Recording an A Cappella CD

Sean Alexander O'Brien
Worcester Polytechnic Institute

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Recording An A Cappella CD

A Major Qualifying Project Report
submitted to the faculty of the
Worcester Polytechnic Institute
in partial fulfillment of the requirements
for the Degree of Bachelor of Science by

Sean O’Brien

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Professor John F. Delorey, Major Advisor
Abstract
This project was intended to record and release an album for WPI's co-ed a cappella group, The Audiophiles, to recommend a procedure to be followed to assist in similar future endeavors. As the musical director, I was involved with the arrangement songs for the album as well as teaching these arrangements to the members of the group. As the recording engineer, I was in charge of preparing the studio for each session by setting up microphones, encouraging the best performances out of the singers, and running the recording software to capture the audio.
Chapter 1 – Introduction

This major qualifying project was intended to complete the Worcester Polytechnic Institute’s requirements for a Bachelor’s Degree in Humanities and Arts with a concentration in Music. The main goal of this project was to lead an a cappella group in the production of a studio recorded album using technology available on the Worcester Polytechnic Institute campus as well as some professional resources. The main deliverable of this project is this written procedure, aimed to aid future groups in similar processes. Recording an album for an a cappella group is a daunting task, especially when each member is concurrently handling a complete course load as a full-time student. The process takes time, money, dedication, and determination. The following report will include recommendations to alleviate some of the more stressful aspects of the project and detail some of the best practices to follow when recording in the future. Hopefully this report can be used in the future as a guide and framework for other WPI a cappella groups. Throughout the process detailed notes were taken and utilized in the creation of this “production manual” for the use of future groups. The manual is intended to be organically and progressively added to by groups in the future to keep it up to date with technological advancements and the knowledge gained by further attempt at recording.
Chapter 2 - Background

2.1 – A Cappella
A Cappella music traces its roots back to the Catholic Church, as it means 'In the manner of the chapel'. Although it had liturgical origins, it eventually moved to more secular organizations, such as the Yale University Men's Glee Club, the oldest men's choir in the United States. However, it wasn't until the 1970's and 80's where the style spread further, and skyrocketed in popularity thanks to TV shows like “Where In The World Is Carmen Sandiego?” which promoted a cappella with live performances by the a famous group known as Rockapella. Now, there is a large scale reality TV show featuring a cappella groups in competition, The Sing-Off. (A Century of A Cappella, 2005) WPI enjoys the presence of a large choral program with over 100 participating students. There are three large ensembles at WPI: the co-ed choir Festival Chorus, the women's chorus Alden Voices, and the men’s chorus The Men's Glee Club. The Technichords and Simple Harmonic Motion exist as subsets of the two single gendered choruses whereas The Audiophiles come from any ensemble and potentially outside of the WPI music program. Once a term or so the groups perform large public performances on campus, with one group acting as host and singing an extended set once a year, along with guest groups from other schools in the nearby states.

2.2 Technology
In order to create the performed and recorded arrangements, many groups use digital composition software such as Finale or Sibelius. These two pieces of software are desktop applications with a very similar look and feel as a standard word processing program. There is also a web application that allows for music composition called Note Flight. The advantage of using a web application is that there is no need to install extra software on a computer and the arrangements you save are put
in cloud storage. One could effortlessly access their arrangements wherever they are and from any computer that they would like.

These pieces of software not only allow the user to create the actual sheet music, but also create MIDI (Musical Instrument Digital Interface) files of each individual line of music. These files are audio files that have a bare-bones representation of the music. These can be individualized to each voice part and distributed to group members so that they may practice outside of rehearsal time. The recordings on this album will be done using the Avid Pro Tools program, allowing the user to record and play back multiple tracks for the most flexible editing and post-production experience. In addition, the auto-tune software Melodyne could be used to help tweak and perfect some of the unavoidable human errors.

2.3 Recording Music
Recording an album takes a lot of planning. First, the arrangements must be selected and/or created. Then, the music must be taught to the group and learned at an acceptable level. The recording times need to be scheduled and then the actual recording needs to happen. Once the tracks are finished, there needs to be communication with the producer to ensure the proper mixing and mastering. Finally (or even concurrently) you need to obtain the rights for each individual song. After all of this, the CD can proceed to release.

2.3.1 Recording A Cappella Music
A Cappella music has some specific and unique differences in tonal quality and sound capture. Firstly, since all sounds must be syllables of some kind, care must be taken to ensure that syllables are consistent throughout each voice part and on every take as to ensure the cleanest, crispest sounds. There are two typical styles of recording used for a cappella – live and multi-tracked. On
the SHM CD Vital Sines, there is a track recorded with the entire group in one space (“Lucky Old Sun”). Unfortunately, such recordings allow for very little editing opportunity from the producer – since many voices are together on one track, changing anything will change all the parts captured by that microphone/track. It is very difficult to manipulate many (or even just two) overlapping sounds. It also is difficult to schedule the entire group for recording without forfeiting some of our normal rehearsal hours. This does, however, allow the energy and atmosphere of the group to synergize throughout all of the members because they are participating in the shared experience. The other method typically used is called Multi-Tracking, invented by the late Les Paul. By having the performers recorded while listening to a guide track of a recording, people can be in sync with the recording and blend with the parts they hear at the time. This allows us to take as many recordings as we want (within reason) of an individual singer and pick their best performance of a certain section of a song. This also gives us the freedom to record parts of a song within each recording session, which can, in turn, allow more time to be spent on harder sections. By having every single person record their parts individually the producer has more room to play around with the tracks and achieve the best possible sound.

2.4 Aesthetic Vision
It is important to keep in mind the desired sound one wishes to achieve from the singers in each song. As the director, it is required to ‘direct’ the singers to the desired, cohesive vision. Another important aspect of this vision is the wealth of postproduction tools and techniques that can be used to enhance (or occasionally detract) from the experience of the listener. While this is mainly the job of the producer, it is important for the director to be a part of the decisions for postproduction effects that will be introduced to the sound of the songs. While overproducing a song can take away from the natural feeling and style of a cappella music, a lack of production can
leave too many imperfections and flaws that disrupt the experience of the listener. On top of ironing out the imperfections, these effects can be used to make the experience feel more like a live performance. Even the most famous jazz ensembles will implement simple fade and balance effects to give the feeling that the band is actually surrounding the listener. This is a good example of how effects bring the performance closer to live performing. It is unlikely that this same ensemble would all be in front of the single listener, all equally distanced, and forming a wall of sound for this person to enjoy (the case where there are no fade and pan effects, and the volume of each instrument is the same as the others). Postproduction has its place but it is possible to take the experience too far.
Chapter 3 – Methodology
A well thought out plan can still change over its duration. Without each member of the group able to devote the same amount of time to the project, it is possible to incur delays. These delays help paint the real picture of the CD recording process and will help prepare those who attempt to continue this endeavor.

3.1 Timeline
To complete a project requiring as many people as a multi-track a cappella recording, it is important to be sure that a projected timeline for the project is complete before beginning the endeavor.

The initial timeline was based off of WPI 4-term system and an estimate of approximately two year from first recorded sound to hard-copy album. Pre-planning work was not included in the two-year time frame. We planned for a two-year timeframe instead of a one-year because we wanted to take into account our change of leadership each spring. We started recording in C term to alleviate the pressure around our B term show (traditionally the term where Audiophiles has their large invitational show).

The project was started in the spring of 2010 where 5 songs were completely recorded and some received an initial round of pre-production.

In the second year, it was clear that the changeover of leadership had imposed a major hindrance on the recording process and the entire project was postponed.

3.2 Organizing a Group Recording Project
As with any group endeavor the results would be useless without the support, work, and contribution from every member. When members feel as though this CD will represent not only
themselves but also the group and their friends/coworkers, members proved to be more inspired to work towards the final product. The successful releases of both Simple Harmonic Motion and the Technichords’ CDs were a wonderful motivating factor.

Another important way to gain support was through offering course credit. In an environment where there is already an overwhelming course load to maintain, giving a student the opportunity to get credit for something they find meaningful or interesting that is still thoroughly productive is a great way to obtain student dedication. Once again, the success of the other two a cappella groups does allow for a competitive mindset in the members of the a cappella group, and contributes to the motivation of each member. If there is more motivation on the whole, it is more likely that the final result will be successful.

3.3. Challenges / Recommendations
It is important to understand that WPI is a fast-paced education and students here are very busy. It is difficult to coordinate schedules.

Recording for credit opens schedules for director, recording engineer, and group member.

3.3 Preparation

3.3.1 Arranging and Rehearsing
In preparation for an album, you must first ensure that you have at least 10 – 12 strong arrangements that your group is comfortable singing. You must be sure these songs have adequate soloists and that the songs are well rehearsed.

3.3.2 Preparing for a session With the Recording Engineer
Preparing for a session entails making sure that the recording engineer you are working with has all the files necessary to record the songs for that session. There are many ways to prepare the recording engineer with the files they need to get accurate recordings. The recording engineer has
to have some type of audio to play into the singer’s ear to keep them in pitch and rhythm through
the song. The two types of audio files we used for the singer were MP3 and MIDI files.

3.3.3 MP3 Files of the Original Song as Audio Input
Generally studio recorded songs as they appear on their original albums have slight changes in
tempo consistently through the song, causing the tempo of the audio input to differ slightly from
the metronome unless you create a detailed “tempo map” of the song.
Some of the songs are not in the same key as the original. This means that the recording engineer
would have to change the key of the MP3 file; sometimes making it sound distorted.
Some singers would have a hard time singing along with just the MP3 because their part is not
expressly heard at all times.
Using MP3’s produce a “higher energy” sound because the singer is enlivened by the full range of
instrumentals and vocals in the original; keeping them alert focused and energetic when singing
their part. This keeps singers engaged and therefore typically on pitch and with better dynamic
variety.

3.3.4 MIDI Files of the Arrangement as Audio Input
It was easier and more straightforward to use MIDI files. No modifications needed to be made to
the input because the MIDI file was an exact copy of the arrangement. Midi files are tempo
sensitive and therefore can be sped up or slowed down easily to fit the needs of the song. Using
midi files as audio input had a tendency to cause laziness. The nature of a cappella arrangements
is to include many repeated notes and phrases. When singing back the repeated notes to a
dynamically static MIDI file, singers more easily lost energy, resulting in a loss of dynamic
attentiveness, rhythmic precision, and pitch accuracy. Because of the static nature of these MIDI
files there was also a tendency for singers to get lost in the piece and make mistakes.
3.3.5 Preparing group members for a session
Have each member come in for a “training session” if possible. It takes a substantial amount of
time to explain all the equipment, how the procedure works, and what they can expect. Make sure
they sing in the box during the training session to familiarize themselves with the “empty” feeling
of the box. It is called an isolation booth for a reason.
Some people will adapt easily while others will not. Make sure to allow plenty of time to acclimate
if it is necessary. Have group members print out copies of “just their part” to bring so they can be
tacked inside the booth as a memory aid (bringing the full score will not work because there can’t
be page turning in the booth. It is very easy to hear someone flipping pages). Even if they have the
song memorized, there is a chance that they will make mistakes. Be prepared to take several takes
in each recording session.

3.4 Multi-Track Recording
1. Record each group member singing only their part. Even if multiple people are singing the same
part, it is very difficult to correct any mistakes later if there are multiple singers on the same track.
2. Get two good takes of each person so that the two tracks can be layered to make the sound fuller
and more human.
3. If there are repeats in a song, a just one sampling of the section needs to be selected for the final
product. This will keep the sound consistent and will mean less time spent in the studio (but
possibly more time for the producer).
4. If the singers overemphasize dynamics, it will be easier to normalize the levels post-production.
5. Make sure that the singer is singing with the same or more enthusiasm when recording as when
they sing live, an unenthusiastic recording will produce a weaker album. It is even possible to give
them some sort of inspiration in the same way a director would for a stage play.
6. Record a song in small chunks rather than all at once. This gives the singer (and director) the ability to focus on specific issues and relieves a need for thorough memorization.

3.5 Post-Production
Copy and paste the best takes of each track through one iteration of the form of the song (a verse, a chorus, and any unique sections). When the basic framework is in place, you can check this for any major errors (timing, pitch, levels, etc) and then copy the takes throughout the rest of the song. Using auto-tune software at this point help take those recordings which are just outside of being in tune and snap them in causing the overall sound to resonate and ring well.
Balance the tracks so that no part is buried, but that the solo can be clearly heard on top of the mix.
Add appropriate effects to the individual voices (these are stylistic choices which can be handled by the producer and approved by the director). This step in post-production is the ‘mixing’ of the sound.
Add appropriate effects to the audio file as a whole. This is also a stylistic choice and is the ‘mastering’ step of post-production.
Do not let a single person decide on the final sound of any song. It is incredibly important to get second and third opinions from other people. It would be wise to have at least one person unrelated to the group give their critiques for a raw, unbiased opinion.

3.6 Further Considerations
In addition to the recording, there are a few more hoops to jump through before release. Because none of the songs are originals and we plan to make money of their distribution, a license must be purchased for each one. The album must be named, must have cover art, and the methods of distribution must be selected. As for the album name, find something the group can agree on.
Track listing is an art form, and sometimes very stressful. Trying to find the right flow between genres and songs is difficult. Whatever is finally decided will be set in stone forever as the official listing.

The opener should be high energy and should be able to grab the listener's attention, convincing them that it will be worth it to stick around for the rest of the album. The following tracks should bring the listener up and down on an emotional ride, ending with your most engaging number.
### Chapter 4 – Results

#### 4.1 - Tracks in Progress
Below is a list of tracks roughly in the order that they were recorded. The first six were completely recorded but never made it to production with the exception of Chim Chim Cheree. The last one was selected, but only the backing track recorded to prepare for recording the individual parts.

<table>
<thead>
<tr>
<th>Title</th>
<th>Year</th>
<th>Artist</th>
<th>Album</th>
<th>Arranger</th>
<th>Soloist</th>
<th>Harmonist</th>
</tr>
</thead>
<tbody>
<tr>
<td>The General</td>
<td>1998</td>
<td>Dispatch</td>
<td>Bang Bang</td>
<td>Michelle Terry</td>
<td>Jason Climer</td>
<td>Sean O’Brien</td>
</tr>
<tr>
<td>Don’t Stop Believing</td>
<td>1981</td>
<td>Journey</td>
<td>Escape</td>
<td>Steven Washington</td>
<td>Group</td>
<td>Group</td>
</tr>
<tr>
<td>Pure Imagination</td>
<td>1971</td>
<td>Leslie Bricusse, Anthony Newley</td>
<td>None</td>
<td>Tamlyn Miller</td>
<td>Carol Wood</td>
<td></td>
</tr>
<tr>
<td>Fidelity</td>
<td>2006</td>
<td>Regina Spektor</td>
<td>Begin to Hope</td>
<td>Michelle Terry</td>
<td>Katharine Mims</td>
<td></td>
</tr>
<tr>
<td>Chim Chim Cheree</td>
<td>1964</td>
<td>The Sherman Brothers</td>
<td>None</td>
<td>Joseph Strong, Michelle Terry</td>
<td>Carol Wood, Madison Dickson</td>
<td></td>
</tr>
<tr>
<td>Always</td>
<td>1994</td>
<td>Erasure</td>
<td>I Say I Say I Say</td>
<td>Christopher Petrie</td>
<td>Christopher Petrie</td>
<td></td>
</tr>
<tr>
<td>Far Over the Misty Mountains Cold</td>
<td>2013</td>
<td>Howard Shore</td>
<td>Original Motion Picture Soundtrack</td>
<td>Sean O’Brien</td>
<td>Christian LeCorps, Shreyas Renganathan</td>
<td></td>
</tr>
</tbody>
</table>
Chapter 5 – Conclusion
While the results were less than ideal, there was a substantial amount of information gained from this experience. There will always be issues with planning and scheduling, and the solution seems to be that you cannot try to make everyone happy. Some people will miss out on recording for certain songs due to their own scheduling constraints and, unfortunately, that’s life. This project, and its predecessors should be used as a guide to help future groups from repeating the same mistakes.
Bibliography
Roffo, G. (2011) From Isolation to Publication: Recording a Multi-Track A Cappella Album. Worcester Polytechnic Institute, Department of Humanities and Arts. Worcester: WPI.
Appendices
Appendix A – Sample Arrangement, Pure Imagination

Score

Pure Imagination

[Composer]
Pure Imagination

S:

A:

T:

B:

Doo Doo Doo doo

Doo Doo Doo doo

Doo Doo Doo doo

Doo Doo Doo doo

Doo Doo Doo doo

Doo Doo Doo doo
Pure Imagination

S
Doo Doo Doo Doo Doo Doo Dah

A
Doo Doo what Doo, Doo Dah

T
Doo Doo Doo Doo Doo Doo Dah

B
Doo Dah Doo Dah Dah Dah

S
Dah Dah Dah Dah Dah Dah

A
Dah

T
Bah

B
Dah Dah Dah Dah Dah Dah
you'll be free if you truly wish to
Doo Doo Doo  Doo Doo truly wish to
Doo  Doo Doo Doo Doo Doo Doo
Doo Doo Doo Doo
Pure Imagination

S

A

T

B

S

A

T

B
Pure Imagination

to it. No-thing to it. No-thing to it.

to it. No-thing to it. No-thing to it.

to it. No-thing to it. No-thing to it.

to it. No-thing to it. No-thing to it.

No. Pure imagination.

No. Pure imagination.


No. Doo. Doo Doo.