The Game Development Process

Audio Creation

Introduction (1 of 2)

• Dramatic evolution of audio
  - Used to be bleep or bloop
  - Any sound on computer by programmer
• Mid-90’s
  - CD-ROM could but “real” music on disc
  - WAV files and other formats
    * Allowed voice overs, other dialog
  - Musicians could use computers
• Now
  - DVD capacity (gigabytes)
  - 5.1 surround sound
  - Adaptive cores

Based on Chapter 6.9, Introduction to Game Development
Introduction (2 of 2)

• Used to be audio handled as an afterthought
  - That was the way films did it, didn’t add sound effects until film footage in place
• But other aspects (polygons, processing, size of data) affect audio
  - Needs to be part of production from beginning
  - Games became data driven, so audio not part of code but could be separate stream
    • Put control back in audio production – didn’t have to be technical/programmers
• Today
  - Budgets enabling bands, choirs, orchestras, voice actors
  - Technology in game audio growing, perhaps most exciting
  - Game designers are audio-savvy

Outline

• Introduction (done)
• Audio Teams (next)
• Computer Audio Technology
• Sound Design
• Music Guidelines
Audio Team

• Briefly, allow to see some roles
  - Book has details
• Production both science (tech) and art
• Three teams:
  - Music Team
  - Sound Design Team
  - Dialog Team

Music Team (1 of 3)

• Music Director (skip)
  - Over see high-level decisions
  - What music to create, who to contract
  - Rolodex with music industry numbers
  - Smaller companies
    • Maybe licenses songs from bands
    • Maybe don't have one, but rolled into other positions
• Composer
  - Write custom music (writing, recording, mixing)
  - Contracted per-project basis
  - With larger budgets, 1 person will have assistants
Music Team (2 of 3)

• **Music Producer (skip)**
  - Maintain creative vision of musical recording
  - In music industry, assure recording goes well between artists, musicians and engineers
  - Not so common in game industry, but becoming more so

• **Recording Engineer**
  - Enables production of sound through mechanical means
  - Gets best sounds out of each component
  - Often work out of home
  - May often be a sound designer (coming next)

Based on Chapter 6.9 Introduction to Game Development

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Music Team (3 of 3)

• **Mix Engineer**
  - Takes completed tracks and balances sound characteristics (volumes)
  - Tempting to combine with recording engineer, but good mix engineer provides "new level"
  - Becoming more common to have separate position

• **Mastering Engineer**
  - Produces final copy, final stage.
  - Listens for subtle mistakes and problems
  - Essential if music files from different sources

Based on Chapter 6.9 Introduction to Game Development
Sound Design Team (1 of 2)

- Audio Director/Manager
  - Manage sound design teams
  - Keep track of resources and schedules
  - Execute vision of game producer on sound and dialog
- Sound Designer
  - Bring life-like (and beyond life) sound to game
  - Critical member, as audio has more capability and more importance

Based on Chapter 6.9 Introduction to Game Development

Sound Design Team (2 of 2)

- Implementer
  - Work with production tools to attach sounds to events, characters, etc.
  - “Level designers” of the audio department
  - Not too common (may often be “just” a programmer with no audio training), but increasingly more common

Based on Chapter 6.9 Introduction to Game Development
Dialog Team (1 of 2)

- **Casting Agent**
  - *Contracted by game company to line up talent for voice acting*
  - Have wide network of people to contract
  - Able to get people in short notice, per contract basis

- **Voice-Over Director**
  - *Coax best performance out of acting talent*
  - Often tempting to put this with director, but works best when specialized training in voice acting

Dialog Team (2 of 2)

- **Voice Actors**
  - *Provide voice for characters, animations, cut-scenes*
  - Unionized (better but expensive) or non-unionized (cheaper, but less expensive)

- **Dialog Editor**
  - *Organize files created by voice actors*
  - Master files, check for errors and submit assets to audio director
  - Often tedious, but critical
Outline

• Introduction (done)
• Audio Teams (done)
• Computer Audio Technology (next)
• Sound Design
• Music Guidelines

Digital Audio

• Sound produced by variations in air pressure
  - Can take any continuous value
  - Analog component

• Computers work with digital
  - Must convert analog to digital
  - Use sampling to get discrete values

Based on Chapter 5.5, Introduction to Game Development
Digital Sampling

• Sample rate determines number of discrete values

Based on Chapter 5.5, Introduction to Game Development

Digital Sampling

• Half the sample rate

Based on Chapter 5.5, Introduction to Game Development
Digital Sampling

• Quarter the sample rate

(Ask: why not always sample at the highest rate?)

Sample Rate

• Shannon’s Theorem: to accurately reproduce signal, must sample at twice the highest frequency
• Why not always use high sampling rate?
  - Requires more storage
  - Complexity and cost of analog to digital hardware
  - Human’s can’t always perceive
    • Ex: dog whistle
  - Typically want an adequate sampling rate
    • What is “adequate” depends upon use …
Sample Size

• Samples have discrete values

• How many possible values?
  + Sample Size
  + Common is 256 values from 8 bits

Sample Size

• Quantization error from rounding
  - Ex: 28.3 rounded to 28

• Why not always have large sample size?
  - Storage increases per sample
  - Analog to digital hardware becomes more expensive

Based on Chapter 5.5, Introduction to Game Development
Groupwork

• Think of as many uses of computer audio as you can
• Which require a high sample rate and large sample size? Which do not? Why?

Audio

• Encode/decode devices are called codecs
  - Compression is the complicated part
• Ex: for voice compression, can take advantage of speech:
  
  “Smith”

• Many similarities between adjacent samples
  • Send differences (ADPCM)
• Use understanding of speech
  • Can ‘predict’ (CELP)
Audio by People

• Sound by breathing air past vocal cords
  - Use mouth and tongue to shape vocal tract
• Speech made up of phonemes
  - Smallest unit of distinguishable sound
  - Language specific
• Most speech sound from 60-8000 Hz
  - Music up to 20,000 Hz
• Hearing sensitive to about 20,000 Hz
  - Stereo important, especially at high frequency
  - Lose frequency sensitivity as age

Spatialized Audio

• Making audio provide physical location clues
• Mono - one channel, no chance for spatialization
• Stereo - two channels, left and right, like the ear works
  - Different volumes create illusion of sounds in space
  - Gradual changes give illusion of “moving”
• Surround sound - 5.1 - 5 main, 1 subwoofer
  - Usually, dialog center, music left and right and specialized sound effects behind
• Environment can often affect
  - Bounce off walls, objects - door open and in next room?
  - Material matters (wood, metal, plastic)
  - Climate matters (temp, humidity)
  - Getting better (Creative Labs with Environmental eXtensions, EAX)
Typical Encoding of Voice

- Today, telephones carry digitized voice
- Capture to 4 KHz (8000 samples per second)
  - Adequate for most voice communication
- 8-bit sample size
- For 10 seconds of speech:
  - 10 sec x 8000 samp/sec x 8 bits/samp
  - = 640,000 bits or 80 Kbytes
  - Fit 3 minutes of speech on a floppy disk
  - Fit 8 weeks of sound on typical hard disk
- Fine for voice, but what about music?

Typical Encoding of Music

- Human ear can perceive 10-20 KHz
  - Full range used in music
- CD quality audio:
  - sample rate of 44,100 samples/sec
  - sample size of 16-bits
  - 60 min x 60 secs/min x 44,100 samp/sec
  - x 2 bytes/samples x 2 channels (stereo)
  - = 635,040,000, about 600 Mbytes (typical CD)
- Can use compression to reduce
  - mp3, RealAudio
Sound File Formats

- Raw data has samples (interleaved w/stereo)
- Need way to 'parse' raw audio file
- Typically a header
  - Sample rate, sample size, number of channels, coding format...
- Uncompressed examples:
  - .wav for IBM/Microsoft
  - .aiff for MAC
- Compressed examples:
  - .mp3 for MPEG-3
  - .ra for Real Audio
  - .au for Sun µ-law
  - .midi has instrument commands

MP3 – Introduction (1 of 2)

- 'MP3' abbreviation of MPEG 1 audio layer 3
- 'MPEG' abbrev of 'Moving Picture Experts Group'
  - 1990, Video at about 1.5 Mbits/sec (1x CD-ROM)
  - Audio at about 64-192 kbits/channel
- Committee of the International Standards Organization (ISO) and International Electrotechnical Commission (IEC)
  - [Whew! That's a lot of acronyms (TALOA)]
- MP3 differs in that it does not try to accurately reproduce PCM (waveform)
- Instead, uses theory of 'perceptual coding'
  - PCM attempts to capture a waveform 'as it is'
  - MP3 attempts to capture it 'as it sounds'.

Based on BEHIND THE MASK - Perceptual Coding: How Mp3 Compression Works, by Paul Sellers
http://www.soundonsound.com/sos/may00/articles/mp3.htm
MP3 – Introduction (2 of 2)

• Ears and brains imperfect and biased measuring devices, interpret external phenomena
  - Ex: doubling amplitude does not always mean double perceived loudness. Factors (frequency content, presence of any background noise...) affect
• Set of judgments as to what is/not meaningful
  - Psychoacoustic model
• Relies upon 'redundancy' and 'irrelevancy'
  - Ex: frequencies beyond 22 KHz redundant (some audiophiles think it does matter, gives “color”!)
  - Irrelevancy, discarding part of signal because will not be noticed, was/is new

Based on BEHIND THE MASK - Perceptual Coding: How Mp3 Compression Works, by Paul Sellers
http://www.soundonsound.com/sos/may00/articles/mp3.htm

MP3 – Masking

• Listener prioritizes sounds ahead of others according to context (hearing is adaptive)
  - Ex: a sudden hand-clap in a quiet room seems loud. Same hand-clap after a gunshot, less loud (time domain)
  - Ex: guitar may dominate until cymbal, when guitar briefly drowned (frequency domain)
• Above examples of time-domain and frequency-domain masking respectively
• Two sounds occur (near) simultaneously, one may be partially masked by the other
  - Depending relative volumes and frequency content
• MP3 doesn't just toss masked sound (would sound weird) but uses fewer bits for masked sounds

Based on BEHIND THE MASK - Perceptual Coding: How Mp3 Compression Works, by Paul Sellers
http://www.soundonsound.com/sos/may00/articles/mp3.htm
MP3 – Sub-Bands (1 of 2)

- MP3 not method of digital recording
  - Removes irrelevant data from existing recording
- Encoding typically 16-bit at 32, 44.1 and 48 kHz
- First, short sections of waveform stream filtered
  - How, not specified by standard.
  - Typically Fast Fourier Transformation or Discrete Cosine Transformation
    * Method of reformatting signal data into spectral sub-bands of differing importance

Based on BEHIND THE MASK - Perceptual Coding: How Mp3 Compression Works, by Paul Sellers
http://www.soundonsound.com/sos/nov00/articles/mp3.htm

MP3 – Sub-Bands (2 of 2)

- Divide into 32 'sub-bands', represent different parts of frequency spectrum
- Why frequency bands? So MP3 can prioritize bits for each
  - Ex:
    * Low-frequency bass drum, a high-frequency ride cymbal, and a vocal in-between, all at once
    * If bass drum irrelevant, use fewer bits and more for cymbal or vocals

Based on BEHIND THE MASK - Perceptual Coding: How Mp3 Compression Works, by Paul Sellers
http://www.soundonsound.com/sos/nov00/articles/mp3.htm
**MP3 – Frames**

- Sub-band sections are grouped into 'frames'
- Determine where there is masking in frequency and time domains will occur
  - Which frames can safely be allowed to distort
- Calculate *mask-to-noise* ratio for each frame
  - Use in the final stage of the process: bit allocation.

**MP3 – Bit Allocation**

- Decides how many bits to use for each frame
  - More bits where little masking (low ratio)
  - Fewer bits where more masking (high ratio)
- Total number of bits depends upon desired bit rate
  - Chosen before encoding by user
- For quality, a high priority (music) 128 kbps common
  - Note, CD was about 1400 kbps, so 10x less
MP3 – Playout and Beyond

- Save frames (header data for each frame). Can then play with MP3 decoder.
- MP3 decoder performs reverse, but simpler since bit-allocation decisions are given
  - MP3 decoders cheap, fast (ipod!)
- What does the future hold?
  - Lossy compression not needed since bits irrelevant (storage + net)?
  - Lossy compression so good that all irrelevant bits are banished?

Based on BEHIND THE MASK - Perceptual Coding: How MP3 Compression Works, by Paul Sellers
http://www.soundonsound.com/sos/may00/articles/mp3.htm

Outline

- Introduction (done)
- Audio Teams (done)
- Computer Audio Technology (done)
- Sound Design (next)
- Music Guidelines
Sound Design (1 of 2)

• Critical is interactive audio component
  - Sound when event occurs (gunshot when trigger pulled, dialog when character spoken to, ...)
  - Well done, sounds great. Poorly done, ruin all.
• Need to avoid repetition
  - One footstep for 20+ hours of play annoying
  - Need 6-20 (depending upon budget)
  - Dynamics can help (pitch, volume, stereo...)
• Mix pre-existing sounds with own sounds
  - Provides "custom" identity for game
• Be creative for sources of sound!
  - Jello for wet, sticky sounds
  - Metal bowl on A.C for rumbling cart
  - Telephone wires for Star Wars lasers
  - Use multiple mics, pick best
  - Go to live events (ie- sports games for crowds)

Based on Chapter 6.9, Introduction to Game Development

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Sound Design (2 of 2)

• Example - Street Basketball soundscape
  - Need individual sounds, but want footsteps primarily
  - Sounds from different courts: wood, dirt, asphalt
  - Vary volumes depending upon location to player
  - Stereo depending upon location of 10 players
  - Random scuffs, scrapes, squeaks in addition to steps
  - Need others: jumps, "oofs", dribble, ball on backboard, swishes ...
  - Need to mix all these together in realistic fashion

• Ambiance (in brief, more later)
  - The feeling or mood of setting
  - Set by background sound more than music
    - Ex: wind, waterfall, distant traffic
  - Want in full, surround sound

Based on Chapter 6.9, Introduction to Game Development
Music in Games

• Despite technology improvements, emotional intensity in computer games not that of films
• Many reasons, but one facet that could contribute has been consistently under-utilized... music

Based on Enhancing the Impact of Music in Drama Oriented-Games, by Scott Morton
http://www.gamasutra.com/features/20050124/morton_01.shtml

Games are not Film

• Game designers "filmize" games
  - Set up cut scenes with orchestral cues
  - Add drama to in-game fights with battle music
  - Add music to areas and levels to give identity and emotional backdrop
• It would seem this approach makes sense, but games are not film
• Film linear, so composer knows exactly what's coming, sets up the perfect emotional "hook"
• Games relativity can't be foreseen, calculated, or controlled
• However... some concepts you can take away from film soundtracks apply to games

Based on Enhancing the Impact of Music in Drama Oriented-Games, by Scott Morton
http://www.gamasutra.com/features/20050124/morton_01.shtml
Mini-Outline

• First, dispel some myths
  - Music Mistakes (4)
• Second, briefly describe some techniques
  - Good Music Rules (4)

Based on Enhancing the Impact of Music in Drama Oriented-Games, by Scott Morton
http://www.gamasutra.com/features/20050124/morton_01.shtml

Music Mistake #1 (1 of 2)

"Watering down my music and making it 'subtle' will help it to fit in and work in multiple situations."

• Ambient in nature, play straight through and repeat
• Ex: common in an RPG
  - Enter a dark dungeon? Music doesn’t foreshadow
  - Finished a battle and am inches from death? Music doesn’t reflect the critical nature of the situation at all
  - Why is the music even playing!? Doesn't make immersive. Just white noise. Detracts from immersive
  - Better to have soundscape (wildlife or city bustling noise) since draw into reality

Based on Enhancing the Impact of Music in Drama Oriented-Games, by Scott Morton
http://www.gamasutra.com/features/20050124/morton_01.shtml
Music Mistake #1 (2 of 2)

• So why do game makers make this mistake?
  1) It’s the norm. There has always been level music.
     - Ex: something to hum to while jumping from pipe to pipe, squashing mushroom people
     - Not comfortable with musical silences in games
     - But irony is that film doesn’t always have music!
     - Need to understand "less is more" factor in music for games...
  2) Don’t trust player to form own emotional picture
     - Ex: entering dark forest just as immersive and spooky with only audio backdrop, as it is with music
       • Try turning off the music next time you play!
     - Once trust player, use music to augment emotions
       • Don’t have that opportunity when ambient music always on

Based on Enhancing the Impact of Music in Drama Oriented-Games, by Scott Morton
http://www.gamasutra.com/features/20050124/morton_01.shtml

Music Mistake #2

“Adaptive music will solve emotional detachment issues and tie players into my game because it will follow what is actually happening”

• Opposite problem … adaptive music can be too reactive (each at one end of spectrum, both watered)
• A great power of film, can choose different types in single scene to change emotion
  - Ex: humorous music to a physically violent scene, versus agitated music (or no music)
• Let music keep emotional independence, not solely dependent upon literal events in game
  - If adaptive music follows gameplay and triggers "appropriate" music, can’t speak independently
  - Slave to game input (player input)

Based on Enhancing the Impact of Music in Drama Oriented-Games, by Scott Morton
http://www.gamasutra.com/features/20050124/morton_01.shtml
Music Mistake #3 (1 of 3)

“Cut scenes with live orchestral music will get players more emotionally involved in my game.”

- Consider *Prince of Persia: The Sands of Time* (Ubisoft)
  - Cut-scenes before and after game are brilliant
  - Ones in middle don’t have “full movie splendor”
    - Fragments of gameplay or are sequences rendered with the same "real-time level" of graphics detail
  - Wouldn’t Ubisoft have been smarter to make all "movie-style" (including music)?
    - No! Might have dropped immersive factor

Based on Enhancing the Impact of Music in Drama Oriented-Games, by Scott Morton
http://www.gamasutra.com/features/20050124/morton_01.shtml

Music Mistake #3 (2 of 3)

- Why do game designers put cut scenes in a game?
  - Expose storyline and introduce new material into the game … but could do that with dialogue box!
  - Cut scenes are created because the designer thinks: "I want to make an emotional, dramatic impact on the player with the way I present this information."
- So, makes sense for a full orchestra to accompany these cut scenes
  - Orchestra is legendary, for 100s of years
  - "So we should use it for games!" Yes, but …

Based on Enhancing the Impact of Music in Drama Oriented-Games, by Scott Morton
http://www.gamasutra.com/features/20050124/morton_01.shtml
Music Mistake #3 (3 of 3)

- Watching film is a passive
  - Watching Matrix. “Cool when Neo kung-fu’d Mr. Smith”
- Games are active. Don’t say “cool when Joe lobbed the grenade” but “cool when I lobbed the grenade”
  - Player “is” the avatar
- During cut-scenes, lose that. Lose emotional involvement.
  - Making it more grandiose, takes away even more
- Orchestra can color game if used at right point

Based on Enhancing the Impact of Music in Drama Oriented-Games, by Scott Morton
http://www.gamasutra.com/features/20050124/morton_01.shtml

Music Mistake #4 (1 of 2)

“Let’s just loop the music once it reaches the end.”

- Very prevalent Final Fantasy to Zelda,
- Many reasons why bad idea
  - Looping hand-in-hand with "watered-down, ambient music" approach (no emotional connection)
  - Worse, detached the player from even registering it
  - Worser, becomes annoying
- Moved from "why should we even have music playing here" to "why shouldn't we turn off the music altogether and listen to MP3s?"

Based on Enhancing the Impact of Music in Drama Oriented-Games, by Scott Morton
http://www.gamasutra.com/features/20050124/morton_01.shtml
Music Mistake #4 (2 of 2)

• Why do we fall into this trap?
  - It’s familiar, done in most games
  - If small music budget might "want to make the best of what we have."
  - Maybe Mr. Programmer said "I don't know what else to do besides looping" and "Mr. Producer told me to stick Music A into Level B."
  - Above reasons not for AAA titles
• The bottom line:
  - If we can’t move beyond mediocre methods of implementation when it comes to music, we will never progress and mature in this area.

Based on Enhancing the Impact of Music in Drama Oriented-Games, by Scott Morton
http://www.gamasutra.com/features/20050124/morton_01.shtml

Good Music Rule #1 (1 of 2)

“Follow the dramatic arc with the game’s soundtrack”

• In film, soundtrack has two purposes
  - Impose emotion on scene
    • Such as subtle underscore during dialogue
    • Such as full-blown cue with just visuals and music
  - Supplement dramatic arc over whole film by connecting everything together musically
    • Not yet done any sophisticated manner in games
• Composers think beyond "What does this level sound like" to
  - "What role does this level and its characters play in the grand scheme of the game and the plot?"
  - "How do I portray that with the music I write?"
  - "Where do I place the music within the level to bring this across in the most effective manner?"

Based on Enhancing the Impact of Music in Drama Oriented-Games, by Scott Morton
http://www.gamasutra.com/features/20050124/morton_01.shtml
Good Music Rule #1 (2 of 2)

• Consider *Baldur’s Gate: Dark Alliance*
  - Boss battles feel more intense than common battles because no music triggered during normal battles
  - When music kicks in for a boss battle feels more important
  - Each boss has its own identifying style and theme.
  - Final battle against Eldrith, plays main theme of game during title screen

• Create a *musical climax* in your game
  - Don’t use most intense music until critical points in dramatic arc
  - Is final boss battle more important than miniboss battle? Show it in the music.
  - Let player (subconsciously) interpret importance of events based on accompanying music

Based on *Enhancing the Impact of Music in Drama Oriented Games*, by Scott Morton
http://www.gamasutra.com/features/20050124/morton_01.shtml

Good Music Rule #2

“Never use music unless it is making a specific emotional statement to the player.”

• Music playing should mean something
  - In a film, music never plays just to play.

• Good guideline to remember “The less you use something, the more effective it is when you do use it.”
  - Don’t be afraid of musical silences in games
  - Use the sounds of forests or dripping caves or crowded streets to immerse a player
  - Trigger music to bring to next level of emotion

• Keep music more sparse
  - Will retain its special element of influence
  - Will not simply be “tuned out”

Based on *Enhancing the Impact of Music in Drama Oriented Games*, by Scott Morton
http://www.gamasutra.com/features/20050124/morton_01.shtml
Good Music Rule #3 (1 of 2)

"Get the composer involved early in the process!"

- Film composers can be given fixed and final product. Watch to see how music inserted from a technical and artistic standpoint
- Games are more intricate. Composer needs:
  - Designer's motivations from dramatic and story perspective
  - How story is presented
  - What kind of influence player has on story
- Bottom line: "hiring the composer when we're done with the game" is not a good idea

Based on Enhancing the Impact of Music in Drama Oriented-Games, by Scott Morton
http://www.gamasutra.com/features/20050124/morton_01.shtml

Good Music Rule #3 (2 of 2)

- Also, important that composer do at least some (if not all) of the music implementation.
  - Needs the ability to experiment and find what works best to match vision
- Could be
  - Team-up with an audio programmer
  - Tools for inserting music
- Method for composer to have influence in all musical performance aspects of game

Based on Enhancing the Impact of Music in Drama Oriented-Games, by Scott Morton
http://www.gamasutra.com/features/20050124/morton_01.shtml
**Good Music Rule #4**

“The more content, the better”

- A piece of music more impact if played in one place
  - Identifies single, critical moment or event
- The more musical content created, the more room for dedicating unique cues to certain places
- Reality of music budget and cost-per-minute of composer can get in way
  - Get composer involved early
  - Dedicate more budget to music and sound
- Awareness of how much influence a well-written and well-implemented musical score can have in a game, hopefully, will raise the priority of a game’s soundtrack in the budget in the near future

Based on Enhancing the Impact of Music in Drama Oriented-Games, by Scott Morton

http://www.gamasutra.com/features/20050124/morton_01.shtml

**Bit Bucket**
The Popularity of Game Audio

• (Chapter 9 Called "Looking Ahead" but really guidelines for making process methods better)
• Game-audio folks complain for not being recognized by peers and public
  - Justified? Yes, difficult skills to master
  - Skills of directing audio, composing music, directing voice, doing sound effects, programming audio
• Note, should be awards for really good (not everyone)
  - Compare plugging instruments in and jamming away to sound and music of Star Wars

Game Audio Awards

• Academy of Interactive Arts and Sciences
  - Best licensed soundtrack, best original music composition, best sound design
• Game Audio Network Guild
  - Supposedly awards for all aspects
• Selection:
  - Allow nomination by anyone
  - Maybe allow voting by anyone
  - National television broadcast
    • May come naturally when games as popular as film (and when audio is as good)
• Misc:
  - Music4Games (www.music4games.net) - news on game music
  - GameMusic.com (www.gamemusic.com) - buy game soundtracks
Popularity Challenges

- Need better production methods
  - (See previous topic on “mistakes”)
  - Better voice acting
  - Less repetition
- (Much of which requires more budget, still)

Guidelines for All Videogames (1 of 2)

- Address audio early, in pre-production
- Publisher or developer hire audio director to oversee audio production
  - Create budget and schedule
- Game audio tasks specialized
  - Ex: composers not do sound effects
  - Ex: producers not direct voice actors
- Ideal: Audio director, Composer, Sound designer, Sound engineer
  - Not necessarily all hired for full project
Guidelines for All Videogames (2 of 2)

- Don’t repeat audio unless musical theme reinstated
  - In that case, variation
- Pace conversations properly, with voice acting
- Game soundtracks adaptive to player actions (makes games different than film)
- Appropriate soundtracks (consider player choice for driving, fighting, puzzle games)
  - (Next)

Based on Ch 9 of Audio for Games, by Alexander Brandon

Guidelines for Fighting Games

- Non-repetition
- Dozens, hundreds of injury sounds
  - Ex: Soul Caliber 2 better than most
- It is ok to have lyrics for music here
- Music adaptive to players moves, fight situation

Based on Ch 9 of Audio for Games, by Alexander Brandon
Guidelines for Driving Games

• Adaptive sound tracks already used for some
  - Ex: *Need for Speed 3: Hot Pursuit* when cop approaches, tension filled
  - Trick: can activate a music track (bass, guitar drums) at checkpoint, say
• Player could choose sound like radio in car
  - Ex: Sega’s *Out Run* and *Out Run 2*
• Real sounds merged with synthesized sounds

Based on Ch 9 of *Audio for Games*, by Alexander Brandon

Guidelines for Puzzle Games

• Adaptive soundtracks based on difficulty
  - Ex: *Russian Squares* for XP Puzzle Pack
• Avoid repetition, even for sound effects that designate puzzle moves
  - Vary slightly

Based on Ch 9 of *Audio for Games*, by Alexander Brandon
Guidelines for Sports Games

• Music transitions based on game conditions (penalty, score)
• Music from PA of system (like at real game)
  - Ex: Madden NFL
• Crowd sound effects, reactions to action
• Audio commentary if depicted as broadcast

Guidelines for Action/Adventure Games

• Use ambient (background) sounds
• Sounds should paint “sonic landscape”
• Sound “textures” like visual textures
  - Ex: Half-life 2, used when objects collide
• Surround sound to aid immersiveness