and permissions to users to control who can access and modify site content.
- **SEO-friendly:** provides tools to optimise website content for search engines, improving online visibility.

Adopting a CMS offers several advantages. Firstly, it simplifies the content management process, reducing the time and effort required to update and maintain the site. This makes content creation faster and accessible to anyone, regardless of technical background.



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In addition, CMSs facilitate collaboration between different users, allowing teams to contribute simultaneously to the project without overlapping. Access management ensures that each user can do their job without compromising the security of the site.

A further advantage is scalability: a CMS can easily adapt to new requirements, allowing the functionality of the site to be expanded through the use of plugins or modules, without the need for complex developments.

Finally, data analysis and integrated SEO tools make it possible to monitor site performance and optimise content to improve online visibility.

We can therefore say that a CMS represents a powerful and flexible solution for those who wish to manage a website efficiently, helping to simplify the work of content creation and management, and to improve interaction with the public.



Figure 6 - CMS example.

7. Best practices in document digitisation

With regard to the digitisation processes of public bodies and the cultural sector, during the study visit to Cesena, we deepened and analysed with partners two extremely interesting case studies both within the Municipality of Cesena.

a) Digitisation of the archive of building practices related to building permits



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The Municipality of Cesena has a paper archive of building practices containing over 150,000 files dating back to 1957, while those prior to that date are preserved and managed by the State Archives of Cesena. The archive is located in various locations in the city and its preservation and consultation require a considerable amount of time and personnel; this element takes on even more significance if we consider that the requests for viewing and extracting copies of building practices received by the Building Sector between 2014 and 2019 amounted to 17,348. We can say that the archive is therefore subject to very frequent consultations that sometimes even result in the loss of documents.

Objectives

In view of these considerations, the Municipality of Cesena decided to undertake a process of digitisation of documentation with the aim of:

- Ensure the proper preservation of archive material
- Provide internal users (building technicians) with documents that can be easily managed and transmitted in daily life
- Working on the logistics of the archive where all building plots are stored
- Reduce filing times and increase staff efficiency.

To undertake this massive digitisation of its document archive, the Municipality of Cesena decided to rely on a private company BUCAP SPA.

The digitisation path

The digitisation process of the archive is quite complex and involved two batches:

- First batch: building permits from 1957 to 1998
- Second lot: digitisation of building files derived from the detached archives.

The steps for implementing the digitisation process were as follows:

- Inventory of all archive files;
- Dematerialisation of the physical archive and creation of digital files conforming to the original;
- Management of access to documents through the use of a web portal dedicated to users of the municipal technical offices;
- Transmission of digital documents to the management system of the relevant municipality.

Achievements

Through this complex digitisation process, the Municipality of Cesena has managed to dematerialise a huge number of documents.



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This made it possible to significantly reduce the time taken by operators to process files, but also the time taken by private citizens to receive the required documents.

The digitisation process has ended with the second batch, but the experience has certainly brought a lot of information and lessons learnt that can be used in future processes of dematerialisation of public documentation.

b) Digitisation of the catalogues and ancient manuscripts of the Malatestian Library of Cesena

In the library that Malatesta Novello designed and built in the mid-1500s, 340 manuscripts are preserved, testifying to the cultural taste and aptitude of the Cesena gentleman. He placed next to the volumes of the ancient Franciscan convent fund (about fifty) a precious nucleus of manuscripts that he had specially copied and decorated, as well as codices purchased or received as gifts or dedications, or that were part of the family patrimony.

The Malatestiana also preserves two illustrious liturgical series from the 15th century, consisting of the seven cathedral choir books and the eight Osservanza choir books, in many ways traceable to the work of bibliographical renewal undertaken by Malatesta Novello. Finally, 59 manuscripts from the 12th to the 15th century belong to the Piana library, i.e. the private library of Pius VII, Pope Barnaba Chiaramonti. The total number of manuscripts amounts to 414.

Aware of this great heritage, the Library wished to undertake a very ambitious challenge: to make the extremely old and valuable catalogues and manuscripts accessible and available online for not only national but also international users.

The process of digitisation

The project to digitize the Malatestian Library's codices was implemented thanks to the 'Open Catalog of Malatestian Manuscripts,' (<http://catalogoaperto.malatestiana.it/>) which allows the user to browse online through all the codices of the Malatestiana, the Piana, and the chorals of the Duomo and Bessarion.

For the construction of the database, they chose the application winisis 5.0.

The Winisis application was chosen for the construction of the open catalogue of Malatestian manuscripts. The reasons for this choice, compared to the use of better known and more widespread databases, are several:



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- Gratuitousness of the product
- Its distribution by UNESCO, which guarantees its maintenance and constant updating over time,
- The wealth of software knowledge already present within the Malatestiana, which makes it possible to exclude the onerous use of external firms for the processing and management of the IT project,
- The availability of a programme, called Wxis and distributed by the Brazilian institution Bi.Re.Me. that allows interfacing Winisis databases with a web server.

However, the obvious and predominant economic motivation also finds justification in the desire to maintain direct control over all aspects of the project and to programmatically refuse that the IT product can find a final landing. Therefore, in accordance with the philosophy behind the realisation of the open catalogue, its IT structure is also configured as open and constantly evolving: rethinking, corrections and implementations of new features have in fact punctuated the three years since the first version was published online.

The structure of the open catalogue

The site of the open catalogue, hosted free of charge on the public server of the province of Forlì-Cesena, provides three accesses depending on the language of the users: Italian, English and German. The site consists of a static part (in html language), basically limited to the introduction pages to the different sections and to the non-digitized texts, and a dynamic part that through CGI modules and the Wxis scripting language allows interaction with the Winisis databases.

The site is divided into four sections:

- Project
- Texts
- Manuscripts
- Forums

Project

The 'Project' section provides a comprehensive overview of the initiative to digitize and catalogue Malatesta manuscripts. Here users can find information about the historical background of the project, the main objectives and the methodologies used for digitization. In addition, team members who collaborated, including experts and scholars involved in research and preservation, are introduced.



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This section is key to understanding the importance of the project and the value of the manuscripts within Italian cultural history. It is also possible to view any updates and news regarding activities related to the project, keeping users informed of progress and new initiatives.

Texts

The 'Texts' section is dedicated to the written contents of Malatesta manuscripts. Here users can access transcriptions and digitized texts, which offer the possibility of directly reading the original contents in an easily usable format. This section can also include critical notes and commentaries that contextualise the texts, facilitating a deeper understanding of the works.

The features of this section allow users to search by keyword, author or theme, enabling quick navigation through the various texts. This makes the section extremely useful for scholars and researchers who need specific references or to analyse particular content.

Manuscripts

The section, which is also subject to constant growth, embodies the first meaning of the open catalogue, that is, a constantly evolving container that offers a dynamic picture of the state of knowledge about Malatestian manuscripts.

There are currently 3043 bibliographic entries and 1139 descriptions available. There are 38 fully digitized manuscripts with a total of 11172 papers. Images of the manuscripts were captured by digital camera with a resolution of 72 dpi. For web publication, jpeg format with a width of 700 pixels is used. Different but mutually integrated query modes are provided:

- by signatures
- simple - advanced search
- by lists
- by images

Forums

The "Forum" section is an interactive space dedicated to discussion and sharing of ideas among users, scholars and enthusiasts of history and culture. Here it is possible to initiate conversations on manuscript-related topics, ask questions, exchange information, and share research experiences.

The forum encourages the creation of a community around Malatestian cultural heritage, promoting collaboration between researchers and the public. Users can participate in existing discussions or create new topics, making this section an important resource for networking and knowledge exchange.



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Attended result

The digitization project has yielded significant results. First, a vast selection of ancient manuscripts is now available online, allowing scholars, researchers and enthusiasts to explore the Malatesta Library's cultural heritage from anywhere in the world. This has greatly expanded the accessibility of materials, overcoming the physical limitations of the library itself.

In addition, digitisation has contributed to the preservation of manuscripts. By reducing the need to handle original documents, the risk of damage has been minimised, ensuring that these historical treasures can be preserved for future generations.

Finally, the open catalogue has facilitated collaboration with other institutions and libraries, promoting the sharing of resources and knowledge. This collaborative approach further enriched the value of the project by creating a network of supporters of culture and history.

c) From paper to the cloud - the innovative process of dematerialisation of building archives in Bassa Romagna

"From paper to the cloud" is the new and complex process of digitizing the administrative process of access to documents, and the related dematerialisation of the archives of building practices of the Union Bassa Romagna and its nine member municipalities.

The project aims to dematerialise the entire documentary heritage of the ten archival fonds of the building practices of the Union and the nine municipalities of Bassa Romagna (Alfonsine, Bagnacavallo, Bagnara di Romagna, Conselice, Cotignola, Fusignano, Lugo, Massa Lombarda, and Sant'Agata sul Santerno) with the immediate purpose of digitizing the service of access to documents, certifying the process and thus maintaining the full evidentiary effectiveness of the digitized documents. A procedure that could, in the future, result in document discarding (except for documents with historical constraints), as well as open up the possibility of implementing innovative services through the use of artificial intelligence systems.

The project stems from several needs:

- Provide the external user with a document in digital support
- To provide the internal user (building technicians) with easily manageable and transmissible documents in everyday life
- Act on the logistics of the archives where all building particles are stored
- Need to preserve the documents that with time tend to spoil and be lost completely



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The process of digitisation

The solution chosen is to digitise the entire archival and documentary material of the construction sector. This process involves a complex and articulated process that can be summarised in the following steps:

- Massive digitization of documents in the construction archives;
- Certification of the process through batch verification and attestation;
- Pouring in Parer, the Archival Pole of the Emilia - Romagna Region (this step allows to obtain a document with full legal validity)
- Pouring into Alfresco Unione (software in which documents are entered where there are very strict rules for uploading that guarantee the validity and certification of the documents)
- Practice data import tool and import into the back-office management system

Attended results

The certification procedure of the dematerialisation process tested by the Union of Municipalities of Lower Romagna, thanks to the fruitful collaboration of technological partners such as Bucap and Retelit Group and with the supervision and collaboration of the Archival and Bibliographic Superintendence of Emilia-Romagna and the Regional Archival Pole - PARER can be easily adopted by any entity that intends not only to digitize its archives, but to implement a real transformation of the way archives are managed in the future, guaranteeing faster, simpler services and documents/data with full legal value.

Having the digital service and the digitised document is not an end point, but a transition point that leads us to be able to develop other user-side services that can have real added value for the institution.

d) [Systematization and records of the company's technical documentation- Liburnian waters Ltd: the project of digitization and recording of the technical archive](#)

An example of good practice is the company Liburnian waters Ltd which is in the process of digitizing the archive according to all relevant laws and regulations on the archive. Through Digitea's independently developed program, an archive of technical documentation is kept, where over 150 types of documentation are maintained, such as building permits, location permits, use permits, projects, land value assessment work, and others. Each document is scanned according to rules and standards, and all documents are in the database.

So far, 2,269 documents containing a total of 51,672 sheets and a volume of 16.6 GB have been scanned.

It is estimated that over 30% of the existing physical archive has been scanned.



Physical archive

The physical archive is divided into the following units: cabinet, shelf and container, while the last level of the physical archive is the document located in the container. The cabinet is divided into shelves, and each shelf contains a certain number of containers.

Each document has its own number, which is found on the cover of the document, which is in the physical archive and which has undergone the registration process in the application. All documents in the archive do not have metal parts on them, they are untied and stored in containers depending on their size.

Program part (application)

The application for entering and maintaining technical documentation (Digitea) serves as a platform through which all the documentation in the archive can be accessed. The application consists of standard menus for entering and accessing archive data.

Through the input form, it is necessary to enter data to access the application, which you will receive later.

Overview of the number of documents by type of documentation	
Name of document type Sum	Number of Document number
certificate	4
certificate documentation	1
certificate	1
data tresor disc	3
diary	1
memorandum	1
elaboration	2
ownership analysis report	3
elaboration of electrical installation	1
elaborate registration of boundaries in the castras	7
elaboration of the exclusion	9
report on the correction of omissions in the maintenance of the castras	2
infrastructure catalog elaborator	128



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elaboration of incomplete extraction easement	18
elaboration of border marking	3
elaboration of parcelation and uris of the facility	17
elaboration of parcelation of land	31
property valuation report	39
elaboration of uris facility	38
elaboration of regional registration of the castras and ground registry	4
water construction elaboration	4
photo documentation	19
geodetic project	1
main concrete project	2
main project of electrical and lightning protection installations	1
main project electrical installation automatic	34
main civil engineering project	140
main engineering installation project	15
building permit	120
building permit amendment	1
gsnss	106
gsnss - amendment	8
hydrogeological test	10
hydrogeological opinion	2
ideal project of civil engineering	13
idea project of mechanical engineering	1
land identification	11
appointment of supervisory engineer	2
executive project of electrical engineering	19
construction executive project	47
executive project of civil engineering and hydromechanics	5
executive project of application installation	1
cctv investigation report	4
waterproofing test report	174
tube calibration report dtk	3
supervisor engineer's report	2
test report	9
review report	81
optical cable laying report	1
report of sanitation	3



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calculation - price calculation	1
copy of the cadastral plan	15
literature	1
location permit	86
draft	37
findings of water sanitary research	2
new measurement	1
statement on project compliance with nature protection	1
decision	7
pip reading of croatian water	3
list	3
special conditions	2
special requirements for arrangement of the space	1
ownership deed	11
confirmation of main project	18
confirmation of main project amendment	9
consent certificate	1
confirmation of water building	1
rule	7
application	5
enrollment proposal	1
manual	3
ideal solution project	2
draft project	8
solution	13
cadastral solution	6
solution urbanism	1
decision of zk section	22
decision of zk ownership correction department	18
decision zk department special legal regime	13
schematic view of armature	1
dimension sketch	2
easement	4
duty of judgments	48
easement solution	43
easement agreement	182
easement agreement annex	1
snapshot of the executed state	1



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photograph of the executed state of the underwater discharge	19
agreement	1
agreement regarding rights and obligations	1
consent	1
technical documentation	12
technical description	1
technical inspection	1
technical report	2
budget	2
agreement	3
construction financing agreement	2
construction contract	3
agreement on the use of the septic tank	2
agreement on the establishment of the right to build	2
agreement on the transfer of ownership rights without fee	1
use permit	64
instruction	1
instructions on commissioning the equipment	1
regulation	2
certificate 1968	28
vhm - project from the state of the hydrant network	86
vhm - certificate on the correctness of the hydrant network	55
vhm - record on functional testing of the hydrant network	138
ownership certificate	21
water management permit for wastewater discharge	2
water management license for water use	39
conclusion	1
conclusion law of construction	2
conclusion urbanism	4
law	5
minutes	9
record of delivery of documentation for the archive	1
minutes on handover and closing of the investment	1
record of handover of works	1
record of delivery	9
minutes technical inspection	8
record external hydrant network	2
final report of supervisor engineer	3



e) Ecosystem of Tourism and Culture in Puglia

Within the program of the Integrated Digital Ecosystem of Tourism and Culture of the Apulia Region, the path of digitization of materials in archives, libraries and museums represents a strategic element for the enhancement of cultural heritage. This process makes cultural content usable online, improving accessibility for citizens, scholars and tourists, and ensuring long-term preservation.

Stages of the Digitization Pathway**1. Census and Cataloguing**

- Identification and mapping of materials preserved in archives, libraries and museums.
- Collection of detailed information on each cultural asset (descriptions, technical and historical data).
- Use of international standards such as the Dublin Core format and specific schemes for cataloging archival and library holdings.

2. Physical Digitization

- Digitization of materials through the use of high-resolution scanners and professional cameras for documents, books, maps, works of art, and artifacts.
- Creation of high quality digital images and documents, optimized for online reference.
- Application of Optical Character Recognition (OCR) techniques to make text in documents searchable.

3. Metadata and Digital Archiving.

- Association of structured metadata to describe and index digitized materials, following national and international standards such as ISAD(G) for archives and MAG for libraries.
- Archiving of digitized files in secure repositories, ensuring redundancy and backup to avoid data loss.

4. Integration into the Digital Ecosystem.

- Inclusion of digitized content in regional platforms:
 - **Puglia Digital Library:** a digital library collecting documents, images and multimedia materials on the region's cultural heritage.
 - **CartApulia:** a catalog of the regional cultural heritage with detailed information on sites, works and collections.



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- Linking digital resources through APIs and standard protocols to ensure interoperability with other national and international platforms.

5. Public Access and Enhancement.

- Online publication of digitized materials through dedicated web portals with advanced search tools and interactive navigation features.
- Integration of innovative applications such as augmented reality (AR) and virtual reality (VR) to enrich the user experience.
- Promotion of educational and tourist use of digitized resources through events, virtual exhibitions and educational projects.

6. Long-Term Digital Preservation.

- Implementation of digital preservation strategies to ensure the durability of digitized materials.
- Constant monitoring and updating of storage technologies and file formats to prevent technological obsolescence.

The digitization path aims to transform the cultural heritage of the Apulia Region into a resource that is accessible and usable by a global audience, promoting its knowledge and enhancing its value internationally. The creation of a digital archive of documents, works of art, historical artifacts and cultural materials will make it possible to preserve and pass on the region's collective memory to future generations. This archive will become an essential tool for scholars, researchers and cultural enthusiasts, offering immediate and in-depth access to materials that would otherwise be difficult to access.

Digitization will also help boost cultural tourism, encouraging the discovery of the riches of the Apulian territory by Italian and foreign visitors. The interactive and innovative use of resources, through web portals, mobile applications and augmented or virtual reality tools, will enrich the tourist experience, making it engaging and personalized.

On the educational front, the digitized materials will be a valuable teaching tool for schools and universities, facilitating the dissemination of culture and stimulating young people's interest in historical and artistic heritage. The initiative also aims to strengthen the region's cultural identity, creating a closer link between citizens and their territory.

Finally, the project will have a significant impact on heritage preservation, ensuring that fragile documents and materials, threatened by time and wear and tear, are digitally preserved and made eternally available in a secure and updatable format. In this way, the Apulia Region is proposed as a model of excellence in the enhancement and management of cultural heritage through new technologies.

- f) RECON Re-evaluation of cultural-heritage, knowledge and opportunity network



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Another best practice presented during the kick off meeting in Conversano is the RECON project. The project, titled "RE-evaluation of Cultural Heritage, Knowledge, and Opportunity Network," is funded by the Interreg IPA CBC Italy-Albania-Montenegro Programme 2014/2020. Commencing in October 2021, it is scheduled for completion in October 2023. The primary objective of the RECON project, involving four partners, including the lead partner Montenegro Cinematheque (Montenegro), the National Film Archive of Albania (Albania), the Apulia Film Commission Foundation (Puglia), and the Municipality of Termoli (Molise), was to enhance cinematographic heritage and preserve the historical and cultural memory of the territories. This goal was pursued through the recovery, digitization, and accessibility of the audiovisual sector's excellence. Among the cross-border achievements was the standardization of film cataloging between Albania and Montenegro through a multilingual vocabulary and the upgrade of the web application with an interface in three languages. Key achievements include the digitalization, cataloging, and indexing of 4,240 film posters from the 1920s to the 1970s, selected by the Puglia Archival and Bibliographical Superintendence and belonging to the rich fund of the Mediateca Regionale Pugliese.

The objectives of the projects are:

- Standardization of the cataloging of film cultural heritage in order to improve the planning and implementation of conservation and restoration measures of partners' heritage
- Upgrading web application with interface in four languages and practical use among institution, professionals and general public, useful for making of administrative, management and statistical reports and monitoring the state of the film heritage in relation to the major reasons for the film deterioration.

Main actions of the project:

- Drafting of a feasibility study for the creation of a Cineteca in Puglia, dedicated to the cataloguing, preservation and analysis of the regional film heritage.
- Enhancement of the film and historical heritage of the Mediateca Regionale Pugliese by digitizing, cataloging and indexing more than 4,000 posters selected from a collection of about 33,000 pieces.
- Implementation and updating of software for cataloging film and multimedia materials, developed by the Montenegrin Cinematheque, to facilitate free search of content and optimize the management of cultural and film heritage, in line with the latest technological standards and translated into English, Montenegrin and Albanian.
- Creation of a joint cross-border platform for the production of two short/medium length video-documentaries, two video installations and a database of digitized movie posters and movie posters, in order to promote collaboration between artists from Albania, Montenegro and Italy (filmmakers, contemporary artists, film heritage experts, etc.).

Expected main results:

- Development of an updated version of a web application that archivists and researchers can use for archiving films and other video materials.



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- Development of a strategy for capacity building and retrieval of audio-video materials, made available to the public through the web application.

The RECON project therefore stands as an excellent example of how it is possible to embark on a path to enhance the film heritage and the preservation of the historical and cultural memory of the territories involved, through activities of recovery, digitization and promotion of excellence in the audiovisual sector.

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