VENICE PROJECT CENTER

THE SOUNDS OF VENICE- APPENDICES

An Interdisciplinary Qualifying Project
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1. Executive Summary

The importance of sound is an element of the human existence that is often overlooked. For example, the movie Gladiator recreated the Roman Arena in order to tell a story. However, in trying to recreate the Arena, the question arises of what did the Arena sound like? Is the representation presented in the movie an accurate depiction of these sounds? This example is just one case of a larger social issue: the documentation of sound. With the technological tools which give us the ability to accurately record sound, what sounds should be recorded such that the sounds that encompass our lives can accurately be represented?

Venice provides a unique environment for such a study of sounds in a city. Being a pedestrian city, automobiles are not present in a vast majority of the city, which is often a sound that is the heard above any other in a major city of a country. Additionally, the city's historic center is devoid of any major permanent industrial noise. These two qualities allow for the ability to clearly hear, identify, and record the sounds which encompass the city of Venice. Furthermore, this unique environment provides for the ability to examine the characteristic properties of sound which are necessary for identifying which sounds are important to record.

This project is the first known systematic attempt to identify, record, and catalogue the sounds which encompass the city of Venice. Specifically, the group accomplished the following objectives

- **Identify the Characteristic Sounds of Venice**- This objective focused on the collection of sound ideas from numerous sources using different methods and developing a way to prioritize the sounds using objective scoring of attributes, and creating a list of sounds for the group to record.
- **Create a Searchable Digital Catalogue-** This objective focused on the recording, processing, and cataloguing of the sounds listed by the previous objective.
- **Organize a Musical Competition**- This objective focused on the creation of guidelines and finding possible contacts for the creation of a musical competition in which composers use the sounds of Venice to create new musical compositions that ascertain the unique auditory environment that encompasses the city.

First, the members of the project team (the group) used six methods to try and collect ideas from multiple sources about what might be the sounds to record in Venice. In completing the below methods, the group kept two major questions in mind: (1) what are the sounds which are characteristic of Venice? and (2) what are the sounds in Venice which are in need of Preservation?

- **Face to Face Interviews**- The group asked 120 English-speaking individuals throughout the city questions about sound in Venice in the hope that the individuals would be aware of the sounds surrounding them in their travels.
- **Past WPI Venice Project Center Student E-mail Questionnaire-** The group e-mailed approximately 48 students and 4 professors' questions about sounds in Venice trying to extract information form their prior two month residence within the city.

- **Focus Groups-** The group held a focus group of 12 current WPI Venice Project Center students to gather sound ideas from preparatory research that each student conducted before their arrival in Venice.
- **Direct Observation-** The group noted the sounds heard within the city during the first three weeks of residence within the city.
- **Free-Lists**- The group had members of the Settetmari Rowing Club and APT Venezia who are residents of Venice to create a free lists of sounds they heard within their city.
- **Content Analysis**- The group examined two movies, two books, and the internet for possible references to sounds heard within the city of Venice.

In total, the group received 437 sound suggestions. Of these 437 sound suggestions, 269 suggestions were classified as characteristic sounds of Venice, and 48 of the 437 were classified as endangered.

Next, the prioritization process used was implemented for two reasons: to ensure the group recorded the sounds of most merit, first within the short time period allotted to record, and second, to eliminate suggestions that are not characteristic or endangered in Venice. First, the group organized and coded the sound suggestions. This eliminated multiple responses from our list, grouped similar responses into a single sound suggestion, and gave action verbs to suggestions of the noun form. The 437 sound suggestions resulted in a list of 129 sound ideas. Next, the group determined that a sound had six attributes of enough merit to determine if a sound should be recorded. These six attributes, listed below in order of relative importance with the most important on top, are:

- **Preservation (5)**- How likely is it for the sound to not be able to be heard in the future? Will the sound become 'extinct'?
- **Uniqueness (4)**- How unique is the sound to Venice? Is Venice the only place in the world to hear this sound?
- **Musicality (3)**- Does the sound possess musical qualities? Will the sound be useful to composers in their future compositions?
- **Popularity (2)**- Do a lot of people think of this sound when they think of Venice? Did multiple methods obtain this suggestion/idea as a result?
- **Feasibility to Record (2)**- Can this sound be easily recorded using our current equipment?
- **Feasibility to Locate (1)**- Is this sound easy to find in order to record it?

The group, using a rubric as a guide, attributed a whole number score from one to five, with five being the highest, with each attribute for a given sound. This resulted in all 129 sound ideas having a score for each of the six attributes. Since each attribute had different relative importance, the group placed a weight upon each attribute, as seen in the parentheses above. Using a formula with these scores and weights, each of the 129 sound ideas was given a total score and ranked in descending order by the total score, giving a prioritized list of sound to become our guide in the recording process.

Upon completion of the prioritization list, the group set out to catalogue the sounds of Venice. The group captured the sound using digital recording techniques with as minimal background noise as possible. The sound was then transferred to the computer for digital audio enhancements to make the sound clearer and of listenable volume levels. Data was collected and compiled on the origin of the sound, the time and date of the recording, and a description of the sound. Upon completion of processing the sounds, they were catalogued into Microsoft Access and keywords were added to make the catalogue searchable. Links to a picture of the sound source, to a map of the area around the recording location, and to a compressed sound file of the process sound were also added. In total 78 raw tracks were recorded containing one or more sounds noted on our list. After processing, 101 sound clips resulted, all of which were organized by out Access Catalogue.

Many interesting means of accessing and disseminating the sounds of Venice have been developed. First, an organized CD Compilation has been created. This CD collection is of high quality digital sound and has been assembled such that a person could play a single sound of interest, or a person could listen to a whole CD in its entirety for personal enjoyment. This CD is complemented by a multimedia Dialogue Box created from the data complied in our catalogue, giving the listener all the necessary information about any CD Track. This Dialogue Box can also be self-supporting, since it links to a compressed version of the CD track. Using software, the group has plotted each origin point on a map of Venice for all raw recorded tracks. This software also allows the user to refer back to Microsoft Access if the user desires to hear the raw recorded track. Finally, the group has developed a prototype of an Interactive Kiosk. This kiosk allows the user to explore a map of Venice, and through the maps and pictures contained in the kiosk, explore the city to find and listen to our processed sound clips.

Finally, the group took the initial steps for the creation of a musical competition that incorporates the sounds of Venice into musical compositions. The group has listed a number of rules, regulations, and judging criteria it would like to see as part of a future competition. Also, the group has started dialogues with many organizations trying to find support for the competition. Of interest, the Venice Tourist Board has already shown interest and support for a future competition. In addition to the rules and guidelines, a suggested four year plan has been created for guidance in creating the competition.

2. Introduction

Throughout history, the existence of cities has allowed people and cultures to flourish. However, history only gives us partial clues to the everyday life of the citizens of cities. Documents tell us about important treaties and laws that existed. Archeological excavations bring forth artifacts and other physical evidence of the art and culture. Modern science and technology can put both documents and artifacts together into a time line to give perspective on the advances that took place in a particular city. However, neither documentation nor archeology can reproduce the sounds that characterized the existence of a city. Can a marketplace or a political arena be accurately described or recreated without the audible characteristics present during their existence? Furthermore, is it acceptable to allow the sounds of the present to be lost when the technology to record and archive them exists today?

The city of Venice, Italy, is a city full of sounds. Devoid of automobiles and major industrial noise pollution, the everyday sounds of the city can be heard and appreciated. From the footsteps of tourists in Saint Mark's Square, to the gondola's cutting through the water of the Grand Canal, to the oar-lock maker partaking in his trade, these sounds offer ambiance and texture to a majestic city. Recording the sounds that characterize Venice would not only complement the many catalogues presently used to preserve history, but also capture the essence of the city itself.

Over the past 30 years, interest in recording the acoustic environments and soundscapes have grown and have developed into a popular field of research. The acoustic environment is understood as the "ever-present array of noises, pleasant and unpleasant, loud and soft, heard or ignored, that we all live in[1]." In other words, an acoustic environment can be recognized as the multitude of sound that surrounds someone at a specific location and time. Acoustic environments and soundscapes have been recorded in cities such as Vancouver and London in the early 1970s. In these examples, CDs have been produced for consumer retail markets. They consist of tracks containing samples of the background sounds recorded in a particular location within the city. These tracks also audibly describe the acoustic environment that was present during the time and place of the recording.

In addition to cataloguing sounds with the acoustic environment in mind, searchable digital catalogues provide examples of individual sound recordings which were recorded for preservation purposes and are independent of time or location. An example is the Cornell University's bird sound library, which catalogues recorded bird calls into a useful form accessible through the web or on an interactive compact disc package. Some databases are so comprehensive that a companion book accompanies the CD.

Furthermore, an innovative idea first developed in the late 1940s and early 1950s is the use of recorded live sounds into a musical discipline called Live Sound Compositions. First implemented with the use of simultaneous vinyl discs and spliced magnetic tape, the idea was to play the recorded live sounds in a manner that, when heard, sounded like a musical composition.

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[1] R. Murray Schafer. The Tuning of the World. New York: Knopf, 1977. IFC

Currently, there is no known published digital catalogue of characteristic sounds of Venice. Sounds that are characteristic of the city have not been documented or recorded. Similarly, unique sounds, as well as, sounds that have the potential of becoming lost have not been recorded or documented. With the technology now available, it is possible to document and record these sounds accurately and easily. Furthermore, it is now possible to make new advances in the field of live sound compositions. With the digital technology available, sounds can be stored, edited, and composed digitally. Effects such as reverb, echo, pitch bend, and others can be done with a click of a computer mouse. This digital technology can facilitate the creation of new styles of music never before possible.

This project represents the first systematic attempt at identifying, collecting, and organizing the soundscapes and individual sounds throughout the city of Venice. Keeping the idea of the soundscape in mind, this project has identified and recorded the places, people, things, events, and other such sounds that are most characteristic of the city. In doing so, the project has also identified and recorded many of the sounds that are in danger of becoming lost for all time. These sounds have been placed in accessible databanks on the World Wide Web, as well as in a CD compilation, that can be used for multiple purposes. Additionally, the project has suggested guidelines for the creation and execution of a musical competition. This competition, with the eventual goal of a gala event to take place in the City of Venice, will allow a new generation of composers to experiment with and create new composition that use our recorded sounds in an interesting and exciting musical fashion.

3. Background

In order to understand the basic concepts and reasoning behind the methods used to accomplish the goals of this project, an objective understanding of sound as it exists in the world around us is necessary. This objective understanding includes the organizational structure that classifies and categorizes the multitudes of sounds. This structure then becomes the framework from which the identification and classification of sounds within the city of Venice can be executed. Furthermore, understanding how sounds have been used, recorded, and preserved through history is important for the development of both the digital catalogue and the future musical competition

The background chapter has been divided into five sections. The first three sections (3.1-3.3) concentrate on the organization structure of sound. Acoustic environments, as well as other broad categories, are presented in section 3.1; the idea of the soundscape and the individual sounds which create the soundscape are presented in sections 3.2 and 3.3. Next, section 3.4 looks at ways sound have been preserved through history. Finally, section 3.5 discusses the many and varied uses of sound.

3.1 Acoustic Environments

Sound is defined in different ways depending on the nature of the sound or the environment that produces it. In general, sound is a particular auditory perception that produces a sensation perceived by the sense of hearing. Furthermore, the assortment of sound produced by the circumstances, objects, or conditions by which one is surrounded is known as the acoustic environment. The sound sources within an acoustic environment can be human-made or environmental.

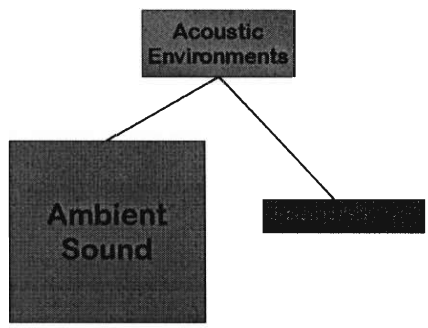

Figure 1: Two Types of Acoustic Environments. This figure illustrates how there are two distinct types of acoustic environments. Ambient Sound is the heading given to any acoustic environment which is large and conveys little meaning. Soundscapes, on the other hand, are comparatively small and convey meaning

There are two distinct types of acoustic environments, as shown in Figure 1. Ambient Sound is the heading given to the largest possible acoustic environments, such as the world or a country. Ambient Sound is all encompassing and is nondiscriminatory on the origin, time, or location of the sounds within it. Additionally, little meaning can be interpreted from listening to Ambient Sound. Conversely, soundscapes[3] describe acoustic environments of smaller area, such as a St. Mark's Square during the evening. Unlike Ambient Sound, soundscapes convey meaning and are concerned with time and location.

The different sounds that are produced in each different area make the identity of that environment unique. These environments include deserts, tropical rain forests, cities, and many others. Similarly, the surroundings of each environment produce a variety of sound that is contingent on the

[3] Refer to Section 3.2- Soundscapes

conditions found at each location. Conditions include weather, landscapes, populations, industry, transportation elements, and other factors. The surrounding includes different combinations of these conditions that produce particular sound. Oceans, forests, highways, mountains, and airports are all surroundings of an environment that create sound that distinguishes a location.

3.1.1 Ambient Sound

Ambient sound is the totally encompassing cacophony of sounds in a given acoustic environment usually composed of sound from all sources near and far. The size of acoustic environments for Ambient Sound is an area large enough such that no meaning comes forth from listening to the acoustic environment. Although little meaning can be extracted from this acoustic environment, it is important enough to note because it is a legitimate acoustic environment

3.1.2 Environmental Sound

Sounds produced by the conditions and surroundings of the environment, as they exist in nature and not produced by human invention, are classified as environmental sounds. Waves crashing on the shoreline, winds rustling the leaves of a tree, or birds singing in the tropical rain forest are all examples of environmental sounds. Different environmental sounds are produced due to differing conditions of the environment. Landscapes, weather patterns, and ocean tides are all conditions of an environment that produce a sound which are different from one another. These conditions are a result of the surroundings of the environment in which they exist, which adds to the uniqueness of the environmental sound produced.

3.1.3 Human-made Sound

Cars, airplanes, and machines are all examples of objects in an acoustic environment that produce human-made sound. Human-made sounds classify any sound produced by humans or objects invented of humans. Cities, for example, consist largely of human-made sound and are the primary source of background[5] sound in the city environment. Sound in Venice is of particular interest because it is a city void of possibly the most common human-made sound: the sound produced by motor vehicles.[6] Human-made sound is ubiquitous but certain sounds are characteristic and found only in particular areas. For example: bells, horns, or people can all produce sound that is characteristic of the place where it occurred. However, as with environmental sounds, the conditions under which human-made sounds exist can significantly distinguish one human-made sound from another.

[5] Refer to 3.3 Individual Sounds

[6] Although there are no motor vehicles that run through the Historic Center of Venice on superhighways or other large transportation systems, there are a minimal number, in comparison to cars in other metropolitan areas, of motorized boats operating within the historic city limits.

3.2 Soundscapes

R. Murray Schafer, a person who spent his life working to developing the ideas of the acoustic environment, first coined the term soundscape in his writings about the idea of acoustic environments and how they affect society. In order for an area to have a soundscape, two subjective criteria must be met. First, all the individual sounds within the defined boundary area of a soundscape are capable of being heard from some point within the boundary area. The individual sounds do not need to be continuous, nor do all the individual sounds within a soundscape need to be heard at all points within the soundscape, but the individual sounds must be audible somewhere within the area. Second, the assembly of sounds within the soundscape must convey some meaning. This second criteria is what separates soundscapes from Ambient Sound and also implies the area of the soundscape is comparatively small. For example, the soundscape of Central Park in New York City should convey the message that it is a park within a city. Furthermore, trying to define the boundary of the Central Park soundscape to include the entire city of New York does not meet the second criteria, since the meaning of a park within a city is lost if the entire city is included. This boundary would be better suited for defining a soundscape of New York City, which Central Park is a part of.

A soundscape is analogous to a landscape. A photographer in a location can capture the landscape he/she sees on film. There could be water, mountains, prairies, tress, or animals captured through the film and eventually on a print. This print he/she created is only one of millions of landscapes he could photograph throughout the world. The same can be done for soundscapes. A sound engineer with a tape recorder can accurately capture the sounds he/she hears in a particular area. Any sound from leaves in the wind, to running water, to fog horns, to footsteps can be captured on the recording. The recording he/she created is one of millions of soundscapes he could have recorded throughout the world.

Figure 2: The Soundscape Analogy The Soundscape is analogous to the landscape. Just as a photographic print portrays a landscape, a soundscape can be compiled by a sound engineer with a tape recorder.

A soundscape may be captured in two ways. The first way is analogous to the painter. The painter interprets what he sees and creates a painting that conveys his overall impression. The second is analogous to a photographer. The photographer frames a particular shot and takes a picture of what he framed. Soundscapes work the same way. Analogous to the painter, the first way to record a soundscape is to record individual sounds and compile them into an interpretation of the area being studied. This is useful for trying to define a city. Analogous to the photographer, the second way is to take a single omni-directional recording which captures the exact sounds at an exact moment in time. This is useful for trying to capture an extremely small soundscape. Both methods are useful for capturing and defining a soundscape of interest.

Furthermore, just as the painter is bound by the size of the canvas and the photographer by his frame and lens, the soundscape has boundaries. Although these boundaries are subjective, it is important to set reasonable boundaries for the area of interest. In doing so, a clear definition of the characteristic properties of the area of interest can be discovered and documented.

3.3 Individual Sounds

Soundscapes can be broken into two subgroups: Background and Foreground. Background Sounds are sounds that create the subconscious soundtrack of the soundscape. Individual sounds that compose the entire background are classified as Keynote sounds. Foreground Sounds are sounds that are consciously heard and stand out from the sounds that constitute the background. The two types of Foreground Sounds are Signals and Soundmarks. Keynotes, Signals, and Soundmarks are the three subcategories of individual sound that, when put together, create the soundscape.

3.3.1 Keynotes

Keynotes are background sounds of the acoustic environment.[7] This is analogous to music where a keynote identifies the fundamental tonality of a composition around which the music modulates. This background is the sound base in which all other sounds are compared too.

Figure 3: Keynotes The sounds produced by pigeons in St. Mark's Square are sounds that are heard but subconsciously ignored

Keynotes are the sounds that distinguish the environment from which it came. For example, the continuous buzz of cars driving by would be the keynote of a super-highway. A keynote is the type of sound that, if it were not audible, would completely change the auditory perception of the soundscape. Using the current example, without that buzz of cars driving by, one would not be able to recognize the highway. This is also true for Venice. Understanding the keynotes of the city of Venice is important since without the keynotes, the soundscape of Venice would not be recognizable.[8]

3.3.2 Signals

Foreground sounds that constitute signals are sounds that are intended to attract attention. Signals are sounds that occur because they create an audible warning or notice. The warning may be an alarm in a building to signal a fire or even a siren from an ambulance to signal it passing on the super-highway. Signals may be as simple as a telephone ring, or as complicated as a whale's song under water. These sounds come to the foreground above the keynote sounds. In the super-highway example, the siren of the ambulance stands out in the foreground against the keynote of the constant buzz of cars on the highway.

[7] Tuning p. 272
[8] Tuning p. 10

Figure 4: Signals: Signals convey information, such as the shouting of "Rialto!" at the Rialto Boat Stop

In terms of the acoustic environment, all sounds can be listened to consciously, but signals are sound that must be heard because of their message.[9] Signals can be found all over the acoustic environment of Venice. They may be sounds associated with closing of wooden shutters or a motorboat passing in a canal. Whatever their message may be, they are important in characterizing the sounds associated with Venice.

3.3.3 Soundmarks

Soundmark is a play off the word 'landmark.' These sounds are foreground sounds that are unique to a community. The people of a city regard these sounds as special and they work to protect the integrity of the sound within the acoustic environment.[10] A particular clock tolling a pattern may be considered a soundmark within a community. The idea of identifying soundmarks is of particular interest in recognizing the sounds of Venice. Our identification process of sounds led us to a number of soundmarks, as people identify them more easily than any other sound. Also, since soundmarks are unique to a community, these are the sounds commonly noted when people identify sounds that need to be preserved.

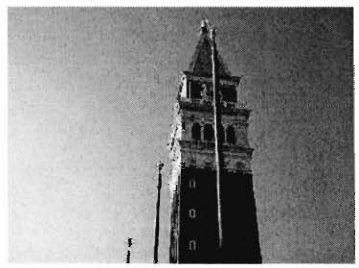

Figure 5: Soundmarks The ringing of bells from the Campanile in St. Mark's Square is a sound that is important to Venetians. Like a landmark, soundmarks are protected because of their importance

3.4 Preservation of Sound

Throughout history, sound has been preserved in some form or another. Originally, music and vocal arrangement was written down on staves so that the songs that the sheet music represented could be reproduced in the same fashion that it was originally created. For live sounds, the only way of documenting the sounds was through writing. Poems and novels often documented the soundscape of a city through words. However, as technology advanced, new and more accurate documentation of sounds were created

3.4.1 20th Century Sound Preservation

Today, technological advances have allowed people too easily and accurately document, transmit, and preserve sound. Older analog (continuous wave) recording medium, such as the cassette tapes, 8-track, and vinyl discs were the first highly produced means of recording sound. However, digital medium, such as Compact Discs (CD), have developed into technology which produces near exact reproduction of any particular sound. Computers have also made it easy to store original music and sounds. Additionally, while the older analog mediums deteriorate over time CDs are more versatile and no physical contact is

[9] Ibid
[10] Ibid

needed for playback. Since CD files can become very large in storage space, lesser quality compressed files are used when storage space becomes an issue.

3.4.2 Sound Archiving

Sound archiving is most commonly done by creating a digital sound file, usually in WAV format, then compressing it using computer software into one of a variety of formats, most commonly the MP3 format. The compressed files are then placed into database software. Once the database is constructed, the compressed files can be downloaded from the database. There are a few sound archives in existence, most notably the Vancouver Soundscape Project and Cornell University's bird sound library. Our project utilized the concept of sound archival when we created our catalogue of sounds.

3.5 Uses of Recorded Sound

Today, recorded sounds have numerous uses, encompassing music, sound effects, and sound clips. Applications of these recorded sounds include commercials, movies, theatre, as well as personal use. This section discusses a few of these uses.

3.5.1. Sound Clips

Sound clips are recordings of sounds that can be easily recognizable to the listener. In general, sound clips are short recordings of sound and the focus is a foreground sound. However, sound clips may also have the focus of a keynote or a soundscape and the length of the clip will be of longer length. Sound clips usually have a descriptive name which describes the sound clip. In Venice, the recordings made are sound clips

Sound clips are easily recognizable in movies, theatre or TV commercials. Since these are visual medium, the sound clips are incorporated to support the visual. For example, movies use sound clips to complement the visual image when an artificial background is used. In a location filming, it is possible to record the sounds created at the location site. However, some parts of movies are not recorded on a location, and therefore the elements of the location must be assembled together. This includes the sound element, and sound clips provide this role. It is quite possible that a sound clip recorded in Venice for this IQP would be ideal for an application such as this.

3.5.2. Sound Effects

Sound effects are artificially created sound clips that imitate actual sounds, such as thunder or an explosion, and are often created for movies or musical purposes. Generally, sound effects are digitally created, however, some sound effects are artificially created from similar sounding materials, such as thunder sounds being produced by sheet metal. Most high quality CD collections are available to purchase, and they usually go for between $20 and $10,000. Lower quality sound effects libraries can be downloaded for free on the internet. Uses include complementing other special effects as well as providing emphasis in movies, television, and theatre.

3.5.4 Live Sound Composition

In the same way as classifying art is subjective, classifying music is also subjective. However, music is generally classified as the combination of sounds that produce a composition having rhythm, melody, or harmony. The most common source of these rhythms, melodies, and harmonies has either come from the human voice or from an acoustic musical instrument. More recently, advances in technology have created a new category of the 'musical instrument.' Acoustic instruments, such as the violin or the clarinet, can be reproduced electronically, and little to no difference could be detected between the acoustic and the electronic instrument by an untrained ear. Furthermore, being able to reproduce and manipulate sounds that have been recorded from environmental and human-made sources provide new 'instruments' that can be used in a musical fashion.

It is impossible to consider natural and human-made sounds as 'instruments.' Whale and birds naturally made music in their calls. They have distinct themes, pitch, melodies and harmonies that constitute song. Carpenters and Blacksmiths hammer with a distinct rhythm and beat, that can create a tempo and syncopation that are complex and rhythmic. These sounds, along with the millions of other sounds, justify how a soundscape can be as musical as any composition created by Mozart or Duke Ellington.

With the advent of technology, the individual sounds in a soundscape can be used as individual instruments in compositions. Just as Mozart or Duke Ellington used acoustic instruments to create music, people like John Cage and Pierre Schaeffer have used the recordings of live sounds to create musical compositions. Both men recorded sounds that occur within soundscapes and created musical compositions out of these sounds. John Cage used variable speed turntables as well as other musical instruments to create an entire series of compositions. It was his belief that music should be opened up to all sounds, not just those created by the conventional musical instrument. With the creation of magnetic tape, Pierre Schaeffer was able to further expand the use of live sounds in musical compositions. With the ability to cut and slice, magnetic tape offered new freedom in manipulation and editing of the live sounds used. Just by the shape of the cut and splice of the magnetic tape, Schaeffer would be able to manipulate the fade from one sound to the next; similar to the way a composer defines a sound when a conventional instrument plays in a composition.[11]

Cage and Schaeffer helped to create a new music style. They showed that sounds recorded from a soundscape are musical instruments and that live sound compositions are a legitimate musical style. Now, with digital technology available, live sound compositions can further expand. Cage and Schaeffer have created a base to work from. This project aims to let a new generation experiment through the planning of a future competition.

[11] EMF Institute: www.emf.org . 20 Apr. 2003

3.5.5 Music Competitions

One of the greatest ways to motivate and inspire composers to create original works of music is through the music competition. Each year, thousands of music competitions are held. They can range from music festivals which present new works in a friendly atmosphere, to symposiums that highly critique the new works presented. Some competitions have entry fees and others reward monetary prizes to the most outstanding works in a competition. Some require the work be entirely new and unpublished or presented, while others showcase a known work. All, however, allow the composer an opportunity to let inspiration and creativeness be presented and appreciated.[12]

As stated above, the most obvious reason to have a competition is to encourage and inspire new artists to create new live sound compositions. However, the competition accomplishes more than new and interesting music. A competition would bring the appreciation and awareness of the sounds we live in. Furthermore, when done properly and effectively, the competition could become an annual fundraising effort for the preservation of sound sources within the city of Venice.

[12] Richard Falco. Personal Interview. 21 Apr. 2003.

4. Methodology

The 'Sounds of Venice' is a term that cannot be described in pictures or words. Therefore, throughout the execution of this project during the months of June and July of 2003, the team worked to define the term in the only way possible: the audible recording of the components which comprise Venice and its unique sounds.

The Sounds of Venice Project has three clear and defined objectives;

1. To identify and classify the unique and important sounds of Venice.
2. To create a searchable, digital, audio catalogue of the sounds.
3. To suggest guidelines for the organization of a musical competition that will incorporate the 'Sounds of Venice' into original musical compositions.

The first objective was the identification of characteristic sounds within the Historic Center of Venice. This became the most important research step because, not only did we finalize a list of sounds to record, but we used attributes for determining the desirability of the sound as an objective means to identify and quantify the characteristic sounds of Venice.

Next, the creation of a searchable digital catalogue looked at the list of identified sounds and captured them for preservation and other uses. Through this digital catalogue, which also includes a compilation compact disc set, the term 'Sounds of Venice' not only has an understandable boundary and definition, but also has a compact and tangible representation that is portable and reproducible. Furthermore, being on a useful CD format, the sounds are available for use in various applications, as well as being archived for preservation and posterity.

Finally, the third objective suggests guidelines to demonstrate a possible way to incorporate the sounds we have recorded into musical compositions. Although mostly written to be suggestions to the creators of the competition, the guidelines are put forth so that the competition can live in the same spirit and enthusiasm that the Sounds of Venice Interdisciplinary Qualify Project (IQP) worked under in creating the final sound product.

4.1 Identification of Characteristic Sounds

Most sounds that are audible to the human ear were considered to be a reasonable source of raw material for this project. Taking this view into account, we realized there are sounds that can be heard in Venice that are similar in nature to other sounds heard all over the world. However, the context in which the sound exists, the source of the sound, or the locale in which the sound is audible can entirely change the meaning of the sound, which in turn has an effect on the people, places, and environments in which they take place. Moreover, there are also particular sounds that can be found only in a specific area that can evoke emotion and interest about that locale. For this project, we needed to accurately depict a representation of the auditory environment that surrounds the city of Venice.

The identification of characteristic sounds had two main tasks that resulted in a final list of sounds, as illustrated in Figure 6. First, we compiled ideas from different resources and took those ideas to come up with a general list of sounds. Next, we filtered the sounds and ranked them along specific criteria to, in the end, come up with a final and prioritized list of sounds to record. These two steps were conducted before the sounds were recorded so that we could compile a knowledge base of what people perceived to be characteristic sounds of Venice. Each one of these main tasks was broken down into sub-tasks and is discussed in detail later within this methodology chapter.

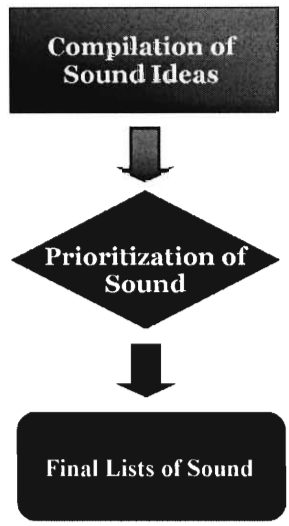

Figure 6: Flow of Tasks with Result to Identify Characteristic Sounds

The goal of the identification of sounds was to try and discover the keynotes, signals and soundmarks[13] of the city, as well as to find areas of the city that have a characteristic soundscape on its own. In trying to achieve this goal, the group kept in mind two major criteria: does the sound have characteristic qualities with recording value; and is the sound in danger of becoming lost. We did not want to record and preserve all sounds, but rather concentrate on specific sounds that enhanced and enriched the cultural diversity of the city.

4.1.1 Compilation of Sound Ideas

The first step of the identification process was to compile lists of sounds that not only list particular sounds, but also lists ideas and thoughts about sounds. This included gathering information about what other people felt the characteristic sounds of Venice were using five different and distinct research methods. These five methods are shown in Figure 7, with their respective subsections and are discussed further in the remaining parts of this section.

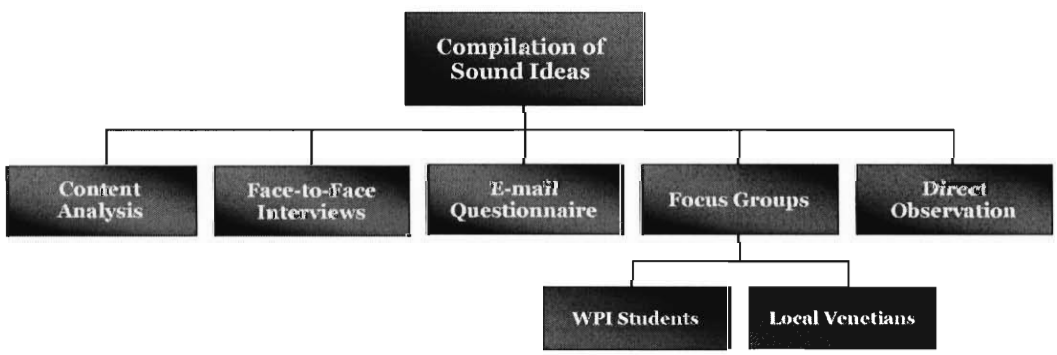

Figure 7: Method for the Compilation of Sound Ideas This graph illustrates that five research methods were used to collect and compile sound ideas (4.1.1.1-4.1.1.5)

4.1.1.1 Content Analysis

A method that was used to identify characteristic sounds found in Venice was content analysis. Content analysis, or the study and examination of recorded human communications[14], is useful when looking for information specifically or topically mentioned in literature or media. Initially, the team searched through writings and films, during the months of May and June of 2003, to find what other people have hinted as possible characteristic sounds of Venice. We felt that if a reference to a sound was included in writing or film, it may be sought-after to identify and record. We searched through two movies filmed in Venice. The content analysis of certain media and literature was an opportunity to create a list of sounds which were analyzed and used to extract useful sounds. Although the group used this method sparingly compared to the other methods, content analysis can be a powerful tool for later executions of similar projects.

4.1.1.2 Face-to-Face Interviews

This method for identifying sounds to record in Venice was done by asking 120 English speaking individuals in the city of Venice questions about possible characteristic and endangered sounds of the city. English speaking individuals were chosen since the group was only fluent in this language. The 120 individuals interviewed were made up of 24 groups of people from locations all over the globe.

The project group expected that individuals in and around the entire Venice area would be aware of their surroundings and, in particular, aware of the sounds around them in their travels. We spoke with people largely in the main tourist areas of the city. This included the *Piazza San Marco*, *Vaporetto*[15], *Rialto*, and *Accademia*. We walked theses places listening for people who spoke English then approached them and asked questions about sound in a casual manor. As discussed earlier, the evaluation of the sounds used two major concepts to serve as a focus for the interview: (1) what are characteristic sounds and (2) what sounds will be lost 100 years from now[16]. We were looking for a stream of consciousness[17] more than people identifying a single sound which may come to their mind.

There were certain boundaries to which the information collected in the method are constrained by. First, of the individuals we spoke to, we only spoke to the English speaking people of Venice, which limits the number of people available to collect information from. Second, this method limited us to getting responses primarily from tourists that represent a population with a limited knowledge of Venice. Furthermore, a major bias that influenced the answers of the participants was that some of the answers the interviewees gave were sounds present in the context of their surroundings at the time of the interview. What the interviewees heard around them was what they gave as answers. The group members attempted to probe at the thought behind the responses, but in some cases, people were

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[13] Refer to 3.3- Individual Sounds
[14] Babbie, Earl. The Basics of Social Research. Australia: Wasdworth Group, 2002.
[15] The Vaporetto is the public transportation service for Venice
[16] For the full survey, refer to Appendix B, Face-to-Face Survey
[17] A stream of consciousness is the premise for people to freely share their thoughts out loud instead of pondering and replying a contemplated answer.

reluctant to have a discussion, most likely due to time constraints or lack of interest. In any event, we used this method to compile data based on other people's opinions. It was a way of extracting as much information as possible from as many different types' of people as we could.

4.1.1.3 Past WPI Venice Group E-mail Questionnaire

The e-mailing of the past two WPI groups who conducted projects in Venice was used to identify additional ideas about sounds[18]. The e-mail addresses were aliases, so we estimate that there were approximately 48 students and four advisors who had received the e-mail.

The past WPI Venice students have both the research and a full two month residence, when they did their project in Venice as previously mentioned, to refer to when they answered the questions sent in an e-mail about characteristic sounds[19]. While response to the e-mail was voluntary, the answers we received led to more information about the sounds of Venice that is not available through the other methods we used. Once again, there were small biases in the answers which were different from the biases with the face-to-face interviews. This was in large part due solely to the similar background of all the past students, however, the information they gave was useful to complement other information gathered during the project group's residence in Venice.

4.1.1.4 Direct Observation

This method was very simple; for it consisted of each group member writing down the sounds heard each time we were out and about in the city. This was done during the first two weeks of E term, and it was very effective because we had enough prior knowledge about sound to keep an "open ear" for any characteristic sounds that could be heard. This included many different categories of sound: foreground; background; keynotes; signals; and soundmarks. This is a straightforward but important method of identifying the sounds in Venice. The limitations of this method are that we are only identifying the sounds that the three members of this project group felt were characteristic. However, the whole point of the identification process is to get input about the sounds of Venice through the use of different methods. Therefore, although this method is elementary it is necessary because the three members of this group had insights into what we felt were the characteristic or endangered sounds of the city. By using this method, an additional intuitive perspective can be entered into our recording lists.

4.1.1.5 Focus Group

A Focus group was another method used for our project. "In a focus group, typically 12 to 15 people are brought together in a room to engage in a guided discussion of some topic.[20]" The purpose of this focus group type was to gather and spark ideas based on responses from our classmates. We conducted the focus group on June 10, 2003 at our residence in *San Marco*. Initially, we planned on setting

[18] WPI deletes e-mail addresses six months after graduation. Therefore, only the past two year's group e-mail aliases were available for use.
[19] Refer to Appendix C- Past WPI Venice Groups E-mail
[20] Babbie, Earl. The Basics of Social Research. 2nd Ed. 2002 Wadsworth group. 300.

up two groups at two different dates; however, due to time constraints and lack of interest, only one session was held and eight students that failed to participate. The session was comprised of 12 students and was recorded to be able to review the dialogue at a later time. Because each student of the 23 member Venice Project Center has participated in research about Venice and has completed a Culture Project as part of their individual project preparation, we knew that we could elicit well thought and educated ideas about sound from the participants. We used the same two underlying ideas of characteristic and preservation qualities as in the face-to-face interviews. There was a bias that was small enough that it did not skew the answers greatly but was definitely present, since all members of this focus group have had similar preparation, but the answers they gave were more to create an additional list and insights to work from or to clarify some sounds that had already been collected.

4.1.1.6 Free Lists

This method was conducted on two separate occasions in causal atmospheres. The first free list session was held at the Settemari Rowing Club Dinner on June 27, 2003 and the second was conducted through e-mail communications with the Venice Tourist Board. The strategy was to ask the Venetians to simply create a free-list of sounds through unobstructed streams of consciousness and decide whether a sound idea is characteristic and/or endangered. Additionally, each participant at the Settemari Rowing Club Dinner listened to recordings of sounds thus far recorded in Venice and feedback was given to further the ideas within the free lists.

4.1.1.7 Threats to Validity

It was noticed in our sound identification process that people had a different interpretation as to what is important or characteristic and what is not. This is not to say that everyone felt the same way or that everyone felt differently, however it is important to realize that suggestions varied. Additionally, it is important for the group to scrutinize suggestions. For example, although a sound may have been used in movies or have been mentioned in different types of literature, dramatic license[21] may alter the usefulness of giving the reader or watcher a true description of what the sounds of Venice are. In another example, some responses from the focus groups or the surveys did not exist as a sound even found within the city of Venice.

The team paid close attention to any possible threats to validity from the responses given throughout the identification of characteristic sounds. These may have arisen in our method collections and we tried to minimize their effects whenever possible. Bias arose from questioning a certain population or just from the tone and form in which a question was asked during an interview. We minimized this by structuring the interview in such a way that we could adapt to the people that we were

[21] Dramatic license is the liberty writers and filmmakers use to slightly alter truths to further the plot or setting of their work.

speaking with. Being aware of these threats and realizing when they occur helped strengthen the accuracy and true validity of our project, and have been noted in this project where applicable.

4.1.2 Prioritization of Sounds to Record

Using all the techniques described in the previous sections, the group had a list of 437 possible sounds and sound ideas to record. When we speak of sound ideas we mean that some of the responses were given in the noun form, for example pigeons were stated on numerous occasions without actually attributing an action verb with the noun pigeon, like pigeon cooing. In order to decide which sounds were desirable to record within our limited time constraints, the possible sounds were processed and refined into workable sub-lists from the six methods used in the previous sections. The prioritization process is broken down into six steps (see Figure 8).

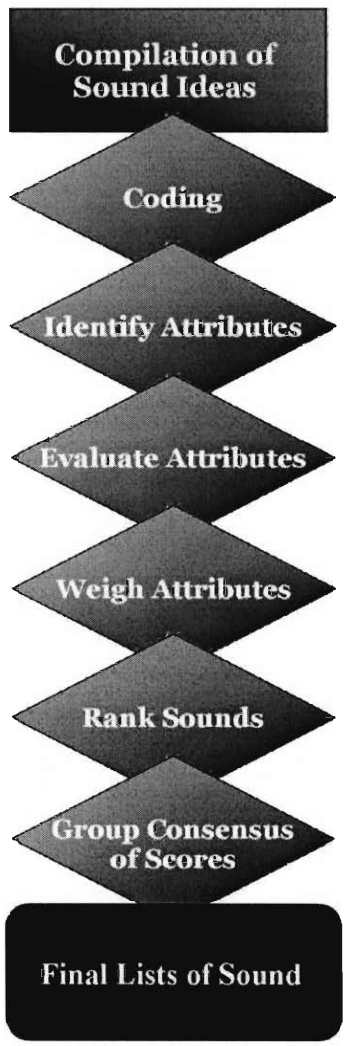

Figure 8: Filter Process This figure is the same as Figure 2 (p24), except with the prioritizing step expanded. (4.2.1.1-4.2.1.6)

4.1.2.1 Coding

Our information we gathered about the sounds of Venice came from many different sources. Each of these sources had their own sub-list of recommended sounds to record. Furthermore, each sub-list partially consisted of nouns or types of sounds. Therefore, it was necessary to clean up and organize to create a master list of recommended sounds to record that not only simplified the sub-lists, but listed actual sounds to record.

Each reference to a sound from the sub-lists was put on a master list by process of coding. "Coding is the process of transforming raw data into a standardized form.[22]" First, the group cross-referenced each sub-list, checking to ensure no sound was listed more than once. Furthermore, if two or more sound references were referencing similar sounds, the group listed the sound once on the master list giving the similar sounds a single 'coded' sound heading. If a sound reference was either a general sound category or unspecific to a sound-making action, the project group listed as many possible ways a sound could be produced from a generic category and listed the ideas into the master list. Each response on the master list noted the method from which the sound was mentioned and the number of times a sound was mentioned. If a sound was mentioned from multiple sub-lists, this was also noted. From this master recommendation list, the group decided what to record.

[22] Babbie, Earl. The Basics of Social Research. 2nd Ed. 2002 Wadsworth group. 317.

4.1.2.2. Identification of Attributes

While the process of collecting sound selections was taking place, the group constantly debated and discussed possible sound attributes. During the first three weeks of the project, all group members brainstormed and debated possible attributes which might be important for determining and prioritizing which sounds to record. After a group discussion a couple days prior to the coding of sounds, the group decided six attributes were of enough merit to be in the prioritization process. Attributes for determining the desirability of the sound are shown in Figure 9 which included: feasibility of recording the sound; feasibility of locating the sound; uniqueness of the sound; vulnerability of the sound becoming "extinct;" ability of composers to use the sound in a musical composition; and, number of responses to a particular sound. These attributes were chosen because of their relevance to both the social science and technical aspects of this project[23].

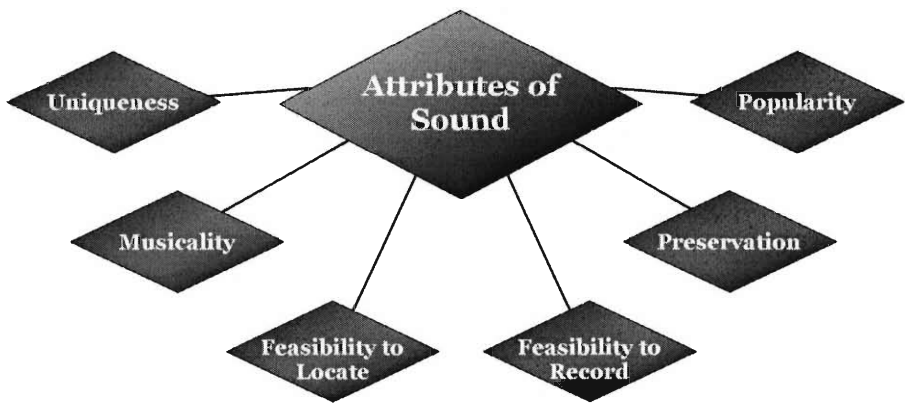

Figure 9: Attributes Used In the Prioritization Process. This illustrates the six attributes chosen for use in the prioritization process (4.1.2.2)

4.1.2.3 Evaluating Attributes

Once the master recommendation list was compiled and appropriate attributes were selected, each member of the group individually looked at each possible sound and determined if the sound was a desirable sound to record. Each member ranked each attribute on a 1 to 5 point whole number scale for each sound in the list. To assist in the evaluating process, the group created suggestive ranking guidelines for each member of the group to follow when evaluating attributes for a given sound.[24]

4.1.2.4 Weighting Attribute

Although each desirability attribute by themselves have merit and credibility, the attributes compared to each other are not of equal value. For example, if a certain sound has been mentioned repeatedly, but is not feasible to record, the sound is not desirable to record. However, a sound may only be mentioned by a single person, but the sound may be highly unique to Venice, so it may be highly desirable to record that sound. For this reason, each member of the group, in addition to evaluating the

[23] Carrera, Fabio,. *What Cultural Heritage Do We Preserve And Why?* May 21, 1997
[24] Refer to Appendix D- Rating Scale of Sound Attributes and Appendix E- Individual Ranking Sheet

attributes, individually weighed each attribute on a 1 to 5 point whole number scale[25]. A higher weight score indicated a higher importance of the attribute to the desirability of the sound. The purpose of the weight was not to put the attributes in a strict order, but to place an attribute in comparative importance to the other five attributes. Since there were six attributes, two or more attributes had equal weight values.

4.1.2.5 Ranking of Sound

Each weight score was multiplied to the attribute score, and the individual weighted attribute scores were summed together to give a final score. The higher the score, the more desirable the sound was to record. Therefore, each member sorted their list by final score in descending order to create a prioritized list.

4.1.2.6 Group Consensus of the Scores

After each group member individually rated the sounds recorded, the group met as a whole and discussed the ratings. For each sound, the group found a consensus score for each attribute. After all attributes have been agreed upon, the group discussed and found a consensus for the weight of each attribute. Again, the individual weighted attribute scores for each sound were summed and a final score resulted. As before, the higher the score, the more desirable the sound was to record.

To try to minimize individual biases in the weighting process, the group asked each current student of the Venice Project Center to put a weight on each attribute under consideration. They did not actually give a score for each attribute of a particular sound or know which sounds were under consideration. The purpose was for each student to give an independent weight assessment to each attribute. The results were averaged and the weights were applied to the attribute scores given by the member of the Sounds of Venice group to recalculate the final scores. With this result, the group was able to identify and minimize any major biases that may have occurred in the process of determining which sounds to record[26].

4.2 Creation of a Searchable Digital Catalogue

There were three steps taken to creating our digital catalogue. First, the sounds of interest must be recorded. Second, the sounds that were recorded were processed to ensure quality. Finally, the processed sounds were archived in several different ways and on different media to better serve all groups interested in our sounds.

4.2.1 Recording of Sounds

Once the process of identifying the historical, characteristic, or otherwise important sounds of Venice is underway, it was a straight-forward process to record the sounds. Using various types of microphones, the various sound signals were sent to a DAT Recorder.

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[25] Refer to Appendix F– Weighting of Attributes/WPI Venice Group Attribute Survey
[26] Refer to Appendix F– Weighting of Attributes/WPI Venice Group Attribute Survey

4.2.1.1 Microphones

Dynamic and condenser are the two broad categories of microphones in use today and were used for recording sounds in Venice. A dynamic microphone is the classic cone-type microphone which converts sounds to electrical signals. A condenser microphone uses electrical circuitry to convert sound to electrical signals. For the recording of sounds in Venice, an AT822 stereo condenser microphone, shown in Figure 10, was the primary microphone of choice. The decision to use a stereo microphone for the primary microphone was made in consideration of possible sound for composition needs of a live sound composer and for realism and quality of the sound. Other microphones, such as the Shure SM57 dynamic or Shure SM58 (see Figure 11) dynamic microphones may be used depending on the circumstance.

Figure 10: AT822 Condenser Stereo Microphone

Figure 11: The SM57 (top) and SM58 (bottom) Dynamic Microphones

4.2.1.2 Recorders

Once the sound has been converted to an electrical signal, it is then possible to record the sound onto media for later processing. A DAT (Digital Audio Tape) Recorder was used to record these sounds. Battery operated, the DAT Recorder can record signals without having to be plugged into an electrical outlet. Also, the DAT tape supports a 16-bit, 44.1Kbps (kilobytes/sec) recording media, which produces professional digital quality audio tracks. A CD also runs on the same 44.1Kbps. Our project will use a Sony TCD-D8 Portable DAT Recorder, as shown in Figure 12. This recorder was chosen primarily due to its availability as well as size, power consumption, and mobility considerations. Battery life of the Sony TCD-D8 recorder is four to six hours of record time. The recorder can also receive power from an electrical outlet when necessary. The DT-120RA DAT tapes can store two hours of recording per cassette.

Figure 12: The TCD-D8 Portable DAT Recorder

4.2.1.3 Recording Process

As mentioned earlier and shown in the top rectangle of Chart A (below), the recording process was straight forward. Once a sound had been identified and placed on the "Sounds to Record" Checklist, the group located the sources of each sound. Using the microphone and the DAT Recorder, the group recorded the sound and completed the "Field Recording Sheet[27]" for that sound. A microphone stand was used if it will increase the quality of the recording.

[27] Refer to Appendix B- Field Recording Sheet

4.2.1.3.1 Recording of Soundscapes

The objective of recording a soundscape is to try to capture the acoustical characteristics of an area. Essentially, the group acted like the photographer of a landscape, except we captured an audio representation of the area instead of a visual representation of the area. The group surveyed a locale for a period of time to try to determine the best location for capturing the whole acoustical representation of an area. Then, the group took recordings of at least five minutes to try to capture the essence of a soundscape. Like a photograph, our recording is like a small, almost instantaneous depiction of the acoustical characteristics of a particular area.

4.2.1.3.2 Recording of Individual Sounds

While the goal of recording a soundscape is to capture the whole, the goal of recording an individual sound is to capture a single sound that is part of a whole. In the cases of certain keynotes, signals, and soundmarks, the individual sound has characteristic or preservation qualities to which makes recording the sound important.

Recording individual sounds is composed of locating and recording the sound from its source. Some sounds required the use of dynamic microphones to try and reduce the unwanted ambient sound that surrounded the source. Others required the continuous recording of the locale to ensure capturing the sound. This sometimes required recording for a long time to capture a short clip. Essentially, the group tried any technique available to us to try and capture the individual sounds.

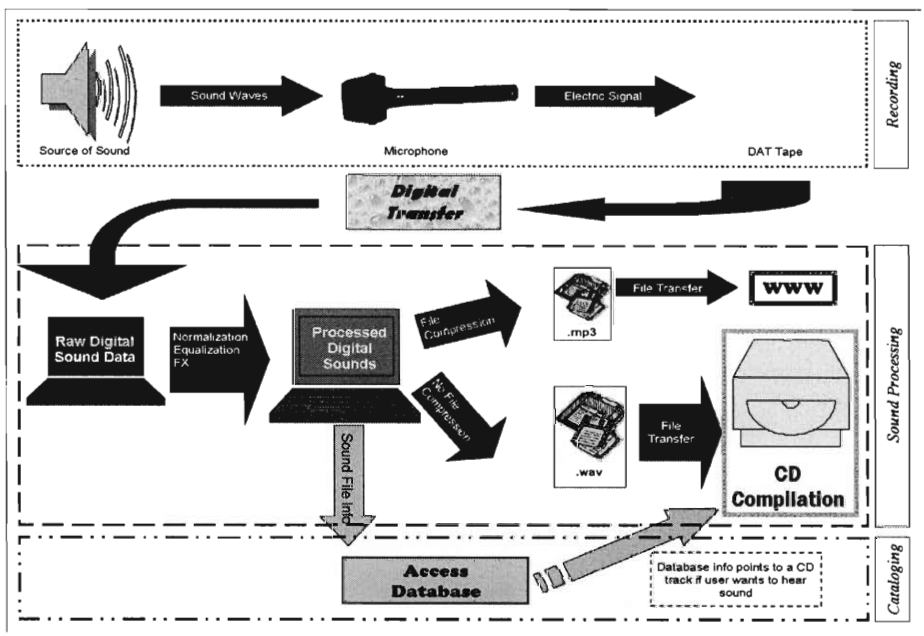

Figure 13: Recording, Processing, and Cataloging Flow Diagram. This flow diagram shows how the three processes of Recording Sounds (4.2.1), processing the Sounds (4.2.2), and the Cataloguing of Sounds (4.2.3) are all related. Starting with the sound signal represented by the speaker (upper left), many steps must be taken to produce a high quality CD Compilation (center right)

4.2.1.4 Documenting Sound Locations

In order to introduce the idea of space and location to the project, MapInfo[28] was used. Whenever a sound is recorded, the location of the sound was also documented on the "Field Recording Sheet". Using MapInfo, the location was plotted on a map of the Historic Center of Venice. Using different layers, the sounds were plotted by category of sound[29]. In this way, we made the connection of space and sound that was lost when sound first was transmitted over wire.

In order to continue with the next step of processing the sounds, the recorded sounds were transferred from tape to a computer, as shown on Figure 13 (previous page) between the recording and processing blocks.

4.2.2 Processing of Sounds

Although it is possible to take the raw recorded sounds and distribute them for use in many applications, the processing of digital sound is an important step to increase the quality and usability of the sounds, as shown in the middle bar of Figure 13.

There are two important reasons for processing sounds. The first is to clean the sound. With any recording device, there are unwanted sounds that can be filtered out. Also, if a particular sound needs some digital processing, such as equalization, audio level compression, or other types of filtering, it can be done at this stage. Unlike live sound recording in a studio that has all necessary components in the recording chain, it is much easier with location recording to apply necessary correction after the actual recording of the sound.

Second, the sound must be normalized. For example, it is often the case where a PC-burned CD[30] requires the listener to adjust the sound levels of the speakers because each track was recorded at a different level. This CD is not normalized. By normalizing sounds, the loudest level of each sound is at the maximum output level, increasing the overall signal size, and making the sound more clear by allowing more room for definition in a digital encoder..

Once the processing of a sound is complete, it is then possible to effectively catalogue and archive the sounds.

4.2.3 Cataloging and Archival of Sound

In order to catalogue and archive these processed sounds, the group needs to create a digital catalogue that is searchable, categorized, and user-friendly. We first compressed the file size of the processed sounds we record into .MP3 using Cakewalk SONAR software. Once this was accomplished, the sound files and their relative information were stored in a catalogue using Microsoft Access. A full description of the structure of the database can be found in Appendix J. Once this was accomplished, Access organized the files so that they are searchable and easy to locate. This catalogue was then stored on the internet for people to download the sounds. A non-compressed compact disc collection was also

[28] MapInfo utilizes GIS maps and map layers to give an exact visual model of an area
[29] Refer to 4.1 Identification of Characteristic Sounds
[30] PC-burned means that a personal computer was used to create an audio compact disc

created as the deliverable for musical composers interested in our musical competition. The non-compressed files are of much better quality than the compressed internet sound files. The CD is also available for interested parties such as movie or television sound engineers to use in their work. Now that the archive is complete, it can be maintained and updated by future IQP groups to help preserve the audible treasures of Venice.

4.3 Organization of a Musical Competition

In order to give life to the efforts that our group has put forth recording the characteristic sounds of Venice, as well as to raise the awareness and appreciation of the sounds that we all live in, the team has created guidelines that should be incorporated into the creation of a competition.

4.3.1 Suggested Rules and Parameters

Rules and parameters of musical competitions are many and varied. Each competition, depending on factors such as size, scale, or complexity, have developed rules that not only create an even and fair competition, but also developed rules that spur the creative genius in each and every participant. We hope that the future competition will do the same, and we have created suggestions to ensure these ideas.

Our suggestion for the competition is a two category competition. To foster the spirit that Schaeffer and Cage[31] put forth in their original live sound compositions, the first category would be a Live Sound Composition category. To try and inspire the combination of the live sounds and conventional music, the second category would be the Combination category.

4.3.1.1 Possible Rules for Both Categories

Even though the two categories are distinct in their own way, both categories share a common set of ideas and rules that may be applied to both categories. First, the only live sounds used in all the compositions should be from the CD compilation created from this project or from a future compilation that either improves upon or expands the quality and quantity of the "Sounds of Venice" compilation. In this rule, all composers will have an even and fair source to use in creating their compositions. Also, there is to be no altering besides the cutting and pitch-bend done to the sounds in the compilation. Third, the compositions should be a minimum length of five minutes long to ensure the composition captures the characteristic qualities. The composition should be of completely original work. Any component must not have been premiered or published prior to use in the competition. Finally, the composition should have no entry free, to allow the maximum number of people to experiment in this exciting and musically interesting discipline.

4.3.1.2 Rules for the Live Sounds Composition Category

The Live Sound Composition category is the more restrictive of the two categories. The entire composition must be composed of only the sounds composed from the compilation used in the

[31] Refer to 3.5.4 Live Sound Composition

competition. This category is to challenge the composer to find the natural music qualities in each sound recorded and arrange the sounds in a manner that produces something that can be described as musical. Other restriction could be applied, but the single restriction listed above is the only rule the group feels necessary to suggest for this category.

4.3.1.3 Rules for the Combination Composition Category

The rules for the Combination Composition category should be designed to allow composers to experiment and be more expressive in their use of the sounds recorded for the competition. Unlike the Live Sounds Composition category, the composers will be allowed to use other forms of musical instruments in the composition. This can include acoustic instruments, electric instruments, or synthesized instrumentation. In this way, the composition will try to not only find the musicality of sounds recorded, but also will find new and interesting ways to which the sounds can be incorporated into the conventional forms of music.

4.3.1.4 Suggested Judging Criteria

As with any musical competition, there is a subjective piece that allows for judging of compositions and determination of a winner. While these criteria are best left to the experts, the group has two suggested criteria.

First, any composition created for the competition must have either a Venetian feel or evoke a feeling which is identifiable of the soundscape that is the City of Venice. In other words, since one of the group's goals was to capture characteristic sounds of Venice, the composition must also try to capture the characteristic soundscape qualities that can only be found in Venice. The composition should, in trying to meet this requirement, use the sounds recorded in Venice to evoke the same feelings that take place when you are actually in the city. The other pertains specifically to the Combination Category. While the compositions for this category can use any combination of instruments, the composition should include a sound from the compilation in at least fifty percent of the duration of the piece.

4.3.2 Discussions with Possible Sponsoring Organizations

As mentioned in the background, there are thousands of musical competitions held each year.[32] Therefore, the project group desires to try and create a foundation for a competition, or create enough background information for the competition so that there can be room for improvement to expand upon the ideas set forth. The most difficult part about building a competition from the ground up is that our competition would be competing against thousands of other organizations. They all compete for composers, grant money, personnel, and professional recognition. It may be very difficult to even have a competition at all unless another approach is taken or unless another project has a solid starting point to work from.

[32] Refer to Section 3.5.5- Music Competitions

Professor Richard Falco, Director of Jazz Studies at WPI, in an interview with a group member, noted that the "key to success for our competition would be to find an existing organization to sponsor it." The group spent some time trying to find an organization to sponsor our competition to further the idea of building information for a further project and a couple of contacts were pursued. It should be noted that we only wanted to pursue contacts for future reference without making any commitments to the organizations *suggested* in the following sections. The group only wanted to explore the possible ideas from the following organizations and seek out our possibilities.

4.3.2.1 Tourist Board

The group held a meeting with the Venetian Tourist Board on July 4, 2003 as a possible contact and/or sponsoring organization for the competition. It was the hope of the group that the Tourist Board would be able to show an interest in the idea of the competition and be willing to work with future endeavors to ensure the competition's success. This interest could be shown by the disclosing of further contacts of other possible sponsors or from direct involvement. Either way, the Tourist Board could be a great marketing opportunity if they become involved in a future competition.

4.3.2.2 Biennale

The group attempted to contact the Biennale committee in Venice for possible future contacts. Being a festival of new and upcoming art, the Biennale would be a perfect showcase of the finished compositions and/or the final gala presenting the winning compositions. Similar to the Tourist Board, the group will simply be looking for interest in a future endeavor to create a competition. The group realizes that the work being done in both the Biennale and Tourist Board contacts are preliminary, but these preliminary contacts may be the spark needed to give life to the competition.

4.3.2.3 Other Possible Contacts

If contacting the organizations in Venice is without result, there are other possible options to explore in the states. The group recommends looking for an artist group or composer guild that would be willing to sponsor and help organize the competition. The sponsoring organization should be an avant-garde collective who will look upon the idea of incorporating live sounds into music as innovative and having artistic merit. According to Professor Falco, many of these organizations already have rules and regulations for conducting competitions in place and are looking for new challenges and concepts for their competitions.

If an artist group or composer collective cannot be found that will sponsor the competition, another alternative is to work with a school of music at a major college or university. Many of these schools have electronic music programs and might be interested in the very specific area of live sound composition. This would make the competition lesser in scale, but may add to the creativity factor since these schools have bright, young students with fresh ideas.

5. Results and Analysis

Throughout the development of the methodology the group conducted the necessary methods to identify and characterize the sounds of Venice. Furthermore we developed what the necessary tools would be for recording, processing and storing these sounds into a digital catalogue. The final part of the methodology discussed how these sounds would be put into use in musical compositions for submittal into a musical competition of which we suggest the guidelines necessary for future endeavors.

Even with our strict identification process and our methods used to discover the sounds of Venice, the group realized there is no objective means to determine exactly what the characteristic sounds of a city are. Therefore, by conducting the methods we did, we would obtain viewpoints from people of many different backgrounds we could find some type of abstract system to determine this list of characteristic sounds.

The group accomplished the three goals set forth in the previous chapter: the identification of 129 characteristic sounds of Venice; the incorporation of these sounds into a searchable digital audio catalogue; and the groundwork for the organization of a musical competition. We did not take any single response to a question to be wholly representative of the group from which that response came. Our third goal was accomplished only to a certain extent due to the time constraints. However, a definite structure is in place for the musical competition to take place at some point in the near future.

Some of our methods were more effective than others; however each method did contribute, to some degree, to the accomplishment of these goals. A clear list of sounds to record was created to determine the order in which the group should record these characteristic sounds, and then they were recorded relatively in order of desirability. Once they were recorded onto DAT tapes, they were then converted into computer files and processed to digitally enhance them if necessary. Finally, plans are currently underway towards the creation of a musical competition that incorporates these recorded sounds.

5.1 Identification of Characteristic Sounds

Through the identification process we discovered the keynotes, signals, and soundmarks of the city as well as areas that were characteristic soundscapes on their own. We recorded and preserved the characteristic sounds that make Venice unique. Following the two criteria mentioned previously in the methodology of characteristic-ness and endangered sounds, we used the methods previously described to compile, prioritize and come up with a final list of sounds to record. The important aspect of the methods we conducted was to obtain valid results. We selected accepted research methods that were appropriate for the type of research we were conducting. The following sections are the results of the methods carried out to identify sounds and also be aware of the methods limitations and validity.

5.1.1 Compilation of Sound Ideas

These are the results of the first step of the identification process: compiling lists of sounds to record. The information presented henceforth is the resulting statistics from the five methods that we

used (see Figure 3). An interesting observation is that the six groups of diverse background that helped us identify our list of sounds to record exhibited many more similarities than differences in their responses to our interviews. Furthermore, we did not take any single response to a question to be wholly representative of the group from which that response came.

5.1.1.1 Content Analysis

Initially the team searched through two feature length films using the scenes filmed in Venice. This method produced a total of 31 suggested sounds to record; 12 sound's from the first film and 19 from the second. Of these 31 sounds, 52 percent, or 16 sounds, made it onto the final list of sounds. Not all of the sounds made the list because many were deemed to be added for the dramatic effect of the film. This method was used sparingly, and the number of suggestions reflect this observation. However, future studies using content analysis may find this a useful tool to discover content not easily discoverable through other methods.

Information we obtained from content analysis that was necessarily extracted out of any of the other methods is that the sounds used in movies and literature are depicting the area in which they take place. For this reason the author or the director chooses sounds that come from the location. Even though these sounds are sometimes added for effect, in most cases they accurately depict the location and were therefore a good indication for what sounds may be present.

5.1.1.2 Face-to-Face Interview

This method for identifying sounds to record in Venice was done by asking 120 English speaking individuals in the city of Venice questions about possible characteristic sounds. English speaking individuals were chosen since the group was only fluent in this language. The 120 individuals interviewed were made up of 42 groups of people from locations all over the globe. Of the 42 groups, 24 of them were from the United States. The group was pleased with this number because it gave a well rounded response group of both Americans and people living outside of America. By receiving answers not solely from Americans we eliminate biases in our identification of the sounds of Venice.

Of the individuals interviewed we obtained 174 sound suggestions. Of the 174 sounds collected, we had 81 sounds that were described as characteristic and 42 sounds that were described as endangered of being lost. This method used a different approach from the last because we wanted to know what the average person thought were characteristic sounds, and what kind of answers they would give if we came up and directly asked them the question. It is a valid method because if anyone is even listening for a brief moment to the sounds around them they can identify what they heard.

5.1.1.3 Past WPI Venice Group E-mail Questionnaire

The e-mailing of the past two WPI group of students who studied in Venice resulted in 12 people replied to the e-mail yielding a response rate of 23 percent. Of the 12 responses we gathered 89 sounds suggestions, all of which were concluded to be characteristic sounds of Venice. This method was

partially retrospective in structure because we were asking the respondents to go back to when they were in Venice, whether it was one or two years ago, and think about all of the sounds they heard that stuck with them in their own minds.

5.1.1.4 Direct Observation

Our intuitive approach to identify sounds resulted in the collection of 49 sound suggestions. All of these sounds made the final sounds to record list for they represented sounds that each group member put thought and perspective into. This method was different from the rest because the group and its three members were specifically looking for sounds that characterized Venice. Instead of just listing sounds, we were constantly keeping and open ear for the sounds that make's Venice unique. This method was also important because it validated some of the results of the other method specifically those sounds mentioned from Venetians that we ourselves had also though of.

5.1.1.5 Focus Group

We conducted the focus group on June 10, 2003 at our residence in *San Marco*. Initially, we planned on setting up two groups at two different dates; however, due to time constraints and lack of interest, only one session was held and eight students failed to participate. The session was comprised of 12 students and was recorded to be able to review the dialogue at a later time. The method produced a total of 31 sounds suggestions; 15 of which were deemed to be characteristic and six endangered sounds. All 31 of the sounds mentioned from this focus group made it onto the list of final sounds to record. We used this method because the group felt there was a general consensus from our classmates as to the aptitude of interest in our project. We felt that they had mentioned to us enough times sounds that they had heard in and around the Venice area, so by sitting them down in a formal setting we were able to spark some really interesting insights into sounds to record. The answers given were well thought out and proved to be useful because, again, they all made it onto the final list.

5.1.1.5 Free Lists

Although conducted in a casual atmosphere, this method led to important and relevant suggestions. This method resulted in a total of 60 sound suggestions. As all the participants are educated Venetians, their answers to questions posed to them as well as the free lists they created gave us great insight into what Venetians feel are important Venetian sounds. This information could not be supplemented from any of the four other research methods.

5.1.2 Prioritization of Sounds to Record

After all of the information collected from the five collection methods had been completed, the project group put order of the 437 individual suggestions[33] given to us through each method. Through much consideration, contemplation, and debate, the group has come to a consensus on the possible

[33] This number represents each individual suggestion. The actual number of non-repeated suggestions was slightly lower.

sounds to record and have created the priority list necessary to effectively record the sounds found in Venice.

The group analyzed the suggestions from the five sub-lists described in the previous chapter. First, the group looked for multiple responses in the sub-lists, eliminating the duplication of responses on the master list. Furthermore, the group went through the five lists and looked for similar and duplicate answers in the list. This allowed the group to eliminate the need to rank similar sounds that could be described by a single category or action. This is because the sound is produced as a result of an action of the subject. This is also called coding. For example, many people mentioned "pigeons" in our face to face interviews, and coding puts the noun "pigeons" into verbs, such as "pigeons flapping their wings", or "pigeons cooing". For suggestions that were generic or part of a category of sounds, the group created a list of actions, on the basis of our own person inspection, in which a sound could be produced. After these steps were taken, a list of one hundred eleven suggestions resulted. These suggestions were placed on the individual ranking sheet, along with the number of times the suggestions were mentioned[34], and the sources from which the suggestion came from[35].

Once the master list was determined, each member of the group, using the rubric in Appendix D as a guide, ranked each sound. Using a Microsoft Excel spreadsheet to facilitate the calculation of scores, each member of the group individually looked at the six attributes in consideration for each possible sound and gave a score on a one-to-five whole point scale for each attribute for a given sound. This resulted in over six hundred sixty-six individual attribute rankings per group member, and 1998 attribute rankings between the three group members. These attribute rankings determined the order of the final list of sounds to record once the weights were multiplied through each attribute of each sound.

Upon completion of ranking the attributes for the master list of sounds, each member of the project group gave a weight to each attribute. This weight, again, using a one-to-five whole number scale, with the five being more desirable to record, allowed the group member to place more emphasis on one attribute over another in determining the desirability of recording a sound. The spreadsheet then multiplied each attribute score by the attribute weight and summed the six attributes together to give a total score, in descending order, with the highest score being the most desirable to record.

Once each member of the team had completed their individual ranking sheet, the project group met and created the priority list. For each individual attribute for each sound, the group debated and discussed the score until the group agreed upon a score. After the consensus of all six hundred sixty-six individual attribute scores, the project group debated and discussed the weight for each attribute. The group had hoped to check this weight consensus on the weights to the survey distributed to the WPI Venice students[36] prior to the meeting, but the response rate was too low to get an accurate average score

[34] The number of responses for a suggestion on the master list may be larger than expected due to a general suggestion from a sub-list applying to multiple, specific suggestions on the master list.
[35] Refer to Appendix I- Sounds to Record Priority List
[36] Refer to 4.1.6.4 Group Consensus of Scores

to check against. The spreadsheet then calculated the scores in the same manor as the individual ranking sheets, and the total score was sorted in descending order to give the final priority list[37].

5.2 Creation of a Digital Searchable Catalogue

Once the identification process had been completed, the task of converting the sound ideas into actual sound clips commenced. While the recording and processing of the keynotes, signals, soundmarks and soundscpaes were straight forward, the process of effectively cataloguing the sounds became one of the most challenging aspects of this project. However, because of these challenges, many new and varied ideas for cataloguing sounds arose, including the Sounds of Venice Interactive Kiosk.

As a whole, the creation of a digital searchable catalogue was a success. While there were a few minor complications that arose during the execution of the methodology, the group found solutions to these complications and continued our work. The resulting CD Collection, Access Multimedia Catalogue, MapInfo Layers, and the Sounds of Venice Interactive Kiosk are all products we are proud of and hope will become part of future endeavors of this project, including the future competition. Furthermore, we hope that these products will all be improved upon and expanded within these future endeavors.

5.2.1 Recording of Sounds

While the group planned on using many different types of microphones to try and capture sound, one common set-up became the norm for all of the recorded tracks. The AT822 Stereo Condenser Microphone became the sole microphone used, which connected directly into the TCD-D8 DAT Recorder. The SM57 and SM58 Dynamic Microphones were not used, as well as a shotgun microphone

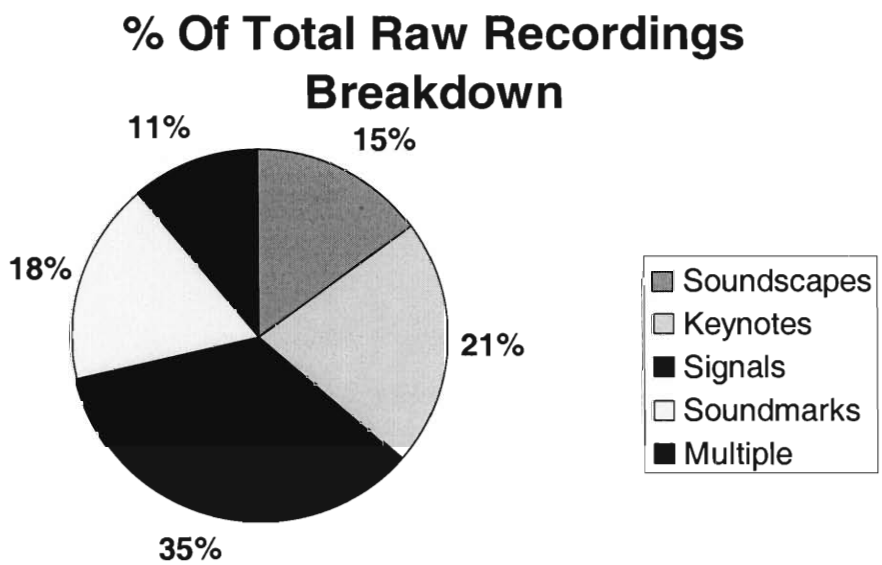

Figure 14: Percent of Total Raw Recording Track by Sound Classification of the 78 Raw Recorded Tracks

[37] Refer to Appendix I- Priority List of Sounds to Record.

provided by the Venice Project Center which was incompatible with our equipment. The AT822 with the TCD-D8 provided excellent, high quality recordings which can be heard in both the raw recorded tracks and the processed cuts.

In total: 5 DT-120 DAT Tapes were used, which resulted in 78 raw recorded tracks. In recording these tracks, 5 of the 6 Sestiere of Venice are represented. Out of the 78 raw recorded tracks: 17 were classified as keynotes, 26 as signals, 15 as soundmarks, 11 as soundscapes, and 9 were classifies as multiple, meaning the raw recorded track either had sounds in two or more categories or the track as a whole could be classifies in two or more categories due to the nature of the recording. Furthermore, all 78 raw recorded tracks had their recording location pinpointed on a map, and the information was transferred to MapInfo onto 5 MapInfo Layers.

5.2.2 Processing of Sounds

The processing of the raw recorded tracks, while successful, proved to the most trouble prone method of the project. First, the raw sounds had to transferred from the DAT tape to the computer. This required the use to two cables, which were bought before the start of the project. However, difficulties arose in trying interface the cables with the computer and the software. After many hours of experimenting and the acquisition of additional software, the group achieved the desired digital transfer from DAT to computer. The group recommends for future projects to ensure all cables, external hardware, and software are all compatible and that all sound transfers are done on a desktop computer,

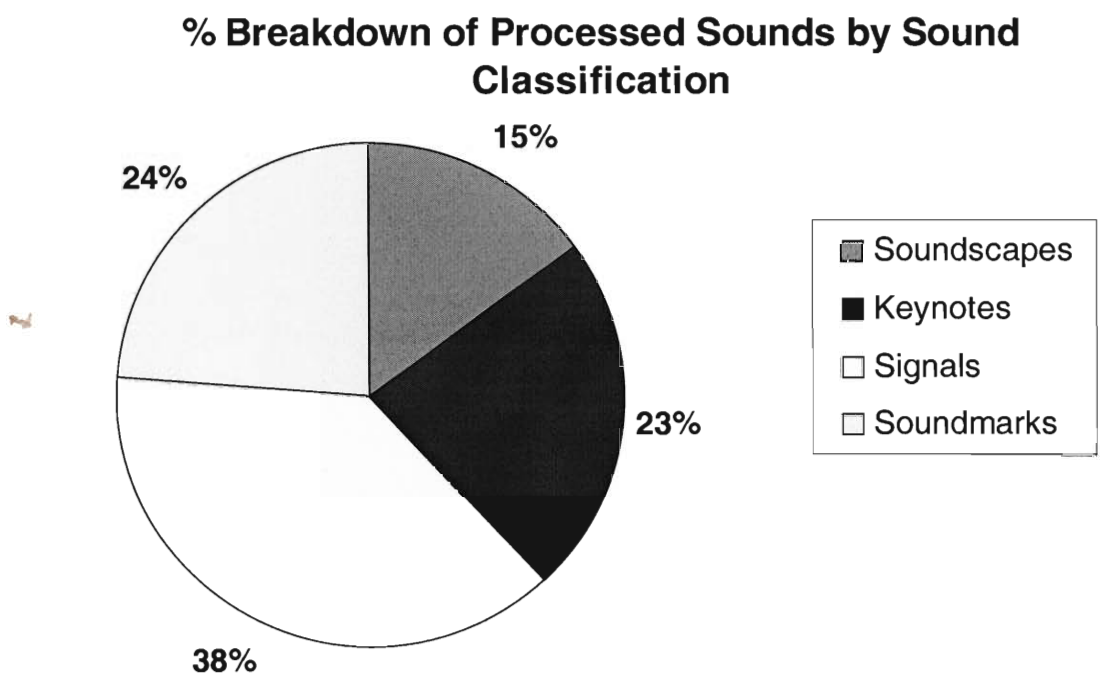

Figure 15: Percent Breakdown of Processed Sounds by Sound Classification of the 101 processed Sounds

not on a laptop.

The other complication that arose was the file size of the sounds. Some of the .WAV files created by the data transfer were over 100MB. This led to a two major problems. Since one computer was used to transfer the sounds from DAT tape and another was used for the actual sound processing, file transfer became an issue. While this problem was eventually resolved with a seven dollar crossover network cable which connected the two computers together, the group realizes that this issue could arise in future endeavors of this project and is an issue that should be addressed in the early planning stages of any sound project. Also, large sound files take a lot of computer processing power. The group recommends that the computer used for the processing of sound is built specifically for this purpose.

In total: 101 cuts (sound clips) were created from the 78 raw recorded tracks. Out of the 101 cuts, 23 were categorized as keynotes, 39 as signals, 24 as soundmarks, and 15 as soundscapes. All 78 cuts and 101 raw recorded tracks are stored in .WAV and .MP3 formats. Combined, the sound files amount to three gigabytes of information.

5.2.3 Cataloging and Archival of Sound

Microsoft Access was the primary cataloguing software used for this project. Using Access, all the necessary information from the Field Recording sheet was entered into an Access table and the raw recorded track was given a record code. Furthermore, after a sound had been processed, a processing code was given to the sound, keywords were attributed to the sound, and all the necessary file information was entered into a separate Access Table. Easy to use forms were created for each of these tables, and a button linking the sound file to the data was created to allow the user to hear the sound being described. Once all the sounds had been processed, the group organized and created CDs, and entered this data into Access. Finally, a Multimedia Dialogue Box was created that gives all the info a listener would want to know about the sound, pictures of location of origin and the item making the sound, and a button to play an MP3 of the sound. In this way, the Multimedia Catalogue can be self supporting, meaning the user can hear the sound directly from the Catalogue, or the Catalogue can complement the CD Collection by supplying the listener organized sound information.

In addition to this Multimedia Catalogue, the group had developed a Sounds Of Venice Interactive Kiosk. Designed to be a self supporting kiosk for the user to use a mouse or touch-screen monitor, the user can explore maps and pictures of Venice to find and hear up to 30 seconds of each processed cut. This kiosk can either complement the future competition, or could be placed throughout the city as an interactive station for visitors to use as they visit Venice.

5.3 Recommended Future Steps

While five months of planning and work had been put forth to create a successful project with excellent results, the Sound of Venice IQP Group realizes that our efforts are only the first step to the full execution of all the ideas behind this project. Therefore, in this section, the group had put forth some recommended future steps for future groups to have a guideline from which to work from

5.3.1 Identification of Characteristic Sounds

Although this project has successfully collected suggested sounds, prioritized them into a working order, and created a final list of sounds to work from, some improvements on this list can be made. First, the items on the final list of sounds were ideas collected in the summer. Therefore, the possibility exists that there are sounds not on the final list due to the fact that they occur in winter, and our collection methods did not yield winter ideas since people were thinking only about the summer. To try and eliminate this, the group recommends that our methodology of collecting and prioritizing sound ideas be executed in a similar manner in the winter months. This would ensure that all ideas from two different times of the year are included on the final list. Furthermore, any additional content analysis would also ensure all ideas have come forth.

Additionally, a more comprehensive validation method should be executed on our final list of sounds. While the group has worked hard to minimize any possible biases in our collection techniques and have used the Settemari Rowing Club for both the Venetian perspective of sounds as well as a validation of our recordings, more can be done to ensure that the sounds placed on the final list and recorded is complete and correct. First, we recommend the use of focus groups using the sounds already recorded as a medium for discussion and debate. The participants in these focus groups should be Venetians and cover a broad demographic range to minimize any possible biases and to coverall areas of the population. An additional idea which was suggested was the use of a focus group consisting of blind Venetian individuals. The thought is that since they do not have visual biases, they may be able to not only give better suggestions to add to the final list, but to judge the quality and clarity of the recording done so far.

5.3.2 Creation of a Searchable Digital Catalogue

While the structure of our catalogue, kiosk and CD collection is in place, the volume of content within the items can always be expanded. For example, a sound may have only been recorded once during our residence in Venice. There may be many different variations on the same sound idea throughout the city, so multiple recordings of the same item would add to the catalogue's usefulness. Furthermore, many areas of the city are represented more than others in our catalogue, so this might be an area of future expansion as well. Also, there are many sounds only heard in the winter months, so recording sounds in the winter months will help complete the sounds needed for a full catalogue. The more locations used and sounds recorded will not only be useful to expanding the catalogue, kiosk, and CD Collection, but will also give a clearer perspective on the characteristic qualities of the sounds in Venice.

An additional endeavor that can be a complement of this project is the re-mastering[38] of the Bells Catalogue created by the Venice Project Students in the early 1990s. This catalogue was recorded using older technology, and re-mastering of the sound may be needed to convert the sound into a digital media. Validation that these bells still exist could also be executed as part of the re-mastering process.

[38] Re-mastering is the process of converting older analog sound technologies to the higher quality digital technologies available today.

5.3.3 Organization of a Musical Competition

This aspect of our project offers the most amount of future growth and potential. The group has worked to lay the initial foundations of communication and support for such an endeavor, but the important stages are still yet to be completed.

The group feels that the completion of a musical competition could be accomplished in four years. This would allow the gala and exhibition of the competition to coincide with the Biennale 2007. Communication with a Biennale representative will be important for this to happen. Within the years of 2003 and 2004, the most important step will be to find a sponsor willing to support the competition financially. The expansion of the catalogue should also happen simultaneously of finding a sponsor. This sponsor will need to be able to provide the salary of a full time individual for two years. This individual would take care of the majority of tasks needed to be accomplished during the years of 2005 and 2006. In 2005, the individual will try and appropriate additional funding for the competition, organize the official rules and regulations, start the initial contacts with needed venues and individuals, contact possible composers, and oversee creation of all CDs needed for competition and sale. In January 2006, the composers would start the one year period needed for the creation of the compositions as the hired individual continues the organization process and obtains appropriate judges. Finally, in 2007, the compositions are judged and different levels of awards are given. With the Biennale in 2007, an exhibition would be presented on the competition and the gala would be held. As always, the competition is the most open ended aspect of this project and the above recommendation could possible change greatly in the upcoming years.

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2003 WPI Venice Project Center Participants

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