

# Preserving Interactive Digital Music: A Report on the MUSTICA Research Initiative

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## Abstract

*The promise of recent technological and legislative developments to facilitate the digital dissemination of music is undermined by the lack of reliable means to preserve accurate copies of digital files: music that can be easily transmitted and played back today may not be retrievable tomorrow. Preserving interactive music compositions is particularly problematic, as their performance typically relies on a variety of specialized components. This paper describes the planned research activities of MUSTICA, an international team of archivists, information scientists, and musicologists that seeks to develop tools to guide the preservation and presentation of interactive digital musical compositions in accordance with the standards and strategies for electronic records preservation being developed by MUSTICA's parent research initiative, InterPARES 2.*

## 1. The electronic records problem

In order for a document to be transmitted and received electronically in accordance with existing aesthetic, cultural, and legal norms, it must first be possible to permanently preserve it in such a way that it is continually accessible in its intended form and kept safe from tampering or unintended modifications. That is to say, preservation conditions must ensure the document's identity and integrity, what archival science terms its *authenticity* [1]. While there are relatively straightforward means for preserving the authenticity of traditional documents, adequate mechanisms for the long-term storage and retrieval of the vast number of electronic documents generated in all fields of human endeavour are lacking. The preservation of electronic documents is further complicated by their fragile nature as well as by the typically short life spans of the software and hardware systems for which they are designed [2].

Therefore, the preservation of interactive digital music, the performance of which involves real-time manipulation of unique pre-programmed systems and sounds, presents complex challenges to archivists. To begin with, such compositions are generally comprised of a number of different types of documents that function as the score, the instruments, and the performers of the piece. These documents, what archival science refers to as *records*, are those necessary for the accomplishment of an action and that are relied upon to provide continuing memory and evidence of the action's occurrence. From this perspective, the records of a composer working in a digital environment might include a finished score in electronic form, MIDI files, and copies of electronic correspondence regarding the performance of a particular piece [3]. To accurately retrieve a work of interactive digital music, these documents must be kept in good conditions.

Because the records of digital music compositions are generally numerous and highly varied in format, composers often do not have the knowledge or means to properly preserve them. In addition, after finishing a composition, composers may be more inclined to pursue new projects rather than take on the arduous task of organizing their records, and they may not perceive uses for the records other than those for which they were originally intended (i.e., the composition and initial performance of a musical work). This means that much of the music composed using digital composition technology is not preserved, and that many of the records of interactive digital compositions that do exist may not be complete representations of their original identities. As interactive digital compositions form a significant portion of the music that is currently being composed in many parts of the world, the failure of society to capture and preserve authentic versions of this music will result in the loss of a vital component of contemporary global musical heritage.

To remedy this situation, steps must be taken to determine which of the components of a musical work are the permanently valuable records that form its identity, as well as what procedures can be followed to ensure the work's continued interpretability, and therefore its longevity. This research must also consider the cultural, legal, and institutional issues affecting the preservation of interactive music, such as differing historical and disciplinary outlooks on methods and concepts for establishing the authenticity of a musical work [4]. Furthermore, attention must be given to the potential of information technologies for enabling dense representations of the contexts in which digital works were created, performed, and received, this context being a crucial component of the work's long-term interpretability. For instance, it may be possible to simultaneously retrieve and present various types of

digital records of the same composition (e.g., multiple versions of scores together with multiple recordings of live performances) in an environment similar to that in which they were originally manipulated for performance purposes. This method of access would permit a richer understanding of the contexts in which the records were originally produced and used than is currently possible to achieve in an analog archive environment [5].

## 2. MUSTICA

MUSTICA, an international team of archivists, information scientists, and musicologists, was established in the spring of 2003 to research issues of digital music preservation. MUSTICA will initially operate as a case study within the framework of InterPARES 2, a large multi-disciplinary international research group based out of the University of British Columbia that is concerned with the preservation of authentic digital records of artistic, scientific, and government activities carried out through interactive and dynamic information systems. The goal of InterPARES 2 is to provide two series of preservation guidelines (one for records' creators and one for archivists) adaptable to a variety of legal, social, and cultural norms (see <http://www.interpares.org>). MUSTICA will assist in the drafting of these guidelines by collaborating with two French organizations, the *Groupe de Recherches Musicales* (GRM), a research center within the *Institut National de l'Audiovisuel* (INA), and the *Institut de Recherche et Coordination Acoustique/Musique* (IRCAM). MUSTICA is supported by the French CNRS through its "Archivage et Patrimoine Documentaire" funding initiative.

### 2.1. Objectives

MUSTICA's research will be based on two principles:

1. A technological principle: the musical content of a music document is an inscription on a physical carrier. In the context of contemporary music composition using computers, this inscription is generally in digital format and will only be accessible through the use of technological mediation to preserve and reconstitute the different formats and materials involved in its creation [6].
2. A musicological principle: interpreting the musical content of a music document requires knowledge of the conditions of its composition, performance, and reception.

The objective of MUSTICA in relation to the first principle is to propose and test strategies to support the continued access to information about the generation of digital compositions: MUSTICA will address the issue of preservation at each phase of a composition's creation

and use by developing appropriate metadata for each phase and testing its effectiveness. MUSTICA will also examine the various technological strategies suggested by the information science community for the preservation of digital documents, such as emulation [7], migration [8], and encapsulation [9].

The second principle implies that archival science must stretch its focus to accommodate not only the issue of preservation and access of cultural archives, but also that of providing for their future interpretability. Therefore, it may be necessary to preserve all versions of a digital work of art along with information about the context within which each version was created. Digital technology, however, tends to eliminate the separation of discrete versions as it permits the transparent modification of a document, enabling authors to move from draft to final product within the space a single document. Even with the ability of versioning software to maintain documentation of separate phases of work, future archivists and would-be interpreters may be prevented from thoroughly investigating a composition if its composer retained insufficient documentation of versions.

In considering these issues, MUSTICA will seek to answer the following questions:

- The genesis and analysis of musical works: How should the phases of development of a work of music be retraced? How should the conditions of its composition, reception, and interpretation be characterized? How should the authenticity of a musical work be established? How does the musicological concept of authenticity differ from that of archival science?
- The nature of documents and records: What relationship exists between the content of a document and its physical carrier? What makes a document used in the process of artistic creation a record? How are archivists to arrange the whole of the records of a particular creator if these records are in different digital formats?
- Formats, metadata, and access: Which formats are adequate to ensure the physical preservation of a work, its interpretability, and its accessibility within a body of archives? How should the information relative to a musical work be represented, managed, and manipulated? The question of access: what are the best conditions permitting access to a work? What modes of presentation of the musical content of a work and its associated documentation enhance its current interpretability and future interpretation?

## 2. 2. Methodology

Three distinct types of activities will provide for the realization of MUSTICA's research objectives.

1. Data collection: by interviewing and collaborating with composers, technicians, and archivists affiliated with IRCAM and the GRM, MUSTICA will to study the functions, activities, and equipment associated with the creation, performance, and preservation of digital music documents.
2. Theory: the results of the field study will inform interdisciplinary theoretical reflection, which will examine the pertinence and applicability of traditional archival concepts to the preservation of audiovisual and interactive digital works [10].
3. Experimentation: MUSTICA researchers will develop models of interfaces and other tools for accessing musical compositions offering multiple modes of interpretation and consultation. These will be designed by taking into account the metadata representing the components of the work's identity, as determined through analysis of the activities involved in the work's creation, performance, and reception.

## 3. Conclusion

The challenges presented by digital archives in general, and digital musical archives in particular, are of immediate concern to the communities of cultural and musical heritage institutions [11], related professionals, composers of digital music [12], and the general public. MUSTICA's core mission is to increase the ability of composers and archivists to preserve and access the records associated with the creation, performance, and reception of interactive digital music. However, by considering the procedures of music composition and the needs of the users of music archives, its findings should be useful to a wider community, as they will help to ensure the long-term stability and interpretability of digital music documents and enable the communication and distribution of the documents in authentic forms.

## 4. References

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