

# **Towards a Paperless Choral Classroom 2013**

*or*

*Improving the Integration of Technology for the Eastern American Choral Directors Association (EACDA)*

An Interactive Qualifying Project Report  
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Report Submitted to:

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## **Abstract**

Our group recommended the best ways to integrate new technologies into the annual Eastern American Choral Directors Association Conference. We worked with Robert Duff, President of the EACDA, to create these recommendations based on his vision and direction for the conference. We researched video conferencing tools, live streaming methods, music cataloging, and tech booth designs for our proposal. We presented our comparisons of these different tools to be used in future Choral Director Conferences.

# Acknowledgements

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Professor John Delorey

Professor Scott Barton

Robert Duff President of the EACDA

We are also grateful to the previous IQP teams who worked on this project.

# **Authorship**

This paper was written by the combined efforts of all group members.

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# Introduction

Choral music classrooms have not fully embraced many of the technological advances that could make for a more organized, efficient, and green classroom. This IQP team worked with the president of the Eastern American Choral Directors Association (EACDA) to create a booth at the EACDA conference to show directors and educators who attend the conference the benefits of integrating technology into their operations.

This project reorganized the Worcester Polytechnic Institute (WPI) choral music library and integrated technology into the EACDA. The IQP team continued work on organizing and building an online reference for the music library. The group also collaborated with the College of the Holy Cross to improve manual databasing. In addition, the IQP team conducted research to help integrate a technology booth into future EACDA conferences and give them a viable means of conferencing via computer. The goal of this project was to improve the existing choral music library system, ensure the accuracy of the database, and help bring technology into the EACDA.

## **Background Research / Literature Review**

The IQP group researched digital databases of music, video conferencing, live webcasting, choral microphones, and the GenieMobile smartphone app. The research on video conferencing helped the group to better communicate with its sponsor, and gave the EACDA conference members new avenues of communication in order to keep the conference running smoothly. The purpose of the research on live webcasting was to figure out a method of advertising and monetizing the conference for members who could not attend. The group researched choral microphones to use in streaming live choral performances at the conference over the web. Finally, the research on GenieMobile provided suggestions of how to integrate the app into the conference in 2014.

### **Online Database of Choral Music**

The Worcester Music Project online choral database is an online database showing not only the basic information for each piece in the database, but which institution in Worcester owns the music(Worcester music library.). This allows for an online searchable database that may promote collaborations between the choral groups in Worcester.(Akhtar et al., 2012)

In order to better understand the process of how to best add choral music data into the database, three members of the group, Jack Tyson, Sean O'Brien, and Janell Biczak went to The College of the Holy Cross and tested manual database input. The group members met with Alan Karass, head of the music library at Holy Cross, and recorded data from choral music scores into an Excel spreadsheet. The information recorded included title, composer, arranger, lyricist, publisher, date published, publisher number, and plate number. Plate number and publisher numbers are the most specific reference to an individual printing of a piece of music, thus the most important piece of identification for the database.

### **Video Conferencing**



The EACDA requested that a method for video conferencing be made available for the EACDA with an accompanying tutorial help the members familiarize themselves once the appropriate software was chosen. Three videoconferencing programs were selected for the initial research: Skype™, Google+™ Hangout™ (GH), and Wimba.

Before starting research on videoconferencing and streaming technologies, Professor Duff was asked to set requirements to help focus the research, with the overall goal to provide interactive video conferencing for a group of up to 27 people. The team then created a set of metrics to help streamline research and find the best solution. These metrics were:

- Price
- Ease of use
- Twenty-seven person capacity
- Video capabilities and screen sharing
- Other unique features

## **Skype**

Skype is a standalone video conferencing program that users must download and install on their computers(Skype.2013). Skype offers both free and premium versions. Skype is supported on Windows, Windows Phone 8, Mac OSX, iOS, and Android. In order to use Skype, users must have an email address and register to the Skype network. Users can create a contact list and use this list to initiate calls. Requests are sent to users if they are added to someone's contact. If two users would like to conference with each other, one of them can start the conference and the other must then accept it. Skype has a limit of ten users in any one conference call.

Skype is a dedicated conference client. It runs in the background, which allows the user to receive calls at any time as long as they are signed into the client. However, some of the features requested by the EACDA require that at least one user in the conference pay for the premium version

of the program. These features include conferencing with more than two people and screen sharing, which allows a user to show the other participants a live feed of his or her screen. At any time, a user may upgrade their free account to a premium account for periods of a day, a month, or a year. The Skype application has an install size of 50MB, which could be a problem for users with little storage space available on their computer.

## **Google+**

Google+ Hangout, one of Skype's competitors for video conferencing, was another client researched(Google+ hangout.). GH is a feature of the social media website Google+. GH is a free feature and is supported on Windows, Mac OSX, iOS, Chrome OS, Ubuntu and other Debian based Linux distributions, and Android. The program runs in a web browser and it is supported on Internet Explorer, Mozilla Firefox, Google Chrome, and Safari. Using GH requires a user to register for Google+ and then initiate a hangout within the website. GH requires the user to download a plugin for their web browser rather than a full application. Like Skype, a contact list is used to initiate conferences and requires an email account to sign up for. Unlike Skype, the plugin does not run in the background, requiring the user to be signed into Google+ at the time of the conference call. GH has no ads and supports group conferencing with up to 10 people as well as screen sharing without a paid subscription.

## **Wimba**

Wimba is primarily a teaching tool that also fills the requirements(What is wimba classroom?2009). Wimba is free through WPI accounts and is web based. Wimba can be run on supported on Windows, Windows Phone 8, and Mac OSX. The program is web based and is supported on Internet Explorer, Mozilla Firefox, Google Chrome, and Safari. There are many benefits to the Wimba system. Wimba has all the same features a GH and Skype along with several other features.

The features that would benefit the ADCA are polling, private text chat, and participant indicator that allow the users to indicate a raised hand and step-in/step-out. Wimba does not recommend the use of video in large groups. Instead Wimba promotes the use of a digital picture.

## **Live Webcasting**

As the EACDA conferences have many seminars and live performances, professor Duff proposed that live webcasting could be a useful tool for allowing the performances to be viewed by people who could not attend the conference or for overbooked performances. His hope was that live webcasts could be used to stream live performances through a video camera to the internet, which could be presented on a dedicated website. This website could be viewed by those who have permission, or only streamed to other locations at the conference.

There are several live webcasting platforms available, and they each have their own advantages. Some include assistance and equipment, and others are aimed for self-installation and self-operation. Webcast Inc. is a company that includes all of the pre-event services, equipment, and personnel required to broadcast the seminar(Webcast inc.). UStream is an alternative option. It is a free service, but does not include equipment or personnel for the conference(Ustream.2013). Livestream was an additional option researched. Livestream could provide all of the levels of service the EACDA were interested in researching from self-service to full service(Live stream.2013). Livestream can provide all of the event services the Webcast Inc. offered and the convenience of Ustream. It had multiple tiers of service available, and would also allow the EACDA to archive our videos online.

## **Choral Microphones**

The EACDA requested that the group research USB/Firewire microphones for choral performances. Two types of microphones were researched. The first were microphones that connected directly to the computer via USB. The second were microphones that connect via a USB or Firewire

interface preamp. Multiple configurations were researched to provide the best possible options to the EACDA.

Two microphones were researched the Blue Yeti Pro, and the Rode NT55. The Yeti Pro has both XRL and USB connections. This means that the microphone does not require a separate preamp(Blue yeti pro.2013). The Yeti also has variable polar patterns giving it great flexibility, and adjustable preamp gain to adjust to different levels. The NT55 only has XLR out meaning a separate preamp is needed, but because of its more specialized design it can give greater performance(NT55.2013). The NT55 has interchangeable capsules that allow the user to pick between a omnidirectional and cardioid polar pattern. Both of these microphones are vast improvements over the microphones found in a webcam or laptop.

Preamps were researched to allow the use of the NT55 and stereo microphone setups. Both the microphones researched had XRL out, based on this preamps with XRL in were researched. The two chosen were the Focusrite Scarlett 2i2, and the M-Audio Profire 610. The primary difference between these preamps is the interface with the Profire 610 using Firewire(M-audio profire 610.2013), and the Scarlett 2i2 using USB. Both of the preamps have two XLR inputs and adjustable gain.

## **GenieMobile**

GenieMobile will be providing a smartphone app for the conference. This app will be used to view schedules, receive information & handouts from presenters, and RSVP to events.. Preliminary research was done on previous GenieMobile apps. The team downloaded an app made for another conference. The app was hard to read because of the background image, which the EACDA committee will choose for their app. Research was also done on the GenieMobile proposal (*GenieMobile mobile app proposal*2012). This research should be continued when the final app is available in June.

# Methodology

There are many technologies to help present choral music in a wide variety of ways. The goal of this project was to recommend ways improve the use of technology by the EACDA. These recommendations will be presented in a Technology Booth at the EACDA 2014 Conference in Baltimore, Maryland, February 5 – 8. The team started researching choral music databases for the duration of A-Term. In B-Term the areas of interest were group video conferences and live streaming. The team also did research in C-Term to help the committee plan for the exhibit, including estimating how much space and equipment would be needed.

The first task of cataloging choral music was aimed to expand the possibilities of sharing choral music digitally. The team began researching by recording non-catalogued sheet music in WPI's own library. This has been a recurring project within the WPI Music Division; many other IQP teams have also worked with the library (Akhtar et al., 2012). A small team was sent to College of the Holy Cross's music library to analyze their methods in order to improve the WPI implemented cataloging methods and to begin adding the music to the WPI database. The team met with Professor Alan Karass, an expert in the publishing notations of music, to help improve the accuracy of the database. In many instances there are versions of songs that have been arranged, transcribed, or rewritten in some way. There are many properties of sheet music that could be added to make the database more comprehensive, i.e. the year published, publisher, publisher number, plate number. These are in addition to the basics, which include composer, arranger, lyricist, and title, among others.

In the music library of College of the Holy Cross, the team took a section of alphabetically organized choral music and began inputting them into spreadsheets. The columns in the spreadsheet were made with the relevant characteristics of the music. The whole process was very arduous because not all pieces of music had the same categories of information. This meant some of the music needed to be deciphered to extract the important information. Even after several hours in the music library, few

pieces made it into the spreadsheet. However, the group successfully learned the issues with manual databasing. Prior musical experience (specifically choral) was very helpful because it allowed the group to quickly find the information in the sheet music to fill in the spreadsheet columns. Without this experience, there would have been a much higher learning curve and the whole process may have been more tedious.

There are many other possibilities for performance and display options for the exhibit. Professor Scott Barton has been designing musical performance robots that play the instruments mechanically rather than a computer producing music using digital sound banks. There is also a program that synthesizes a Virtual Orchestra, designed by Professor Frederick Bianchi of WPI, for directors to practice with in real-time. Both of these exhibits show the convention attendees new ways to use technology to further their own goals.

To determine how the Tech Booth exhibit should be designed, our team consulted Professor Robert Duff of Dartmouth College, the current President of the EACDA over the internet using Google+. The Technology Hub is aimed to be a centerpiece of the conference, to focus on the importance of technology in society today and how it affects music and music education. Our group began to design the booth to accentuate this by ensuring all the displayed projects and features are presented in an interesting and engaging way to the people attending the conference.

Before starting research on videoconferencing and streaming technologies, Professor Duff set requirements to focus the research, which fell into three categories. The first was to provide interactive video conferencing for a large group. The second was to allow performances at the convention to be viewed by people who could not attend. The final set of requirements defined the need to stream performances from groups not at the conference to the conference. For each of these requirements the team created a set of metrics to help streamline research and find the best solution. These metrics included factors such as price, ease of use, and relevant features to determine which option researched

would be the best choice. The result of the research would be presented to the advisors and the president of the EACDA with the recommendations.

To determine which program to use to accomplish group video conferencing, the team researched and tested the programs. The team used Google+ initially, and encountered some non-trivial problems. There were problems with hardware, which must be addressed on a user-by-user basis. Google+ has a less direct process of adding contacts, as adding another person to a “circle” does not send that person a request to be added to their circles. The team also researched Wimba through a number of professors at WPI who use it.

Professor Duff requested a short PDF tutorial be made for the committee that would be using Google+ until Wimba is made available to them. The tutorial covers all of the steps of creating accounts, adding contacts, software compatibility, and videoconferencing. The team used Google+ throughout the project, and the problems faced during research were used to determine what was necessary to include in the tutorial. The tutorial includes screenshots and detailed directions so that it can be followed by people less familiar with the technology. The tutorial that was delivered to Bob can be seen in the Appendix.

The EACDA requested that the exhibit have a way to stream performances from the conference to people who could not attend the performances.

The metrics developed for this requirement were:

- Large number of viewers
- High quality stream
- The setup and configuration requirements
- Cost of streaming

The team discussed the possibilities of streaming performances on the internet so they could be viewed anywhere versus only streaming them to the Tech Booth and other areas of the conference using

projectors and screens. The team decided to base its recommendation on the metrics of stream quality, broadcaster audio quality, ease of setup, and price.

To ensure the best possible presentation of choruses outside the conference, the team researched USB microphones to ensure that the EACDA could capture the sound of the performance adequately. The metrics for this task were compatibility with streaming software, price, ease of configuration, and various audio quality metrics (including bit depth, polar pattern, and frequency response). These metrics were chosen because without microphone compatibility the system would not be useful. Similarly, if the system does not improve the quality of the sound being streamed it is not worth the extra cost and setup time. If, in the end, the user cannot get the recommended system to work then it does not meet the requirements. Finally, even if the system allows for a massive increase in sound quality it may not be worth the investment if the costs are too high. The results of this research were presented to the president of the EACDA, professor Duff.

The requirements for the Technology Hub layout included the need for performance space, workstations for use with the presentations, and methods of displaying streaming or recorded performances. The metrics were chosen to create a space that will be accessible, educational, and efficient. The team used these metrics to narrow the initial designs down to a circular stage surrounded by workstations, so that guests could circulate through the displays without blocking foot traffic and so that the center stage could be viewed by everyone at the conference when there was a performance.



# Conclusions

The group made recommendations in four categories:

- Video conferencing,
- Live streaming,
- Live streaming microphone
- Music cataloging, and the
- Tech booth for conferences.

## Video Conferencing

The EACDA committee consists of 27 members, which meant that neither Skype nor Google+ Hangout are viable options due to volume limits. Wimba does not recommend using video with groups that large, so it does not meet the initial requirements, but Wimba has many positive features that would benefit a large group, such as an electronic whiteboard, polling, and public and private text chat. In spite of not using video, Wimba is the most viable option for our sponsors' current needs because it includes all of the same functions as the other clients, and its use at several universities showcases Wimba's reliability.

## Live Streaming

LiveStream is offered at three levels, self-service, partial service and full service. The self-service provides the user no equipment and requires the user setup and maintain the streaming. The partial service involves using LiveStream hardware and having the user do the streaming. The full service option involved LiveStream handing hardware, recording, and streaming with their own personnel. The partial service option was selected to stream the performances happening at the conference. This is due to the software being simple to use and the LiveStream hardware would help

prevent issues in that area. At the same time this allows future IQP teams control over what the EACDA would show. The self-service option is recommended to stream outside performers into the conference as it is simpler to have third parties supply their own hardware.

## **Live Streaming Microphone**

Based on the research done on microphones for live streaming the group suggested the use of a stereo microphone setup using a dedicated preamp. The suggested setup uses a matched pair of Ride NT55's connected to either an M-Audio Profire 610 or the Focusrite Scarlett 2i2 depending on if the end user is using Firewire or USB respectively. This setup is intended to maximize the audio quality for streaming while keeping the system simple enough to not require additional training. The stereo setup gives better audio quality than mono. The NT55 was chosen because it gives a more even frequency response and polar pattern. Thus it is easier configure the audio system for the specific environment the chorus is in. The major drawback to the suggested system is that it is not compatible with tools such as Skype, but does work with tools such as Live Stream. The M-Audio Profire 610 has been tested with Live Stream and shown to support stereo audio input. Future IQP teams should test the suggested setup with the streaming service that is selected.

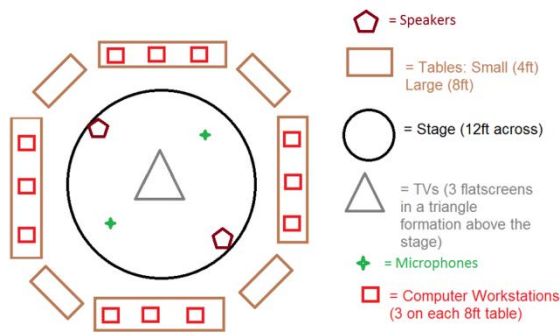
## **Music Cataloging**

Part of the process of this IQP was continuing the integration of technology to the daily functions of the EACDA. To this end the group worked to continue the use of the WPI choral library, and adding pieces of music to it. The team also went into the current paper music library and disposed of music that was no longer needed due to the new database. This process included saving at least one copy of each piece of music to be kept elsewhere for prosperity. The rest of the sheet music was recycled.

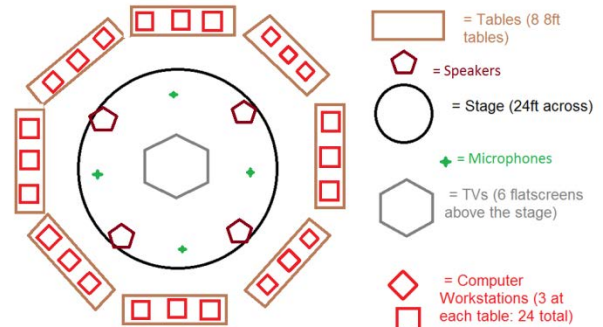
A large portion of the choral sheet music at WPI has already been organized into an online database. As current and future choral directors expand the music library there will be a need for students to continue to input this music into the database. The next step will be to have a digital representation of all of the music in the library (either by finding digital forms or by manually scanning the music) and associating these files with the database. We can then distribute access to students to view the music on digital devices.

## Tech Booth

The IQP team created 2 designs for Professor Duff, one being about twice as large as the other. The Tech Booth designs are very similar. The larger one has the same features on a greater scale (more TVs, tables, etc.). The Tech Booth acts as a central information hub for the conference, live performance area, and an exhibition to present ways technology is being incorporated in choral music. The next IQP group will have the final say as to what will be shown on the TVs as well as the schedule of events for the Tech Booth.



**SMALL TECH BOOTH DESIGN**



**LARGE TECH BOOTH DESIGN**

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# Appendix

## Weekly Meeting Minutes

September 24, 2012

ACDA2012

Kevin Burns (CH), Sean O'Brien (SEC), Prof. Delorey (ADV)

### 1. Minutes

- Wednesday 09/26, 1-3pm; sorting music/orchestra pile
- Wednesday 10/03, Holy cross, 2pm, meeting with Alan
- Alan knows what's up if we have questions
- Go to library and learn endnotes/refworks
- Grant will be done beginning of B term **\*\*important\*\***

### 2. Accomplished since last meeting/Old Business

- Getting the group organized

### 3. Discussion/New Business

- Wednesday 09/26, 1-3pm; sorting music/orchestra pile
- Wednesday 10/03, Holy cross, 2pm, meeting with Alan
- Alan knows what's up if we have questions

- Go to library and learn endnotes/refworks
- Grant will be done beginning of B term **\*\*important\*\***

**4. To Accomplish by next meeting/Action items**

- Wednesday 09/26, 1-3pm; sorting music/orchestra pile
- Go to library and learn endnotes/refworks

**Goal Statement:** Currently the group is sorting music and learning endnotes/refworks.

**October 01, 2012**

ACDA2012

Sean O'Brien (CH), Biao Zheng (SEC), Prof. Delorey (ADV)

**1. Minutes**

- Cataloged orchestral music
- Spreadsheets are currently google docs
- Concert venue - first baptist church (March)
- Use reference library if possible
- TODO:Go to Holy Cross on Wednesday at 2pm
- TODO:Bug TC about numbering
- TODO:Create PowerPoint - get a tech suite
  - Logos on website should be on ppt
  - Serif font

**2. Accomplished since last meeting/Old Business**

- Cataloged orchestral music
- Spreadsheets are currently google docs

**3. Discussion/New Business**

- Go to Holy Cross on Wednesday at 2pm



- Bug TC about numbering
- Create PowerPoint - get a tech suite
  - Logos on website should be on ppt
  - Serif font

#### **4. To Accomplish by next meeting/Action items**

- Go to Holy Cross on Wednesday at 2pm
- Bug TC about numbering
- Create PowerPoint - get a tech suite
  - Logos on website should be on ppt
  - Serif font

**Goal Statement:** Currently the group is sorting music and learning endnotes/refworks.

**October 24, 2012**

ACDA2012

Biao Zheng (CH), TODO (SEC), Prof. Delorey (ADV)

## **1. Minutes**

- Presentation Notes:
- Title Slide
  - Sponsor Logo on Title Slide
- Overview
  - 2nd slide "table of contents"
- Background – Why?
- Robert Duff (pres of Dartmouth) asked to show a comparison of video chat software
  - looked at this that and the other thing
  - decided to focus on Skype and Google +
  - everyone on laptops
- Research
  - Format such that bullet points are parallel
  - include cost analysis
  - CONSISTENCY
  - don't leave 1 word on new line
- Methodology -
  - Put 'answer' first

- don't include course of action
- Conclusion
- References
- Questions?

## **2. Accomplished since last meeting/Old Business**

- Kevin & John Presented on Video Chat Software
- Google +: Best choice for video Conference
- Good Point: said words not on screen

## **3. Discussion/New Business**

- Online access/purchasing of mp3s
- making spreadsheet

## **4. To Accomplish by next meeting/Action items**

- conference call @ 2:30 w/ Bob Duff
- Jack, Sam, Biao - presentation of HOW TO GOOGLE CHAT - meeting Friday @ 12
- update PowerPoint - John/Kevin -Fri @noon

**Goal Statement:** Currently the group is communicating with Bob Duff and picking the best video chat option.

**November 01, 2012**

ACDA2012

TODO (CH), Sam Stadlander (SEC), Prof. Delorey (ADV)

**1. Minutes**

- Started taking about the Tech Center
  - What do we want
  - Test app
  - social networking
- Critiqued Google+ Hangout PowerPoint
  - All slides need to be numbered and have WPI and ACDA logos on them
  - Title slide should include students majors and year
  - Be careful when using colons
  - Expand on Instructions
  - Use less white space with graphics
  - Have a slide for questions

**2. Accomplished since last meeting/Old Business**

- Made a powerpoint about how to use Google+ Hangout

**3. Discussion/New Business**

- Started taking about the Tech Center
  - What do we want
  - Test app
  - social networking

**4. To Accomplish by next meeting/Action items**

- Janell and Merrielle redo slides
- Jack organize a hangout
- Delorey email Duff about a 2:30 hangout during meeting and email out notes
- Everyone should know how to use sharepoint

**Goal Statement:** Currently the group is beginning to discuss the recommendation for the tech booth.

**November 07, 2012**

ACDA2012

Sam Stadlander (CH), John Arnold (SEC), Prof. Delorey (ADV)

**1. Minutes**

- Video Conference with Bob Duff failed
- one on one with Bob Duff (Jack/Merrielle)
- Bob's needs (when2meet)
- Timeline
- App for conference. Look at it (JFD will send us access)
- Technology for exhibition (Listening/reading stations, Internet access, other things)
- video conference done by the weekend
- Start researching live webcasting for conference (Kevin)
- Store for Conference buyables (Bao) iTunes?

**2. Accomplished since last meeting/Old Business**

- Video Conference with Bob Duff failed

**3. Discussion/New Business**

- Timeline
- App for conference. Look at it (JFD will send us access)
- Technology for exhibition (Listening/reading stations, Internet access, other things)

- video conference done by the weekend
- Start researching live webcasting for conference (Kevin)
- Store for Conference buyables (Bao) Itunes?

#### **4. To Accomplish by next meeting/Action items**

- one on one with Bob Duff (Jack/Merrielle)
- Bob's needs (when2meet)
- Timeline
- App for conference. Look at it (JFD will send us access)
- Technology for exhibition (Listening/reading stations, Internet access, other things)
- video conference done by the weekend
- Start researching live webcasting for conference (Kevin)
- Store for Conference buyables (Bao) Itunes?

**Goal Statement:** Currently the group is conducting research and waiting to get in contact with Bob in order to better understand what he needs.

**November 14, 2012**

ACDA2012

John Arnold (CH), Merrielle Ondreicka (SEC), Prof. Delorey (ADV)

**1. Minutes**

- All attempts to contact Bob Duff failed
- Bao looked up how to sell apps on iTunes
- Kevin Researched live webcasting for confrence
- Research Genie Mobile App (Sean / Sam)
- Store for Conference buyables (Bao) iTunes?
- Webcasting summary (Kevin/Janell)
- One on one with Bob Duff (Jack/Merrielle)
  - Bob's needs
  - Timeline from Bob
  - Technology for exhibition (Listening/reading stations, Internet access, other things)
- Send out When2Meet to Hangout with Bob (after we get in contact)
- Google+ Hangout with Bob
  - Tutorial via Google+ with Bob Duff (Jack/Merrielle)

**2. Accomplished since last meeting/Old Business**

- All attempts to contact Bob Duff failed
- Bao looked up how to sell apps on iTunes



- Kevin Researched live webcasting for confrence

### **3. Discussion/New Business**

- Research Genie Mobile App (Sean / Sam)
- Store for Conference buyables (Bao) iTunes?
- Webcasting summary (Kevin/Janell)

### **4. To Accomplish by next meeting/Action items**

- One on one with Bob Duff (Jack/Merrielle)
  - Bob's needs
  - Timeline from Bob
  - Technology for exhibition (Listening/reading stations, Internet access, other things)
- Send out When2Meet to Hangout with Bob (after we get in contact)
- Google+ Hangout with Bob
  - Tutorial via Google+ with Bob Duff (Jack/Merrielle)

**Goal Statement:** Currently the group is conducting research and waiting to get in contact with Bob in order to better understand what he needs.

**November 28, 2012**

ACDA2012

Merrielle Ondreicka (CH), Janelle Biczak (SEC), Prof. Delorey (ADV)

**1. Minutes**

- one on one with Bob Duff\_ (Jack/Merrielle)
- Bob's needs (when2meet)
- Timeline
- App for conference. Look at it (JFD will send us access)
- Technology for exhibition (Listening/reading stations, Internet access, other things)
- video conference done by the weekend
- Start researching live webcasting for conference (Kevin)
- **Store for Conference buyables (Bao) Itunes?**
- Tutorial via Google+ with Bob Duff (Jack/Merrielle)
- iTunes summary (Bao)
- Webcasting summary (Kevin)

**2. Accomplished since last meeting/Old Business**

- one on one with Bob Duff\_ (Jack/Merrielle)
- Bob's needs (when2meet)
- Timeline
- App for conference. Look at it (JFD will send us access)
- Technology for exhibition (Listening/reading stations, Internet access, other things)
- video conference done by the weekend
- Start researching live webcasting for conference (Kevin)
- **Store for Conference buyables (Bao) Itunes?**

**3. Discussion/New Business**

- Tutorial via Google+ with Bob Duff (Jack/Merrielle)
- iTunes summary (Bao)
- Webcasting summary (Kevin)

**4. To Accomplish by next meeting/Action items**

- Certain actions will be apparent before the meeting, others will be created from the action items gathered in the meeting.

**Goal Statement:** Currently the group is beginning to discuss the recommendation for the tech booth.

**December 05, 2012**

ACDA2012

Janell Biczak (CH), Jack Tyson (SEC), Prof. Delorey (ADV)

**1. Minutes**

- Tech Booth Brainstorm:
- Center of the exhibit
- can showcase anything we can think of that is interesting
- performances of the conference
- virtual choir/orchestra/other things to play with
- learning tools
  - conference can be geared towards a younger crowd
- live video streaming to booth instead of internet an option?
- Cool things professors Barton/Bianchi are doing
- robot instruments-actuating digital music vs speakers
- developing relationship between technology and music

**2. Accomplished since last meeting/Old Business**

- Jack/Merrielle talked to Bob
  - showed him Google ppt
  - found out about streaming
  - first priority is now the Tech booth, and we need ideas

- Finished Streaming ppt

### **3. Discussion/New Business**

- Talk to Prof. Barton—Sean/Biao
- Send ppt and recap to Bob—done
- Paper rough draft
- Intro/format—John
- Background Research—Sean/Merrielle
  - what we've learned
  - goal: recommendation for next year/tech booth for this year
- Citations--Sam

### **4. To Accomplish by next meeting/Action items**

- 

**Goal Statement:** Currently the group is beginning to discuss the recommendation for the tech booth.

**January 16, 2013**

ACDA2012

Jack Tyson (CH), Merrielle Ondreicka (SEC), Prof. Delorey (ADV)

## **1. Minutes**

- Sean / Merrielle : teach Wayne Abercrombie google hangout ewa@umass.edu
- Jack / Kevin : talk to bob about genie mobile, get date for conference in 2 weeks
- Sam / John : do the paper
- Janelle : talk to prof Manzo about if he's interested in the tech booth for next year
- Bao / Janelle : get conference ready – 1on1 w/ bob in 2 weeks about genie mobile? or possibly booth recommendation
- Paper :
  - finalize your drafts of the paper!!
  - John will read stuff on the dropbox **Saturday morning**
  - check dropbox for example paper format
  - everything shall done on powerpoints from now on -> this will become the paper
  - put holy cross stuff in the appendix

## **2. Accomplished since last meeting/Old Business**

- Jack / Merrielle : ppt in the dropbox
- John : waiting on abstract, intro skeleton done
- Everyone worked on the paper

## **3. Discussion/New Business**

- Sean / Merrielle : teach Wayne Abercrombie google hangout ewa@umass.edu
- Jack / Kevin : talk to bob about genie mobile, get date for conference in 2 weeks
- Sam / John : do the paper

- Janelle : talk to prof Manzo about if he's interested in the tech booth for next year
- Bao / Janelle : get conference ready – 1on1 w/ bob in 2 weeks about genie mobile? or possibly booth recommendation

#### **4. To Accomplish by next meeting/Action items**

- Sean / Merrielle : teach Wayne Abercrombie google hangout ewa@umass.edu
- Jack / Kevin : talk to bob about genie mobile, get date for conference in 2 weeks
- Janelle : talk to prof Manzo about if he's interested in the tech booth for next year

**Goal Statement:** Currently the group is working on the paper.

**January 23, 2013**

ACDA2012

Merrielle Ondreicka (CH), Kevin Burns (SEC), Prof. Delorey (ADV)

**1. Minutes**

- This week's secretary assigned power point to run the next meeting due on Tuesday (Kevin)
- Debrief from meeting with Bob (all)
- Paper components to be in drop box by Thursday night (all)
- Paper to be put together by Saturday (John/Sammie )

**2. Accomplished since last meeting/Old Business**

- Talk Wayne about Google+
- Talk to Bob about gene mobile
- Set up meeting with Bob at 2pm on Wednesday
  - Meeting agenda
    - gene mobile
      - identify concerns
      - get students involved next year
    - Google chat
      - already talked to Wayne
    - tech booth
      - 12 students and 3 faculty next year
      - Performance space

**3. Discussion/New Business**

- This week's secretary assigned power point to run the next meeting due on Tuesday (Kevin)



- Debrief from meeting with Bob (all)
- Paper components to be in drop box by Thursday night (all)
- Paper to be put together by Saturday (John/Sammie )

**4. To Accomplish by next meeting/Action items**

- This week's secretary assigned power point to run the next meeting due on Tuesday (Kevin)
- Debrief from meeting with Bob (all)
- Paper components to be in drop box by Thursday night (all)
- Paper to be put together by Saturday (John/Sammie )

**Goal Statement:** Currently the group is making powerpoints for every meeting.

**January 30, 2013**

ACDA2012

Kevin Burns (CH), Jack Tyson (SEC), Prof. Delorey (ADV)

## **1. Minutes**

- Conference with bob Notes:
  - App will be functional June 1, possibly sooner
  - (functional as in content can be uploaded and formatted)
- Time to talk Tech Hub schematics
  - Tvs mounted above stage?
  - stage size?
  - hub placement/organization
  - screens on counter, people don't sit, keep moving
  - ways to keep people moving in/out
  - dont want traffic
- GenieMobile will have printing stations set up, we do not do that
- Bob wants us to think big with the hub, it will be large and in the center of the hall
  - set the tone

## **2. Accomplished since last meeting/Old Business**

- Confrence with Bob

### **3. Discussion/New Business**

- Kevin--please send Bob the final streaming ppt
- John,Sean,Merrielle--get paper ready
- Sam--sketches of preliminary floorplan possibilities
- Jack--Idiot proof tutorial pdf
- biao--Look up "Wimbo" or other paid video chat software, as google+ backup

### **4. To Accomplish by next meeting/Action items**

- meeting time next week is the same time 330-430
- To do for week:
- Kevin--please send Bob the final streaming ppt
- John,Sean,Merrielle--get paper ready
- Sam--sketches of preliminary floorplan possibilities
- Jack--Idiot proof tutorial pdf
- biao--Look up "Wimbo" or other paid video chat software, as google+ backup

**Goal Statement:** Currently the group is working with Bob on the tech booth.

**February 06, 2013**

ACDA2012

John Arnold (CH), Jack Tyson (SEC), Prof. Delorey (ADV)

**1. Minutes**

- Tech suite time (paper)
- Bob expecting a list of equipment by Mar 1 (Kevin = mics)
- Skype/Wimba? (Baio on Wimba) (Janell on Skype)
- Contact southern conference Janell/John (Email bob)
- Proper presentation for Genie (done)
- Master powerpoint for next week (John)
- Wired connection for videoconferencing (John/Janell ask Bob) (Kevin cable) (Shaun external mic)
- Collect narrative/history of how we got here (Merrielle)
- Sam present and describe stage designs in ppt

**2. Accomplished since last meeting/Old Business**

- Videoconferencing issues
- Meeting with bob
- Paper
- Stage layouts
- Google+ tutorial (Jack is still working)

**3. Discussion/New Business**

- Tech suite time (paper)
- Bob expecting a list of equipment by Mar 1 (Kevin = mics)
- Skype/Wimba? (Baio on Wimba) (Janell on Skype)
- Contact southern conference Janell/John (Email bob)

- Proper presentation for Genie (done)
- Master powerpoint for next week (John)
- Wired connection for videoconferencing (John/Janell ask Bob) (Kevin cable) (Shaun external mic)
- Collect narrative/history of how we got here (Merrielle)
- Sam present and describe stage designs in ppt

#### **4. To Accomplish by next meeting/Action items**

- Meeting at 4:00 next week
- Sam and John Meeting 7:00 Friday CC for stage ppt
- John and Janell meeting at 12 Thursday CC for bob contact

**Goal Statement:** Currently the group is working with Bob on the tech booth and making master powerpoints each week.

**February 20, 2013**

ACDA2012

Sean O'Brien (CH), Janell Biczak (SEC), Prof. Delorey (ADV)

## **1. Minutes**

- Kevin/Sam: talk to bob about your sections, tech booth setup, ask about how important video is, group questions:
  - also need internet access (will there be wireless? will it be unreliable?)
  - Reading session
    - have pdf of music and way to link directly to recording of it
  - Multi-cultural sessions (ask Bob about this next week)
  - Stream Concerts
  - Live Performances
    - Where will they be placed?
  - Robotic Performances
  - ask where all of these performances should be
  - Speakers to make announcements

## **2. Accomplished since last meeting/Old Business**

- Duff meeting did not happen along with everything
- Email things to Delorey
- “bob’s email”
- When to meet created for writing paper

## **3. Discussion/New Business**

- -

#### **4. To Accomplish by next meeting/Action items**

- Kevin/Sam: stuff mentioned above
- John: give updated paper sent to delorey
- Sean/Merrielle: update section
- Jack/Kevin: more
- Janell: Results Conclusion

**Goal Statement:** Currently the group is working with Bob on the tech booth and finalizing the paper.

**February 27, 2013**

ACDA2012

Janell Biczak (CH), Jack Tyson (SEC), Prof. Delorey (ADV)

**1. Minutes**

- Paper
  - look up papers for format
  - APA6 (Refworks)
  - make it simple and to the point
- Background/methodology/conclusions mostly done
  - On email and Dropbox

**2. Accomplished since last meeting/Old Business**

- What didn't happen:
  - presentation, usually iqps are presented
  - miscommunications from sponsor
- Kevins meeting with bob
  - Mics-OK
  - Unify idea of what is going to be there- next IQP group's work



### 3. Discussion/New Business

- Dumb the tech booth down
  - no live performances
  - robots are good
  - Information screens about whats coming next
  - ppts looping
    - bios of groups/people

### 4. To Accomplish by next meeting/Action items

- work on the paper until next Wednesday at the latest
- Surveys and the IRB (Institutional Review Board)
  - Recommendation for next year: *\*\*make a survey for the ACDA about their needs to send out in B term\*\**
- Wimba stuff for paper
  - recommend next year's group to look at Wimba

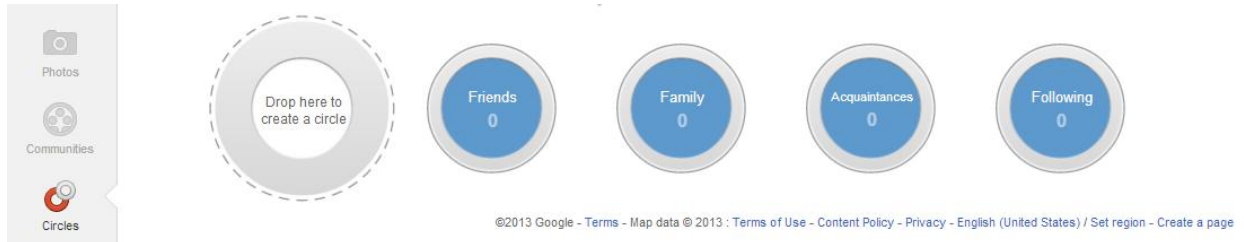
**Goal Statement:** Currently the group is in the end stages and is finalizing the paper.

## Google + Tutorial

- 1) Create a Google+ Account, you can upgrade if you already have any Google account

[www.plus.google.com](http://www.plus.google.com)

- 2) Add people to your Circles that you want to chat with

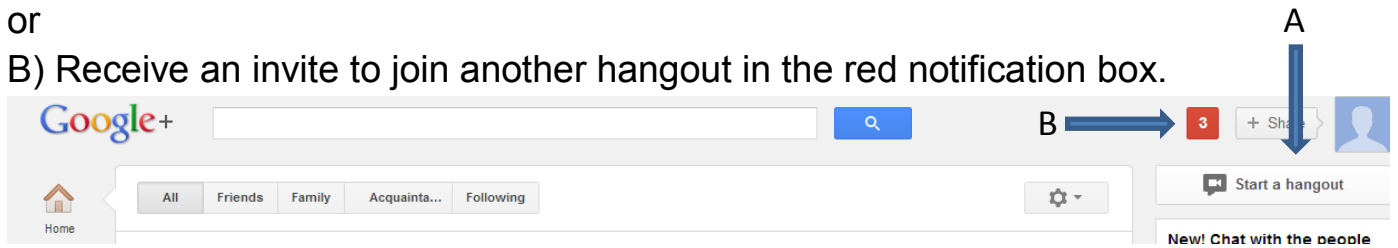


***\*\*they must be in one of your circles if you want to chat with them\*\****

- 3) A) Start a new hangout and invite people to it.

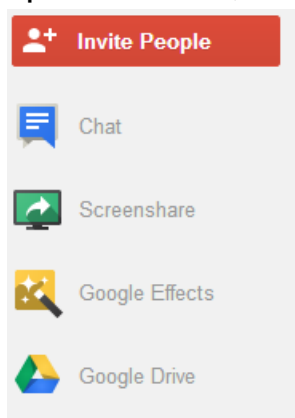
or

- B) Receive an invite to join another hangout in the red notification box.



- 4) Install plugin (first time only)

- 5) Once in the “Hangout”, you can create & share documents (pdfs, spreadsheets, and word docs), share whatever is on your screen



ORGANIZING THE MUSIC LIBRARY  
&  
CATALOGING SYSTEMS TRIAL  
TEST SUBJECT: HOLY CROSS



*Presented by*

*Janell Biczak*

*Sean O'Brien*

*With help from*

*Sam Stadlander*

*Jack Tyson*



OVERVIEW

- ❖ Cleaned WPI Music Library
- ❖ Organized and Recorded Orchestra Music
- ❖ Decided Spreadsheet Layout
- ❖ Cataloged Holy Cross Music

# ORCHESTRAL

❖ Spreadsheet Had 4 fields

- Year
- Title
- Composer
- Voicing/Orchestration

❖ Missing information

# HOLY CROSS

❖ Received Expert Advice from Alan

❖ Revised Spreadsheet, new categories include

- Lyrist
- Arranger/Other Contributor
- Plate Number
- Publisher
- Publisher Number
- Year
- Biblical?

# Google+ Hangout Tutorial

Janell Biczak, Class of 2014, Industrial Engineering

Merrielle Ondreicka, Class of 2014, Computer Science

Background

Instructions

- Create a Google+ account
- Creating a “Hangout”
- Install Plugins
- Inviting People to the Hangout
- Joining a Hangout
- Screenshare
- Adding from Google Drive

Tips and Tricks

Google+ is best option

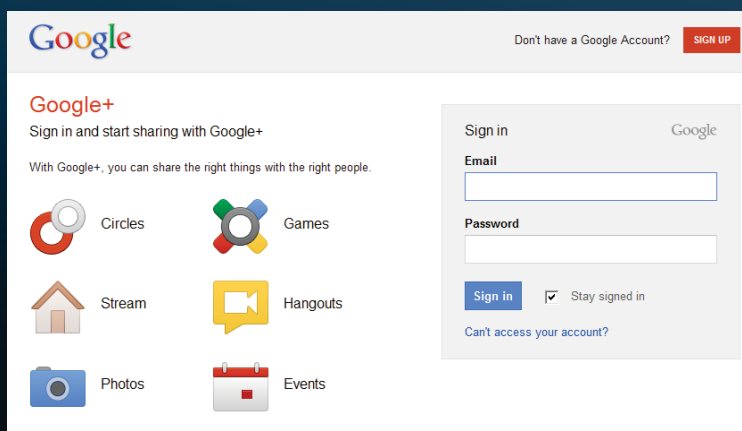
As shown in John and Kevin's comparison of video chat conference options

Set up our own Google+ accounts

Made a tutorial

## Create a Google+ account

Go to [www.plus.google.com](http://www.plus.google.com)



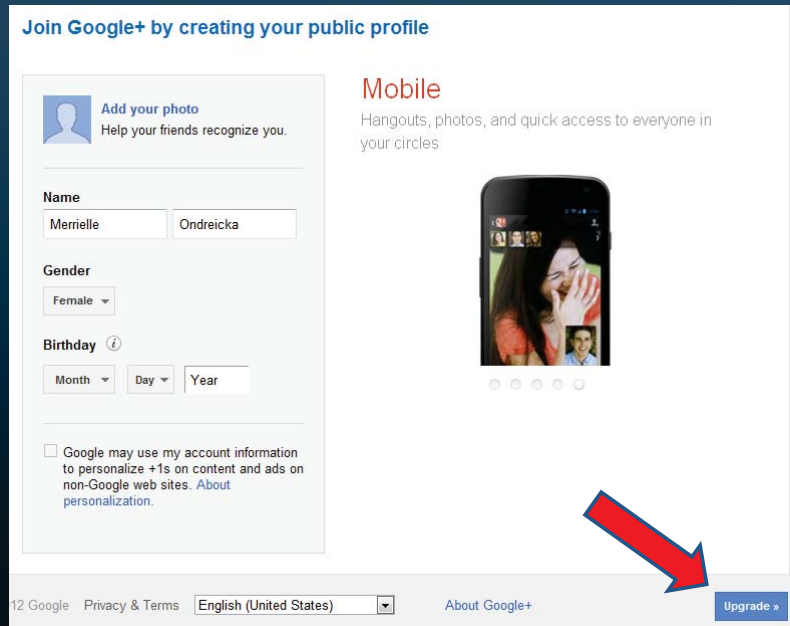
Create a Google Account

OR

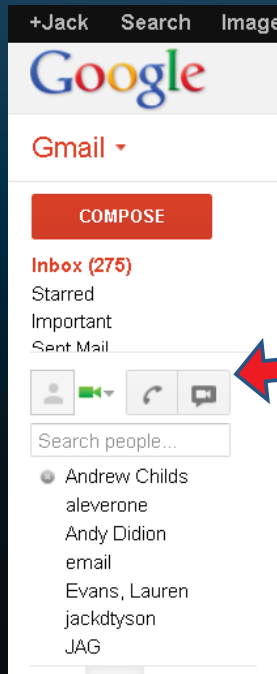
Log in with an existing account

Enter personal info  
as desired

Click upgrade

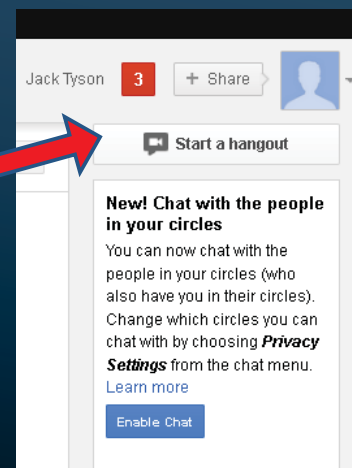


Click "Start a hangout"



From Gmail

From Google+



Save and then run the file

### Install Plugin


To get started with Google+ Hangouts, first install the Google Voice and Video Plugin

**Note:** Click [here](#) if the page doesn't refresh automatically after install.

Requires Windows XP+, Mac OS X 10.5+, or Linux

[Install Plugin](#)

Click to invite people



No one has been invited to this hangout...

[Invite people](#)

Enter the name/email of the person you want to add

Click here to begin

### Invite others to this hangout


Hanging out is fun with friends. Start typing below or click a friend to invite them.

+ Add names, circles, or email addresses


[+telephone](#)

Hang out

Close



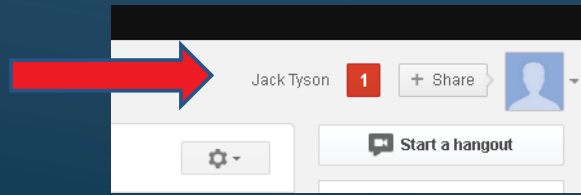
Jack Tyson



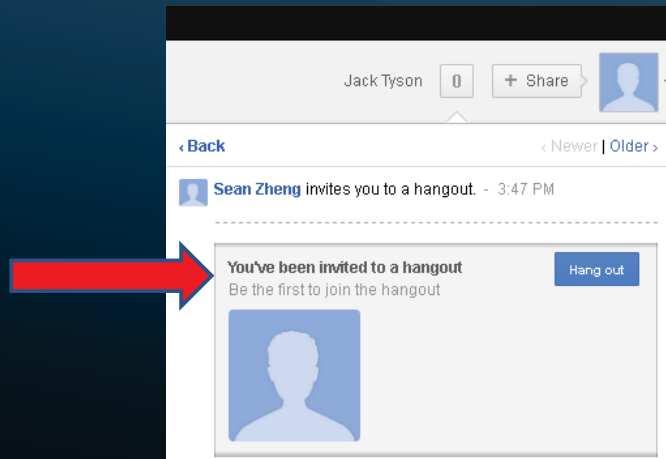
Sam Stadlander

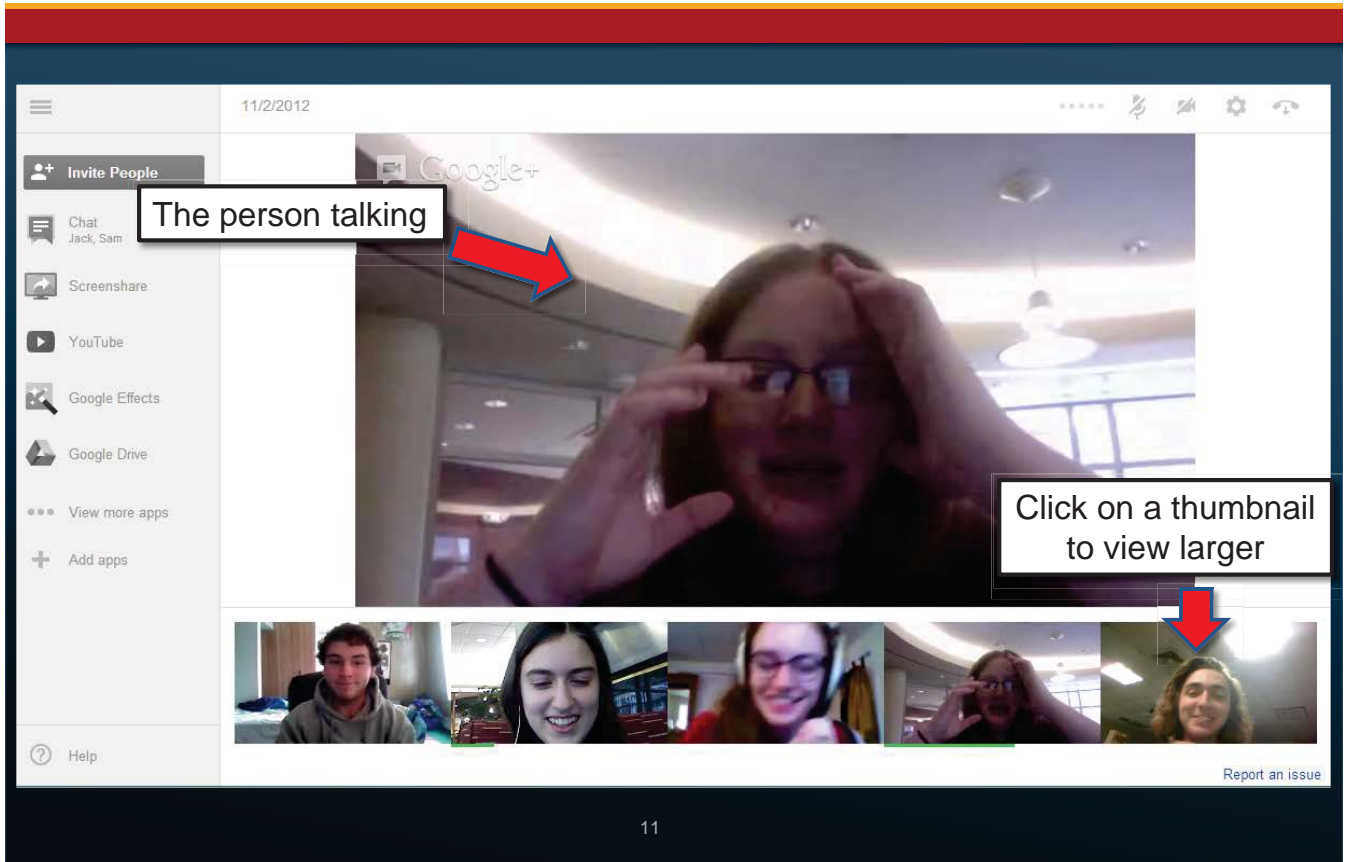


Click the big red  
“Notifications” box



Click “Hang out” to  
join the Hangout

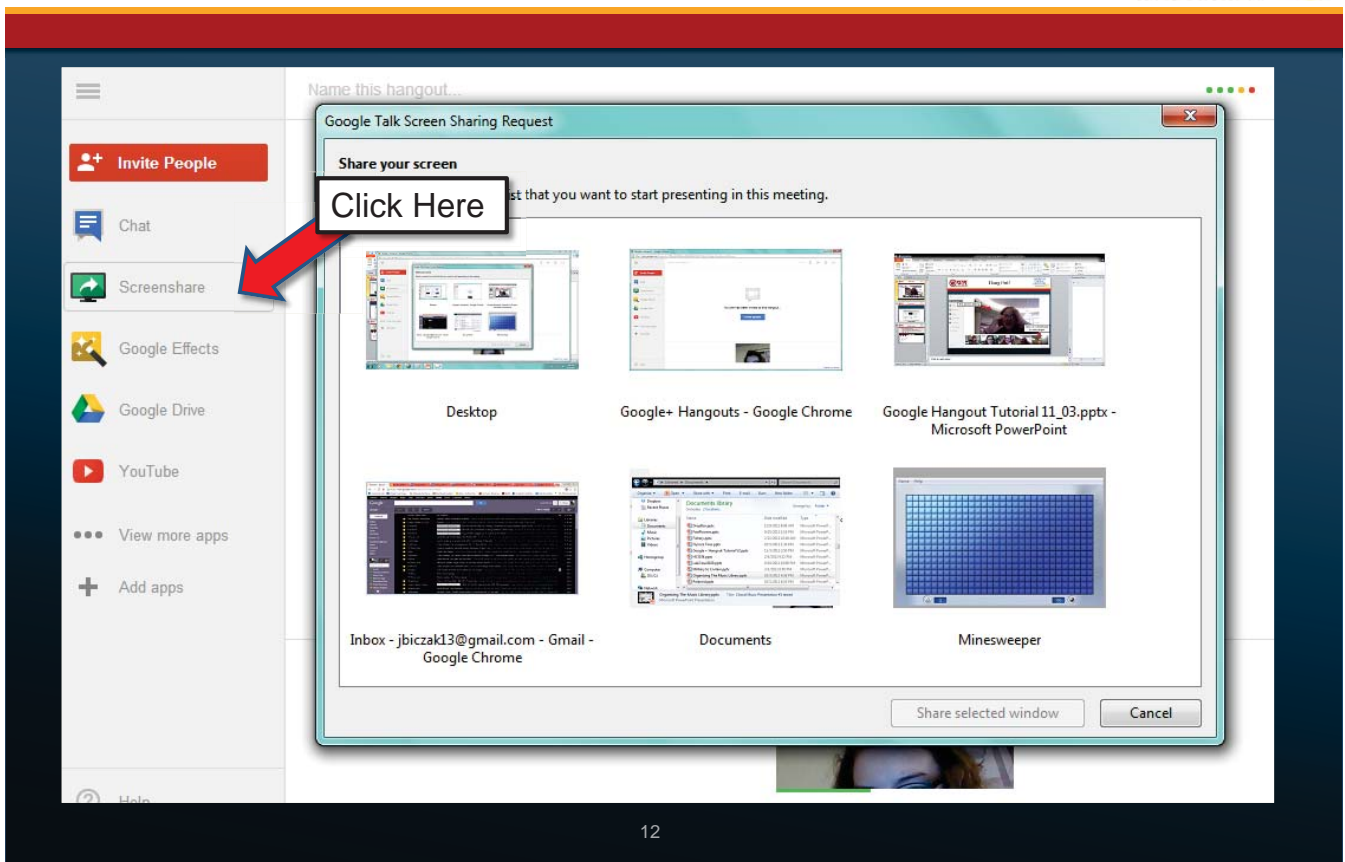




The person talking

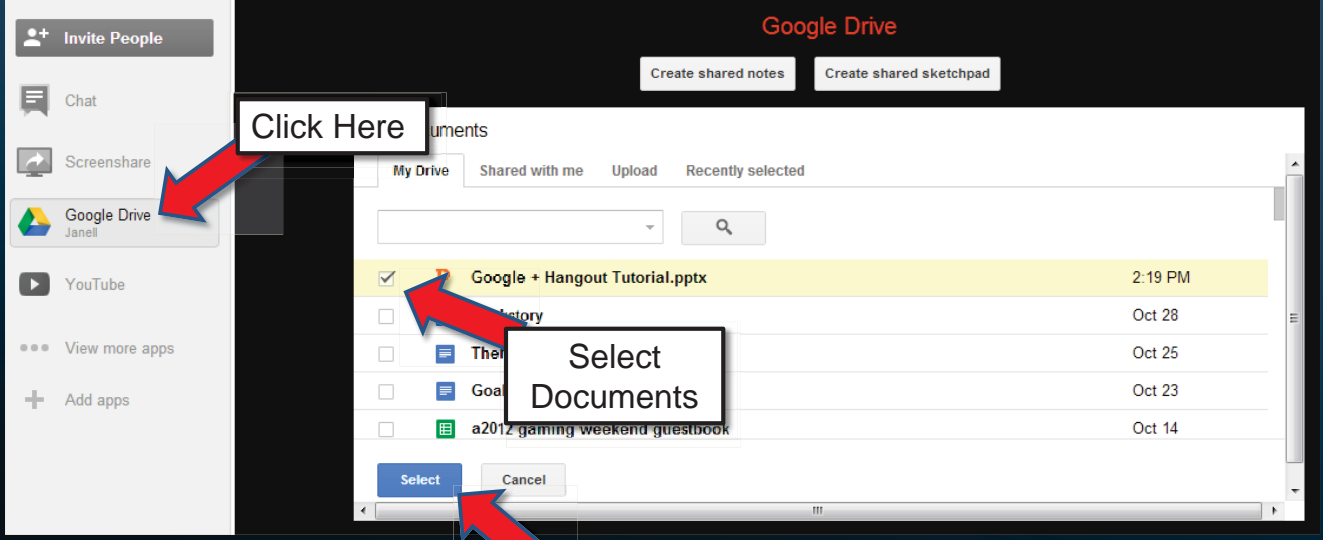
Click on a thumbnail to view larger

11



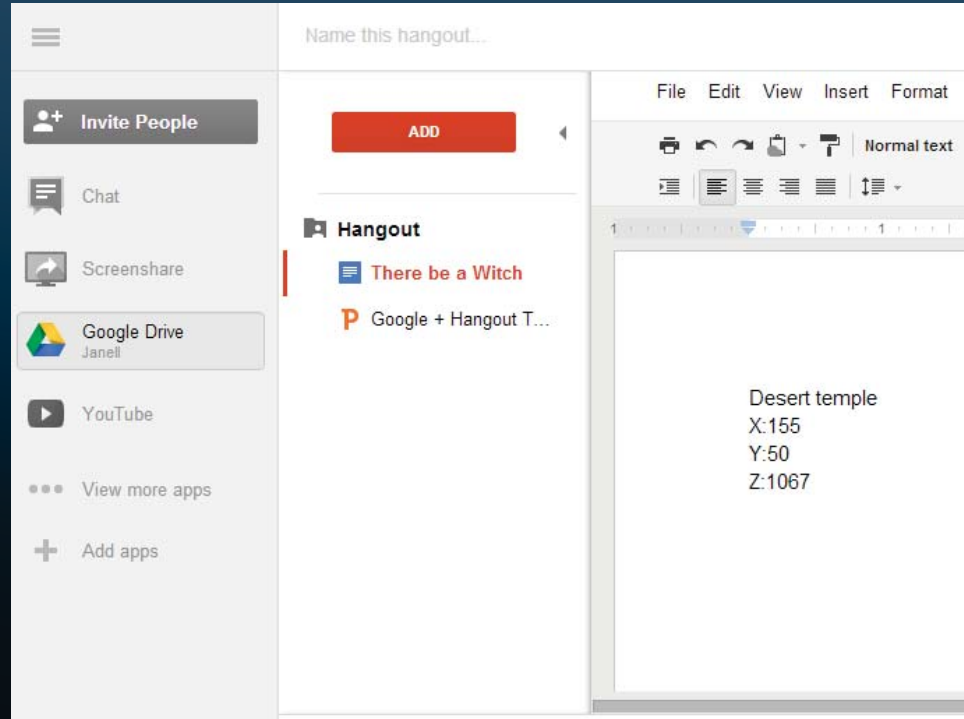
Click Here

12



The screenshot shows the Google Drive interface. On the left sidebar, the 'Google Drive' icon is highlighted with a red arrow pointing to a box labeled 'Click Here'. In the main content area, a document titled 'Google + Hangout Tutorial.pptx' is selected, with a red arrow pointing to a box labeled 'Select Documents'. At the bottom of the document list, a red arrow points to a box labeled 'Then Click Here'.

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The screenshot shows a Google Hangout interface. On the left sidebar, the 'Google Drive' icon is highlighted. In the main content area, a document titled 'Google + Hangout T...' is listed. A red arrow points to a red 'ADD' button above the document list. The document content is visible, showing the text 'Desert temple X:155 Y:50 Z:1067'.

Now everyone can edit the Document

Click "ADD" to share more documents

14

## Plan Ahead

Make sure everyone is available

## Wear Headphones!

Prevents echoing

## Use a Mic

Helps People hear you more clearly

# QUESTIONS?

- No IQP students were harmed in the making of this Powerpoint

## G+ Hangout with Bob Duff 12/04/2012

Merrielle Ondreika

Jack Tyson

Bob told us about our involvement for:

- Live Streaming
- The Tech Booth
- The app

- How many things should be streamed
  - How much do we give away for free?
  - Do we have licensing to show it online?
  - Could we show just a preview?

- Needs to be interactive
- Have info on all repertoire, location of musical pieces
- Listen to pieces from performances if possible
- Useful information that attendees might not know

- We have \$\$\$\$ to be creative with
- Can incorporate large displays/monitors
- Things to spark peoples imagination

- Genie mobile is making the app
- General logistics info
- It will allow presenters to send out info before lectures

- Google+ troubleshooting
- !!everyone you are going to chat with must be in one of your circles!!



# Streaming Options

Janell Biczak '14 Industrial Engineering

Kevin Burns '14 Robotics Engineering

Advisors

Professor John Delorey

Professor Scott Barton

Sponsor

Professor Robert Duff

President, American Choral Directors Association

1

# Overview

- Background
- Livestream Background
- Livestream
  - Full service
  - Livestream Broadcaster
  - Self service
- Recommendation

2

- Requirements
  - Permanent record of the event
  - 1-2 simultaneous streams
- Researched options
  - Livestream offered the best set of services

- Service Plan
  - Basic plan
    - \$49/month
    - Unlimited archives
    - Ad-free
- Features
  - Video downloads available
  - Best price
- Note: only one stream per account

- Cost
  - From \$5,000-\$100,000
    - Expect to be closer \$5000
- Features
  - Staff
  - Equipment
  - Highest possible quality
  - Internet connection (if needed)

5

- Cost
  - \$495 per device
  - Three months of service per device (~\$150)
- Features
  - Low staff involvement
  - HDMI Cameras required
  - HD video compatible



6

- Cost
  - No cost beyond account
- Features
  - Dedicated staff required
  - Laptops and cameras
  - Lower quality
  - Unpredictable results

- We suggest the full service option
  - Higher cost but guaranteed to work
  - All options require that the Livestream account be maintained year round

- "Livestream." *Livestream*. N.p., n.d. Web. 04 Dec. 2012. <<http://new.livestream.com/>>. Information about Livestream products, services, and plans can be found on this website
- "Ustream ©." *Ustream*. N.p., n.d. Web. 04 Dec. 2012. <<http://www.ustream.tv/>>.
- "YouTube." *Help*. N.p., n.d. Web. 04 Dec. 2012. <<http://support.google.com/youtube/?hl=en>>.

# Skype

Janell Biczak'14 Industrial Engineer  
Advisors

Professor John Delorey

Professor Scott Barton

Sponsor

Professor Robert Duff

President, American Choral Directors Association

- Features
- Cost
- Recommendation

- Application
- Group Video Calls
  - Maximum 10
  - Only one person needs Premium Account
- Group Screen sharing
- Customer Support
- Unlimited Calls

- Only priced for single Premium Subscription
- \$9.99 per month
- \$60 per year subscription
- \$4.99 per day pass

- Concerns
  - 10 people per conference call
  - The application must be installed and the user must have account
- Positives
  - Customer Service
  - More features than Google+

# Wimba

Janell Biczak '14 Industrial Engineering  
Biao Zheng '14 Electrical & Computer Engineering

Advisors

Professor John Delorey

Professor Scott Barton

Sponsor

Professor Robert Duff

President, American Choral Directors Association

1

## Overview

- Background
- Features
- Comparison

2



- Google+ and Skype insufficient
- Wimba Available Free at WPI



3

- Voice conferencing
  - Recommend not using video
- Electronic Whiteboard
- Screen sharing
- Polling
- Public and Private Text Chat
- Participant indicators
- Event Recording

4

- Concerns
  - Video not Recommended
- Positives
  - Other Desired Features From Video Chat
  - Better Equipped for large meetings

<http://www.wpi.edu/Academics/ATC/Facilities/Wimba/what.html>

## ACDA 12 IQP

John Arnold, '14, PH  
Janell Biczak, '14, IE  
Sean O'Brien, '13, CS  
Jack Tyson, '14, ME

Kevin Burns, '14, RBE  
Samantha Stadtlander, '14, IMGD Art  
Biao Zheng, '14, ECE  
Merrielle Ondreicka, '14, CS

### Advisors:

Professor John Delorey

Professor Scott Barton

### Sponsor

Professor Robert Duff

President, American Choral Directors Association

- USB Microphones
- Skype
- Wimba
- Tech Booth Layout and Design

# USB Microphones

Kevin Burns '14 Robotics Engineering

Advisors

Professor John Delorey

Professor Scott Barton

Sponsor

Professor Robert Duff

President, American Choral Directors Association

3

## Overview

- Categories
  - Low price
  - Mid price
  - High price
- Criteria
  - Price
  - Sound quality
    - User reviews
    - Specifications
- Recommendation

4



- Blue Snowflake
- Blue Snowball
- Samson C01UCW

5



- Audio Technica AT2020 USB
- MXL USB 007
- MXL 990

6



- Blue Yeti Pro
- MXL USB 009
- VO: 1-A  
Microphone and  
MicPort Pro USB  
Preamp

7



- Blue Snowball
- MXL 990
- Blue Yeti Pro

8



- Blue Snowball
  - Everything you need, and nothing more

9

# Skype

Janell Biczak '14 Industrial Engineer  
Advisors

Professor John Delorey

Professor Scott Barton

Sponsor

Professor Robert Duff

President, American Choral Directors Association

- Background
- Features
- Cost
- Comparison

- Issues with Google+
- Re-examine other options
- Skype





- Application
- Group Video Calls
  - Maximum 10
  - Only one person needs Premium Account
- Group Screen sharing
- Customer Support
- Unlimited Calls

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- Only priced for single Premium Subscription
- \$9.99 per month
- \$60 per year subscription
- \$4.99 per day pass

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- Concerns
  - The application must be installed and the user must have account
- Positives
  - Customer Service
  - More features than Google+

Biao Zheng '14 Electrical & computer Engineering

Advisors

Professor John Delorey

Professor Scott Barton

Sponsor

Professor Robert Duff

President, American Choral Directors Association

Prices depend on institution size and selected products, starting at under \$7,000 with discounts for multiple products purchased.

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Content sharing (PowerPoint slides, Flash movies)

Screen sharing

Web-based(no application needed)

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Higher cost

Required high speed internet

No Smartphone app

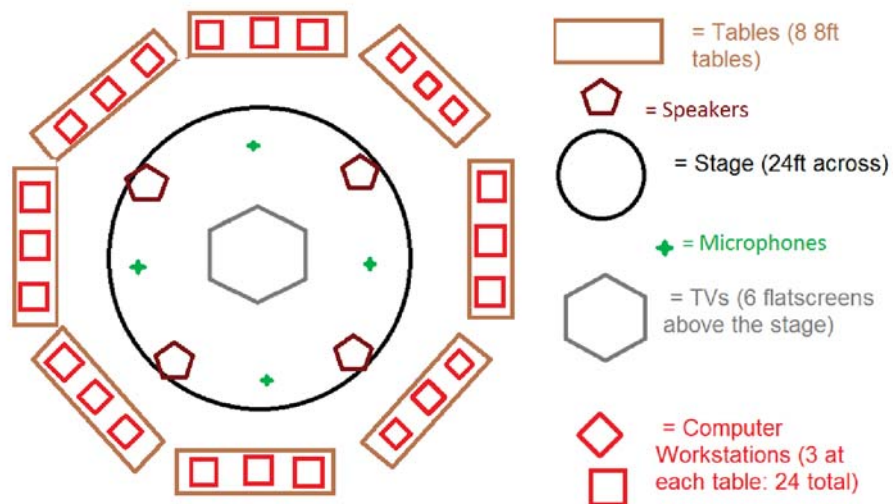
## Tech Booth Sketches

Samantha Stadtlander - IMGD Art '14

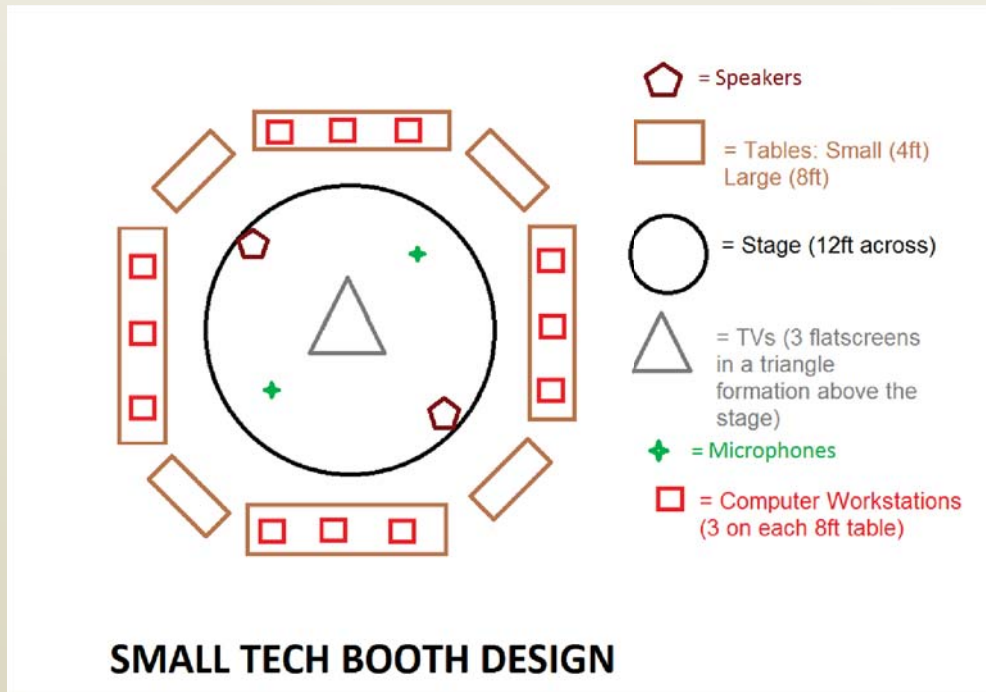
- Background
- Research
- Conclusions

- Create two design sketches for the Tech Booth setup at the Eastern Division Conference
- Take general specifications and create one small and one large booth design.

- General specifications:
  - TVs
  - Computer Work Stations
  - Performance Area (Stage)
  - Speakers
  - Microphones



**LARGE TECH BOOTH DESIGN**



- Sample Schedule:
  - 7:30am - meeting
  - 8:00am - show (75 minute show)
  - 10:00am - show
  - 12:00am - show
  - 2:00pm - show

- Possible shows
  - Multi-Cultural Sessions
  - Concert streaming
  - Live performances on the stage
  - Robotic performances on the stage

- Ongoing throughout the day
  - Reading sessions at the computer workstations
    - PDF scores available
    - Follow along with video of performance
  - Schedules posted on one or more of the TVs



- Possible Other Needs:
  - Ethernet cords/ internet access for workstations
  - Chairs for students to use, inside the circle of tables

## Microphones for Streaming Choral Music

Kevin Burns '14 Robotics Engineering

Advisors

Professor John Delorey

Professor Scott Barton

Sponsor

Professor Robert Duff

President, American Choral Directors Association

- Background
- Microphones and Preamps
- Mono Microphone Setup
- Stereo Microphone Setup
- Recommendation
- References
- Questions

- Criteria
  - Number of Mics
    - Mono, One
    - Stereo, Two
  - Polar Pattern
    - Cardioid
    - Omnidirectional
  - Sound quality
    - Bit depth
    - Frequency response



## Blue Yeti Pro

- Both USB and XLR out
- Adjustable preamp gain
- 24bit 192KHz conversion
- Variable Polar Pattern
  - Cardioid, Bidirectional, Omnidirectional, Stereo



## Rode NT55

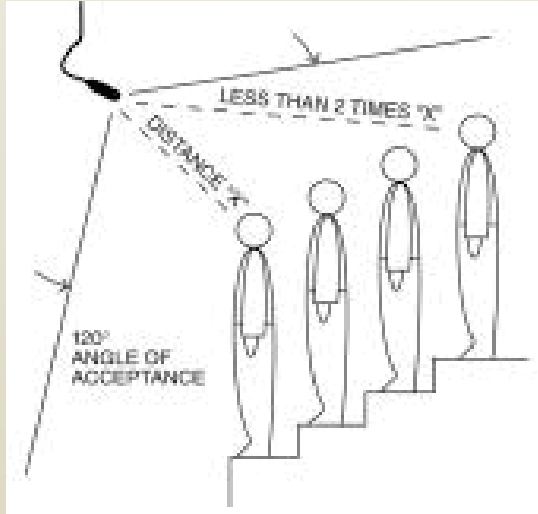
- XLR out
- Interchangeable capsules for cardioid or omnidirectional capabilities



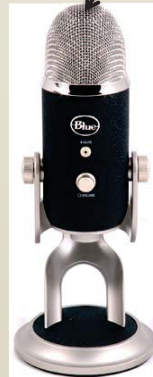
- Required for NT55
- Optional for the Blue Yeti Pro
- M-Audio Profire 610
  - Firewire interface
  - 24Bit 192KHz conversion
  - 2 XLR inputs
  - 48V Phantom power



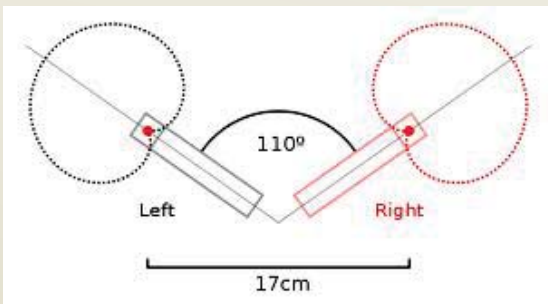
- Focusrite Scarlett 2i2
  - USB interface
  - 24Bit 96KHz conversion
  - 2 XLR inputs
  - 48V Phantom power



- Microphones
- Rode NT55
- Blue Yeti Pro



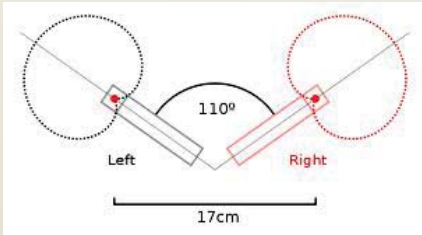
- Pros:
  - Relatively low price
  - Simple to setup
  - Works with both video chat and live streaming software
- Cons:
  - Only provides mono sound



- Microphone
- Rode NT55



- Pros:
  - Provides stereo sound
- Cons:
  - Higher cost
  - Only compatible with systems like Live stream



- Stereo Microphone Arrangement
- Matched pair of Rode NT55's
- M-Audio Profire 610
  - For those without Firewire the Focusrite Scarlett 2i2 can be substituted



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- NT55 polar pattern omnidirectional [http://media.rodemic.com//images/mics/nt55-s/nt55\\_polar\\_omni.jpg](http://media.rodemic.com//images/mics/nt55-s/nt55_polar_omni.jpg)
- NT55 <http://www.rodemic.com/mics/nt55-s>
- NT5 Matched Pair <http://www.rodemic.com/mics/nt55-mp>
- M-Audio Profire 610 [http://www.m-audio.com/products/en\\_us/ProFire610.html?do=products.family&ID=FWinterfaces](http://www.m-audio.com/products/en_us/ProFire610.html?do=products.family&ID=FWinterfaces)
- Focusrite Scarlett 2i2 <http://us.focusrite.com/usb-audio-interfaces/scarlett-2i2>
- Blue Yeti Pro <http://bluemic.com/yetipro/#/desc/>

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