



# Accessible Music: Requirement analysis





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## Executive summary

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 a context of integrated education.

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 operative proposals, guides and didactic solutions to take full advantage of information technology and modern equipment.

These surveys have been undertaken in order to get a better view of the current wishes and demands of the user groups concerning teaching Braille music and computer programmes and the didactic service to be developed under this project.

These wishes and demands are analysed and form the basis of the requirements which will serve for the next phases of the development. The deliverable explores and considers Braille music notation learning and teaching issues, the use of computers and embossed copies of scores in order to read Braille music and the difference between the supply and demands of the different music genres.

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# 1. The MUS4VIP Project

The Mus4VIP project aims to develop the best possible use of new technologies in the field of Braille music, so as to prevent further disadvantage to visually impaired people and in order to reverse the dramatic decline in music literacy among blind people. In recent years there have, in fact, been signals (New York Times articles by Rachel Aviv, Published: December 30, 2009) of a serious return to musical illiteracy, due to the fact that new basic technologies (iPad, smartphones, and similar technologies based purely on listening), have discouraged the visually impaired from learning Braille, offering them the easy, but inferior, alternative of relying on learning by ear. This method is indeed very easy to implement; in fact today, the Internet allows the retrieval of almost anything, as well as offering immediate results. On the other hand, as we already pointed out in this document, it is also known that learning only on the basis of listening tends to limit the ability to conceptualize learning contents. In fact, hearing / listening recalls written symbols in those who are literate, while, for those who are not literate, it does not produce concepts, but only labile traces in the memory, which cannot easily be refreshed, corrected or enriched, through the continual, flexible and personal reference to a written source. This turns out to be a very significant obstacle to genuine education, and denies the principle of equal opportunities.

Mus4VIP seeks to overcome these problems by exploiting the best of 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.

Mus4VIP will, therefore, derive maximum advantage from the sense of touch, which offers the only true means of achieving real literacy for a blind person. By comparison the sense of hearing, gives an "overview" of a musical score but, crucially, it does not allow the same degree of accuracy in examining details. With regard to the available technologies, Mus4VIP will combine the use of tactile devices, such as Braille display and Braille embosser, with acoustic devices, including sound cards and speech synthesis.

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 aims to:

- 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. Structure of this Deliverable

In achieving the goals of the Mus4VIP project it is essential that the consortium have a clear idea of the terrain in which they are trying to achieve these goals. In this case, it is working with and improving the environments and processes which involve Braille music. Work Package 2 of the project assesses the potential currently offered by music formats and Braille music education in general for all stakeholders of Braille music.

This deliverable has two main objectives:

- Research and investigate users' needs based on specific questionnaires for teachers that will be sent through partners.
- Questionnaires aim to gather a better understanding of users' specific needs in the didactic area, and to have a clearer idea of the extent to which the project can enhance the current situation.
- Research and investigate to study and analyse the possible uses of IT in the production of Braille didactic materials, looking at access to music using existing resources, and employment opportunities based on musical abilities.

In achieving these objectives, the document starts with an overview of the technological issues which currently surround the production and use of Braille music. This includes an overview of the current IT solutions which are available to create and interact with Braille music.

The deliverable builds upon this work by reporting and summarising a user survey which was carried out in the population of teachers of blind students.

The results of the user survey are collated into a set of user requirements and user scenarios which will be used throughout the rest of the project.



## 3. Methodology

This chapter outlines a methodology for the analysis, aimed at providing a well-structured feedback from the user questionnaires, enabling a clear determination of the requirements for the project. The methodology gives an overview of the data collection procedure, questionnaire design and describes the way the analysis has been carried out. The user groups in the survey consisted exclusively of teachers, both visually impaired and sighted, who teach in either mainstream schools where there are blind children or in special schools for the blind children, as well as those who teach blind students on a private basis.

### 3.1 Data collection

#### 3.1.1 Interviews

The consortium chose to carry out data collection through structured interviews with the use of a predefined questionnaire. Telephone interviews were also allowed as a quick and personal way to receive answers from the respondents. Often more information is gained from the users because it will take less effort from them to convey what they mean than if they were asked to put their responses in writing.

The aim of this approach is to ensure that each interviewee is presented with exactly the same questions in the same order. This ensures that answers can be reliably aggregated and that comparisons can be made with confidence between sample subgroups or between different survey periods or different countries.

Sample respondents were mainly music teachers who teach blind children and teaching assistants or support teachers of music teachers, working in mainstream schools as well as schools for children with special needs.

Considering the small number of existing potential respondents, it was not considered relevant in our survey to differentiate between the countries the respondents were from, whilst it was important to know if the respondents teach and work in an integrated or a specialized institution.

### **3.1.2 Data collection survey**

The distribution process was different for the various countries. In Italy, for example, where there are no special institutions, it was necessary to find music teachers who have a blind pupil in their class. This was possible with the help of the National Italian Association of Blind People that provided us with several names to contact.

In France the questionnaire was sent to various associations for the Blind present within the country and it was necessary to telephone the associations for their cooperation. In addition, thanks to direct acquaintances of the French partner, other users were contacted directly making interviews by phone.

In the UK and in Poland, some names were identified and so the interviews were carried out directly by sending them the questionnaire by email.

### **3.1.3 The Questionnaire background**

A questionnaire was prepared by imagining the situation in which a music teacher, an assistant or a specialized support teacher works either in integrated schools, in special institutes, or both and assuming that he or she uses both the traditional tools and new technologies.

### *Questions*

The questionnaire consists of 30 questions and contained three kinds of questions:

- Contextual questions
- Closed questions
  - Dual choice questions - The respondent answers with a “yes” or a “no”.
  - Multiple choices - The respondent has several options from which to choose.
- Open ended questions
  - Completely unstructured -  
For example, “What is your opinion of ...?”

### *Question topics*

The following topics were included in the questionnaire:

#### **Personal information (questions 1-5)**

The questionnaire does not ask for respondents’ name and surname or for sensitive information (such data are not relevant for the project) which would require a release on the national privacy legislation in order to be stored for the project. This section provides information on the type of respondents, whether they are teachers or teaching assistants and the type of school in which they work.

Only in cases where the respondents wish to receive the results of the survey and be added to the address list for the project newsletters, would we then need their e-mail address, with the confirmation and authorization to store it when they sign up to receive the newsletters.

### **Education and teaching methods (from questions 6 to 9)**

The second part concerns aspects of teaching. The first question is necessary, and it asks if the teacher teaches Braille directly or needs an assistant or a support teacher. This way we can evaluate the subsequent answers – whether they should be considered as more or less authoritative. This question sparked a debate in the consortium and it is very important, especially in integrated schools, as music teachers, even if they have blind children in their class, are almost never experienced in Braille music and Special Educational Needs. In Italy, for example, where there are only integrated schools, in secondary music schools there is a second professional figure, the support teacher who must be an expert in communication for blind children.

The survey will show that the training of such support staff is limited on topics of Special Pedagogy and the teachers themselves are not trained in either music or in Braille Music Notation. In special schools, music teachers for blind children may be more or less familiar with Braille Music notation, but it is important to point out that pupils might attend music courses with non-expert staff or specific courses dedicated to Braille Music with highly trained teachers.

The seventh question is about the age at which students should start, in the teacher's opinion, to study music in a systematic way using Braille. This does not necessarily refer to the age when the pupils should start to approach sounds and music in the form of play which, as we know, should happen as soon as possible for good musical ear training, but only the age at which pupils should begin to read Braille music. This question attempts to explore responses that can be very different and to understand the reasons for them.

Indeed, for some people it is advisable to learn Braille music only after learning literary Braille and maths Braille. That would mean only after the age of 8-9 years. For others, Braille music may not be learnt until after the age of 13-14, leaving them to learn musical scores by ear, hopefully developing an increasingly perceptive ear.

The Music4vip project proposes the learning of Braille Music notation for children from 7 years of age, making use of games, perception and speech synthesis, combining the concepts with the symbols and sounds of the topics dealt with. This question investigates whether the proposal of the project is aligned with pedagogical indications of the various teachers and schools with regard to the introduction of Braille Music.

Question 8 continues on the same theme to confirm the above and obtain further information on how the transition from studying and performing by ear to reading notes actually occurs.

Question 9 was included to complete the same theme and it asks how students read music scores. In other words, it verifies whether they have acquired full autonomy in using Braille texts, or if they need third persons (i.e. parents, friends, support assistants) to read notes or if they use other solutions including:

- listening to the track to be studied as a MIDI file. The advantage of a MIDI file is that it is easy to select specific passages within a piece, one can opt to listen to a single part, e.g. just the right or left hand and the music may be played at any desired speed.
- listening to CDs or recordings of the song in an easy, slow form
- listening to passages realised by their teachers
- listening to recordings in spoken form.

### **Braille music and the computer (questions from 10 to 25)**

Question 10 and following are important to know more in detail the capabilities of the respondents. Question number 10 might seem obvious but in fact it is not because, although it has been 15 years since the release of the International Manual, it is not uncommon to meet teachers and students who use old textbooks of Braille music produced before the introduction of the International Manual.

The next question asks whether the teacher has specific IT skills to teach Braille

music. If not, of course, we go to question 25 where they indicate the reason for that gap - which might be due to an aversion to computers or a lack of confidence in using new technologies for teaching and for Braille.

So, from question 12 to question 24, we have all the specific questions on technologies regarding various issues, such as the percentage of PC and other operating systems used, how to realize the direct production of material in Braille and/or where to search for the material, in which structures and if this material is used in conjunction with specific or generic types of software (text editor), software for music recognition and automatic conversion, database systems used or online archives consulted. More specifically, it is important to gain specific information about the difficulties met with the tools used and the suggestions and improvements that the teacher feel to be necessary.

### **General information about the teachers and their students (from 27 to 30)**

These generic questions range from the knowledge of the tools used by students, to the type of organization of Braille music that teachers normally use, from their interest in using Braille or not, to their consultation of book catalogues in Braille. These last questions, the 27, 28, 29, need to verify and confirm whether the respondents are actually interested or not in new technologies, in the archives of Braille text and in using the internet as a working tool for their profession.

The last question, number 31, is directed, above all, at teachers with a long career behind them, to find out their impressions on the progress of music studies for blind children, today compared to the past, and their opinion as to whether this trend is declining or not.

A total of 31 questions and our evidence of completion lead us to believe that it takes between 10 to 15 minutes to fill out the questionnaire, a time we consider to be more than acceptable and requires little disturbance of the interviewees, facilitating dialogue and a positive acceptance of the interview.

## 4. Results

The process of data collection took four months and was carried out by all the Mus4VIP partners. The analysis took one month and was carried out by ARCA progetti with help of all partners.

### 4.1 Data collected

Data was collected in four different countries, which interviewed the following groups:

- France: Teachers,
- Italy: Teachers, teaching assistants, support teachers (the latter are not always musicians)
- United Kingdom: Teachers
- Poland: Teachers

The questionnaires were distributed randomly by contacting tutors, schools and associations that operate in the education sector of music and disabilities.

Members of the group in Italy, France and Poland first had to translate the questionnaire in to their own language and later on they had to translate the answers of the respondents into English. It should be noted that this might have an influence

on the outcome of the survey.

Another problem was the difference in the way things are organised in each country that participated in this survey, as for example, school systems which are solely integrated, or mixed types or those that which require learning to be done exclusively in special institutes or colleges, in the variety or lack of choice of places to get formally transcribed scores. In some countries, there is a central library which is also the main transcriber whereas in other countries there are more varied possibilities. Therefore the consortium decided to describe the outcome of the answers instead of making it a statistical overview.

A total of 32 questionnaires were gathered.

#### **4.1.1 Demographic information**

The age of the interviewees ranges from 30 years to 72. The average age is 49 years.

This value indicates that the teachers' category is quite advanced in age and it is therefore clear that teaching music and in particular teaching Braille music is a profession that is not very open to younger people. If we analyse the reasons of this we can certainly observe that one of the determining factors is the decline of music studies among young blind students; there is also a decreased number of schools and centres offering music studies for young blind students, and finally we must also consider that becoming a music teacher or educator for the blind requires extensive training and is a very demanding learning process.

It is also true that young blind students, thanks to new technologies, have access to new professions that were not available to them in the past, opening the range of possibilities to extend beyond music and the traditional school syllabus.

60% of the people interviewed were female.

70% of them work in special schools and the remaining 30% in integrated



schools. This ratio varies with the country of the interviewees. In Italy, for example, there have not been any special schools since the 70s, but only integrated schools (90% of schools are public or under public control).

It is not possible to establish the education level of the students taught by the respondents as those working in institutes teach students of all ages. For those working in integrated institutions the age range is from primary, middle and secondary schools to music conservatories.

40% of the people interviewed are music teachers, while 20% are support teachers who are not qualified in music, but are experts of textual Braille syntax with some knowledge of music, and 40% are personal teaching assistants for blind children who, among other subjects, study a musical instrument.

All of the people interviewed, however, confirmed that they work in the field of music for the blind and that they have satisfactory knowledge (see question 10) of Braille music syntax. In particular: 30% have very good knowledge (mostly music teachers in special schools including blind teachers), 40% good knowledge and the remaining 30% satisfactory.

The youngest people of the sample interviewed mostly work in integrated schools as support teachers or personal teaching assistants of blind students, and therefore claim that they are not musicians (except in one case) and this also relates to their response that their knowledge of Braille music is sufficient. In other words, teaching assistants and support teachers (for instance in Italy in primary and middle school and especially in music colleges where there is a blind student) have general knowledge of Braille for literary texts, for chemistry, for Maths and even for music.

Therefore, the Music4VIP project will have to take into account the fact that the most likely users of the educational material that will be produced could include precisely this group of teachers that work in integrated schools. These teachers need fast educational solutions - solutions that are ready to use and of practical

application. These might include video lessons and other online resources. Furthermore, this material could also be useful for music teachers who are not trained in special educational needs as well as for blind students and their parents.

From the analysis of the data and information gathered it also emerged that the interviewees who work in special institutions are themselves mostly blind teachers, while those who work in integrated schools (music teachers as well as support teachers and teaching assistants) are all sighted teachers. The latter have a good level of general training and operate to their fullest to support children with different types of disabilities (motor development, intellectual, auditory and visual) and this element highlights once again that educational instruments and video lessons specific for this category of teachers are necessary as they also need to be trained rapidly if a blind student enrolls to an integrated school and has particular needs such as the study of music in Braille.

#### **4.1.2 Results on the issues concerning didactics and teaching methods**

Questions 7 and 8 are connected to each other and pertain directly to the issue of didactics, starting from the understanding of what age, according to the interviewees, is the best to start studying Braille music and also at which age students can start learning on their own, without the support of assistants, using Braille music to learn either vocal or instrumental music. Everybody believes that music for blind children is an educational duty and they wish that blind children could approach music as a form of play at the earliest possible opportunity, even at the age of 2-3 years, as music is a vehicle for the development of children within the cognitive, social, emotional, motor development and linguistic spheres.

With regard to musical notation, the survey reveals quite a uniformity of opinion, supporting the idea of introducing musical notation as soon as the child is able to use Braille to read and write, just like a child that learns the symbols used in

mathematics. This precocious approach is considered essential as it allows the association of concepts, auditory events and symbols, and this association provides a greater awareness and knowledge of the auditory and performance aspects.

With regard to independent study using Braille scores alone especially for the study of an instrument like the piano, there are two slightly different positions. 60% of the teachers, mainly those working in special schools, advocated the introduction of Braille music immediately in easy stages and using it regularly for reading the scores for their instrument, with the aim of reaching full learning autonomy in a few years (one or two at the most) from the time of starting to learn the instrument.

The second group suggests using Braille texts for the independent study of an instrument with a more gradual progression that leads to an effective and complete autonomy of study in a longer period, such as 4-5 years.

The latter group argues more or less vehemently that auditory experience, learning a song by imitation, by listening, is equally important because it develops the aural and rhythmic skills. They believe that Braille can be exploited positively in studying music once a certain level of instrumental attainment has been reached, approximately the third or fourth year of study. In the case of the piano this would be about the time the student started to study polyphonic works such as Bach's two-part inventions. Therefore, age can vary according to the precocity of the student, and if a student starts learning the piano at the age of 6, Braille music can be fully used autonomously around the age of 11-12.

The two positions are not mutually exclusive, but can coexist and be adapted to the characteristics and qualities and needs of students, who as always must be the focus of any educational action.

In conclusion, the teaching of Braille syntax in music can be introduced quite early, in parallel with the progress of sighted peer students and it can be an element in integration for singing activities, rhythmic exercises or, as in Italy, for the reading of musical notes (sight reading exercises). This ability is improved gradu-

ally until the student can easily read simple scores such as technical exercises that have little in the way of musical complexity and subsequently more demanding scores up to the polyphonic ones whose part writing and formal structure can only be fully understood by reading the scores.

On the other hand, the use and development of the students' listening and performance skills by imitation can make a valuable contribution to their progress. The introduction of Braille music in small steps over a longer period of up to 4-5 years may be more appropriate for some students. In either case the aim is for the student to achieve fully independent individual study.

Question 9, on the one hand, gave us the chance to assess the coherence of answers 7 and 8, in other words to verify in practice how teachers behave, and particularly to know the various solutions adopted to teach a musical instrument and Braille.

The sample of people interviewed, as illustrated above, includes instrument teachers (mostly piano teachers) whose answers were the most interesting for their methodological contents, while theory teachers and singing teachers described their experience which for obvious reasons is centred on the progressive learning of Braille music alongside the music theory programme. Also interesting were the answers of the teaching assistants who are those that put into practice the study methodology suggested by teachers and therefore described their almost daily experience of personal assistance.

The students can be divided in two groups: the more expert and advanced ones who read Braille and can study autonomously and those who need an assistant to learn a new score, the assistant being either a parent or a classmate from a more advanced course, or a newly qualified teacher.

Using the information from the answers given we describe below some scenarios that allow us to summarize the outcome of the survey.

### **Scenario 1: Beginner piano student**

The approach to learning a new score is as follows:

First the teacher plays the whole piece at least twice. Sometimes the student is given a recording of the piece and of the various sections as we illustrate below (using, for example, the recording function of a mobile phone).

The teacher presents the piece in small fragments, usually going through a whole sentence (on average 8-16 bars). The teacher then repeats the same bars placing more focus on the right hand and playing more softly with the left hand. Then a couple of times only two bars of the right hand, sometimes singing along the name of the notes. Then the teacher stops to explain in detail the rhythm if needed, and repeats the fragment, while counting the beats. Finally s/he focuses on the indications of the fingering and invites the student to repeat the fragment on the piano.

Some teachers play the same fragment with the student (in a higher register of the piano), others sing the notes.

Once the first two bars have been learnt, they go on with another two for half a sentence repeating from the beginning without interruption (in a cyclical way). Then the fragments are joined to make a whole sentence or period, all played from memory. The same thing is done with the left hand and so forth until the end of a section.

Some teachers point out that, once the student has memorised the piece with separate hands, they play the other hand to the student, in order to address direct the student's attention also to the other voice.

Once the notes for both hands have been learnt, the student can continue studying on his/her own (or if possible with a personal assistant) to continue reinforcing the memorisation of the piece or to speed up and become more skilful even with more technically difficult fragments. It is essential for all students of the piano, whether sighted or not, to study the hands separately and then put them together carefully. This approach requires the help of a teacher or teaching assistant.

**Scenario 2:**

The teacher prepares an audio recording of the piece at slow speed and in small fragments (not more than 16 bars) with separate hands, and prepares several Braille versions of the same piece on embossed paper. The first is simplified for the single hands, i.e. only with the notes and the fingering, without ornaments or interpretation indications.

During the time of personal study the student reads small fragments in Braille and plays them on the piano with separate hands, continuing by small fragments until the end of a musical period. S/he then checks what s/he has learnt with the teacher's recording. Then s/he repeats it all several times to learn the passage from memory, always with separate hands.

In the following lesson, the student's task is to bring the piece learnt from memory with separate hands. The teacher then gives the student a new simplified version of the Braille text, but this time the text has both the right and the left hand, to be studied with both hands. The following week, the teacher gives the student the complete Braille version with all the original information. As we can understand in this scenario the student does not need an assistant, but instead studies autonomously receiving the material in an appropriate way that best supports the learning process.

Some of the interviewees who described a mode of study in line with scenario 2, also added that sometimes this method is hard to put into practice, because of the scarcity of material, the need for help in the transcription stage and they wish that the burdensome work of producing simplified texts could be done in an automatic way with specific software.

Following on from question 9, question 11 goes into further detail about how teachers work with Braille scores. Therefore, the question asks how they get Braille texts, for the study of an instrument as well as for theory, singing and sight reading. The answers vary and some interviewees gave more than one solution.

65% of the respondents answered that they find the texts directly at their schools (this is particularly true for special institutions) and all the interviewees periodically refer to the few specialised libraries in their country. None of the interviewees refer to libraries from other countries. 15% said that besides the above-mentioned methods they produce their own material, and only 6% said that sometimes they order (presumably with payment) new transcriptions of scores. This answer illustrates that although there is only a limited amount of musical material available compared to the existing printed format (the European project *Contrapunctus* had indicated that there is less than 1% of Braille texts compared to printed ones) it has been verified that the same Braille material has been used for many years now and the teachers themselves adapt their didactics to what is available in the school library or in the National Braille library. Such a solution does not meet the needs of students who are interested in more modern pieces (which may be closer to the sensitivity and the interests of young people), nor does it fully meet their educational needs because teachers have somehow to adapt their teaching to the existing texts which are mainly from the late 18th and 19th century.

### **4.1.3 Issues regarding Braille music and the computer**

From question 12 onwards we deal with the issues of didactics and new technologies. 42% replied positively in the sense that they use IT solutions to teach and they filled in the following questions up to number 24, while the others gave a negative answer and explained this answer (question 25) as follows:

For 30% of them the negative answer is related to the fact that they do not consider music software accessible to them. They obviously refer to traditional software for electronic graphic publishing which is not accessible to blind users. 50% claim that they do not know of the existence of software for Braille music and they believe that solutions should be found that can be easily adapted or usable

also to produce Braille music, such as the access to a database that offers electronic scores which can be easily translated into Braille.

Finally, 20% claim that they do actually use IT for music, but the existing software that they use cannot be used for teaching because they do not have adequate and accessible solutions.

All of those who gave a positive answer claim that they use the computer (all use PC with MS Windows installed) for the production of Braille music, for reading scores in Braille, using a specific software for music. The following list shows the most popular types of software and in what percentages they are used (some respondents used more than one programme and therefore the percentages add up to more than 100%):

- 20% use Notepad which is the free version of the music publishing programme Finale. Once the piece has been notated, the BME2 programme is then used for the conversion into Braille with the MusicXML code. With BME2 the piece is then printed in Braille. Only one user mentions converting the file with WinBraille for the purpose of Braille printing, others use Duxbury for printing, and some print directly from Windows WordPad.
- 30% use the programme Finale, and even in this case the piece is converted in MusicXML and then with the BME2 programme it is converted into Braille to be printed on embossed paper.
- 15% use Sibelius.
- 10% use Tocco finale, a programme that lets them convert Braille texts for printing, from the format of Finale to Braille.
- 60% write Braille music directly with BME2 to produce simplified texts, examples, or other didactic material to use with students. The material is embossed in Braille on paper and also given and saved in electronic format. Consequently their students also use the BME2 programme or the BMR reader.



- Less than 10% use more traditional writing programmes such as Word, WordPad, Duxbury and even outdated MSDOS software to write musical Braille text, and that is only for printing purposes (in conjunction with programmes like Italbra). One user who came across problems in managing the Braille fonts created an ascii table and uses a traditional font instead of the existing Braille ones.
- 15% use Dancing Dots together with the LIME programme.

In conclusion, the most popular programme is BME2 (and the free BMR reader connected with it) used both as a music publishing programme in the case of a blind student, or it is used by sighted people as an instrument to obtain scores more quickly from the MusicXML format produced by traditional publishing programmes such as Finale or Sibelius. A small group uses Toccofinale and the American programme Dancing Dots.

With regard to the more or less positive way of using the mentioned IT tools, it is convenient to divide the sample group in two parts.

On the one hand, there are those who prefer to manage Braille music documents in electronic format and to do this they use the BME2 programme and the conversion of MusicXML format, while others use IT tools mainly to produce scores embossed on paper.

Most observations and complaints come from the second group of users who encountered problems and complicated processes for writing text in Braille when it is produced manually typing directly on a traditional text publishing programme. In particular, they came across printing problems for special characters, characters which are used in their language, punctuation characters incorrectly mapped in the system they use. They frequently need to correct some symbols and characters manually before the score will print correctly. WinBraille users had problems with the software re-paging their text without, of course, taking into account Braille music rules.

In general, a large majority add that there are not enough scores available in electronic format. Some mention the difficulty of using the scores existing in Finale format for automatic transcriptions, if these scores contain atypical graphic elements and tricks of graphic presentation that cannot be converted and reproduced in MusicXML format and therefore in Braille format. This means that users have to make manual corrections to the Braille format which can be more demanding than having to re-write the whole piece in Braille, or it causes problems to those who are not sufficiently expert in using Braille and would like to solve the problem simply by using a conversion from one format to the other.

The Optical Music Recognition (OMR) programmes were not popular among the interviewed sample. Only 20% of them use OMR software but they did not consider them very useful because they are not very reliable and the final result still needed considerable editing.

Questions 20 and 21 check the issues dealt with above, i.e. the use of new technologies. They ask which file format is used to save music in electronic format, and therefore verify if such formats correspond to the same products from the programmes previously mentioned and also offers a criterion to understand the level of competence of the users interviewed.

The values are in line with the percentages indicated above and refer to files in BME2 format (BMML code), to files in Finale format (MUS), to files in TXT format, Duxbury format (DBT) and MusicXML.

Questions 22 to 24 deal with the issue of music archives online, both traditional ones and those specific for Braille music. 78% access traditional archives such as the Petrucci music library, but nobody knows of the existence of special archives for Braille music. However, there is a widespread interest in being able to access specific music archives in Braille if they existed or were more widely publicised.

#### 4.1.4 General information on didactics and students

The final questions are more generic and focus on the IT instruments used by students, on the preferred formats of Braille musical syntax and whether the internet is used for the exchange of digital material, to find remote lessons or training courses, theory methods and so on.

The answers were quite aligned and uniform and in general all the students have an excellent use of IT tools, including speech synthesis. In 90% of cases a Braille Display is used. This characteristic in terms of computerisation is uniform across the four countries where the interviews were carried out.

With regard to the usefulness of the internet, here again there is a general agreement about the lack of resources available and the Internet is used only to get news on conferences and at the most to consult some local catalogues of Braille texts. There are no courses, distance-learning programmes, didactic material or tutorials and therefore the internet in this field is of little help.

A useful factor for the purposes of the Mus4VIP project is that of knowing the Braille rules for the organisation of music scores which are mostly used in teaching and the Section-by-section formula that is used by 70% of the interviewees.

The questionnaire ends with an open-ended question which asks interviewees to say freely and in a personal way whether there is a decline or not in the study of music and Braille for the blind, and if yes, whether they can, from their own experience, identify the reasons that have led to this trend. They are asked whether they believe that a part of the responsibility is due to the difficulty of Braille, or to teaching methods, or to the difficulty in finding trained teachers, and whether the new technologies have helped in this process and could, in the future, reverse this trend.

It must be said that all of the participants claim (for the younger teachers even if it is not personal experience but something they have heard about) that nowadays there is less interest in the study of music compared to the past, for instance 30 or 40 years ago. There is a perception that, in the past, compared to today, teachers

cared more about teaching music Braille notation and promoting its use, even if this required lengthy reading and studying times. Nowadays everyone seems to be more pressed for time, partly due to the many integrative activities that are recommended to young people and it is often left to the parents to try to organise the various activities of study, sport and leisure time whilst leaving time for a musical instrument. So the conclusion is that IT instruments can represent a real solution if they give the chance to access Braille music information in a direct, immediate and fast way, simplifying the text and adapting it to the stages of learning.

Another important aspect, pointed out by a number of interviewees, is the fact that nowadays in the classes that they teach there are children who, besides being blind, also have other forms of disability and this proportion is perceived to be increasing compared with the past.

For these children the world of music and rhythm is sometimes limited to therapeutic-leisure activities.

Here below is a list of the main reasons that underlie the decline in music studies that emerged from the survey:

- Reduced number of teachers trained in the teaching of Braille music
- Scarce distribution of these teachers across the territory, so children have to move or live in boarding schools to find specialised places and people.
- Little promotion among families, of centres and structures that can provide music educational activities for young blind people.
- Lack of accessible materials: better accessibility with the scores could improve the situation even if training in musical Braille requires considerable efforts
- The integration of the blind children in ordinary schools can be a problem, if there are no teachers skilled in Special Educational Needs for the blind and Braille music teaching.
- Lack (apart from the degree programme of the conservatory of Padua) of recognised courses in special didactics for music teachers

- Lack of recognised courses to become Braille transcribers.
- Lack of didactic material. Many teachers teach themselves music Braille from “The New International Manual of Braille Music Notation” and they teach it using the same manual, which is not adequate as it is not conceived as a didactic tool to teach theory and music in Braille. This creates confusion and does not offer a useful didactic guide for work in the classroom. This is especially true in integrated schools.
- A decline in learning of the literary Braille system whilst new technologies are being promoted.
- Difficulties in getting Braille music
- Lack of awareness of Braille music itself
- Limited projects dedicated to the transcription of new material in Braille especially in electronic format.
- Lack of training for the younger people, because if they learn music and Braille music when they are adults they do not become independent and they cannot be as efficient as those who start at a younger age.
- High prices of electronic equipment (especially Braille displays), special software and Braille materials;
- Many differences between codes used in particular countries, making the exchange of electronic materials difficult.



## 5. Requirements

From the analysis of the results of the questionnaire carried out in this Work Package, a list of requirements was created for the Mus4VIP project. Some of these requirements feed directly into the work on Work Package 3, while others are more important for the exploitation and dissemination of the project. Others are more general requirements that the consortium should be aware of throughout the progress of the project.

The requirements cover the following areas:

- Students, teachers and music schools;
- Availability of Braille texts;
- Braille music and informatics [IT]
- Web service;
- Braille music syntax;
- Support for Braille music Pedagogy;

### 5.1.1 Students, teachers and music schools:

- Focusing on children at a young age and encouraging them to study music;
- Children have a greater ability of immediate learning and do not have difficulties with Braille if it is introduced soon and in small steps. Braille music becomes natural for them.
- Thanks to IT instruments, children can use Braille more easily than in the

past and with these tools music is readily accessible to them. There is, however, a real problem when teachers are not up-to-date with the potential and IT knowledge of their own students. Teachers need training courses that are specific for new technologies to make their teaching methods more appropriate to the times, and IT tools also need to be constantly updated and adapted to the new requirements. This requires specific funding which is not always available.

- The people in charge of programmes and policies in schools (institutional directors and, in particular, people involved in the politics of education) are not always aware of the real needs of music education for the young blind.
- What should be promoted is a form of teaching that gives equal importance to studying by ear and learning through reading. Although it is well known that many only teach by ear because it is considered simpler, it must be emphasised that this leads to the formation of musicians who are, in effect, illiterate and, therefore, lack independence.

### **5.1.2 Availability of Braille Texts**

- It should be possible to obtain Braille scores quickly and easily. A faster service should be provided for the provision of Braille music scores
- There should be a much greater variety of genres of Braille music scores. The scores should be of varying difficulty, possibly with reduced and full transcriptions of the same musical material.
- The information in the scores should correspond as precisely as possible to the print editions.



### 5.1.3 Braille music and informatics

- Reliable software for handling the current notation should be available
- Development of more tools, for example BME2, is very important in order to facilitate the learning of Braille music
- Creation of an international Braille music catalogue and new scores, for example, on the Internet so that it is easy to download Braille music scores.
- Encourage the use of a PC for reading music.
- Create computer programs that allow the scanning of print scores and the automatic conversion of these into Braille music.
- E- learning will be a complement to the presence of a teacher which is essential for young children:
  - With the help of a computer program it will be possible to have several tools in only one device: Speech synthesiser and Braille display
  - The software could make the conversion of scores from Braille music into staff notation and vice versa
  - The facility to make notes , corrections, listen to parts and the whole piece without having to have lots of paper. Being able to both read and hear the music aids the memorisation process.
  - Some respondents think that the computer program can have advantages when they (as blind teachers) teach sighted students. Specifically, a computer program would enable them:
    - to obtain the scores more quickly
    - for both the blind teacher and the sighted student, to interact with the scores in both media simultaneously, giving better communication between the two
- Most people prefer embossed copies when they read Braille music scores. This is because it fits on a music stand; it is easy to use and easily transportable. For some people it is the only format they can get at the moment and they feel most comfortable with this format. There are a few

though, who prefer to use a computer when they read Braille music. The reason is the combination of print, speech and MIDI which they think is ideal

- All software and services should be accessible to all target age groups.
- The software should provide the user with functionality to emboss scores without complicated or numerous operations.
- All output should be accessible on screen by both sighted and non-sighted users.
- It should be possible to process a score from hard copy to the desired Braille music output medium within one day.
- The pricing of the software solutions should provide affordable solutions for home users, charities and education establishments.
- The costs of using the service or to download scores should be kept as low as possible, ideally the same price as the mainstream counterpart.
- The program should be able to convert all electronic formats that are used for Braille music into BMML.
- The program should be able to convert existing notation files into Braille music
- The conversion process should be quick and require little training to use
- Full user documentation should be provided for the use of the software, including documentation on keyboard access and other accessibility features.
- Customisation of the Braille music score layout should be possible
- Functionality should be provided to alter existing Braille music scores
- The software should be fully accessible using screen reading technology
- Support for scanning of hard copies should be provided
- The software should support display of fragments of music both horizontally (a section or movement) and vertically (left hand, right hand, or one instrument from an ensemble)

- Multiple output formats should be supported (MIDI, Braille etc.) from the same source file.
- Audio feedback of the musical information should be possible, i.e. Playback of a phrase of transcribed music.
- The software should provide full keyboard access.

#### **5.1.4 Web service:**

- The Web service should meet the criteria of an Accessible web service (WCAG 1.0, WCAG 2.0)
- Where possible, the service should be compatible with existing music databases, creating links to libraries and transcription centres.
- A variety of output media should be provided to meet the needs of as many users and user scenarios as possible
- The library of music scores should encompass a wide range of musical genres
- The web service should provide fragments and small overviews of the scores provided, preferably with the means to interact with these with little additional effort.
- It should be possible for users of the system to upload their own works and disseminate compositions.
- The web service should include sources of information on dealing with copyright and authors' rights of musical material in accessible formats.

### 5.1.5 The Braille music syntax

- It should be easy to use, thanks to the new technologies.
- The Braille music in electronic files should contain Braille music scores and midi files
- It should be possible for the Braille Music in electronic format to be embossed without any problems.
- The Braille Music in electronic format should be accessible to screen readers
- It should be possible to choose what you want to see of the Braille music score, for example, left hand or right hand or both in keyboard music.

### 5.1.6 Support for Braille music Pedagogy

- to get an overall picture of the score easily
- music Braille is complex: it is difficult to motivate people to use it
- slow reading speed
- As Braille music is a linear code, read from left to right, it does not show the pitch contours of high and low in the way that staff notation does. This does not make for immediate understanding of the melodic line.
- The challenge of writing music using exclusively the 63 signs and the blank cell to emulate the several hundreds of signs in staff notation
- It must be possible to isolate bars, pieces or signs, understand the general structure and then study section by section.
- It should be possible to integrate the software with current Braille music pedagogy
- Support should be given for teaching, in the form of a variety of digital resources for learning Braille music
- The project web service should provide additional materials on learning Braille music

- The web service should provide additional materials and the use of appropriate signs in the transcription of Music scores.
- The web service should provide functionality to make contact with other musicians, students and Braille music users



## 6. Conclusions and further work

The work in this deliverable and that of Work Package 2 in general is essential in providing a foundation of knowledge on which the further work in Mus4VIP can be based. Deliverable 2.1 drew on many sources of information to provide the state of the art in current Braille music production and use, and this deliverable took a step further by reporting on how users currently interact with Braille music and what IT support is available and in use to aid music pedagogy.

While statistical analysis of the results of the questionnaires presented in this deliverable was not possible given the populations sampled, the results provide an idea of how Braille music is currently, used, learned, taught and produced. Many of the users questioned had clear ideas about where they see technology aiding their use of the Braille music format in the future, and this highlights the relevance of projects such as Mus4VIP.

From the answers of the people interviewed it emerges that much is expected of IT solutions that can affect both didactics and the faster, cheaper production of new scores in Braille. Furthermore, new technologies can contribute to offering more didactic solutions to use and access online, hoping to create more interaction and cooperation at an international level to reduce duplications both in the creation of Braille music content and the development of technical solutions for meeting the needs of users of Braille music.

Solutions to the issues highlighted in this deliverable will be developed further by the Mus4VIP project by building demonstrative solutions to some of the problems raised in the music pedagogy. This will contribute to the Braille music user com-

munities across Europe through exploitation and dissemination of the solutions developed.

Finally, all the partners in the project know of numerous instances of blind persons learning music or even working in this domain, with a very poor or even no mastery of music Braille notation. Although the oral tradition has been a vital element in human communication, the invention and the diffusion of musical notation has proven to be an indispensable factor in the development of Western music.

As stated in the first pages of this deliverable, the main goal of the Mus4VIP project is to close the gap between music and its blind users. In this document we have tried to show the many components that make up this “gap”, and we illustrated the main factors (relevant differences between printed and Braille music notation, shortage of trained teachers, high transcription costs, slow and uncertain access to existing material, etc.). We believe that, thanks to our proposed solutions, and thanks to our new training modules, many of the individuals who presently learn music only by ear, will be in the position to open the doors of the magic castle of music, and will acquire new capabilities to understand the “how” and the “why”, of their beloved objects, thus closing the gap caused by their lack of sight, as much as the available technology can allow them.

Concerning the near future, users’ feedback and ideas suggest to us that we pursue our investigations in the following directions:

- a) raising awareness for parents, teachers, policy makers, and above all blind persons, of the genuine possibility of achieving musical literacy, valuing the contribution of learning by ear, but going beyond it, towards a more professional standard in which the performance is informed by a detailed knowledge of the score;
- b) improving distance learning, taking into consideration the opportunity to set up counselling / support services, following the model adopted for other school subjects, such as maths and science;



c) promoting effective political resolution at European level, in order to assure the real implementation of the principle of equal opportunities in the domain of music literacy.



## 7. References

- [BME ] <http://www.dodiesis.com>
- [CONTRAPUNCTUS ] <http://www.contrapunctus.it/>
- [DANCINGDOTS ] <http://www.dancingdots.com>
- [DUXBURY ] <http://www.duxburysystems.com>
- [FINALE ] <http://www.makemusic.com/>
- [LILYPOND ] <http://lilypond.com>
- [MUSICXML ] <http://www.makemusic.com/>
- [MUSITEK ] [www.musitek.com](http://www.musitek.com)
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- [SHARPEYE ] <http://www.visiv.co.uk/>
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### **Publications**

- [KROLICK 1996] Krolick, B (1996), “New International Manual of Braille music Notation”, World Blind Union, FNB, Amsterdam

## Appendices: questions asked during the surveys

Below is the questionnaire as it was sent to the interviewees or used as the basis for a telephone interview.

Mus4VIP Project

### Questionnaire to teachers, student assistants

#### TEACHER REQUIREMENTS QUESTIONNAIRE

Dear Mr/Ms,

The Mus4VIP project is being developed by an European consortium which includes state and private institutions working in the field of Braille music. MUS4VIP is subsidized by the European Community Programme LLP(Lifelong Learning Programme 2012)

The project's main objective is that of making music scores more easily and quickly accessible to blind and partially sighted people, including music students, professional or amateur musicians) music teachers and schools who deal with visually impaired students.

The Mus4VIP project will set up an internet-based trans-European service which will incorporate several didactic resources, tutorials, conversion modules, and some Braille electronic music texts which will be available for download and used by teacher and non-sighted musicians through a specific software (Braille Music reader), available on our website: [www.music4vip.org](http://www.music4vip.org)

The first part of the MUS4VIP project is an accurate analysis of teachers of blind musicians needs. Therefore, we are asking you to co-operate in order to outline

our work on the basis of users current needs. Target groups of this questionnaire are music teachers, study assistants, parents of blind or partially sighted people who can use Braille in the field of music. It is meant to be disseminated in several countries, including Italy, France, United Kingdom, Poland. The results of the project will be published in Musi4VIP reports and be made available on the Internet ([www.music4vip.org](http://www.music4vip.org)).

Kindly answer to the multiple choice questions by encircling or writing the right choice.

1. Personal details. Please write:

Age:                      Gender:                      Country

2. Are you:

- a) Music teacher
- b) Study assistant of blind student.
- c) Other:

3. Please specify type of school (for example: Public / private, special school / integrated school)

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4. Would you like to receive the results of this research?

- a) Yes                      b) No

If yes please indicate e-mail address or other modality (e.g. via our forum).

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5. Would you like to test the service during the pilot phase which will be carried out by the project?

- a) Yes                      b) No

6. Do you teach personally Braille music to your students?

- a) Yes                      b) No                      c) or make use of your students' knowledge of Braille notation during your classes.

7. In your opinion, at what age should the student start learning Braille music?

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8. In case of an instrument student, at what age would you introduce learning through reading instead of learning by ear?

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9. Could you describe how your student learns a music piece through reading?

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10. Do you know the new International Manual of Braille Music Notation?

- a) Yes                      b) No                      c) A little                      d) Enough

11. Do you use computer for teaching music? example: music theory, note reading, learning of Braille syntax, or other? please specify

- a) Yes                      b) No

**If not please go to n. 25**

12. Do you use computers for producing music Braille scores or learning material for your student/s, such as music pieces, music examples, short notes with musical elements, or other?

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13. Where do you find your music scores for your students?

- a. In school library;
- b. I get books from a special library (please specify its name);
- c. I produce them myself.
- d. I order transcription if the scores are unavailable

14. Did / do you use specific music software to consult or create music scores in Braille?(Yes/No)

- a) Yes
- b) No

15. If yes, describe which software and for what purposes.

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16. What kind of computer do you use?

- a) PC Windows
- b)Apple Macintosh
- c)Other (please specify)

17. What are the constraints and difficulties with the existing software systems and what improvements would you expect from future system developments?

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18. Do you use any music recognition software for producing Braille music scores?

- a) Yes                      b) No

19. What do you think of the results?

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20. Have you saved onto your PC music in electronic notational format?

- a) Yes                      b) No

21. If yes, in which format?

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22. Do you have access to any score music database (traditional and/or Braille)?

- a) Yes                      b) No

23. If yes, describe name and format (CDRom, website etc.)

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24. If no, would you be interested in them?

- a) Yes                      b) No

25. If you don't use computer, please what are the reasons for not using computers within the Braille music domain?

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26. Your student make use of:

- a) Speech synthesiser                      b) Braille display,                      c) keyboard of 6 key Braille,  
 d) equipment like Perkins                      e) other

27. Do you prefer using Braille music scores "bar over bar" in teaching music? or "section by section" format?

- a) bar over bar                      b) section format                      c) staff after staff (very used in some countries).

28. Do you use Internet for looking up information about music and didactic for blind students?

- a) Yes                      b) No

29. If yes, what kind of information do you search for in the teach Braille music domain?

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30. How do you rate your current sources / strategies to get music scores?

a) very unsatisfactory; b) unsatisfactory; c) average; d) satisfactory; e) very satisfactory

31. In your opinion, in comparison with '60 and '80 's years do you think that there has been a decay concerning musical studies for the blind? If yes, could you write some comments and some ideas? such as – difficulty in reading, difficulty in finding good teachers ...

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The pilot phase of the MUS4VIP project will develop a web portal, where a number of tutorials realised with BME2 editor, will be stored. Furthermore, our portal will contain different kinds of music scores which will be attached to tutorials.

If you would like to help us in evaluation activity, we kindly ask you to indicate which aspects in your opinion are more complex, from the teacher's point of view, as well as indicating relevant gaps or lack of learning material, for example music theory, note reading, spoken solfege if present in your school, melodic solfege, or learning material for instrumental music, hardcopy music notes, or electronic learning material, or others.

Thank you very much for your co-operation

For further information please contact:

Giuseppe Nicotra

Conservatorio di Musica di Padova

Email: [archibraille@gmail.com](mailto:archibraille@gmail.com)

Kindly return your answer by email to: [archibraille@gmail.com](mailto:archibraille@gmail.com)