

## Protocol for Synthesizing Audio Examples and Editorial Additions

NB: Steps pertaining to editorial additions are notated in green, this may be moved to a separate protocol document later. As these additions are required for generating the audio, it is more efficient to do both steps at the same time, otherwise the editorial additions will need to be added before the audio generation step.

### Required Software:

#### 1. For all audio examples:

- a. Sibelius Ultimate (<https://www.avid.com/sibelius>)

*NB: For batch-process exporting of MIDI, PDF, and/or XML files, the "Export Audio Score and Parts" plug-in is recommended. It can be installed through the "File" tab in Sibelius.*

#### 2. For audio examples to be rendered with East West Libraries:

- a. Logic Pro X (<https://www.apple.com/ca/logic-pro>)\*
- b. EastWest ComposerCloud (<http://www.soundsonline.com/composercloud>) or access to the following EastWest Libraries individually:
  - i. EW Goliath
  - ii. EW Pianos Steinway Gold D
  - iii. EW Solo Violin
  - iv. EW Symphonic Choirs Gold\*
  - v. EW Symphonic Orchestra Gold Complete
  - vi. EW Voices of Opera\*

\*These are for the vocal/choral examples, which may not be possible. This list may expand if I find more instruments that are needed -w

### I. Gathering Audio and Other Necessary Information from Naxos:

1. Access the FDS master spreadsheet (FDS\_Metadata\_1900DS\_ArcGIS\_18May2019\_master), and the Suter Examples Audio Synthesis Spreadsheet. Open the "Naxos Recording Link" for the relevant example.
  - a. If the naxos link is no longer accessible, a new recording will have to be selected:
    - i. Go to the information page for the work on the naxos website and use a random number generator to select one of the available recordings, ensuring that this recording has not already been selected for any other example from the same work wherever possible.
    - ii. Ensure that the recording is of the same arrangement/instrumentation of the work as in the Suter example.
    - iii. Copy the web address of the new recording into the "Naxos Recording URL" column of the **Audio Spreadsheet**.

- iv. In the **Master Spreadsheet**, add a comment to the “Naxos Recording Link” cell containing the newly selected link. Additionally, add in comments the start and end time of the example in the new recording, the full unit duration, and the length of the example in seconds.
  - b. Wherever possible, the selected recording should contain the ‘suter work full unit’ (SWFU) as one track.
    - i. Usually the SWFU is one movement, or a single-movement work, and will align with a single track on the recording. In some cases, however (particularly stage works), the tracks on the Naxos recording may not align with the SWFU; if this is the case, attempt to find another recording that does align with the SWFU. In the case that no available recording aligns, include the name of the track in the comment with new timing information (i.e. ‘4:23 of track “Act II, Intermezzo Piccolo”’)
2. From the naxos website, copy the following information into the columns in the Audio Spreadsheet:
- a. Album Title (copied from the title at the top of the web page)
  - b. Label
  - c. Catalogue no.
  - d. Release Date Year
3. Create a WAV audio file of the example from the Naxos recording:
- a. Use the “Example Start Time” to find the beginning of the example in the recording.
  - b. Record the Naxos playback of the example (using a virtual device to send the audio output of the browser to an audio software, I’ve been using Loopback and Logic to do this -ww)
  - c. Trim the beginning and end of the recording to align as closely as possible with the start and end points of the example, and save as a WAV file to the “TDS Excerpted Naxos Audio Clips” folder (currently in my RA folder -ww)
4. Troubleshooting:
- In the event that there is no available Naxos recording of a given example**, the audio will have to be sourced elsewhere. **Start by searching Spotify for a recording of the work**; if one is found, the process is the same as using Naxos, the link to the recording can be found under “share” => “get song link”. Since Spotify is not designed with classical music in mind, it may be more difficult to track down recordings, and a random selection is likely not possible, however whenever possible continue to adhere to the protocol of not using the same recording for multiple examples of the same work.
- If the work is not available on Spotify**, attempt to ascertain whether a commercial recording exists. If the audio is available (e.g. on YouTube), a recording for audio synthesis purposes can be gathered from any online source, but do not update the master spreadsheet. **If a CD exists as the only recording**, make a note of this in the ‘naxos audio excerpt taken?’ column of the audio spreadsheet, so that the CD can be obtained.

## II. Generating an Audio and/or MIDI File with Sibelius:

*These steps are necessary for generating either Sibelius Sounds or East West Libraries audio examples.*

NB: Editorial additions of information present in the score but not expressly notated in the bars of the example should be added in **square brackets []**. Since this information will need to be added to create the audio files, the editorial addition process is outlined in these steps.

1. Access the Google Drive folder containing the final edited Sibelius files “RDS Archive/RDS Examples/RDS Edited Files/PDF” and **download a copy of the Sibelius file** for the example to be synthesized, and open the file with Sibelius Ultimate. On the Suter Examples Audio Synthesis Spreadsheet **add today’s date as ‘Sibelius File Access Date’**
2. If the example does not contain a metronome marking, from the FDS master spreadsheet (FDS\_Metadata\_1900DS\_ArcGIS\_18May2019\_master), use the “Example Start Notated Beat” and “Example Start Notated Beat Rate” to **add a tempo indication (in square brackets)** to the copy of the Sibelius File.
  - a. This tempo information used should be copied into the corresponding columns in the Suter Examples Audio Synthesis Spreadsheet so that a record is maintained should the tempo information on the master spreadsheet be updated later.
  - b. In cases where the tempo given is a range, the median value should be used; input this as the “Example Start Notated Beat Rate” on the Audio Spreadsheet
  - c. If the master spreadsheet does not contain tempo information, use the following procedure:
    - i. In the Suter Examples Audio Synthesis Spreadsheet, indicate the missing tempo in the “missing tempo?” column. This will then be double-checked (by Kelsey) against the original score to determine whether the metronome marking is simply missing from the spreadsheet, or whether the composer did not indicate a specific metronome marking.
    - ii. If the example is confirmed to not have a notated metronome marking, the tempo will need to be calculated from the naxos recording:
      1. Access the audio example from Naxos from the “Excerpted Naxos Audio Clips” folder (instructions for creating this file are detailed under “Gathering Audio and Other Necessary Information from Naxos”)
      2. Select a logical note value for a metronome marking (eg. quarter note in 4/4), and measure the duration of the example in multiples of this value (eg. 5 bars of 4/4 = 20 quarter notes)
      3. Divide the duration of the example in note values by the duration of the Naxos audio clip in seconds, then multiply that value by 60 to determine the mean tempo from the recording. (eg. 20 quarter notes divided by 8 seconds = 2.5; times 60 = 150 BPM; so the final tempo will be quarter = 150)
      4. Input this tempo into the “Example Start Notated Beat” and “Example Start Notated Beat Rate” columns in the Audio

Spreadsheet. Also add a note in the comments column indicating that this tempo was calculated from the Naxos recording.

3. If any instruments have notes indicated before the first written dynamic, use the information from the “Starting Dynamic” column in the Suter Examples Audio Synthesis Spreadsheet to **input the missing dynamics (in square brackets)**. If that information is not available, there is not enough information to generate the audio at this time. The “Status” column in the Suter Examples Audio Synthesis Spreadsheet should be changed to “needs dynamic information”

- a. Non-existent dynamics:

If specific dynamics for a part do not exist (either no dynamic is notated, as is common in vocal parts, or the previous dynamic is ambiguous, such as a crescendo) see Non-existent dynamics in **Special Considerations**.

4. If any instruments have an indication of ‘sempre staccato’, or any other indication where the composer/editor has given a written instruction instead of including a written notation on every note (i.e. sempre trem., trem with ‘simile’, etc), **add the notation to all affected notes**. Indicate a ‘yes’ in the ‘sempre staccato etc.’ column of the Audio Spreadsheet. If this is anything other than a sempre staccato, include a written description in the ‘issues/problems’ column. Indicate ‘no’ in the ‘sempre staccato’ column if no such issue was found.

5. **Special Considerations:**

*Sibelius will play back nearly all examples accurately by default, however there are certain cases where the Sibelius file will have to be modified in order to play back correctly.*

NB: All of these modifications will change the appearance of the Sibelius file, so in cases with special considerations make **two copies of the Sibelius file**: one with only the editorial additions (which will not play back correctly), and another with the special additions (which will play back correctly, but **should not be used for any other purpose**).

- a. Non-existent dynamics:

If specific dynamics for a part do not exist (either no dynamic is notated, as is common in vocal parts, or the previous dynamic is ambiguous, such as a crescendo), these should be added based on whatever information is available to ensure proper balance of parts.

- b. Special Trills:

Trills with an accidental attached will likely not play back correctly. To ensure a trill plays correctly in Sibelius, open the information window for the trill and manually select “Half-Step” or “Whole-Step”.

- c. String Harmonics:

String harmonics notated with a ° (degree symbol) over the notehead should play correctly. Harmonics notated with a second diamond notehead (including touch-4 or touch-5 harmonics) will **not** play back correctly. There is a sibelius plug-in that will cause the harmonics to play at the correct pitch, but it will not necessarily ensure that the ‘harmonic’ sound is used. The Sibelius Sounds solo string instruments do not have harmonics as an option, so for chamber works, the instrument will need to be switched from the (solo) instrument to the section instrument before each harmonic, and back to the (solo) afterwards.

d. Percussion or Non-Standard Instruments:

Depending on how the Sibelius file was transcribed, some percussion parts or parts for non-standard instruments may not play correctly. Assuming the Sibelius Sounds have the necessary instruments available, this is simply a matter of doing an **instrument change** to the correct instrument.

NB: Ondes Martenot should be played with the **Theremin** instrument, **not** the Ondes Martenot instrument.

For multi-line percussion, it may be necessary to go into Edit Instruments > Edit Instrument... > Edit Staff Type... and change the sounds associated with individual lines on the staff

e. Mallet percussion octave:

For examples with octave-transposing mallet percussion (glock, xylophone, crotales, and including celesta), the accuracy of octave should be double-checked. (I’d suggest against the naxos recording. We may also consider going back to the original scores to get information)

f. Glissandi: Sibelius provides several playback options for glissandi, available in the information panel for the glissando line object. The “continuous” option should not be used, even when a continuous glissando is how a human performer would play the passage. “Chromatic” is usually the best option; while somewhat inaccurate, the playback is significantly better than the “continuous” option. For piano glisses, the “white notes” option should be used. For harp glisses, the notes will have to be manually added (there’s probably a better way to do this, but I haven’t gone looking for it and the number of harp gliss examples is pretty low -ww)

g. Gradual tempo change: If the examples includes any gradual tempo changes (rit., accel., rubato, etc.), indicate a “yes” in the “Tempo Changes?” column of the Audio Spreadsheet, and export and archive a second version of the audio with the playback of the tempo changes turned off (so that the playback is at a constant tempo, or includes only notated, abrupt tempo changes).

6. **Ensure that the master volume track in Sibelius is set to 0.0 dB** by pressing M to bring up the mixer, and double click on the slider labelled “MASTER” on the far left. (Some of the Sibelius files have had the master volume adjusted to 0 and will produce no sound on playback or export)
7. **“Proofread” the Sibelius file against the Naxos recording:** listen to the Excerpted Naxos Audio Clip and compare it to the Sibelius playback. There are several types of errors that are particularly likely to go unnoticed until this step, including:
  - a. Missing technique indications (mutes, pizzicato, col legno, etc.)
  - b. Incorrectly transposing instruments
  - c. Wrong instruments (usually involving translation errors from non-english scores)
  - d. Incorrect octave transposition
  - e. Playback of accidentals that only apply to the immediately following note (This is a more significant issue that we’re still working on a plan for dealing with)

***If the file is to be rendered with Sibelius Sounds:***

8. **Export an audio file** using the following parameters:  
*NB: This can be batch-handled with the “Export Audio Score and Parts” plug-in, but it will default to .aiff files on mac computers and it occasionally crashes. I’ve made some adjustments to the code and can use this fairly reliably, but I’m not sure how to move the edited plug-in to another computer. Unless a large number of files need to be processed at once by someone other than me, it’s probably not worth the hassle -w.*
  - a. Configuration: Sibelius 7 sounds
  - b. Playback line: Export from start
  - c. Filename: default value (this will be the same filename as the Sibelius file, ending .wav instead of .sib)
  - d. **Format WAV** (Sibelius will default to MP3 every time the application is opened)
  - e. Bit depth: 16-bit
  - f. Sample rate: 44.1 kHz

**Make sure to select the destination folder each time you export an audio file,** it will reset to a default location each time you open a new file.

**Make sure to click the “Export” button,** selecting a destination folder will not save the file, unlike in the MIDI export menu.

*The Sibelius sounds can be used to quickly and easily create synthesized audio examples. The quality of performance is significantly better than general MIDI, but not as good as the results obtained by using the EastWest libraries.*

***If the file is to be rendered with East West Libraries:***

9. **Export the file as MIDI** using the following parameters:  
*NB: This can be quite easily batch-handled with the “Export Folder of Scores in Multiple Formats” plug-in.*
  - a. Playback device: General MIDI
  - b. MIDI file type: 1

- c. Tick Resolution: 960 PPQN
- d. Export pick-up bars as full bars padded with rests: true

*The EastWest libraries allow for a much more realistic final audio file, but require much more work to render, as well as the additional software.*

#### **10. Save the edited Sibelius file to an archive location:**

##### ***If no special considerations additions were necessary:***

Ensure that the master Sibelius file has not been edited since your download in step 1, if it has, re-download the Sibelius file and add the editorial additions to the most recent version.

Save the edited Sibelius file, as well as an exported PDF and XML to an archive location.

*NB: This can be quite easily batch-handled with the “Export Folder of Scores in Multiple Formats” plug-in.*

##### ***If special considerations additions were necessary:***

Save the Sibelius file edited for playback in an archive location, ensuring it is labeled ‘for audio only’, then save the clean file with only editorial additions according to “if no special considerations were necessary’ above.

#### **11. Update the Audio Spreadsheet:**

- a. update the following columns (yes,no,n/a):
  - i. Sibelius Audio
  - ii. Editorial Additions to Sib file complete?
  - iii. Editorial changes needed?

### **III. Generating an Audio File with the East West Libraries:**

*The remaining steps are only necessary for examples to be rendered with East West Libraries. All necessary steps for the Sibelius Sounds file generation have been covered above.*

#### **Importing the MIDI File into Logic and Setting up the Synthesis:**

1. Open the MIDI file (created in step 8 of “Generating an Audio and/or MIDI File with Sibelius”) with Logic Pro X
2. Delete track 1, which will default to “Steinway Grand Piano” and only contains the MIDI filename, as well as any instrument tracks which contain no notes

3. Move the project end marker to a location approximately 5 seconds after the last note release of the example
4. For each instrument track, change the instrument slot from the Logic default to “Au Instruments > East West > Play > Stereo”
  - a. Any audio effect slots activated by default should be deactivated, this may include EQ or other effects depending on which instrument Logic has selected as the default for that track

5. Within each track open the “Play” instrument and select and load the necessary instrument samples\*

\*Which exact samples need to be loaded will depend on the specific example, eg. if the violin instrument contains staccato notes the solo violin Staccato or Spicatto instrument will need to be loaded, but if it only contains legato notes, these will not be needed. If necessary, I can put together a table of which specific samples I’m using where, but these may vary from one example to the next depending on what sounds better in that context. All of that information will be saved individually in each Logic file, though. –w

### Fine-Tuning the Performance in Logic:

A lot of this is quite subjective, and involves trying various options which may not be the same from one example to the next. Musicality is enhanced by choosing which samples to use for which articulations/notes, adjusting velocity values, automating the expression and/or modulation data, and adjusting volume and pan to get a balanced mix.

An important step here is “proofreading” against the Naxos audio of the example, which is especially valuable if the same person is not doing both the Sibelius and East-West examples.

The Logic files can be saved with all this intact, so if the Logic files are made available along with the final audio files, anyone with Logic can open these to see or adjust exactly what was done for a given example. –w

### Troubleshooting specific issues with EW libraries:

- **Written range of instrument exceeds range of EW instrument:**
  - The ‘Tune’ setting in the Play instrument can be used to artificially adjust the playback pitch of the samples. Select the out-of-range notes and move them to a separate MIDI channel, and assign the desired instrument patch. Determine the difference in semitones between the farthest out-of-range note and the closest playable note. **Change the ‘Tune’ setting to this value** (e.g. -3.0 if the needed note is a minor third below the lowest sample), **and then move these MIDI notes up/down by that number of semitones**. The end result is triggering a sample that is within the range of the instrument, but pitch-shifting it to the required



note. N.B. **This method will sound very unrealistic if intervals of more than around a fourth are needed**

- **Non-standard percussion:**
  - The EW libraries contain a wide variety of percussion samples, but some percussion instruments used in the Suter dataset are not included. These include: siren, lion's roar, wood-headed drums, and 'indian' drum, among others. It is usually best to simply substitute a similar-sounding instrument that is included in the EW libraries, however the siren, wood-headed drum, and lion's roar are not easily replaceable. There is not yet a standard way of handling these instruments

### **Exporting the Final Audio Example:**

1. Adjust the master volume slider to ensure the audio does not overload (clip)
2. Bounce the project with the following settings:
  - a. Destination: PCM
  - b. File Format: Wave**
  - c. Resolution: 24 bit
  - d. Sample Rate: 44100
  - e. File Type: Interleaved
  - f. Dithering: None
  - g. Ensure the **start** and **end** are set to the project start and project end locations (this may not be the case by default)
  - h. Include Audio Tail: False
  - i. Normalize: Overload Protection Only**
3. **If the example has any gradual tempo changes** (rit., accel, etc.), also bounce and archive a copy of the audio with those changes removed, so that the piece plays back at a constant tempo of whatever the initial tempo indication is.
4. **Save the Logic file** (as a package) to an archive location