

Rethinking the archiving of education and research documents in Tunisia: a genuine collaborative approach between librarians and archivists

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Abstract

This article aims to delve into archives associated with education and research, shedding light on the imperative need for restructuring, enhanced categorization, and proper preservation. We argue that the integration of digital archiving introduces a novel perspective for valorizing these archives, commonly found in a state of disarray across various departments and services. Through an examination of the archives at the Borj Cedria Technopole (BCT) in Tunisia, we scrutinize the relevance of reevaluating archiving methodologies, underscoring their pivotal role in advancing scientific research and innovation across diverse fields.

The study adopts an action research methodology, involving the establishment of a working group, providing training and support to identify challenges associated with archiving scientific documents within the TBC. Key findings from this research advocate for the formulation of a comprehensive document classification and conservation guide, along with the development of a prototype for an open and centralized document and records management system. The latter seeks to ensure the preservation and long-term security of documents while fostering scientific research. Additionally, it sustains intrinsic connections between documents, their creators, and the contexts of their production.

Keywords: Education and Research Archives, digital archiving, document classification plan, schedule of retention periods, Borj Cedria Technopole. Tunisia.

1. Introduction

Within universities and research centers, a considerable amount of documents, both administrative and scientific, is generated and received on a daily basis. These documents form the foundation of scientific research and development strategies. Unfortunately, they are often poorly organized, misclassified, and dispersed among different services such as research laboratories, the library, the archives department, the executive office, the finance department, the academic and research services, among others.

In practice, a distinction is usually made between administrative documents, which have administrative, legal, and financial value and often little scientific value. They are managed and preserved by administrators and

archivists. Scientific and technical documents, on the other hand, are entrusted to librarians and documentalists as they hold greater scientific importance. Today, these are commonly referred to as "scientific archives," referring to the systems they administer, often in the form of open archives. It is important to note that, in this context, the term "archives" does not strictly refer to the scientific concept of archives, encompassing all documents created or obtained by any entity in the course of its administrative activities, in accordance with most laws worldwide.

However, concerning scientific documents emanating from academic and research institutions, they do not exclusively fit into either category. They represent a combination of both, thus constituting administrative records of scientific and research activities. They are more precisely referred to as "science archives," a term less prone to ambiguity than "scientific archives." These archives generally have a lasting character and serve as organizational memory for the institution, representing its scientific heritage. It is essential to review them over time while ensuring they remain accessible to future generations, following the natural logic of the cumulative approach to science.

In Tunisia, technopoles stand out as centers of excellence for research and innovation development, showcasing academic potential while fostering the growth of innovative enterprises. These hubs bring together academic institutions, research laboratories, SMEs, advanced training centers, among others. Their central role involves supporting project leaders in establishing innovative structures, stimulating investors by providing them with highly qualified human resources, generating employment opportunities for university graduates, and contributing to the improvement of the country's industrial and technological competitiveness.

Due to the diverse nature of activities within these technopoles, a multitude of scientific and research documents circulate among the various institutions that compose them. These documents, often originating from various sources, constitute a complex mix that includes purely administrative and institutional documents, scientifically oriented documents reflecting the work of researchers in laboratories, as well as documents of a personal or biographical nature. However, traceability of activities related to teaching, research, and collaboration between the academic and research spheres currently lacks structure.

2. Research Questions

Scientific research constitutes an indispensable foundation for any university education system and economic development. It represents an essential condition for ensuring the quality and effectiveness of teaching and training in all disciplines, while providing a means to address economic challenges. The close connection between the two sectors requires active student

participation in research, imposing on the university the responsibility to valorize the results of their investigations.

According to Akatyev (1984), "the greater the scientific potential of higher education institutions, the more modern teaching and research resources will be, and the more opportunities there will be for the researcher-teacher to impart up-to-date knowledge, while fostering increased participation in research activities." In other words, academic performance can only be achieved through a close interdependence between teaching and research, both of which must serve the social, cultural, and economic fabric of society. They also contribute to updating the content of academic programs, ensuring continuous adaptation to technological and scientific developments in various vital areas.

Today, all higher education institutions integrate scientific research into their teaching and training programs. They emphasize the development of creative capacity, hard work, and civic awareness in their students through this synergy between teaching and research.

It is in academic environments, particularly by recognizing the concept of the "knowledge society," that information is highlighted as a driving force of the economy through innovation, learning, and knowledge. Since 1996, the Organization for Economic Co-operation and Development (OECD) has emphasized that "knowledge and its use are becoming essential to the prosperity and success of our societies" (OECD, 1996). Since then, many research systems across various countries attribute a crucial role to universities as economic drivers. Teacher-researchers transform into advisors and consultants for private enterprises, establishing cooperation and co-training agreements between ministries of higher education and industry. In Tunisia, this convergence between the university and industrial worlds materializes through the establishment of competitiveness clusters and technopoles. The goal is to innovate through collaborative activities, sharing, and synergy between businesses and research and educational institutions. Currently, Tunisia already has four technopoles and five competitiveness clusters, demonstrating the country's commitment to strengthening links between higher education, research, and the industrial sector.

The issue that emerges here concerns how to archive scientific and research activities, the true engine of economic development. It is about finding an approach that highlights the processes and traces of science and research, even encompassing the personal activities of researchers, while preserving the organic link that unites all these documents. This task cannot be accomplished simply by following the general principles that archivists usually refer to, which involve inventorying and classifying funds as administrative documents, devoid of the inherent vitality of constantly evolving or meandering thought (Bert, 2014).

In this field, several initiatives focused on the historicity of knowledge have been in place for some time. However, these initiatives have primarily focused on printed publications, adopting a chronological approach and neglecting the historical, social, and cultural dimensions of knowledge production (Wolikow, 2009). Therefore, it becomes imperative to examine the specific archiving modalities and methods for science and research within higher education institutions and their partners. This study focuses particularly on the reality of managing scientific archives within the technopole of Borj Cedria.

3. Objectives and Research questions

The main objective of this study is to contribute to the development of innovative thinking on the specific archival treatment of documents linked to science and research. This treatment should take into account historical, cultural and production conditions, based on the archives of the Borj Cedria technopole in Tunisia. It is important to recognize that tracing research archives, as a complex process, is not an easy task. This complexity, as Muller (2006) pointed out, arises from the mobilization of various resources and "universes which intersect several archival registers: administrative, academic, parapublic or private, also including the personal documents of researchers, etc."

The questions that emerge are as follows:

- What is the significance of archives linked to science and research, and how to identify them within the Borj Cedria technopole?
- How can we establish an archiving process for scientific and research documents that ensures their reuse and accessibility, without sacrificing the organic link that unites all of these documents?

Research methodology

Our study is based on an action research approach as a scientific methodology, encompassing several data collection methods. This approach involves visits to the various research centers and higher education establishments affiliated with the Borj Cedria Technopole (TBC), with the aim of analyzing the current state of the archives. At the same time, we set up a working group, trained it and supported it to identify issues related to the archiving of scientific documents within the TBC. This approach also included the preparation of an action plan, the analysis of the results obtained, and the formulation of appropriate responses.

The visits carried out included the different services, research laboratories, and libraries, while semi-structured interviews were conducted with administrative and research managers. We have also implemented support and intervention actions. All of these initiatives affected all TBC establishments, including the three higher education establishments, namely:

- National School of Advanced Sciences and Technologies (NSAST)

- Higher Institute of Information and Communication Technology (HIICT)
- Higher Institute of Environmental Sciences and Technologies (HIEST).

As well as the 4 research centers:

- Center of Biotechnology Center (CB)
- Center for Research and Energy Technologies (CRET)
- Center of Water Research and Technology (CWRT)
- National Center for Research in Materials Sciences (NCRMS) And
- The BCT Management Company (TBCMS).

Interviews were conducted with directors of establishments and/or general secretaries, as well as with librarians and IT professionals. The discussions covered the following points:

- Library funds
- Library staff
- Acquisition, processing and distribution methods
- The users
- The hardware and software used
- Archives kept in work offices
- Archives kept in an archive service (if it exists)
- The typology of archive files
- Methods for managing, processing and communicating archives
- People responsible for managing archives.

The technical committee for electronic archiving (TCEA), which we formed, mainly brings together librarians, archivists and computer scientists. The objective is to include a representative from each establishment capable of following the electronic archiving training and ensuring follow-up and coordination after the program is completed. This committee is made up of 16 members, including 9 librarians, 2 archivists and 5 computer scientists, distributed as follows:

Institution	Status
HIICT	2 Librarians and 1 Computer Scientist
CB	1 Librarian and 1 archivist
NCRMS	1 IT specialist and 1 Librarian
CRET	2 Librarians and 1 archivist
TBCMS	1 Computer scientist
NSAST	1 Librarian and 1 Computer Scientist
HIEST	1 Librarian and 1 Computer Scientist
CWRT	1 Librarian

Table 1: Composition of technical committee for electronic archiving

Each representative, whether an individual or a group, within an establishment, is responsible, after having followed training in collecting information, analyzing the current state, and the inventory of documents, to carry out an in-depth analysis of the state of documents within this

institution. This analysis includes the typology of documents, with a clear distinction between those of a scientific and technical nature, their state of conservation, as well as the methods of circulation and/or management.

Archives of science and research

Definition elements

Here, we make a distinction between the terms "scientific archives" and "archives of science." Although these two concepts often share a similar definition in the field of archival science, they may carry different meanings in information sciences more broadly. Indeed, the term "scientific archives" nowadays refers to openly accessible repositories of scientific documents voluntarily contributed by researchers (self-archiving). Therefore, we prefer to use the concept of "archives of science and research," which we find less ambiguous and is based on archival practice from the perspective of object and provenance (from which the legal status of archives generally derives). These archives are defined as "all archival sources allowing the study of the general evolution of scientific research and teaching policies, the evolution of a particular scientific discipline, or the contribution of a specific scientist to the development of knowledge" (Charmasson, 2006).

This definition encompasses both public archives, whether administrative or scientific (originating from educational institutions or their supervisory bodies, research laboratories involving relationships with individuals or entities, and archives related to editorial or teaching activities), and personal archives of scientists and researchers. The latter are considered "private" archives, even though they are primarily produced within public educational and research institutions.

It is this intertwining of scientific, administrative, pedagogical, and personal activities that constitutes the main characteristic of archives of science and research. Archiving is not limited to scientific concepts and objects but also encompasses the organizational aspects of research, including the relevant institutions, affiliated laboratories and teams, as well as the involved researchers. It is a comprehensive approach to archiving that considers the entire life cycle of documents, from production to use, in a contextual reflection that emphasizes understanding the conditions of production (Wolikow, 2009).

Interests and delimitation of the perimeter

The inherent interest in these archives lies in their role as sources for the history of sciences, providing the opportunity to reuse research data and revisit anthropological fields. As archives, they play a crucial role as evidence and justification of the rights of individuals and communities (Hannoun, 2015). These archives, regardless of their format, take various forms related to research activities, encompassing reports, summaries, notes,

correspondence, laboratory notebooks, as well as documents related to conferences, scientific events, and various publications.

They also include documents related to publishing activities, including manuscripts, articles, books, proofs, reports, summaries, correspondence, and translation documents, among others. Furthermore, these archives may extend into the realm of education, including study programs, course descriptions, teacher lists, curriculum vitae, exam copies, and diplomas, highlighting the diversity and richness of documentary content in this corpus.

On the other hand, a crucial consideration is defining the scope of these archives. Indeed, by defining the documents subject to archiving, we can identify key participants in the archiving process, namely producers and managers. It is also essential to identify the legal texts governing the procedures and constraints related to the processing of these documents, linked both to archive codes (such as the Heritage Code in France, for example) and to intellectual property codes.

Therefore, close collaboration must be established, firstly, between librarians and archivists, and secondly, between these professionals and specialized researchers. Agreement between the parties should focus on methods of sorting, evaluation, preservation, and communication of these archives. This involves the involvement of at least three services within each central administration of higher education or grouping of education and research institutions, as is the case for technopoles, an aspect we will return to later. These services, namely the university library, the archives service, and the IT service, should receive support from top management. Their mission is to support researchers and educators in adopting these new research practices, drawing inspiration, for example, from the French model of collaboration between university libraries and the catalog of archives and manuscripts in higher education (Calames) (Mercier, 2020).

Borj Cedria Technopole: field of study

The choice of this study area stems from my involvement as an electronic archiving expert in a project of the Tunisian Ministry of Higher Education and Scientific Research focused on the development of the Borj Cedria Science and Technology Park. My commitment has been particularly focused on its component dedicated to the promotion of scientific research. Funded by the Japan International Cooperation Agency (JICA), this project aims primarily to recognize the leadership of the Borj Cedria Technopole and its added value in technological promotion and support, especially in the fields of energy, water, environment, materials, and plant biotechnology. Its influence extends not only in Tunisia but also throughout the Maghreb region, the Middle East, and North Africa (referred to as MENA), as well as in the Mediterranean Basin.

With its four research centers specialized in Renewable Energies, Water and Environment, Plant Biotechnology, and Materials Science, and three higher education institutions (Information Technology, Advanced Sciences and Technologies, Environmental Sciences and Technologies), as mentioned earlier, the Borj Cedria Technopole aims to "stimulate and develop, in Tunisia and particularly in the Greater Tunis and Cape Bon region, research, development, and innovation to promote the creation and development of innovative enterprises.¹" Given its mission and strategic geographical location between two of Tunisia's most dynamic regions, Greater Tunis and Cape Bon, which represent nearly 20% of Tunisia's industrial fabric, the Borj Cedria Technopole generates enormous quantities of scientific and technical documents every day. Unfortunately, there is currently no policy for their management, conservation, or communication.

Study Results

Synthesis on the Existing Analysis

The in-depth visits and meetings conducted within the various institutions of the Borj Cedria Technopole (TBC) provided us with a detailed overview of the volume, nature, flows, conservation of documents, as well as the individuals responsible for their management. Simultaneously, an inventory of computer equipment was conducted to complement this analysis.

During these initial visits and meetings, our goal was to gather precise information on various aspects such as the volume of holdings, methods of processing and conservation, the number of specialists involved in managing these documents (librarians, archivists, documentalists, etc.), as well as the storage location, whether in the library or in rooms specifically dedicated to research archives, and many other elements. Below is a summary of the current state of these documents, categorized by institution:

Institution	Funds description
CRTEN	Library: Funds: 1683 titles of documents in foreign languages (French, English, etc.), 85 titles in Arabic, 55 reference works (Encyclopedias and Dictionaries), 1 Atlas title (4 volumes), 64 titles of periodicals from 1958 until 2017, 1 title of thematic documentary file (Engineering techniques) from 1951 until 2017 (with gaps in numbers) in foreign languages, 4 Magazine titles from 1997 until 2010, JORT collection in Arabic and French from 2005 to 2014 (with gaps in numbers), 141 titles of scientific publications, 361 titles of theses in French (1962 - 2015), Processing: CDU classification, Validation in a database (PAPYRUS), Validation in the BIRUNI collective catalog, Specialists: 1 Chief Library Curator and 1 Library Curator, Users: 155 Archives: Volume of archive funds: 30 linear meters, Types of documents: paper, Processing methods: Manual, GEC (there is a GEC system), Specialist: a person responsible for document and archives management.

Institution	Funds description
CBBC	Library: Funds: Books 1700 titles, Diplomas: 1100, Periodicals: 76 titles whose chronological coverage dates back to the 1950s, Articles in PDF format: 1100, Staff: 1 Chief Curator of Libraries, 1 Administrative Assistant. Archives: Deposit of intermediate archives (12 m2 room with 1000 archive boxes), The number of boxes processed is approximately 400 boxes inventoried and classified in a database making it easier to locate documents if necessary.
CNRSM	Library: Funds: 287 works, 186 theses and dissertations, 04 journals, Processing: Validation in a database (PAPYRUS software), Validation in the BIRUNI collective catalog; Specialists: 1 Library Curator, Users: 200 Archives: No Archives unit, files are kept in the work offices, their processing is manual.
CERTE	Library: Funds: 2818 magazines, 1140 books, 99 dictionaries, 189 theses and dissertations. Archives: No Archives unit, files are kept in the work offices, their processing is manual.
ENSTAB	Library: Funds: 528 books, 69 reports (69 CDs): PFE, Processing: manual, Staff: a library manager, Users: 60 (10 teachers and 50 students) Archives: No Archives unit, files are kept in work offices.
ISTIC	Library: Funds: 612 Books, 130 PFE, Processing methods (Table Excel + Directory of end-of-study projects in Word), conservation on metal shelving in the processing office. Distribution: List of new acquisitions, Sending lists by e-mail to teachers, Distribution via Facebook Staff: 1 Chief Administrator (director), 1 Librarian, Users (350 students and 37 teachers), Equipment: 2 computers and 1 server Archives: Archival documents kept in work offices. Typology: Student files, Complaints, Attendance sheets, Grade sheets, Financial documents (quotes, invoices, etc.), Administrative documents (correspondence, etc.), Minutes of exam results, etc. Archive room containing: Exam sheets from previous years, 1 archive box (Administrative documents such as (correspondence, minutes, etc.).
ISSTE	Library: Funds: 310 master's theses, 1145 end-of-studies projects, 155 course and practical workbooks, 2669 book titles (with 3880 copies), Staff: 2 Librarians and 1 Executive Assistant.

Table 2: inventory of documents in TBC establishments

The preliminary results of our survey reveal primarily that research archives encompass both scientific and administrative documents, and it proves particularly delicate to separate them. This situation arises from the close interaction between administrative services and research and teaching projects, creating an intricate mix that is challenging to disentangle.

We also observe a lack of collaboration in document management among the research centers, institutes of higher education, and the management company. Additionally, there is a lack of necessary technological infrastructure for the implementation of electronic archiving projects, such as scanners, dedicated software, computers for document consultation,

dedicated servers, etc. To date, no archival service is established, except for the Center for Energy Research and Technologies (CERTEN), which houses the archives of the IRST (Institute of Scientific and Technical Research, founded in 1977, became the INRST in 1984 by adding the epithet "national" before evolving into the current designation of the technopole). Although these archival collections are of great importance, they are neither digitized nor processed, often scattered in various offices and that of the research laboratory head, with no search tools available. Thus, the role of the library and archives seems relatively marginal concerning the development of scientific research.

Following these investigations, we first succeeded in identifying the main functions of the activities carried out within the institutions of Borj Cedria Technopole (TBC). These functions can be classified into two main categories, accompanied by other complementary functions. The first category concerns research and skill development in the key areas of these research institutions, namely energy, water, plant biotechnology, and the environment. The second main category is related to training and higher education in the fields of competence of the three institutes of higher education, such as information and communication technologies, environmental science and technology, as well as advanced science and technology.

In addition to these two main functions, several other functions have been identified to strengthen the former. The business creation function stems from the supervision and support of research laboratories and educational institutes in defining projects. This support covers all stages of setting up a creation project, from identifying opportunities to defining the concept, from market research to idea testing, from business plan writing to business model development, from obtaining financing to choosing the legal structure, etc. Another function related to this is project and development engineering, which involves translating any high-value initiative into a project that can be positioned in a promising market. Two other functions have also been identified: the economy and production function carried out by industrialists and companies, and the marketing and communication function aimed at positioning the various actors of the technopole in appropriate forums.

Implementation of Classification and Preservation Tools

After identifying the main types of documents and files within the various institutions of Borj Cedria Technopole (TBC) and determining the primary functions arising from teaching and research activities, we initiated a phase of creating tools for the classification and preservation of research archives. This phase unfolded in three steps:

- Formation of the Technical Committee for Electronic Archiving (TCEA): This training took place within the premises of the TBC management

company. It covered the fundamentals of archiving, basic concepts, legislation, management tools, etc. On one hand, it also addressed archives related to science and research. Subsequently, targeted interventions were organized in each institution to enable participants to understand the methods and processes of data collection. Concurrently, these interventions aimed to raise awareness among administrative officials about the importance of this initiative.

- **Systematic Inventory:** This step involved a methodical inventory of all types of documents of interest for scientific research. Data collection forms were used to guide this operation, which required a significant time investment and involved in-depth discussions with administrators regarding the nature of the documents.

- **Drafting Classification and Conservation Guides:** This final step involved developing detailed guides for the classification and conservation of research archives. These guides aim to provide a clear structure for organizing and preserving documents while considering their significance for scientific research.

Top of Form

Furthermore, after conducting several interviews with information-producing managers and establishing a detailed inventory of all types of documents produced or received by various departments within the organization, we developed a directory of standard files, a classification plan, and a schedule of retention periods. This collaborative effort, involving all members of the CTAE, relied on individual meetings with the responsible parties and the use of pre-prepared forms.

This process of creating directories and classification plans also integrated existing tools developed by the Archives Department of the Ministry of Higher Education and Scientific Research. In this approach, we aimed to fill any identified gaps at the level of the files inventoried by the ministry's archives service, especially those related to research projects, teaching programs, research laboratories, agreements, business incubators, etc.

The nominal list of all types of documents and files with scientific value that we have developed takes into account the following points:

- It catalogs documents from the establishments of the Borj Cedria Technopole, including three academic institutions, four research centers, and the management company.

- It considers the main functions related to the activities of the technopole, particularly focusing on scientific and/or educational documents as well as technical documents.

- It relies on tools previously established by the Ministry of Higher Education.

- It prioritizes the digitization of documents deemed most important and/or frequently used.

In the following table (Table 2), we list the main files containing priority scientific and research documents for long-term archiving and digitization, along with their classification codes. Due to space constraints in this article, it is not possible to present the constituent parts (we provide an example of subfolders for the "Scientific Research" file). It is important to emphasize that the best approach is to preserve these documents in their production context so that they serve as a foundation for the scientific research of faculty members and contribute to the enhancement of all activities within the technopole, which were previously widely dispersed, unclassified, untreated, and difficult to access.

File title	Codes
Elections	10000
Organization of university studies	20000
Student file	30000
Teacher Executives File	40000
Meetings of the scientific council, departments and disciplinary council	50000
Scientific Research	60000
24. Laboratory and Research Unit	61000
25. Scientific events	62000
25/1. International cooperation project	62100
25/2. Carrying out studies	62200
26. Scientific and technical equipment	63000
26/1. Acquisition of equipment	63100
27. Scientific analyzes	64000
28. Research contract	65000
29. Missions abroad	66000
30. Academic publishing	67000

31. Valorization of research and technology transfer	68000
Information management: Libraries, documentation and Archives	70000
Safety and maintenance of buildings and facilities	80000
Relations of the institution with the economic and social environment	90000

Table 3: Part of the directory of standard files of scientific and research value, with classification codes

Regarding the classification plan, we have taken into account the existence of other archival tools developed in this field by the National Archives for general documents and by the Archives Directorate of the Ministry of Higher Education for specific documents. Our intention is not to replace them but rather to strengthen them by adopting a distinct approach focused on the archives of science and research. We started numbering from 10000 to avoid any confusion and to distinguish ourselves from existing tools. The goal is to create a common platform between libraries and archives to enhance scientific research based on archival procedures and methods.

In the same vein, we have developed a retention schedule inspired by the schedules established by the Ministry of Higher Education (Figure 1). This document, however, stands out in that it focuses first on records with value for scientific research and aims for intelligent preservation of these documents to enhance scientific research within and around the TBC. This intelligent preservation mainly involves identifying the most important pieces of the records and digitizing them to ensure their availability and sharing.

60 SCIENTIFIC RESEARCH				
61 RESEARCH UNITS AND LABORATORIES				
copy	unit	active	semi-active	inactive
principal [c]	Unit/Research Lab	31	31	E2
secondaire [c]				
Notes : (E = Élimination C = Conservation) ¹ Conservation 3 years in active age and 3 years in semi-active age ² Elimination. The elimination concerns only paper documents, but digitally it is necessary to preserve legal texts, lists of subjects of current doctoral theses, CVs of researchers, list of research projects, research contracts, conventions, reports activities, the rehabilitation report, project progress reports. ³ Conservation 3 years after receipt of the document				

Figure 1: Example of a retention rule concerning the scientific research file
 We recall that a conservation rule “constitutes a standard, established from the evaluation of documents establishing their conservation period, their

progress and their treatment from their creation until their elimination or their transfer to the historical archives” (Couture, 1982). We have established only nine conservation rules grouped by categories based on the major scientific functions of TBC establishments. In each category, the rules have been grouped by subject.

7.3 Design and implementation of the digital archiving system

Based on the analysis of the existing situation and the archival tools that we have developed, with reference to the various standards in terms of records management, in particular standard 15489, we have undertaken conceptual work for the establishment of a records management system. This design aims to collectively reflect on the needs of the different current and potential users of the various TBC institutions in terms of access and reuse of scientific and research documents, without losing sight of the administrative context in which these documents were created. Five requirements were considered in this process: The first requirement concerns the classification plan, allowing documents to be organized into relevant groups while preserving the context of their production. The second requirement is related to control and security possibilities, establishing user profiles based on their roles in the system. The third requirement concerns the capture of documents by ensuring that these documents are anchored in their context, capturing all relevant information at the time of collection. The fourth requirement concerns the identification of documents as they enter the system. Finally, the fifth constraint is linked to the location and restitution of documents, by offering methods of searching, accessing and reading documents from the classification system, while also allowing full text searching.

After studying the main tools existing in the free world, we carried out a comparison between three free software widely used in the French-speaking context, namely Alfresco, Maarch, and Constellio EIM. Ultimately, we chose the Constellio EIM solution (see figure 2) because of the following advantages:

- It manages the entire life cycle of documents;
- It optimally meets the requirements of standard 15489 concerning Records management;
- It easily and quickly integrates a classification plan as well as a retention period calendar;
- It includes a high-performance search engine allowing you to search all existing business applications from a single interface;
- It facilitates the import and export of data in XML format;
- It is capable of handling very large volumes of data thanks to artificial intelligence features, including automatic versioning and duplicate detection.

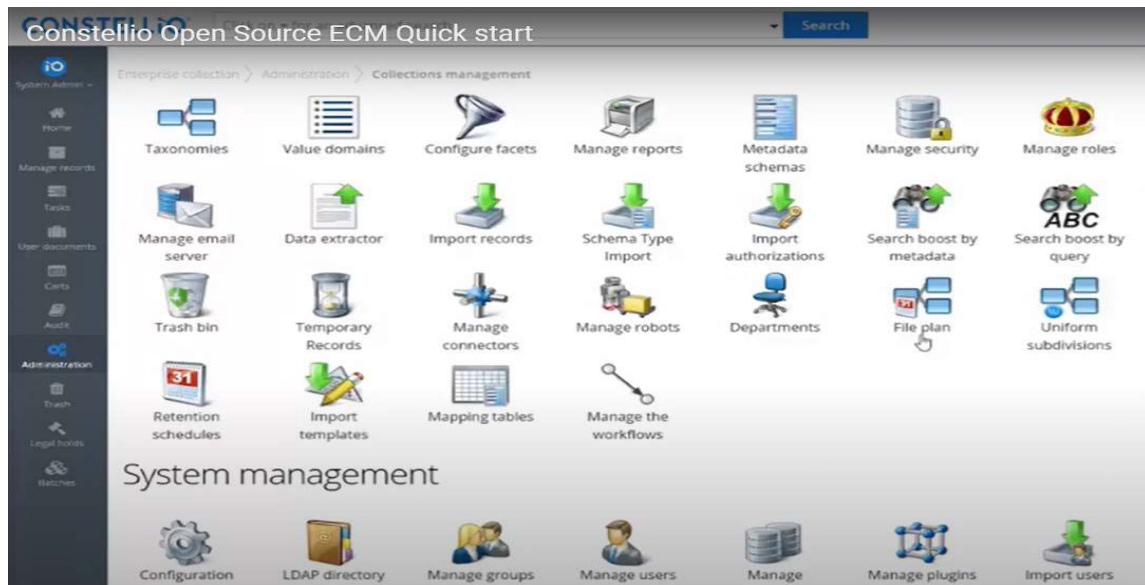


Figure 2: Constellio control interface

The aim is to create a prototype that will serve as a test for all other institutions. The CBBC center was chosen as the pilot institution to implement the Records Management system due to the presence and motivation of the librarian, who performs the functions of both the library and the archives, as well as the IT specialist, both of whom are part of the Electronic Archiving Technical Committee (CTAE).

The first step, after installing the software, is to integrate the classification plan and conservation rules while establishing the link between the two tools based on the relevant administrative unit. In a second step, we defined all types of documents, containers, media, locations, etc., in the "value domains" section. Next, we added and configured the administrative units with their identifying codes, as well as users with their names, surnames, email addresses, and roles. We grouped users with similar roles to assign them the same rights. Four roles were assigned to different users:

- Administrator: the one who controls the system without having control over the files and documents
- Manager: the one who gives authorizations on the different actions on the documents
- User: the one who creates, manages and modifies documents and files on a daily basis without having control over the system management and data deletion function;
- Responsible for document management: the one who has access to all functions including the management of the system in its basic functions.

Then we created the folders and started integrating the documents with their metadata into the system. At the same time, for paper documents, a digitization operation has been set up in order to dematerialize all the documents that we have chosen to submit in our system. The choice of the

main files on which we gave priority was based on the importance of these documents for researchers, in particular: Conventions, Scientific articles, Licences, Research contracts, Activity reports, Employment contracts, etc. All documents are introduced into their respective folders with the necessary metadata configured in advance for each type of document while mentioning their types and their names. The metadata used for the different document types are as follows:

Type of document	Metadata
Convention	Title, partners, year of signature, subject
Scientific article	Title, Author, Journal, Year of publication, Name of laboratory
Patent	Title, Date of signature, Partners, Natural and/or legal person concerned
Annual activity report	Year, name of organization
Employment contract	Name of service provider, Year of signature, Laboratory concerned, type of contract

Tableau 4: Examples of Metadata defined for document types in Constellio

Regarding research, Constellio enables us to conduct simple searches using free keywords, full-text searches, as well as advanced searches by cross-referencing multiple criteria such as document, folder, administrative unit, laboratory, partner, year, date, etc. Additionally, Constellio provides the capability to manage workflows by modeling and automating business processes. It also supports the document lifecycle by automatically calculating transfer dates and administrative expiration dates, while applying the final disposition to each file. Constellio further facilitates the management of imports and exports with other systems, ensuring traceability by allowing the verification of various actions taken by system stakeholders.

Results Discussion and Perspectives

The work conducted within the Borj Cedria Technopole clearly demonstrates that archives related to education and research require a different treatment approach from classical archival practices, which reveal their limitations in this context. The separation between administrative archives and research archives leads to a loss of context, contradicting a fundamental archival principle, that of respecting funds (Mercier, 2020). The need for specific treatment of research archives has been recognized for a long time, as mentioned by Bert (2014) in his article "Archiver les sciences ou les manières de chercher?" published in OpenEdition Press. He emphasizes that "The specificity of the documents that make up a researcher's collection, whether known or unknown, often requires separate archival and scientific treatment."

Research archives, dispersed across various administrative registers such as public, para-public, and private, as well as in academic and research registers, demand distinct treatment and classification. It is crucial to distinguish between "historical archiving, whose main mission is conservation, and living archiving focused on the dissemination and sharing of data" (Allain, 2014). It is in this perspective that we adopted a separate archiving approach, distinct from both classical administrative archives management and the conservation of scientific archives in university libraries.

Digital archiving emerges as a flexible and scalable solution that can draw inspiration from the functions of both libraries and archives to create new archives (digital copies) that preserve the organic connection between documents. This approach, bringing together librarians, archivists, and computer scientists in a collaborative effort, serves as a starting point for a profound reflection on research archives in Tunisia. This reflection gives archives a more tangible dimension, focusing on the preservation of thoughts and actions beyond mere objects and documents. Echoing the definition of archives by Charles-Victor Langlois and Charles Seignobos, cited by Allain (2014), that "documents are the traces left by the thoughts and actions of men from the past," we emphasize the safeguarding of ideas and actions.

In this context, the comprehensive digitization of research archives is of crucial importance for the development of scientific heritage, enabling broader access to scientific data and research processes (Delauney, 2012). This digitization process unfolds in various ways, including scanning all paper documents and incorporating all digital documents. It also involves promoting administrative practices that encourage research stakeholders to submit digital copies of their works, including theses, research projects, reports, curricula vitae, etc.

This digitization initiative can be expanded to include various media such as video recordings of lectures and scientific events, exam copies and notes, diplomas, course materials, as well as manuscripts, plans, graphs, postcards, maps, private documents, etc., as highlighted by Muller (2006).

The proper preservation of research archives within the Borj Cedria Technopole unquestionably requires the active involvement of researchers and teaching staff affiliated with this institution. They contribute to knowledge production, and their archives, rich in information, are of paramount importance for researchers themselves, offering insights that isolated administrative archives or detached scientific archives cannot provide. In this perspective, our project aligns with a collaborative approach involving researchers and heads of research laboratories, considering

research archives as a domain that touches on the individual activities of researchers.

Furthermore, the enduring preservation and valorization of scientific research cannot be the exclusive responsibility of archivists or librarians. Close coordination between both professions, along with collaborations with researchers, computer scientists, and administrative officials, is essential. This convergence between librarians and archivists challenges the relevance of the traditional distinction between these professions, even though, from the perspective of techniques and practices, they have different processing logics (Combe, 2006). As highlighted by (Tomy, 2017), the dematerialization of documents has resulted in greater permeability between the roles of archivist and librarian. This correlation is further confirmed through initiatives by major institutions worldwide, such as the Museum, Libraries and Archives Council in the UK, Bibliothèques et Archives Canada (BAC), Bibliothèque et Archives nationales du Québec (BAnQ) (Tomy, 2017), as well as UNESCO's program on harmonizing education in library science, information science, and archival science (Couture, 2014), etc.

The convergence between the professions of librarians and archivists finds justification and confirmation, especially in contexts such as technopoles, where documentation needs to be centralized and accessible to all internal and external actors to support their network and clustering approach. By adopting this approach, Borj Cedria Technopole aims to create and develop synergy between the worlds of production, training, and research and development (R&D) through the establishment and development of collaborative operational actions. Without a clear policy for archiving teaching and research documents, TBC cannot realize its ambitions, including networking between business and research unit actors. The goal is to foster a culture of innovation in the fields of renewable energy, biotechnology, water, and materials within these two worlds and enhance their visibility at the national and international levels.

In other countries, this research document archiving policy demonstrates a certain maturity today, similar to the French experience, which considers itself already behind what is happening in the United States and Canada, for example. In France, the Ministry of Higher Education and Research, through the National Center for Higher Education Computing (CINES), has established since 2004 a platform for archiving research documents. These archives can include administrative documents, publications (theses, digitized works, periodicals, etc.), as well as scientific data (observation records, simulation results, etc.). To be eligible for archiving in PAC (Common Archiving Portal), they must meet certain requirements, such as no longer undergoing modifications, being accompanied by a description,

and being encoded in a specified, open, and widely used file format (Lorène, 2013).

The choice of Constellio software was motivated by two main reasons. Firstly, to promote open-source software, whose philosophy is closely aligned with that of the information-documentation profession. This is evident, particularly in the right to access information and the culture of sharing knowledge through providing the source code of the software (Mkadmi, 2015). Secondly, the choice is linked to Constellio's development partners and its various users, such as "Library and Archives Canada", "Laval University", "University of Quebec in Montreal" (UQAM), "the National Canadian Institute for Scientific Research", etc. The automation features, search engine, and the Windows interface added in 2020 provide users with a familiar, efficient, and secure environment for working and accessing documents.

Constellio, with its Records Management approach, offers the opportunity to integrate archival tools necessary for managing research documents from the outset, such as the directory of standard folders, the classification plan, and the retention schedule. This helps maintain the organic link between all documents, allowing the reconstruction of the history and evolution of research and education within TBC.

Conclusion

This study sheds light on the process and importance of establishing a policy for the management and preservation of research and teaching documents through digital archiving technology. The choice of Borj Cedria Technopole is part of your involvement in a project of the Tunisian Ministry of Higher Education focused on the valorization of scientific research. This underscores public investment in research and innovation, especially through the development of competitiveness clusters that bring together the public and private sectors. Moreover, it aligns with the national strategy aimed at valorizing scientific research.

Digital archiving is seen as a key element of this national strategy, contributing to transparency and democratization of processes and documents related to scientific research and higher education. The dematerialization of documents, with an archival approach ensuring their organic links, offers Borj Cedria Technopole the opportunity to enhance interaction between educational and research institutions and businesses. This aligns with the goal of fostering "entrepreneurial universities," those seeking to consolidate academic excellence through the development of technological transfer, entrepreneurial spirit, and mobilization of appropriate financial resources (Dhaoui, 2022).

The variety of terms used in the literature to address the archiving of documents related to education and research (scientific archives, science

archives, research archives, education and research archives, knowledge archives, etc.) reflects the complexity of the issue and indicates that discussions on this topic are still ongoing. The commitment of researchers and educators to their own documents contributes to maintaining this debate, evolving it in directions favorable to the development of scientific strategies, and facilitating connections between various information experts.

It is emphasized that there are numerous new possibilities for developing services from these collections, particularly by using digital humanities tools, a trend that university libraries are beginning to explore. These new services could address concerns that have emerged in recent years among librarians and archivists regarding their roles in this period of digital transformations. Archiving research documents allows each person to recognize the heritage and historical dimension by managing testimonies of past research and traces of academic memory (Mercier, 2020).

The recommendation to the Ministry of Higher Education and Scientific Research is to deepen reflection by developing similar projects in various university campuses and competitiveness clusters, including other technological hubs in Tunisia. The idea is to concurrently work on a national strategy for archiving teaching and research documents. An additional suggestion is to promote a culture of sharing and collaboration among different information specialists within each educational and research group within Borj Cedria Technopole.

To facilitate these initiatives, it is recommended to establish an administrative structure dedicated to information and documentation, bringing together library, archival, documentation, monitoring, and administrative information access services. The creation of such a structure aims to enhance the cultural role of information specialists by freeing them from daily and burdensome administrative tasks.

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