

Preservation of digital literary works : another model of memory ?

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Digital technology has raised great hopes in the field of heritage preservation. It has appeared as a solution to the problems of media decomposition and content accessibility. Theoretically, digital technology permits perfect reproduction, ubiquity (non competitive access to content), universality (any content can be digitalized) and homogeneity (the life cycle is integrated in an interoperable technical system). But in reality, one has to face issues such as the emergence of new formats and the logical obsolescence of content, the proliferation of transformed copies and complex and heterogeneous reading environments.

The archiving and preservation of digital data appear particularly crucial in the field of electronic literature. The preservation of works of electronic literature leads to a real theoretical and practical problem. A digital literary work is indeed not an object, but in most cases it isn't either a simple event limited in time, like a performance or a digital installation. In fact, it partakes of both aspects: it is a transmittable object but also fundamentally a process that can only exist in an actualisation.

Some authors consider that their works – notably online works – are not meant to last forever. They consider that their works bear their own disappearance within themselves. Their lability is part of the artistic project. This claim can be made *a posteriori*, as in the case of Talan Memmott and his *Lexia to Perplexia*¹. In this article, we shall first dwell on the works which do not claim to adhere to this aesthetics of dereliction or disappearance. What should be preserved in such digital literary works? The mere preservation of the original file seems insufficient to preserve the work. Especially so if the work is generative or interactive. In this case, the file is not the work as it isn't what the reader perceives. Not to mention that online works sometimes rely on readers' contributions: they grow thanks to the internet users' contributions and are in a process of constant evolution.

We shall first analyse the specific problems that arise with digital preservation and the paths that can be explored to preserve the works. Then we shall examine how those solutions are used in current preservation projects and how electronic literature may prove to be an interesting laboratory when addressing digital preservation.

1. Digital preservation as reinvention

The digital content is not preserved but rebuilt

Bruno Bachimont distinguishes the « inscription form » and the « restitution form » («forme d'enregistrement » / « forme de restitution ») of a document [BAC 07]. On a printed medium, the inscription form and the restitution form are identical (the printed text). On a digital medium, the two forms are distinct insofar as, between these two forms, there is the mediation of calculation. This distinction is close to the distinction between SCRIPTON and TEXTON by Espen Aarseth² : Aarseth indeed coined these terms to distinguish between underlying code and screen display. Thus what is the content of a digital document? The content to be

¹ http://www.uiowa.edu/~iareview/tirweb/hypermedia/talan_memmott/

² AARSETH, E. (1997). *Cybertext, Perspective on Ergodic Literature*. — John Hopkins University Press, Baltimore.

found on the hard drive (the resource) or the content displayed on the screen (the rendering)? Both the resource and its renderings have to be taken into account. Yet what is the *right* rendering of the document? If the preservation of the resource is not enough, how can the rendering of it be preserved? The question remains open.

When dealing with the preservation of digital works, one must take into consideration the fact that digitalization does not preserve the content, but the resources and tools used to rebuild the content. Content is only accessible through the functionalities of the tools. The first consequence is that interpretation is conditioned by access tools. The second consequence is that reconstruction is variable. One can observe a proliferation of variants. Numerous versions of a *similar* content are to be found. Therefore, the questions which must be asked are: what makes the identity of a content? What makes some versions acceptable? What permits to differentiate a variant from the original? Maria Engberg [ENG 05] bore such questions in mind when she analyzed the various versions of *RiverIsland*³ by John Cayley.

Strategies of preservation

Considering what we have said so far, what are the various strategies of preservation available for electronic literature? Four main strategies are possible to preserve digital data [THI 02, BOR 06, GLA 07] :

- museology ;
- migration ;
- emulation ;
- description.

- The museological approach

It consists in preserving contents as they are as well as the tools permitting playability. This way, it is not only the information which is preserved, but the technological environment characteristic of a certain time and content. Such approach is suitable for small contents but comes up against the difficulty to maintain obsolete tools. However, it turns out to be useful to recreate the playing conditions of arcade video games for example, or to be able to read old contents like the first versions of Word.

It is sometimes the solution libraries choose for electronic literary works when they have digital storage space.

- Migration

Migration involves updating the technical format of the contents so that they should remain compatible with and adapted to the reading tools available in the current technological environment. This approach is costly since it must be applied to every content, yet it is the easiest to implement. Moreover, *migrated* contents benefit from the latest improvements of formats and tools.

- Emulation

With this approach, the contents are not made to evolve. Instead, the reading tools of the old formats are simulated on current environments. Although very attractive theoretically since the contents are left untouched, this solution is fragile since emulation is never perfect nor effective. Furthermore the constant and never ending evolution of reading tools implies costly

³ <http://www.shadoof.net/in/riverisland.html>

and ineffective technological complexity. For some time now, attempts have been made to preserve contents by emulating them on a virtual machine, which has to be implemented on the targeted environment [LOR 02]. Supporters of this approach [ROT 99] claim this approach ensures archiving while respecting integrity and authenticity. Selecting what should be kept of a content to make it migrate or to reproduce it becomes unnecessary. This approach has been favoured lately thanks to the virtual approach.

Jim Andrew's initiative on the web⁴ to preserve the digital poem *First Screening* by bpNichol (1984) combines several strategies. Thus Jim Andrews proposes (figure 1):

- the original computer program coded with Hypercard.
- the emulator of the original machine which permits to run the program today (emulation).
- a rewriting of the program in javascript to play the work on today's machines without resorting to an emulator (migration).
- a rendering of what was seen on the screen at the time through the use of a video (simulation of the event).

By proposing these complementary approaches, Jim Andrews claims that « *the destiny of digital writing usually remains the responsibility of the digital writers themselves.* »⁵

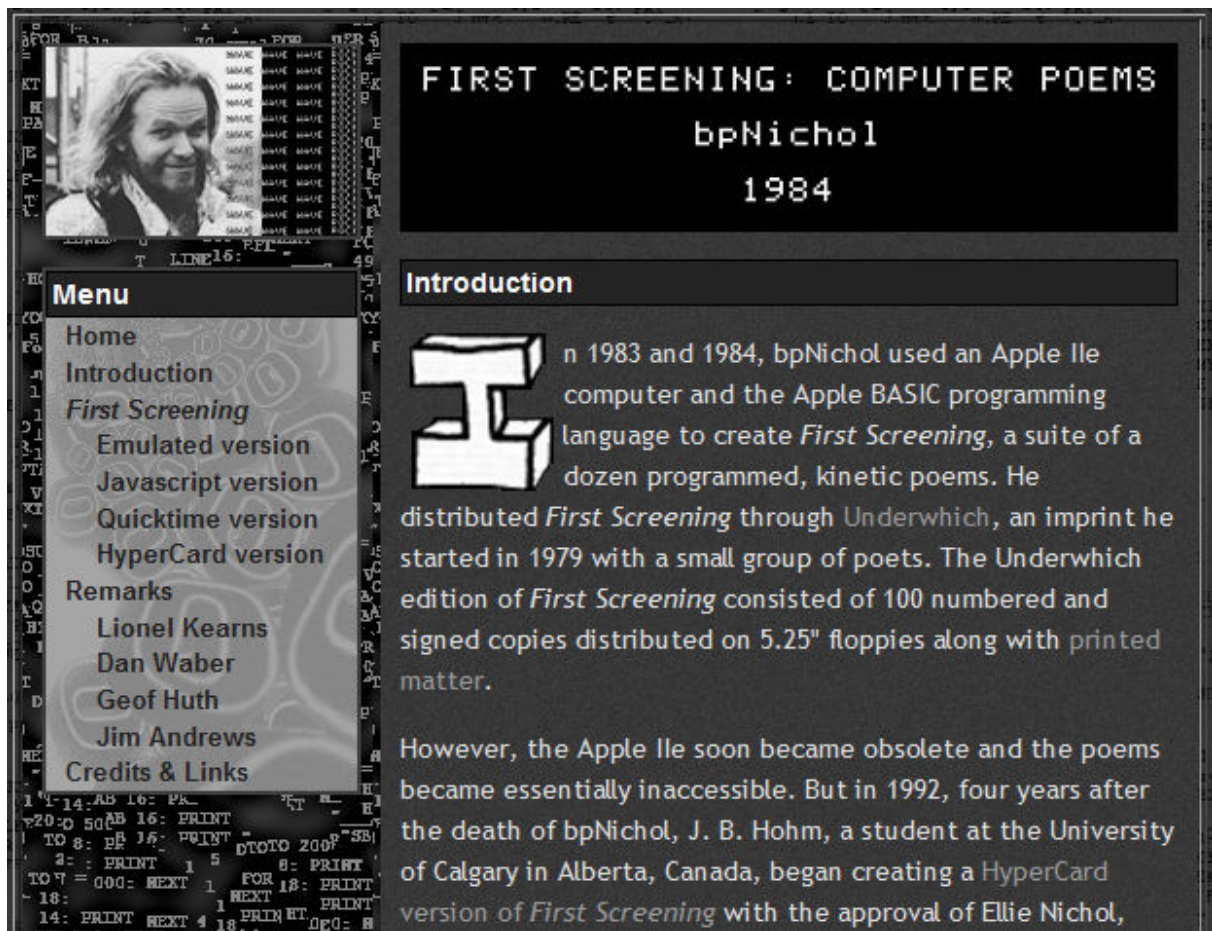


Figure 1. Online preservation of « *First screening* ».

⁴ <http://vispo.com/bp>

⁵ Ibid.

- The description

This last approach is counter-intuitive but it is the most potent on a theoretical level. What it keeps is not the content, but a description of the content. Digital technology is indeed so complex that one can't keep everything. The best one can do is to reinvent. This approach consists in discarding recorded contents in as far as they are incomplete, partial or ill-defined. Therefore it is better to preserve a description of the content which permits to reproduce it. The description may concern the reproduction of key elements, of the author's intention (e.g. [DEP 03] and the *variable media approach*⁶), of the graphic appearance, etc.

Not one of these strategies or approaches surpasses the others. None of them can claim that it covers all the advantages and characteristics of all the others. Therefore the only option is to build a new strategy each time, which relies on these four approaches and depends on the work in question and on the goals set to its preservation.

However, considering the complexity of digital technology, description-based approaches should develop in the future. Research on the means and standards of description will undoubtedly become major issues in the coming years. The challenge is to define languages permitting to write the non variable elements used to pilot and control the reconstruction or reinvention of the contents.

The model of classical music

Regarding this description-based approach, we can focus on an effective model, that of music. Indeed, we still know how to play baroque music even though we have no recording of how it was played at the time. This is due to the combination of three factors:

- Music scores which describe not the music itself but the way to play it and reproduce it on an instrument.
- Musical instruments and stringed-instrument making techniques still in use.
- Music schools where instrumental practice is maintained.

Thus classical music relies on description-based preservation through the conjunction of three elements: score, instrument and instrumental practice. The score provides the instructions required to be able to produce music from an instrument. Organology preserves the instruments and the techniques used to make them. It is the indispensable addition to the score and it permits to play the music while respecting its tone, resonance, tonality, melody. Finally, thanks to its practice (score reading, instrument playing), music is continuously taught and transmitted. Preservation comes with constant use. The model of music is a model which permits to keep track of a content that one doesn't know how to record, by saving a resource (the score), a player (the instrument) and a practice (the music school).

The musical solution is therefore very original: failing to preserve the content itself, one keeps a non variable description of its performing. The content is preserved by a dual practice (instrument making and instrumental practice) which overcomes the impossibility to preserve the content itself. It is only practice which makes preservation possible. Besides, preservation appears first and foremost as an interpretative act. This is what the DOCAM project⁷

⁶ <http://variablemedia.net/>

⁷ Documentation et conservation du patrimoine des arts médiatiques : <http://www.docam.ca/>

emphasizes. Preserving is keeping intact the interpretability of the work to be able to reinvent it. In other words, preserving is saving the *knowledge* of its re-invention.

A possible solution for digital literary works would be to rely on what is done in music. The score is an abstraction which represents the element which never varies through the many interpretations or performances of the work, and which therefore defines the integrity of the work [RIN 03]. The digital code can be considered as a kind of score played by the computer. Yet it is too dependent on its performing environment. A notation system is here needed. It would have to be more abstract than code, independent of its environment and as strong as musical notation. The idea would be to come up with a notation system for digital works which would rely on a conceptual model calling up an ontology or a metadata framework. The current problem is that conceptual models are not stable, or at least not as stable as musical notation [ROT 99].

Another model of archiving but also of memory

Thus, digital preservation is a reinvention of the archive by the use of preserved data. The fact that it is a reinvention stems from the fact that access to content is feasible through a calculated reconstruction. Therefore, archiving cannot be considered from the perspective of the archive to be preserved in its original state. It must be considered from the perspective of the use which will be made of it, even if the ultimate goal is to re-establish the authenticity and integrity of the content. Since it is in constant evolution, archiving is not about guarding a content, but about bearing witness to the continuous transformation of an identity that requires constant evolution.

The model of archiving that we have attained is based on the following:

- Preservation comes with the use and interpretation of the contents, which therefore entails their conservation.
- The decision of what is necessary to preserve is based on the definition of the non variable elements constituting the identity of a work. This definition is always temporary because it concerns convention and cultural tradition. This is why preservation cannot be made once and for all, but must be related to a research which calls into question these non variable elements and rebuilds the model of the content. Archiving belongs to the scientific and cultural community, and cannot refer to choices fixed by default (everything is kept) or dogmatically (a selection is made).
- The conservation is not a preservation of the physical integrity of the content, but a permanent reinvention of the content based on the preserved elements. The issue is to preserve an identity of the content through the transformation of their resource and the variability of their reinvented renderings.
- Preservation should adopt an organic vision of memory, in which the content evolves, changes, adapts to be maintained and preserved.

2. Electronic literature as a laboratory

To test these avenues of research, electronic literature seems to be a good laboratory. Indeed:

- Works are digital *natives* and obey various logics of diffusion (performances, presentations, electronic publications...).
- The field is relatively recent: few works were created before the beginning of the 1980s [BOO 06]. The great majority of the actors of the field are still alive, which can be useful for documentation needs. The field of the works is of small size compared with the wider field of digital arts for example.
- The research field in electronic literature is recent; the first European thesis on the subject goes back to 1980. This field gathers a still small group of researchers who constitute a pluridisciplinary community, in which many exchanges take place and which is in the process of structuring itself on an international level.

To what extent do practices and ongoing projects illustrate - or not - the avenues that we have just emphasized ?

Archiving of online works by the libraries

Can we rely on the practices of the libraries regarding archiving and preservation? Concerning the Internet - and thus online works -, two national archiving projects are currently run in France, within the framework of the law for Internet copyright. Nevertheless, these projects are unlikely to fulfill all the expectations.

Indeed, the BNF⁸ project only allows the user to access a general archive (and the only analysis tools will be those proposed for consultation in the BNF). As for the INA⁹ project, the archive will be more specific but restricted to *media* sites. In both cases, researchers will not have the possibility to carry out their own archiving campaign, nor even to define their own research field. The interest of Web archiving centered on a precise topic (for example electronic literature) thus remains intact and would possibly be complementary to the two French national projects.

The constitution of a hypermediatic works directory by the NT2 laboratory

One of the difficulties of the reception of online works is the absence of context. How is one to know if one is about to undergo a literary or artistic experience? The projects of constitution of online works directories, in particular those which propose a critical apparatus, allow to *contextualise* the works.

To meet the needs of inventory of the works, the NT2¹⁰ laboratory (*New Technologies New Textualities*, UQAM University in Montreal) constituted an online “directory of

⁸ To know more about copyright registration on the Internet at the BNF (Bibliothèque Nationale de France) : http://www.bnf.fr/pages/infopro/depotleg/dli_intro.htm

⁹ INA : Institut National de l'Audiovisuel.

The two missions indeed differ : sample policy for the INA vs registration of copyright for the BNF.

¹⁰ The NT2 Laboratory aims at promoting the study, the reading, the creation and the preservation of the new kinds of texts and works on the Web.

hypermediatic literature and arts”¹¹. This directory in French identifies and indexes the artistic and literary experiments on the Web, in order to describe them and to encourage their study. There are currently more than 3000 descriptions online. To make up such a directory, an inductive methodology was adopted, based on the NT2 research assistants’ observations and first impressions of the online artistic works. This methodology is centered on the experience of the Internet user. The approach is not technical, but is rather based on the aesthetic experience allowed by “hypermediatic works”. Thus, the most important keywords for the constitution of the directory are those concerning the forms of interactivity¹².

Descriptions contain also historical and stylistic perspectives: critical bibliography, biography of the artist, commented screen captures, a video of the navigation in the work. For certain works, an interview of the artist gives information on the creative process and the technical aspects. The directory also provides theme-related articles presenting a recurrent practice, theme or trend in online works. However, the listed works are not archived on the server of the directory. Yet let us mention that the *bleuOrange*¹³ review, which is also a creation of the NT2 laboratory (the second issue was published in March 2009), does archive the published works on its server. In brief, the directory of hypermediatic works fullfills the need for critical literature on the works.

The screenshot displays the NT2 website interface. At the top, the logo 'nt2' is followed by the text 'NOUVELLES TECHNOLOGIES NOUVELLES TEXTUALITÉS' and 'LE LABORATOIRE DE RECHERCHE SUR LES ŒUVRES HYPERMÉDIATIQUES'. Below this is a navigation bar with links: ACCUEIL, OBSERVATOIRE, ATELIER, RECHERCHES, AGORA, LE LABO, and buttons for 'SE CONNECTER' and 'NOUS CONTACTER'. A search bar is located on the left side of the main content area.

The main content area is titled 'RÉPERTOIRE DES ARTS ET LITTÉRATURES HYPERMÉDIATIQUES'. It features a grid of four work entries, each with a thumbnail image and a brief description:

- [[ad]]Dressed In a Skin**: An artwork featuring a large orange shape resembling a snake or a stylized figure against a dark background with text.
- :// Self Portrait**: A landscape photograph with a white structure in the foreground and a cityscape in the background.
- !C!**: A collage of various images, including a cityscape and abstract patterns.
- ?+?= ? Raisonnements mathématiques**: A dark image with a small white figure and text.

Each entry includes a 'Code_Oeuvre' and a 'Site Web' link. The right side of the page has a red sidebar with the title 'RÉPERTOIRE' and '+ de 3000 fiches à consulter...'. It contains a search bar and a 'RECHERCHE GUIDÉE' section with a list of categories and their corresponding counts:

- Oeuvre -2556-
- Vitrine artistique ou littéraire -302-
- Portail/répertoire -65-
- Documentation d'événement artistique/littéraire -58-
- Site d'hébergement -51-
- Site d'organisme -46-
- Périodique -35-
- Site d'édition -16-
- Carnet -14-
- Galerie/musée -5-
- plus...

Figure 2. The NT2 directory of hypermediatic works.

¹¹ <http://www.labo-nt2.uqam.ca/observatoire/repertoire>

¹² Examples of interactivity : « Robot clavardeur », « Capteur de position », « Lien mobile », « Manipulation d'un avatar »...

¹³ <http://revuebleuorange.org/>

The ELO's *Archive-It* and *Electronic Literature Directory* projects

The Electronic Literature Organization (ELO) also wants to bring elements of solution. It is a non-profit organization which has been promoting and developing the writing, publishing and reading of electronic literature since 1999. Since the beginning, ELO has helped the authors of electronic literature to communicate their works to a large public. Since 2006, ELO has been hosted by the Maryland Institute for Technology in the Humanities (MITH) of the University of Maryland.

Among the various programs, the PAD¹⁴ program (*Preservation, Archiving and Dissemination*) aims to identify electronic works in danger, with a view to preserving them and maintaining the access to all readers. A report from 2005 is available on line¹⁵. The ELO preservation program has materialized in a DVD, *Electronic Literature Collection volume 1*¹⁶, which will be followed by a second volume in 2009.

Available on the ELO website, the *ELO Library of Congress/Archive-It* project allows any internet user, via a wiki¹⁷, to index and to access online works of electronic literature. The indexing work is based on the participation of the whole community.

But the ELO also wishes to emphasize an editorial and reviewing activity. The ELO website indeed provides the reader with a directory (*Electronic Literature Directory*) which counts currently more than 2300 works selected by an “editorial collective”. The next version of the *Electronic Literature Directory* (version 2.0) will soon be accessible online. It will propose a critical apparatus of various selected works.

There is a risk of confusion between the *Archive-It* project with the Library of Congress (*open control source*, under the direction of Scott Rettberg) and the *Electronic Literature Directory*, an editorial and critical project (*controlled*, under the direction of Joe Tabbi, the president of the ELO). However the two projects, by articulating indexing and reviewing, can appear as complementary.

Thus, both the NT2 laboratory and the ELO tend to contextualise the works by offering a critical documentation. We will find the same emphasis on the documentation in the next two projects, the one documenting the life cycle of a work, the other the different facets of the work.

¹⁴ <http://eliterature.org/programs/>

¹⁵ <http://eliterature.org/pad/bab.html>

¹⁶ <http://collection.eliterature.org/1/>

¹⁷ http://eliterature.org/wiki/index.php/Main_Page

The screenshot shows a web browser window displaying the ELO Library of Congress/Archive-It project page for the work "Lexia to Perplexia" by Talan Memmott. The page is organized into several sections:

- Navigation:** Includes links for Main Page, Add Collection of Works, Browse Collections of Works, Add Individual Work, Browse Individual Works, Add Context Site, Browse Context Sites, Add an Author or Editor, Recommended Keywords, FAQ, and Report Bugs.
- Functions:** Includes links for New pages, Recent changes, Random page, Help, and Donations.
- Search:** A search box with "Go" and "Search" buttons.
- Toolbox:** Includes links for What links here, Related changes, Special pages, Printable version, and Permanent link.
- Article Information:**
 - URL of Work:** http://www.uiowa.edu/~iareview/tinweb/hypermedia/talan_memmott/
 - Archived URL (if entered in Archive-It by the ELO):** Not entered or N/A
 - Title of Work:** Lexia to Perplexia
 - Author:** Talan Memmott
 - Year of Publication:** 2000
 - Language:** English
- Description:** A detailed paragraph describing the work as an observation of internet technology and literary hypermedia, mentioning its original publication in the *Electronic Book Review* and *Iowa Review Web*.
- Authorization:** Editorial status: not reviewed by the ELO for inclusion in the Archive-It project.
- Last edited or reviewed:** {{{edittime}}} by {{{edituser}}}
- Additional Notes:** A paragraph detailing the work's development for the trAce Online Writing Community's INCUBATION Conference in 2000 and its subsequent publication in the *Electronic Book Review* and *Iowa Review Web*.

Figure 3. ELO Library of Congress/Archive-It project.

The CASPAR project : Life-Cycle description

The CASPAR¹⁸ European program (*Cultural, Artistic and Scientific knowledge for Preservation, Access and Retrieval*) aims at proposing an approach for long term conservation of scientific data, cultural contents and digital works [GIA 06]. It associates the question of knowledge with that of preservation. This approach is based on the OAIS model [CCSDS 02]. It is currently implemented within an infrastructure which will be validated in the three fields referred to above. This infrastructure mainly makes it possible to store the knowledge suggested by archive producers and to provide the archive users with an access to this knowledge.

The CNRS (*Centre National de Recherche Scientifique*) intervenes in this project within the Heudiasyc laboratory of the University of Technology of Compiègne¹⁹. Its main action is in the field of artistic works and in particular of electroacoustic music, with two partners: INA²⁰ and IRCAM²¹. A method of representation of electroacoustic works has been conceived. It is based mainly on the Life-Cycle representation of the work (a solution suggested to maintain the long-term intelligibility of the work) and a method allowing to build this representation (from the saving of the files to the graphic representation). The angle of Life-Cycle description makes it possible to answer the question: "Who does what?" Thus, a structured history is obtained, which can start simply with the original idea of the work and does not end as long as elements are added to the archive. This method has been validated with a certain number of works and has allowed to establish a model of description of this type of creation.

¹⁸ <http://www.casparpreserves.eu/>

¹⁹ <http://www.utc.fr/caspar>

²⁰ National Institute of Audiovisual (Institut National de l'Audiovisuel) : <http://www.ina.fr/>

²¹ Institut de Recherche et Coordination Acoustique/Musique : <http://www.ircam.fr/>

This model can be expressed in various manners, in particular with an ontology developed within the project as a working tool and which is focused on the Life-Cycle description of artistic creations (AWLCD: *Artistic Work Life-Cycle Description*) or with a more standard ontology like CIDOC CRM [DOE 03].

Currently, the project goes on with the implementation of an online prototype (CYCLOPS, cf. figure 4) illustrating this approach based on the Life-Cycle representation. The prototype is focused on the tasks of the archive producer (in particular the Life-Cycle representation) and on those of the archive users (information research and exploitation).

The CASPAR approach thus considers that the various strategies of preservation (museological, migration, emulation, description) can be implemented according to the works. Nevertheless, the stress is laid on description with the emphasis on the temporality of the creative process. A question remains: to what extent could a tool, designed for a type of artistic works with a terminology used by the INA, be adapted to the preservation of digital literary works?

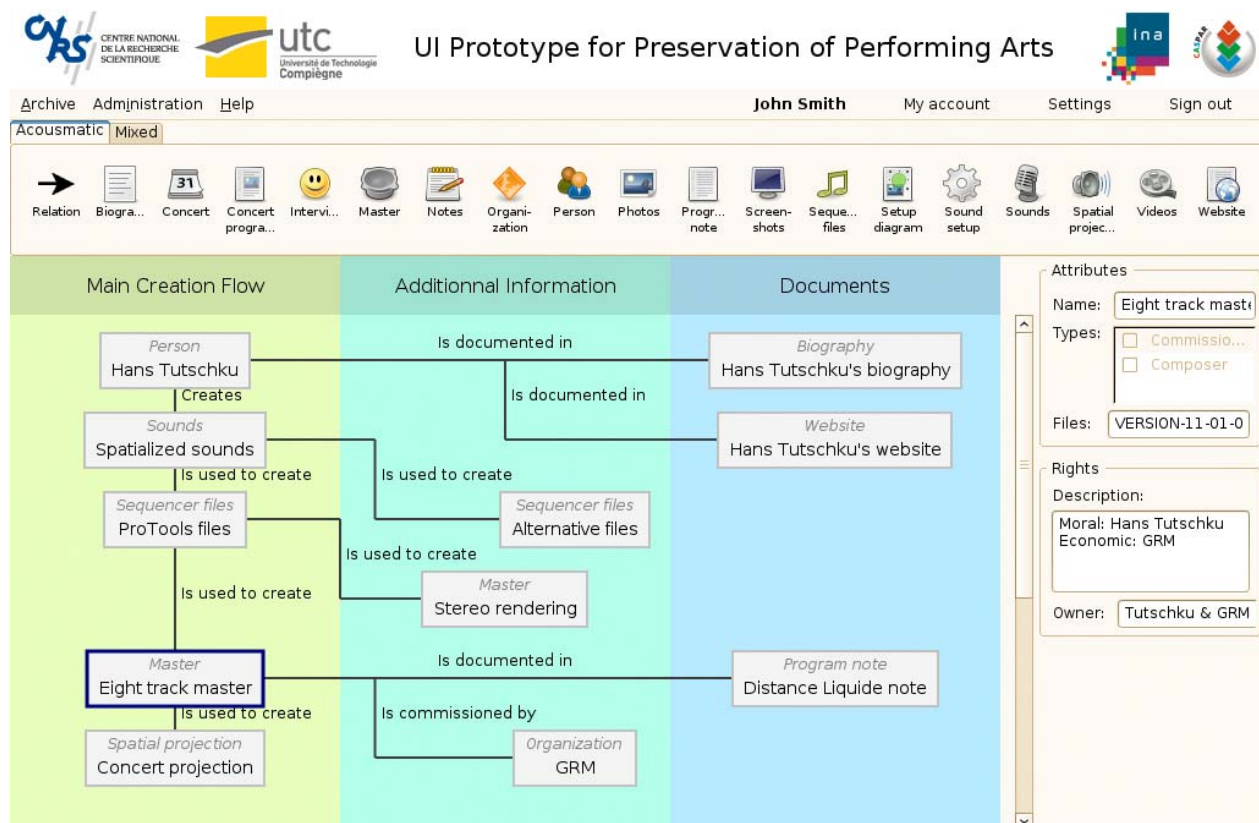


Figure 4. Screen capture of the prototype implemented in the CASPAR project.

The ARCHIPOENUM project: ontological approach and indexing tool

This approach through description is also very present in another research and development project, which considers indexing solutions. The ARCHIPOENUM project [BOO 08] is an ongoing project on electronic literature, under the direction of Philippe Bootz. In this project, preservation relies on a documentation of the various facets of the work: source code, algorithmic descriptions, functional simulations, video captures in various technological

contexts, recording of reading sessions, testimonies of readers and authors... These facets have to be preserved independently and indexed according to several viewpoints (semiotic, historical...). These viewpoints are expressed in various indexed documents.

The theoretical construction rests on a Spinozist approach. The “work” entity being perishable, it is illusory to seek to make it immortal. What is necessary to preserve is an access to its identity. However this identity remains forever external to us. We can only preserve knowledge about it, knowledge which will make it possible to rebuild a partial actualization of this identity. Philippe Bootz’s procedural model gives a global communicational approach which can be used as a framework for the development of a tool. This tool should allow to create ontologies from all viewpoints on these documents, to index them and to visualize their characteristics.

The project thus aims at developing an open source prototype tool for indexing all types of documents concerning electronic literature, including material components of the works. This tool will be based on a modelization of viewpoints thanks to ontological agents. These documents are currently scattered on a multitude of media, which makes their reading difficult. The tool will make it possible to build an easily accessible knowledge database. In particular, it will provide a visualization of the relations between the documents and the works. It will thus allow to go from documents to works and conversely, in order to provide information about the works. This tool will be freely accessible for the scientific community. In a second stage, it will be available for a larger public, in particular through libraries and cultural organizations.

In order to provide the community with a tool based on a database of viewpoints, technological and theoretical developments will be completed by the constitution of reference ontologies, relating to the semiotics of the works, to aesthetics, to psychological reception. They will be used to produce a first corpus of viewpoints of the researchers’ community. This attractive approach is still in its beginnings, and also requires to be specified: which facets will be documented, and according to which viewpoints ?

These projects emphasize the will to combine theoretical thinking and practical solutions. What is emerging is the necessity to adopt a strategy of description of the works. What should be aimed at now is the will to combine the description of digital works with a practice of this description, to be able to reinvent with the current tools the contents that we wish to preserve.

Conclusion

Regarding preservation, the digital age is undoubtedly the most fragile and complex context in the history of humanity. The added-value of digital technology is thus not where one expects. The digital medium is not a natural preservation medium, but is on the contrary *hell* for preservation. But digital technology makes us enter another universe which is a universe of reinvented and not stored memory. From an anthropological point of view, this model of memory is more valuable and more authentic than the model of printed media which is a memory of storage (the book that one stores on a bookshelf just like the memory that one would store in a case of one’s brain). Indeed, cognitive sciences teach us that memory does not function on the model of storage and conservation.

Preserving is thus permanently reinventing the content. The issue is to have an accurate and faithful invention, a reconstruction in which the changes are explicit and commented upon. The fidelity of the invention rests on the describing of the transformation. Preserving is thus editing: reinventing the content, tracing the transformations, integrating a critical view of these transformations.

From this point of view, electronic literature can be regarded as a good laboratory to address digital preservation: it makes it possible to raise the good questions and presents the digital age as a move from a model of stored memory to a model of reinvented memory.

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