Findings from the DAISY Music Braille Conversion Tool Requirements Survey

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7.2 It either: generates output which can be compiled in a braille editor as part of a production workflow; or can handle mixed text-music files entirely. 59

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7.4 It can extract parts from, e.g. chamber music or orchestral scores. 60

7.6 It can reformat Bar-Over-Bar material using different braille page sizes [to be defined]. 60

7.7 Outputs an eBraille/Text file [in BRL text format] for use on a refreshable braille display. 61

7.8 Outputs a printable file of stave notation*.* 61

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8.1 If installed locally, it must work with XX technology, and uses no more than 2GB RAM even for the most complex files. [minimum specification to be defined]*.* 63

8.2 It must be programmed in such a way that it can be further developed. 63

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9.3 Offer the service for a minimum term, e.g. 5 years *[to be defined].* 67

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# Executive Summary

In this part of the DAISY Music Braille Project we wish to support the development of a sustainable software tool, or tools, which enable rapid and accurate conversion primarily of digital music scores in MusicXML format, into embossed music braille scores.

In an attempt to begin to prioritise the sector’s requirements in music braille conversion tools in the future, a Requirements Document and survey captured the majority of high-level functionality requirements raised through previous DAISY Music Braille Surveys and meetings, Haipeng Hu’s specification framework, and a UK trial of music braille conversion tools. The focus was on tools needed by agencies for music braille production, but a wide range of respondents was invited to take part as their requirements are often similar.

34 respondents from 15 countries and 20 organisations rated a lengthy list of features, and these ratings and comments were used to prioritise (rank) the features into Essential, Desirable, Nice to Have, or Not Needed.

14 official Organisational responses were received, as well as 20 individual responses (11 of whom listed an organisational affiliation), with many respondents having multiple roles including: transcribers, end-users, teachers, developers, as well as product manager, accessibility expert, proof-reader, music technology trainer, and software engineer.

The features were grouped into the following sections in the Requirements Document and survey, and this report follows the same order:

1. Accessibility and Usability
2. File Handling
3. Formatting/Layouts
4. Country Codes
5. Options
6. Conversion of Musical Symbols
7. Output
8. System Requirements
9. Business Arrangements
10. Note about Funding
11. Anything Else.

The number of responses received (34) is clearly only indicative of the opinions across the whole sector – but we do believe they are probably representative of the sector as they include a worldwide mix of agencies, educators, developers and end-users, many of whom responded with a valuable combination of expertise in more than one of those roles, and the Organisational responses typically came from a group of transcribers in one agency.

It was interesting that for some features there was a very strong consistent rating from all respondents (e.g. everyone rated a feature as Essential); whereas opinions for a small number of features were entirely split across all ratings, and there was no clear preference amongst one respondent type over another – for example, there were just as many organisations as individuals rating a feature as 1 Essential or 4 Not Needed. Furthermore, transcribers from the same agency did not always rate features in the same way, highlighting the individual nature of transcription, perhaps due to the type or purpose of the music, as well as individual differences in experience or transcription practice.

Respondents were thoughtful in their ratings. Comments were frequently made that there was an essential need to ensure that basic coding and transformations were accurate and reliable for the most common kinds of musical scores needed by blind musicians and students - and that they could manage without more advanced features which they accepted would be helpful, but were not essential at the expense of more basic improvements. Our consideration of the prioritised features should ensure that essential features are dealt with, as well as considering features which make the tools fit for the future. Several respondents suggested prioritising features to convert the most commonly used scores such as keyboard, solo instrument and vocal music.

The ratings and comments confirm some views that it may be difficult (maybe impossible) for a single existing tool to perfectly cater for all needs. Having a choice of reliable tools will probably be in the sector’s best interest, to ensure that the needs of agencies, educators and end-users are well met, and in a suitable time-frame. Considerations such as cost, business model, development speed/cost, type of musical scores, output format, ability to write and play back music, and accessibility all play a part in determining which tool will be best for a particular setting, and we hope that products will be positioned accordingly.

The prioritised requirements are listed below, together with a précis of any other suggestions received from respondents in Section 11, and the rest of the report gives detail for each of these features individually. These ranked requirements are indicators of how a cross-section of the music braille sector feels about future functionality in music braille conversion tools.

We now invite developers to consider and respond to these prioritised requirements giving their views on which features are easy/complex to build in their product, at what cost, and which main target group or groups their product is most likely suited for.

## Prioritised requirements (listed)

Note: If an item ends with … please see body of report for full text. If an additional suggestion is listed, the rating was proposed by the respondent as these suggestions were not read or rated by other respondents. Please see body of report for comments on each of these features.

### 1. Accessibility and Usability

**Essential**

* 1.2 Blind people rate it as easy to use with at least one of the main screen-access solutions (e.g. Jaws, NVDA, SuperNova).
* 1.4 When navigating through the digital score, it supports: Select, Go To, and Browse Next-Previous, by: note, voice, stave, system, print line, and braille line.

**Essential-Desirable**

* 1.3 The tool can be translated into other languages.

**Desirable-Essential**

* 1.1 Sighted users rate it as easy to learn and to use.

**Additional suggestions (not ranked, as not read or rated by other respondents):**

* 11.20 *From a developer*:refer to standard products (e.g. MuseScore Sibelius, Forte) which use keyboard entry/shortcuts extensively, and have brilliant ideas…

### 2. File Handling

**Essential**

* 2.1 It can handle large files up to 100 MB.
* 2.2 It accepts the latest MusicXML or MNX input files, as well as older versions.
* 2.3 It can handle the full range of stave notation imports.

**Essential-Desirable**

* 2.4 It can accept a MusicXML file with an infinite number of parts, and the user should be able to select from any of those parts.
* 2.6 It is future-proof by allowing for the addition of agreed DAISY-defined new signs for special notation.
* 2.7 It accepts SMuFL specifications in the MusicXML file.
* 2.8 It allows users to specify the order of pieces in a volume, or over multiple volumes.
* 2.9 It can split a large file into several segments; and combine segments into a complete file/full score.

**Desirable-Essential**

* 2.5 It validates MusicXML/MNX input and provides automated or proposed corrections.

**Desirable-Nice to Have**

* 2.10 Scores can be given encrypted copy protection.

**Nice to Have-Desirable**

* 2.11 It can save different revisions for comparison, or rolling back.

### 3. Formatting/Layouts

**Essential**

* 3.1 Single Line.
* 3.2 Bar-Over-Bar, (with option for Line-Over Line).
* 3.3 Line-By-Line (Open Score).
* 3.4 Section-by-Section (with option for Stave-By-Stave).

### 4. Country Codes

**Essential**

* 4.1 It can produce at least the main country codes: e.g. UK, USA, European *[to be specified].*

**Essential-Desirable**

* 4.2 It can handle multiple languages in one file.

**Additional suggestions (not ranked, as not read or rated by other respondents):**

* 11.11 *From a transcriber and end-user*:Consider how braille music code will be maintained/updated/extended with other standards bodies…
* 11.26 *From an end-user*: Add Canadian Music Braille standards…
* 11.28 *From a transcriber and end-user*:UK and USA English should be different languages (different spelling and musical terms)…
* 11.30 *From a transcriber and end-user*:Some countries require a list of abbreviations and special symbols page…

### 5. Options

**Essential**

* 5.1.1 Fingering (on/off)
* 5.1.6 Bar numbers (on/off)
* 5.1.9 Define interval direction (specified)
* 5.1.14 Repeat handling (specified)
* 5.5 It can transcribe according to specific instrument types, so that the same symbol can be transcribed to appropriate braille equivalents.

**Essential - Desirable**

* 5.1 The tool permits options to show/hide features in particular layouts to suit different user needs, e.g. for learners, or those learning the score in a particular way
* 5.1.2 Print line numbers (on/off)
* 5.1.4 Position of braille page number (specified)
* 5.1.8 Print page numbers (on/off)
* 5.1.12 Paper size (specified)
* 5.1.13 Doubling convention (specified)
* 5.1.15 Transpose a single part/voice (specified)
* 5.1.16 Rehearsal letters (on/off)
* 5.1.18 Octave signs at the start of each line (on/off)
* 5.1.19 Lyrics (contracted/uncontracted)
* 5.1.20 Braille page number (on/off)
* 5.4 When editing, it can automatically move objects in a braille staff or system, like modifying texts in MS Word or Duxbury Braille Translator.

**Desirable - Essential**

* 5.1.7 Bar number location (side/top)
* 5.1.10 Indentation (specified)
* 5.1.11 Hide empty staves (on/off)
* 5.1.17 Position of rehearsal letters (specified)
* 5.2 User profiles (configurations and definitions) can be saved for users with different requirements.
* 5.3 It can provide dynamic on-screen visual and braille music notation.

**Desirable - Nice to Have**

* 5.1.3 Position of print page number (specified)
* 5.1.21 Running header (on/off)

**Additional suggestions (not ranked, as not read or rated by other respondents):**

1. **Essential**: *[from a music teacher and end-user]* Need settings for in-accords or moving notes, and options for choir music handling, options for e.g. interval signs but not lyrics…
2. **Essential**: *[from a transcriber and music teacher]* Embellishments; dynamics; tempo; prefixes for shaped notes; nuances; ornaments ... (on/off).
3. **Essential**: *[from a transcriber, end-user, and music teacher]* Chord symbols; accents; dynamics; sixteenth groupings - on/off for all those features.
4. **Essential**: *[from a transcriber, end-user, and music teacher]* Want to quickly isolate different aspects as needed. How will this work with multiline displays…
5. **Essential**: *[from a transcriber and end-user]* Lots more options, *e.g.* show/hide clef signs, nuances, ornaments, dynamics/expressions - options to strip a score down right from the complete score, through to just the notes. Also: whether to show every bar number; how many bars are shown per section; whether the number sign (numeric indicator) is shown for bar numbers or not; what kind of slur sign is used (simple C, or phrase 56-B, or both)…
6. **Essential**: *[from a transcriber, end-user, and music teacher]* Many other items to include in the section about fingering, for instance, slurs, ornaments, dynamics.
7. **Desirable***: [from an end-user]* Switching between interfaces in different languages.
8. **Desirable**: [*from an end-user, developer, and music-teacher]* Options shouldpermit production of a score of nothing but pitch, octave, and duration through facsimile score.
9. **Desirable**: *[from a transcriber]* For a song with several verses with the same melody, have on/off option for writing out the print music repeat…
10. **Not rated:** *[from end-user]* Part extraction part transposing (key and clef) implode and explode copy and paste of parts and other material.
11. **Not rated:** *[from end-user]* The ability to pick and choose between different country code options…

### 6. Conversion of Musical Symbols

**Essential**

* 6.1 Accents are correctly converted, according to NIM and MBC.
* 6.2 Supports both types of breath marks, according to NIM and MBC.
* 6.3 Chord symbols are accurately translated according to NIM and MBC.
* 6.4 It presents clefs accurately, according to NIM and MBC.
* 6.5 It converts dynamics appropriately, whether written as symbols or words, or combinations, following NIM and MBC.
* 6.6 It converts fingering for keyboard, string instruments (right and left hands) appropriately, according to NIM and MBC.
* 6.7 Markings for strings are correctly translated according to NIM and MBC.
* 6.8 Grouping/beaming of notes is converted correctly according to NIM and MBC rules.
* 6.9 In-accord signs are handled correctly, following NIM and MBC for various situations.
* 6.11 Long and short-value signs are presented, and whether a bar in 4/4 begins with a semiquaver, following NIM and MBC rules.
* 6.12 Vocal music conversions confirm to NIM and MBC.
* 6.13 Unison signs are correctly used, showing two or more parts on the same note.
* 6.14 Tremolos are translated appropriately, as per NIM and MBC. E.g. repetition, alternation and doubling of note repetition signs.
* 6.15 Time signatures are correctly translated, even if they are not numeric.
* 6.16 Ties are presented so they are distinguishable from each other: single note, chord tie, accumulating tie/arpeggios.
* 6.17 It can present stem signs.
* 6.18 Different kinds of slurs are presented accurately.
* 6.20 Ornaments are correctly translated, following NIM and MBC rules.
* 6.21 Octave signs are correctly presented following NIM and MBC rules.
* 6.22 Nuances are correctly presented.
* 6.27 It combines musical symbols in the right order.
* 6.28 Multiple Bars' rest are presented in a compact manner, following NIM and MBC rules.
* 6.29 It handles bars appropriately…

**Essential-Desirable**

* 6.10 Instrument names are correctly presented according to language, and where instrument names change within a single part, the translation is correct.
* 6.19 Prefixes for shaped notes are correctly translated according to the most usual symbols.
* 6.23 It can present Tablature (notation indicating instrument fingering rather than musical pitches) following the agreed specification.
* 6.25 It can present Figured Bass following NIM rules.
* 6.26 In ensemble scores, it can control part names flexibly…

**Additional suggestions (not ranked, as not read or rated by other respondents):**

* 11.6 *From a transcriber and music teacher:* Add reference to MBC and Mary Turner De Garmo's, Introduction to Braille Music Transcription (Second Edition 2005)…
* 11.12 *From an end-user*: Good support for percussion notation is essential because there are lots of percussionists out there.
* 11.15 *From a transcriber and developer:* Defining tabular notation, this is nice for guitar music, nice to have.
* 11.17 *From a transcriber and end-user*: Prioritise the most commonly needed types of music; e.g. there is probably more keyboard, solo instrument and vocal music needed over full orchestral scores…
* 11.22 *From a transcriber and end-user:* Essential to have correct braille code within word expressions in the music (may well be different from the code used for lyrics in the same music)…

### 7. Output

**Essential**

* 7.1 Conversion generates an e.g. >80% error-free success rate when an agreed range of samples is tested *[to be specified]*
* 7.2 It either: generates output which can be compiled in a braille editor as part of a production workflow; or can handle mixed text-music files entirely.
* 7.3 It can output the full range of stave notation (single line, vocal (including multi-voice), keyboard, full score, lead sheet, continuo part, all standard instrument-specific articulation and other techniques).
* 7.4 It can extract parts from, e.g. chamber music or orchestral scores.
* 7.5 Outputs a file suitable for embossing (e.g. BRF, BRL (text file) format).
* 7.7 Outputs an eBraille/Text file [in BRL text format] for use on a refreshable braille display.
* 7.10 It notifies the user of conversion progress, success or failure.

**Essential-Desirable**

* 7.8 Outputs a printable file of stave notation.

**Desirable-Essential**

* 7.6 It can reformat Bar-Over-Bar material using different braille page sizes [to be defined].

**No Ranking**

* 7.9 When using a publisher’s master file, it disables hard-copy printing, only displaying stave notation on-screen.

**Additional suggestions (not ranked, as not read or rated by other respondents):**

* 11.5 *From a transcriber*: Sound. Starting from Music-XML you can have sound as a feature effect, why not? Desirable.
* 11.10 *From a developer*: Make dynamic conversions in real time depending on the needs of the user, which will change during use of the score…
* 11.12 *From an end-user*: Unicode braille is the future, like in normal digital text. For us the potential is even more because it also covers music notation.
* 11.14 *From a transcriber and music teacher*: Use Unicode for braille (in contrast to musical symbols), to avoid, or better solve the different language codes, Essential.
* 11.16 *From a developer*: Generate and play the sound-representation of each musical event in parallel with the Braille representation…
* 11.18 *From an end-user*: MIDI playback to allow users to check their work by listening, Essential.
* 11.23 *From a transcriber and end-user*: Develop APIs for other transcription software to call the music transcription tool as a subprocess.

### 8. System Requirements

**Essential**

* 8.2 It must be programmed in such a way that it can be further developed.

**Not ranked**

* 8.1 If installed locally, it must work with XX technology, and uses no more than 2GB RAM even for the most complex files. *[minimum specification to be defined].*

**Additional suggestions (not ranked, as not read or rated by other respondents):**

* 11.9 *From a developer*: The program should be portable to all (PC/Mac/Android...) platforms.

### 9. Business Arrangements

**Essential**

* 9.4 Operate a system for reporting bugs, issues and requests, and for sharing updates on implementation.

**Essential-Desirable**

* 9.1 Annual service level agreement available to secure fixes and support *[define an acceptable response time for support questions]*
* 9.3 Offer the service for a minimum term, e.g. 5 years *[to be defined].*

**Desirable-Essential**

* 9.2 If server-based, provide built-in redundancy for server failure/recovery to minimise downtime *[define acceptable downtime]*

**Additional suggestions (not ranked, as not read or rated by other respondents):**

* 11.2*From an end-user:*Be available both as a trial version (as for example a 30-day-demo) and as a full version. Essential…
* 11.4 *From a music teacher:*Have a cut down version without so many options for beginner users…
* 11.7 *From an end-user:*Documentation; user manuals, quickstart guides, keyboard shortcut lists, should be available in a range of accessible formats; HTML, plain text, BRF, ...
* 11.8 *From a transcriber and developer*:Feedback, because things do not get better without feedback. Essential.
* 11.19 *From an end-user and music teacher*:Need a database for scores produced, as world wide as possible, so we avoid all the double productions we have now.
* 11.21 *From a transcriber and end-user:*Clearly document the system, Essential.

### 10. Note about Funding

**Essential-Desirable**

* 10.1 The sector should aim to secure the future of a tool, or tools, which together support both agency production as well as education.

**Additional suggestions (not ranked, as not read or rated by other respondents):**

* 11.3 From an end-user:Make sure this tool can be used for learning braille music…

### 11. Anything Else

* 11.1 *An organisational response (transcriber, end-user and developer)***:**

We are considering mainly expert Braille users who master Braille music notation. We all are well aware of the fact that the number of this population will decrease rapidly in the following 5-10 years. On the other hand Interest for music and music literacy is still very high among blind and partially sighted persons of all ages, but Braille has proved to be a relevant barrier. Possible way out: The Multimedial and flexible access to structured Braille music score. BMML format does exactly this, although it needs some improvement (20%)…

# Introduction

## Vision

Musicians who read braille enjoy timely and affordable access to increased numbers of accurate music braille scores in hard-copy and digital formats produced by effective and reliable conversion tools.

## Mission

Through collaboration, we wish to achieve greater automation for music braille production, primarily in production houses and in education. Where possible we would also like blind musicians themselves to be able to obtain and convert files for their own use.

We also wish to secure greater opportunity for sourcing and creating higher-quality MusicXML (and later, MNX) files better suited for conversion.

Through these improvements, we intend to enable greater international file sharing, increasing the speed agencies can deliver music braille to musicians, and reducing the duplication of effort across the sector.

We wish to support the development of a sustainable software tool, or tools, which enable rapid and accurate conversion primarily of digital music scores in MusicXML format, into music braille scores.

The tool(s) will primarily produce scores suitable for embossing. If the resulting file can also be displayed on a refreshable braille display that would be beneficial.

The tool(s) will be supported by a robust business plan with a financial plan in place to ensure their sustainability (e.g. for at least 5 years).

## Out of scope

The project is not (at least for the moment) concerned with tools which enable blind musicians to write, read, listen to, and edit their own scores, and producing output for sighted musicians. These are essential tools for blind musicians, but this project cannot focus on this at this stage. (Some questions did fall outside of this scope, for information-gathering purposes).

## Description of intended user

It is expected that the user of this tool(s) would be familiar with music and the basic terminology and features of music braille used by blind end-users. They may also be proficient music braille transcribers. The users may be sighted, or low-vision or blind using screen-access technology with the tool.

## The survey process

A detailed Requirements document was created capturing:

1. the majority of high-level functionality requirements raised through the two international surveys and two Round Table Meetings conducted by the DAISY Music Braille Project (between January 2018 and October 2018);
2. the main points from Haipeng Hu’s framework specification for a music braille conversion tool; and
3. common issues identified through testing of various conversion tools during 2018 by the UK team, identifying bugs and fixes required, led by Roger Firman. These bugs/fixes have already been reported to developers, and some may not yet have been implemented.

The document contained issues which agencies, transcribers, and end-users reported that a tool should do in future, to make the production of embossed music braille accurate, efficient and reliable so they can get more scores out to more blind musicians. These improvements should also mean that producers can share files effectively.

Note: these features were not intended to be a comprehensive list of all features that a tool should (and may already) provide; merely those which would help to shape the design/implementation of future features.

The Requirements document and link to the accessible online survey was: circulated to the project mailing list (around 150 people); linked on the project webpage; and promoted by organisations including the International Council on English Braille, and the UK Association for Accessible Formats.

We informed participants that the resulting prioritised Requirements would be shared with Developers, seeking their comments, and estimates for pricing and timeframe for implementation, and would be main focus of our next meeting in Geneva in May.

## Prioritisation

Survey respondents were asked to review and prioritise the Requirements, adding any comments they wished to make for each. There was also opportunity to suggest additional requirements at the end of the survey. Respondents were made aware that it would be unlikely that we could have everything on this list, and that some requirements might not even be possible, and were asked to prioritise carefully so the essential requirements became obvious.

Respondents rated each requirement as:

1 = Essential

2 = Desirable

3 = Nice to Have

4 = Not Needed

0 = No Opinion.

## Reference rule books

Throughout the document, reference is made to two main rule books:

* NIM: New International Manual of Braille Music Notation
* MBC: Music Braille Code, Braille Authority of North America 2015

## The report structure and analysis method

### Order of the report

The main body of the report presents the results in the same order as asked in the Requirements survey. Each section starts with a list of features in ranked order, with any suggestions received from respondents from Section 11, followed by details with ratings and comments for each feature. The report is written to be as accessible as possible.

### Differences in respondent ratings

For each feature, if there were any particular differences in ratings/respondent types (e.g. between ratings from organisations vs individuals; or from teachers vs end-users etc) this is highlighted. If no mention is made of any difference, ratings were spread across all respondent types.

### Anonymity

Where it is helpful to identify a specific responding agency they are named, but otherwise responses have been collated anonymously. Any feedback from developers commenting on what their particular product can do has been removed, ready for their formal response to these prioritised requirements.

### Number of responses to each feature

Respondents only completed questions where they had relevant experience or views, so not every question was answered by every participant. The total number responding to (and skipping) each feature is stated. On average, 33 responses were given to each question.

### How rankings were calculated

Some features were rated in the same way by the majority of participants and where more than 50% of respondents gave the same rating, that determined the ranking of that feature.

For features which had a greater split of ratings where no single rating scored more than 50% or where it was very close around 50%, the ratings on either side were taken into consideration, to promote/demote the ranking; this meant that some features fell between Essential and Desirable and so on.

The final ranking is highlighted in yellow in the data table, and stated underneath together with the numbers giving each rating.

# Respondents

34 responses were included in the analysis after the data had been cleansed of empty submissions (e.g. some people signed up, but did not complete any answer fields). However not all questions were answered by all 34 respondents; typically each question was answered by between 31-33 respondents, with between 1 and 3 skipping the question. The numbers of exact responses for each feature is given for clarity.

## Respondent types

* 14 official organisational responses:
(where staff had collated their responses into a single response, or a staff-members/s had responded to the survey on behalf of the organisation).
* 20 individual responses:
(11 of these had also given their organisational affiliation).
* 14 respondents (of all respondent types) raised 30 additional issues/suggestions between them in the final section of the survey, with just under half of those making suggestions making a single suggestion, and others making between 2 and 6. The respondent type is given for each suggestion which have been incorporated into relevant sections of the report.

## Countries represented

* 15 countries were represented, with the following number of responses:
* Australia (3), Austria (1), Belgium (1), Canada (4), China (1), Denmark (1), Germany (2), Italy (1), Netherlands (2), New Zealand (2), Norway (1), Sweden (1), Switzerland (1), UK (11), USA (2).

## Organisations responding

Responses came from 20 organisations worldwide, and those marked with \* stated that they were submitting an Organisational response; others simply gave their organisational affiliation but stated they were responding as an Individual:

* BLENNZ, New Zealand
* Blind Foundation, New Zealand
* BrailleOrch and Open Braille Music Projects, China
* Bundes-Blindenerziehungsinstitut, Austria
* \* CNIB, Canada
* \* DAISY Consortium, Belgium
* \* Dancing Dots, USA
* \* Dedicon, Netherlands
* \* DZB, Germany
* IBOS, Denmark
* International Council on English Braille (ICEB) Music Committee, Canada
* \* Italian Library for the Blind, Italy
* \* London Borough of Hillingdon, UK
* New College Worcester, UK
* \* RNIB, UK
* \* SBS, Switzerland
* \* Statewide Vision Resource Centre, Australia
* \* Swedish National Agency for Special Needs Education and Schools, Sweden
* TAVIP, UK
* \* UK Association for Accessible Formats (UKAAF), UK

## Roles

Two-thirds of respondents (21/34) stated they had a single role; with one-third having multiple roles: five had 2 roles, six had 3 roles, and two had 4 roles.

Just under half the respondents were transcribers, and just under half were end-users of music braille, with one-third being music teachers:

* 16 transcribers
* 15 end-users of music-braille
* 10 music teachers
* 6 developers
* 11 listed having other roles: specialist teachers of visually impaired, product manager, researchers in music notation, non-braillist musician accessibility expert, proof-reader, music technology trainer, and software engineer.

Figure 1: Bar chart showing respondent roles, as described in report

# 1. Accessibility and Usability

## Ranked according to ratings

**Essential**

* 1.2 Blind people rate it as easy to use with at least one of the main screen-access solutions (e.g. Jaws, NVDA, SuperNova).
* 1.4 When navigating through the digital score, it supports: Select, Go To, and Browse Next-Previous, by: note, voice, stave, system, print line, and braille line.

**Essential-Desirable**

* 1.3 The tool can be translated into other languages.

**Desirable-Essential**

* 1.1 Sighted users rate it as easy to learn and to use.

**Additional suggestions (not ranked, as not read or rated by other respondents):**

* 11.20 *From a developer*:Any sighted user involved in this project should start by learning to use standard products as MuseScore, Sibelius and Forte to see how these programs handle things. These programs use keyboard entry and shortcuts very extensively and are a source of lots of brilliant ideas.

## Individual features in detail

### 1.1 Sighted users rate it as easy to learn and to use.

Why: A tool is easier to learn and more efficient to use by sighted people when it is similar to other modern tools.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 11 | 16 | 4 | 1 | 0 | 32 | 2 |

Desirable-Essential: 27/32 rated this as Desirable (16) and Essential (11) combined, 4 Nice to Have, 1 Not Needed.

Comments included that for users in school settings for example, where time and expertise is limited, it would be especially important that the tool is easy to learn and use, whereas power users such as transcribers in organisations would accept a learning period. Another commented that all users would benefit from a standard interface.

### 1.2 Blind people rate it as easy to use with at least one of the main screen-access solutions

(e.g. Jaws, NVDA, SuperNova).
Why: Blind transcribers and blind end-users need to use the tool to convert materials.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 26 | 6 | 0 | 0 | 0 | 32 | 2 |

Essential: Felt to be Essential by 26/32, 6 as Desirable.

It was hoped that if the tool was written ‘properly’ with standard operating system components, accessibility should follow naturally, so that any screen-access technology could work with it; or that the tool should be self-voicing.

### 1.3 The tool can be translated into other languages.

Why: To support users in different countries.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 16 | 8 | 7 | 0 | 1 | 32 | 2 |

Essential-Desirable: 24/32 rated this as Essential (16) and Desirable (8) combined, 7 Nice to Have, 1 No Opinion.

Comments were that a tool in English was felt to be acceptable, but if it had some other languages/localization features it would maximise potential users and enable international cooperation between users.

### 1.4 When navigating through the digital score, it supports: Select, Go To, and Browse Next-Previous, by: note, voice, stave, system, print line, and braille line.

Why: Users need to be able to quickly navigate through the score.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 19 | 8 | 3 | 1 | 2 | 33 | 1 |

Essential: Rated as Essential by over half of respondents (19/33) and by almost all transcribers, with 8 Feeling it was Desirable, 3 as Nice to Have, 1 as Not Needed. Two had No Opinion.

However, two respondents requested additional features for Search, and Search & Replace, and also to be able to navigate to the same time position in different staffs or parts. However, a couple of respondents felt though that this feature was out of scope, as this feature might be in a score editor, not in a transcription tool.

# 2. File handling

## Ranked according to ratings

**Essential**

* 2.1 It can handle large files up to 100 MB.
* 2.2 It accepts the latest MusicXML or MNX input files, as well as older versions.
* 2.3 It can handle the full range of stave notation imports.

**Essential-Desirable**

* 2.4 It can accept a MusicXML file with an infinite number of parts, and the user should be able to select from any of those parts.
* 2.6 It is future-proof by allowing for the addition of agreed DAISY-defined new signs for special notation.
* 2.7 It accepts SMuFL specifications in the MusicXML file.
* 2.8 It allows users to specify the order of pieces in a volume, or over multiple volumes.
* 2.9 It can split a large file into several segments; and combine segments into a complete file/full score.

**Desirable-Essential**

* 2.5 It validates MusicXML/MNX input and provides automated or proposed corrections.

**Desirable-Nice to Have**

* 2.10 Scores can be given encrypted copy protection.

**Nice to Have-Desirable**

* 2.11 It can save different revisions for comparison, or rolling back.

## Individual features in detail

### 2.1 It can handle large files up to 100 MB.

Why: Some scores are large and complex, or one book may contain a large number of scores.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 19 | 8 | 3 | 1 | 1 | 32 | 2 |

Essential: 19/32, for most transcribers, 8 Desirable, 3 Nice to Have, 1 Not Needed, 1 No Opinion.

Comments were that this file size represents a very large and complex score, so should be sufficient for most, though perhaps there should be no limit. It should also be possible to break a large file into smaller ones if needed. Working on a whole score in one file was reported to be essential to prevent errors occurring when working with multiple files.

### 2.2 It accepts the latest MusicXML or MNX input files, as well as older versions.

Why: Keeps up to date with industry standards, so digital files can be converted without requiring scanning from the paper score.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 22 | 10 | - | - | - | 32 | - |

Essential: An Essential feature for two-thirds of respondents (22/32) including almost all transcribers, and Desirable for one-third (10) many of whom were end-users and/or teachers of music braille, with a few transcribers.

Comments were that accepting older versions was appreciated, but with the realisation that truly out-dated formats should not be indefinitely supported. Tools which only accept one file type, or one particular version, are very restrictive, so accepting a range of inputs would be better. We also need good publisher files which export all the necessary information correctly, rather than having to rely on scanning which introduces errors. The compressed format MXL was mentioned by one participant as a possible input file, and another mentioned MIDI input and BRF import.

### 2.3 It can handle the full range of stave notation imports:

single line, vocal score (including more than one vocal line), keyboard, score, lead sheet, continuo part, all standard instrument-specific articulation and other techniques.
Why: Musicians need such scores for study and performance.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 25 | 6 | 1 | - | - | 32 | 2 |

Essential: An Essential feature for the majority (25/32); Desirable for 6, and Nice to Have for 1.

Comments included that the more instruments and techniques it supports the more musicians it will be useful for – but a prioritised list of the most frequently requested types of material should be created, so tools can focus on doing those especially well. If a tool can handle specific types of music in a well-defined way, that would be better than trying to do everything with mistakes. Some will need orchestral and ensemble/chamber music scores as well as other kinds too. For learners, they mostly need for example single line, piano and small ensemble scores, with segments of orchestral scores. There are probably more demands for vocal and piano music than others for example.

### 2.4 It can accept a MusicXML file with an infinite number of parts, and the user should be able to select from any of those parts.

Why: To accommodate all kinds of scores, and user needs.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 15 | 14 | 4 | 0 | 0 | 33 | 1 |

Essential-Desirable: 29/33 rated this as Essential (15) and Desirable (14) combined, 4 Nice to Have.

The rankings and comments indicated that whilst the sentiment was good, ‘infinite parts’ was too many to consider – it should be able to handle complex scores e.g. perhaps the size of two times a full symphony orchestra plus chorus score, but probably does not need to handle infinite parts. It is essential that a user can select a particular part or parts.

### 2.5 It validates MusicXML/MNX input and provides automated or proposed corrections.

Why: To check the file is good enough to get a reliable conversion whilst minimising human intervention for common issues.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 11 | 17 | 4 | - | 1 | 33 | 1 |

Desirable-Essential: 28/33 rated this as Desirable (17) and Essential (11) combined, 4 Nice to Have, 1 No Opinion.

Comments indicated that this kind of validation and automated correction feature was clearly liked in principle. However concerns were raised about whether such a tool could really know about and fix problems correctly in all contexts; whether users would know what to do if they were given a list of proposed corrections; and whether this would be more time-consuming than manual transcription. Validation and automated correction was hoped for by many respondents. One developer felt that the tool should handle any MusicXML import file whether valid or not; it should fix any problem automatically if it is possible to do so; it should report any non-fixable problems in the file; and propose methods to solve ambiguous problems, perhaps offering interactive corrections. Another respondent suggested these features could be done in a separate tool instead.

### 2.6 It is future-proof by allowing for the addition of agreed DAISY-defined new signs for special notation.

Why: DAISY may wish to add a sign used in their specification.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 16 | 4 | 5 | 4 | 4 | 33 | 1 |

Essential-Desirable: 20/33 rated this as Essential (16) and Desirable (4) combined, with 5 Nice to Have, 4 Not Needed, and 4 No Opinion.

Respondents agreed that the tool should be future-proof to allow for new signs/symbols, but stated that any new braille signs should come from international braille authority standards. Special notations could be covered by transcriber notes, and/or substituting existing symbols rather than creating new symbols. Any new tags for MusicXML/MNX should be proposed to W3C.

### 2.7 It accepts SMuFL specifications ([www.smufl.org](http://www.smufl.org)) in the MusicXML file.

Why: SMUFL-compliant fonts (such as Bravura) can be used to display music notation, or access SMUFL glyph names. New symbols can be defined, and can incorporate updates to MusicXML and MNX. SMuFL is the next-generation music font standard, and most of the notation software (now Finale, Dorico and MuseScore) will use it in the future. MusicXML 3.1 and MNX also make use of such a standard.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 11 | 11 | 4 | 1 | 6 | 33 | 1 |

Essential-Desirable: 22/33 rated this as Essential (11) and Desirable (11) combined, 4 Nice to Have, 1 Not Needed, and 6 No Opinion.

Respondents do want tools to be future-proof, though many said that did not know enough about this specification to be able to comment with authority; and suggested that MusicXML should contain as much as possible to avoid the need for font definitions.

### 2.8 It allows users to specify the order of pieces in a volume, or over multiple volumes.

Why: agencies need to produce large books of many pieces in a particular order, or a large work, which is often large enough to require multiple volumes.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 9 | 9 | 7 | 6 | 2 | 33 | 1 |

Essential-Desirable: This feature had an almost balanced split of responses across all types of respondents: with 18/33 rating it as Essential (9) and Desirable (9) combined; and 13 rating it as Nice to Have (7) and Not Needed (6) combined. 2 had No Opinion.

Some felt that the transcribed version should always follow the order of pieces in the printed version, whilst others felt that it would be useful to be able to break a large volume into smaller pieces for portability of the final embossed score. Two commented that rearranging scores into books should be a task for another tool not the converter tool (since literary braille transcription tools do not do volume splitting either), and another commented that the development time for this feature might take longer than the time saved for users. Another respondent suggested that we should get the standard, single work situation sorted first.

### 2.9 It can split a large file into several segments; and combine segments into a complete file/full score.

Why: Multiple transcribers need to be able to collaborate to complete one project and these need to be collated when complete.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 12 | 6 | 8 | 6 | 1 | 33 | 1 |

Essential-Desirable: 18/33 rated this as Essential (12) and Desirable (6) combined, 8 Nice to Have, 6 Not Needed, 1 No Opinion.

Several comments indicated that if agencies needed this, it should be included, though there wasn’t an overwhelming call from agency respondents for it. Others commented that collaborative work like this would not be desirable – to ensure consistency and to avoid errors, collaboration between different transcribers is not typically used to complete a single project, instead a transcriber completes a whole work in its entirety. This has the advantage that any transcriber discretion is consistent across the whole project. Another respondent commented that the tool should not be designed to be a score editor, it should do the conversion rather than file handling, as other tools can be used to cut up MusicXML files. A variation on this feature proposed was to be able to make changes or corrections across similar situations across the whole file/score. One commented that being able to select an individual piece or pieces would be nice to have.

### 2.10 Scores can be given encrypted copy protection.

Why: To protect publisher’s materials from being used for back-translation to print scores.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 8 | 7 | 8 | 8 | 2 | 33 | 1 |

Desirable-Nice to Have: This feature received an almost even number of ratings, across all respondent types, but no rating stands out amongst any respondent type. 8/33 Essential, 7 Desirable, 8 Nice to Have, 8 Not Needed, 2 No Opinion; as the ratings were spread evenly, the middle-two rankings have been chosen for this feature.

No-one who rated this as Essential made any comments. Others commented that for teachers in schools, the ability to back-translate into some form of print is important to see what the braille learner has. Another said that there is low risk for publishers, since back-translating from braille will not result in a beautiful print file, so it’s not likely to be abused. One commented that they wouldn’t want this to affect the way access technology could be used with the file. One felt that it would be good to distribute the braille file with an encrypted MusicXML file so that alternative braille could be produced from it (with well-implemented encryption).

### 2.11 It can save different revisions for comparison, or rolling back.

Why: Users may wish to compare scores for study or performance, or revert to an older version of the score they are preparing.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 2 | 10 | 13 | 6 | 2 | 33 | 1 |

Nice to Have-Desirable: 23/33 rated this as Nice to Have (13) and Desirable (10) combined, 2 Essential, 6 Not Needed, 2 No Opinion.

There was a mix of comments, some feeling that this could be useful for transcribers and end-users - especially senior students or professional musicians. Others felt that this was not a necessary feature for a conversion tool, since existing file version handling tools can do this in effective ways already. One respondent felt that auto backups and a ‘Save As’ option would be sufficient. One suggested that the original source file should never be changed; it could save the settings that were used to produce each output file - which could be especially useful for agencies doing batch processing i.e. to perform the same action on various source scores or a similar action on a single score.

# 3. Formatting/Layouts

## Ranked according to ratings

**Essential**

* 3.1 Single Line.
* 3.2 Bar-Over-Bar, (with option for Line-Over Line).
* 3.3 Line-By-Line (Open Score).
* 3.4 Section-by-Section (with option for Stave-By-Stave).

## Individual features in detail

The tool should produce the most common layout formats (each described in the Requirements document), with default settings in place, together with options for customisation.

### 3.1 Single Line.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 27 | 4 | 1 | 0 | 1 | 33 | 1 |

Essential: 27/33 respondents rated Single Line as being Essential, with 4 Desirable, with 1 each for Nice to Have and No Opinion.

Several respondents commented that it would be ideal if users could choose whichever notation they are used to for each transcription, or when studying a score in different ways. Another commented that this is really a subset of Section-by-Section format. Another respondent suggested that even more options are needed than these four, e.g. variants for theory exam situations; Bar-By-Bar gives a compact reading experience, and perhaps will be valuable for refreshable braille displays; and perhaps a sensible default could be suggested based on region and type of music.

### 3.2 Bar-Over-Bar, (with option for Line-Over Line).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 25 | 2 | 4 | 0 | 1 | 32 | 2 |

Essential: 25/32 rated Bar-Over-Bar as Essential, 2 Desirable, 4 Nice to Have.

One agency reported that they don’t see the necessity for Bar-Over-Bar, and advise clients against using it, but can produce it if requested. Another agency commented that it would be nice to have ‘Accompaniment with Outline’ (as per the RNIB Braille Music Layout Manual p139ff); also that in the UK Bar-By-Bar is used for Keyboard and score music; and also noted that there will probably be options required within each format.

### 3.3 Line-By-Line (Open Score).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 24 | 4 | 3 | 1 | 1 | 33 | 1 |

Essential: 24/33 felt Line-By-Line was Essential, compared to 4 Desirable, 3 Nice to Have, and 1 each for Not Needed and No Opinion.

One agency reported using Line-By-Line for vocal music in the UK; and noted this format may need options. Another commented that this looks quite like the format for printing full scores. One respondent requested that the tool could permit human intervention to specify (or over-rule) where to divide parallels in choral music (needed in the UK for separate parts extracted from choral scores).

### 3.4 Section-by-Section (with option for Stave-By-Stave).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 19 | 4 | 2 | 3 | 5 | 33 | 1 |

Essential: 19/33 rated Section-by-Section as Essential; compared to 4 as Desirable, 2 Nice to Have, 3 Not Needed, and 5 had No Opinion.

One agency reported that this format is not used in the UK, but they know that it is essential for other countries. Another commented that these two formats (Section-by-Section, and Stave-by-Stave) are completely different and not comparable, but both can be done in at least one current tool. One requested that it should be possible to start a section with an upbeat, and that options for customisation should be available.

# 4. Country Codes

## Ranked according to ratings

**Essential**

* 4.1 It can produce at least the main country codes: e.g. UK, USA, European *[to be specified].*

**Essential-Desirable**

* 4.2 It can handle multiple languages in one file.

**Additional suggestions (not ranked, as not read or rated by other respondents):**

* 11.11 *From a transcriber and end-user*:Consider how the braille music code may be maintained and/or updated, in conjunction with other standards bodies, as the World Braille Council (the logical organisation) has said it will not get involved. Note ICEB has this as a Resolution.
Why: there are some aspects of the braille music code which are either not specified, or incomplete; new symbols also need defining (e.g. arrows, wedges and other special modern notation).
Priority: 2 Desirable.
* 11.26 *From an end-user*: Canadian Music Braille standards were neglected in the survey choices.
* 11.28 *From a transcriber and end-user*:Consider UK and USA English as different languages - as well as spelling, we have different musical terms.
Priority 2 Desirable.
* 11.30 *From a transcriber and end-user*:As well as a list of instrument abbreviations used in full scores, some countries also recommend (demand?) a special symbols page that lists any unusual musical symbols that have been used.
Priority: 2 Desirable.

## Individual features in detail

### 4.1 It can produce at least the main country codes: e.g. UK, USA, European *[to be specified].*

Why: Minimises the options available, making it easier to share files, and to build/maintain the tools.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 18 | 8 | 4 | 0 | 3 | 33 | 1 |

Essential: Just over half (18/33) rated this as Essential, 8 Desirable, 4 Nice to Have, 3 No Opinion.

One respondent felt that the most desirable option would be to agree a unified world-wide code, and another suggested using uncontracted UEB, others agreed that more standardized codes would enable greater file sharing. One felt that choosing a language code should be independent of the chosen layout. One user said they liked the efficiency of the US code, which took up less space than the UK code, and they and others still wanted options for specific refinement to turn some features on and off for each transcription. One agency commented that if a music braille format such as BMML would be considered that this would be possible, and suggested providing style sheets in HTML for each need.

### 4.2 It can handle multiple languages in one file.

Why: So text can be output in any language which has a braille table.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 15 | 8 | 5 | 4 | 1 | 33 | 1 |

Essential-Desirable: 23/33 rated this as Essential (15) and Desirable (8) combined, 5 Nice to Have, 4 Not Needed, 1 No Opinion.

Respondents felt that this was necessary for producing vocal music with lyrics in different languages, as well as for musical instructions in different languages. This must be correctly marked up in the input file. A couple of respondents commented that it should be able to offer both contracted and uncontracted braille; though others commented that contracted braille should not be used as this restricts the ability to share the files internationally. Another noted that different countries may wish to handle ‘foreign’ languages differently in their transcriptions (e.g. UK may use contracted braille for English, but uses a specific ‘Foreign Language code’ for French, which is not the same as either the contracted or uncontracted native French code). Two respondents suggested that if the tool provided Unicode Braille as an output format it could easily be coded with other local braille tables, and also be usable with screenreaders.

# 5. Options

## Ranked according to ratings

**Essential**

* 5.1.1 Fingering (on/off)
* 5.1.6 Bar numbers (on/off)
* 5.1.9 Define interval direction (specified)
* 5.1.14 Repeat handling (specified)
* 5.5 It can transcribe according to specific instrument types, so that the same symbol can be transcribed to appropriate braille equivalents.

**Essential - Desirable**

* 5.1 The tool permits options to show/hide features in particular layouts to suit different user needs, e.g. for learners, or those learning the score in a particular way
* 5.1.2 Print line numbers (on/off)
* 5.1.4 Position of braille page number (specified)
* 5.1.8 Print page numbers (on/off)
* 5.1.12 Paper size (specified)
* 5.1.13 Doubling convention (specified)
* 5.1.15 Transpose a single part/voice (specified)
* 5.1.16 Rehearsal letters (on/off)
* 5.1.18 Octave signs at the start of each line (on/off)
* 5.1.19 Lyrics (contracted/uncontracted)
* 5.1.20 Braille page number (on/off)
* 5.4 When editing, it can automatically move objects in a braille staff or system, like modifying texts in MS Word or Duxbury Braille Translator.

**Desirable - Essential**

* 5.1.7 Bar number location (side/top)
* 5.1.10 Indentation (specified)
* 5.1.11 Hide empty staves (on/off)
* 5.1.17 Position of rehearsal letters (specified)
* 5.2 User profiles (configurations and definitions) can be saved for users with different requirements.
* 5.3 It can provide dynamic on-screen visual and braille music notation.

**Desirable - Nice to Have**

* 5.1.3 Position of print page number (specified)
* 5.1.21 Running header (on/off)

Individual respondents also submitted the following suggestions for additional requirements for Options, which they rated themselves, included here verbatim, with an indication of their roles as a respondent.

**Additional suggestions (not ranked, as not read or rated by other respondents):**

1. **Essential**: *[from a music teacher and end-user]*“We need settings for use of in-accords or moving notes. Moving notes is for instance useful and quick to read, but can only be used in scores without fingering. Good handling of chords and polyphone music makes life much easier for pianists and organists. And, we need options for how the program handles choir music in a good way. For instance a staff with soprano and alto together should be separated in the braille score, or else it will be very difficult to read the alto voice as it will be presented with interval signs. In other situations, when I would like to play a choir piece at the piano I would like to have the interval signs, but not the lyrics. Lyrics can be written between lines in the score or at on a separate page, people would have different wishes here I think.”
2. **Essential**: *[from a transcriber and music teacher]*“Embellishments; dynamics; tempo; prefixes for shaped notes; nuances; ornaments ... (on/off).”
3. **Essential**: *[from a transcriber, end-user, and music teacher]*
“Chord symbols; accents; dynamics; sixteenth groupings - on/off for all those features.”
4. **Essential**: *[from a transcriber, end-user, and music teacher]*
“Just to be able to quickly isolate different aspects as needed. Not sure how all this will be effected with the introduction of multi-line braille displays.”
5. **Essential**: *[from a transcriber and end-user]*
“As well as show/hide fingering, there are a lot more: e.g. show/hide clef signs, nuances, ornaments, dynamics/expressions, ... basically options to strip a score down right from the complete score, through to just the notes.
Also an option is needed whether to show every bar number (when bar numbers are shown above), particularly useful in exam or analysis situations.
Also in section by section, how many bars are shown per section: 1, 2, ... up to a maximum, plus "according to original".
Also, whether or not the number sign (numeric indicator) is shown for bar numbers or not (determined in part by the layout chosen).
Also, what kind of slur sign is used (simple C, or phrase 56-B, or both.
Compare also other existing programs, all the options are there for a purpose so should be included and not dropped.”
6. **Essential**: *[from a transcriber, end-user, and music teacher]*“There are many other items to include in the section about fingering, for instance, slurs, ornaments, dynamics.”

**Desirable:**

1. **Desirable***: [from an end-user]*
“Switching between interfaces in different languages.”
2. **Desirable**: [*from an end-user, developer, and music-teacher]*“Range of options should permit production of a score of nothing but pitch, octave, and duration through facsimile score.”
3. **Desirable**: *[from a transcriber]*“Where a song consists of several verses written to the same melody, it is desirable to have an on/off option for writing out the print music repeat. If the setting varies from verse to verse we might write out the print repeat; if it does not vary, lyrics of the subsequent verses can be output in paragraph form beneath the music (RNIB Braille Music Layout Manual).”
4. **Not rated:** *[from end-user]*
“Part extraction part transposing (key and clef) implode and explode copy and paste of parts and other material.”
5. **Not rated:** *[from end-user]*“I like aspects of a few country codes. sometimes I think UK codes takes up too much space & have worked with US code produced out of New Zealand and I like the efficiency of this! I would like the ability to pick and choose as I see fit! For example, my biggest bugbear is that I would like the option to just have wordsign dynamic markings with notes on 1 line, with everything else pertaining to the music on the line above indented two cells (note: I am talking about vocal music). This is so once I have studied the score, I can clearly see the line of words and then the notes easily. I would like the ability to turn this on or off as necessary.”

## Individual features in detail

### 5.1 The tool permits options to show/hide features in particular layouts to suit different user needs,

e.g. for learners, or those learning the score in a particular way.
Why: Agencies and end-users need settings to produce for different end-user purposes, or for different countries. Proposing default sets reduces tool complexity and variability of scores, but may require some compromises.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 16 | 11 | 4 | 1 | 1 | 33 | 1 |

Essential-Desirable: 27/33 felt this was Essential (16) and Desirable (11) combined, 4 Nice to Have, 1 Not Needed, 1 No Opinion.

Comments indicated that some common option sets would be welcomed, with the option for some customization, particularly helpful to be able to use one master score to create materials for different users at different levels. A couple of respondents mentioned saving sets of options as User Profiles here so they can be recalled for the same user or for similar transcriptions. These kinds of options could be very helpful for refreshable braille displays, so instead of producing a whole score, it could dynamically create parts of the score with specified options as and when needed. One respondent noted that educating users is also important, so they and their teachers can start to understand and accept what is available.

Options should include:

#### 5.1.1 Fingering (on/off)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 19 | 9 | 4 | 1 | 0 | 33 | 1 |

Essential: 19/33 rated this as Essential, 9 as Desirable, 4 as Nice to Have, 4 as Not Needed.

Comments were that this allows materials to suits the user level, especially for students and teachers.

#### 5.1.2 Print line numbers (on/off)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 13 | 8 | 8 | 1 | 3 | 33 | 1 |

Essential-Desirable: 21/33 rated this as Essential (13) or Desirable (8) combined, 8 Nice to Have, 1 Not Needed, 3 No Opinion.

Comments were that this would be vital when playing with sighted musicians or teachers, where cross-reference between the print and braille scores would be necessary. However one respondent felt bar numbers were more important than line numbers (though not always used). Another considered that print line numbers in line-by-line layout would complicate matters, so it should be possible to turn them off. System break indicators with section numbers were also mentioned. Bar numbers and section numbers were felt to be more important than line numbers.

#### 5.1.3 Position of print page number (specified)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 9 | 10 | 10 | 3 | 1 | 33 | 1 |

Desirable-Nice to Have: 20/33 rated this as Desirable (10) and Nice to Have (10), 9 Essential, 3 Not Needed, 1 No Opinion.

Comments were that different countries have very particular details about the location of print page numbers so the tool should allow for this. Options must include ‘print page numbers on/off’.

#### 5.1.4 Position of braille page number (specified)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 14 | 9 | 7 | 3 | 0 | 33 | 1 |

Essential-Desirable: 23/33 felt this was Essential (14) or Desirable (9) combined, compared with 7 Nice to Have, 3 Not Needed.

Comments were as those for 5.1.3 but referenced braille page numbers.

#### 5.1.5 Line numbers (on/off) – duplicate of 5.1.2

Item duplicated in error, see 5.1.2.

#### 5.1.6 Bar numbers (on/off)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 19 | 10 | 3 | 1 | 0 | 33 | 1 |

Essential: 19/33 felt this was Essential, compared with 10 Desirable, 3 Nice to Have, 1 Not needed.

Comments included that it is important to provide the first bar number of each line, not of each bar. Another reported that normally the showing or hiding of bar numbers depends on the format, but another option should be whether to mark every bar number (theory exam format) or just the first in a parallel. Caution of the placement in Bar-Over-Bar, so bar numbers should be either in the left-hand margin, or above the music so as to align with each bar. One agency reported that when they add bar numbers not present in the print, the second time bar of a print repeat is given the same number as the first time bar.

#### 5.1.7 Bar number location (side/top)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 9 | 14 | 6 | 0 | 4 | 33 | 1 |

Desirable-Essential: 23/33 Rated this as Essential (9) and Desirable (14) combined, compared with 6 Nice to Have, and 4 No Opinion.

Comments indicated that having a choice of location like this would be nice, but typically the choice of format dictates the position of the braille bar number. For casual users or exam materials we might need this feature; with an additional option to mark every bar number or just the first in the parallel. Bar numbers in Bar-Over-Bar need to be either in the left-hand margin, or above the music so as to align with each bar.

#### 5.1.8 Print page numbers (on/off)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 13 | 9 | 7 | 4 | 0 | 33 | 1 |

Essential-Desirable: 22/33 rated this as Essential (13) and Desirable (9) combined, 7 Nice to Have, 4 Not Needed.

This was felt to be very necessary by many, especially when working alongside a sighted teacher or musician. This should be an option with print page number position as ‘off’.

#### 5.1.9 Define interval direction (specified)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 22 | 4 | 5 | 0 | 2 | 33 | 1 |

Essential: 22/33 felt this was Essential, 4 Desirable, 5 Nice to Have, and 2 No Opinion.

This was clearly an important feature for the majority, and essential for the different country formats. Ideally it should have obvious sensible defaults, and be on a per-part basis, as well as the possibility to use in-accords or moving notes, because different music needs different ways of chord notation for ease of use.

#### 5.1.10 Indentation (specified)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 11 | 12 | 3 | 2 | 5 | 33 | 1 |

Desirable-Essential: 23/33 rated this as Essential (11) and Desirable (12) combined, 3 Nice to Have, 2 Not Needed, 5 No Opinion.

This had an even split between Essential and Desirable across all participant types. Comments were that the indentation is usually defined by the format chosen, to give the correct layout for the resulting braille, but some participants don’t feel the need to amend those settings.

#### 5.1.11 Hide empty staves (on/off)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 8 | 13 | 7 | 3 | 2 | 33 | 1 |

Desirable-Essential: 21/33 rated this as Essential (8) and Desirable (13) combined, compared with 7 Nice to Have, 3 Not needed, 2 No Opinion.

Comments were that if they are hidden there should be some indication anyway, and braille notation has very good solutions for compressing empty bars very efficiently to save space. Mostly needed for full scores, not needed for single part scores (e.g. vocal and solo instruments), may be occasionally useful in piano/organ scores.

#### 5.1.12 Paper size (specified)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 13 | 9 | 3 | 4 | 4 | 33 | 1 |

Essential-Desirable: 22/33 rated this as Essential (13) and Desirable (9) combined, 3 Nice to Have, 4 Not Needed, 4 No Opinion.

For production in different countries this was reported to be essential as they use different paper sizes. Having an option to output to format to a refreshable braille display was requested. However, one respondent commented that this kind of information should be handled in the print process, rather than in the music braille file.

#### 5.1.13 Doubling convention (specified)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 15 | 10 | 2 | 1 | 5 | 33 | 1 |

Essential-Desirable: 25/33 rated this as Essential (15) and Desirable (10) combined, 2 Nice to Have, 1 Not Needed, 5 No Opinion.

One respondent felt that this should be limited to published standards, since customizing to personal preferences which vary from those standards could cost a lot of development time. Others felt that it wasn’t a strong requirement to be able to do this, since it wasn’t normally something which needed to be changed, but could be a useful possibility in certain cases; and being able to turn it on/off is required. A question was raised about how the tool would handle choices between doubling and bar-repeats etc – they would like to be able to choose/over-ride in specific bars if necessary.

#### 5.1.14 Repeat handling (specified)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 18 | 10 | 2 | 0 | 3 | 33 | 1 |

Essential: 18/33 rated this as Essential, 10 as Desirable, 2 Nice to Have, none Not Needed, and 3 No Opinion.

One respondent commented that we would need to specify exactly what this does (e.g. use of automatic segno signs, use of specific bar number repeat signs, use of repeat last bar signs, use of repeat part-bar signs, etc.). Another asked whether the tool would recognise "go-backs" in Bar-Over-Bar layout (RNIB Braille Music Layout Manual p36), as it would be nice to have the choice of using/not using each potential go-back. Another commented that this should have some flexibility to distinguish within bars, between bars, to use or not.

#### 5.1.15 Transpose a single part/voice (specified)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 13 | 11 | 7 | 1 | 1 | 33 | 1 |

Essential-Desirable: 24/33 rated this as Essential (13) and Desirable (11) combined, 7 as Nice to Have, 1 Not Needed, 1 No Opinion.

One respondent felt this may be useful for a full score where the instruments may be shown in the concert pitch or their instrument pitch; also for general ease of use, transposing a song for a different singer. Another felt this would be helpful as a lot of their work is for choir members, and another said it would be essential so they could work with the instruments you have. One question arose: How will a part written in the treble clef with small 8 below be treated? - When we extract a tenor choral part, we give the sounding pitch. Another respondent commented this was out of scope as it was score editing, which could be done in other software.

#### 5.1.16 Rehearsal letters (on/off)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 14 | 10 | 6 | 2 | 1 | 33 | 1 |

Essential-Desirable: 24/33 rated this as Essential (14) and Desirable (10) combined, 6 Nice to Have, 2 Not Needed, 1 No Opinion.

Felt to be necessary so you can work with conductors and teachers, but could be an option with the position of letters as ‘off’. One participant said they would like them at the start or near the start of a line so as to enable easy location.

#### 5.1.17 Position of rehearsal letters (specified)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 9 | 14 | 5 | 0 | 5 | 33 | 1 |

Desirable-Essential: 23/33 rated this as Essential (9) and Desirable (14) combined, 5 Nice to Have, 5 No Opinion.

One respondent commented that they use Australian formatting but like positioning of US rehearsal letters – so would like the ability to mix and match. Two other respondents suggested that this should be combined as an option with rehearsal letters on/off.

#### 5.1.18 Octave signs at the start of each line (on/off)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 14 | 9 | 5 | 4 | 1 | 33 | 1 |

Essential-Desirable: 23/33 rated this as Essential (14) and Desirable (9) combined, 5 Nice to Have, 4 Not Needed, 1 No Opinion.

One respondent commented that we should follow the international music manual, where octave signs should always be present at the start of each line. Another suggested a clarification to the question – that ‘line’ refers to ‘overrun lines’ (since there is always an octave sign at the start of a section). Two respondents noted that depending on country format/custom there will be a difference (e.g. bar-by-bar/section-by-section) as to whether it’s needed or not.

#### 5.1.19 Lyrics (contracted/uncontracted)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 15 | 11 | 5 | 1 | 1 | 33 | 1 |

Essential-Desirable: 26/33 rated this as Essential (15) and Desirable (11) combined, 5 Nice to Have, 1 Not Needed, 1 No Opinion.

Most comments included a requirement to use uncontracted braille to enable international sharing. But offering this option for personalisation or digital scores would be useful. One respondent commented that they usually contract English lyrics, but use uncontracted foreign lyrics. One suggested that we should combine this with specifying the language code to use.

#### 5.1.20 Braille page number (on/off)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 14 | 11 | 6 | 1 | 1 | 33 | 1 |

Essential-Desirable: 25/33 rated this as Essential (14) and Desirable (11) combined, 6 as Nice to Have, 1 Not Needed, 1 No Opinion.

One commented that this was important especially when printed into hard-copy, another always wanted them on. Another liked the aspects of different country’s specifications so want to be able to mix and match. Another suggested that this should be combined as an option for position of braille page numbers ‘off’.

#### 5.1.21 Running header (on/off)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 9 | 8 | 10 | 3 | 3 | 33 | 1 |

Nice to Have-Desirable: 18 rated this as Desirable (8) and Nice to Have (10) combined, compared with 9 Essential, 3 Not Needed, 3 No Opinion.

Two respondents commented that they felt it was necessary, especially to orient yourself in a book of longer pieces. Two others commented that it was more important to control the running header – defining what it says, and if necessary abbreviating it to fit on one line.

### 5.2 User profiles (configurations and definitions) can be saved for users with different requirements.

Why: Agencies can save settings when producing for multiple customers; educators can do this when producing for multiple students.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 12 | 15 | 4 | 1 | 1 | 33 | 1 |

Desirable-Essential: 27/33 rated this as Essential (12) and Desirable (15) combined, 4 Nice to Have, 1 Not Needed, 1 No Opinion.

Respondents said this would be particularly helpful if any number of user profiles could be created, particularly for education, or for an agency; as it would save time setting up new jobs. One respondent said they’d like to be able to tell or upload their profile specifications to a producer. One respondent suggested it might be worth separating out the basic page settings from the musical settings (e.g. the paper size). One respondent asked if their agency would need a separate user profile for each of their formatting layouts.

### 5.3 It can provide dynamic on-screen visual and braille music notation.

Why: To easily make corrections viewing either notation, where modifying one updates the other.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 11 | 12 | 7 | 1 | 1 | 32 | 2 |

Desirable-Essential: 23/32 rated this as Essential (11) and Desirable (12) combined, 7 Nice to Have, 1 Not Needed, 1 No Opinion.

Some respondents could see how being able to see the graphical display of the braille could be useful for a transcriber/teacher to work with the print and braille at the same time (a real wow factor), and that it would need a good refresh button for it to happen. However, several respondents also felt this was out of scope for a braille conversion tool, if it is not designed to be a score editor.

### 5.4 When editing, it can automatically move objects in a braille staff or system

like modifying texts in MS Word or Duxbury Braille Translator. For big changes to a system or section, a reformatting operation can simply update the modified score to the correct layout.
Why: Ease the editing process, avoiding large number of manual adjustments after editing or correction.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 14 | 10 | 2 | 5 | 2 | 33 | 1 |

Essential-Desirable: 24/33 felt this was Essential (14) and Desirable (10) combined, 2 Nice to Have, 5 Not Needed, 2 No Opinion.

One respondent commented that this feature would be amazing, however, several respondents said that this kind of editing (like 5.3) was out of scope for a conversion tool, since conversions from existing materials should be as automated as possible. One raised the risk that manual intervention can lead to errors being introduced. One commented that it is desirable to have block protection in the output, so that a braille parallel is not divided over two braille pages.

### 5.5 It can transcribe according to specific instrument types, so that the same symbol can be transcribed to appropriate braille equivalents.

Why: So a user gets the right annotation for the parts (e.g., the plus sign in horn scores is a stopped note, while in scores for bowed string instruments is a left hand pizzicato).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 22 | 6 | 4 | 0 | 1 | 33 | 1 |

Essential: rated by 22/33 as Essential, 6 Desirable, 4 Nice to Have, 1 No Opinion.

Respondents commented that the braille output must of course be comprehensible, accurate and include instrument-specific techniques. Another commented that it is desirable to follow specific rules for voice parts as well, e.g. phrasing slur dots 5-6, 1-2 beginning and dots 4-5, 2-3 ending to indicate phrasing which does not form part of the word setting.

# 6. Conversion of Musical Symbols

## Ranked according to ratings

**Essential**

* 6.1 Accents are correctly converted, according to NIM and MBC.
* 6.2 Supports both types of breath marks, according to NIM and MBC.
* 6.3 Chord symbols are accurately translated according to NIM and MBC.
* 6.4 It presents clefs accurately, according to NIM and MBC.
* 6.5 It converts dynamics appropriately, whether written as symbols or words, or combinations, following NIM and MBC.
* 6.6 It converts fingering for keyboard, string instruments (right and left hands) appropriately, according to NIM and MBC.
* 6.7 Markings for strings are correctly translated according to NIM and MBC.
* 6.8 Grouping/beaming of notes is converted correctly according to NIM and MBC rules.
* 6.9 In-accord signs are handled correctly, following NIM and MBC for various situations.
* 6.11 Long and short-value signs are presented, and whether a bar in 4/4 begins with a semiquaver, following NIM and MBC rules.
* 6.12 Vocal music conversions confirm to NIM and MBC.
* 6.13 Unison signs are correctly used, showing two or more parts on the same note.
* 6.14 Tremolos are translated appropriately, as per NIM and MBC. E.g. repetition, alternation and doubling of note repetition signs.
* 6.15 Time signatures are correctly translated, even if they are not numeric.
* 6.16 Ties are presented so they are distinguishable from each other: single note, chord tie, accumulating tie/arpeggios.
* 6.17 It can present stem signs.
* 6.18 Different kinds of slurs are presented accurately.
* 6.20 Ornaments are correctly translated, following NIM and MBC rules.
* 6.21 Octave signs are correctly presented following NIM and MBC rules.
* 6.22 Nuances are correctly presented.
* 6.27 It combines musical symbols in the right order.
* 6.28 Multiple Bars' rest are presented in a compact manner, following NIM and MBC rules.
* 6.29 It handles bars appropriately…

**Essential-Desirable**

* 6.10 Instrument names are correctly presented according to language, and where instrument names change within a single part, the translation is correct.
* 6.19 Prefixes for shaped notes are correctly translated according to the most usual symbols.
* 6.23 It can present Tablature (notation indicating instrument fingering rather than musical pitches) following the agreed specification.
* 6.25 It can present Figured Bass following NIM rules.
* 6.26 In ensemble scores, it can control part names flexibly…

**Additional suggestions (not ranked, as not read or rated by other respondents):**

* 11.6 *From a transcriber and music teacher:* Here only specific details of NIM were mentioned. I would say NIM in its entirety is essential. Possibly expanded with MBC and Mary Turner De Garmo's, Introduction to Braille Music Transcription (Second Edition 2005). Because everything in these books is crucial.
* 11.12 *From an end-user*: I think good support for percussion notation is essential because there are lots of percussionists out there.
* 11.15 *From a transcriber and developer:* Defining tabular notation, this is nice for guitar music, nice to have.
* 11.17 *From a transcriber and end-user*: Prioritise the most commonly needed types of music; e.g. there is probably more keyboard, solo instrument and vocal music needed over full orchestral scores.
Why: So development benefits the largest number of people as soon as possible, and time is not overspent on rarely used features.
Priority: 1 Essential
* 11.22 *From a transcriber and end-user:* Correct braille code within word expressions in the music. Note, this may well be different from the code used for lyrics in the same music! For example, a bracket in UEB in title or lyrics will be the UEB bracket; but the same bracket in a word expression in the actual music will be a different sign. For example, an accented letter in lyrics may be a different sign for the same accented letter within a word expression in the actual music.
Why: so the correct braille is produced.
Priority: 1 Essential
Comment: like all the other building blocks of the music, it should be accurate.

## Individual features in detail

### 6.1 Accents are correctly converted, according to NIM and MBC.

Why: The braille music should show the correct translation from the print music notation.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 27 | 1 | 0 | 0 | 3 | 31 | 3 |

Essential: 27/31, 1 Desirable, 3 No Opinion.

Comments, it must be accurate, and could prioritise by most common musical features and ease of development.

### 6.2 Supports both types of breath marks, according to NIM and MBC.

Why: In print vocal and wind instrumental music, signs are used for half-breath and full-breath; which both need to be translated into braille scores.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 21 | 5 | 3 | 1 | 2 | 32 | 2 |

Essential: 21/32, 5 Desirable, 3 Nice to Have, 1 Not Needed, 2 No Opinion.

Comments, as 6.1.

### 6.3 Chord symbols are accurately translated according to NIM and MBC.

Why: There are a range of signs used for this type of music, but they must be translated correctly into music braille with the various conventions being observed. Examples of errors found include:
A. Signs for sharps and flats being shown as S for flat and F for sharp.
B. To check that recognised signs for Sharp and Flat are used.
C. Special Parenthesis (dots 2,3,5,6) are used rather than Brackets in Unified English Braille.
D. To check that braille signs for circles, triangles and other signs are recognised.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 27 | 3 | 1 | 0 | 2 | 33 | 1 |

Essential: 27/33, 3 Desirable, 1 Nice to Have, 2 No Opinion.

Comments as 6.1, and one commented that Chord symbols often feature on exam papers and practice papers and need to be accurately produced. Another said there are a number of conventions in print and in braille, this may be harder. Also there are some details not entirely standardised in how things should be done in braille.

### 6.4 It presents clefs accurately, according to NIM and MBC.

Why: Accurate clef presentation is vital. Examples of errors found include:

A. Tenor clef not being recognised by some software.

B. Dot-3 needed after tenor clef sign before Sharp.

C. Figure 8 following a bass clef sign does not mean the part is transposed down an octave.

Advisable to check Figure 8 above does not transpose up an octave.

D. More flexibility with interval direction after clef signs.

E. Hand alternation on the same stave.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 25 | 4 | 2 | 0 | 2 | 33 | 1 |

Essential: 25/33, 4 Desirable, 2 Nice to Have, 2 No Opinion.

Comments included that we also need the option to turn the clef signs off, and if the country code or user preference omits clef signs in the braille score, the pitches must be transcribed where they sound and not as written (ie the braille output has to have the right pitch, but showing the pitch can be an on/off option). One respondent also commented that although music braille uses octave signs, deeper level study of clefs is needed.

### 6.5 It converts dynamics appropriately whether written as symbols or words, or combinations, following NIM and MBC.

Why: So a user gets the correct dynamic marking.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 29 | 2 | 0 | 0 | 2 | 33 | 1 |

Essential: 29/33, 2 Desirable, 2 No Opinion.

Comments included that this should include end dynamic signs where necessary, and one commented that they like the wordsign f for forte rather than the word and they liked it indented in by 2 cells in the line rather than on the same line (like the word ‘legato’), to make it clear and simple to read.

### 6.6 It converts fingering for keyboard, string instruments (right and left hands) appropriately, according to NIM and MBC.

Why: Fingering for keyboard and string instruments differs, conversion must follow rules for the correct instrument.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 24 | 4 | 2 | 0 | 2 | 32 | 2 |

Essential: 24/32, 4 Desirable, 2 Nice to Have, 2 No Opinion.
One person commented that they needed to be able to do single-handed adaptations, so needed to be able to show this in one hand, and specify intervals read up or down.

### 6.7 Markings for strings are correctly translated according to NIM and MBC.

Why: Accurate presentation of these kinds of details are essential. Examples of errors found includes:
A. Bowing signs.
B. String signs.
C. Position and fret signs.
D. Fingering

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 26 | 2 | 0 | 1 | 4 | 33 | 1 |

Essential: 26/33, 2 Desirable, 1 Not Needed, 4 No Opinion.

No comments.

### 6.8 Grouping/beaming of notes is converted correctly according to NIM and MBC rules.

Why: These need to be observed with specific reference to unusual groupings. Example of errors identified include:
A. Grouping of notes when 3/8 time-signature is used.
B. Can the software use signs to show irregular grouping?.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 22 | 6 | 1 | 1 | 3 | 33 | 1 |

Essential: 22/33, 6 Desirable, 1 Nice to Have, 1 Not Needed, 3 No Opinion.

Comments included one person saying this is absolutely essential, whilst another said it was less often required. One commented that grouping needs to be observed within the usual rules of braille music, including unusual groupings too. One response which felt this was Not Needed commented that - groupings in Braille and groupings in ink print do not necessarily match! They can be different! So in Braille groupings are used to indicate beats which could differ from ink print. Especially: If ink print beams are contra rhythmical they must not be adopted to braille.

### 6.9 In-accord signs are handled correctly, following NIM and MBC for various situations.

Why: To make it clear which are outer and inner parts. Example of errors identified include:
A. Outer part needs to come first, rather than inner part, then outer part.
B. Use of part-bar division and in-accord signs for part of a bar

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 28 | 2 | 0 | 0 | 2 | 32 | 2 |

Essential: 28/32, 2 Desirable, 2 No Opinion.

One respondent commented that it was absolutely essential, and another that it is essential that the order of parts is correct; it would be nice to have the choice of full or part-bar division for specific bars, as judgements which are hard to codify! Another commented that this may be harder, as you ideally need good input so the program knows which are the outer and inner parts.

### 6.10 Instrument names are correctly presented according to language, and where instrument names change within a single part, the translation is correct.

Why: so the user can follow the correct part. Example of errors include:
A. Instrument names to be defined correctly.
B. Instrument names in: English, French, German, Italian and Spanish.
C. Instrument change of names within the same part.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 17 | 8 | 6 | 4 | 2 | 33 | 1 |

Essential-Desirable: 25/33 rated this as Essential (17) and Desirable (8) combined, 6 Nice to Have, 4 Not Needed, 2 No Opinion.

One respondent suggested that it would be preferable that instrument names would be required in MusicXML or MNX source; and that instrument names in the braille score should agree with those in the print score. Another commented that print music might have instruments in another language, but print scores for a specific piece are probably available in various languages whereas Braille scores probably aren't; relatively straightforward to develop for standard list of instruments. One also commented that they had never seen notes where an instrument changes after some measures but this might exist.

### 6.11 Long and short-value signs are presented, and whether a bar in 4/4 begins with a semiquaver, following NIM and MBC rules.

Why: Braille signs are necessary to avoid ambiguity not present in print music.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 23 | 3 | 0 | 0 | 3 | 32 | 2 |

Essential: 23/32, 3 Desirable, 3 No Opinion.

One commented that these should be used within reason, since these can be used over-zealously.

### 6.12 Vocal music conversions conform to NIM and MBC.

Examples of errors found include: presentation of multi-verse lyrics, syallabic slurs, and slurs in first, second and third languages etc.
Why: In braille music, the presentation of vocal music is, by its nature, quite different. As the words and music are not vertically aligned, slurs need to be added in many cases so the singer knows which syllables are sung to the required notes.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 23 | 7 | 1 | 0 | 2 | 33 | 1 |

Essential: 23/33, 7 Desirable, 1 Nice to Have, 2 No Opinion.

One commented that it is essential that syllabic slurs are added correctly; most of our vocal music is single language, so the multi-language slurs are nice to have. Another said that this could be difficult to automate, especially as braille often wants to show lyrical lines rather than bars; these are the same if the lyrical line is in synch with the bars, but not if there is an anacrusis to each line.

### 6.13 Unison signs are correctly used, showing two or more parts on the same note.

Why: In braille music there are two different situations: 1. That the sign indicating two or more parts on the same note is used; and 2. Where signs for intervals are use. It is important that the correct combination of signs is transcribed i.e. the written note, the octave sign for the specific octave, and the sign indicating an interval of an octave.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 19 | 8 | 3 | 0 | 3 | 33 | 1 |

Essential: 19/33, 8 Desirable, 3 Nice to Have, 3 No Opinion.

One respondent indicated that this is rarer, and that in-accord is also an option that would work. Another commented that there might be some special situations missing from existing tools.

### 6.14 Tremolos are translated appropriately, as per NIM and MBC.

E.g. repetition, alternation and doubling of note repetition signs.
Why: Print music notation has ways of displaying tremolos, but braille music requires a range of signs to convey this information. We need to be sure they work in single or doubled usage.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 19 | 6 | 5 | 0 | 3 | 33 | 1 |

Essential: 19/33, 6 Desirable, 5 Nice to Have, 3 No Opinion.

One commented that there might be some special situations missing in existing software, and another felt it necessary to just have the accurate braille signs.

### 6.15 Time signatures are correctly translated, even if they are not numeric.

Why: In addition to numeric indication, there are also some signs conveying information, such as Common Time, Alla Breve, and the Breve sign, which should be translated.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 26 | 5 | 1 | 0 | 1 | 33 | 1 |

Essential: 26/33, 5 Desirable, 1 Nice to Have, 1 No Opinion.

Comments were that these should all be included in braille, and there might be some special situations missing from existing software.

### 6.16 Ties are presented so they are distinguishable from each other: single note, chord tie, accumulating tie/arpeggios.

Why: Users must be able to tell these different types of ties apart. This may be an issue for MNX.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 24 | 7 | 0 | 0 | 1 | 32 | 2 |

Essential: 24/32, 7 Desirable, 1 No Opinion.

Comments included one person suggesting that Single and Chord tie are essential = 1; but Accumulating tie is just nice to have = 3. Another reported that (as intimated in the question) we need a good input file to do this; different ways of presenting the input may yield different (equally correct) output; sometimes getting the right slur signs may be a question of interpretation by an "intelligent transcriber". Another asked that if it is an issue, please can we have a consistent error/warning to search for.

### 6.17 It can present stem signs.

Why: Stems are an obvious feature of printed music notation, and should be correctly translated when users need to know what a print score contains.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 19 | 3 | 9 | 0 | 1 | 32 | 2 |

Essential: 19/32, 3 Desirable, 9 Nice to Have, 1 No Opinion.

Comments included: that these are not always needed so should have an option for on/off. Another two said that stem signs are absolutely essential for teaching, and in the preparation of skeleton score listening tests for exam papers and practice papers. One said that an accurate transcription would designate voices based on stem direction specified in the print score. Three respondents however queried this question asking for example: (1) Do you mean notes without stems? Stems without heads?; (2) We need to be a bit careful here as stems in braille music are more a rhythmic device or are used to show places where completion in appropriate note-values are required. (3) There is no way to show the direction of the print note stem in braille music. Braille music "stem signs" show a note length with no pitch. They are used for specific situations, e.g. UK metronomic markings, exam questions and more rarely for specifically interpreted music. Other mechanisms, such as in-accord could equally deal with the last case. Stem signs occur but rarely in the body of "real" music.

### 6.18 Different kinds of slurs are presented accurately.

Why: As far as possible, the range and use of slurs should be catered for (may be issues for MNX). Examples of errors found include:
A. The software needs to be able to use both the two-cell and one-cell slur signs at the same time, and if the one-cell sign is doubled.
B. Overlapping slurs.
C. Can the software deal with different types of slurs in addition to those mentioned above?.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 25 | 5 | 0 | 1 | 2 | 33 | 1 |

Essential: 25/33, 5 Desirable, 1 Not Needed, 2 No Opinion.

Comments were that this was essential for teaching purposes, one developer commented that there might be some special situations missing from existing tools. One asked that if there are issues, please can we have a consistent error/warning we can search for.

### 6.19 Prefixes for shaped notes are correctly translated according to the most usual symbols.

Why: There are many and various print elements concerning contemporary notation. Where it is important to show different types of symbols for interpretation, the most usual should be correctly translated.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 13 | 11 | 6 | 1 | 2 | 33 | 1 |

Essential-Desirable: 24/33 rated this as Essential (13) and Desirable (11) combined, 6 as Nice to Have, 1 Not Needed, 2 No Opinion.

No comments.

### 6.20 Ornaments are correctly translated, following NIM and MBC rules.

Why: There are many different types of ornaments in printed music notation, and they need to be correctly translated into braille music, as illustrated in NIM and MBC.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 24 | 6 | 2 | 0 | 1 | 33 | 1 |

Essential: 24/33, 6 Desirable, 2 Nice to Have, 1 No Opinion.

One respondent commented that identification of ornaments is sometimes part of the assessment in an exam requiring a student to refer to a score. Another wished us luck with this as print signs vary so much.

### 6.21 Octave signs are correctly presented following NIM and MBC rules.

Why: Unlike print notation, braille music relies upon use of octave signs to denote pitch, and must be correctly translated. Examples of errors found include:
A. Doubling of octave signs.
B. Octave sign needed after bar with an in-accord sign(s).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 31 | 1 | 0 | 0 | 1 | 33 | 1 |

Essential: 31/33, 1 Desirable, 1 No Opinion.

One respondent commented that this is the most important of all.

### 6.22 Nuances are correctly presented.

Why: Print music notation must be correctly transcribed in braille. Examples of errors found include:
A. Nuances with interval signs.
B. First and second lines of continuation.
C. First and second-time bar numbering.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 27 | 2 | 2 | 0 | 2 | 33 | 1 |

Essential: 27/33, 2 Desirable, 2 Nice to Have, 2 No Opinion.

No comments.

### 6.23 It can present Tablature (notation indicating instrument fingering rather than musical pitches) following the agreed specification.

Why: To cater for guitar or lute reading conventions.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 12 | 8 | 7 | 3 | 3 | 33 | 1 |

Essential-Desirable: 20 rated this as Essential (12) and Desirable (8) combined, 7 Nice to Have, 3 Not Needed, 3 No Opinion.

One respondent said that Tablature can also apply to some keyboard music. Another felt that there is no standard/specification for tablature, so it cannot (yet) be supported. Another commented that it should be a separate system, because the users of tab live in a different world than users of staff-based music.

### 6.24 It can present Chord Symbols correctly following NIM and MBC rules - duplicate of 6.3

Question duplicated in error (see 6.3 above).

### 6.25 It can present Figured Bass following NIM rules.

Why: To produce correct figured bass of Baroque scores in braille.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 17 | 9 | 2 | 0 | 5 | 33 | 1 |

Essential-Desirable: 26/33 rated this as Essential (17) and Desirable (9) combined, 2 as Nice to Have, 5 No Opinion.

For those who need Figured Bass they rated it as Essential, commenting that we really need a program that handles figured bass, as this system is particularly useful for blind musicians as it is quicker to memorize than full scores. Another said that blind musicians need the same information as sighted performers of music from this period, and the study of figured bass is a requirement of virtually all college-level music degree programs. Another that it is essential for students following some A-Level courses and further study at University.

One commented that figured bass may be a topic for discussion and updating the code, and is needed for exam papers.

### 6.26 In ensemble scores, it can control part names flexibly…

including defining instrument names and abbreviations, printing out list of instrument names and braille abbreviations before the music, setting instrument changes by either using those inserted in MusicXML or manually added ones.
Why: To make instrument labels correctly follow the original score, for clear reading.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 16 | 7 | 8 | 1 | 0 | 32 | 2 |

Essential-Desirable: 23/32 rated this as Essential (16) and Desirable (7) combined, with 8 Nice to Have, 1 Not Needed.

One commented that these might need to be in either English, French, German, Italian or Spanish. Another that this is related to the option for correct instrument names (see 6.10). One Developer commented they would like to see an example.

### 6.27 It combines musical symbols in the right order.

Why: So it’s accurate and comprehensible to the user.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 30 | 3 | 0 | 0 | 0 | 33 | 1 |

Essential: 30/33, with 3 Desirable.

Comments included that this assumes that the order of signs is well documented in the chosen country code, and perhaps even by organisation, and that this may need further work on the code.

### 6.28 Multiple Bars' rest are presented in a compact manner, following NIM and MBC rules.

Why: These occur in parts for single-line instruments and orchestral scores, and need to be transcribed giving the information in a compact manner. In orchestral scores, to save space in the braille copy, the part can be left out.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 21 | 8 | 3 | 0 | 1 | 33 | 1 |

Essential: 21/33, 8 Desirable, 3 Nice to Have, 1 No Opinion.

The only comment was that saving space is vital, you can clearly distinguish who is playing in what bar.

### 6.29 It handles bars appropriately…

correct bar alignment in bar-over-bar format; offers a variable number of bars per line; identifies bar zero; and does not split bars over a page break.
Why: ease of reading

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 30 | 2 | 1 | 0 | 0 | 33 | 1 |

Essential: 30/33, 2 Desirable, 1 Nice to Have.

 One person commented that this is also essential when preparing practice exam scores / skeleton scores designed to be read in conjunction with a question paper. Another commented that this relates to ‘Options’ too.

# 7. Output

## Ranked according to ratings

**Essential**

* 7.1 Conversion generates an e.g. >80% error-free success rate when an agreed range of samples is tested *[to be specified]*
* 7.2 It either: generates output which can be compiled in a braille editor as part of a production workflow; or can handle mixed text-music files entirely.
* 7.3 It can output the full range of stave notation (single line, vocal (including multi-voice), keyboard, full score, lead sheet, continuo part, all standard instrument-specific articulation and other techniques).
* 7.4 It can extract parts from, e.g. chamber music or orchestral scores.
* 7.5 Outputs a file suitable for embossing (e.g. BRF, BRL (text file) format).
* 7.7 Outputs an eBraille/Text file [in BRL text format] for use on a refreshable braille display.
* 7.10 It notifies the user of conversion progress, success or failure.

**Essential-Desirable**

* 7.8 Outputs a printable file of stave notation.

**Desirable-Essential**

* 7.6 It can reformat Bar-Over-Bar material using different braille page sizes [to be defined].

**No Ranking**

* 7.9 When using a publisher’s master file, it disables hard-copy printing, only displaying stave notation on-screen.

**Additional suggestions (not ranked, as not read or rated by other respondents):**

* 11.5 *From a transcriber*: Sound. Starting from Music-XML you can have sound as a feature effect, why not?
Priority: 2 Desirable.
* 11.10 *From a developer*: It should be designed to make dynamic conversions in real time depending on the needs of the user, which will change in time, and even during the process of studying one single score: Example: A choir singer will start by focusing on his own part, and partly integrate the other parts.
* 11.12 *From an end-user*: Unicode braille is the future, like in normal digital text. For us the potential is even more because it also covers music notation.
* 11.14 *From a transcriber and music teacher*: There is also the issue of Unicode for braille (in contrast to musical symbols), to avoid, or better solve the different language codes.
This also, seems essential.
* 11.16 *From a developer*: The program should generate and play the sound-representation of each musical event in parallel with the Braille representation, just like a program for sighted users plays the music while showing the notes. This is certainly not easy to do using embossed paper.
* 11.18 *From an end-user*: Another essential feature is MIDI playback because MIDI playback allows users to check their work by listening.
* 11.23 *From a transcriber and end-user*: Consider developing APIs for other transcription software to call the music transcription tool as a subprocess.
Why: a textbook may have many independent Music XML chunks within it. The main literary braille transcription program wants to call the music braille transcription program for these extracts.
Priority: 3 Nice to have.

## Features in detail

### 7.1 Conversion generates an e.g. >80% error-free success rate when an agreed range of samples is tested *[to be specified]*

Why: So greater numbers of scores are automatically converted with little or no human intervention.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 18 | 10 | 1 | 0 | 2 | 31 | 3 |

Essential: 18/31, 10 Desirable, 1 Nice to Have, 2 No Opinion.

Nine respondents commented that 80% is far too low, and should be much closer to 100% or it won’t be saving any time and the resulting material will not be usable. One commented that even the identification of 20%, or less than 10%, of errors could take longer than keying it in or fixing it. Another commented that where human intervention is required, please can the errors be easy to spot, e.g. a search which stops at known problems.

One further suggested that those errors might range from a single non-essential symbol not being produced (not a problem) through to absolute garbage (a serious problem). What is the range of samples? For example, there is a huge difference between a grade 1 recorder piece, to a full score of a piano concerto. Probably more practical is to have a list of features which work, are of concern, or don't work. For example, notes work; so any number of notes, from grade 1 to the most complex, will work. Note also, it is relatively easy to get 80% accuracy, it gets successively more and more difficult to get towards 99% and almost impossible to get 100% accuracy.

### 7.2 It either: generates output which can be compiled in a braille editor as part of a production workflow; or can handle mixed text-music files entirely.

Why: Agencies need to be able to produce text books containing musical scores and easily integrate the two types of files.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 19 | 10 | 3 | 0 | 0 | 32 | 2 |

Essential: 19/33, 10 Desirable, 3 Nice to Have.

Comments included that output must be standard braille that can be opened and edited in braille editors, and that if this is done, options to disable all pagination may be appropriate in the music transcription tool. Another commented that it was essential that it can output as a Duxbury file, despite needing human intervention. Developers commented about a tool which can produce mixed output of converted Braille and raw data; and another specifically requested that it be possible to integrate it into other tools like DAISY Pipeline – so it would be important that the tool has an API or a command line interface (batch mode) – and further that if the tool can be invoked programmatically, then another tool would be able to handle mixed text-music files entirely. Another respondent suggested that using Unicode braille would make this feature easier. One person ranking it as Desirable commented that being part of a workflow would be enough, another commented that it has to be possible to correct/change the braille either within the tool or in the output.

### 7.3 It can output the full range of stave notation…

(single line, vocal (including multi-voice), keyboard, full score, lead sheet, continuo part, all standard instrument-specific articulation and other techniques).
Why: Musicians need such scores for study and performance.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 24 | 6 | 1 | 0 | 0 | 31 | 3 |

Essential: 24/31, 6 Desirable, 1 Nice to Have.

Comments included that the more score types the more useful the tool would be, though one commented that they do not produce many full orchestral scores, but the other outputs would be essential. Another commented that it needs to output music in a variety of braille formats, regardless of how it is presented using stave notation.

### 7.4 It can extract parts from, e.g. chamber music or orchestral scores.

Why: Users may need to isolate specific parts when learning or assessing scores.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 20 | 9 | 3 | 0 | 0 | 32 | 2 |

Essential: 20/32, 9 Desirable, 3 Nice to Have.

One respondent commented that this can be achieved in other software, but it would be useful and relatively easy to develop. Others commented that this feature felt related to earlier questions.

7.5 Outputs a file suitable for embossing (e.g. BRF, BRL (text file) format). Why: End-users and agencies wish to emboss the score**.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 27 | 3 | 2 | 0 | 0 | 32 | 2 |

Essential: 27/32, 3 Desirable, 2 Nice to Have.

Comments included that this is related to 7.2 above. Several respondents requested PEF be added to the list of formats to provide interoperability with embosser, and it’s a good format to apply XML-based post-processing or conversion to BRF, and PEF is also used by the DAISY Pipeline 2 Braille Modules. Others asked that it should be possible to import into Duxbury, and into braille editors. Another commented that this would be essential if the braille format/Layout/Printer setting is configurable. Four commented that it would be good to dynamically produce sections of braille on a refreshable braille device, e.g. helpful as the pupil’s requirements change during the learning process. One commented that in the future all the conversion to braille / braille Music should be done on the fly on a portable device, with no need for physical embossing. One respondent commented that it would be very useful to have a structured music braille format file to share between various reality - BMML is an example, but it could be a new one.

### 7.6 It can reformat Bar-Over-Bar material using different braille page sizes [to be defined].

[Some adaptation and compromises of some braille rules may need to be made].Why: Embossed output needs to be printable on different sized braille paper.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 10 | 11 | 6 | 3 | 2 | 32 | 2 |

Desirable-Essential: 21/32 rated this as Essential (10) and Desirable (11) combined, 6 Nice to have 3 Not Needed.

Comments included that support for paper sizes for more countries is good, with an option for paper size and line length. Several respondents expressed strong views that this feature is not needed, commenting that it would be better to produce error-free braille from the source with specific layouts/filters; not to re-format existing braille (as you might do in a braille editor) – which should be out of scope for a music conversion tool; and also that you can’t always tell if line breaks were intended or due to paper size.

### 7.7 Outputs an eBraille/Text file [in BRL text format] for use on a refreshable braille display.

Why: More and more users are learning scores from their braille display.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 21 | 8 | 2 | 1 | 0 | 32 | 2 |

Essential: 21/32, 8 Desirable, 2 Nice to Have, 1 Not Needed.

Comments included referral back to 7.2 and 7.5 above. Additional comments included that it should be able to handle new technology, and users to have the option of embossing or reading it on a refreshable braille device. One noted that this requirement is the same for refreshable braille as it is for embossed braille - there is no separate standard (yet) for use of refreshable braille displays, and further discussion and development of such a separate standard may be a different project. One also commented that using Unicode braille as intermediary braille table could be only be a question of filtering issue.

### 7.8 Outputs a printable file of stave notation*.*

Why: so a blind user can share a score with a sighted teacher/another musician who may be helping them with learning the score**.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 12 | 9 | 4 | 7 | 0 | 32 | 2 |

Essential-Desirable: 21/32 rated this as Essential (12) and Desirable (9) combined, 4 Nice to Have, 7 Not Needed.

Comments included that this would be vital, or important with an automated layout for print so they would be legible to sighted people. On the other hand, others felt that this was out of scope, and not needed – this should be a music conversion tool, not a score editor – and it could be done in other software; e.g. students would produce a score from Sibelius or Musescore. Another commented that this might infringe copyright, and the sighted colleague should buy the score. Other output options mentioned by one participant were MusicXML for use in other notation apps, PDF for printing and reading, MIDI for use in sequencers and such, and MP3 for listening.

### 7.9 When using a publisher’s master file, it disables hard-copy printing, only displaying stave notation on-screen.

Why: To protect the publisher’s print score so it cannot be printed**.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 8 | 3 | 3 | 6 | 7 | 32 | 2 |

No Ranking: This question split respondents across the board: 8 Essential, 6 Desirable (3) and Nice to Have (3) combined, 6 Not Needed, 7 No Opinion.

Comments indicated that this might be required if publishers insist on it, but even if applied, copy protection can be circumvented. Additionally, several commented that if this is only a conversion tool and not a score editor, then this feature is out of scope. One queried how this would affect using assistive technology with the tool.

### 7.10 It notifies the user of conversion progress, success or failure.

Why: So users know how long to wait for their file, or why it failed to convert**.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 20 | 7 | 4 | 1 | 0 | 32 | 2 |

Essential: 20/32, 7 Desirable, 4 Nice to Have, 1 Not Needed.

Comments included that some kind of audio notification that the tool is still running would be useful, and that confirmation of why a file failed is essential, more important than an estimate of time remaining, which could be unreliable anyway.

# 8. System Requirements

## Ranked according to ratings

**Essential**

* 8.2 It must be programmed in such a way that it can be further developed.

**Not ranked**

* 8.1 If installed locally, it must work with XX technology, and uses no more than 2GB RAM even for the most complex files. *[minimum specification to be defined].*

**Additional suggestions (not ranked, as not read or rated by other respondents):**

* 11.9 *From a developer*: The program should be portable to all (PC/Mac/Android...) platforms.

## Features in detail

### 8.1 If installed locally, it must work with XX technology, and uses no more than 2GB RAM even for the most complex files. [minimum specification to be defined]*.*

Why: To run on the typical set-up of the intended agency client.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 9 | 4 | 5 | 1 | 13 | 32 | 2 |

No Ranking: 13/32 respondents had No Opinion of this; 9 rated it as Essential, 4 Desirable, 5 Nice to Have.

The main comments were that it should work on a ‘normal’ computer, and use resources sensibly, and be written properly so that it can do so (or be a server-based solution). Two respondents commented that 4GB might be a better RAM minimum, but two others felt that we cannot specify the minimum spec yet, only the software developers can do this.

### 8.2 It must be programmed in such a way that it can be further developed.

Why: To ensure the tool is future-proof**.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 26 | 5 | 0 | 0 | 0 | 31 | 3 |

Essential: 26/31, 5 Desirable.

Comments included that this is more of a business consideration than development; it could be open source and yet written in a way that it makes it difficult for anyone to maintain/update. One felt that it should be Open Source as it needs open source utilisation protocols to work on this huge project. One developer commented that making the tool future-proof has always been a high priority for them. Another respondent commented that getting developers is a challenge. Another said that any tool will need to incorporate MNX if/when it becomes the dominant file format.

# 9. Business Arrangements

## Ranked according to ratings

**Essential**

* 9.4 Operate a system for reporting bugs, issues and requests, and for sharing updates on implementation.

**Essential-Desirable**

* 9.1 Annual service level agreement available to secure fixes and support *[define an acceptable response time for support questions]*
* 9.3 Offer the service for a minimum term, e.g. 5 years *[to be defined].*

**Desirable-Essential**

* 9.2 If server-based, provide built-in redundancy for server failure/recovery to minimise downtime *[define acceptable downtime]*

**Additional suggestions (not ranked, as not read or rated by other respondents):**

* 11.2*From an end-user:*The tool(s) should be available both as a trial version (as for example a 30-day-demo) and as a full version.
Why: using the trial version, it would be possible for the user to test the tool and to decide for a purchase.
Priority: Essential.
* 11.4 *From a music teacher:*Perhaps also have a cut down version without so many options for beginner users.
Why:Because many QTVIs [qualified teachers of the visually impaired] supporting in education may not have the technical knowledge required and would find it daunting having too many features. They might not need to do much but would enable them to so simple things to get students started reading music braille.
* 11.7 *From an end-user:*Documentation; user manuals, quickstart guides, keyboard shortcut lists, should be available in a range of accessible formats; HTML, plain text, BRF, ...
Why: to give quick, simple and effective access to all types of user.
Priority: Essential
* 11.8 *From a transcriber and developer*:Feedback, because things do not get better without feedback.
Priority: Essential.
* 11.19 *From an end-user and music teacher*:We need a database for scores produced, as world wide as possible, so we avoid all the double productions we have now.
* 11.21 *From a transcriber and end-user:*Clearly document the system.
Why: So people know how to use it, and what to expect.
Priority: 1 Essential.

## Features in detail

### 9.1 Annual service level agreement available to secure fixes and support *[define an acceptable response time for support questions]*

Why: For business support for agencies and security for long-term business practice for developers.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 15 | 9 | 4 | 0 | 3 | 31 | 3 |

Essential-Desirable: 24/31 rated this as Essential (15) and Desirable (9) combined, 4 Nice to Have, 3 No Opinion.

Comments included this was a good idea to stop it from dying. One said that some level of support and fixes (even if just for the first year) would be helpful if it did not make the product too expensive. Another felt that some kind of support throughout a product’s life is helpful especially when the tools are infrequently used or different versions are in use; otherwise people give up in frustration. Another raised the issue of whether this was only relevant for a company/commercial model rather than open source/free tool, and this choice needs careful consideration.

### 9.2 If server-based, provide built-in redundancy for server failure/recovery to minimise downtime *[define acceptable downtime]*

Why: To protect agencies from loss of data and unnecessary delays.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 9 | 12 | 5 | 1 | 4 | 31 | 3 |

Desirable-Essential: 21/31 rated this as Essential (9) and Desirable (12) combined, 5 Nice to Have, 1 Not Needed, 4 No Opinion.

Comments were that this should be an essential part of remote software provision, and that regular backup and some redundancy should be standard for all hosted products. Another felt that the tool should not be server-based at all.

### 9.3 Offer the service for a minimum term, e.g. 5 years *[to be defined].*

Why: So agencies are assured some business continuity with the tool (and their payment secures business continuity for the developers).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 14 | 10 | 2 | 2 | 3 | 31 | 3 |

Essential-Desirable: 24/31 rated this as Essential (14) and Desirable (10) combined, 2 Nice to Have, 2 Not Needed, 3 No Opinion.

Comments were similar to 9.1 above. One went on to add that they personally don’t like the license model – they want to use it for as long as they have the tool, not be time restricted at all. Another commented that they would not want to pay for any fixed-term service contract until they knew the tool was what they actually required and that the vendor was stable.

### 9.4 Operate a system for reporting bugs, issues and requests, and for sharing updates on implementation.

Why: So users can request maintenance and development of the tool in a structured way.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 20 | 6 | 3 | 0 | 1 | 30 | 4 |

Essential: 20/30 rated as Essential, 6 Desirable, 3 Nice to Have, 1 No Opinion.

Comments were that this would be very nice to have; but questions were raised about who would develop/manage/pay for such a system, and who would pay for the reported fixes to be made.

# 10. Note about Funding

## Ranked according to ratings

**Essential-Desirable**

* 10.1 The sector should aim to secure the future of a tool, or tools, which together support both agency production as well as education.

**Additional suggestions (not ranked, as not read or rated by other respondents):**

* 11.3 From an end-user:Make sure this tool can be used for learning braille music. If we have no good tool for this, every project in this field will lose it’s value over time. Maybe this should be a separate tool, like a braille music game. I just hope you do not forget the teaching aspect in your work.

## Features in detail

### 10.1 The sector should aim to secure the future of a tool, or tools, which together support both agency production as well as education.

Why: To support production now, and to secure future users.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Essential | Desirable | Nice to Have | Not Needed | No Opinion | Total | Skipped |
| 16 | 11 | 1 | 0 | 2 | 30 | 4 |

Essential-Desirable: 27/30 rated this as Essential (16) and Desirable (11) combined, 1 Nice to Have, 2 No Opinion.

One respondent felt that if the needs of agencies are met this would widely increase the availability of braille music (to education and to individual users too); whereas another felt that if the right tool for end-users was developed the need for agency production would decrease. One commented that securing tools with appropriate funding would be essential to avoid a short-term project being abandoned when the project funding period ends. One developer commented that they had considered whether tools for education and professionals should/could be different, and had concluded that separating them was more effective to meet their different needs.

# 11. Anything else?

This final section of the Requirements Survey was an open invitation to submit other issues/suggestions.

14 respondents raised additional 30 additional issues between them, with just under half those responding making a single suggestion, and others making between 2 and 6 suggestions/comments.

These have all been included in the relevant sections of this report, listed in the first section with ranked features, in a group labelled as ‘**Additional suggestions (not ranked, as not read or rated by other respondents)’.** The respondent type is given for each suggestion for context.

One response from an agency (comprising developers, end-users, transcribers and teachers) did not fall naturally into any particular section of the report, so it is included here verbatim:

* 11.1 *An organisational response (transcriber, end-user and developer)***:**

We are considering mainly expert Braille users who master Braille music notation. We all are well aware of the fact that the number of this population will decrease rapidly in the following 5-10 years. On the other hand Interest for music and music literacy is still very high among blind and partially sighted persons of all ages, but Braille has proved to be a relevant barrier.

Possible way out: The Multimedial and flexible access to structured Braille music score. BMML format does exactly this, although it needs some improvement (20%).

Short description

BMML at present has following strong points:

1. can use in all combinations, according to user's needs: sounds, refreshable Braille, synthetic voice pronouncing neme of musical element (note, octave ..) or pronouncing Braille dots (1-4-5 ...), hard paper Braille

2. hide / show different classes of signs, e.g. signs not familiar or not important for a quick reading (ties, fingering, ornaments, dybnamics, etc.).

3) select what to liste, such as: parts (one at a time or more at a time), number of bar ...

4) re-format Braille output (page lenght, line lenght, trascription mode [section by section, bar over bar[)

5. change speed

6) lok for (musical element) (backwards / forwards)

7) bookmarking and annotation (useful for didactical scopes).

Benefits

Teach yourself Braille, based on flexible use of syntethic voice combined with sound of single notes.

Related software

Braille music reader (file is not modifiable). Braillemusic editor, a complete editor which allows a blind musician to produce his /her own score for a sighted peer (school mate, sighted teacher, sighted pupil). Both Braille music reader and Braille music editor are based on BMML format.

Braille music transcription

This topic consists of at least three main problems, independent from each ogher but in close correlation, that is a good solution of one topic influences results of remaining topics

1. an effective format for music scores for sighted persons.

Means that the format should be NOT graphics oriented, BUT contents oriented. Example: fingering can be inputted in different way, such as as image symbols (to avoid), or object oriented (to be preferred). Normal scores are often full of graphical symbols, some of which are only for the sake of good appearance, but do not have a musical meaning. Some on the opposite have musical meaning, but are still in image format. A good transcriber should use always use features that are related to a given musical element, and not a good looking image. Every good translation (from alanguage into another, from a media into another) must always be bound to content, rather than to signs. Example: the English expression "it is raining cats and dogs" has no sense in any other language if it is translated literally. Similar situations are very frequent also when putting a normal score into Braille.

2. Braille format.
Braille music notation can be considered as a kind of "language", with its alphabet (dot combination), its grammar (order of signs), and its elegance (use of indenting, place for paging, etc.). A good Braille music format should consider each single element, for further use in the best possible flexible way, in order to meet all needs.

3. Layout for Braille.
Braille layout is as important as graphical appearance for sighted persons. Braille layout varies from country to country, from centre to centre and even from transcriber to transcriber, because it reflects personal preferences or depends from the end user. Example: for a beginner we might prefer a score with only essential symbols, dobule spacing etc.

This vision may not be shared by our interlocutors, and this fact is more than normal. We believe though that good solutions come from frank and exhaustive discussion, and differences in views and opinions are a value, rather than an obstacle.

End.