

**New services for the public
in a technology-related approach:
the AXMEDIS project inside a museum of musical
instruments**

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Abstract

Museums are recently landed to the use of the information technology with wide applications: from digitalisation of their contents to use of the audio-guide. Now 'multimedia museums market' is urging better pricing and value-for-money for their new products and services. Key issues for a viable and sustainable business venture in the digital cross-media content include the containment of content sale prices and the accessibilities to the contents in order to allow better exploitations of the heritage of a museum.

Currently, the museum sector has not fully exploit new possibilities from the Information Technologies for their public services and management aspects. Possible technology-enhanced solutions to containment of sale price challenge could be found by automating, accelerating and restructuring content managing, production of new content and delivering processes, providing solution for content protection.

The AXMEDIS project (Automating Production of Cross Media Content for Multi-channel Distribution) is supported by the European Commission to create an innovative technology framework for the automatic production and distribution of digital cross-media contents - providing solution for content protection - over a range of different media channels with protection, including PC (on the internet), PDA, kiosk, mobile phones and i-TV (interactive-TV). AXMEDIS aims to meet the above mentioned challenges of the museums and the market demand by:

- reducing costs for content management with the application of appropriate Artificial Intelligence techniques (for the management of the documentation related to each instruments)
- reducing content production, distribution, protection and aggregation costs in order to increase exploitation and accessibility to the heritage of the museum with novel and innovative technological framework (from the e-commerce of the contents to the creation of customised explanation for the audio-guide);

- providing new methods and tools for the protection of the digital contents to preserve the copyright and to provide rightful royalty to the content owner with Digital Rights Management (DRM).

This paper presents a brief introduction to the AXMEDIS project and discusses the new functionalities and capabilities highlighting the applications and exploitations in the musical instruments museums context through the experience of the Accademia Nazionale di Santa Cecilia. For further details on the Accademia Nazionale di Santa Cecilia, see www.santacecilia.it .

Introduction

The world of museums compared to the libraries sectors is the follower in the introduction of the ICT. Libraries have already created standards for cataloguing and realized digital collections.

Anyway, in the recent past years museums of musical instruments have improved the use of the ICT, in particular at European level:

Basel, Musikmuseum, Historisches Museum

Bruxelles, Musée des instruments de musique - MIM

Copenhagen, Musikhistorisk Museet

Edinburgh, University Collection of Historic Musical Instruments

London, The Horniman Museum

Leipzig, Musikinstrumenten Museum

London, The Royal Academy of Music

Paris, Musée de la Musique, Cité de la Musique

Stokholm, The Stokholm Music Museum

The experience of Accademia Nazionale di Santa Cecilia in introducing the ICT

In 1997 Accademia Nazionale di Santa Cecilia (ANSC) started the digitalization of its heritage to create a multimedia library. The Multimedia Library of Accademia Nazionale di Santa Cecilia holds a huge collection of invaluable

heritage contents, from late XVth century to the present day. The historical archive contains many different forms of content including documents, audio recordings, photographs and others. The library preserves many original manuscripts (particularly from the XVIIth-XXth Century) and printed editions.

Within the summer of 2005, 120.000 pages of the contents and a part of the audio-video sources will be digitised. The digitalization process and the use of the ICT has already improved several internal activities of the library.

Within the end of December the multimedia catalogue of the digitized contents will be available on internet.

The Museum of musical instruments and musical iconography of Accademia Nazionale di Santa Cecilia holds an important collection of ancient and modern instruments.

Since its inauguration in 1895, the so called "Museum of Historic and Modern Instruments" has been characterized by the extreme diversity of both cultured and ethnic European and non-European instruments it houses.

In 1900, there were 77 instruments in the collection, some purchased by the Accademia and others donated by antiquarians and collectors. Today, there are 270 instruments and about 150 other items (pictures, musician portraits, curious etc.). Three groups in the collection attract particular attention for their importance and interest:

1. the 1926 legacy of Queen Margherita of Savoy (26 examples, mainly plucked instruments, some extremely rare and preciously decorated);
2. two stringed quartets and other single instruments entered in the national competitions for stringed instruments makers organised by the Accademia between 1952 and 1956;
3. the donation of Gioacchino Pasqualini, violinist and researcher in acoustic physics who was museum curator in the 1960's and founder of the Associazione Nazionale Liuteria Artistica Italiana (ANLAI). The collection contains numerous items including important bowed stringed instruments.

The Museum's best-known and most important item deserves special mention: the Stradivari violin from the Mediceo Quintet (1690), known as "Il Toscano", which was purchased by the Accademia in 1953.

Beginning in 1993, the collection has been systematically catalogued and, where necessary, carefully restored. The technical drawings, pictures of the instruments, the images used for the restoring (x-rays, ultraviolet pictures...) and the other items (pictures, musician portraits, curious etc.) has been digitised.

The next steps to a full appreciation of the collection is its exploitation through the use of the ICT (see later on) and its exposition in the new Accademia Nazionale di Santa Cecilia premises (scheduled in 2006).

In 2002 the Accademia Nazionale di Santa Cecilia moved the concert seasons together with the museum's collection, the archives (historical documents, photos, ethnomusicological collection) and the library to a new residence: the

new Auditorium of Rome. Built on a project by Renzo Piano, the new Auditorium has three concert halls, several rehearsal halls, exposition spaces, rooms to host the ANSC musical instrument museum and the ANSC multimedia library, shops and restaurants.

A big opportunity for ANSC to exploit the digital content of the museum and the multimedia library came from the participation to the AXMEDIS project.

AXMEDIS

The AXMEDIS initiative is funded by the European Commission to create and explore innovative technological framework for automatic production and distribution of cross-media contents over a number of different distribution channels (e.g. networked PC, PDA, kiosk, mobile phone, i-TV, etc) with DRM. In the context of the museums market, AXMEDIS aims to offer innovative solutions and tools to:

- manage and distribute and share digital content, such as audio-visual materials (video/film), images, documents, games, and others, in a protected and verified manner, over many different distribution channels including Internet, mobiles devices, PDA, PC, i-TV, satellite and others;
- increase the visibility and accessibility of content with the realisation of tools for content sharing among content owners. This allows the content to reach distant users with access to larger markets;
- offer additional and relevant sales channels that can simplify content distribution at a reasonable cost for end-users;
- increase both the safety and reliability with the protection models to ensure verifiable and protected delivery the objects to content producers and distributors;
- increase the accessibility of European audio-visual content;
- provide new international business opportunities to all the related SMEs in the areas of cross media content production, aggregation and distribution;
- allow end-users to gain access to the contents at a reduced costs. This will be realised by exploiting the AXMEDIS infrastructure which will open paths for new services for industrial content exploitation and for both public and corporate clients (archives, schools, museums, etc). It will also create low cost distribution chains of digital material for entertainment, education, e-commerce, etc. At the same time, this will accelerate the process of digitisation of contents for archives with reduced production costs, and enhance the value of the cultural heritage by facilitating the exploitation of the archives in digital form.

The AXMEDIS project started in September 2004. The first results are expected by the end of 2005, to be demonstrated at the annual AXMEDIS International Conference (see <http://www.axmedis.org/axmedis2005>) and the completed framework is scheduled for 2007. The present results are the identification of requirements and a large set of formal definition of scenarios

for content production, protection and distribution considering B2B and B2C domains.

AXMEDIS Consortium and Potential Users

The AXMEDIS consortium consists of leading European digital content producers, integrators, aggregators, and distributors, together with information technology companies and research groups. The consortium has important resources and complementary skills which will have an effective impact upon the industry. It will also demonstrate the value of the project outcomes and the reliability and effectiveness of the project results to a wide range of potential users, including:

- museums, archives, institutions, schools and content producers;
- associations of content producers;
- Publishers and digital content providers;
- Content integration and design, audio and video;
- Networks, broadcaster and their technology providers for i-TV, PC, etc.;
- Mobile distributor for GSM cells or UMTS, etc.;
- Content distributor operators and technicians towards PC on internet;

How AXMEDIS works

The AXMEDIS Framework manages objects. In this context, every object here is a digital container for some digital content. Depending on the ownership, each museum has the right to produce licenses which are modelled as profiles for the use of the content (i.e., print, play, save, time limited use, etc., to control the access and proper usage). On the base of the profile, each museum can issue licenses and establish relevant fees.

AXMEDIS is a complete framework for the normal processes required in the Museum domain, including management, control, processing, distribution, transaction (selling and buying), etc. With AXMEDIS, the objects are stored in a database within the museum (reachable through IP address), or in a Kiosk, and the process of digital contents transaction can be improved in several different contexts:

- in normal day-to-day operations;
- new possibility of complete/share content collections (virtually), with access to digital contents from other museums/archives and, at the same time, widen the accessibilities and availabilities of the contents.

AXMEDIS for ANSC

For the ANSC case, one of the key benefits offered by the AXMEDIS framework is the functionalities and capabilities to process and manage combinations of contents and create complex digital objects.

ANSC plans to explore usages involving:

- Raw objects, which contain just one or more digital items of the same type, like digitised photos, audio files, descriptive records, connected only by means of metadata;
- Complex objects, e.g.:
 - 2 different instruments made by the same maker, coming from 2 different museums. In this case each museum has their own licensing model
 - Catalogue: a UNIMARC (or XML) file with the descriptive record of an instrument and digital samples of the content
 - UNIMARC FILE + original instrument + modern copy

Since the Accademia has a Multimedia library and a musical instruments and musical iconography museum, there are a wide range of available contents in different formats, including archival documents. As an example, a typical Accademia complex object can be an entire archival record of a single musical instrument, and the object contains:

- The XML file of the descriptive record of the instrument containing the data on the maker, restaurer, date, place, measurements etc...;
- The pictures of the musical instrument (e.g. in JPEG);
- The audio recording of his sound (e.g. in MP3). if available;
- The technical drawings (e.g. in JPEG, or CAD)
- Catalogues of exhibition in which the instrument has been exposed (e.g. in PDF)
- Press reviews related to exhibitions or concerts in which the instrument has been involved (e.g. in PDF)
- Maker's and owners biographies (e.g. in ASCII TEXT)
- Archival documentation related to the instrument (e.g. in JPEG)
- Restauration documentation (e.g. in JPEG and PDF)
- Documents and portraits of players (virtuoso) and instrument makers (e.g.: for Carlo Mannelli detto "del violino", member of ANSC, the portrait and documentation on his violin collection he purchased to ANSC)
- The digitised copy of a printed edition of music composed for that instrument.

With AXMEDIS, the process of the creation of a complex object could be automatic. On the other hand the content delivery process is optimised by means of different distribution channels, including PC (or kiosk), mobile, i-TV, PDA.

With AXMEDIS, the customer can go through the whole process online and receives the contents requested in real time. The museum staff has only to check the results of the process and does not need to manually perform all the time-consuming individual sub-tasks.

The ANSC museum could also provide to its customer an object made of digital contents coming from other content providers. In this case the AXMEDIS framework will automatically provide to all the content-owners their revenues in accordance to the licence agreed and contract with the museums which

produced the objects. AXMEDIS will ensure also that the content distributor will receive a percentage of the income (when agreed) if the content is acquired through a distributor. All these activities are managed in a transparent manner and accessible independently from the different partners of the value chain. Thus each value chain partner may access to the AXMEDIS certifier and supervisor to enquire and receive information on the consumption of any functionality of any object.

The combinations is huge and wide ranging, even considering only musical instruments, and this is why AXMEDIS is important in supporting cross-media to allow optimised processes for museum related domain.

Technology-Enhanced New Services and New Possibilities

With the new possibilities resulted from the AXMEDIS framework, ANSC and European Museums will have the possibility to promote, manage and distribute their content on a global scale with less effort. The new technology-enhanced business model will be able to support the growth of the European content industry and to enhance the accessibilities and increase the availability of a significantly increased quantity and quality of multimedia content globally.

Possible solutions to these challenges can be found by automating, accelerating and restructuring the management and delivering and distribution processes, together with the application of content protection solution. These approaches can enhance the management and delivery processes by offering faster and cheaper services, while at the same time providing new capabilities to support a safer and protected distribution and sharing of digital content.

In conclusion, we can imagine different kind of museum activities that at present are possible and additional ones that AXMEDIS can realise reducing cost and accelerating the process.

For example, on a B2C (Business-to-Customer) scenario, the museum can make use of the AXMEDIS environment to support the sale of the documentation or the merchandising objects owned by the museum to its own customer.

The framework can also provide the sale of the contents from other museums to its own customer.

What happens for example if a visitor of the ANSC museum wants to study and deeply compare the different violas signed by Antonio Ciciliano? We know several Ciciliano's violas, the one in the ANSC Museum, one in the Bruxelles's collection, one in the Bologna "Museo della musica" and four in the Kunsthistorisches Museum. With AXMEDIS installed in each one of these museums, a visitor can have the complete documentation on each of the violas, photos, technical drawings etc., and he could buy copy of every document he is interested on .

The sale can happen before, during or after the visit of the customer to the museum through the use of a PDA given to the customer during the museum visit, or through the museum kiosk. The customer could also decide to buy additional documents once home, using internet.

On the other hand AXMEDIS framework will automatically ensure the correct revenue to each museums.

In addition the museum can make use of the AXMEDIS environment to realise a customised guide of the museum obtaining multimedia contents from its own or from another heritage (with the possibility to see additional documentation, hear the instrument playing...)

On a B2B (Business-to-Business) scenario, the AXMEDIS environment can be used to support the sale of the contents from its own museum to another museum, or to support the sale of the contents from their own museum to another business user.

With AXMEDIS, the new possibility will stimulate better value-for-money digital content due to effective and automated processing, production and delivery of the content using latest network technology to enable optimum interconnection and transactions between B2B and B2C, with DRM.

AXMEDIS Support

AXMEDIS can offer assistance and technical support to museums interested in using the platform and adopting the AXMEDIS solutions. This support action will be provided through activities such as training, management, assessment and evaluation, dissemination and demonstration at conference and fairs, and affiliating them to AXMEDIS. Furthermore, the AXMEDIS consortium will grant the sum of 1 million Euro distributed by means an European competitive call to companies and research institutes interested in developing real solutions by exploiting AXMEDIS technologies.

Conclusion

We believe that the AXMEDIS solution will encourage not only the creation of new digital archives (based on international standards of cataloguing and descriptions (metadata)) but also stimulate the exploitation process for a wider range of digital media over many different distribution channels. AXMEDIS can introduce a new vision for the digitalisation process, encouraging the creation of digital archives for heritage preservation, as well as providing wider and better access to the important contents of the museums such as books (in electronic form) and all other types of audio-visual materials. We hope that AXMEDIS can also encourage the creation of networks of museums with the

framework where it will be possible to buy and sell (free or otherwise) digital contents between all partners, significantly increase the points of entrance to the contents of the museum, on a Business-to-Business model.

It is easy and beneficial for all to gain access to the AXMEDIS technologies. Over the course of the project, some didactic events will be organised to provide better understanding of the AXMEDIS technologies with further information about the potentialities of AXMEDIS. Business delegates can attend these events in order to participate in the project and bring AXMEDIS technologies to their company. Special training sessions and courses will be held for managers, content managers, content producers and integrators, and digital content distributors. Workshops and courses will be organised in several venues in Europe. To provide better understanding of the new solutions, AXMEDIS is providing a forum for discussion with technologists and experts who are ready to assist with any AXMEDIS related queries. Further information, events and calls are available online at the project website, www.axmedis.org

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