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An Approach to using digital technology in scenic design for low budget performance.

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Abstract

This practice-based research is an exploration of current, accessible, digital technology and the impact it is having on visual-based scenic design for live performance. This is examined through my freelance art and design practice, which includes areas such as, props, sculpture, set design/construction and model making.

This project considers visual-based digital technology in the process of creating scenic design solutions for low budget performance productions of less than \$20,000.00 in total production costs (excluding personnel costs), taking typical profit share productions as the template. It focuses on accessible projection hardware and interactive visual software.

Drawing from a range of digital based theorists and performance practitioners, I review the current use of digital technology in providing visual scenic design solutions for performance. This includes examples of recent productions that use visual based digital solutions in performance. Cost effective, accessible

options inspired by these examples are then investigated through my practice and discussed here.

The staging of an exemplar low budget performance 'Absolute Uncertainty' (less than \$12000 allocated costs, including in kind support and donations) is documented in the accompanying video file, located on the presented USB drive. This includes unedited video of a dress rehearsal (titled: Absolute Uncertainty 480p.m4v), and video samples of three rehearsals, two at the start of the rehearsal process (May 2017) and one toward the end of the rehearsal process (August 2017). These followed three months of preproduction and experimentation.

The final outcome of this project is the development of an adaptable, lightweight, easily configurable projection system that may be used as the core element in scenic design for low budget performance productions. The processes involved in this are discussed and evaluated through the staging and presentation of Absolute Uncertainty, and two other performances I worked on prior to 'Absolute Uncertainty', A Midsummer Night's Dream, and Latecomers, where I developed and experimented with concepts.

The focus of this discussion is on the usefulness of digital projection in different environments, digital projection and other visual technologies ability to effectively create a performance environment and the quick adaptability of these technologies in the development and staging, including blocking for low budget production.

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Chapter 1: Introduction

Introduction

Visual-based digital technology is increasingly more sophisticated and affordable, and is providing an opportunity to develop innovative, low-cost, scenic design solutions for a range of production budgets¹.

This introductory chapter outlines ways of exploring and adapting visual-based digital technology for use in creating low cost scenic design solutions for performance. Through this exploration I aim to demonstrate a resulting expansion of creative practice for independent theatre artists. I will highlight the access to visual-based digital technology as a resource for those artists developing and testing methods of sharing ideas through live performance.

My hypothesis is that the flexibility of digital projection and other visual-based digital technologies is providing advantages for low cost scenic design.

I begin by describing the definition of low budget and the scope of the term live performance for this exploration. This is followed by an explanation of the term digital technology in relation to scenic design solutions. Next, I propose a redefining of scenic design and a discussion of the scope of use for visual-based digital technology in this area. Lastly, I will give an outline of the discussion covered in the forthcoming chapters. These chapters explore and discuss practical examples of how visual based digital technology is being adapted for use by theatre artists.

Research Question

The aim of this research is to identify advantages for using visual-based digital technology when delivering practical, effective, scenic design solutions for low budget performance. I specifically ask, **how could visual-based digital technology be integrated into scenic design, to deliver the best solutions for low budget productions?** I will be undertaking a critical analysis into digitized design for low budget performance by examining the current use of affordable, visual-based digital technology to create scenic design solutions. I have identified an existing need for this exploration through observed experience during my professional engagement in the field.

The advantages to be gained from this research will benefit scenic designers, performing artists and independent producers. One advantage will be the provision of a practical, introductory reference for emerging and independent theatre-based artists and producers of low budget performance. The collaborative, cross-disciplinary aspects explored when using digital technology are also relevant to the way performing artists are currently producing art. While emerging and independent producers will gain useful insight into reducing set-up costs and doing more with less.

¹ Here I refer to budget as the total available funds and cost as the expenses of the production.

1.1 Definition of low budget

When discussing the term low budget in reference to drama-based performance productions, it is important to acknowledge that budget is a defining factor when it comes to scope and expectation of these productions. For this research project the definition of low budget scenic costs that I am concerned with is around \$2,000 to \$6,000 (including labor and other costs). I am basing this on productions typical of smaller, Melbourne based venues. Such as independent groups like Carlton’s La Mama Theatre, Dance House in North Carlton, St Kilda’s Red Stitch Theatre and Theatre Works, whose total production budgets average less than \$20,000, see Table 1 for details of budget characteristics.

Table 1: Scenic Budget Characteristics

Performance Project Characteristics				
Venue	Cast & Crew	Total Production Cost	Total Scenic Budget	Funding Source
Small, independent and community-based, such as La Mama, Red Stitch and Theatre Works Independent community funded volunteer based 2	Independent artists & practitioners, usually a profit share arrangement.	Around \$20,000	Around \$6,000	Non-commercial, non-taxpayer funded, for example through government grants.

1.2 Live Performance

It is also important to clarify what I mean by live performance. This can be many things, from the simplest street performance, costing zero dollars to produce, to a large-scale, stadium spectacular costing hundreds of thousands of dollars. The common element is an immediacy that connects the performance to the audience in real-time. Digital performance researcher Steve Dixon echoes this sentiment (2007) when he says that liveness has more to do with experiencing the present moment than being physically present. Philip Auslander (2006) proposes that feedback from a living audience is what makes a performance live. Helen Freshwater (2009, p2), states that the relationship between theatrical performance and the audience is “indispensable”. Without the presence of a

² Stage Whispers, March-April 2019, refers to the recent expansion of community theatre in New Zealand in relation to a Consortium style model. My research offers an alternative view to this article.

living audience to receive and respond, there can be no communication or connection. This implies that the presence of a living audience is a necessary part of staging a live performance.

1.3 Digital Technology

One of the more common terms used when describing the use of digital technology in live performance is Audio Visual (AV). The focus of this exploration is on visuals, particularly visual-based digital technology currently used by theatre artists and those involved with creating scenic design solutions. For today's practitioner engaging in scenic design, this involves projection or screen-based display of visual material. The type of visual material that is used ranges from animated computer graphics to live action video, either pre-recorded or streamed live, Salter (2010). Projection and screen-based options are currently being used throughout a range of productions in combination with interactive visual programming to explore the use of augmented reality in performance.

The following paragraphs discuss approaches to projection in live performance, which influence this exploration.

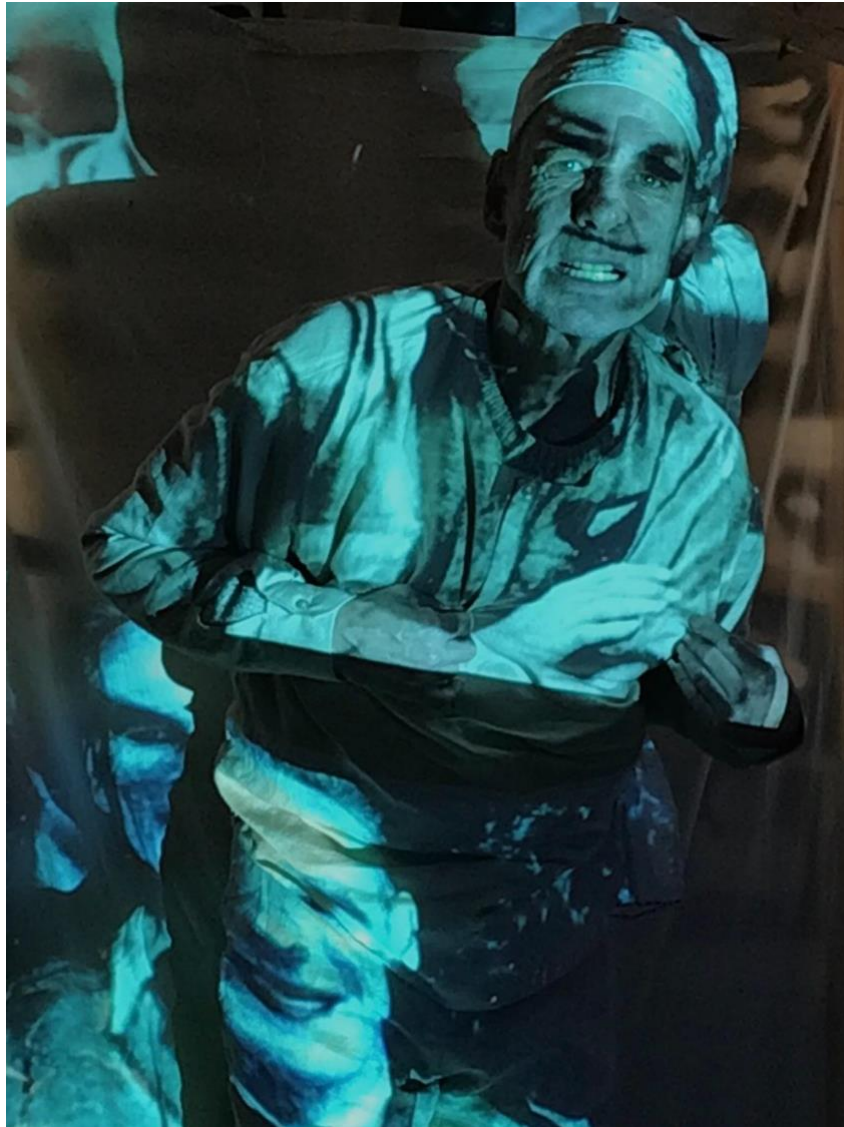
Donato Maniello (2015), in his book *Augmented Reality for Public Spaces*, describes augmented reality as an option that can enhance and change the viewer's perception of a space through the use of visual-based digital technology. It includes the display of content using devices such as, phones, tablets, computers, cameras and projectors to visually mix or overlay information into the viewer's perception of the performance space. Projection mapping is used to augment reality by adjusting projected video content so that it does not appear distorted by the topology of the projection surface. The purpose is to appear as if the images are physically applied to a 3-dimensional surface. Locally, this technology is being used with great effect, from large-scale mapping of projected images on buildings as part of Melbourne's projection-based festival, *White Night*, shown in Figure 1 below,



Figure 1: White Night Melbourne 2014 - Image by Richard Misso - Design by The Electric Canvas

to enhancing and replacing painted scenic visuals for independent theatrical productions, such as designs by local Melbourne projection artist, Simon Fisher

at his studio performance space in Minyip, Victoria (for a performance called *Shadows*), shown in Figure 2 below.



**Figure 2: Simon Fisher rehearsing at his studio (Minyip/Victoria), 2018 -
Image by Simon Fisher**

An important starting point for augmenting or enhancing the performance space through the use of projection and projection mapping is motion graphics. When using the term motion graphics in relation to live performance I am referring to the display or projection of digitally generated animation content, to either enhance or represent some form of physical movement. A very effective example of this can be seen in the work of a multimedia performance artist from the United Kingdom who goes by the name of “A Dandy Punk”, shown in Figure 3 below. In this piece titled *The Alchemy of Light*, he uses highly choreographed physical performance in combination with mapped projections of animated figures and scenery to create the illusion of depth and movement.



Figure 3: A Dandy Punk -The Alchemy of Light, 2012 - Image by A Dandy Punk

The next step in digitally augmenting the performance space using projection is interactive programming. Typically, digital augmentation involves collecting and processing information in real-time such as depth, movement or sound data, from either the performer or the viewer. Information is collected through various inputs such as electronic sensors, portable cameras, depth cameras or microphones, and processed in real-time, using customisable visual programming software. Interactive programming software can be used to allow either the performer or the viewer to control projected content within the performance space. From simple activities like changing colours of a display, to a much more complex style of task. Such as altering the projected video content in real-time, in response to the performer's movements, gestures or sounds. A recent example of this can be seen in the production of Melbourne based dance company Chunky Move, Figure 4 below, titled *Mortal Engine*. Where animated effects are projected onto and controlled by the performer.



Figure 4: Chunky Move Production of Mortal Engine - Image by Andrew Curtis

For the viewer this creates a perceived interaction between the physical world of the performer and the virtual world of projected digital content. Recently, technology such as projectors, projection mapping software, motion graphics or video capture software and interactive programming, have become more common when designing scenic solutions for performance. This research will investigate the impact of affordable access to these types of digital technology on the design process. Of particular interest is the interaction between the physical and virtual performance space, Bolter and Gromala (2003).

1.4 Scenic Design

Scenic design outcomes are used to define the performance space and assist in conveying the narrative, they can cover a wide range of genres in live performance.

The use of digital projection in scenic design is having a greater influence, through increasing flexibility to adapt and define the performance space and how the audience views the overall performance. In a recent video interview for an educational theatre website, Digital Theatre Plus (2016), British based sculptor turned video designer, Rod MacLachlan, gives an insight into the advantages of using projection, from the perspective of a practitioner. He says;

projection can expand the scope of smaller productions, introducing additional characters, objects and atmospheres that escalate the sense of scale. (Digital Theatre Plus 2016)

Here, he is referring to the continuing increase in the ability to adapt and manipulate visual scenic elements through the use of digital projection, which is resulting in a wider range of possible solutions for scenic design. An increase in the scope of scenic design solutions, particularly for small, low cost productions, is providing an opportunity to have a greater influence on how a performance is staged. In terms of both the creative and the economic freedom to test a range of ideas. Melbourne based professor of design research, Peter Downton (2003) endorses this when he discusses the significance of an increase in influence in this area, proposing that the augmenting of performance through visual means,

i.e. scenic elements, can tell the audience equally as much as words. Dixon (2007) supports this, saying;

a new optimism about the potentials of digital media that is at complete odds with the knowing cynicism and cool distanciation of postmodern art and discourse. (Dixon 2007, 7)

Dixon's view is also in line with other well published authors like Aronson (1984), Davis (2012), Salter (2010) and others who believe that this increasing access to digital technology has resulted in scenic design outcomes developing a greater influence on the final outcome of sharing ideas through live performance.

1.5 Overview

The overall purpose of this research is to discuss the expansion of creative practice when creating scenic design solutions, using low cost visual-based digital technology. Currently, the process of creating solutions using this technology is overlapping three distinct design-based roles that contribute to the final outcome; scenic, lighting and projection. Through this research I will demonstrate the usefulness of this technology as a resource for developing and testing new ideas and methods when creating scenic design solutions and the impact of using this process, on the overall performance.

Chapter 2: Relevant Literature, will discuss the technology available, existing theories on the use of visual-based digital technology, and the relevance to current practice. In order to better understand this technology when creating visual scenic design solutions, it is necessary to be familiar with the state of current practice and the theory behind it. I identify and discuss digitally based performance theorists and practitioners that have influenced how live performance, and specifically theatrical performance, is using the type of visual based digital technology mentioned above in,

1.3 Digital Technology.

Through the examination of current practice and theory related to the use of digital technology in performance, I will narrow the focus to the influence of access to increasingly affordable digital projection software and equipment for low budget performance.

Chapter 3: Studio Process, I will outline the proposed methods to be applied to the staging of my research project.

Chapter 4: Process Analysis, documents and reviews the research project itself. The practice element here involves staging a performance that is designed and developed to demonstrate use of low budget digital technology in the creative process, based on processes and ideas discussed in Chapter 2: Relevant Literature. The effectiveness of the processes chosen, will be discussed, in terms of how to best balance the expression of the idea with the pragmatics of technology within the project.

Chapter 5: Personal Reflection, discusses the use of projections in the creation of the performance *Absolute Uncertainty*. It includes my experience of the collaborative process, documenting a view from within the production team of an independent, low budget performance, and the impact on the process of using low cost visual-based digital technology.

The Conclusion encapsulates the outcome of the explorations and presents options for projection-based scenic design research into the future.

Conclusion

In summary, low budget performance is well placed to take advantage of increased access to affordable projection-based digital technology, through increased testing of methods of projection for scenic design. Because there is less at stake financially, pressure to avoid failure is reduced, therefore more ideas can be tested to achieve successful outcomes. I see this as the main reason why we should be interested in projection-based digital technology's influence on how we produce visual solutions for scenic design. The increase in access to digital communication, file sharing and visual-based software that we are experiencing, means that those engaged in producing work for performance have a wider variety of methods available to create solutions. Freedom of access to an increased variety of methods is driving innovation in scenic design at a low cost level, where the risks are lower. Innovation through freedom of access is providing opportunities for projection designers to have a greater influence over both how the performance space is defined and how the narrative is delivered. Opportunity to expand creative practice is important for the performing arts as it allows the industry to continue to grow, through nurturing and developing effective and innovative ways to communicate an artistic concept to a viewing audience.

Chapter 2: Relevant Literature

Introduction

This chapter discusses the impact of accessible digital projection software and equipment in providing scenic design solutions for dramatic performance. A selected range of digital based theorists and performance practitioners are reviewed throughout it as an initial point of reference, before embarking on the practical explorations of my research project, which are covered in Chapter 3: Studio Process.

Scenery and scenic design have existed in some form since the outdoor theatres of the Ancient Greeks, 2000 years ago. However, widespread use of changeable, constructed scenery was not common until the mid 16th century, during the Italian Renaissance. Hartnoll and Hartnoll say that there are

...two important aspects of theatre... The first is the form of the new theatre building, with its proscenium arch, and the second is the development of painted scenery. (Hartnoll and Hartnoll 1985, p52)

This period saw the introduction of a new form of permanent, roofed building for theatrical performance. A major contribution was the use of the proscenium arch to mark a transitional divide or 'fourth wall', between the space where the audience is located and the performance area. Another significant contribution was the increase in the use of standardised, painted scenery, that demonstrated the then recently established method of depicting perspective.

The 19th century saw a general increase in the size of theatrical venues and the replacement of candles and oil-based lighting as a source of illumination, first with gas, then with electricity later in the century. The technology behind scene changes was no longer openly displayed, instead being hidden from the viewing spectators. Construction of scenery became more customised or tailored to suit an individual production, rather than re-using standardised stock options. The early 20th century saw a move away from realism, endeavouring to simplify sets and scenery. Shifting from two-dimensional scenery toward the use of three-dimensional structures to define an acting or performance environment. The box style set replaced the 'romantic-style' painted backcloth and side curtains (wings). In the late 20th century, after the introduction of digital technology such as computer-controlled lighting and sound, scenery and scenic design was able to examine its contribution to the performance environment, and as Christopher Baugh suggests "become a performer within performance" (Baugh 2013, 212).

Since the idea of Plato's cave (around 350BC), and the use of fire and shadows to share stories, western theatre has used light to augment the performance space. A space that gradually (between the time of Ancient Greek theatre and the late 16th century) became more constructed or boxed in and in need of illumination. During the late 19th and early 20th century, the introduction of electricity and the projected moving image saw the depiction of depth on a flat, scenic surface take a major step forward in terms of realism (Salter 2010). Wide-spread use of projection in performance did not occur until technical and cost related development issues could be overcome (Oliszewski, Fine, and Roth 2018). A reduction in costs occurred from the 1970's to the end of the 20th

century, with a resulting increase in use of video technologies in theatre, dance, and performance art.

Now access to personal computing and digital projection media is within financial reach of scenic artists and technicians. Oliszewski goes on to describe current trajectory of digital media design for projection as having 5 aspects or 'interfaces' in the process of staging a performance production. First, is production based such as script choice and budget. Second, is collaboration with other roles in the production process. Third, is content creation, such as the mode (or software) and display method. Fourth involves technical execution of the projection, how it is delivered. Fifth and final, is story telling or narrative, the creation of meaning and dramaturgical goals through the use of projected scenic visuals.

Throughout the course of my creative practice, I have witnessed an ongoing increase in the influence of visual-based digital technology in the creative arts. Based on observations from my professional experience, this is being driven by improved and affordable access. There is a supported view that this increase in access is having an impact on the way we produce and experience art, particularly in the areas of visual and performing arts, (Aronson 1984, Birringer 2008, Dixon 2007, Love 2017, Saltz 2001). It is in low budget theatrical performance where I see this having the greatest impact. Low budget performance is an area where new ideas are tested, and boundaries are pushed, to explore how we define ourselves. The idea of live performance as a forum for community connection aligns with Canadian drama and performance academic Susan Bennett (1997), when she argues that helping us to define ourselves is a major contribution of theatre in society;

...live performance has an often uncanny ability to touch those very stories by and through which we understand ourselves. (Bennett 1997, 8)

My review of the impact of increased access to digital projection software and equipment is grouped into three areas of discussion. Firstly, I will look at the technology available for low budget performance, describing what is available and current uses. The second part discusses the theory on use of digital projection in this area and the impact of increasing accessibility. The third part looks at practitioners, and the relevance of this research for industry from an independent practitioner's perspective.

2.1 Technology available

The technology available begins the discussion in this chapter because the development and then uses of technologies first form and then influence the approaches of practitioners, which then form resulting theories.

Currently, increasing access to projection-based digital technology is providing a range of options for performance across the industry. Increased access to these options has meant that it is no longer the exclusive domain of high end, large budget, arena sized spectacles. It has become an integral part of even the most modest, independent production. This can be seen in hardware developments such as LED lighting, cameras and projector technology as well as the software that generates, manipulates and distributes images for projection.

According to theatre technology author Drew Campbell (2011), projector technology can be divided into two categories, LCD (liquid crystal diode) and DLP (digital light processing), they refer to the technology being used to manipulate the light source emitting from the lamp in order to project the image.

LCD projectors produce a bright image with accurate colours, comparable with models of DLP as well as generating less heat.

DLP projectors are more compact and less heavy than LCD. The image they produce has a higher contrast ratio (difference between black and white) and a less visible pixel grid than LCD.

It depends on your intended use, as Campbell says they are converging in price and quality.

The major types of projector he lists, from lowest cost to most expensive, are Pico or pocket projectors, home theatre projectors, conference room projectors and large venue projectors. Prices can range from just below one hundred US dollars, for a pocket-sized projector to tens or even hundreds of thousands of US dollars, for a high-end professional unit able to fill a large venue.

He describes pocket projectors as the least useful category for general scenic applications that need to define the performance space, because of their low brightness levels and small image size. Instead, I would suggest that small or pocket projectors are better suited to localised stage work and testing or demonstrating on scale models during the design process.

Home theatre projectors have a better contrast ratio than pocket projectors but still require very dark environments to produce their best images due to a similar lack of brightness.

Conference room projectors are designed to be portable and have bright lamps that compete well with ambient lighting typical of corporate environments. Although, this usually comes with a lower contrast ratio and lower general image quality.

Large venue projectors produce the brightest image of all these categories with powerful lenses for projecting over large distances while not having to compromise on image size. Averaging around 160,000 US dollars (at the time of publishing), these projectors are a very expensive option and mostly used for high end professional projects.

Campbell (2011) names conference room projectors as the best match for low budget theatrical use, for several reasons. Their image brightness enables them to compete with other stage elements such as some form of ambient or detail lighting. A typical unit is reasonably priced at around 1000 US dollars and produces around 2-3000 lumens (units of brightness). The contrast ratios are similar in comparison to the high end, large venue projectors. He suggests that conference room projectors should provide an effective image for an audience less than 15 meters from the projection surface in low to moderate lighting levels (conditions similar to low budget theatre venues).

The review and selection of current options available for video mapping and sequencing software that I have chosen to focus on are based on information from a free access, industry website called www.projection-mapping.org. The site is regularly updated and lists a range of software options suitable for creating an installation or performance. The selection criteria used to identify

the following 5 options were budget size (with nothing over \$400), level of experience and choice of computer operating system (compatible with both PC & Mac). They are a list of representative examples, described on the website at the time of writing this paper, that I identified as suitable for use in low budget theatre;

VPT (Gilje 2017) is a multi-purpose, real time projection software for manipulating both live and recorded video content and interactive displays. It is free to download and available for use with both Mac and Windows operating systems.

QLab (QLab 2017) is a cue-based, multi-media, image sequencing software that includes basic image masking. It is available in a low cost, 'rent to buy' option and available for use with both Mac and Windows operating systems.

Max (Cycling'74 2017) is a low cost visual-programming software for manipulating multi-media images. It can generate or augment footage, for both audio or visual content, and apply real-time or pre-set effects filters.

Painting with Light (May 2019) is a less complicated software package for video mapping, aimed at artists and VJs who want to project and manipulate still and moving images. Being open-source it is free to download and available for use with both Mac and Windows operating systems.

Complementary hardware and software options have also become more accessible and affordable, further increasing the scope for exploration and experimentation with projections and projection mapping software for theatre and performance. The complementary hardware options I refer to are items such as programmable LED lighting and integrated digital camera technology (incorporated within other portable digital devices such as smart phones and tablets). While complementary software options, refers to video editing or sequencing and animation software as well as visual programming software or interactive graphics applications.

A local example of a performance that explores a selection of accessible options for low budget production is the performance of Caryl Churchill's play *Love and Information*, presented by the Intercollegiate Activities Council - ICAC at the Guild Theatre, Melbourne University Parkville campus in May 2017, see Figure 5 below. Published in 2013, this play is an exploration of the growing impact of technology on personal relationships in society today. The set design used a mixture of wall-based projection, basic lighting, monitors and laptops to incorporate a blend of live camera footage and audio-visual sequences into the performance space. The use of digital video elements to augment the performance space created an environment that integrated visual scenic elements with the performers to assist in conveying the chaos of how we incorporate technology into our everyday lives. A sentiment shared by theatre reviewer Martin Fatmaja Hoggart (2017), in his online theatre review *The Dialog*,

AV design by Alice Bouchard was very successful especially for a play dealing with the effects of technology on contemporary life. (Fatmaja Hoggart 2017)

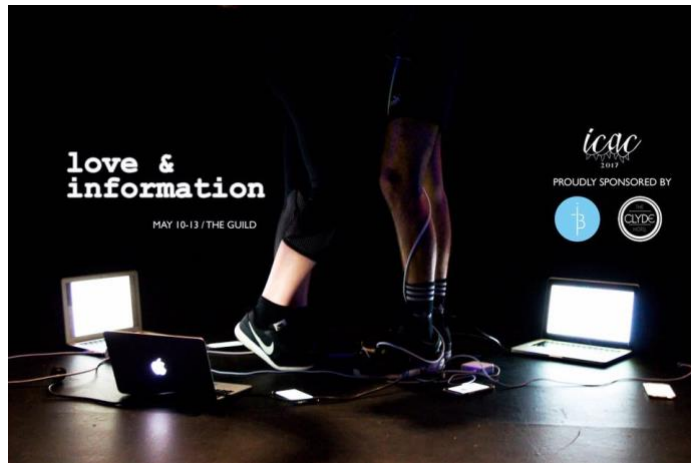


Figure 5: ICAC & Guild Theatre, Love and Information, 2017 - Image by Guild Theatre

As an example, it is a relevant performance because until recently, addressing a topic like the integration of digital technology in society was a costly exercise that would often see the technology dominate the performance at the expense of the story or narrative. With increasing access to low-cost, projection-based digital technology there is an increase in the range of options available. The increase in access and resulting increase in options is providing creative and financial freedom to experiment and achieve a balance with the other elements within the performance space.

2.2 Theory on use of digital projection

Helen Freshwater (2009), in her publication *Theatre and Audience*, provides a starting point for discussing general theory on the use of digital projection as scenery. Freshwater poses that theatre and performance, as with all artistic disciplines, are vehicles for communication of ideas. I support this position and add that the role of practitioners engaged in creating scenic design solutions, is to collaborate with the creative team to define the performance space. Resulting in solutions that communicate and share the ideas contained within the creative work, (Curtis 2014, O'Dwyer 2015). The use of projection-based digital technology by scenic designers to achieve these solutions, has a direct influence on how the performance is both staged and perceived. (McKinney and Butterworth 2009), support this in their publication *The Cambridge Introduction to Scenography*, when they cite a quote from leading Canadian playwright Robert Lepage, stating that technology in performance can be;

...both a facilitator of action and an essential element of the dramaturgy. (McKinney and Butterworth 2009, 137)

Styles of scenic solution

American theatre scholar Arnold Aronson (1984), in his *Drama Review* journal article, describes what he sees as five main styles or settings when designing scenic solutions for dramatic performance: *spectacle*, *hyperrealism*, *sculptural*, *architectural* and *multi-media*.

He describes **spectacle** as a production that is overtly enhanced with technology, large scale movement and lighting, see example below in Figure 6.



Figure 6: Spectacle - RSC/Barbican Theatre, *The Tempest* - Image by Tristram Kenton, 2017

While *hyperrealism* is defined as a production with heightened, stylized representations of the everyday or real-life, see example below in Figure 7.



Figure 7: Hyperrealism - MTC, *Jasper Jones* - Image by Jeff Busby, 2016

A *sculptural* production uses symbolic structures and multi-directional lighting to create a three-dimensional, almost in the round performance space rather than a rigidly defined set of layered viewing planes, see example below in Figure 8.



Figure 8: Sculptural - Bridge Theatre, Julius Caesar - Image by Manuel Harlan, 2018

An **architectural** style production is made up of a complex, structure-based environment that the audience can explore and view from many different angles and perspectives that all represent the theme, see example below in Figure 9.



Figure 9: Architectural - Rutgers Theatre, Romeo and Juliet - Image by Johnathan Wentz Design, 2008.

Finally, a **multi-media** production typically involves the projection of moving images, graphics and lighting. In discussing multi-media, Aronson (1984) mentions the potential for rethinking the possibilities of using video in performance, as access to the ability to deliver better quality images increases, see example below in Figure 10.



Figure 10: Multimedia - The Curious Incident Of The Dog In The Night Time, London, UK Tour - Image by Brinkhoff Mogenberg, 2012

Today, as anticipated by Aronson in 1984, we are experiencing an increase in access to better quality and less expensive options for using multi-media based images in performance design (Lawler 2014). The use of electronic (or multi-media based) images to define a performance space has emerged as a current style trend being explored in today's live performance works, as discussed by Dixon (2007), O'Dwyer (2015), and Davis (2012), which I intend to focus on during my exploration.

Digital imagery in performance

In *The Power of Space in a Virtual World*, Arnold Aronson (Hannah and Harsløf 2008) comments on the widespread trend for using multi-media technology in dramatic performance. He argues that design for performance is now dominated by the use of digitally manipulated imagery. Slovak film and theatre theorist, Dagma Podmaková (2015), suggests a definition that aligns with this and observations from my professional networks and experience. She explains that the use of digital imagery often falls into two basic categories, moving scenery and cultural reference.

The category of moving scenery involves manipulating the scale and display of video images and motion graphics to assist in describing the environment or the setting of a performance. Typically, this is done using screen-based projection methods or through monitor displays. More recently, this has extended to objects and even the performers themselves. It is considered an effective tool to augment or assist progression of the performance narrative, for example using projection of a live camera feed to efficiently convey close-up, detailed information.

The category of cultural reference involves the use of still or moving images that reference current journalistic media and culture such as lifestyles, rituals and stereotypes. Examples of these can be sourced from such areas as television and film productions, celebrity life, politics and social media. It is considered to be an effective tool for connecting everyday audience experiences with the performance narrative, for example using current news footage or popular videos or other content from the Internet to give a current context.

Augmented reality

In addition to productions using the above mentioned digital image manipulation categories of moving scenery and cultural reference, there is an emerging trend beginning to be incorporated in the use of projection-based digital technology for scenic design solutions for performance. Grouped under the general category of augmented reality, it is the use of software to manipulate digital images, displaying variations that respond to input in real-time, termed '*interactivity*'. These real-time responses or '*interactivity*' typically occur between the viewer and/or performer and the digitally manipulated images being used to define the performance space. The use of software with customizable options is necessary to enable real-time image manipulation. Options that vary the level and time of response in relation to the presence of the participants, viewers or performers. The intention is to convey a sense of immediacy or interaction for those involved. To assist in understanding this, I chose to focus on researcher and digital performance author, Steve Dixon (2007). He suggests grouping the level of influence of software in performance into four categories: *navigation*, *participation*, *conversation* and *collaboration*.

Navigation is identified as the least amount of real-time interaction, where the video work is either on or off, being triggered by the overall presence or absence of participants.

Participation delivers responses that are again triggered by the presence of the participants, however these responses are randomly selected from a list of available options.

Conversation relies on a cause and effect-based dialogue with the participants, where they have to achieve certain aims to trigger certain responses.

Collaboration, as the name suggests, relies on input from the participants to create an alternative or new outcome.

Belgium-based, social media and communications researcher, Catherine Bouko (2014), proposes that the of the level of interactive experience is what should be considered important. Suggesting that for it to work, there needs to be some level of dialogue or exchange of information from both parties involved. She concludes that an effective solution for creating a digital projection-based interactive experience lies in the investigation and selection of appropriate aspects of multi-media, digital technology that deliver a level of control that suits your particular performance rather than handing over control completely to either the spectator or performer.

An emerging trend that is supplementary to the interactive, digital experience described above is the use of projection mapping. Previously, projection has only been used as a type of animated backdrop to represent the performance environment, a kind of moving wallpaper. However, it is now possible to augment the exterior of an object, static or dynamic, or designated parts of the interior of the performance space. Blending the virtual world of the performance with the physical realities of the venue through the use of this technology. A recent Korean study, published in the open access journal *Symmetry*, by Lee et al. (2015), examines an example of the use of projection-based augmented reality via projection mapping, see Figure 11 below. From their examination,

they propose what I consider to be an important advantage driving the increasing use of this technology;

Using projection-based AR/augmented reality, it is easy to implement graphical representation that ordinary lighting techniques cannot express. (Lee et al. 2015, 184)



Figure 11: Real-time projection-based augmented reality system, Lee et al, 2015

That is, being able to easily enhance the audience's visual experience through changing shape, texture and creating depth illusions for various components within the performance space that could not effectively have been achieved without the use of projection-based digital technology. A further exploration of the potential value that this trend can provide, particularly for low budget scenic design, is of great interest to me and is discussed further in the next section.

2.3 Practitioners perspective

Digital projection in performance

Support for exploring the creative potential of using projection-based digital technology for scenic design solutions in dramatic performance is discussed in *American Theatre journal article - The Case For Live Movies*, by American new-media academics and practitioners, Malone and White (2009). As this and the following reference are now ten years old, we are able to reflect and note the value of their statements and how we are now seeing these ideas come to fruition. In their article, they discuss the potential value to be gained through using digital visual technology as a tool for communicating in performance. They argue that there is a need to reinvigorate theatrical performance in order to connect or engage with a new generation of audience. Ensuring that theatre continues to develop and adapt with society to maintain its relevance. Re-affirming with younger audiences it's value as a forum for public discourse. In the same year, British based theatre academic, Dr. Helen Freshwater (2009), also expressed support for the idea of an increasing level of interest among the theatre-going public, for connection and engagement through theatre and live performance;

commentators and venues are lagging behind contemporary audience's taste for the intimacy of live [performing] art. (Freshwater 2009, 58)

An intimacy that I propose, can now be enhanced through a range of options, as a result of current accessibility to projection-based digital technology. Mike

Lawler (2014), U.S. based technical theatre author and scenic designer, discusses this in his American Theatre journal article, where he interviews a selection of leading educators and industry innovators within the United States. He quotes Charles Otte, the head of program for Media and Live Performance at the University of Texas, as listing 3 main areas of digital technology currently being explored in theatre performance;

computers (“and by extension lighting, audio and show control systems”), media and projection design (“changing not just scenery, but the ways in which we interpret scenery”), and interactivity ushered in by social media. (Lawler 2014, 39)

It is Otte’s comment on the second area, regarding media and projection design, that in my opinion contributes support for the benefits to be gained by exploring the use of digital projection in performance from a scenic design perspective. Identifying the impact that it is beginning to have on how an audience perceives scenery and in turn the performance space.

A locally based production that demonstrates an exploration of the use of digital projection in performance, is by Sydney based theatrical ensemble *Version 1.0*, called *The Disappearances Project*, pictured in Figure 12 below. Although it also explores computer-controlled audio and lighting effects and to a greater extent “social” interactivity through the discussion of community issues (in this case missing persons), I consider that successful impact is achieved through its transformation of the performance space through projection. The audience is offered a heightened insight into the character’s journey by transforming the backdrop into a continuous visual monologue. They use projected footage of a first-person point of view, of everyday street scenes from a moving vehicle, (evoking feelings of uncertainty and anxiety, often experienced by families of missing persons). By using projected content that relates to the narrative, the performance space has become a visual extension of the dialogue.



Figure 12: Version 1.0, The Disappearance Project, 2012 - Image by Heidrun Lohr

The broadening of scenic design through the use of projection-based digital technology offers both opportunities, as discussed above, and pitfalls. The most common pitfall occurs when productions become overly reliant on this technology to fill the performance space. Content is neglected, moving into the category of spectacle, as defined by Arnold Aronson earlier in this discussion. An overuse of spectacle often occurs when a production loses focus of why they are conveying content and allow how they convey it to take over,

showcasing the technology to the detriment of the story. A recent example of this is the 2013 production of King Kong see Figure 13 below. Where, in the words of theatre reviewer Charlotte Moore (2013), in her online review article in Limelight magazine;

the story seems like an afterthought, neglected at the expense of Kong's wow factor.
(Moore 2013)



Figure 13: Global Creatures, King Kong, 2013 - Image by James Morgan

Queensland based, education and performing arts academic, Susan Davis (2012), offers advice for avoiding such pitfalls, in her publication on the use of digital technology in performance; *Liveness, mediation and immediacy*. Discussing Joseph Addison's 18th century essays on the pleasures of the imagination, Davis suggests that through considered manipulation of key elements such as scale, novelty and beauty, practitioners can successfully engage the viewer's imagination and deliver the best solution for a theatrical performance. An example that demonstrates a considered manipulation of these key elements, involving the use of digital projection technology, can be seen in the performances of Spanish theatrical group La Fura Dels Baus, as seen in Figure 14, below. Founded in 1979, they are known for their ability to engage and interact with audiences. They have succeeded in creating their own style of large scale, site-specific performance for contemporary theatre, opera and corporate events. Based on performance in the round, they blend image based digital media with traditional theatre elements in unconventional ways. Creating a performance space that engages the audience's attention in order to deliver the narrative.



Figure 14: La Fura Dels Baus, La Grand Macabre, 2009 - Image by Franc Aleu

Davis (2012) continues her discussion on the impact of projection-based digital technology for performance and describes the potential for it to increase the scope of scenic design. She describes the increasing influence that it can provide for practitioners;

The innovative drama practitioner is therefore a nuanced designer of experience, embracing the digital, the live, the embodied and the conceptual, framing and creating experiences that draw attention, connect and make us feel 'alive'. (Davis 2012, 514)

A notable example of work that demonstrates this is Théâtre de Complicité (*Complicité 2017*). Founded in 1983, this London based group began as a collective of theatre-based creative professionals from a diverse range of backgrounds. They describe a collaborative method of devising a production as the group's defining characteristic;

famous for a distinctive, visually rich stage language, which layers physically beautiful performances and tightly choreographed ensemble work with innovative lighting, sound and video design. (Complicité 2017)

In 2007 they produced a performance of "A Disappearing Number", see Figure 15 below, based on the true story of the collaboration of two mathematicians who founded the idea of '*string theory*'. In a 2007 interview on the Barbican theatre's YouTube channel, the director Simon McBurney (Barbican 2007), discusses his technique for using projection-based digital technology in performance. He urges in favor of the importance of balancing the relationship between the performers and the technology, in line with Susan Davis, mentioned above. He talks of integrating the projections with other elements, rather than relegating the technology to the role of a mere backdrop. Their mix of theatre technologies, such as computer-controlled lighting, digital projection and an engineered soundscape, enhance the performance and convey the emotional landscape inhabited by the characters, creating a balanced relationship across all elements of the production.



Figure 15 Théâtre de Complicité, *A Disappearing Number* - Image by Joris-Jan Bos

The staging of performances such as those discussed above, brings together important themes that are currently defining performance for both practitioners and the audience. Themes such as context and connection, that result in an engaging experience for the audience. Achieving these sort of outcomes within the same time frame and budget would have been prohibitive without access to projection-based digital technology for use in scenic design options.

Relevance of my research to practitioners

There is increasing interest among theatre-going audiences for the inclusion of mediated elements such as digital projection. American theatre practitioner Mike Lawler, in the journal *American Theatre* (2014), explores the impact of this trend. He discusses organizational and economic benefits of using projection-based digital technology for performance and how it is influencing production methods. His view, which is part of a growing number of theatre practitioners, is that currently, when designing for performance, there is a need for collaborative, customizable, and economical options. Made available through using software and related equipment to modify and customize visual scenic solutions to suit the specific needs of each production. Increasing what can be achieved in the time available. He reminds us that *'moving and interactive images'* are now so integrated into the way an audience, and society in general, communicate today that it has become an important area for practitioners to further "explore and unpack". An idea that is reflected in current theory of live performance, implying that an audience expects greater experiential value and higher levels of engagement (Freshwater 2009), (Auslander 1999), (Aronson 2005), (Walmsley 2011). Theatre practitioner/theorist Christopher Baugh (Baugh 2013) agrees, suggesting that through the lowering of cost and greater access to digital technology, the benefits of creating a visually mediated experience are becoming more affordable and achievable to explore. In his text, *Theatre Performance and Technology*, Baugh highlights the benefits that an exploration of digital media and projection-based digital technology can bring. He describes a freedom of access that can now be achieved through an increased sharing of methods and information and a resulting expansion of the range of applications. The relevance of exploring these benefits are discussed by Bolter and Grusin (1999) in their publication *Remediation: understanding new media*. They use the term *'remediation'* to describe the process of how we understand new

media. They view it through our relationship to, or interpretation of existing forms, explaining the new by using it to reconnect to the established or existing. Remediation is part of a continuing process of overturning theatrical conventions (McKinney and Butterworth 2009), in search of,

...effective ways to reflect a contemporary view and experience of the world. (McKinney and Butterworth 2009, 131)

The desire to search for ways to better represent a contemporary or current view of the world impacts how we view the relationship between new and existing visual media. Considering this view, I agree that the use of projection-based digital technology is fostering a continuing expansion of opportunities for practitioners engaged in creating scenic design solutions.

Interest in the expansion of professional practice is mentioned in an article about current creative development, by South Australian based creative and producer Emma Webb (2014), on the *Arts Hub* website. In her article, Webb proposes that independent artists and practitioners are experienced at doing more with less, and that utilizing opportunities such as those presented through increasing access to visual media (such as projection-based digital technology) for performance production is no exception. Rather, it is just another tool available to the theatre practitioner. Which, Davis (2012) links to a long established, ongoing process, previously identified by Lev Vygotsky in 1978. The idea that all communication relies on some form of mediation, augmentation or assistance, to convey ideas to the outside world.

Conclusion

In summary, the above discussion of performance theorists and practitioners has highlighted how the level of acceptance of projection-based digital technology is growing rapidly, as reduced costs make it accessible to a wider range of practitioners. The combination of increased access with the on-going desire to search for better ways to represent a current view of the world, point to the valuable relevance of my research, as these factors are relevant issues in theatre making today. However, the existing discussion does not focus on projection-based scenic design in low budget theatrical performance. The staging of an exemplar performance that explores these techniques, to best represent the content of a performance, aims to add this element to the discussion.

Theatrical performance may be considered a vital tool for discussing and reflecting on issues in society and fostering understanding through shared experiences. If the design of the performance space isn't effective, then the audience is less likely to connect and engage with the content (Curtis 2014). A reduction in the level of connection with the content not only discourages people from attending, it also fails theatre's role as a vehicle for communication. Scenic design is expanding its influence in this process, enhancing the performance environment through increased access to digital-based projection software and equipment options. The sum of all these factors is providing the catalyst for this exploration of projection-based digital technology and its impact on scenic design for performance.

Chapter 3: Studio Process

Introduction

In the previous chapter I discussed available resources and a selection of theorists and practitioners, to identify industry support and relevance for my research question. The gathering of support is in preparation for embarking on a practical exploration of my research question. During my exploration I use projection-based digital technology to provide the best scenic design outcome, using accessible low cost solutions. It is worth noting that the authors I have referenced, span a comparatively long period when considering the developments in relevant technologies. However, the ideas, concepts and problems discussed have remained relevant.

For this chapter I outline the proposed approach for staging a practical exploration of my research. I will reflect on the process and outcome of this practical exploration, analyzing how it relates to my research question. The intended outcome is to demonstrate an expansion of creative practice for scenic design practitioners. I will achieve my demonstration of expansion of practice through exploration of the use of digital projection software and equipment as an accessible, low cost resource, for developing and testing methods for creating scenic design solutions.

To achieve my intended outcome, I will first refer to examples of low budget performance productions (drawing on examples from my professional practice) and what impacts the scope and choice of techniques. Based on this information I will outline the proposed details (time, location, budget, etc.) for staging my performance-based research project and the intended procedures for analyzing and reflecting on how the techniques and methods used, inform creative practice for practitioners creating low cost solutions for scenic design.

3.1 Examples of low budget performance

Taking my earlier definition of low budget performance into account, I will discuss two former productions from my professional practice that fit comfortably within these boundaries. The use of examples from my own practice, will assist the process of identifying appropriate, comparable, conditions for the staging of my performance project in September 2017. Using examples with comparable conditions will maintain a level of continuity in resources, range of budget and production development time, throughout this discussion.

Example 1: A Midsummer Night's Dream - Melbourne Shakespeare Company



Figure 16: Melbourne Shakespeare Company, A Midsummer Night's Dream, 2016 - Image and design by Simon Bowland

In 2016 I was part of an emerging, independent theatre group called Melbourne Shakespeare Company, in the role of set and costume design and constructor for a profit share production of A Midsummer Night's Dream. It was staged at 'Testing Grounds' in Melbourne, an inner-city vacant lot repurposed as a makeshift urban recreation space.

The theme that the director and I decided to explore in this Shakespeare text is the dream-like state of pursuing love and the difficulties that can arise from it. The costume and scenic design concepts that were used subverted the existing look and feel of the built-up, city location, to convey a feeling of unreality or semi-dream.

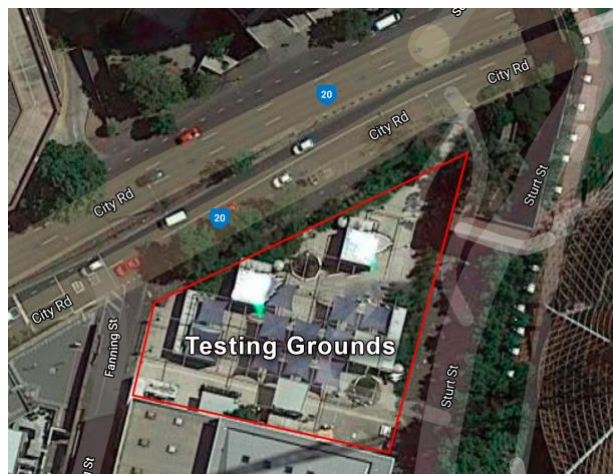


Figure 17: Aerial view of venue location for A Midsummer Night's Dream - Image from Google Maps

We achieved these design elements by incorporating a mix of visual cues, such as abstract ribbons of colour to represent forgotten pagan fertility rituals (juxtaposed with the physical location) and reconfigured recycled clothing and

props that could be used to quickly transform the setting or performers to give a feeling of mixed realities. Although this production of *A Midsummer Night's Dream* did not use projection-based visuals, it is relevant as a comparative benchmark of the requirements for staging a low budget performance production. The following analysis will discuss this production in terms of the impact of location and budget when considering the use of projection-based digital technology to create scenic design solutions.

The design budget (set and costumes) for Melbourne Shakespeare Company's production of *A Midsummer Night's Dream* was around \$6000, this is approximately 30% of the previously defined average independent theatre budget of less than \$20,000.

The site limitations of using a low cost, outdoor venue that requires half the performances to take place during daylight hours, meant that the option of using projection and/or lighting for visual-based scenic solutions would be difficult. I decided that the inclusion of projection-based digital technology, in this case, was not best practice and not necessary for us to realize this production. Instead, we created a stripped back interpretation of this well-known Shakespearian tale. The visual style favored by the director was a relaxed, resourceful, mash-up of urban, community elements and discarded industrial elements, which were pre-existing at the venue. As a result, we decided to build on the existing style of the site by including some of the surrounding urban environment as scenic elements.

As a preliminary example of a practical investigation into a low cost theatrical production this performance used no projection-based digital technology in creating and defining the performance space. It provides a useful comparison with further test collaborations in low budget performance, where conditions may be more conducive to incorporating digital elements.

Example 2: Latecomers – Open Body Theatre.

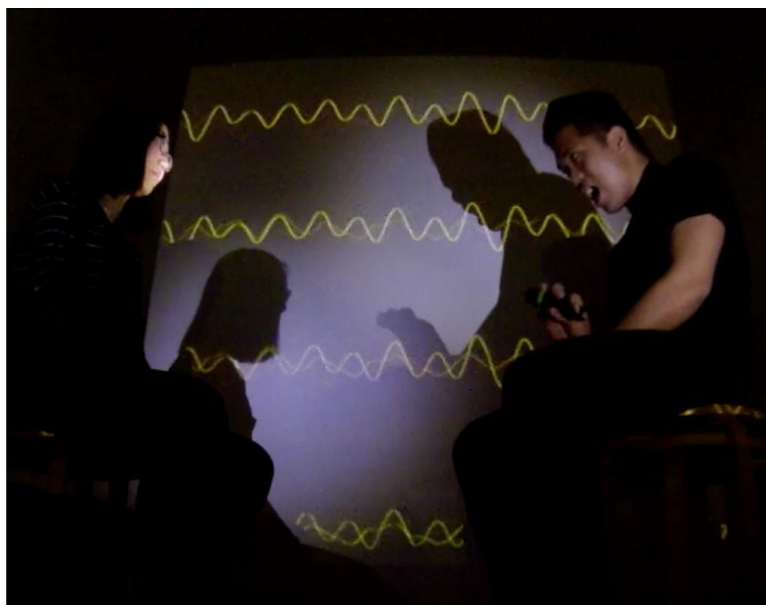


Figure 18: Open Body Theatre, *Latecomers*, 2016 - Image and design by Simon Bowland

The second practical example, *Latecomers*, see Figure 18, above, focused on projected visual content rather than physical set and costume solutions. It had a

smaller budget than the example above, however it had more scope and opportunity to incorporate and experiment with digital elements.

The production of *Latecomers* was staged as part of a small performance run at an independent venue in Fitzroy, now called 'The Burrow' (formerly Aeso Studio), as part of a collaborative, student-based theatre group called 'Open Body Theatre'. My role for this production was scenic, lighting and projection design. The performance was an original devised work based on issues related to the experience of being an international tertiary student. No formal script was created, however a basic trajectory for each performance was adhered to.

The venue, a white studio box, was restricted by the lighting and use of projections of stylized motion graphics and shadow play, using hand-held torches. This created a dark, at times confusing, performance environment that aligned with the themes of dislocation and separation anxiety that were present in the performance.

The theoretical underpinning for this production was a personal exploration opportunity to explore the ensemble's experience of being an international student in Melbourne.

Set and costume budget for this experimental theatre production was around \$650. All performers and crew were volunteers and sourced their own costume and any specialist equipment not supplied by the venue. Venue hire was the largest cost at around \$500, this included a small selection of audio-visual equipment such as microphones, speakers, amplifier and projector. These expenses were covered by our ticket sales.

The venue was a small, white, studio space, measuring 3.6m x 10m, consisting of a concrete floor and false wall at one end of the space for projection and concealed entrances.

In terms of equipment for audio-visual requirements, I provided a Mac book Pro laptop - including specialist software, a multi-directional USB microphone connected to the laptop and a selection of connector cables. The set consisted of a single, projected backdrop, using the visual programming software Max to create a display of sound activated visuals. The backdrop image was composed of 4 yellow, horizontal, oscilloscope-style, lines on a dark background, see Figure 18, above. The lines became more animated as the sound produced by the performance increased, providing an interactive visualization of the surrounding audio environment. Initially we tested various video filters using a real-time camera feed, intending to project the modified, live video as part of the backdrop. We decided that the best design solution was to project abstract visuals (sound responsive lines that visually represent both a blend of a polygraph display and a protective wire barrier or fence). Small LED torches were used to generate imposing silhouettes of the performers (a typical example of an inventive solution to a low budget scenic effect). The silhouettes of the performers were overlaid on the main projection and physically manipulated to individually skew the scale between the performers, visually reflecting their position in the conversation. The use of strong, simplified, scenic visuals implied an environment of uncertainty, anxiety and intimidation for the audience. The depiction of an oppressive, confusing, environment such as this, was in keeping with the themes associated with our intended narrative.

Our blending of traditional/manual techniques and digital techniques shows a valuable, practical example of connecting new media with the old (i.e. *remediation*, as mentioned in 2.3 Practitioners perspective). The creation of scenic visuals that referenced an urban, street art vibe gave a current context to the theme of exploring issues related to the experience of being an international student.

I was pleased with this production as an alternative example to the previously mentioned 'A Midsummer Night's Dream'. As a comparative performance, it represented a low budget production that required the use of projection-based digital technology. In terms of audio, much of the performance used a bath of acoustic sounds and dialogue, focusing on how we interpret and relate them to our surroundings. The mix of manual and digital methods used for both sound and visual solutions was an effective outcome that resonated with the theme of the narrative. These findings were achieved with minimal outlay and would not have been possible without access to affordable software and equipment.

The performances described above provide useful examples to compare with the staging of my practical investigation into the use of projection-based digital technology for low cost scenic design solutions. Budget and time frame are the two most important factors to consider once the narrative has been decided. As budget determines how much is spent on each aspect of the production, and time-frame impacts on the cost of each aspect. The less time you have to plan ahead, the more expensive it is to access things. As a result, my performance project will need to allow enough time to maximize availability of low cost options for venue, materials, equipment and labor.

3.2 Research content (time & place)

I intend to develop and stage an independent, low-cost, dramatic production which will be developed through my professional practice. It will engage with interested, locally based networks of Melbourne theatre practitioners.

The aim of staging a production is to demonstrate the flexibility of using projection-based digital technology in scenic design, that is accessible to a range of production budgets. My investigation will pay particular attention to the areas of projection and visual programming. To assist in achieving this I look at options that are financially achievable, adaptable and relevant to current practice.

The most important factor in making this project financially achievable, as discussed earlier in this chapter, is going to be time. Allowing enough time for the flexibility to reduce cost through self-direction, such as learning new skills (and expanding my practice) and testing ideas to identify effective, low cost options. Based on my professional experience, I estimated that this would require 6 to 12 months in order to avoid fast turn-around times that can lead directly to an increase in cost.

The next most important factor after time is budget allocation. To keep venue costs down, as mentioned above, requires time, to plan ahead and confirm access to suitable options (that are usually in high demand as a result of their reduced cost). The venue needs to be adaptable, to respond to changes in performance requirements during the development process. This also includes

regular access to the venue or a similar space, to test, rehearse and develop the performance.

Scenically, the performance will be best suited to the kind of venue that will only require the sourcing and installing of the basic elements. Such as black theatrical drapes, a control desk, and hanging points or support structure for any lighting, audio and projection requirements. Drew Campbell (2004), in his book *Technical Theatre for Non-Technical People*, describes this type of set as the most appropriate for low budget theatre.

offering simplicity and low cost while maintaining the atmosphere of the show. (Campbell and Knekt 2004, 23)

He refers to it as “the unit set”, consisting of a basic performance space designed to allow the movement of smaller stage elements to communicate changes in scene and/or location, accommodating as many variations as practicable. Major scenic elements such as walls remain in place while smaller, scene specific elements are included or removed to suit the requirements of the narrative. In the case of this project the smaller stage elements would be freestanding, relocatable structures that can be re-arranged and re-purposed by the onstage performers. These freestanding structures can function as either individual backdrops or be grouped together as a single, structural scenic element.

Part of my focus on the impact of accessible, projection-based digital technology is to consider the relationship between narrative (message, idea or storyline) and scenic design (the setting or surroundings required). I will look at what impact narrative choice has on the scenic methods used to present the performance. The intention for this project is to present a customized selection of techniques that use both manual (shadow play) and digital scenic projection effects that suit the chosen narrative and best define the performance space. I will achieve my intended outcome through the testing and selection of low cost methods that will include the use of projected video and/or motion graphics content, modified in real-time. I plan to realize this project in September 2017 and significantly reduce the estimated outlay of funds through access to university facilities and equipment for little or no cost.

3.3 Equipment for low budget

Projection-based digital technology has been in broad use in performance for decades, typically in a ‘*moving wallpaper*’ style of application, where it is placed as an additional afterthought to the rest of the performance space. More recently, it has begun to be integrated into the development process in response to increasing access to equipment and the demand for flexibility of options, (Lawler 2014). The aim of this research is to demonstrate the value to be gained from integrating it into the development process and the influence that it’s adaptability has on the process of realizing a performance. Specifically, for the areas of projection mapping and interactive visual programming and what they can bring to scenic design for low budget performance.

The estimated scenic production budget to create my exemplar performance, titled *Absolute Uncertainty*, will be around \$6,000 (AUS). I based my estimate on an average figure drawn from industry experience that includes venue costs and any required modifications.

When intending to stage a low cost production, a defining factor of what type of equipment will be required is the venue. As discussed above, the venue will be basic (i.e. bare walls, floor and ceiling and power outlets). A basic set-up suits my intended method of ongoing experimentation and exploration of ways to integrate projected visual content and provide flexibility throughout the development process. Using flexible projected content will allow for ongoing adaptation and adjustment during this period, while also lowering the impact on the budget.

The basic equipment required to support the staging of this type of performance project, falls into three areas; lighting, scenery and sound. Projected content and projection mapping, can impact all three of these areas so it is important to strike a creative balance between all the elements that define the performance space. The over reliance on one particular aspect can result in that aspect dominating the experience. When using projection-based digital technology in performance this can sometimes be the case (Brophy 2014). To clarify this I will discuss each of the basic areas identified above in terms of both their purpose and their potential interaction with projection.

The traditional lighting requirements for this performance have to be quite basic. An initial requirement is to highlight focal points where necessary followed by the need to create areas of colour, texture and depth. It also needs to balance with the use of projected images which require areas of lower surrounding light to be effective. Drew Campbell (2011), recommends at the bare minimum, the blending of 3 different lighting sources to create a “wash of light”. He suggests adjusting two sources that come from downstage and are angled to the center from either side, giving the performers and physical set elements interest and depth, while the third source is used as either back or rim (head and shoulders) lighting to visually differentiate the performers and the scenery. To achieve this, I tested options for small, powerful lighting units that could provide areas of light that support and augment the areas around the projections, while minimizing impact on the projected content.

Scenery has to include the basics of support cross bars, stands and structures for traditional performance space requirements. Theatre drapes need to be included - for managing sound and acoustics, speakers and any supports for projection devices. Projection surfaces are of key importance when staging an exemplar production based on demonstrating digital projection software and equipment as an accessible, low cost resource. It requires an emphasis on the materials and method of construction used to support them and an awareness of how they impact the performance space that they occupy. A discussion of the impact of the projection surfaces being used, should include how they are integrated with the actions of the performers, their impact on acoustics, traditional lighting and above all, how they receive projected images. The aim is to focus on exploring the influence that the combination of these elements will have on how the space is perceived.

Sound would also be of importance in terms of customizable options as it can work independently or with visual content to augment the performance space and convey the presence of essential characteristics of the performance narrative. For this proposed exemplar production, the aim is to use a mix of acoustic and digital sound to give extra dimension to key moments in the

narrative, creating a soundscape that will be appropriate for it. The acoustic component is to be comprised of a singular musician, using an Asian woodwind instrument to echo and respond to a pre-recorded digital soundscape, creating a blended atmosphere of contemporary and traditional sounds. The digital soundscape is to be achieved using a standard laptop and basic software and sound amplification system. The aim of using a mix of acoustic and digital sound is to reflect the overall style of the project, which is to demonstrate the effective blending of traditional techniques with access to current digital technology.

My options for including projected visual content required at least one projector, dependent on which scenic components were to receive the projection. During development of the narrative and based on the equipment and software information discussed in my literature review, I plan to investigate and test suitable options that will integrate well with other elements of the performance space. In terms of equipment, this includes recommendations for use of a mid-range projector, suitable for business and conference style presentations. Mid-range projectors are suggested as an effective solution for small, independent theatre productions, such as used in my professional practice. I also require access to a variety of data input devices for capturing audio and video data, to manipulate and augment information collected from the performance environment as visual scenic content. Decisions made by the production team, regarding how the narrative is to be presented, have a significant influence on this. To visually generate content from any data, requires an investigation of suitable visual programming software, image and video manipulation (including projection mapping) and sequencing software. Again, using the information from my literature review as an initial guide, I aim to experiment and test potential options as required throughout the development process.

To allocate a budget for the various aspects discussed above I chose costings based on commercial estimates. Table 2, below, lists both the hiring and the purchase costs, where available. I am including this to gain an insight into the potential, longer-term, economic benefits of spreading financial outlay across multiple projects. A key insight is that this will help reduce budgets for individual productions in the future.

Table 2: Estimated equipment for proposed low budget production (AUS dollars)

NON-TECHNICAL STOCK				
Items	Description	Quantity	Weekly Hire	Purchase
Theatrical Drapes	Heavy Black Drapes (3.6M)	18M	\$720.00	\$650.00
Drape Support Crossbars	Metal	8	\$200.00	\$576.00
Adjustable Uprights (2400mm - 4000mm) and Base Assembly	Metal	2	\$90.00	\$455.60

		TOTAL	\$1,010.00	\$1,681.60
		TOTAL + GST	\$1,111.00	\$1,849.76
TECHNICAL STOCK				
Items	Description	Quantity	Weekly Hire	Purchase
Extension cables:				
10.0M	10.0M	7	\$70.00	\$105.00
5.0M	5.0M	2	\$20.00	\$21.20
3.0M	3.0M	3	\$30.00	\$18.00
Power boards:				
4 outlet	4 outlet	3	N/A	\$33.00
Lighting:				
4 channel dimmer	4 channel dimmer	1	\$40.00	\$765.00
Par 16 240V (Birdie) lights	Par 16 (Birdie) lights	7	\$70.00	\$245.00
LED Pin Spotlights	LED Pin Spotlights	2	N/A	\$50.00
Audio system:	to suit small space	(as per Sound Designer)	\$300.00	\$2,400.00
Software:				
Sequencing	35 days	QLab 4 (VideoLAN 2017)	\$28.00	\$399.00
Visual Programming	365 days	Max 7	\$1.90	\$399.00
Image Manipulation	365 days	Adobe CS	\$16.75	\$871.00
3D - modelling	365 days	Fusion 360	\$5.80	\$300.00
		TOTAL	\$582.45	\$5,606.20
		TOTAL + GST	\$640.70	\$6,166.82

On initial inspection of non-technical production stock in Table 2 above, a direct comparison of totals identifies hiring as the preferred option for reducing costs. Although purchasing is only around \$740 more than weekly hire, they are bulky items that can be costly to store. And I would like to avoid accumulating excess stock items that are specific to a particular site and less likely to be re-used.

Although it would be ideal to access all of the non-technical items for the entire duration of the development period (approximately 8 months), to minimize spending on non-technical stock, I will limit the hire of these items to a total of one week (the week of the performance). To accommodate our stock needs until that week, my intention is to source temporary approximations, at minimal cost.

The technical stock, also listed in Table 2 above, appears to be cheaper to hire on initial inspection. Again, this is accurate for items only required for 1 week. Since we will require access to most of the technical items for the duration of the development period, up to and including the production week, purchasing is going to be preferable to hiring. Unlike non-technical stock, sourcing approximations is not a practical option and most are easily adapted to differing locations, as well as being a necessary part of ongoing professional practice.

3.4 Data collection, instruments and procedures.

Reflecting on the processes used to stage this project will highlight the growing impact of accessible projection-based digital technology on experimentation for performance design. Particularly as an important resource for the performing arts community. Performance research authors Joslin McKinney and Helen Iball (2011), when discussing contemporary methodologies for conducting scenic design based research, advocate that it;

needs to be responsive to the experiential and fluid nature of scenography. (Iball and McKinney 2011, 114)

Being able to adapt how the space is defined and respond to the requirements of a production as it evolves and develops. They define scenographic research as a discussion of the process of going from intention to production. To assist an exploration of this process, they describe five approaches to scenographic research that can be used when analyzing the responses or adaptations involved during the production process:

Retrospective:

Retrospective refers to a method of response that is based on, or filtered through, the lens of past documentation of a production and the researcher's previous experience.

Implied:

Implied or embodied research refers to a kinesthetic method of gaining knowledge through practical experience and reflecting on that experience.

Spatial:

Spatial thinking as a research method, relies on referencing the processes and practices of your own work to examine and inform the research project.

Audience feedback:

A practice-based or audience feedback method relies on the analysis of audience responses, with the option to repeat the process to gain further insight.

Scenographic:

Scenographic writing refers to a process of analyzing the author's intention and modifying the performance narrative to better represent this intention.

The analysis of my research project will be a mix of implied or embodied style research and spatial thinking. Using a mix of acquired technique and practical application is important because the aim of this research is to demonstrate the direct benefit to creative practice of the increasing access to low cost, projection-based digital technology for use in scenic design. The most successful way to examine the process is through the perspective of the practitioner/s involved in the project.

To broaden the insight into this project from the practitioner's perspective, I will include consideration of the collaboration of the members of the production team when documenting and reflecting on the development and staging of the performance. Using a collaborative development method requires careful planning in order to satisfy both the logistical needs of staging a production and the developing creative needs of the performance. Both of these requirements impact the amount of time available and the allocated budget. The logistical needs include access to an adaptable space for rehearsal, equipment testing and the identification of installation requirements. The creative needs, while impacted by the limitations of the logistical needs, are more flexible and less defined. They develop throughout the production process and involve the realization of ideas drawn from the narrative. The creative needs are met using a mix of design skills to engage a mix of scenic elements. The ongoing development of creative needs drives the process of testing and choosing technique, equipment and materials. Included in the process will be an investigation of software options for generating and controlling the scenic content and soundscape. The development process will be documented using studio notes, visuals, models and rehearsal footage. The finished performance is documented as a video file (located on the presented USB drive) and referred to in Chapter 4: Process Analysis.

When presenting this performance project, it is my intention to use a mix of projected visuals, that includes real-time sound responsive motion graphics and a mix of pre-recorded or file footage to be manipulated and used to augment the delivery of a narrative presented by two actors. A musician will be engaged to play an acoustic musical accompaniment throughout the performance as part of a physical or analogue component that mixes with a digitally augmented soundscape. Using the described mix of elements will assist in the demonstration of an exemplar performance that uses a blend of traditional and digital theatrical elements to augment the production. The intention is to use customizable options that adapt and evolve throughout the process, from original intention to finished production.

3.5 Analysis of data

I will be analyzing the data collected from staging this performance project from the perspective of the practitioner (as mentioned above). By doing so, I will focus my analysis on the creative process from intention to production, using the two previously identified categories of scenic performance analysis; implied/embodied thinking and spatial thinking (Iball and McKinney 2011, 119-126). Implied thinking refers to the intangible qualities that are conveyed through the experience of creating a performance. These qualities are discussed as a reflective commentary on the practical work being produced, identifying insights into the shared knowledge or experience of the practitioners involved. While spatial thinking is concerned with examining experience drawn from your own practice and the knowledge of processes used to develop ideas.

Using these two categories as a reference for my analysis I examine the collected documentation, consisting of notes, sketches, models and visual documentation of the development process and the eventual staging of the performance. I will discuss choices faced by performance practitioners, such as the areas of text, venue, technique, equipment and design of scenic content. Thus, gaining an insight into the impact of projection-based digital technology on creative practice, when designing low cost scenic solutions.

In terms of sourcing a text, I will look at narratives based on themes or concerns that are relevant to current issues. The choice of venue is going to be dictated by budget allocation, as outlined above, and is kept to basic requirements. By minimizing venue costs I am able to allow for a greater budget allocation for scenic requirements and, in turn, flexibility of options. Based on the choices made when identifying text and venue, there will be an ongoing design and development period. In order to test, identify and document appropriate equipment, materials and technique. I use the process of generating and reflecting on visual material, such as drawings, sketches/storyboards, models and video images to assist in organizing the performance space during the development process.

The inclusion of video documentation of the finished performance in my analysis chapter provides a clear reference for my discussion as well as a practical demonstration of my research.

Joslin McKinney and Helen Iball (2011), recommends the use of video documentation during the creative development process,

Video recording of rehearsal and performance allows 'strips' of work to be isolated and examined from a visual perspective. (Iball and McKinney 2011, 124)

I refer to the video documentation to reflect on selected scenes from the performance as supporting visual material to relate my project to concepts supported by performance theorists and practitioners discussed previously in this research.

Conclusion

In summary, this discussion has outlined the methods I have proposed for staging my research project and reflecting on how it relates to my research question. Aside from choice of narrative, both budget and time-frame are identified as key factors. They influence the choice of method and materials

used to inform my exploration of the impact on creative practice for independent performance practitioners. The most useful type of set for minimum outlay and maximum atmosphere is identified as the 'basic box' or unit set, as it permits flexibility and adaptability. These are necessary requirements for ongoing testing of software and equipment options during the development process. Testing, developing and staging the performance is driven by a collaborative team of practitioners, chosen in order to provide a broad range of professional input. Documenting and reflecting on the process will be discussed using the identified scenic performance analysis categories of implied thinking (or existing knowledge of practice) and spatial thinking (or process-based reflection) in the next chapter. These two categories of analysis, focus on the impact of increasing access to digital projection software and equipment, from a practitioner's perspective and a reflective, process-based perspective. Analyzing the impact of access from a practice-based perspective relates back to my research topic, where I question the process of integrating projection-based digital technology to create the best scenic solutions for low cost performance productions.

Chapter 4: Process Analysis: discussing the accompanying artwork *Absolute Uncertainty*

Introduction

In the previous chapter I outlined the proposed methods for staging a practical exploration of my research in the form of a theatrical performance. I identified my intention to consider the impact of narrative choice, budget and timeframe on the scope and choice of techniques and materials for realizing scenic solutions. I included identification of the proposed analysis process for examining the outcome of this exploration, from a practitioner's (my) perspective. The aim of using this analysis process is to reflect on the insights gained through shared knowledge of those involved in the practice and the processes used to develop ideas to realize the project.

The following discussion includes the development and documented performance of my exploration and investigates how the outcomes that were achieved relate to my research question. It outlines how those outcomes succeed in demonstrating the benefits of using low cost projection-based digital technology. The aim of this process is to highlight this technology as a resource for expanding creative practice for independent theatre artists.

I first discuss the development and performance of the project in terms of narrative choice (or theme of script), budget range, venue requirements and choice of equipment and technique. I then discuss the relationship of these outcomes to previously discussed theory and practitioners. I will look at how projected visual content was tested and used to create visual scenic design solutions, that best define the performance space.

4.1 Analysis of the processes and the outcomes

I started this research to explore the usefulness of projection-based digital technology when creating visual scenic design solutions for low budget theatrical performance. I looked at how increasing access to projection-based digital technology is providing more flexibility and a greater level of influence for scenic based performance practitioners. Low budget, independent productions gain notable benefit from an increase in access, as it provides greater freedom to explore, experiment and adapt projection-based digital technology to existing professional practice.

Through my professional practice I have noticed a significant increase in affordable access to projection-based digital technology for performance productions. During my theory and literature investigation, I identified this increase in affordable access as an opportunity for practitioners designing low cost scenic-solutions for performance, to access the flexibility afforded by this technology. I outline the potential of this to influence the process of testing ideas to visually communicate themes in a performance space and use less resources. An example of support for this can be seen in the following quote from Iball and McKinney (2011) in their summary which argues that,

interfaces between scenography and new technologies are now increasing the range of tools available for research. (Iball and McKinney 2011, 132)

To begin planning an exploratory performance project, that would demonstrate the benefits of increasing access to a range of tools, I chose to start by looking at options for dramatic narrative, to establish the theme to be communicated. I focused on identifying a work that would be both financially achievable and relevant, to my research and to issues that appeal to a current audience.

Initially I was drawn to the one-man Samuel Beckett play, *Krapp's Last Tape*, as it addresses ideas of memory and self-image, reflected through technology. The expression of these themes had the potential to be well suited to a realization through the use of projection-based digital technology.



Figure 19: Pico projector test for proposed production

Figure 19 above, shows examples of my preliminary testing of ideas for staging a performance of *Krapp's Last Tape*. The scale model shows a pared back set for a small venue. Consisting of a curved, sheer fabric, cyclorama for mapping projected background images. The character representation, printed from a 3D scan, is placed center stage and lit by a clock-based image, to be mapped from an overhead projection. My intention here is to represent time and memory from the character's perspective and how they might choose to remember and re-interpret a record of their past.

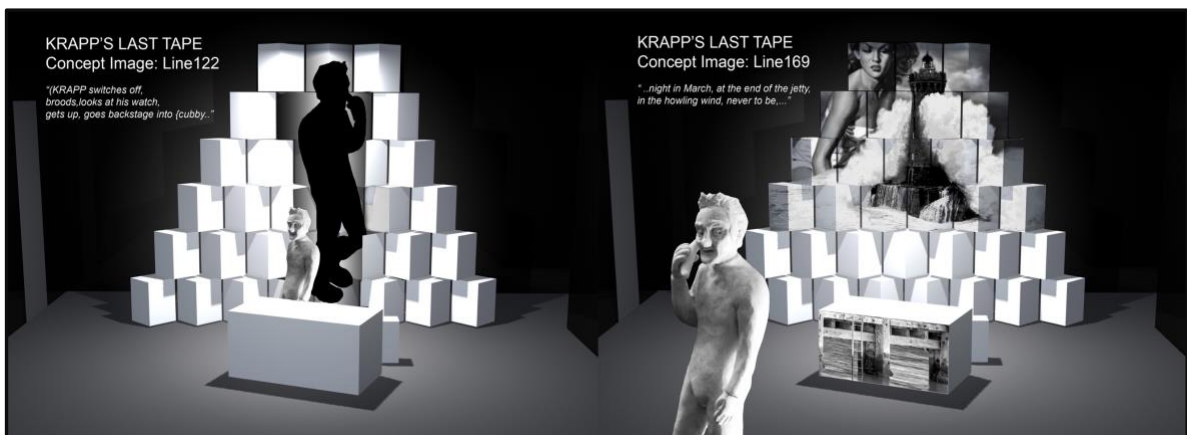


Figure 20: Proposed concept images using Maya 3D software & sculpted character maquette

Figure 20 above, shows an alternative concept for a studio space at Northcote Town Hall in Melbourne's inner north. The rendering of the space and the background items are digitally constructed and collated with a mixture of images, including a maquette of the main character I sculpted in oil-based clay. The version represented above shows a backdrop of lightweight (easy to assemble and deconstruct), white cardboard boxes. Projections mapped to the

boxes enable rapidly changeable options for creating depth, texture and scale illusions, economically creating an effect that could not be achieved without the use of this technology.

Unfortunately, I was unable to gain permission from the Beckett Estate to stage this particular text, so it became necessary to locate an alternative text that would still satisfy the criteria for my practical research project.

My second choice was to adapt a short play by the well-known Spanish playwright Miguel de Cervantes, called *The Puppet Show of Wonders*, which is a seventeenth century retelling of *The Emperor's New Clothes*. As an alternative text it appealed to me professionally because of how it deals with another current social issue, the idea of illusions or misrepresentations in society. The idea of scenically representing perceived illusions appealed to me, as I was able to identify potential ideas within the narrative that would translate into creative opportunities. These opportunities involve the use of projection-based digital technology in solutions for defining the performance space, and reflecting the themes of the text.

Using digital projection to define the performance space demonstrates a core idea of my written research, concerning the use of low cost digital technology to augment the scenic artist's ability to share ideas through performance. I learned a lot about the process of conceptualizing for low budget performance during my investigation of options for a suitable narrative.

Absolute Uncertainty

In response to the above investigation of narrative options, I chose to form a collaborative group with other students and researchers aligned with related disciplines, who were also looking to expand their creative practice. When exploring source options for a dramatic narrative, it was important for me as a professional theatre artist, to continue with a professionally challenging and socially relevant theme such as those dealt with in the retelling of "The Emperor's New Clothes" by Cervantes, identified above. Upon forming our production group, we began developing an original performance script. We focused on developing a professional, financially achievable production, that would allow those involved to actively participate in the creative process and expand their practice. Our group was culturally diverse, and the majority were involved in academic study, this led us to choose a narrative theme that would draw on our collective experiences. We chose a theme of exploring issues of preconceived cultural differences experienced by international students living in Melbourne. Through choosing this theme we were keeping with the theoretical underpinnings being explored in my previous narrative choice: illusions in society, focusing on exploring perceptions of cultural identity.

To augment the delivery, we projected a curated selection of original, edited footage and motion graphics (modified in real-time). The projections were mapped onto freestanding frames that could be reconfigured to suit our scenic requirements. These frames were covered in a semi-transparent fabric that could vary the level of transparency relative to the method of lighting being used. When designing the frames, it was important that they were lightweight and sturdy, for easy transport to rehearsal venues and ease of reconfiguring or relocating within the performance space. The adaptability of using lightweight frames inspired us to explore a narrative style of using a series of related short

vignettes or episodes, transitioning among the intended locations and moments in the timeline. Our decision to explore this style of narrative for our performance helped to preserve the authentic, intimate, nature of the content, sourced from the contributors who recalled their own experiences. Using projections as both scenery and lighting (on occasions) suggested options to control the transparency of the frames and investigate a visual layering effect when presenting each vignette. Being able to quickly reconfigure the performance space and change depth cues in this way expanded our options during the process of devising the narrative.

The design concept for *Absolute Uncertainty* reflects our chosen theme of sharing personal experiences in a dramatic narrative, sourced from experiences of international students living in Melbourne, Australia and studying at university. It was decided to design the look of the performance space, our frames and larger props in a simplistic, international style that had minimal cultural association and could be staged in any similar gallery space around the world. By keeping the design of the performance space simplified, we were able to convey a neutral starting point for the audience and access the flexibility to quickly change focus from scene to scene through movement of frames and projections. This was assisted by mapping or overlaying the projections into the performance space as visual cues for the cultural associations being presented during a scene. The overlaying and layering of projected visual cues related well to the illusionary nature of the theoretical underpinning of identity and illusions in society.

As a relevant industry-based example, I was able to reflect on and examine it in relation to my theory and literature discussions.

As a group, we met regularly over a period of 7-8 months in 2017, testing ideas, documenting and developing the process as we went. I drafted a budget for our production, based around a combination of industry information and my professional experience, see Table 3 below. Using a mix of development and documentation helped to confirm that we had an achievable financial framework that would locate the work within the current landscape of low budget performance. I secured a small grant from the Melbourne University Arts Faculty (\$1,500 AU) to assist with basic costs and was able to source the rest of our needs through access to University facilities and personal investment.

Table 3: Total Production Budget - Absolute Uncertainty

EXPENSES				
	Items	Allocated Amount	Supplied	Actual Amount
Venue	Rehearsal/Performance Space	\$5,000.00	VCA Student Gallery	
(HIRE)	Seating	\$200.00	VCA Student Gallery	
	Technician (video/documentation)	\$400.00	Faculty Small Grant Scheme	\$200.00
	Musician(s)	\$100.00	In kind (volunteer)	
	Security Guard	\$120.00	VCA Student Gallery	
	First Aid Kit	\$60.00	VCA Student Gallery	
	Venue Total	\$5,870.00	Venue Total	\$200.00
AV Equipment	Projectors (short throw)	\$1,200.00	In kind (borrowed)	
(HIRE)	Extension cables & power boards	\$150.00	In kind (borrowed)	
	Projector mount bracket	\$60.00	In kind (self funded)	\$5.00
	AV cables (and adapters)	\$60.00	In kind (self funded)	\$2.76
	Mixing console	\$250.00	in kind (VCA Stock Tech Shop)	
	Speakers	\$250.00	in kind (VCA Stock Tech Shop)	
	Microphones	\$350.00	In kind (borrowed)	
	Audio cables	\$60.00	in kind (VCA Stock Tech Shop)	
	Lighting (Spotlights, Gels, etc)	\$400.00	Faculty Small Grant Scheme	\$400.00
	Kinect (360) X2	\$120.00	Not used	
	Video camera	\$400.00	Not used	
	AV Equipment Total	\$3,000.00	AV Equipment total	\$507.76
AV Software	Technician (video/projection)	\$1,000.00	Faculty Small Grant Scheme	\$510.00
	AV Software Total	\$1,000.00	AV Software total	\$510.00
Scenic Elements	Projection fabric	\$100.00	Faculty Small Grant Scheme	\$90.00
	Tool hire	\$50.00	In kind (borrowed)	
	Screen fixtures & fittings	\$400.00	Faculty Small Grant Scheme	\$300.00
	Audience workshop	\$200.00	N/A	
	Scenic Total	\$750.00	Scenic total	\$390.00
Costume	Performer 1	\$100.00	Long sleeve top	\$5.40
	Performer 2	\$100.00	In kind (borrowed)	
	Props	\$400.00	Various	\$366.85
	Costume Total	\$600.00	Costume Total	\$372.25
Public Relations	Posters	\$60.00	Printing/copying	\$9.95
	Advertising	\$250.00	Social media & newsletters, etc	
	Ticket Fee	\$75.00	Melbourne Fringe Festival	\$90.00
	Royalties (performance)	\$100.00	N/A	
	Cashbox and Receipt Book	\$60.00	Officeworks	\$4.61
	PR Total	\$505.00		\$324.56
Insurance	Public liability	\$279.00	Duck for cover	\$279.00
	Contents			
	Insurance Total	\$279.00		\$ -
	TOTAL	\$11,404.00	FSGS Total	\$2,304.57

Venue

Choosing a venue for our performance was challenging. Development of the script was an ongoing collaboration in parallel with other elements of the production. We juggled the resulting needs of adaptability and extended venue access, while relying on limited finances. I investigated several established low budget venue options available in the Melbourne area, to get an indication of the average cost. These included La Mama and La Mama Courthouse in Carlton, Dance House also in Carlton, Red Stitch Theatre in St. Kilda and Theatre Works also in St. Kilda. The average budget for staging productions for these venues satisfied my criteria for staging a low budget production (less than \$20,000 AU overall). However, to be able to realize this project, we needed to find a performance space that was free to hire. As the nature of this exploration meant that the majority of our budget needed to go into scenery and experimenting with equipment that could adapt to the emerging requirements of the script. Our requirement for a cost free venue narrowed our options

significantly. Resulting in the selection of the student-based venue, *Artspace (Gallery 1)*, at the VCA/Southbank campus as our chosen venue, see Figure 21, Figure 22 and Figure 23 below. Firstly, as current students, we could hire this space for free, and secondly, there were often times we were able to have exclusive access throughout the development period to regularly test ideas. Extra access to the venue was invaluable, resulting from using a student-based gallery that offered ongoing, intermittent periods of vacancy. In terms of facilities and equipment, although set-up as a gallery/exhibition space, we decided that the flexibility to test and alter how we interact with the space during script development, would counter the challenge of having to adapt it to stage a dramatic performance. The development technique or process that best suited our group was progressive or ongoing, and collaborative, in the form of workshops and rehearsals. Our chosen process directly influenced the creative decisions associated with narrative choice, performance direction and scenic design. Our development requirement of ongoing access to the performance venue or a similar space meant that any equipment and physical scenic elements had to be light and portable to allow for the transient nature of our rehearsal set-up. Fortunately, we also had access to a selection of similar, alternative rehearsal spaces when required, also owned by the university and also free of hire charges, see Table 4 below.

Table 4: Performance Rehearsal Spaces - Absolute Uncertainty

	VCA Artspace (Gallery)	Melbourne University (Parkville campus)	ACMI-X meeting room (Southbank)
February:			
18/2/17	Pre-production planning & music test		
March:			
3/3/17	Lighting & acoustic test		
10/3/17	Group briefing & brainstorming		
18/3/17		Production meeting	
24/3/17		Script & tech development	
31/3/17	Script & tech development		
April:			
7/4/17	Script & tech development		
29/4/17		Script & tech development	
May:			
6/5/17			Script development
13/5/17		Tech development & publicity photos	
20/5/17		Script & tech development	
27/5/17		Script & tech development	
June:			
3/6/17	Script & tech development		
8/6/07	Script development		
July:			
7/7/17	Tech development		
15/7/17	Script & tech development		
22/7/17			Script development
29/7/17		Script & tech development	

	VCA Artspace (Gallery)	Melbourne University (Parkville Campus)	ACMI-X meeting room (Southbank)
August:			
5/8/17	Rehearsal & Tech Testing		
12/8/17	Rehearsal & Tech Testing		
17/8/17		Script development	
26/8/17	Video Artist Meeting		
27/8/17	Rehearsal & Tech Testing		
31/8/17		Rehearsal & Tech Testing	
September:			
2/9/17	Rehearsal & Tech Testing		
9/9/17	Rehearsal & Tech Testing		
16/9/17	Rehearsal & Tech Testing		
24/9/17	Installation of set and equipment		
25/9/17	Video documentation of final rehearsal		
26/9/17	First performance		
27/9/17	Second performance		
28/9/17	Final performance		
30/9/17	De-installation of set and equipment		



Figure 21: VCA Artspace - gallery 1, view 1



Figure 22: VCA Artspace gallery 1, view 2

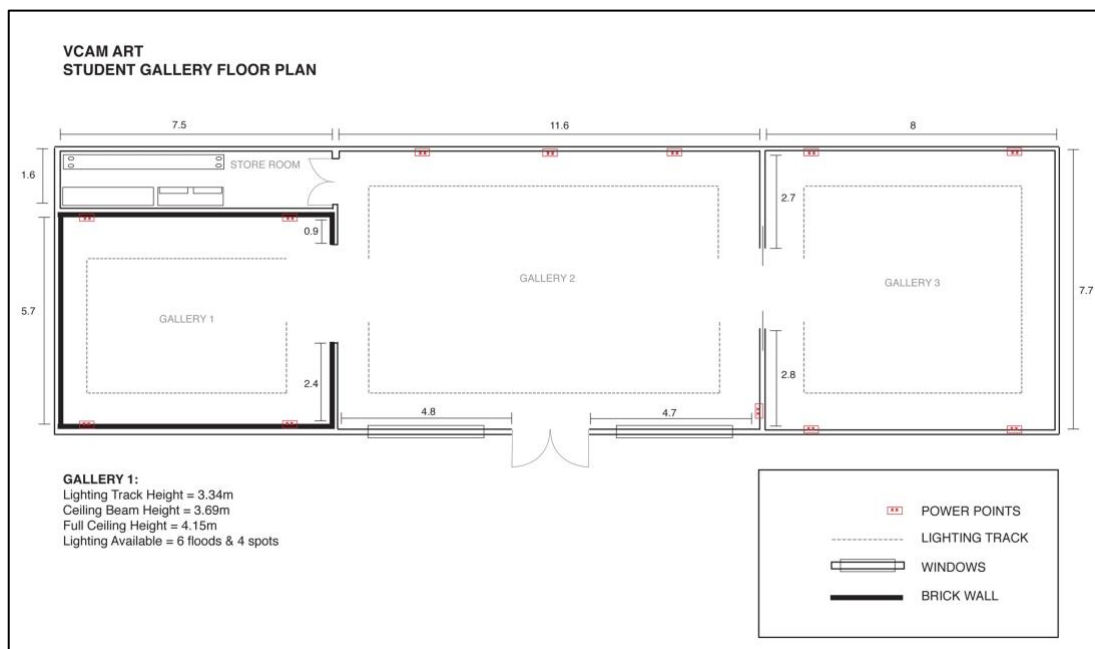


Figure 23: VCA Artspace Floorplan

Technique & Equipment

The choice of technique and equipment to realise the visual scenic content was influenced by a mix of three factors; script development, budget and time. Developing the script simultaneously with the rest of the production, as mentioned earlier, required flexibility of venue access. In order to test potential techniques in the intended space, or somewhere similar, to assist us in deciding how to define the performance space and how best to convey the narrative as it developed. As well as influencing our scope of choice for available venues, the

overall budget also influenced our access to software and equipment. It is the broadening of the scope of access to software and equipment available for low budget performance that provided the basis of my motivation to embark on this research project. The last factor of time, involved an awareness that each member of the production team would only be able to commit to the project on a part-time basis. As an influencing factor, the limited availability of the group meant we would require careful forward planning to work within budget to realize our goal. A goal of best utilizing low cost, projection-based digital technology as scenic content, to translate the verbal and physical actions of the performers and define the performance space.

To achieve this goal, when choosing scenic content, our focus was on conveying the narrative to the audience in a way that couldn't have been achieved using previous, non-digital, low cost methods alone. The result would demonstrate the usefulness of increasing access to projection-based digital technology for low budget scenic solutions.

I started with a mix of visual, sound and lighting elements blended with a selection of scenic structural materials to define the performance space. I began testing based on my discussions in previous chapters, e.g. selecting and testing software and equipment, selecting fabrics for projection surfaces, assembling adaptable, cost-effective structures and testing lighting and sound options. In order to identify the most appropriate scenic solutions for the production. The images below illustrate the three main structural ideas for supporting projection surfaces that I investigated during the development process.

Figure 24 below, shows a concept constructed from 20mm diameter PVC plumbing pipe that was easily dismantled and adapted for different width, freestanding panels.

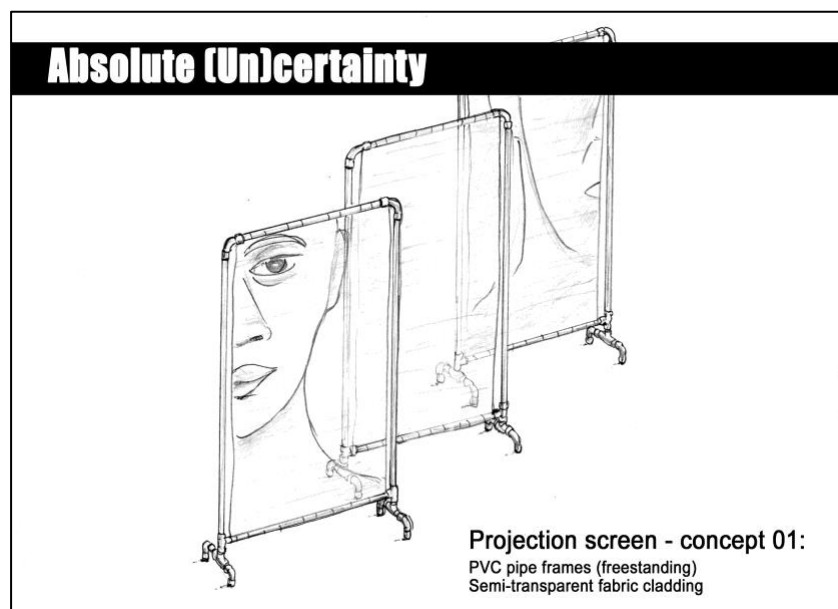


Figure 24: Concept 01, Freestanding PVC pipe frames

Figure 25 below, shows a concept based on hinged, rectangular frames constructed from more rigid materials such as timber or metal. Drawing inspiration from traditional, decorative, Japanese screens (*known as Byōbu*).

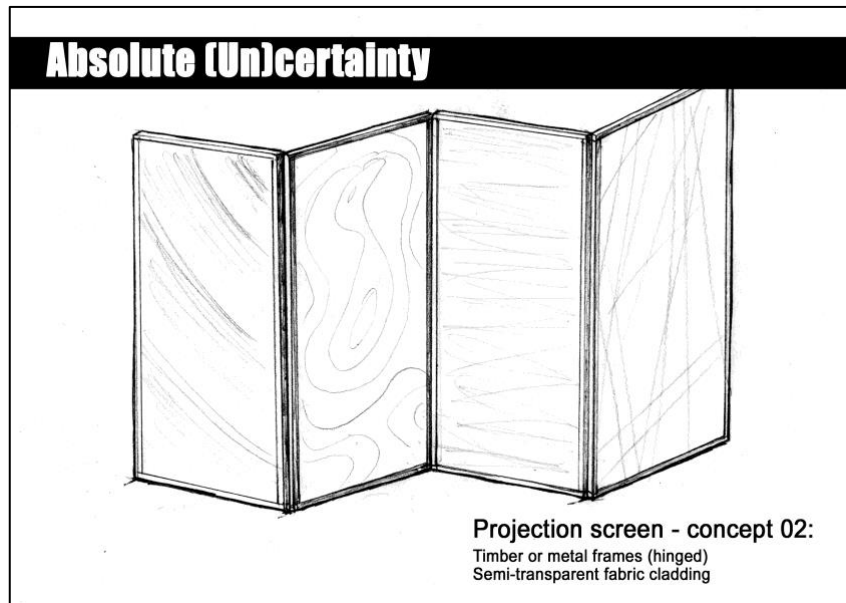


Figure 25: Concept 02, Hinged timber/metal frames

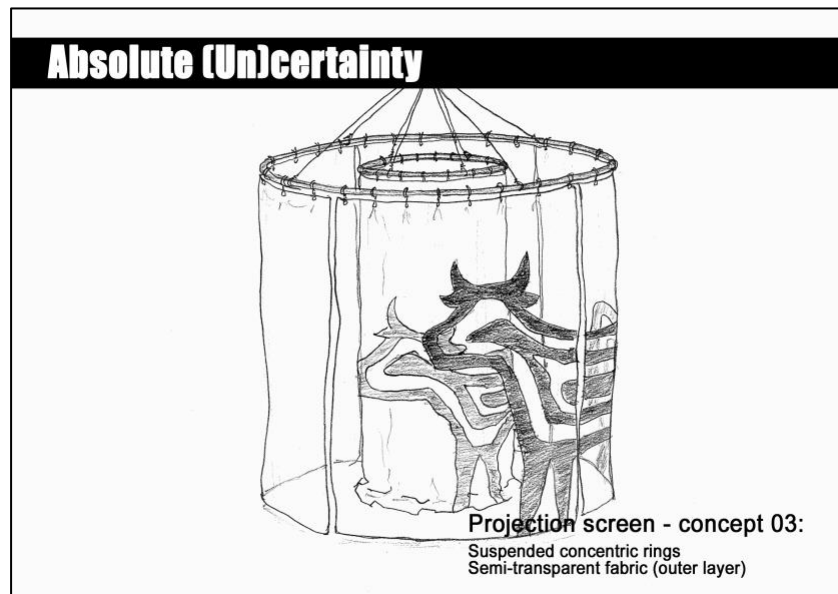


Figure 26: Concept 03, concentric rings of fabric with increasing opacity

Figure 26 above, shows a less conventional concept based around hanging the projection surfaces in concentric rings, using opaque fabric in the centre of the installation. The concentric concept would enable an 'in the round', layered option, using a traditional light source to explore shadow-based images in the central ring, as seen on the left hand side of Figure 27 below.

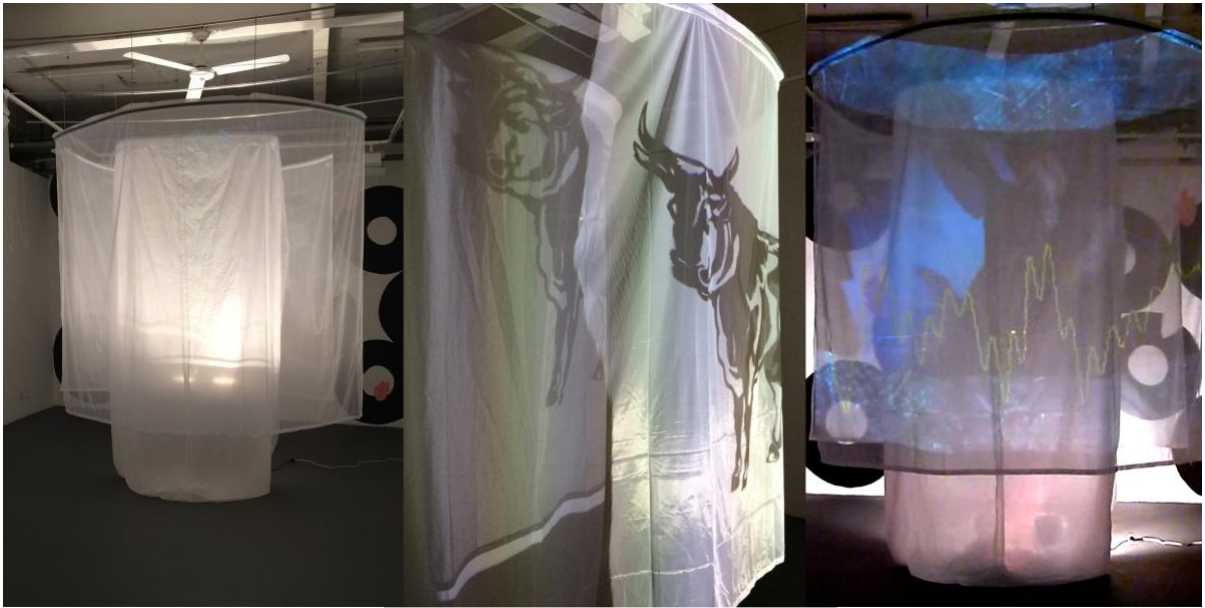


Figure 27: Test installations of ring concept

Figure 26 above, shows a test installation of *projection screen - concept 03*, using a low cost, white, sheer curtain fabric for the outer ring and a plastic lined, disposable paper drop sheet for the inner ring. Although the image reproduction of the sheer white fabric used in the outer ring was good, there were unwanted reflection and transparency issues from some angles. Ultimately the ring concept did not suit our vision for the narrative and lacked sufficient adaptability for consideration in future productions.



Figure 28: Test installation of frame concepts

Figure 28 above, shows the testing of a low cost, mid-grey, sheer fabric (*Swiss Voile*). It shows *projection screen - concept 01* on the left and 2 modified variations of *projection screen - concept 02* centre and right. The matt finish of the mid-grey fabric proved to be much less problematic with reflections and transparency, while still providing good image reproduction. Although the frame structure of *projection screen - concept 01*, (*PVC pipes*) was easily dismantled

and more adaptable than the circular option of *concept 03*, it lacked rigidity and speed of set-up. The modified, freestanding version of *concept 02*, as pictured in Figure 28 below, proved to be the best option for this project and had the most potential for application in future productions.

As the script development progressed and we moved further along the timeline of our production schedule we were able to establish a clearer idea of what the finished production would require. Things we established were; what level of interactivity the software would need to provide, what actions the performers would carry out and how they would move around the performance space.



Figure 29: Testing video footage & motion graphics with movements of the performers

Figure 29 above, shows a sequential selection of rehearsal images representing themes of travel and emotional upheaval drawn from our narrative of exploring cultural differences. The focus of the performances shown in these images is on what it is like for people from a range of different backgrounds to leave home and settle somewhere new, whether that be in another country or even interstate. From left to right the 2017 dates of these rehearsals are 13th May, 27th May & 27th August. These images illustrate how we tested and adapted the configuration of projection surfaces and the type of projected visual content being tested, as the script developed. The first two images of Figure 29 show us testing the video mapping software VPT7 to manipulate test footage of water as a metaphor for emotions.

The left-hand image in Figure 29 shows projected footage recorded on my iPhone during a ferry crossing in Tasmania (four months prior to this rehearsal). This setup contrasts a confined, boxed-in, arrangement with images of the open ocean from the ferry footage (see video link below).

- link to rehearsal video (May13thRehearsal.mov)
[https://www.dropbox.com/s/5xr3lmv1ny9z41p/May13thRehearsal.mo
v?dl=0](https://www.dropbox.com/s/5xr3lmv1ny9z41p/May13thRehearsal.mov?dl=0)

The centre image of Figure 29 shows more heavily manipulated (water-based) footage, generated by team member Christiana Garvie, using the 3D modelling software Cinema 4D, this arrangement was aimed at exploring a more subdued

and contemplative setting for appropriate sections of the narrative (see video link below).

- link to rehearsal video (*May27thRehearsal.mov*)
<https://www.dropbox.com/s/xlykg4x0knvoyr7/May27thRehearsal.mov?dl=0>

The right-hand image of Figure 29 shows another preliminary test, checking the suitability of using the visual programming software Max. This time to generate sound responsive visuals. In the case of this image we were introducing the concept of moving lines via a gif file to represent the use of Max. Software whose output would become more chaotic in direct response to an increase in sound (see video link below).

- link to rehearsal video (*August27thRehearsal.mov*)
<https://www.dropbox.com/s/415nb2hhtu1wjtK/Aug27thRehearsal.mov?dl=0>

In terms of testing a soundscape we used a mix of live music and digital sound files. Figure 30 below, (*click link below to activate*) is a test recording of a live musician (*Jeremy Yau*), playing a Japanese flute (*Shakuhachi*). This was recorded in the VCA performance space, before installing curtains to reduce unwanted echoing. Ultimately we decided to let the musician choose when to use the flute to respond to and augment the digital soundscape in real time throughout the performance.

https://www.dropbox.com/s/iwi9hatdbnbdpm3/Japanese_Flute.m4a?dl=0

Figure 30: Sound sample 01 - Japanese Flute/ Jeremy Yau

Figure 31 below, (*click link below to activate*) is an audio sample from the digital soundscape created by our sound designer Connor Ross and was used throughout the performance.

<https://www.dropbox.com/s/8sa8tsn9lyg1iu7/AmbientSoundscape.m4a?dl=0>

Figure 31: Sound sample 02 - Ambient Soundscape/ Connor ross

Absolute (Un)certainty: Scenic Breakdown



Scene 1.0: Anna visits China/Monologue.
Translations fade in/out
No soundscape



Scene 2.0: Nores packs for Australia/ Monologue.
Moving Lines visuals/ sound responsive
Slow low-key underscore



Scene 3.0: Nores arrives in Melbourne/ Melbourne Airport.
Scrambled letters, revealing "Welcome to Melbourne"
No soundscape



Scene 4.0: Arriving in Melbourne.
Moving lights visuals/ sound responsive
Diagetic sounds per line (tbc)

Figure 32: Storyboard/Scenic breakdown Scenes 1 - 4

We then incorporated a film-based design method of creating a storyboard for each scene or theatrical moment (*22 in total*), as seen in the sample page in Figure 32 above. Using a storyboard assisted in identifying the needs of the narrative and planning the detailed requirements for staging it. Such as, deciding what blend of physical and digital scenery needed to be present, to support the performers and describe the space that their characters would inhabit. To assist this process, I constructed both a physical scale model and a digital/3D model of the performance space and basic items of scenery that would be used during the performance, see Figure 33, Figure 34, Figure 35 and Figure 36 below.

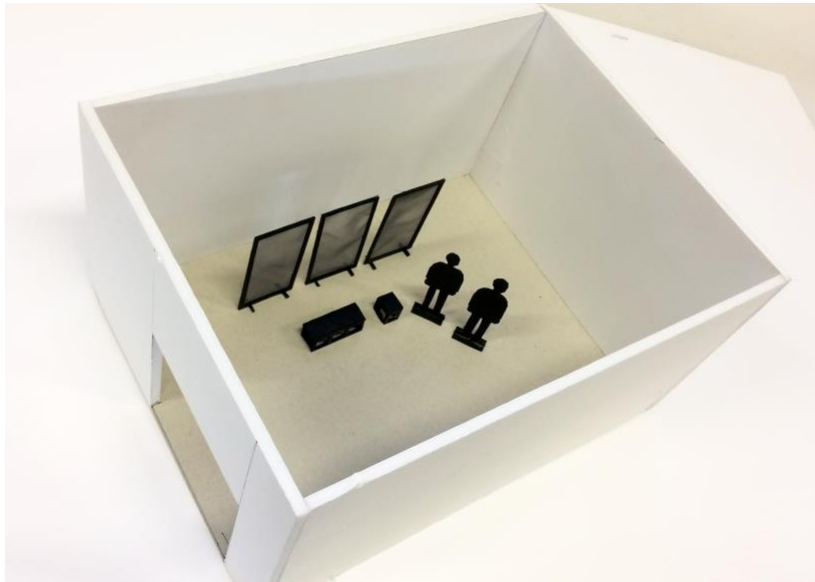


Figure 33: Venue - Scale card model



Figure 34: Venue - Digital scale model

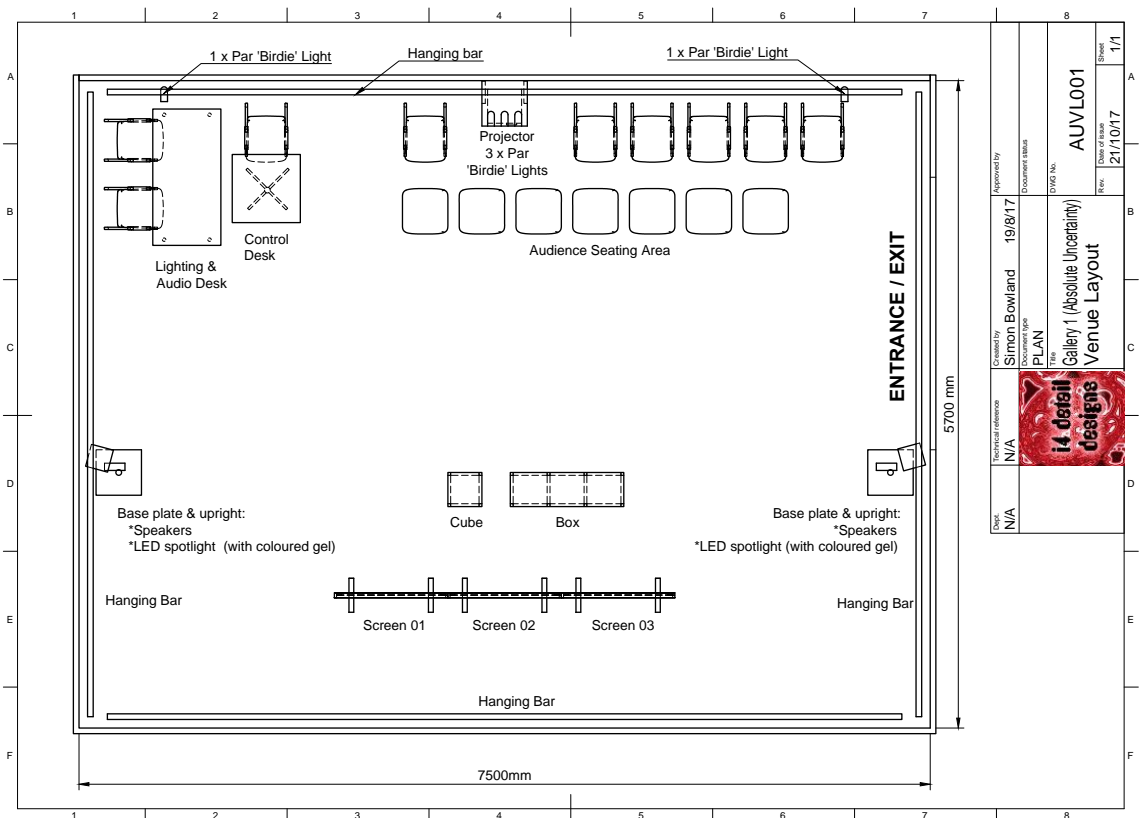


Figure 35: 2D Plan view of venue layout

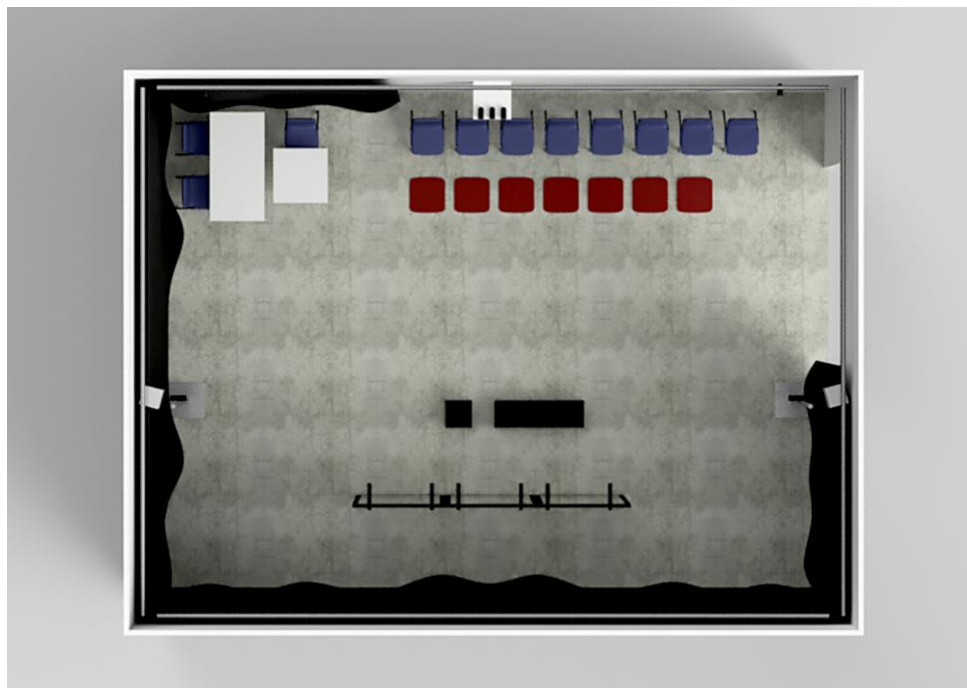


Figure 36: 3D/Rendered plan view of venue layout

The digitally generated version of the performance space and major scenic elements were constructed using a low cost (*free for students and educators*), online subscription based, 3D design/drafting software called Autodesk Fusion

360 (Autodesk 2017). It was created as a singular software tool to design, test and fabricate products. As well as providing an affordable digital drafting option for laying out the performance space, this software also included a very useful prototyping option, that allowed easy production of 3D printed models of proposed individual scenic elements, if required.

The process of generating visual content for use during the performance involved experimenting with a selection of software for image processing, manipulation and sequencing. The majority of the pre-recorded and rehearsal video was captured using either a Canon digital SLR camera or an iPhone 5S camera. Basic editing was done using either Apple Quick Time (Apple 2017), VLC (VideoLAN 2017) a free cross-platform software or Adobe After Effects (Adobe 2017).

For image processing and manipulation, including real-time mapping, we experimented with several programs at the low budget end of the range. These included Processing, VPT, Max, Syphon and QLab.

Processing is a code based, visual art software that provides access to free, online tutorials. Although free to access, practitioners who are not experienced with coding environments should allocate time to become familiar with this software. Through my contact with Melbourne Media Lab (a locally based art and digital technology collective) I was able to access introductory information on how to capture and manipulate images from a low cost, gaming-based, depth camera, commercially known as *Kinect-360*. The intention of using a depth camera was to explore the option of using projection mapping to select or exclude the performer from the projected scenery, adapting to changes in their location and position in real time. Figure 37 below and Figure 38 below, show set-up and initial testing of this option with various sheer fabrics (such as mesh lining, organza & voile). There was a considerable delay in real time responses to movement when using a 2017 Mac book Pro laptop (suitable for gaming and visual design) and some alignment issues between the positioning of the projector and the depth camera. The identification of issues, along with time constraints and the lack of suitability of this effect for our narrative, led to our decision not to include the use of this effect (and software) in this production.

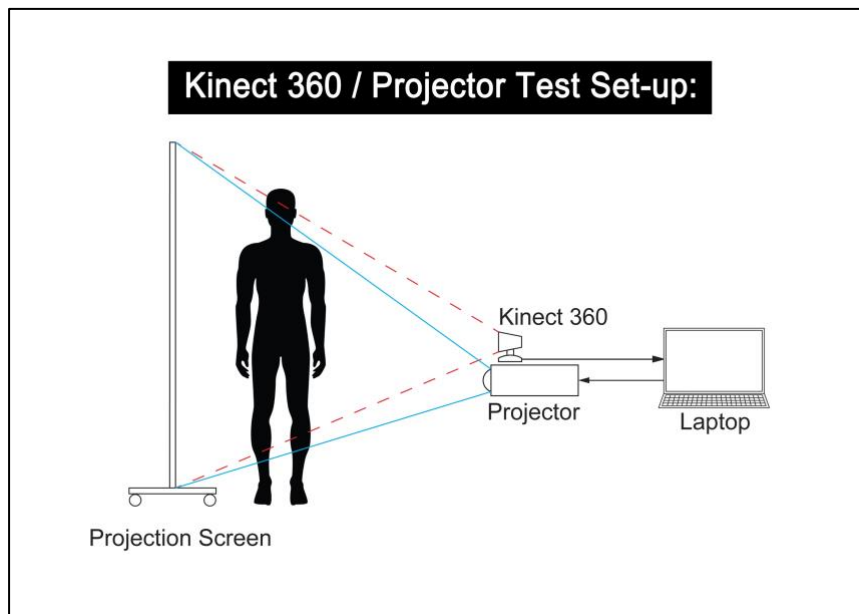


Figure 37: Kinect 360 /Projector Test Set-up for real time mapping



Figure 38: Real-time mapping test images, using Kinect 360 & processing

VPT is suitable for entry level, real time projection mapping and has a user-friendly interface. It is also free to download and has free online support. As a software option it is used to bring together samples of visual source material, blending video with visual programming effects from external software (i.e. Processing and Max). It is best suited to installations that use a blend of pre-recorded graphic effects with live footage, as I experienced significant technical issues when trying to stream real-time graphic effects (using Syphon, see below) from software such as Processing and Max.

Max is a low cost visual-programming software for manipulating multi-media images. It proved to have the best balance for our needs, between adaptability and having an intuitive user interface (more so than Processing). It is mainly used to create self-contained multi-media programs, called *patches*. These can generate or augment footage, for both audio or visual content, and

apply real-time or pre-set effects filters. The ability of this software to mix and match commands (or internal content) between *patches* and embed them within other *patches*, in a visually based interface, gave us greater user accessibility in a shorter time frame.

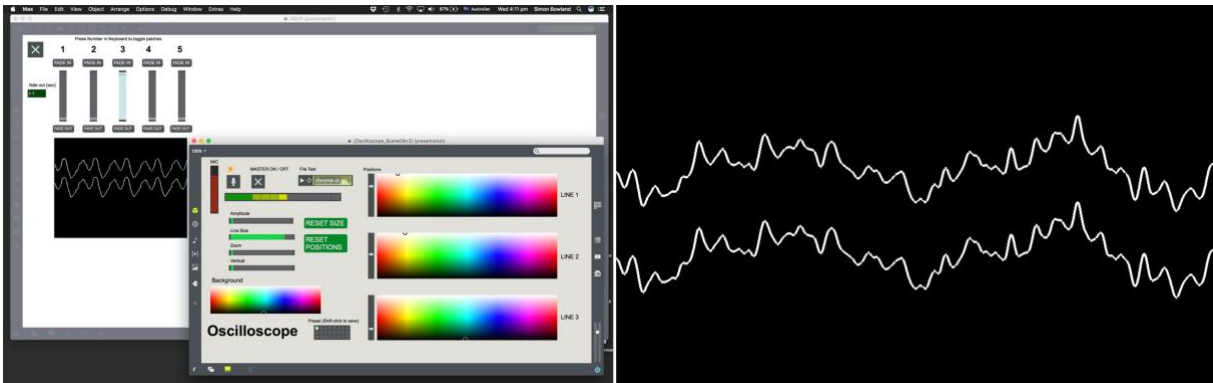


Figure 39: Max 7 - Absolute Uncertainty, Patch 3/Oscilloscope with output sample image (right)

Syphon is a Mac-based application for streaming visual content between software. We used this to send content from visual programming software (Processing and Max) to projection mapping software (VPT) and audio-visual sequencing software (QLab 2017). We had our best results exporting from Max to QLab.

QLab, see Figure 40 below, was chosen for our multi-media, cue-based, image sequencing software. It is available in a low cost, 'rent to buy' option, which meant we only paid for when it was needed (throughout the production). It was also able to cover our projection mapping needs, by choosing basic, geometric shaped projection surfaces. Consolidating our needs reduced the number of different programs that had to be coordinated throughout the performance, which reduced the number of sources for potential problems.

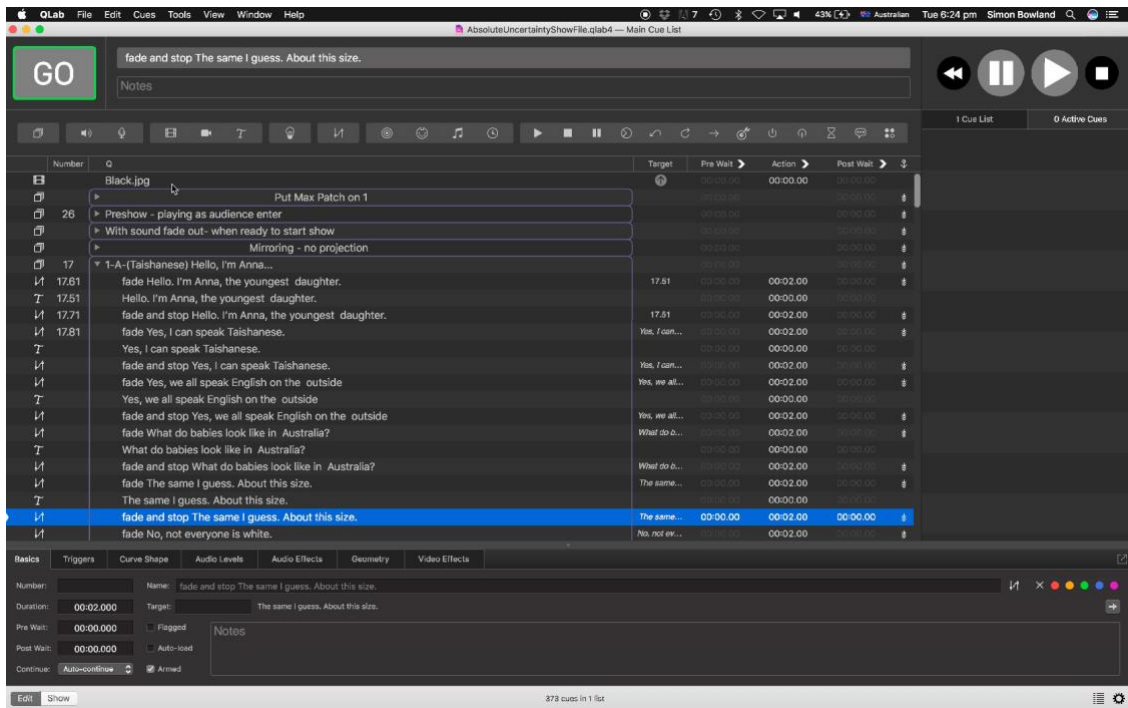


Figure 40: QLab, screenshot of performance cue list for Absolute Uncertainty

4.2 Relationship to key theorists and performance practitioners

To discuss the relevance to industry, of the methods and ideas used to stage this creative project, I have chosen to focus on four key areas;

- Testing and exploring
- Multi-media/interactivity/collaboration
- Projected illusions
- Interpreting scenery

Testing/Exploring

After the developmental testing and exploration period described in the previous section, we applied our chosen methods and ideas for staging the finished production of our original narrative, Titled *Absolute Uncertainty*. It was presented as part of the 2017 Melbourne Fringe Festival on September 26th, 27th and 28th, see Figure 41 below for promotional image.

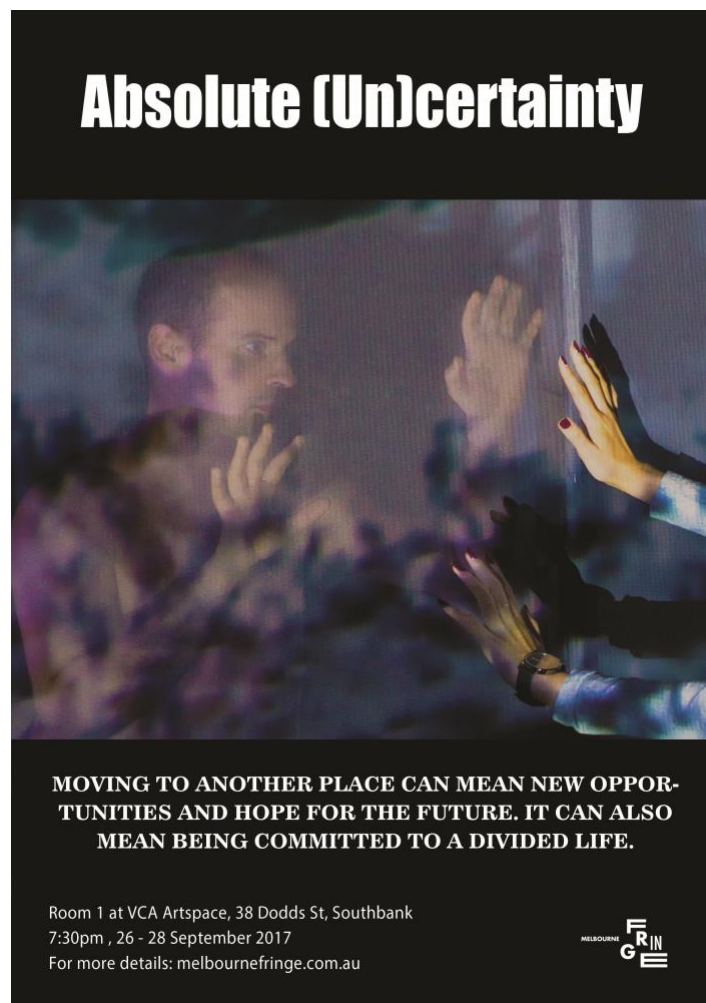


Figure 41: Promotional poster for 2017 Melbourne Fringe Festival - image by Jodie Hutchinson

Reflecting on my experience, insight into the benefit of going through this process can be gained through reference to an Arts Hub article by Melbourne-based arts writer Richard Watts (2015). He quotes Dino Dimitriadis of Sydney Fringe Festival, on providing advice for emerging, independent artists presenting a (low budget) performance.

some of the more successful groups distill their productions down to the essence of the work and really showcase what the performance is about. (Watts 2015)

I found this sentiment was reinforced during our testing and development process. We focused on the dramatic theme of providing a forum for discussing ideas of home and cultural identity. Using the perspective of the international, tertiary student experience in Australia to deliver this theme in a contemporary context. Our focus on the process improved the design outcome, resulting in a simplified, integrated, presentation of projected images that showcased what the performance was about. The process outcome relates back to my research topic of demonstrating the economic and design-based advantages of using projection-based digital technology in low budget performance, to best realize the theme of the narrative.

When using projection as scenery, portability and adaptability are important factors in defining the cost effectiveness and design benefits of this approach. They are considered valuable and familiar attributes for independent scenic

design practitioners, particularly when developing a low-budget performance project. The importance of these ideas is supported by South Australian based, independent Art Director Emma Webb (2014) in a previously published article on the Arts Hub website, regarding public funding for performance ,

Independent artists are very adept at working with big ideas and little resources. (Webb 2014)

In other words, when utilizing resources to create and produce low-budget, independent performance, that have an impact on the audience, independent artists are experienced at doing more with less. Which is why projection-based digital technology, such as image manipulation software and digital projection are having such a large impact. As a result of portability, lower set-up costs and increased access to affordable options, we are experiencing an increasing freedom to test and explore. These factors are fostering an opportunity to share methods through collaboration and networking, producing a range of adaptable application options for independent theatre artists. The impact of lower set-up costs was also a key aspect highlighted by author Christopher Baugh (2005), discussed earlier, see Relevance of my research to practitioners. Some examples from our final dress rehearsal performance (from the video file *Absolute Uncertainty 480p.m4v*, located on the accompanying USB) that demonstrate an application of adaptable options include;

Scene 6A, *Nores explores Chinatown*: (frame count) **07.32 - 08.00** where layered, angled screens and a projected 'moving wallpaper' style montage of location footage was used to present a mediated diorama of city alleys being explored by an international student character.



Figure 42: Scene 6A, Nores explores Chinatown - Image by Rick Evertz

Scene 9, *Asian name*: (frame count) **15.43 - 16.28** used a different screen arrangement and mapped, sound responsive visuals, mixed with animated, text-based graphics to augment or enhance the experience. This configuration of scenic elements created a confronting, disconnected mood that aligned with the dialogue being delivered.



Figure 43: Scene 9, Asian name - Image by Rick Evertz

Scene 14, *Anna goes to China*: (frame count) **24.10 - 24.42** used a wall configuration of the screens with mapped projections of a pre-recorded, overhead view of the character in a similar pose, delivering dialogue. The footage progressed through a constantly changing, random tile pattern, generated in real-time in Max and streamed into QLab using Syphon.



Figure 44: Scene 14, Anna goes to China - Image by Rick Evertz

Scene 18, *Nores on bus*: (frame count) **31.22 - 32.31**, the screens were used to divide the performance space and the audience view, creating more layering

and partial obscuring, consistent with the focus for our narrative theme. Here we can see a progression from ambient video footage to sound responsive lines generated in Max, being used to define space where characters are divided by ideology. Finally, all projected light is removed, except a soft-edged, animated, spotlight image that isolates the remaining character.



Figure 45: Scene 18, Nores on bus - Image by Rick Evertz

Multi-media, interactivity and collaboration

The process of customizing how the performers interacted with the performance space to suit the production was significantly enhanced by our use of accessible software and hardware options. We were able to adapt the configuration of our lightweight, modular, freestanding projection surfaces to suit a mix of work. The sound and digital projections were controlled and coordinated through QLab, a low cost, sequencing software. QLab allowed us to directly manipulate video footage (pre-recorded on smart phones), create simple animated lighting effects and import real-time generated visuals from the visual programming application Max, using a free software streaming application called Syphon. Through using a mix of projection-based digital technology and group collaboration we were able to effectively modify and customize our options to suit the needs of the production. The importance of adaptable options is outlined by Mike Lawler in the journal, *American Theatre* (Lawler 2014), where he describes a need for collaborative, customizable and economical options.

Some examples of this from our final dress rehearsal performance (from the video file *Absolute Uncertainty 480p.m4v*, located on the accompanying USB) are:

Scene 2, *Nores leaves Italy*: (frame count) **02.50 - 03.45**, which shows the modification of a basic set-up in Max7 that produces real-time responsive video/motion graphics, outputting to QLab using Syphon. One performer is placed

downstage and a singular panel is placed center stage, framing the second performer as a visual cue to augment the dialogue. The figure of the second performer has turned their back to the viewer while a display of lines is overlaid. The lines become more chaotic in response to the downstage (or first) performer's voice. A visual connection is established between the upstage (or second) performer and scenic elements with the first performer, as the dialogue expresses the downstage character's concern about relocating and throwing their life into upheaval.



Figure 46: Scene 2, Nores leaves Italy - Image by Rick Evertz

Scene 9, *Asian name*: (frame count) **15.43 - 16.28** uses the same software configuration with a different visualization of the spoken dialogue. This scene is about the experience of feeling lost in the system. To convey this, the three screens were arranged in an imposing arrow formation with one screen center stage and two angled screens on either side, slightly upstage. The sound of the performers voices was visualized in real-time using wavy, oscilloscope style lines placed on a background of animated letters. A solution that quickly and efficiently conveyed a sense of disconnection and confusion, also augmented by using partial opacity to blend layers. Contrasting between the lonely, vulnerable character, highlighted downstage and the boxed-in, ghostly, interrogating figure. Visible through the stage left projection screen, see Figure 43 above.

Scene 22, *Mirroring*: (frame count) **39.40 - 40.40** uses traditional shadow work and varying levels of opacity to augment and filter the performance in a different way, using low-cost/high impact LED spotlights with coloured gels. This time a singular screen was used in the round, which offered variations on the viewer's experience depending on their position within the space.



Figure 47: Scene 22, Mirroring - Image by Rick Evertz

Projected illusions

Incorporating projection-based digital technology into scenic elements, to visually augment and extend the performance space can have mixed results. As discussed in Chapter 2: Relevant Literature, easier access to higher quality images offers the potential for flexible, adaptable solutions. While an over reliance can be visually confusing and result in needless spectacle. When creating a performance that incorporates this, author Arnold Aronson in his essay *The Power of Space in a Virtual World* (2008), advises us to be conscious and take advantage of the adaptable, transient nature of the projected digital image. When creating and defining a performance space,

what possesses dimension is the projection surface, not the projection. (Hannah and Harsløf 2008, 26)

There is now a greater flexibility of when, where and what is impacted, as the projected illusion only exists during the time it is perceived or viewed.

The following examples demonstrate a variety of situations exploring flexibility and impact from our final dress rehearsal performance (from the video file *Absolute Uncertainty 480p.m4v*, located on the accompanying USB):

In Scene 1, *Anna visits China - translations*: (frame count) **02.00 - 02.35**, we chose to manually trigger the sequences of projected translations of Chinese dialogue, as it meant that we could vary the rate of projection to match the rate of delivery.



Figure 48: Scene 1, Anna visits China/ translations - Image by Rick Evertz

In Scene 2, *Nores leaves Italy*: (frame count) **02.50 - 03.45**, without needing to change the physical layout of the screens from scene 1, we were able to quickly alter the area of focus for the next scene and character through a very brief fade-out. We used projection-controlled content as a light source, to redefine the space and progress to a faster tempo. The change in scene was done using a mix of expressive dialogue augmented by a simple, sound responsive display of moving graphics, see Figure 46 above.

In Scene 4, *Arriving in Melbourne*: (frame count) **04.20 - 04.45**, we continued with the same screen configuration. The performance space was again able to quickly transition to a wider focus further upstage. By placing the two characters behind a screen at either side, and using the opacity of the projection fabric, they were temporarily blended visually with the mapped video images, to present this scene in the style of an upbeat instructional demonstration. The animated, soft-edged, spotlight effect, mentioned above, was used again over the top of the moving images, to highlight both of their faces, while still appearing to be part of the content being mapped across the performance space.

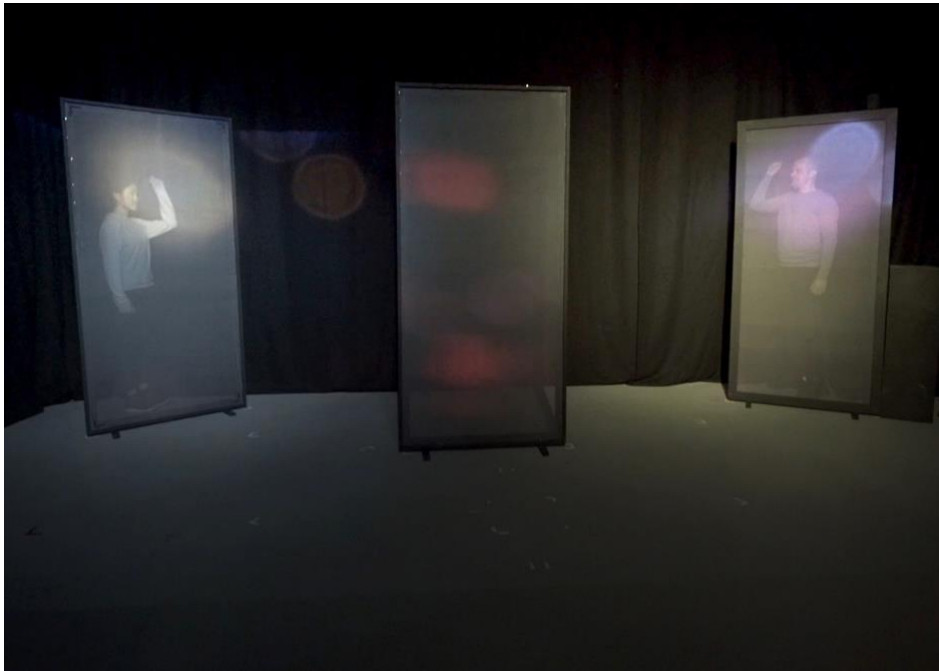


Figure 49: Scene 4, Arriving in Melbourne - Image by Rick Evertz

Scene 6B, *Nores night bus ride*: (frame count) **08.03 - 09.25**, involves a brief reset that occurs half-way through scene 6. It transitions from using angled, parallel projections in a singular, unified set-up, located in the center of the performance space, to two distinct visual areas in an otherwise darkened scene. The dialogue is delivered downstage at the edge of the performance space with the actor singled out by a stationary, projected rectangle of white video static. Further upstage, behind a central screen, the figure of the second performer can be seen through a frame of projected video footage that depicts travelling on a bus at night. The mixed visibility creates a second focal point that is visually separated from where the dialogue is being delivered.



Figure 50: Scene 6B, Nores night bus ride - Image by Rick Evertz

Scene 11, *Anna on the train*: (frame count) **22.22 - 23.14**, transitions from the same screen arrangement as the end of scene 6, quickly becoming an intimate, triptych style set-up. The locally sourced footage wraps across the

screens, condensing the performance boundaries for this scene. While the delivery of dialogue through the semi-transparent projection creates a distancing effect for the upstage character, blurring the boundary between the upstage performer and other scenic elements, and enhancing the isolation of the downstage character delivering the main dialogue.



Figure 51: Scene 11, Anna on the train - Image by Rick Evertz

In exploring these examples of flexibility and adaptability, we can begin to see the potential of using projection to augment performance spaces for low budget theatre. A sentiment reflected concisely in a 2015 Korean research paper on the topic, Lee et al. (2015),

Using projection-based AR, it is easy to implement graphical representation that ordinary lighting techniques cannot express. (Lee et al. 2015, 184)

Another common illusionary scenic element explored in these examples is the technique of extending the perceived boundaries of the performance space. An extension is achieved through the interaction of the projected and the physical elements being used to describe the scene. Aronson (Hannah and Harsløf 2008) discusses the impact of projection on the boundaries of scenic elements in his essay *The Power of Space in a Virtual World*, he argues that the combination of imagery and real object allows the audience to recognize visually extended space.

For example, in Scene 8 *Better English - notes & phrases*: (frame count) **13.45 - 15.43**, the screens are arranged across the performance space and mapped with an opaque display of animated text. By using a unified display to define the floor space and the backdrop across the three separate screens, we created the impression they are part of a single space that spans the performance area. Compared to the set-up in scene 6B shown in Figure 49 above, where we chose to create a layering effect with 2 separate spaces, the upstage area being a visualization that relates to the dialogue being delivered in the downstage area.



Figure 52: Scene 8, Better English/notes & phrases - Image by Rick Evertz

Another idea present in this exploration is “remediation”, (Bolter and Gromala 2003) (Bolter and Grusin 1999), or the use of new media to re-examine or re-interpret pre-established or existing forms of media. As theatre practitioners, this occurs when initially exploring the uses of an emerging technology by relating it to, or experiencing it, through an existing one that we already have knowledge and experience of.

Scene 20, *The fight/glitching*: (frame count) **36.35 - 36.44** involves projection of simple video footage of scaled up dappled sunlight, to represent a domestic setting, filtered through a visual distortion effect generated in Max. As the dialogue becomes more heated and less harmonious, we manually triggered the random horizontal distortion effect (emulating a corrupted video signal). This conveyed an increasing disharmony using a current cultural reference to corruption of digital video signals. For us, this provided an opportunity to experiment with visual programming software in a scenic context, through the now commonplace projected backdrop.



Figure 53: Scene 20, The fight/glitching - Image by Rick Evertz

Interpreting scenery

Contextualizing or framing the performance space using projection-based digital technology and design, sends a signal via the scenic images or visual cues, that describe the narrative. Letting the audience know where the message is coming from. Using a combination of projection, physical scenic elements and accessible digital design software, to augment the scenic artist's ability to share ideas, through describing and defining the live performance space. Theatre author, Arnold Aronson (2008), describes this, when he says,

The viewer will read the meaning differently depending on the decorative framing. (Hannah and Harsløf 2008, 27)

Aronson's idea was demonstrated in Pre-show, *Ferry footage*: (frame count) **00.40 - 00.50**, through the use of video footage (recorded in slow motion on a smart phone) of a ferry crossing south of Hobart in Tasmania. The slow moving, wall of water visually represented the emotional upheaval associated with relocation. By removing this footage from its original context and reframing it as moving wallpaper, mapped across the freestanding projection screens and the performance space, we were suggesting a generalized context to the audience of the idea of crossing distances . We removed the original meaning and asked the audience to draw on their own expectations, based on the mix of scenic elements being presented to them.

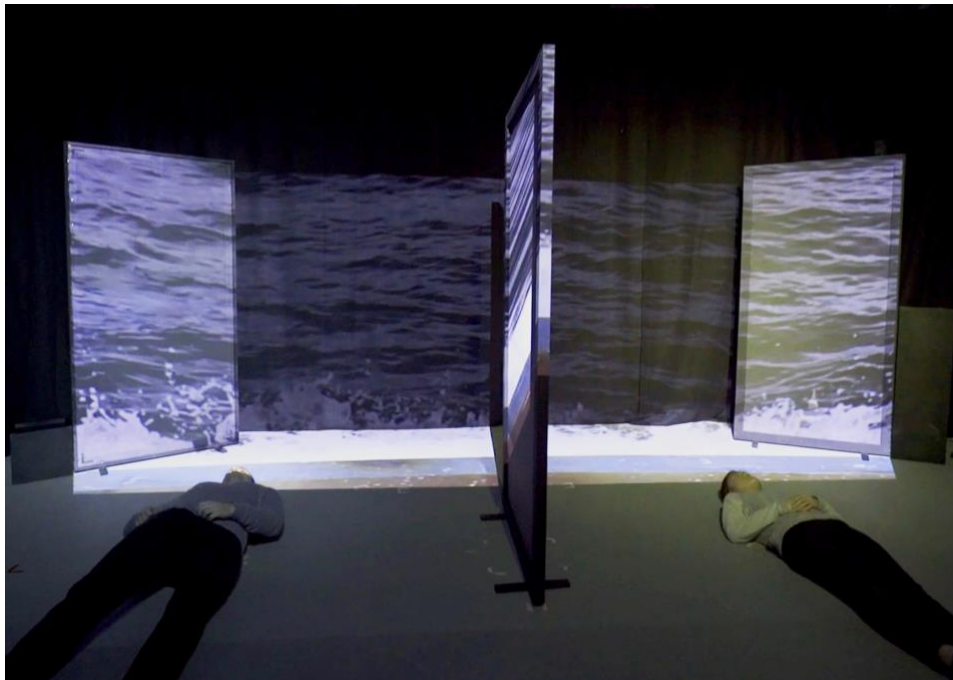


Figure 54: Pre-show, ferry footage - Image by Rick Evertz

Simon McBurney (Barbican Centre, 2007) Argues the importance of balancing the relationship between performers and technology (placing each in relation to the other). Integrating projections with other theatrical elements rather than as a simple backdrop. Getting them off the wall and into the performance space.

Scene 19, *Nores in limbo/confined*: (frame count) **33.15 - 33.55**, is one of several examples from our final dress rehearsal performance that demonstrates

this (from the video file *Absolute Uncertainty 480p.m4v*, located on the accompanying USB). The performer is interacting with the projection of an animated, soft-edged spotlight effect, downstage at the edge of the performance space. Using a technique of layering projection surfaces allows flexibility to experiment with the boundaries of the performance space by altering the relationship between the scenic elements.

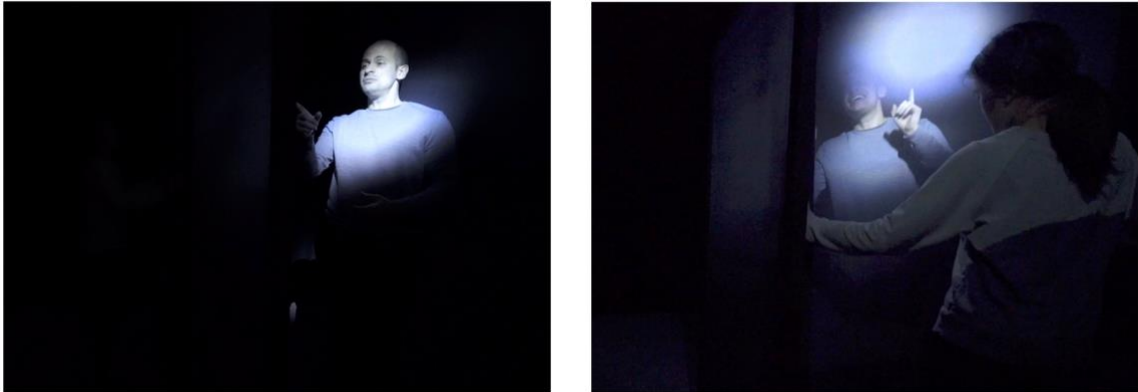


Figure 55: Scene 19, Nores in limbo/confined - Image by Rick Evertsz

It is through the economies of projection now available to scenic design practitioners that this process of contextualizing the performance space has changed. Through the combination of projections, physical scenic elements and accessible digital design software it is quicker and more efficient to achieve this

Scene 10, *The Bachelor*. (frame count) **18.56 - 19.23** is another example that demonstrates this, using screen video capture footage from a text message conversation on a smart phone and a mix of free stock video footage of television-based, screen static. Our combination of elements and software creates an effective, low cost collection of scenic visuals that efficiently augment the performance space to assist in conveying the performer's expressions and dialogue.



Figure 56: Scene 10, Watching the Bachelor - Image by Rick Evertsz

Conclusion

As Arnold Aronson suggests in his essay *The Power of Space in a Virtual World* (Hannah and Harsløf 2008), all art demands attention, wanting to convey a message. In performance the context of that attention is very broad and hard to define. Digital technologies increase this difficulty because they impact across a range of theatrical production aspects and disciplines. Which is why it is important, for practitioners wanting to incorporate it into a performance, to have a broad knowledge of related disciplines. As identified by UK based projection artist, Rod Maclachlan (Digital Theatre Plus 2016). He suggests that a broader awareness of the influence of digital technology and a willingness to share the process can inform your own practice. The range of tools and knowledge available to performance practitioners, and the options for how and where we define that space are expanding. With this expansion of tools and knowledge, practitioners designing scenic solutions for low budget performance are gaining flexibility to create without needing access to a traditional theatre space. The flexibility of venue location brings freedom to allocate more of the budget to explore digital projection based scenic options, creating a more customized context and in turn expanding creative practice.

The analysis of the process of developing and staging this performance demonstrated a valuable insight into what can be achieved. Providing insight into the usefulness of projection-based digital technology in creative practice, for those involved in scenic design for low budget performance. My analysis involves a reflection on the processes used during both the project's development and the performance period. A process that combines digital projection and other visual technologies to demonstrate the quick adaptability and effectiveness to create a performance environment.

Chapter 5: Personal Reflection

Introduction

In the previous chapter I reflected on the development and staging of my research project, “Absolute Uncertainty”. Discussing, from a practitioner’s perspective, how the outcomes that were achieved related to my research discussion.

The aim of this chapter is to outline a personal reflection of my experience of the project from development to post performance. The purpose of outlining this experience is to share current practical insights into the creation of low cost digital projection-based scenic solutions. As part of this discussion I will include the impact on my role as an independent performance practitioner, during this process and for future directions.

To achieve this outcome, I will first discuss my experience of the collaborative process. I will then discuss what worked and what didn’t work as a result of this process. Finally, I will outline what opportunities for further experimentation I think have emerged from this experience.

5.1 My Experience

Australian playwright Alana Valentine (2018) raises a relevant point, in her 2018 Arts Hub online article , that discusses the process of creating an independent performance,

It’s a perverse truth that close work theatre, which looks to all the world like stories about other people, is really you parading your own concerns, perceptions, values and interests up on the stage. (2018)

I related to this observation, when reflecting on my experience of staging a collaboratively developed, independent performance. Particularly during the design and development process, as each member of the team contributed to the script through the influence of their own motivations and inspirations. I consciously tried to ensure that the rest of the team were gaining some experience and expanding their practice in return for donating their time and expertise. Time and expertise that I would otherwise have had to outsource and budget for if I had chosen to pursue a solo project. Conversely, one of the major drawbacks of accessing skills and knowledge through collaboration was that at times, we had to compromise and restrict some of our choices to ensure we created a project that delivered benefit for all members of the group. Budget, time-frame and practicality were influencing factors when making these choices. This led to an identified need for flexibility, or being able to change the plan as the project evolved. One example was the decision not to include the use of depth cameras and motion tracking technology. This decision was the result of several factors, including limited time to identify, learn and test the necessary software and equipment, as well as insufficient funds to outsource to an expert. In the end it was decided that this effect was not necessary to realize the narrative as it was not practical in terms of the available performance space.

During the development process we operated with a less defined role structure. However, at certain key moments, decisions had to be made in order to move the project forward. This meant that there was always going to be a need for an

executive type role to coordinate and regulate the group as a whole and make decisions. At times, due to poor communication and issues within the group dynamic, it was unclear exactly who would facilitate this role which resulted in further delays to the process. In the majority of instances, the role of coordinator/producer defaulted to myself in close consultation with the director (a post-graduate international student). The defaulting of the executive role to myself, and the close, consultative nature of my relationship with the director, was the result of the decision to use this project as a combined, practical realization of our separate research topics. With the intention of creating a whole that was greater than the sum of its parts. There were occasions when our requirements did not coincide, and a compromise had to be reached. The addition of the role of producer to my initial role of overseeing design and art direction was the most significant compromise. Impacting the amount of time I personally had available to experiment and explore digitally based scenic options. The added need for a supervisory role was a significant realization for me, that I had not anticipated and was a deciding factor, when choosing software and equipment. If the user interface was not intuitive enough for me to quickly understand and adapt to meet the needs of the production, it was quickly dismissed.

During the performance week our designated roles became more defined and task focused. Role demarcation was a necessary progression in the collaborative process. It involved the finalization of movement, dialogue, scene changes, cues and the process for physically staging the performance to be translated into an itemized schedule. Creating the schedule formalized the process and made it clearer and easier to delegate specific tasks, which assisted in reducing confusion in the group. As with any low budget production, installing equipment to adapt a non-traditional space for performance, while trying to achieve maximum impact with limited resources, was always going to be a challenge. However, the transient/portable requirements of our rehearsal/development period did lead us to streamline our set-up process and choice of equipment. Streamlining meant that during production week we needed less time to install and set-up and had more time to allocate to technical fine-tuning and troubleshooting. There were no major technical issues that emerged during the three performances. I attributed this to our method of ongoing testing during development and the considered selection of simple, effective, digital visual effects. We chose to avoid the temptation of overcomplicated solutions that are not worthwhile for the outcome they deliver. Particularly, since all team members had both limited time and limited funding to devote to this production. To counter the time constraints, we did choose to use some of our limited funding on hiring an experienced visual programming artist at the end of the development period, to assist and accelerate the resolving of issues. The addition of an experienced third party was worthwhile, as the software setup we used performed smoothly. I saw this as part of an ongoing learning curve, involved in developing and expanding professional practice, especially when combined as part of a research degree. As expected, there was a significant reduction in error as we progressed through the performance period. Again, as with the development stage, my attention was spread across several roles, including coordinator/producer. The increase in demands on my time, highlighted the value that the sharing of techniques and knowledge of each other's roles was providing. As we were easily able to rely on each other to assist with other roles when necessary.

Looking back on the production, the main factors in deciding what was explored were time and budget. The impact of these constraints resulted in a relatively short performance run in comparison to similar Fringe Festival performances.

I found there were significant insights gained after each show. One of the main insights correlated to an observation made by Arnold Aronson (Hannah and Harsløf 2008, 29) that outlines what he refers to as the main problem facing theatre today: the clash of requirements between traditional theatre elements (including actors) requiring illumination and digital projection, which requires the absence of light to be viewed clearly. A problem that was noticeable upon reviewing the documented video of the performance, in the months after the production was staged. In some instances, where the projection was not as vibrant and we highlighted the actors using traditional lighting, the projected scenery lost some of its impact. When negotiating this mix of requirements on a small budget, I found that you had to balance the visual properties of the content depending on their proximity to traditional lighting. Or else dispense with traditional lighting and modify the projected content to approximate of the illumination requirements.

5.2 What Worked vs. what didn't work

In the same Arts Hub article mentioned in the previous section, Alana Valentine (2018) mentions another relevant point. When creating an independent performance, you're not able to include or try everything and would make yourself miserable trying to accomplish this. As ideal as it would have been to have included a wider range of examples of equipment and software combinations, that explore applications (such as real-time modification of mapped projections, using movement and depth-based data), no single project is ever going to cover everything. As simple as this realization was, it gave me the clarity to focus and be confident with what we had chosen to include in the performance and conversely, what we did not include. When it came time to discuss and decide what needed to be included, communication within the group was important, and at times there were issues. Particularly when it came to - communicating what was achievable using digital technology in scenic design, and the differences in perception about this issue within the group. These issues were influenced by the fact that the members of the group were drawn from a diverse range of areas across theatre and performance, as a result shared knowledge of each member's role was limited. Most collaborative work is transient by nature, especially on low budget independent productions. You can quickly lose access to team members through external commitments, this can make coordination and communication difficult. An area where I experienced particular difficulty, was when it came to communicating to the group what scenic design and the use of digital projection and visual programming software could potentially bring to a performance. I attributed this difficulty to two factors, first is the rapid increase in digitally based options available to designers, second, is the broad range of disciplines that traditionally have their own separate role. Roles that are being reinterpreted when referenced in the use of these newly accessed options. In low budget performance, the role of director is better understood than the role of scenic designer. In terms of currently available options for using projection-based digital technology, and how those skills can influence the production.

In terms of what worked, I found that being part of a collaborative team offered access to a greater pool of experience and knowledge than operating alone. The opportunity to share and combine those resources was important. Creating something more than could be achieved in the same time frame and budget, on your own as an independent performance practitioner. The aim of using digital projection in this performance was to demonstrate a considered balance of traditional, non-digital, scenic elements and digitally projected scenic content. An aim that was achieved by selectively limiting the placement of projected content to moments that would have the most impact on conveying the narrative. Moments that demonstrate effective, economic and time-based advantages. Providing an adaptable, mediated, style of solution that until recent years would have been unachievable for low budget performance. Demonstrated in examples such as Scene 6, *Chinatown*: (frame count) **06.00 - 11.43**, which is a long scene that contains several resets that require quick visual transitions to different time settings within the narrative, such as flashbacks. Another example was Scene 9, *Asian name*: (frame count) **15.43 - 18.45**, which enabled us to quickly transition from an imposing display of text and oscilloscope style, animated lines to a more subdued and relaxed set-up of scaled-up, edited footage of dappled sunlight. The combination of portability of the lightweight screens and the immediacy of using mapped projections, meant that scene changes could be quick without sacrificing impact. As in Scene 13, *Anna goes to China*: (frame count) **23.15 - 23.28**, which didn't require visuals, as it was a brief scene with a short burst of dialogue. As a result, we were able to use this scene as a way to quickly reset the performance space. Combining the delivery of the dialogue with the physical movement of the screens. Scene 19, *Nores in limbo*: (frame count) **33.11 - 36.15**, shows a subtle blend of digital projection and traditional shadow work, between the animated, soft-edged spotlight effect and the portable LED light source. A set-up, that when combined with screen placement, was quickly adapted to create a constricted, confined space in contrast to the open feeling of the previous scene.

What didn't work as I had hoped, were issues related to adapting the performance space and software. Such as placement of equipment and the lighting of performers. These issues reduced the impact of the projections in relation to exploring and adapting software options, particularly in combination with issues related to time constraints. For instance, the combination of the restriction of venue size, equipment choice and layout requirements, meant options like rear projection weren't possible. It would've helped avoid unwanted projection spillage onto the performers if rear projection had been an available option. Several scenes were visually too sparse, as a result of software mapping restrictions of the projected content, typically when confined to a single, central screen. The type of scenes included were Scene 1, *Anna visits China*: (frame count) **02.00 - 02.35** and Scene 5, *Arriving at the apartment*: (frame count) **04.47 - 06.00** and Scene 16, *Anna returns home*: (frame count) **27.10 - 30.27**. The sparseness of the projected content may have been reduced with the use of additional projectors and more time to adapt and map the software to the projection surfaces. With more time to review and adapt sound responsive visuals and the addition of live camera content to augment some of the displays, several scenes could have been improved. Such as Scene 4, *Arriving in Melbourne*: (frame count) **04.20 - 04.46** where the modified video footage could be replaced with a similar style sound responsive visual application created in Max7. Another example can be seen in Scene 20, *The*

Fight/glitching: (frame count) **36.18 - 38.22.** Where only a single, central panel shows the modified video backdrop, associated with the apartment setting, displaying a random, 'glitch' style disruption, generated in Max7. A more effective display could include the two side panels and include real-time camera footage of the performers to be modified by the 'glitch' effect. Including the use of an augmented live camera display would convey a fracturing of their images or identity and visually expand the performance space.

5.3 Further development

Reviewing this project, and the processes involved, was a reflection of one attempt or experiment. Further developments, or areas of exploration, that I would consider investigating, include the creation of a rough guide to collaboration for low budget performance, from a digital, scenic design perspective. A possible inclusion could be the development of a collaborative process that shares an understanding of generic terms among newly formed groups. Alternate methods of collaboration could be included, such as the development stage occurring in parallel but separate from other team members and bringing together a range of elements that unify for the end product. Another area of interest to emerge is the developing and sharing of an online forum for low budget methods and tips, for engaging projection-based digital technology, including a suggested starter kit for using projection as scenery in low budget theatre.

The type of specific projects that would align with expanding my professional methods and processes could include experimenting with freestanding projection frames to achieve greater transparency, improved image reproduction and alternative frame configurations. Also, the control and manipulation of real-time camera data, through further experimentation with visual programming software would be of interest to me professionally. As there is much more to be explored in terms of potential solutions and combinations.

A large part of my learning style is kinesthetic and like many others in the visual and performing arts, I achieve my best results when able to focus on a practical outcome. One suitable option, for planning to achieve the ideas mentioned above, could potentially take the form of a small production company. Forming such a group would work as a focus and conduit for providing further exploration and experience, based on my area of research. The opportunity to continue my journey of exploring and sharing low budget options, using projection-based digital solutions to create and adapt spaces for performance, would provide valuable inspiration for my professional practice, as well as support for other practitioners. A key area that I would include in this venture would be developing a time frame for renewal of low budget, digital technology for performance, perhaps reviewing after 5 years. Following a structured time-frame would allow opportunity to be comfortable with the selected software and/or equipment and explore what can be achieved with it. If you are comfortable with how something works, you are more likely to relax and experiment when creating solutions. The constant renewing of technology is like learning to play a new instrument every 6 months and abandoning the old equipment. It was proposed earlier in this research that a way we engage with new technology is by connecting or relating to it, through existing technology or methods. Being constantly distracted by the most current version or update of

something denies us the time and freedom to sufficiently engage with this process. Denying the flexibility to find and nurture an inspiring, creative zone that sparks ideas. Another important factor to include in the development of this time-frame is a redefining of what is meant by low budget. As has been discussed previously in this research, there is a range of options that could be categorized as fitting into low budget. The amount that was listed in this discussion, less than \$20,000 AUS, was for the total production budget required to stage a performance. However, when it comes to the amount allocated to set, scenery and the cost of individual solutions, it becomes much harder to define and could easily form the basis of a separate enquiry in itself. Regardless, as independent practitioners become more able to adapt and increase what can be done with available equipment and software, the more venue options become available. The result is an effective increase in the proportion of budget available for set, scenery and individual solutions by enabling the use of lower cost spaces for performance.

Conclusion

In summary, choosing a collaborative process to realize this project had both advantages and disadvantages. Overall, there were more advantages than disadvantages. The most notable advantage was the fact that as there was more than just my own requirements to satisfy, I was encouraged to focus on and highlight what the project was about, which was being resourceful and creative with less. Or to put it another way, simple ideas done well with a big impact. As I pointed out above, this was only one experiment or interpretation to demonstrate what could be achieved through increasing access to both digital tools for performance and a collaborative sharing of knowledge. The decision to commercially stage the performance as part of the Melbourne Fringe festival was another advantage, as it gave the project practical, industry-based context and a realistic time-frame. It also provided valuable professional experience and exposure for all those involved. The main disadvantage was navigating the complexities of group dynamics. Particularly maintaining the balance between compromise and creativity. Making sure that the constraints of time, budget and individual creative vision, didn't restrict the consideration of ideas.

Looking forward, there is much to be explored in terms of potential solutions and combinations. I will use the insight gained from this experience to further explore professional options. One option to pursue is an online forum for sharing methods and tips, for defining a performance space using low budget, projection-based digital technology. With the possible inclusion of a rough guide to coordinating low-budget collaborative projects that utilize this technology.

Chapter 6: Conclusion

Introduction

In the previous chapter I described a reflection of my personal experience of staging a project from development to post performance. As part of that reflection I included the impact of collaboration on my role as an independent theatre artist, during this process and for future directions.

This chapter summarizes the information covered throughout the discussions of the previous chapters. It also outlines possibilities for future research on the impact of accessible projection-based digital technology as a resource for expanding creative practice for independent theatre practitioners.

To achieve this outcome, I will first give an overall summary of the written and practical research discussed throughout this paper and the impact it has on professional practice. I will then discuss the significance of the outcomes achieved during this project and how that relates to the direction of possible future research.

6.1 Summary of Discussion

The material covered in my research discussion, the staging of my exemplar performance and reflection on the outcomes that were achieved, were aimed at demonstrating the effectiveness of an increasing freedom to test and explore low cost scenic design solutions for performance. My research into this increasing freedom, focused on the usefulness of projection-based digital technology and the resulting expansion of practice that it affords to independent practitioners.

Throughout my discussion I have identified increasing access to projection-based digital technology as an important resource, one that is influencing the expansion of practice when designing low cost scenic solutions. The discussion started with two categories for how projection is being used, moving scenery and cultural reference, as discussed in 2.2 Theory on use of digital projection. The term moving scenery refers to the manipulation of projected visual elements such as scale and image display. While cultural reference is about using projections based on source images and video footage that contain identifiable, culturally based, visual references. The type of references that this would include are ones that give the audience a point of connection or context to the narrative or storyline. The next part of the discussion looked at interactivity, or the generation and user-controlled modification of projected visual content within the performance space. Using sound and movement-based data received in real-time from collection devices, such as microphones and depth cameras, to generate and/or modify this content. Lastly, I described projection mapping, or the customized distortion of projected visual content to fit within the surface constraints of physical objects located within the performance space. In my description I included how engagement with mapped projection content can create texture and depth illusions. Effects that visually transform the surface of selected components in a way that could not be achieved in the same time frame without the use of digital technology. As mentioned above, access to these options is increasing the impact of scenic design to provide low cost, visual solutions for performance. I include how customized control of these

options is changing audience perception of scenery and in-turn, the performance space. Eckersall, Grehan, and Scheer (2017) discuss this influence on audience perception, in the conclusion to their chapter on projection in theatre in the recent publication, *New Media Dramaturgy*. They suggest that the current use of projection in theatre highlights how all performance elements impact and react to each other.

By using projection-based digital technology to integrate visual content, the physical elements within the performance space are being transformed. Changing how those elements connect and define the performance space. The integration of digital projection was discussed in 2.3 Practitioners perspective where UK theatre director Simon McBurney advises on the importance of maintaining a balance between technology and the performers. His work uses the integration of projection-based digital technology with the physical elements of the production to create a blended interaction within the performance space. A blending that avoids isolating or disconnecting one particular element from the performance and creating unwanted attention that can have a distracting effect on presentation of the narrative.

After discussing the context and relevance of using digital projection technology to design scenic solutions for low budget performance, I investigated the options available to stage an exemplar production. As part of my enquiry I included a necessary exploration of my definition of a low cost performance and the type of venues currently staging them. A selection of small independent venues in Melbourne were chosen as the guide for an overall production budget of less than \$20,000 Australian dollars. Next, a selected range of available equipment and software were explored in relation to this financial guide. I identified a suitable starting point for the selection of accessible software and projectors to use when integrating digital technology into a low cost performance, see Table 5, below.

Table 5: Scenic Projection Starter Kit

Scenic Projection Starter Kit <i>(recommended examples)</i>		
Category	Brand	Specifications
Projectors <ul style="list-style-type: none"> - Brightness (3-5000 lumens) - Resolution (1280 x 800 or better) - Contrast ratio (10,000:1 or better) 	Epson EB-2250U Corporate Multi-Media Projector	Native resolution: WUXGA (1920 x 1200) Contrast ratio: 15,000:1 Brightness: 5000 lumens Approx. cost: \$2000.00 (AU)
	NEC-M353WS Conference room projector (Short throw)	Native resolution: WXGA (1280 x 800) Contrast ratio: 10,000:1 Brightness: 3500 lumens

		Approx. cost: \$1,400.00 (AU)	
Laptop <ul style="list-style-type: none"> - Four-core processor - 8-16GB RAM - Discrete (dedicated) GPU 	PC -Dell XPS 13 (no discrete GPU)	Approx. cost: \$1000.00 (AU)	
	MacBook Pro (15-inch) 256GB	Approx. cost: \$3,500.00 (AU)	
Software	Image - (creation & manipulation)	Max 8 (Cycling'74) Fusion 360 Syphon (streaming for Mac) Spout (streaming for PC)	Approx. cost: \$99.00 (AU) per year Approx. cost: \$300 (AU) per year (or free for start-ups) Free Free
	Image - (mapping & sequencing)	QLab (PC & Mac)	Approx. cost: \$1,000.00 (AU) or \$10/day

The options included 3-5000 lumen conference room projectors, visual programming software, image manipulation software and 3D modelling software.

Aside from choosing what narrative to present, I considered time and budget to have the greatest influence, when developing a low cost performance production. That is, time available to allocate to development, installation and performance, as well as having the budget available to support this. When planning this project, I chose to assemble a collaborative team of volunteer practitioners. Focusing the development process on a mix of narrative choice and allocations of time and budget was an effective method for gaining insight into the accessibility of projection-based digital technology and the impact it is having on scenic design for low budget performance. As a result, the project achieved a broader insight than having created a solo project. I chose to analyze the processes and outcome of this project based on two areas, implied or embodied research and spatial thinking, see 3.4 Data collection, instruments and procedures. In summary, this focused on the existing knowledge of the practitioners involved and a reflection on the processes that were used, with reference to the impact on professional practice.

After completing my review of the development and staging process, I gained insight into the usefulness of projection-based digital technology and the resulting impact on design for low cost performance. In looking for flexible,

adaptable, design options, I found that the level of accessibility varied in direct relation to the amount of time you could allocate to development and testing. Particularly when comparing the options of self-directed learning (which is time intensive), to the alternative of outsourcing (which can be a drain on the budget). Any mix of these can be appropriate, based on their suitability to the desired outcome and the affordability in terms of time and budget. Though, an achievable balance needs to be sought, in order to move the project forward and create the best possible outcome. My view of best practice when exploring this technology in performance, is to achieve a balance with the physical elements. Identifying and assessing the best available options, to suit the needs of the performance and defining the performance space. I found the combination of lightweight, freestanding screens and visual-based projection software and equipment, provided access to lower set-up costs and the ability to modify and customize our chosen options to be both cost-effective and quick to adapt. Reviewing factors involved in the development and staging process was useful when navigating the challenges of limited time to explore and limited money to spend.

6.2 Significance and future research

As a result of investigating this research topic I have provided an insight into the impact of projection-based digital technology on low cost scenic design for performance. Identifying the increasing influence of scenic design as a result of this impact. Through staging an exemplar performance project and reflecting on the process, I was able to demonstrate the advantages of using digital projection technologies to create a low budget performance space and the potential for further exploration in this area. Creating solutions that can only be achieved by exploring and integrating accessible, projection-based digital technology. It must be remembered that the process of identifying what is and isn't achievable is documented from my perspective as an independent practitioner. Drawing on past professional experience and the result of staging one exemplar performance.

In hindsight, one of the fundamental difficulties or disadvantages I encountered, was the adaptation of low budget performance environments to balance the conflicting lighting-based needs of scenic elements. The elements incorporating projected content do not require additional lighting to be seen. Whereas, most other elements within the performance space do require additional lighting. Another challenge that emerged was the additional learning time required to explore the complexities of visual programming and image manipulation software, in order to identify suitable options. Currently, options such as the use of infra-red depth cameras to simulate real-time tracking for projection mapping and RGB cameras to remote stream live video can require significant processing power to be worthwhile using. Acquiring such items can be difficult on a limited budget and it depends heavily on the presentation needs of the performance as to whether it can be financially justified.

One of the economic advantages that emerged from testing the options that I considered accessible, is the flexibility of venue and location. The reduced cost of access and set-up not only provides freedom to experiment, but also freedom to use spaces and locations that traditionally, haven't easily been able to stage a performance. Access to portability and adaptability, means lower cost venues

can be used, allowing more of the budget to be allocated to defining the performance space.

A professionally based advantage to emerge from the impact of more affordable access and adaptability is the increasing influence it provides for the practitioners engaged in creating scenic design. We are able to provide a heightened, more focused insight for the audience by augmenting a broad range of scenic elements and influencing how the performers interact with the space.

In terms of potential avenues for further research, I identified a small selection of ideas at the end of Chapter 5: Personal Reflection. These included, but were not limited to, further exploring the use of depth cameras and motion tracking for low cost performance. The economics of portability, looking at what point do portability and transience become a financial burden, rather than a liberator, when using projection-based digital technology in non-conventional performance spaces. A guide to collaborating when using digital technology to create performance spaces for low budget productions. And lastly, developing an online forum for sharing low cost techniques and methods for using projection-based digital technology in performance to create low cost scenic solutions.

Conclusion

In summary, my research discusses the advantages of using low-cost, projection-based digital technology in the scenic design process. With the intention of inspiring further exploration and consideration of the opportunities it can bring to scenic design for low budget performance. The value of engaging this technology in low budget performance is in the increasing access to a wide range of options that redefine how the performance space is used, and in turn, how the audience views the performance. Offering, economical, adaptable options that integrate with and relate to other scenic elements in a manner not previously achieved without it. The development, staging and analysis of the performance project provided an insight for professional practitioners engaged in scenic design for low cost performance productions. It highlights the impact of using adaptable, digital-based visual solutions and the associated reduction in set-up costs. A further advantage is the expansion of skills through accessibility to affordable options, to identify, develop and test potential solutions, without overcommitting financially. The collating and sharing of methods and techniques for independent performance practitioners, through online forums and discussions, would be a worthwhile area for future research. As it would bring together a resource for independent practitioners and provide supported access to improvements in software and equipment, while increasing efficiency and reducing cost. It would also assist in driving innovation and the promotion of industry growth.

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