

Slide: Music and the Web

‘Music and the Web’ is an intimidatingly broad title for this presentation. In fact, I have been asked to explore my own musical work as a specific example of this topic. However, I do also want to discuss ‘music and the web’ more generally, and so contribute to the ongoing discussion on the subject.

So, this is going to be a somewhat autobiographical presentation, but with, I hope, sufficient general points to be of wider interest.

I should stress from the outset that my interest is in the web as a creative medium. I will consequently not be examining the many issues deriving from its use as a distribution platform. This immediately rules out discussion of important ethical issues such as piracy and the consequences of web business models for artists, as well as technical issues such as recommender engines or music ontology creation. Any one of these could be subject of an entire conference, let alone a single presentation, so it is probably just as well if I leave them alone this morning.

I have been an active researcher into, and creator of, internet music ever since the early days, so my more personal observations are more than just the anecdotes of a composer-cum-computer scientist. Indeed, I flatter myself that I have done something to help to shape music on the web, at least in a non-commercial context, through various radio broadcasts, published articles, my book *The Digital Musician*, and my web compositions and performances. At the same time, I have critically examined web music, or “internet music”, as I have preferred to call it, and contributed to numerous theoretical discussions.

So, this presentation will mix theory and practice, with personal narrative and original research, to present various ideas and instances in relation to music and the web. This will include a presentation of selections from some of my web compositions.

Slide: Looe Island

Let’s begin at the beginning. In 1994, I was living on an island off the coast of Cornwall, writing a piece called ‘Island Symphony’. This was a very large 74’ electroacoustic composition, later re-worked for orchestra and live electronics. This website, built several years later, provides an audiovisual tour of the island, along with excerpts from the symphony: <http://andrewhugill.com/looeisland/> Let’s go for a brief tour.

As you can see, the island was pretty isolated, and communication was difficult. Nevertheless, I was able to get an internet connection on the fastest modem available at that time: a bitrate of 28.8 kbits/sec. With this device I was able to join CompuServe forums and start to gather sounds from around the internet. They would take hours to download, but that was ok because I was at the same time recording sounds around the island to include in the Symphony.

I saw a parallel between the two activities. I thought of myself as a kind of musical Robinson Crusoe, gathering materials from the sea but also the internet-sea to construct my work. This metaphor has stayed with me to the present-day, as I am just starting a transmedia performance project based on Robinson Crusoe.

Back in 1994 I also joined the ResRocket Surfer band – a 600-strong online music group that jammed online using MIDI. That was fun and the band went on to have some commercial success (although without much input from me by that stage). http://www.jamwith.us/about_us/rocket_history.shtml I also used MUDs and MOOs for musical purposes, something that became significant in my educational work later on.

Slide: CompuServe/Mosaic

During the composition of Island Symphony I became aware of a strange new thing called the World Wide Web. ‘Mosaic’, the first web browser, became available within CompuServe. If you clicked into Mosaic from inside CompuServe, you were warned about the dangers of what you would find: uncensored, uncontrolled material from the ‘Wild West’ frontier of the internet. It was very exciting. But what I mainly remember were lots of yellow triangles saying “under construction”. At that time,

most of us netheads were a bit sceptical about the WWW. Academics, in particular, saw it as a vulgarisation of their nice, obscure, internet world. I remember many of the arguments at the time, and even computer-using colleagues (who were in the minority) stridently declaring they would never use it!

In those early days, the most promising thing was the concept of 'surfing', because it conveyed both a sense of danger but also a sense of skill. Once again, the sea played the role of internet metaphor. There genuinely was at this time a real prospect of stumbling upon something surprising or unexpected as one wandered around what there was of the web. From a musical point of view, finding materials was one benefit, and another was access to musical discussions and ideas. Since music is a social activity, there was also the question of how music could be made at a distance and without being able to see the other musicians (videoconferencing was really a pipe-dream at this stage). And of course there were tools being made available online, often with small and enthusiastic user groups who would offer technical advice and share musical outcomes. This web culture still exists today and continues to grow.

Around this time BBC Radio also became interested in what I was doing with the web. They had commissioned several pieces from me in the past, and they broadcast parts of Island Symphony. Now they came to my house (after I'd left the island and returned to Leicester) to do an extended interview for musicians about 'how to use the internet in your work'. It seems inconceivable today, but at the time the BBC lacked sufficient resources to demonstrate these things in their own studios, so they had to come to mine!

Slide: Symphony for Cornwall

So, I became very interested in the potential of the world wide web as both a compositional environment and an educational tool. The next project was one of the first to use the WWW's potential in both respects. I see that Tod Machover has recently adopted the formula of creating a web-based Symphony linked to a place, with his Symphony for D(etroit) and other projects, but I like to think that my project was pioneering in this respect.

Secondary schools across Cornwall were invited to send me short (10 – 15 second) sound recordings of anything they chose. I then used these as the 'seeds' from which to grow a composition for orchestra and live electronics. The working process was charted, discussed and developed on a website. The main outcome was a performance at the Hall for Cornwall, Truro, on 27 May 1999, given by the Bournemouth Sinfonietta, plus live electronics (conducted by Richard Studt). Imagine: a performance of a 40 minute new work that was quite musically challenging, attended by a full audience of mainly young people who cheered at the end!

This use of the web as a compositional medium led to a community of individuals forming around the discussion room and message board on the website. This included not just participating schools, but also members of the orchestra and other interested parties. For the latter, this was an opportunity to witness the use of music technology in composition and performance. For the school students, the project was a significant part of their year's work, and prompted debates both about the nature and purpose of music and, on a more practical level, about the way in which this particular piece of music was unfolding. The Internet activities were supplemented by workshops, and I made visits to the schools as well as leading studio work with the orchestra. This had a transformational impact on some students, who decided to go to university to study music technology as a direct result of the project.

Slide: Contemporary Music Review

In 2005, I was asked to guest edit an issue of Contemporary Music Review dedicated to "Internet Music". My own contribution included an account of Symphony for Cornwall and my use of MUDs and MOOs in teaching music, which I will come on to in a moment. As you can see from the list of titles: I tried as editor to cover all aspects of the topic.

Slide: Taxonomy of Music on the Web

I also wrote a general introduction to music and the web, which contained the following taxonomy:

Music that Uses the Network to Connect Physical Spaces or Instruments

This was the initial motivation for many early experiments in Internet music. The main challenge facing this kind of interconnection was and remains technical: network latency, replicating visual cues, achieving a homogenised sound and so on. Undaunted, various artists, scientists and engineers have come up with solutions to these problems that include live performance events across a small local network (often wireless), often using laptops, in which a range of controllers and software are used to enable real-time manipulation of sonic materials. One particular solution that has evolved separately is to create a networked sound installation, rather than trying to replicate a conventional rehearsal or recording studio setup. This practice seems to have more in common with ‘fine art’ than ‘music’ (although the results are often highly musical) and is consequently often seen as a branch of ‘sonic art’ or ‘multimedia’.

Music that is Created or Performed in Virtual Environments, or Uses Virtual Instruments

Virtual instruments in a virtual world would seem to make sense, and there are numerous examples, ranging from the single virtual instrument that can be manipulated by multiple users, to the multi-user environment in which each user has their own virtual instrument. To a great extent, this kind of music bypasses many of the technical issues of web music by giving the virtual environment its own peculiar characteristics that take into account latency and so on. Often it involves virtual agents, with the result that this area of Internet music is of particular interest to computer scientists working in Artificial Intelligence and Robotics.

Music that Translates into Sound Aspects of the Network Itself

A different solution is to avoid simulacra of conventional musical interaction altogether and treat the Internet purely as data traffic that can be rendered as digital sound. Today we would call this ‘sonification’. Digital data may be obtained in many ways, so the major questions facing musicians working in this area are: why use a network at all, and how to translate it successfully into sound? Most examples of this kind of Internet music therefore contain some metaphorical or semiotic content that evokes the network, and rely for their existence on being connected to the network.

Music that Uses the web to Enable Collaborative Composition or Performance

In this kind of work, the web is integral to the process of creation of the work, but may not be evident at all in the final outcome. The asynchronicity of the medium is here embraced as a positive virtue, and the creative process is given time and space for critical reflection, which tends towards a more formalistic and less improvisatory approach than is the case in many other types of Internet music.

Music that is Delivered via the web, with Varying Degrees of User Interactivity

This is currently the most widespread form of web music, incorporating soundtoys, online music games, educational websites, radio and much more. Attention usually focuses on the degree of interactivity available to the user, ranging from complete passivity (they log on and the music automatically plays) to a large variety of ‘point-and-click’-type interaction, which can be extended to keyboard (computer or music) and other game-like controllers.

Slide: Latency and Loss

I also discuss the twin “problems” of latency and loss, and the extent to which these really are problems, or whether they are in fact capable of successful musical exploitation. Perhaps the web is an acoustic environment, just like a concert hall, to which musicians must adapt. At any rate, latency is as much a result of the physical distance between sound sources as a problem with the network itself. Even in an age of speed-of-light fibre connections and unlimited bandwidth, sound still takes approximately 133 milliseconds to travel in both directions to points on opposite sides of the planet. Human perception of appreciable time difference between audio impulses is around 20 milliseconds, which means that in a musical situation the time delay should not exceed 40 milliseconds – i.e. the time it takes for a performer to perceive a second performer’s reaction to a musical gesture.

Slide: MustMOO/MusiMOO

From the early 'noughties' I had been involved in the BBC's "21st Century Classroom" experiment, which involved teaching teachers to use the web in class. This in turn led me to experiment more with using the web for music teaching and to revisit MUDs and MOOs. This all resulted in what today would be called a "virtual learning environment", but at the time (2003/4) was pretty new. MusiMOO or MUSTMOO, was built using the enCore MOO, a web-based system developed by Cynthia Haynes and Jan Rune Holmevik, which supported multimedia and server-side applications.

The map you see here represents the entire environment built by the students in the class of 2003/4 studying Music, Technology and Innovation at De Montfort University, Leicester. The names of the various places give a clue as to their contents, and some were extremely well developed. The mutability of the objects provides one immediate key to the educational value of the MOO. In my experience, with large classes (over 80 students) in particular, but even in relatively small groups, certain students find it difficult or even impossible to speak in front of others. Perhaps this is an age issue, or a social context problem, or even (as has been suggested to me recently) a product of dyslexia. However, in the MOO, the opposite seems to apply. Students who are normally quiet speak as much and as loudly as the rest. Furthermore, the 'fun' aspect of the MOO seems to draw them in: on many occasions I have logged into the MOO late at night to find a groups of students engaged in productive discussion. The possibility of remote location, alternative identity and a virtual world that gives primacy to the imaginative and creative aspects of the student's mind seems to provide an excellent context for social and academic interaction of the kind that overcomes many of the problems surrounding modern higher education learning.

Slide: The Sound Exchange

Also in 2004 I began a major collaboration with the Philharmonia Orchestra, who wanted to develop their web presence in ways which were more than simply marketing and ticket sales. As is so often the case with orchestras, this innovative project was under the remit of the Education Department, who approached me with a substantial budget and essentially a blank canvas. I came up with several ideas, most of which still exist at their 'Sound Exchange' site, along with several others they have subsequently developed. These were some live and interactive projects as well as some resources.

The live interactive projects included an interactive version of Percy Grainger's innovative composition 'Random Round', which used chance procedures several decades before John Cage, a workshop for young people to create orchestral samples for use in dance tracks, and a "composer resource". This aimed to provide an online resource for composers of all levels, ages and abilities (e.g., from school students to professionals) to explore ideas. Read-throughs of original material are streamed from the site, and conductor and players have the opportunity to feed back to the composer. The intention is to provide composers with a 'scratch pad': an opportunity to try out their ideas with work in progress.

Slide: The Orchestra: A User's Manual

The most substantial project was an enormous site called 'The Orchestra: A User's Manual'. I want to pause on that site for a little while, because it has demonstrated to me just how much reach the web can enable. I know this is something we all already know, but it still amazes me. I recently re-designed the site to make it mobile friendly, but the original version also still exists. It is really a research project into instrumental techniques, the history and repertoire of the orchestra and, most importantly, into the minds and attitudes of musicians. The research takes the form of structured and unstructured interviews, instrumental and orchestral recordings, historical discussion and musical analysis. The main aim is to provide information about the orchestra, orchestration, composition and instruments, for the benefit of anybody with an interest in the subject. Unlike conventional text-based orchestration manuals, this features movies of players explaining relevant aspects of their instruments and technique, audio clips and samples of the instruments, and illustrative music from the repertoire drawn from the Philharmonia's postwar recorded archive.

TAKE TOUR

This site, ten years after its creation, is still getting around 16,000 unique visits per month from all over the world. This is something that would be hard to achieve in academic book form. Every country in the world is represented apart from a few obvious war-zones. I have had testimonials from Oscar-

winning composers and first year students, from academics and musicians. The dissemination of useful information in a novel and interesting way is still a foundation of music on the web.

Slide: Web Opera

Now, I want to approach some of my recent compositions and give a demonstration and performance. It is important to stress that what you will see and hear is only a sample. These works exist online in variously interactive websites, so you may choose to explore them at your leisure after the presentation.

I am interested in the potential for a kind of web opera or digital opera.

Now, it is important to distinguish here between the live broadcast of traditional opera through cinemas and what I am calling “web opera”. The former is a digital remediation of the operatic experience. This does bring certain novel features to the theatrical delivery, to be sure, but audience research has shown quite clearly that the audience for this kind of opera is even more narrow in its age range and taste than is the case for opera in opera houses.

“Digital opera” describes a potentially explosive encounter between digital technologies and the long-established art-form of opera. In digital opera, audiences participate in their operatic experiences in ways that would have been inconceivable even twenty years ago. This participation may be remote or asynchronous. The experience may resemble social media interaction or gaming more than a traditional performance ritual. Digital opera narratives are often non-linear and immersion can be achieved at a distance. Digital opera does not rely on a proscenium arch, nor any traditional theatrical setting. The operatic singing voice, which was developed to fill large houses without amplification, is no longer essential: the human voice may be completely transformed. Notions of “staging” or “mise-en-scène” are replaced by a new dramaturgy. New creative collaborations and new creative processes open up innovative possibilities for artists and composers. In sum, the nature of the operatic experience is transformed in a new media environment.

Slides: various examples of digital opera

This abrasive encounter between new media arts and the operatic tradition offers the possibility of a subversion of perceived elitism and a reification of formalism that is in itself creative. Digital Opera has transcultural, global appeal and is underpinned by a new system of cultural values which, combined with modern media distribution methods, is leading to the possibility of new economic and business models. This is important because, even if traditional opera is “redundant” (Till 2004, 15), its forms still offer a uniquely powerful field of artistic expression that can be recuperated and reimagined through the digital. Digital opera matters because opera is too important a form of artistic expression to be allowed to die. Furthermore, as technology transforms the world and human relationships, it may be opera that is the most appropriate means to capture this transformation. While the creators of digital opera possess a set of skills that would be mostly unrecognisable in traditional opera houses, they nonetheless share similar concerns of music, narrative, mise-en-scène, dramaturgy, theatre, etc. It is the emergence of digital opera that has necessitated a re-evaluation of these concepts (Till et al. 2014).

Slide: The Imaginary Voyage

So we come to *The Imaginary Voyage*, which is inspired by the voyage from Paris to Paris by sea in Alfred Jarry’s *Exploits and Opinions of Dr Faustroll, pataphysician*, and as such represents the most substantial item of interest to this audience. I would like to encourage you to experience the work for yourselves by visiting www.theimaginaryvoyage.com In the meantime, I would like to give you a brief tour of some of the ‘islands’ you visit as you navigate the Squitty Sea which is the web.

The Imaginary Voyage is conceived and delivered entirely through the web, over desktop and laptop machines only. The challenge was to create a work that is operatic in scale and conception within the constraints or new possibilities of these media. From the outset, we were determined not to make something that simply remediated theatre-based opera. For the work to be successful, we reasoned that it had to emerge organically from the internet and from the digital technologies in which it was created. Yet, at the same time, we did not want to lose the power and splendour of familiar opera. The project is a collaboration between the Institute of Creative Technologies (IOCT), Leicester, UK, and The Opera Group, London. The work was conceived by Andrew Hugill and Lee Scott (IOCT) and Frederic Wake-Walker (TOG).

The central scenario is that the user is the main character in the opera, undertaking a voyage from island to island. Each island tells its own story, but the whole navigation becomes a narrative of its own. Levels of interactivity vary from island to island.

The Imaginary Voyage deploys a new technology developed in the Institute of Creative Technologies at De Montfort University: the 'Syzygy Surfer' (Hendler and Hugill 2011).

This is a creative search engine that exploits metadata to deliver deviations or swerves, sudden unexpected alignments and anomalous moments, instead of the predictable target-driven results of conventional search. This is the engine that underpins much of the operatic experience and guarantees that user interest is maintained and that novelty is constantly renewed, but in a way that is not too divergent.

Each island contains three elements: the text or libretto, which is either spoken or sung; the music, which is without voices; and the imagery, which may be moving or still or a combination of the two. The island's general character is predetermined by three main factors: duration (conditioned by the relative length of the musical fragments); spatial aspects (reverberation characteristics and settings); atmosphere (mood and 'feel'). These may themselves be determined by the text used, the musical or visual content, or the types of singer. In some instances, one of these predominates in setting the character, in other cases there is more of a synthesis.

The methods of creating each island also vary, but all methods are characterised by the same approach to content: it must be capable of seemingly endless recombination and variation, but in ways which are perceptibly meaningful and not simply random. This introduction of an aesthetic and semiotic layer is expressed mostly at the level of unseen metadata, giving the user a seamless experience whose mysterious hidden order only gradually (if at all) becomes apparent. It is in this deliberate ambiguity that the mystery of the opera resides and which provides a reason for users to revisit the work time and again.

Each island is constructed from 'fragments' of sound and image that are sequenced and combined dynamically by the Syzygy Surfer. We begin the sequencing process by attaching descriptive metadata to the sound fragments. This method is very similar to the ID3 tagging system that is used to embed track identification data within an mp3 audio file. In this case, however, the metadata layer contains information about a sound's musico-logical attributes, such as harmonic structure, spectromorphology, voicing, instrumentation and genre. The Syzygy Surfer focuses on one attribute, for example 'Voicing: Trio'. It then searches a bank of audio files, held in a MySQL database, to identify another sound fragment that shares this particular tag. This file is then queued for play-back. From here, the Syzygy Surfer can either iterate this process based on the tag 'Trio', or can identify the current sound file and refocus the search based on one of its other attributes, such as 'Harmony: Modal'.

A separate tagging procedure is employed to connect image fragments to sound fragments. In this instance, we select one universal attribute that can be applied across all three of our compositional elements: sound; image; and text. For this we assign each fragment a perceived 'feeling' or 'mood', and draw from a pool of metadata that includes tags such as: joy; calm; awe; sadness; and confusion. The subjective nature of this categorisation system, coupled with the notion that a sound or an image can evoke any number of emotions, often results in Syzygy Surfer connections that are completely unexpected and rather delightful.

Slide: Isle of Cack

We first created the Isle of Cack. Drawing from Jarry's (1996, 32 – 34) description, we establish the atmosphere of the island as effluvial, ruptured and unsettling. The music is highly varied in texture, harmonic structure and genre, and features sounds from a range of sources including frogs, pianos, electronic synthesisers and the orchestra. Each musical fragment has a duration of around five seconds; however, the Syzygy Surfer will often interrupt playback after only a fraction of a second. The island therefore feels as if it is being experienced in irregular 'bursts'. The text element comprises sung and spoken samples that are similarly dislocated and variously redundant. Visually, we focus on the polarity between the reality of existence and the anarchy of the surreal. Themes include: rotting fruit; death; taxidermy; and surgery; and also: dancing fish; 'un-rotting' fruit; underwater lighthouses; and smiling frogs.

Slide: Amorphous Isle

The Amorphous Isle is 'like soft coral' (Jarry 1996, 41). It is languid and drifting, shapeless and ambiguous. Texts are generated by Fania Raczinski's working prototype of the Syzygy Surfer, that uses Faustroll as prime material. The island is presented as a quincuncial projection designed by Lee Scott, complete with pulsing gridlines and curious symbols that mark musical settlements. There are thirty settlements in total: seven of these are dedicated to Jarry's description of the three 'kings' that reside on The Amorphous Isle, ten are 'lighthouses' that appear on the coastline, and thirteen exist as 'nebulas', pockets of activity that have no fixed location. Each settlement is assigned a visual theme such as cyclical movement, abstract pattern or light in motion, as well as a specific 'feel' that is determined by its musical content. The music comprises spoken word, choral singing, and accompanying sounds of thirty seconds duration. The music includes slow, subtle transformations, gentle textures, drones and a fairly static harmonic structure.

Slide: Land of Lace

The Land of Lace is altogether more unified than the other islands, and is intended to feel more like a 'conventional' aria that sets the ten evocative images, derived from Aubrey Beardsley, in Jarry's (1996, 35 – 36) description. It is through-composed by Andrew Hugill and consists of ten vocal lines that may be substituted one for another, each in two versions, one English and one French, thus giving the user a choice of languages. Each of these ten lines is set to one of ten possible accompaniments, scored for flute, organ, harmonium, piano, celesta, glockenspiel, harp, harpsichord and untuned percussion. The combination of instruments in each line is determined by a Greco-Latin bi-square, with two 'active' instruments and two 'passive'. These roles imitate the behaviour of the four bobbins in bobbin lacemaking. As it works through the ten lines, the music gradually becomes more harmonically complex and decadent in style. The Syzygy Surfer performs numerical operations to determine a route through the accompaniment that ensures the musical language evolves as intended. The Syzygy Surfer is also used to navigate the visual material of The Land of Lace, which is created by Jo Lawrence and inspired by images from Jarry, Beardsley and patterned lace, that progressively becomes more intricate over time (Beardsley 1967).