MUS4VIP PROJECT

Progress Report – Public Part

Project information

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Beneficiary organisation:	Conservatorio di Musica C. Pollini – Padova (IT)
Project coordinator:	Giuseppe Nicotra
Project coordinator organisation:	Conservatorio di Musica C. Pollini – Padova (IT)
Project coordinator telephone number:	+39 349 6494709
Project coordinator email address:	Mus4vip@gmail.com

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Executive summary

This document is intended for wider public communication, which is as important as communication in scientific contexts. After a section concerning the background and motivations of the project, we present a short overview of the proposed solutions, and finally our first outcomes and plans for the future. Special attention has been devoted to contribution to European policies.

After the paragraph on background and motivations, we offer a short description of the main problems concerning music studies by blind persons of all ages. We outline the current situation and we indicate the main difficulties facing a blind individual, both in special and in mainstream schools, in learning music not just by ear, but through direct and personal access to music scores, without external assistance.

Next we give a short overview of recent perspectives opened by IT technologies, in the framework of specific European project. Finally, we present the main objectives of the Mus4VIP projects, first outcomes, plans for the future, how the project contributes to European policies in the domain of education, culture and equal opportunities.
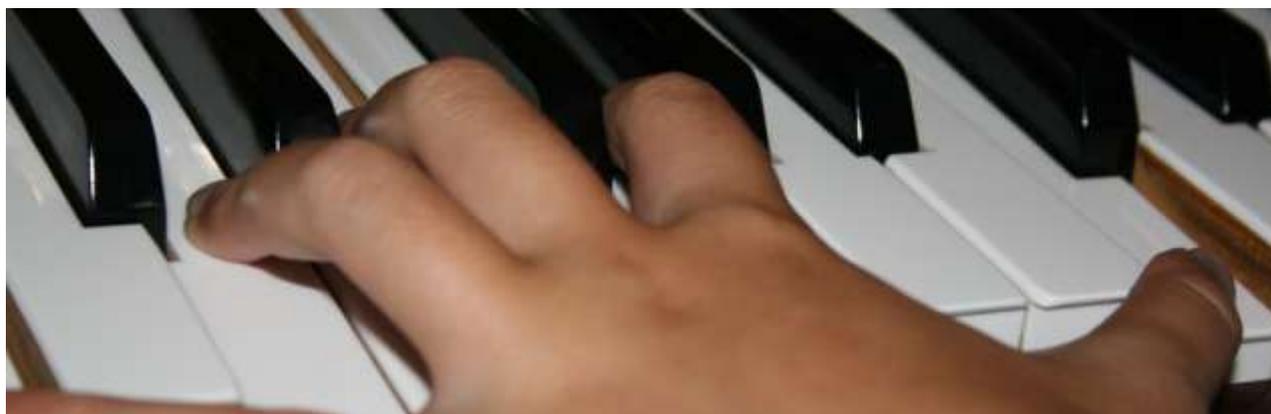
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1. Project's objectives.

The main goal of "Mus4VIP" is to close the gap between Braille music and its non-sighted users.

This goal will be achieved by designing, developing and testing a new didactical methodology, capable of exploiting the new software, in an integrated educational context.

The project will also address the fragmentation in this area; this approach brings together different groups working in different countries. The project will develop a learning pathway that will promote wider adoption of Braille Music by encouraging its integration within mainstream environments.

The Mus4VIP project includes the creation of a web portal that offers teachers of blind music students methods of working, guides and didactic solutions to take full advantage of information technology.

1.1 Background and motivations

Although music is the only form of art totally accessible to blind people, only a very limited number of blind individuals have access to music literacy but music literacy is indispensable for music studies. , can be considered a formal written language. Braille music notation is the traditional method that allows a blind person to read and write music scores. In other words, a blind person is able to learn and compose music using the Braille notation, although with greater mental and physical effort than his sighted peers.

Nevertheless, in the last 40 years, music studies have dramatically declined among the blind, owing to the difficulty in finding appropriately trained teachers in mainstream schools.

The main reason for this is the gulf between common music notation and Braille music notation. Indeed, while common music notation is able to represent the main musical elements in an intuitive manner, a Braille score is more like a town

with no windows and no signs, so that the reader finds every single element on his way, but is not able to get an overview of the page.

This distance between the two kinds of music notation has several negative implications, which discourage blind people from learning music in a formal way:

a) it requires well trained teachers;

b) transcription into Braille music is both time-consuming and expensive;

Furthermore, since Braille is based on tactile reading, the blind music student is generally obliged to separate reading and playing. In other words, blind musicians, with the exception of singers, are obliged to read a fragment first, before being able to play it. This represents a significant challenge, especially for beginners.

1.2 The current situation

Nowadays, the vast majority of blind musicians memorise their scores using different strategies, based either on learning by ear, or on verbal description of the score.

In other words, the beginner listens to the teacher playing the first studies, or to a professional recording, and he or she imitates the teacher first, and afterwards learns the score from memory (Learning by ear).

Alternatively, especially for more complex pieces, the student has a friend, often a parent, who either directly, or in a recording, describes what he or she sees on the music page, one element after another. This takes time and very hard mental effort both for the sighted reader and for the blind student ("Spoken Music").

Despite the difficulties in using the above mentioned strategies, in different combinations, some blind musicians nonetheless manage to achieve astonishing results.

2.   Project Approach

2.1 Proposed solutions

Our experience in the field of education, and of music teaching, suggests that, rather than jettisoning currently adopted solutions, which, although very labour intensive, produce some results, it is worthwhile looking at their positive aspects. New perspectives offered by IT technologies, in particular the combination of different sensory channels in a flexible way, as well as our experience of more than 15 years, has enabled us to develop an innovative solution, based on all the strengths of current solutions, i.e. Braille, learning by ear, spoken music.

Specifically, the blind student is able to choose any combinations of: a) Braille display (paperless Braille); b) Braille printer (paper Braille), c) sound, that is to say, listening to the notes; d) verbal description (spoken music).

It must be added here that the Braille music score, originally a city with no windows and no signs, is processed by our software in such a way that it becomes a well-structured database, where the blind student can move and navigate in different ways, such as note after note, bar after bar, part after part, etc. In short, he can act as a visitor to a city with a very accurate map in his hand, able to move towards a precise location, or to explore a given surrounding. He can walk or run, jump or stop as long as he likes.

This was the result of several different European projects, e.g. Play2, Ebrass, Contrapunctus.

Our new challenge now is to develop effective didactical strategies, along with appropriate tools, aiming at establishing and disseminating an innovative method for teaching music to blind students, both in special and in mainstream schools.

2.2 Project Approach

Our approach is based on two general principles:

a) Learning by doing is more effective than just learning by listening;

b) b) Learning to read and to write music is very similar to learning to understand a non-native language you speak every day. The big difference with music is that in most cases the student is able constantly to monitor his work by listening to what he / she is writing.

Our approach therefore can be considered as interactive learning, where the two sensory channels make up an integrated system of trials and errors, under constant monitoring by the student himself.

Mus4VIP therefore seeks to overcome learning, understanding and memorisation problems by exploiting the best available resources, both in terms of the functioning senses (touch and hearing), and the best possible use of existing technology based on these two senses.

2.3 Project outcomes & results

The outcome of this will be to promote Braille music literacy, because hearing and touch will support each other in the complex process of deciphering and comprehending music as a language.

In particular, the project will:

- Develop an educational methodology that will attract students and support teachers in the field of accessible music.

- Offer the opportunity to develop training materials in a collaborative way, taking into account knowledge and understanding of the cultural differences between the various participating countries (each country has developed its own local Braille language, with small, but significant differences; the project will consider this aspect, by collecting and systematically organizing the differences between countries).

- Help young visually impaired students to develop a more attractive and accessible method for studying music, bearing in mind what an important contribution music can make to an individual's intellectual and psychological development.

- Help new generations of teachers, teaching assistants and lecturers to acquire specific basic skills in the area of accessible music, by offering them powerful resources and workplace opportunities, both in special schools and in institutions devoted to training the visually impaired.

- Develop, test and disseminate new teaching models in the areas of Braille music theory, reading and writing, based on the use of new technologies.

- Create a collaborative process among schools at the European level, aimed at improving both basic training and services for music teachers and other categories of people working in schools, such as teaching assistants for visually impaired students. The purpose of this collaboration is to exchange experience, with a view to developing new teaching strategies aimed at improving music teaching quality and the use of Braille both in

schools and special institutes, particularly in those classes with one or more visually impaired students.

- Develop a guide to the use of available computer tools that will meet the training needs of teachers at primary, secondary schools of theoretical and practical subjects in music conservatories and music high-schools, considering the conditions of each participating country in terms of school integration and education provided by special institutes.
- Dialogue with projects and networks that operate on the same themes
- Improve the quality and European dimension of training for teachers of visually impaired students;
- Promote the development of contents, services, pedagogical solutions and innovative practices based on IT in the field of permanent learning.
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2.4   Overview of achieved results

During the first year of life, Mus4VIP consortium has developed and realised the following products:

1. **music theory handbook, containing all examples and notational elements in** the BMML format. As for the format and the contents of the units, on the basis of data collected through interaction with users and teachers, it was necessary to devote special attention to the young blind students who face the Braille system and its music theory for the first time. This has brought us to create a new specific teaching aid, whose main purpose is to acquaint the young student with both some features of his/her PC (especially useful for the next phase of the study) and the peculiar concepts of Braille music notation which do not correspond with common music notation. The

original book has been enriched by a special section named "stay in tune". This section aims at ensuring that the blind students "keeps in step" with his sighted peers. The section contains all the special information and instructions concerning Braille music notation, following the different topics dealt with in the corresponding chapter. Testing and exercises accompany each chapter. Relief tables ensure that the blind student understands specific terms and concepts belonging to common notation, which have no application in Braille notation, i.e. stave, clef, etc.

2. **BMB (Braille Music for Beginners)**. This course consists of 16 interactive units. Its main goal is to familiarise beginners with Braille music notation, along with basic concepts of music theory. The main principles inspiring this course are: a) self-training; b) attractiveness; c) use of metaphors and appropriate language, in order to explain complex concepts by using familiar situations / experiences.

On the basis of analysis of the collected interviews it has indeed emerged that, on the whole, the Braille handbooks available use very clear and precise language, but at the same time we found that all the material is aimed at adult users, for whom it is taken for granted that they have specific skills (prerequisites). A striking example is the International Braille Music Notation Handbook. It is an excellent guide to learn Braille, but it was intended for an adult audience. For young students, however, there is very little specific literature

Therefore, the BMB program proposes to overcome this deficiency, offering a series of 16 lessons with contents in the form of stories, through the use of metaphors and references to familiar experiences for young students, full of sounds and sound effects that help the student to understand better what is described. For example, when it comes to high / low sounds, or dealing with clear or dark timbres, the information is much better assimilated and contextualised if the student has the opportunity to listen to these sounds, and if he is able to interact through our learning tool, in order to establish a close rela-

tionship between music symbol and musical effect.

At first, the computer support to use these teaching units was meant to be incorporated as a plug-in into the BMR program. After some internal tests and trials, on the basis of the results obtained, it was felt that it would be more practical and useful for students if an entirely new program were created, dedicated to the consultation of such teaching units. This is also due to the fact that the new program has some completely new features. In particular: a) the ability to listen to midi or wave fragments within the text (they couldn't be incorporated as a plug -in within the BMR program); b) the ability to enter some descriptive text read by the screen reader in a different mode from music. In Braille music symbols are represented by letters and punctuation marks, so the new piece of software avoids confusion and misunderstandings.

In addition, this approach was designed to facilitate future development and production of new content and new teaching units devoted to teachers.

3. **Videos for teachers.** We have produced 7 videos dealing with: Braille, music and Braille, communication for blind people, ear training and a presentation "how a blind musician can read and write music using Braille Music Editor".

3.   Partnerships

All Mus4VIP project partners are organisations with a strong European presence in supporting visually impaired people: this will trigger greater cohesion and integration in Europe.

In particular, the Mus4VIP consortium consists of associations representing users, music schools specialised in teaching the blind, who have reached very high quality levels in the domain of music teaching, e-learning, music psychology, electronic music archiving, interactive editing (European Project Musicnetwork), accessible solutions in the domain of music (Play2, Contrapunctus).

The following is a brief description of each of the consortium partners

I.Ri.Fo.R. (Istituto per la Ricerca, la Formazione e la Riabilitazione (Institute for Research, training and rehabilitation) (http://www.irifortoscana.it/) is a non-profit organisation, registered as an organisation of social utility. IRIFOR was founded in 1991 by "Unione Italiana Ciechi e Ipovedenti" (UICI) (Italian Union of the Visually Impaired).

EKMS - Edwin Kowalik Music Society. The Edwin Kowalik Music Society is a non-governmental organization consisting of 40 members, both blind and sighted. It was set up in 1998, by a group of blind and sighted music lovers, dedicated to continuing Edwin Kowalik's effort to promote the activity of blind musicians – those still in education and those performing music either as amateurs or professionals.

Conservatorio Statale di Musica di Padova "Cesare Pollini".

 (http://www.conservatoriopollini.it/) The tradition of teaching music in Padua dates back to the Renaissance. In 1577 the "Accademia degli Elevati" was founded with the purpose of "training instrumentalists and singers". In the years that followed the teaching of Music took place in the university, until, in 1878, the Conservatory was founded. The Conservatory has a strong tradition of teaching Music Braille.

Arca Progetti SRL. ARCA Progetti s.r.l. (http://arcaprogetti.veia.it/) is a private company based in Verona, Italy, whose primary activity is the design and development of music software solutions for blind students (BME2 editors, music interfaces). Collaboration with Europe's chief associations and libraries for the blind, particularly with the Ital-

ian Union of the Blind, European Blind Union, has led to an unrivalled expertise in accessibility, in conjunction with the professional use of innovative technologies.

New College Worcester (www.newcollegeworcester.co.uk).   New College Worcester (NCW) is a national residential school and college for young people aged 11 to 19 who are blind or partially sighted. Every student receives an individual programme of education, mobility and Independent Living Skills to support them in reaching their full potential both in and outside the classroom. Music is a very important part of the curriculum and many of the students study one or more instruments.

IUFM Midi Pyrénées is a school integrated in the university of Toulouse le Mirail. (http://iufm.univ-tlse2.fr). An area of activity at IUFM is research into Didactics and Teacher Training. IUFM organise preparation course for qualification for the teaching of music, and a Master in Music Education and Training in collaboration with the music department of the university of Toulouse le Mirail.

4.   Plans for the future

For the future we plan:

- the testing of our products in different situations, such as mainstream and special schools;

- dissemination activity using all available means, including traditional ones and social networks. Our communication will be targeted both on the general public and to specific categories, such as parents, students, associations, teachers and school leaders, school assistants, policy makers, technicians, researchers. Enhancing our BMB modules, by developing a simple authoring system, allowing the teacher himself to draw a learning map, according to best convenience, using both text and sound files, following specific needs.

Looking ahead, then, each teacher will be able to design content and educational paths suitable for each specific situation.

The project partners will therefore in the future offer a service to the teachers who are interested in taking advantage of this new tool.

We believe that the results achieved with Mus4VIP will have strong effects in the pedagogical field. The project's web portal will turn into a forum which will keep on playing a role after the project ends. In fact, it will be a significant virtual place where diverse protagonists (teachers, students, schools, libraries) can meet and exchange information, discuss the results they have achieved, and share experience.

The project results include a number of publications that will be made available on the portal.

The portal will play a fundamental role for the project's future; therefore, it will be so designed as to offer wide access to all and possibilities to debate the results of research, with invitations for comments on project results by teachers and trainers.

From its early stages, the project will pursue the objective of attracting numerous users and teachers to access the portal and forum. In this way, the portal will also

become a significant potential advertising space for music software and hardware developers, in the field of music and accessible music; all will be offered the opportunity to show how their products can be functional and help support the project's teaching program.

In the future, the project will be promoting initiatives, conferences and consulting for schools and for software developers, who will be increasingly asked for special attention regarding the teaching aspects, tutorials and guides of their products. Since the project is based on the use of newly introduced information technologies, it is also clear that music scores will have to be converted into an electronic format; therefore, the project partners will positively make use of this project area as a music library where all the pieces used for teaching should be held. Therefore, the portal will turn out to be self-supplied because it is everybody's interest to share files, so as to cut the costs of local production and avoid the production of duplicates.

It is, in fact, the case that schools spend large amounts of money each year for transcription (in formats that no longer have a future).

The web portal will be highly accessible, thanks to the experience achieved with practice, besides offering advertising possibilities.

The service also has the advantage of cutting down printing costs and delivery time.

New trade possibilities will arise, such as agreements with publishing houses and record companies.

The portal will promote the possibility for transcribers to work at home

The portal will open up new possibilities in the field of Braille music archiving too. It is in fact known that Braille libraries conventionally lend music sheets, with a big waste of time and space for archiving, distribution through couriers and reprinting after Braille scores have got damaged because of the steady wear caused by the touch. Mus4VIP provides new modalities of using scores; these will represent a significant reference for Europe's music libraries, which will be enabled to imitate the service model.

5.   Contribution to EU policies

The Mus4VIP project aims to harness Information and Communications Technology (ICT) to develop innovative education practices in the field of music training for non-sighted users of conventional schools, music institutes, University and conservatories. It also aims to improve access to all levels of education and training, from basic schools up to special music and composition and adult training courses, and helps develop advanced management systems.

The project is addressed to users of various ages in a transversal form, as indicated in the EU Programme for permanent learning about ICT promotion, and supports action on the general issue of content access and learning practices in the music field.

The use of computer tools in the specific field of music training for the disabled has had an even more limited impact in recent years, if compared with other contexts. Mus4VIP wants to fill in this gap by making ICT integration actually possible in the education system, in order to outline teaching methods that will be able to modernise current practices. Thanks to the support of ICT, the Mus4VIP solution, which provides exploration of new pedagogical and teaching possibilities, facilitates the study of music scores, because it allows students to select significant music elements through more hierarchical levels. The ability to write, process and listen to written music texts are all factors that help create new and more effective teaching and operational support models, also from the viewpoint of organisational innovation. It is known that ICTs are now embedded in our social and economic fabric; and they are becoming more and more indispensable for blind people's access to information and communication. Therefore, the project has the objective to promote large-scale dissemination of ICT in the field of education and music training, at all levels.

Mus4VIP is not about promoting technology in itself. Instead, thanks to previously developed solutions provided by such EU-funded research projects as Play2 and Contrapunctus, it wants to boost the use of technology to enhance learning

environments and support further experiences in the field of music for blind users. To this purpose, the project will start a programming and a pilot stage that includes simulations in a real context. Young learners especially will discover how to manage music with computers, with such operations as the selection of a part, a hand, a measure, a voice; of fragments for simultaneous reading and listening with respect to music sheets. This will be highly attractive for the young, besides representing a significant tool for adults and for all those who are interested in music writing and composition. Even those who have found it difficult to manage Braille syntax will be attracted to studying music. By focusing on the use of a Braille-related music editor, Mus4VIP will facilitate MIDI access, as well as the possibility to control MIDI keyboards, thus making the study of music theory more interesting. This will attract back to the music world, for example, non-sighted and early music study leavers, even outside conventional educational environments.

Mus4VIP is part of ICT Ka3 Transversal Multilateral Projects because it supports development and reinforcement in the field of permanent learning, especially of music contents in digital format. These services will be made available through the project's portal, with the purpose of disseminating and promoting the digitisation of music texts, also indicating pedagogical and practical solutions for music learning, with the acquisition of permanent competence in musical Braille

6. Impact

In order to understand better the expected impact in its different aspects, we are going to describe our work hypothesis, then we offer a short overview of the present situation concerning music studies for blind persons; afterwards we will present a short list of our products, and finally we will illustrate the impact of the innovative solutions in their different aspects.

Work hypothesis.

We assume that music notation is one of the written formal languages, like mathematic notation, or like any known alphabet. Braille music notation should be also considered a written formal language, with its alphabet, its lexicon, it syntax. Braille's main limitation is the fact that it can use only 64 symbols, which are normally arranged in a linear format. Common music notation on the other hand can rely on a 2-dimensional representation of music elements, and on a vast variety of graphic symbols, many more than 64. Furthermore, while common notation offers a visual image of the main music elements (structure of the piece, one-part / polyphonic piece, notes and attributes, such as fingering, slurs, etc.), Braille notation does not allow an intuitive association between graphic symbol and musical event.

Learning by doing is more effective than learning just by listening. At present blind people have really almost no opportunity to experiment with learning by doing, except in a very limited number of cases, such as learning Braille using a 6-dot keyboard associated with voice synthesizer.

These factors produce: a very significant distance between the two music notations, the common notation and the Braille notation, a distance which is much bigger than the differences between literary notations. In other words, Braille alphabet can be understood in no more than 5 minutes, although it requires months of practice in order to be mastered and in order to be able to teach it. Braille music notation requires much more time to be understood, and consequently a long training in order to be able to teach it.

This circumstance has some important consequences, which have been illustrated in the above mentioned deliverable: a) few trained teachers; b) Braille notation discourages beginners; c) Braille transcriptions are often expensive and require long production time; d) need for extensive external help when it comes to writing homework or new compositions; memorising is very tiresome and prone to errors, especially in the case of a new modern piece, where ear is not so reliable.

Proposed innovative solution

Our solution is based on a new xml format, called Braille Music Mark-up Language (BMML), which in turn is a subset of xml format.

The first innovative aspect of this solution is the fact that Braille is no longer an alien way to represent a text. On the contrary, Braille becomes central to a new way of approaching music. Indeed Braille, with its limitations (only 64 symbols), and its strengths (extremely precise in representing music elements), can be the foundation of a new format, which is fully compatible with the very popular Music xml format.

In this way Braille becomes a bridge between common music notation and special music notation, and gives the opportunity for the best possible communication between sighted musicians and their blind peers, and vice versa.

The second innovative aspect of our new products is the integration of different strategies of exploring a piece of music: a) through listening; b) through verbal description of music element; c) through reading on a paperless Braille display; d) through reading on traditional paper Braille.

The third innovative aspect is the flexibility of our new products. At present the most popular way of learning music for blind persons is based on a combination of learning by ear, listening to recordings made by a teacher or by a friend, having somebody (mother, friend) describing each single element (the so-called "spoken music"). Only a small minority use Braille, which, despite its limitations, is still the most flexible and effective way to achieve access to written information. The flexibility of our solution consists in the fact that the end user can choose at any time the best combination (only listening, listening to notes and obtaining their names, listening and reading on Braille display, ...), and he can choose speed, level of details (chord / single components, multi-part / separate parts) ...

The fourth innovative aspect is that our products are interactive learning tools, following the principle of "learning by doing". Our solution, for the first time in the history of the education of the blind, allows steady interaction between listening and doing. This means that Braille and sound effects are closely connected to each other, in a positive and reciprocal relationship. Our first provisional results show that the student of music is encouraged to improve his / her mastery of Braille through listening to the outcome of his / her writing. On the other hand, the student becomes more aware of music events because he himself is the author of his piece, and he can have a live and direct experience, in real time, of the musical results of his Braille writing.

Impact

Our provisional results legitimate following expectations:

Learning process.

The learning process will be:

    a) faster. In fact until today the memorisation process required continuous jumping from paper score to instrument. The blind student had to read with one hand if possible and execute notes on his instrument. In some cases (singer) execution can be immediate, but in other cases (violin, guitar) execution has to be postponed. Piano allows partial execution in real

time (only one hand at a time). Our solution allows a faster process of learning and memorisation.

b) more effective. This means that, besides memorisation, the student will better understand many aspects of the piece he is trying to memorise. In fact, because our tools are interactive tools, the student will be offered the opportunity to analyse some relevant details, and to gather direct experience of their functions in the score. Our learning process is based, among others, on difference. In our case, if the student suppresses an accidental, he can listen to the music effect of his action immediately. This was not possible until today.

c) Emotional aspects. Learning is more attractive, because it offers the opportunity to invent, and to create new situations.

Social aspects:

a) self image - more independence produces higher self-esteem. Our software, as well as our training modules considers both special schools and mainstream schools. In particular, BME2 is specifically devoted to blind musicians who want to write their own scores and to produce them either in Braille or in printed notation. Printout is based on BMML format, which is automatically converted into MusicXML, for further treatment. Music xml format is compatible with over 100 music editors, including Finale, Sibelius, and many others. Thanks to BME2 the blind student can fulfil all his homework in full independence, the blind composer can deliver his scores to the publisher, a blind music teacher is in the position to print his exercises of the day for his class.

b) Image from the point of view of others. More independence enhances the image of the blind in society. The importance of the "help" relationship should be considered here. One of the most important aspects in the learning process concerns positive and flexible relationship in the class. Normally the blind person is relegated into the role of the person in need for

help. Through our products the help relationship can be significantly enriched, and the blind student is now able to interact with his sighted peers on an equal level, that is he can ask for help, but he can also offer his help, thus enjoying the experience of feeling himself useful to his group.

c) Distance communication will enhance exchange possibilities through our portal. In fact, our online library of music scores is expected to enhance exchange of materials, while our forum could turn out to be one of the very few virtual places where blind musicians of all over the world meet together and share ideas, views and problems.

School organization.

Our solution reduces significantly the need for teacher training. This fact should reduce any potential resistance to accepting blind students at music institutions, such as conservatories, academies etc. Furthermore we expect that an increasing number of blind students, who at present are discouraged by school leaders, will find their way and start, or continue studying music, attending their nearest school, just like any other student.

Economical aspects.

Access to music by the blind will be less expensive, faster and more flexible. Our software and our online resources make it possible now to set up customized services, such as transcription of music scores on demand, at sustainable costs.

New opportunities

a) At school. - Some specific subjects that were very hard to do will be now fully accessible. In particular musical dictation, composition, musical analysis, harmony, counterpoint.

b) Job opportunities. Through our solution a blind teacher can work with sighted students in full independence. Many music teachers produce exercises for the day and give them to their students. A blind music teacher

      will be able to do the same thanks to our BME2.

c) Job opportunities. - Arrangements of songs can now be written in full independence by a blind musician. Likewise, preparing separate parts for choir members is now a very simple task and requires no external help.

For associations of and for the blind.

Considering the fact that their mission is the progress of blind people, a new approach to music, the only art which is totally accessible to them, should contribute to the improvement of services in the domain of education, job opportunities and leisure activities.

Further research.

In our deliverable on the state of the art we pointed out some analogies between music literacy and scientific studies. Researchers in the domain of education of the blind in cooperation with IT experts could well consider the idea of developing a tool for enabling a blind person to draw mathematical functions without external help, with the help of an acoustic feedback for checking and reviewing. Likewise, the idea of employing an interactive tool, allowing a blind person to monitor and control his actions while doing his homework in different subjects, might contribute to the development of new learning / teaching strategies, based on the multisensory approach.